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Draft Economic Analysis of Critical Habitat Designation for the Spreading Navarretia

Prepared for:

**U.S. Fish and Wildlife Service
Division of Economics
Arlington, Virginia**

Prepared by:

**Northwest Economic Associates
A Division of ENTRIX, Inc.
Vancouver, Washington**

August 16, 2005

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August 16, 2005

TABLE OF CONTENTS

Executive Summary	ES-1
1.0 Introduction and Background	1
1.1 Approach to Estimating Economic Effects	1
1.1.1 Efficiency Effects	2
1.1.2 Distributional and Regional Economic Effects	3
1.2 Scope of the Analysis	5
1.2.1 Sections of the Act Relevant to Economic Analysis	7
1.2.2 Other Relevant Protection Efforts	8
1.2.3 Additional Analytic Considerations	8
1.2.4 Benefits	10
1.3 Analytic Time Frame	12
1.4 Information Sources	12
1.5 Background of the Navarretia Listing	12
1.6 Background of the Navarretia Critical Habitat Designation	13
1.7 Description of the Species and Habitat	14
1.8 Critical Habitat Designation	15
1.8.1 Unit 1: Transverse Range CHU	16
1.8.2 Unit 2: San Diego North Coastal Mesas CHU	16
1.8.3 Unit 3: San Diego Central Coastal Mesas CHU	17
1.8.4 Unit 4: San Diego Inland Valleys CHU	17
1.8.5 Unit 5: San Diego Southern Coastal Mesas CHU	17
1.8.6 Excluded Lands	18
1.8.7 Not Included Lands	18
1.9 Organization of the Report	19
2.0 Framework for Economic Analysis	21
2.1 Pre-Designation and Post-Designation Effects	21
2.2 General Categories of Economic Effects	21
2.2.1 Federal	23
2.2.2 Private	23
2.2.3 Effects on Small Entities	25
2.2.4 Effects on Energy Supply	26
2.3 Project Life, Period of Analysis, and Discount Rate	26

2.4	Definition of economic impacts	27
2.5	Caveats and Assumptions.....	28
3.0	Socioeconomic Profile of the Critical Habitat Area	30
3.1	Geographic Description of the Region.....	30
3.2	Population Characteristics and Demographics.....	30
3.3	Employment and Economic Activity	32
4.0	Regulatory Environment	36
4.1	Other Species Listed under the Act.....	36
4.2	Federal and California State Statutes and Regulations.....	38
4.2.1	Federal Section 7 Consultations	38
4.2.2	Clean Water Act	39
4.2.3	Porter-Cologne Water Quality Control Act.....	40
4.2.4	California Environmental Quality Act.....	41
4.3	Conservation Programs	42
4.3.1	The Southern California Wetlands Recovery Project.....	42
4.4	Habitat Conservation Plans	43
4.4.1	The San Diego County Multiple Species Conservation Program.....	43
4.4.2	The San Diego County Multiple Habitat Conservation Program.....	47
4.4.3	The North County Multiple Species Conservation Program.....	50
4.4.4	Western Riverside County Multiple Species Habitat Conservation Plan.....	51
4.4.5	Marine Corps Air Station (MCAS) Miramar Integrated Natural Resource Management Plan (INRMP)	53
4.4.6	Marine Corps Base Camp Pendleton Integrated Natural Resource Management Plan (INRMP).....	54
5.0	Economic Effects on Residential, Commercial, and Industrial Development	56
5.1	Costs of Pre-Designation Activities	56
5.2	Costs of Post-Designation Activities.....	68
5.2.1	Mitigation Fees	68
5.2.2	Conservation Activities	69
5.2.3	Assumptions	72
5.2.4	Development Projections.....	73
5.2.5	Estimation Results: Cost of Mitigation Fees and Conservation Activities.....	80
5.2.6	Estimation Results: Administrative Cost of Section 7 Consultation	87
5.2.7	Estimation Results: Total Post-Designation Economic Costs	90
5.3	Total Economic Cost of Development Activities.....	92

6.0 Economic Effects on Transportation and Other Activities 96

6.1 Effects on Transportation 96

6.1.1 Road Projects 96

6.1.2 Railways 105

6.1.3 Airports 108

6.1.4 Administrative Costs 111

6.1.5 Total Costs to Transportation 113

6.2 Effects on the San Jacinto Flood Control Project 115

6.2.1 History of the Project 115

6.2.2 Project Modifications 116

6.2.3 Conservation Efforts and Costs 116

6.2.4 Administrative Costs 118

6.2.5 Total Costs 118

6.3 Effects on Pipeline Projects 119

6.3.1 Metropolitan Water District 120

6.3.2 Pre-Designation 120

6.3.3 Total Protection Costs to Pipeline Projects 124

6.3.4 Administrative Costs 125

6.3.5 Total Costs to Pipeline Projects 125

6.4 Federal Land Management 126

6.4.1 Marine Corps Air Station Miramar INRMP (Units NI1, NI2, and NI3) 126

6.4.2 Marine Corps Base Camp Pendleton INRMP (Unit E7) 131

6.4.3 Federal Lands (Unit 5D) 131

6.4.4 San Diego National Wildlife Refuge (Unit 5A) 132

6.4.5 Other Federal (Brown Field Bombing Range (Unit E17) and Brown Field Naval Auxiliary Air Station (Unit E18)) 133

6.5 State of California Land Management 134

6.5.1 CDFG, Santa Rosa Plateau Ecological Reserve (Unit E6) 134

6.5.2 CDFG, San Jacinto Wildlife Area (Unit E1) 134

6.6 Management of Other Lands 137

6.6.1 TNC and Riverside County Park and Open Space District, Santa Rosa Plateau Ecological Reserve (Unit E6) 137

6.6.2 TNC, Wildlife Research Institute, and San Diego County, Ramona Grasslands Preserve (Unit 4E) 141

6.6.3 Center for Natural Lands Management, Skunk Hollow (Unit E5) 144

6.6.4	Sweetwater Authority (Units 5A and E9).....	145
6.7	Cost of Habitat Conservation Plans.....	145
6.7.1	Cost of the San Diego County MSCP	147
6.7.2	Cost of the San Diego County MHCP	148
6.7.3	Cost of the Western Riverside County MSHCP	150
6.7.4	Cost of the North County MSCP	150
6.8	Effects on Agriculture	150
6.9	Fire Management.....	152
7.0	Summary and Analysis of Economic Effects	154
7.1	Summary of Findings	154
7.1.1	Landowner and Agency Costs	159
	References	REF-1
	Appendix A: Economic Effects to Small Entities and Energy	A-1
	Appendix B: Issues in the Assessment of Development Costs	B-1
	Appendix C: List of Acronyms	C-1
	Map Attachment	MAP-1

This report addresses the economic effects associated with the designation of critical habitat for the spreading navarretia (*Navarretia fossalis*, hereafter “navarretia”). The U.S. Fish and Wildlife Service (hereafter “Service”) published a proposed rule designating critical habitat for the navarretia in the *Federal Register* on October 7, 2004.¹ The purpose of this report is to identify and estimate the economic effects associated with conservation activities for the navarretia stemming from its listing under the Endangered Species Act (Act) and proposed designation of critical habitat. The analysis quantifies the economic costs of conservation activities that benefit the species in areas identified as essential to its conservation, including the subset of essential areas that are proposed for critical habitat designation. The analysis includes the cost of conservation-related measures that are likely to be associated with future economic activities that may adversely affect the essential habitat as well as the cost of measures voluntarily undertaken by government and non-profit entities to conserve navarretia essential habitat. Economic costs are measured here in terms of the impacts of the listing and the designation on the efficient use of society’s resources, as well as how those costs are distributed across segments of society. This analysis is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the final designation outweigh the biological benefits of including those areas in the final designation.

The navarretia is a low, mostly spreading or ascending, annual herb of the phlox family (*Polemoniaceae*), and is about four to six inches tall. The lower portion of the stem is mostly bare, while the upper portion has soft and finely divided leaves, which appear long and spine-tipped when dry. The navarretia grows in vernal pools, clay flats, irrigation ditches, alkali grasslands, alkali playas, and alkali sinks. It is primarily associated with vernal pools at elevations between sea level and 4,250 feet, and on flat to gently sloping terrain. It is distributed from northwestern Los Angeles County and western Riverside County, south through coastal San Diego County, California, to northwestern Baja California, Mexico. The Service proposed threatened status for the navarretia on December 15, 1994, in a proposed rule which included three other plant species.² Following an extended comment period, the Service published a final rule listing the navarretia as threatened in the October 13, 1998, edition of the *Federal Register*.³

¹ U.S. Fish and Wildlife Service, October 7, 2004, “Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule,” *Federal Register*, Vol. 69, No. 194, pp. 60110-60134.

² U.S. Fish and Wildlife Service, December 15, 1994, “Proposed Rule to List Four Southwestern California Plants as Endangered or Threatened, Proposed Rule,” *Federal Register*, Vol. 59, No. 240, pp. 64812-64823.

³ U.S. Fish and Wildlife Service, October 13, 1998, “Determination of Endangered or Threatened Status for Four Southwestern California Plants from Vernal Wetlands and Clay Soils, Final Rule” *Federal Register*, Vol. 63, No. 197, pp. 54975-54994.

SCOPE OF THE ANALYSIS

The navarretia critical habitat economic analysis applies a distinct analytical framework, as outlined in Section 2.0. The framework includes the following elements:

- Consistent with recent court rulings, the analysis includes impacts that occur co-extensively with the listing under the Act. Enforcement actions taken in response to violations of the Act are not included.
- The analysis considers conservation and protection efforts for the navarretia. No distinction is made between impacts that occur due to listing and those that result from the designation. It also includes any protective measures taken as a result of other Federal, State, or local laws that aid habitat conservation in the areas identified in the proposed rule.
- Inevitably, actions taken to protect navarretia provide benefits to other species. Where possible, this analysis addresses this issue by (1) focusing on the costs of conservation efforts rather than general habitat improvements; and (2) excluding activities implemented prior to the final navarretia listing in October 1998. Finally, when conservation efforts are implemented in areas of habitat overlap between navarretia and other listed species, the analysis includes the full costs of the conservation efforts as co-extensive with navarretia and other listed species.
- Both pre-designation and post-designation costs are considered. Pre-designation costs include those that have accrued since the time that the navarretia was listed as threatened (October 1998), but prior to the final designation of critical habitat (October 2005). Post-designation effects include likely future costs associated with navarretia conservation efforts following the final designation of critical habitat in October 2005, effectively 2006 through 2025.
- The geographic scope of the analysis reflects distinct areas identified as essential to the conservation of the navarretia, including both lands proposed for critical habitat, and lands excluded from or not included in the proposed critical habitat designation. These essential habitat lands are all located within three California counties: Los Angeles, Riverside, and San Diego.
- The geographic unit of analysis for proposed critical habitat is the area defined by the Service as each of five critical habitat units and, in some cases, the subunits. Lands excluded from proposed critical habitat and lands not included in the proposed critical habitat designation have been divided into units based on geography. These units and subunits are shown on Maps 1 through 6 in the Map Attachment to this report.
- The localized economic efficiency effects reflect the area specifically identified as critical habitat, as well as those essential lands excluded from or not included in proposed critical habitat. However, activities occurring in adjacent land or beyond the boundaries of the proposed critical habitat with the potential to affect critical habitat, such as water quantity and quality, are also considered when appropriate. Thus, all relevant costs in adjacent areas may be included.

- This analysis utilizes a “with” and “without” framework, and emphasizes those effects that are determined to be attributable to navarretia conservation efforts. Impacts that would have occurred without the navarretia listing and designation are evaluated on a case-by-case basis to determine if they are driven, in part, by conservation efforts for the navarretia.
- The period of analysis and discounting is guided by the availability of information concerning the start date and duration of the activity. Each potential cost component is examined over the time period that is appropriate for that specific activity or investment. Some of these are costs that are incurred one time only, while others are recurring. These costs are presented in undiscounted dollars⁴ and as net present values and annualized costs, using three and seven percent discount rates.

ALLOCATION OF COSTS AMONG OTHER LISTED SPECIES

Section 7 consultations regarding a proposed action consider all listed species that may be affected by the action. Further, management actions and conservation efforts outside of section 7 within and adjacent to the proposed designation may be directed towards multi-species recovery and protection. As a result, section 7 consultations and other conservation efforts for the navarretia may also consider other listed species. Likewise, conservation efforts for other listed species may also consider the navarretia. Costs of conservation efforts that benefit the navarretia, whether driven by the navarretia or other listed species, are considered in this analysis.⁵

In each instance, this analysis attempts to identify costs specifically related to conservation of the navarretia where multiple species are the subject of a single conservation effort or section 7 consultation. In the case that another species clearly drives a conservation effort, the associated costs are appropriately not attributed to the navarretia. Where data are not available to accurately capture costs specific to navarretia conservation, this analysis includes the full costs and notes the multiple considerations that may contribute to the undertaking of the conservation effort. This analysis then acknowledges that because these conservation efforts are undertaken for multiple reasons, including the full costs likely overstates the costs related to navarretia conservation.

⁴ “Undiscounted” dollars represent the sum of the future costs in 2005 dollars that are not adjusted for inflation (expected changes in purchasing power).

⁵ The flowering plants *Atriplex coronata* var. *notatior* (San Jacinto Valley crownscale) and *Allium munzii* (Munz’s onion), and *Brodiaea filifolia* (thread-leaved brodiaea) occur in vernal pools and other wetlands or on clay soils and moist grasslands in the same region as the navarretia. Furthermore, California Orcutt grass (*Orcuttia californica*), the San Diego fairy shrimp (*Branchinecta sandiegonensis*), and Riverside fairy shrimp (*Streptocephalus woottoni*) are often found in the same vernal pool complexes with the navarretia.

PROPOSED CRITICAL HABITAT

The Service has identified 31,086 acres of habitat in Riverside, Los Angeles, and San Diego counties as essential for the conservation of the species (“essential habitat”). Portions of the essential habitat are located within approved and pending habitat conservation plans (HCPs), training areas on Department of Defense (DOD) lands the Service classifies as “mission critical” in the proposed rule, and areas covered by Integrated Natural Resource Management Plans (INRMPs) on DOD lands; a total of 26,785 acres of these lands have been excluded from or not included in the proposed critical habitat designation for *navarretia*. The remaining area, 4,301 acres in San Diego and Los Angeles counties, represents the essential habitat proposed as critical habitat.⁶

The Service divided the 4,301 acres of proposed critical habitat into five units (Units 1 through 5). These units are based on the Management Areas for *navarretia* as identified in the Service’s 1998 Recovery Plan for Vernal Pools of Southern California (Recovery Plan).⁷ Units 1, 4, and 5 were further divided by the Service into nine subunits (Units 1A and 1B, Units 4A through 4E, and Units 5A through 5D). The majority of the land area proposed for critical habitat is in private ownership, with 4,123 acres privately owned, of which 3,527 acres are in San Diego County while 596 acres are in Los Angeles County. The remainder, 178 acres, is in Federal ownership, and all of the Federal lands are located within San Diego County. The five critical habitat units (CHUs) are described briefly below and shown on Maps 2, 4, and 6 in the Map Attachment to this report.

Unit 1: Transverse Range CHU

The proposed Transverse Range CHU encompasses 596 acres of privately owned land located in northern Los Angeles County. The unit is located within the Transverse Management Area as identified in the Recovery Plan. This unit has been further divided into two subunits (Units 1A and 1B). The proposed critical habitat in this unit includes the occupied vernal pools at Cruzan Mesa. *Navarretia* also occurs in a vernal pool in nearby Plum Canyon. These vernal pools are the last remaining vernal pools in Los Angeles County.

Unit 2: San Diego North Coastal Mesas CHU

The proposed San Diego North Coastal Mesas CHU encompasses 143 acres of privately owned land within San Diego County. This unit is within the San Diego North Coastal Management Area as identified in the Recovery Plan. This unit includes one occupied vernal pool complex in the City of Carlsbad, located at the Poinsettia Lane train station. This complex is one of the last remaining coastal

⁶ U.S. Fish and Wildlife Service, October 7, 2004, “Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading *navarretia*), Proposed Rule,” *Federal Register*, Vol. 69, No. 194, pp. 60110-60134.

⁷ U.S. Fish and Wildlife Service, September 1998, *Vernal Pools of Southern California Recovery Plan*, Portland, Oregon.

occurrences of navarretia outside the boundaries of Marine Corps Base (MCB) Camp Pendleton. Occupied vernal pools on Camp Pendleton are located within the same management area, but have been excluded from the proposed CHD.

The City of Carlsbad has completed a subarea plan as a part of the Multiple Habitat Conservation Program (MHCP) in northwestern San Diego County. Under this plan, the City of Carlsbad is undertaking conservation and management actions to allow for the coverage of navarretia. As part of this plan, the portions of the Poinsettia Lane vernal pool complex that are under the jurisdiction of the City of Carlsbad will be managed for the conservation of navarretia. The other portion of this vernal pool complex is on land owned by the North County Transit District (NCTD). NCTD is not a participant in the MHCP and incidentally their land is not covered by the MHCP.

Unit 3: San Diego Central Coastal Mesas CHU

The proposed San Diego Central Coastal Mesas CHU encompasses 143 acres of privately owned land in San Diego County and includes occupied vernal pools not on Marine Corps Air Station (MCAS) Miramar or included in the San Diego Multiple Species Conservation Program (MSCP). The unit is located within the San Diego Central Coast Mesas Management Area as identified in the Recovery Plan. The management area also includes other occupied pools on MCAS Miramar that are not included in proposed critical habitat, as well as occupied pools that are within the San Diego MSCP that are excluded from proposed critical habitat.

Unit 4: San Diego Inland Valleys CHU

The proposed San Diego Inland Valleys CHU encompasses 3,027 acres of privately owned land within San Diego County, and is divided into five subunits (Units 4A through 4E). This unit is located within the San Diego Inland Valleys Management Area identified in the Recovery Plan. Each proposed critical habitat subunit contains one or more occupied vernal pool complexes and the subunits are located within the jurisdiction of the City of San Marcos and the community of Ramona. One complex in the community of Ramona is located within the boundaries of the Ramona Airport. Vernal pools in San Marcos are identified in the Recovery Plan as essential to navarretia recovery because of their role in stabilizing populations and preventing habitat loss. Vernal pools in this unit are within the easternmost edge of the geographical distribution of navarretia.

Unit 5: San Diego Southern Coastal Mesas CHU

The San Diego Southern Coastal Mesas CHU is located within San Diego County and encompasses 392 acres within the Southern Coastal Mesas Management Unit as identified in the Recovery Plan. The unit contains several vernal pools and other physical features essential to the conservation of navarretia. A majority of the pools in the Management Unit are part of the San Diego MSCP, and these areas are excluded from the proposed critical habitat. Only vernal pools and their watersheds that occur on lands not protected by the MSCP are proposed as critical habitat. The unit is divided into four subunits (Units

5A through 5D). Federal lands within this proposed critical habitat unit include approximately 44 acres in Unit 5A that are managed by the Service as part of the San Diego National Wildlife Refuge, and approximately 122 acres under unknown Federal management in Unit 5D.⁸ The remainder of the unit is comprised of privately owned lands.

EXCLUDED LANDS

A total of 26,011 acres have been excluded from the proposed critical habitat designation under section 4(b)(2) of the Act. These “excluded lands” include 67 acres of habitat located within training areas the Service classifies as “mission critical” on MCB Camp Pendleton, as well as 25,944 acres of essential habitat covered by approved HCPs. While the proposed critical habitat areas for the navarretia were clearly named and numbered by unit in the proposed rule, unit names and numbers were not provided for the excluded lands. For the purpose of this economic analysis, the excluded lands are divided into 20 units based on geographic separation and numbered Units E1 through E20 (see Maps 3 through 6 in the Map Attachment to this report).

NOT INCLUDED LANDS

Occupied vernal pools located on MCAS Miramar have been identified by the Service as essential habitat for the navarretia. MCAS Miramar has an INRMP in place that provides for the conservation of vernal pool resources located on the base through management and monitoring, providing a benefit for the navarretia. Therefore, areas considered essential for the conservation of navarretia at MCAS Miramar are not included in proposed critical habitat. These “not included lands” encompass 774 acres of habitat area. For the purpose of this economic analysis, the “not included” lands are divided into three units numbered NI1 through NI3, based on geographic separation of the habitat areas (see Map 5 in the Map Attachment to this report).

SUMMARY OF RESULTS

This section addresses the economic effects of conservation efforts attributable to both the listing of the navarretia under the Act and other protective measures triggered by the listing from the time the species was listed in October 1998 until the expected date of final critical habitat designation in October 2005 (pre-designation), and economic effects of conservation activities estimated to occur following the designation of critical habitat, including costs related to the both the listing and designation of critical habitat for 20 years following the expected date of final critical habitat designation (post-designation). All costs are presented in 2005 dollars. Total post-designation costs are presented in undiscounted dollars and with a three percent and seven percent discount rate. Annualized post-designation costs are also

⁸ The proposed rule designating critical habitat did not provide detailed ownership information for essential lands. Estimates of ownership by unit were developed by NEA using GIS data from the California Resources Legacy Project. As such, the acreage data presented in these descriptions may differ slightly from that presented in the proposed rule.

presented using three percent and seven percent discount rates. The analysis measures effects on residential, commercial, and industrial development, flood control facilities, water service pipelines, public lands management, and transportation.

Table ES-1 provides a summary of the economic impacts due to navarretia conservation efforts in essential habitat for each of the activities analyzed. Pre-designation costs total \$7.9 million, with development bearing \$2.9 million of the costs. The remainder of the pre-designation costs is split among water pipelines, public land management, transportation, and flood control. Post-designation costs are estimated to total \$96.0 to \$256.0 million in undiscounted dollars, or \$69.9 to \$186.2 million and \$48.6 to \$129.0 million in present value terms using a discount rate of three percent and seven percent, respectively. Annualized costs are estimated to range from \$4.7 to \$12.5 million and \$4.6 to \$12.2 million, also at three and seven percent, respectively.

The annualized costs at discount rates of three and seven percent are similar, and the similarity is a function of (1) the unknown timing of many of the projects or activities, and (2) recurring equal undiscounted dollar costs for projects or activities during the post-designation period. When the timing of a project or activity is unknown or uncertain, the costs are assumed to have a uniform probability of occurrence across the future years. As such, the annualized post-designation costs at three and seven percent discount rates are equal for that particular project or activity. Similarly, with an undiscounted recurring cost during the forecast period, the annualized post-designation costs for that particular project or activity is equal regardless of discount rate. In this analysis, many of the conservation costs consist of projects and activities of unknown timing, or with recurring undiscounted dollar costs during the post-designation period. Thus, the annualized costs at three and seven percent discount rates are similar. Costs and timing for each project and activity analyzed in this report are discussed in Sections 5.0 and 6.0. Those projects and activities that contribute to similar annualized costs are summarized below:

- Pre-Designation Development Projects: The annual conservation costs for one project are equal during the post-designation period (i.e., \$7,640 in annual monitoring, maintenance, and operating costs during the post-designation period).
- Post-Designation Development Projects: The annual conservation costs, a function of the number of acres developed to low-, medium-, and high-density residential, commercial, and industrial land classes, vary with the forecasted annual population growth rate for the three counties during the post-designation period. The forecasted development and conservation costs vary by year, but not significantly, resulting in similar annualized costs when discounted at three and seven percent.
- Transportation Projects: Thirteen road and railway projects are expected during the 2006 to 2009 period; the timing for six projects is known and the timing of the remaining seven projects is unknown. Likewise, the timing of the 52 projects forecast during the 2010-2025 period is also unknown. The analysis assigns an equal probability of occurrence to conservation costs being incurred in each year within respective timeframes (i.e., 2006-2009 or 2010-2025) for those projects with unknown timing.

- San Jacinto Valley Flood Control Project: The timing of the project is unknown, and the analysis assigns an equal probability of occurrence across the 20 year time frame to project modification costs.
- MCAS Miramar: The annualized post-designation conservation costs are similar at three and seven percent because many of the conservation activities recur annually at the same undiscounted dollar amount for the duration of the post-designation period (i.e., overhead, exotic plant control, staff training, GIS equipment/maintenance, and vernal pool management).
- San Jacinto Valley Wildlife Area: The timing of conservation costs is unknown, and the analysis assigns an equal probability of occurrence to conservation costs being incurred in each year across the 20 year time frame of the analysis.
- Ramona Grasslands Preserve: The timeframe for developing the Preserve’s monitoring and management plan is 2005-2007, and this analysis spreads the costs equally during the three year period, or \$66,700 per year. Following the developing of the monitoring and management plan in 2007, estimated annual management costs (i.e., approximately \$28,000) recur every year from 2008-2025. Public education, the remaining cost, recurs annually at the same undiscounted dollar amount for the duration of the post-designation period. Because annual conservation costs during the post-designation period only vary during the first two years of the forecast period, 2006 and 2007, the annualized costs are similar when discounted at three and seven percent discount rates.
- Administrative Cost of Section 7 Consultation: The timing of many of the forecasted section 7 consultations is unknown and the analysis assigns a uniform probability across the 20 year time frame to administrative consultation costs being incurred for these consultations.

RESULTS BY CRITICAL HABITAT UNIT

Table ES-2 provides a summary of the economic impacts due to navarretia conservation efforts by habitat unit or subunit, where so delineated. The costs include all of the categories of impacts shown in Table ES-1. Pre-designation costs range from \$0 in 24 of the 36 units, to \$2.6 million in Unit E2. Among the three units with pre-designation costs in excess of \$1 million, two are excluded and one is “not included.” Among the units that are proposed for critical habitat, only one (Unit 4E) exceeds \$100,000 in pre-designation costs. More than 70 percent of the post-designation costs in the proposed critical habitat units are also concentrated in Unit 4E, with approximately 70 to 85 percent of the costs in the Unit resulting from impacts to land development.⁹ Post-designation costs in excluded units are highest in Units E1, E2, E17, E19, and E20. These costs are associated primarily with land development, flood control, and transportation.

⁹ Post-designation percentages are calculated using undiscounted dollar costs.

Table ES-1
Summary of Administrative and Conservation Costs for Navarretia by Activity^{a/}

Category of Impact	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (2006-2025)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Development	\$2,863,800	\$50,340,100 - \$140,321,200	\$36,041,200 - \$100,220,200	\$24,479,500 - \$67,852,100	\$2,422,500 - \$6,736,300	\$2,310,700 - \$6,404,700
Flood Control	\$213,200	\$20,032,300 - \$90,032,300	\$14,902,000 - \$66,973,000	\$10,611,100 - \$47,690,100	\$1,001,600 - \$4,501,600	\$1,001,600 - \$4,501,600
Pipelines	\$2,328,100	\$0	\$0	\$0	\$0	\$0
Public Lands	\$2,287,500 - \$2,300,800	\$5,747,900 - \$5,781,200	\$4,338,100 - \$4,362,900	\$3,121,100 - \$3,138,800	\$291,600 - \$293,300	\$294,600 - \$296,200
Transportation	\$238,700	\$19,873,100	\$14,641,400	\$10,346,000	\$984,900	\$977,000
Total Essential Habitat	\$7,931,300 - \$7,944,600	\$95,993,300 - \$256,007,800	\$69,922,800 - \$186,197,500	\$48,557,800 - \$129,027,100	\$4,700,600 - \$12,516,100	\$4,583,900 - \$12,179,700

a/ Tables ES-1 and ES-2 include both the administrative costs (provided in Table ES-3) and the conservation costs (provided in Table ES-4).

Note: Numbers may not sum due to rounding.

Table ES-2
Summary of Administrative and Conservation Costs for Navarretia by Unit^{a/}

Habitat Unit	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (1998-2005)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
1A	\$0 - \$13,300	\$1,042,300 - \$5,102,500	\$737,100 - \$3,646,600	\$490,600 - \$2,467,100	\$49,600 - \$245,100	\$46,400 - \$233,000
1B	\$0	\$206,200 - \$997,500	\$149,300 - \$738,000	\$102,500 - \$521,700	\$10,000 - \$49,600	\$9,600 - \$49,200
2	\$0	\$746,600 - \$1,831,500	\$534,500 - \$1,319,100	\$362,100 - \$901,500	\$36,000 - \$88,700	\$34,200 - \$85,100
3	\$0	\$2,211,200 - \$4,449,600	\$1,633,100 - \$3,241,200	\$1,156,000 - \$2,251,900	\$109,700 - \$217,800	\$109,100 - \$212,600
4A	\$0	\$137,500 - \$228,200	\$115,300 - \$181,000	\$95,700 - \$141,100	\$7,700 - \$12,200	\$9,100 - \$13,300
4B	\$0	\$344,500 - \$737,200	\$261,500 - \$542,200	\$193,000 - \$383,100	\$17,600 - \$36,500	\$18,300 - \$36,200
4C	\$0	\$931,200 - \$2,166,300	\$672,900 - \$1,547,000	\$464,000 - \$1,048,000	\$45,300 - \$104,000	\$43,800 - \$98,900

Habitat Unit	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (1998-2005)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
4D	\$0	\$73,900	\$69,600	\$64,700	\$4,700	\$6,100
4E	\$212,400	\$21,354,900 - \$48,062,900	\$14,949,000 - \$33,549,200	\$9,833,600 - \$22,001,700	\$1,004,800 - \$2,255,000	\$928,200 - \$2,076,800
5A	\$0	\$433,900 - \$771,300	\$350,200 - \$601,200	\$278,400 - \$457,200	\$23,500 - \$40,400	\$26,200 - \$43,100
5B	\$0	\$1,102,700 - \$2,393,000	\$810,400 - \$1,770,200	\$568,100 - \$1,251,500	\$54,500 - \$119,000	\$53,700 - \$118,200
5C	\$0	\$488,700 - \$1,067,300	\$359,400 - \$789,800	\$252,200 - \$558,700	\$24,200 - \$53,100	\$23,800 - \$52,700
5D	\$20,000	\$59,100	\$56,000	\$52,300	\$3,700	\$5,000
Proposed Critical Habitat	\$232,400 - \$245,700	\$29,126,200 - \$67,933,800	\$20,692,000 - \$48,044,800	\$13,907,200 - \$32,094,500	\$1,390,900 - \$3,229,400	\$1,312,900 - \$3,029,600
E1	\$912,000	\$21,591,300 - \$93,524,200	\$16,078,100 - \$69,599,900	\$11,465,300 - \$49,589,600	\$1,080,600 - \$4,678,100	\$1,082,200 - \$4,680,900
E2	\$2,637,800	\$7,516,700 - \$14,875,200	\$5,717,100 - \$11,240,300	\$4,196,000 - \$8,175,600	\$384,400 - \$755,700	\$396,100 - \$771,800
E3	\$0	\$958,600 - \$1,778,900	\$755,200 - \$1,370,900	\$578,600 - \$1,022,200	\$50,900 - \$92,200	\$54,600 - \$96,400
E4	\$0	\$60,900 - \$147,100	\$44,800 - \$109,500	\$31,400 - \$78,100	\$3,000 - \$7,300	\$3,000 - \$7,400
E5	\$0	\$243,600 - \$467,600	\$180,100 - \$348,200	\$127,200 - \$248,300	\$12,100 - \$23,400	\$12,000 - \$23,400
E6	\$0	\$74,100 - \$172,000	\$54,700 - \$128,200	\$38,500 - \$91,500	\$3,600 - \$8,600	\$3,700 - \$8,700
E8	\$0	\$295,300	\$267,800	\$237,100	\$18,000	\$22,400
E9	\$0	\$546,300 - \$1,020,000	\$433,000 - \$785,400	\$336,400 - \$587,300	\$29,100 - \$52,800	\$31,700 - \$55,400
E10	\$0	\$135,500 - \$332,400	\$99,200 - \$245,700	\$69,200 - \$173,500	\$6,800 - \$16,600	\$6,600 - \$16,400
E11	\$0	\$725,300 - \$1,571,500	\$532,800 - \$1,162,200	\$373,400 - \$821,600	\$35,800 - \$78,100	\$35,200 - \$77,500
E13	\$0	\$687,300 - \$1,689,700	\$503,100 - \$1,248,800	\$350,600 - \$881,600	\$33,900 - \$84,000	\$33,000 - \$83,100
E16	\$0	\$313,700 - \$758,700	\$229,300 - \$560,300	\$159,500 - \$395,300	\$15,400 - \$37,700	\$15,000 - \$37,300
E17	\$20,000	\$8,148,000 - \$17,634,200	\$5,998,800 - \$13,055,400	\$4,215,600 - \$9,240,500	\$403,300 - \$877,600	\$397,900 - \$872,200

Habitat Unit	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (1998-2005)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E18	\$20,000	\$3,150,100 - \$7,628,100	\$2,133,700 - \$5,118,900	\$1,345,700 - \$3,187,100	\$143,300 - \$344,000	\$127,100 - \$300,900
E19	\$1,147,600	\$10,229,900 - \$24,532,500	\$7,332,100 - \$17,545,300	\$4,988,700 - \$11,897,200	\$492,800 - \$1,179,300	\$470,800 - \$1,122,900
E20	\$20,000	\$6,373,900 - \$15,521,500	\$4,389,800 - \$10,656,800	\$2,824,600 - \$6,832,500	\$295,100 - \$716,300	\$266,600 - \$644,900
Excluded Habitat	\$4,757,400	\$61,050,500 - \$181,948,900	\$44,749,600 - \$133,443,600	\$31,337,800 - \$93,459,000	\$3,008,100 - \$8,969,700	\$2,957,900 - \$8,821,600
NI1	\$220,800	\$876,800 - \$1,009,300	\$704,800 - \$801,900	\$550,100 - \$618,100	\$47,300 - \$53,900	\$52,000 - \$58,400
NI2	\$1,983,800	\$4,452,600	\$3,353,500	\$2,401,300	\$225,400	\$226,600
NI3	\$9,200	\$440,300 - \$616,100	\$379,000 - \$509,800	\$320,800 - \$414,000	\$25,500 - \$34,300	\$30,200 - \$39,000
Not Included Habitat	\$2,213,800	\$5,769,700 - \$6,078,000	\$4,437,300 - \$4,665,200	\$3,272,200 - \$3,433,400	\$298,200 - \$313,600	\$308,800 - \$324,000
Unallocated ^{b/}	\$727,600	\$40,400	\$37,600	\$34,500	\$2,500	\$3,300
Total Essential Habitat	\$7,931,300 - \$7,944,600	\$95,993,300 - \$256,007,800	\$69,922,800 - \$186,197,500	\$48,557,800 - \$129,027,100	\$4,700,600 - \$12,516,100	\$4,583,900 - \$12,179,700

a/ Tables ES-1 and ES-2 include both the administrative costs (provided in Table ES-3) and the conservation costs (provided in Table ES-4).

b/ Clayton Ranch is residential development project by Lennar/U.S. Home located outside the bounds of the essential habitat. Formal consultation with the Service on the project occurred in 2004, the company incurred conservation costs for the navarretia in 2004 and 2005, and navarretia-related conservation efforts are expected to continue from 2006 through 2013.

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

Table ES-3 provides a summary of administrative costs that occurred (pre-designation) or are anticipated to occur (post-designation) associated with section 7 consultations and the essential habitat area. Approximately \$275,000 will have been spent on the administrative section 7 consultation process prior to designation, with action agencies incurring more than 70 percent of these administrative costs. Following designation in October 2005, it is anticipated that \$3.1 million will be spent on the administrative section 7 consultation process in undiscounted dollars, or \$2.5 million and \$1.9 million in present value terms using a discount rate of three percent and seven percent, respectively. Annualized administrative section 7 costs are estimated at \$165,800 and \$177,100, also at three and seven percent, respectively. Action agencies will bear approximately 75 percent of these administrative costs.

**Table ES-3
Summary of Administrative Costs by Agency**

Agency	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (2006-2025)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Action Agency	\$197,800	\$2,328,400	\$1,856,500	\$1,410,400	\$125,100	\$133,300
Service	\$43,300	\$450,100	\$357,600	\$273,000	\$24,000	\$25,700
Third Party	\$34,000	\$312,500	\$247,600	\$190,000	\$16,700	\$18,000
Total Essential Habitat	\$275,200	\$3,091,000	\$2,461,700	\$1,873,400	\$165,800	\$177,100

Note: Numbers may not sum due to rounding.

Table ES-4 provides a summary of conservation costs by category of landowner. The landowner types that are relevant in this analysis include private, State of California, Federal agencies, non-profit organizations, and local government (cities and counties). Pre-designation conservation costs total \$7.7 million, with private entities and local and Federal governments each bearing about 30 to 35 percent of the conservation costs. Pre-designation costs for private entities are related to land development and occur primarily in Units E2 and E19, which are excluded from the proposed designation. Pre-designation costs for local governments are also concentrated in Unit E2, as well as Unit E1, and are associated with water supply pipelines. The Federal government's pre-designation costs occur at MCAS Miramar, in Units NI1, NI2, and NI3, which are not included in the proposed designation.

Post-designation conservation costs are concentrated largely on privately owned lands, which account for more than half the costs. These costs are the result of conservation efforts associated with land development. Local governments bear the next greatest percentage of forecast costs, about 20 to 35 percent; the San Jacinto Valley Flood Control Project in Unit E1 comprises most of these costs. The state of California bears another 10 to 20 percent of the post-designation costs, primarily related to transportation projects. The remaining landowners and managers, non-profits and the Federal government, together represent less than five percent of post-designation costs.

**Table ES-4
Summary of Conservation Costs by Landowner**

Landowner	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (2006-2025)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Federal Government	\$2,213,800	\$4,532,000	\$3,385,100	\$2,423,800	\$227,500	\$228,800
Local Government	\$2,543,300	\$20,639,100 - \$90,639,100	\$15,369,900 - \$67,440,900	\$10,961,400 - \$48,040,400	\$1,033,100 - \$4,533,100	\$1,034,700 - \$4,534,700
Non-Profit	\$7,000	\$140,000	\$104,100	\$74,200	\$7,000	\$7,000
Private	\$2,685,600	\$49,857,500 - \$139,838,600	\$35,682,200 - \$99,861,200	\$24,223,900 - \$67,596,500	\$2,398,400 - \$6,712,200	\$2,286,600 - \$6,380,600
State Government	\$206,400 - \$219,700	\$17,733,700 - \$17,767,000	\$12,919,700 - \$12,944,500	\$9,001,100 - \$9,018,800	\$868,800 - \$870,500	\$849,800 - \$851,500
Total Essential Habitat	\$7,656,100 - \$7,669,400	\$92,902,300 - \$252,916,800	\$67,461,100 - \$183,735,800	\$46,684,400 - \$127,153,700	\$4,534,800 - \$12,350,300	\$4,406,800 - \$12,002,600

Note: Numbers may not sum due to rounding.

SUMMARY OF RESULTS BY MAJOR ACTIVITY

RESIDENTIAL AND COMMERCIAL DEVELOPMENT

As discussed in Section 2.2.2.1, the impact of a federally listed species or its designated critical habitat on residential, commercial, and industrial development may include:

- Cost of project modifications for development (e.g., employ biological monitoring and flagging of vernal pools during construction activities, protect the vernal pool site by fencing and signage, prohibit the planting of exotic plants, and restrict the use of pesticides); and
- Cost of habitat conservation plan-related mitigation fees and conservation activities for development (e.g., vernal pools, alkali grassland, alkali playa, and alkali sink habitat (hereafter “vernal playa”) restoration, enhancement, creation, and conservation).

In this analysis, the costs are estimated based on the assumption that development is allowed in the designated areas if appropriate project modifications and/or mitigation activities are taken, and/or mitigation fees paid. Thus, this analysis assumes that no land is removed from potential development as a result of development restrictions. The costs for these project modifications and/or habitat conservation plan-related mitigation fees and conservation activities are paid by developers or landowners.

The basis for the development analysis is the open city model, which is considered the most appropriate approach for analyzing the effects of the CHD on development. Inherent in this model is the recognition or understanding that people are unconstrained from moving. Therefore, housing prices will not be affected by the CHD. It is possible that land purchased for mitigation purposes could decrease the supply of developable land; however, the analysis suggests that this will not be a constraint on development.

Although not explicitly written into the HCPs, mitigation ratios for impacts to vernal pools typically range from one-to-one (1:1), to three-to-one (3:1). To account for the range of mitigation ratios and the variety of mitigation measures available to the developer for mitigation, the analysis presents the potential costs associated with navarretia conservation efforts incurred by developers and landowners as a range.

Five units are expected to bear more than 75 percent of the post-designation forecast annualized costs, Unit 4E in Ramona in San Diego County (almost 30 percent), Units E19 (15 percent), E17 (13 percent), and E20 (10 percent) on Otay Mesa in San Diego County, and Unit E2 (10 percent) near Hemet in Riverside County. San Diego County is forecasting almost 800 acres of rural residential development in Unit 4E, 290 acres of low-density residential and industrial development in Unit E17, 150 acres each of medium-density residential, high-density residential, and commercial and 40 acres of industrial in Unit E19, and 60 acres of commercial and 250 acres of industrial in Unit E20. Based on the current level of developed acres in Unit E2 in Riverside County (500 acres), and the strong growth rate forecast in the County, almost 300 acres are forecast to be developed in this unit.

Conversely, Units 4D, 5D, E7, E8, E12, E14, E15, and NI2 are forecast to have no new development during the next 20 years. These lands are either fully developed as of 2005 (Unit 4D near San Marcos and Unit E8, Montgomery Airfield), undeveloped open space preserves/reserves (Units E12, E14, and E15 located near Lower Otay Reservoir), vacant Federal lands (Unit 5D along the border of Mexico), military training lands (Unit E7 on MCB Camp Pendleton), or a military airfield (Unit NI2 on MCAS Miramar).

FLOOD CONTROL COSTS

The County of Riverside, the Riverside County Flood Control and Water Conservation District, the City of Perris, and the CDFG are developing a flood control project to channelize the San Jacinto River between Ramona Expressway and Railroad Canyon in Unit E1. To avoid sensitive habitat, the size of the project was reduced, and six alternatives are under consideration, including the no project alternative. The five feasible project alternatives consider partial channelization, conserving more lands, and altering the project so that navarretia sensitive areas still receive water during flood events.

TRANSPORTATION COSTS

Transportation costs are related to roads, railways, and airports. California Department of Transportation (Cal Trans) has six road projects planned in or around the essential habitat areas in Riverside County near the east-west Route 74, the north-south Route 215, and Route 79 during 2006 to 2009. In San Diego

County, several projects in or around essential habitat are either under construction or planned to take place between now and 2008. No projects are anticipated near essential habitat units in Los Angeles County during 2006 to 2009. In addition, an estimated 16 road projects are forecasted to occur in the essential habitat during 2010 through 2025.

Two railroad expansion projects are also expected to occur in navarretia essential habitat in San Diego County during 2006 to 2009, a track for the Los Angeles-San Diego Rail Corridor Agency in Unit NI1 and the NCTD Sprinter Rail along Route 78 between the coast and the intersection of Route 78 and Interstate 15 in Units 4A, 4B, 4C, and 4D. In addition, eight railway projects are forecast to occur in the essential habitat during 2010 through 2025. Forecasted acres of future development are used as an indicator for the location of future road and railroad projects as future urban development will require the construction and/or maintenance of a transit infrastructure. This method allocates over 80 percent of the road and railway transportation projects to Units 4E, E2, E17, E18, E19, and E20.

A suite of conservation efforts and costs for a representative road project are developed for protecting a listed plant during road and railroad construction activities. Before a project begins, a survey of the area is done to identify the plant species in the proposed project area. If navarretia are identified through the surveys, several measures are available to avoid the plant species in order to minimize the disturbance. Fencing off areas that include listed plant species, or flagging sensitive plants are also avoidance tactics that will likely be used for the navarretia. A qualified biologist may be required to monitor activities in the project area during construction in order to avoid disturbing the navarretia and/or its habitat. It is also likely that seed collection in the project area will be required. Following construction activity, it is likely that monitoring will occur in the project area and/or in the mitigation area.

The Ramona Airport in Unit 4E is also expected to incur conservation efforts for the navarretia during the post-designation period. The conservation efforts at the airport include fencing and monitoring to avoid impacts to the navarretia. For the first five management years under the airport's Habitat Management Plan (July 2005 – August 2010), monitoring visits of the preservation and restoration pools will be conducted at least twice annually. After five years of management, the monitoring visits will decrease to once per annum.

LAND MANAGEMENT

Public and non-profit land management comprises less than five percent of the remaining post-designation conservation costs (\$4.7 million in undiscounted dollars). All of the Federal government's conservation costs (\$4.5 million) are related to vernal pool management actions at MCAS Miramar in Units NI1, NI2, and NI3. These management actions include monitoring and surveying vernal pool habitat, removing and controlling exotic plants, developing various media to further public awareness, protecting habitat through fencing and field markers, and working with project planners to minimize impacts to vernal pool areas, and are specified in the Base's INRMP. The non-profit conservation consists of \$7,000 annually, or \$140,000 in undiscounted dollars during the post-designation period, for public education at the Ramona Grasslands Preserve in Unit 4E. These costs will be born by the Wildlife Research Institute.

ECONOMIC EFFECTS TO SMALL ENTITIES AND THE ENERGY INDUSTRY

This report presents a screening level analysis of the potential effects of conservation efforts for the navarretia on small entities, including small businesses, organizations, and governments, due to the rulemaking to assist the Service in its certification that the proposed rule will not have a significant economic impact on a substantial number of small entities.¹⁰ In addition, in response to Executive Order 13211 “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” this analysis considers the impacts of conservation efforts on the energy industry and its customers.¹¹ While small business impacts are discussed, significant impacts on the energy sector are not expected. See Appendix A for an analysis of impacts to small entities and the energy industry.

¹⁰ 5 U.S.C. § 601 *et seq.*

¹¹ Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use.”

This report addresses the economic effects of conservation efforts associated with the listing and proposed critical habitat designation (CHD) for the spreading navarretia (*Navarretia fossalis*, hereafter “navarretia”). The U.S. Fish and Wildlife Service (hereafter “Service”) published a proposed rule to designate critical habitat for the navarretia in the *Federal Register* on October 7, 2004.¹²

This analysis is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the biological benefits of including those areas in the designation.¹³ In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).¹⁴ This report also complies with direction from the U.S. 10th Circuit Court of Appeals that “co-extensive” effects should be included in the economic analysis to inform decision-makers when considering areas to designate as critical habitat.¹⁵

This section provides the general analytic approach to estimating economic effects, including discussion of both efficiency and distributional effects. Next, it discusses the scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts. Then, it describes the information sources employed to conduct this analysis. Finally, it describes the background of the listing and proposed designation of critical habitat for the navarretia.

1.1 APPROACH TO ESTIMATING ECONOMIC EFFECTS

This economic analysis considers both the economic efficiency and regional economic impacts that may result from species and habitat protection. Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities on private lands are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents

¹² U.S. Fish and Wildlife Service, October 7, 2004, “Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule,” *Federal Register*, Vol. 69, No. 194, pp. 60110-60134.

¹³ 16 U.S.C. § 1533(b)(2).

¹⁴ Executive Order 12866, September 30, 1993, “Regulatory Planning and Review;” Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use;” 5 U.S.C. § 601 *et seq*; and Pub. Law No. 104-121.

¹⁵ In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass’n vs. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 of the Endangered Species Act (Act) represent opportunity costs of conservation efforts, given that those resources committed to the consultation process are not available for alternative activities. To the extent possible, the efficiency analysis also measures the distribution of these opportunity costs across groups, such as producers and consumers. For example, some costs related to conservation actions may fall entirely on one group, or may fall on individuals within a group, such as low income farmers. While economic efficiency is concerned with the total change in societal welfare from a given policy or action, and is thus the appropriate measure to ensure efficient use of resources, distributional measures can also be useful to policymakers in assessing who gains and who loses from such policies or actions.

This analysis also addresses the impacts associated with the conservation activities in the areas proposed for critical habitat, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities, the energy industry, or governments. This information may be used by decision-makers to assess whether the effects of the designation unduly burden a particular economic sector. For example, while habitat conservation efforts may have a small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience a significant level of impact. The difference between economic efficiency effects and regional economic impacts, as well as their application in this analysis, are discussed in greater detail below.

Where data are available, the analysis attempts to capture the net economic impact imposed on regulated entities and the regional economy of navarretia conservation actions. That is, the economic impact of navarretia conservation to the land management agencies and regulated community net of any direct offsetting benefit they experience.

1.1.1 EFFICIENCY EFFECTS

At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 “Regulatory Planning and Review,” Federal agencies measure changes in economic efficiency in order to discern the implications on a societal level of a regulatory action. For regulations specific to the conservation of the navarretia, efficiency effects represent the opportunity cost of resources used, or benefits foregone, by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surplus in affected markets.¹⁶

¹⁶ For additional information on the definition of “surplus” and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., 1990, *A Guide to Benefit-Cost Analysis* (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc.; and U.S. Environmental Protection Agency, September 2000, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a landowner or manager may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost, because the landowner or manager's time and effort would have been spent in an alternative activity had his or her land not been designated critical habitat. In the case that compliance activity is not expected to significantly affect markets – that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price – the measurement of compliance costs provides a reasonable estimate of the change in economic efficiency.

Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the real estate market.

This analysis begins by measuring costs associated with measures taken to protect species and habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. In the case of the navarretia, compliance costs are in fact expected to represent a reasonable estimate of efficiency effects, and thus impacts on consumer and producer surpluses in affected markets are considered but not estimated.

1.1.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

Measurements of changes in economic efficiency focus on the net impact of conservation efforts across broad aggregates of people (e.g., producers and consumers), without consideration of how certain economic sectors or groups of people (e.g., low income farmers) are affected. As noted above, these distributional or equity effects regarding how efficiency gains or losses are borne may be important to policymakers. In addition, economic efficiency effects do not address issues related to impacts on local or regional economies. Thus, a discussion of efficiency effects alone may miss important distributional considerations, as well as impacts on local economies. OMB encourages Federal agencies to consider these latter effects separately from efficiency effects.¹⁷ This analysis considers several types of these effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these impacts on local economies or sectors are fundamentally different measures of economic costs than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

¹⁷ U.S. Office of Management and Budget, September 17, 2003, "Circular A-4," <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

1.1.2.1 Impacts on Small Entities and Energy Supply, Distribution, and Use

This report presents a screening level analysis of the potential effects of conservation efforts for the navarretia on small entities, including small businesses, organizations, and governments, due to the rulemaking to assist the Service in its certification that the proposed rule will not have a significant economic impact on a substantial number of small entities.¹⁸ In addition, in response to Executive Order 13211 “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” this analysis considers the impacts of conservation efforts on the energy industry and its customers.¹⁹ While small business impacts are discussed, significant impacts on the energy sector are not expected. See Appendix A for an analysis of impacts to small entities and the energy industry.

1.1.2.2 Regional Economic Effects

Regional economic impact analysis can provide an assessment of the potential localized and distributive impacts of proposed conservation efforts. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models, such as those created using IMPLAN modeling software and databases. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., expenditures by recreationists) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreationists). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy. These additional impacts are referred to as “secondary impacts.”

The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency

¹⁸ 5 U.S.C. § 601 *et seq.*

¹⁹ Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use.”

losses. Thus, these types of secondary impacts are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

Because this report assumes that development is not restricted by CHD, and that the developers will use conservation and mitigation to address navarretia concerns, it is not appropriate to measure secondary and regional impacts. Therefore, regional economic impact analysis is not part of this analysis.

1.2 SCOPE OF THE ANALYSIS

This analysis identifies those economic activities believed to most likely threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid, mitigate, or compensate for such threats within the boundaries of the CHD. In instances where critical habitat is being proposed after a species is listed, some future impacts may be unavoidable, regardless of the final designation and exclusions under section 4(b)(2). However, due to the difficulty in making a credible distinction between listing and critical habitat effects within critical habitat boundaries, this analysis considers all future conservation-related impacts to be co-extensive with the designation.²⁰

Co-extensive effects may also include impacts associated with overlapping protective measures of other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation. It is noted that in past instances, some of these measures have been precipitated by the listing of the species and impending designation of critical habitat. Because habitat conservation efforts affording protection to a listed species likely contribute to the efficacy of the CHD efforts, the impacts of these actions are considered relevant for understanding the full effect of the proposed CHD. Enforcement actions taken in response to violations of the Act, however, are not included.

The navarretia critical habitat economic analysis includes the following items:

- Consistent with recent court rulings, the analysis includes impacts that occur co-extensively with the listing under the Act. Enforcement actions taken in response to violations of the Act are not included.

²⁰ In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass'n vs. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)). In 2004, the U.S. 9th Circuit invalidated the Service's regulation defining destruction or adverse modification of critical habitat (*Gifford Pinchot Task Force v. United States Fish and Wildlife Service*). The Service is currently reviewing the decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

- The analysis considers conservation and protection efforts for the navarretia. No distinction is made between impacts that occur due to listing and those that result from CHD. It also includes conservation efforts at the State or local level that are the result of either the listing or CHD.
- Inevitably, actions taken to protect navarretia provide benefits to other species. Where possible, this analysis addresses this issue by (1) focusing on the costs of conservation efforts rather than general habitat improvements; and (2) excluding efforts implemented prior to the final navarretia listing in October 1998. Finally, when conservation efforts are implemented in areas of habitat overlap between navarretia and other listed species, the analysis includes the full costs of the conservation efforts and attributes them in their entirety to navarretia.
- Both pre-designation and post-designation costs are considered. Pre-designation costs include those that have accrued since the time that the navarretia was listed as threatened (October 1998), but prior to the final designation of critical habitat (October 2005). Post-designation effects include likely future costs associated with navarretia conservation efforts following the final designation of critical habitat in October 2005, effectively 2006 through 2025.
- The geographic scope of the analysis reflects distinct areas identified as essential to the conservation of the navarretia, including both lands proposed for critical habitat, and lands excluded from or not included in the proposed CHD. These essential habitat lands are all located within three California counties: Los Angeles, Riverside, and San Diego.
- The geographic unit of analysis for proposed critical habitat is the area defined by the Service as each of five critical habitat units and, in some cases, the subunits. Lands excluded from proposed critical habitat and lands not included in the proposed CHD have been divided into units based on geography. These units and subunits are shown on Maps 1 through 6 in the Map Attachment to this report.
- The localized economic efficiency effects reflect impacts in the areas specifically identified as critical habitat, as well as those essential lands excluded from or not included in proposed critical habitat. However, efforts occurring in adjacent land or beyond of the boundaries of the proposed critical habitat with the potential to affect attributes within essential habitat, such as water quantity and quality, are also considered when appropriate.
- This analysis utilizes a “with” and “without” framework, and emphasizes those effects that are determined to be attributable to navarretia conservation efforts. Impacts that would have occurred without the navarretia listing and CHD are evaluated on a case-by-case basis to determine if they are driven, in part, by conservation efforts for the navarretia.
- The period of analysis and discounting is guided by the availability of information concerning the start date and duration of the activity. Each potential cost component is examined over the time period that is appropriate for that specific activity or investment. Some of these are costs that are incurred one time only, while others are recurring. These costs are presented in undiscounted

dollars²¹ and as net present values and annualized costs, using three and seven percent discount rates.

1.2.1 SECTIONS OF THE ACT RELEVANT TO ECONOMIC ANALYSIS

The analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as CHD. Pursuant to this section, the Secretary is required to list species as endangered or threatened “solely on the basis of the best scientific and commercial data available.”²²

The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the Act. The economic effects of these protections are considered in this analysis:

- Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of the species’ designated critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and the designation of critical habitat.²³
- Section 9 defines the actions that are prohibited by the Act, and in particular, prohibits the “take” of endangered wildlife. The term “take” means to “harass, harm, pursue, ... or collect, or to attempt to engage in any such conduct.”²⁴ The economic impacts associated with this section manifest themselves in sections 7 and 10. While the prohibition against “take” does not apply to plant species such as the navarretia, the Service is obligated to ensure that proposed activities adequately minimize the impact to the species.
- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for a species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a

²¹ “Undiscounted” dollars represent the sum of the future costs in 2005 dollars that are not adjusted for inflation (expected changes in purchasing power).

²² 16 U.S.C. § 1533.

²³ The Service notes, however, that a recent Ninth Circuit judicial opinion, *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, has invalidated the Service’s regulation defining destruction or adverse modification of critical habitat. The Service is currently reviewing the decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

²⁴ 16 U.S.C. § 1532.

property.²⁵ The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The designation of critical habitat does not require completion of an HCP; however, the designation may influence conservation efforts provided under HCPs. While HCPs are not developed solely for plant species, if listed plants occur in the area subject to the HCP, the Service must consider whether the proposed activities may adversely affect or jeopardize the continued existence of the plant species. In the case of the navarretia, areas covered by seven HCPs have been excluded from the proposed CHD (see Section 4.3).

1.2.2 OTHER RELEVANT PROTECTION EFFORTS

The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction. In general, economic impacts will be evaluated regardless of whether or not species protection efforts required by the Act are also required by other Federal agencies or State or local governments. The impact of these protection efforts will be treated as “co-extensive” with, or attributable to, navarretia listing and designation. Examples of these types of regulations include, but are not limited to, the California Environmental Quality Act (CEQA) and Section 404 of the Clean Water Act (CWA), as well as Integrated Natural Resource Management Plans (INRMPs) on Department of Defense lands (see Section 4.4.6).

In some cases, non-habitat related regulations will limit land use activities within critical habitat in ways that will directly or indirectly benefit the navarretia or its habitat. For example, local zoning ordinances that specify the amount and type of development that may occur, if any, in a certain area may benefit the navarretia and its habitat. The impact of these types of local, non-habitat related regulations and land use controls are not considered “co-extensive,” with or attributable to the navarretia listing and designation. Examples of these types of local regulations or controls include, but are not limited to, local zoning ordinances and local hillside of view shed protection ordinances.

1.2.3 ADDITIONAL ANALYTIC CONSIDERATIONS

Previous economic impact analyses prepared to support critical habitat decisions have considered other types of economic impacts related to conservation efforts associated with CHD, including time delay, regulatory uncertainty, and stigma impacts. This analysis considers these other types of economic impacts that can be a consequence of navarretia CHD, as described below.

²⁵ U.S. Fish and Wildlife Service, “Endangered Species and Habitat Conservation Planning,” <http://endangered.fws.gov/hcp/>, accessed August 6, 2002. Sections 9 and 10 of the Act do not apply to plants. While HCPs are not typically developed specifically for listed plant species, an HCP may include listed or non-listed plant species that may be affected by the project subject to the HCP.

1.2.3.1 Stigma Effects

Stigma refers to the change in economic value of a particular project or activity due to negative (or positive) perceptions of the role critical habitat will play in developing, implementing, or conducting that project or activity. For example, “stigma effects” could include changes to private property values associated with public attitudes about the limits and costs of implementing a project in critical habitat. Stigma effects are a form of uncertainty that relate more to perceived fluctuations rather than observation, when there is limited information on actual outcomes. There is currently a void of peer-reviewed literature that has successfully identified or attempted to quantify empirical estimates of stigma effects. As such, while there is a potential for some developable land to be subject to short-term stigma effects due to uncertain regulatory requirements, no attempt is made to estimate its magnitude.

1.2.3.2 Time Delay and Regulatory Uncertainty

In addition to direct costs of consultation and project modification associated with navarretia conservation efforts, the analysis considers potential indirect impacts, such as may result from project delays. Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the section 7 consultation process and/or compliance with other laws associated with the designation. The need to conduct a section 7 consultation will not necessarily delay a project, as often the consultation may be coordinated with the existing regulatory approval process. However, depending on the schedule of the consultation, a project may experience additional delays, resulting in an unanticipated extension in the time needed to fully realize returns from the planned activity. Delays of this nature were considered in the development of this analysis and it was determined that they may result in an impact that is not likely to materially change the quantitative results of this analysis.

Regulatory uncertainty costs can occur in anticipation of having to modify project parameters, and might include, for example, project proponents retaining outside experts or legal counsel to better understand their responsibilities with regard to critical habitat.

1.2.3.3 Other Impacts

Under certain circumstances, CHD may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have been triggered absent the CHD, they are included in this economic analysis. In this regard, the analysis considers the extent to which the navarettia CHD might trigger the completion of an environmental impact report (EIR) under the California Environmental Quality Act (CEQA).

1.2.4 BENEFITS

Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.²⁶ OMB's Circular A-4 distinguishes two types of economic benefits: direct benefits and ancillary benefits. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.²⁷

In the context of CHD, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.²⁸ *Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

CHD may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, CHD can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

It is often difficult to evaluate the ancillary benefits of CHD. To the extent that the ancillary benefits of the rulemaking may be captured by the market through an identifiable shift in resource allocation, they are factored into the overall economic impact assessment in this report. For example, if decreased off-road vehicle use to improve species habitat leads to an increase in opportunities for wildlife viewing or hiking within the region, the local economy may experience an associated measurable, positive impact. Where data are available, this analysis attempts to capture the net economic impact (i.e., the increased regulatory burden less any discernable offsetting market gains) of species conservation efforts imposed on regulated entities and the regional economy.

²⁶ Executive Order 12866, September 30, 1993, "Regulatory Planning and Review."

²⁷ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

²⁸ Ibid.

1.2.4.1 The Potential for Amenity Values

When wetland areas are designated as critical habitat for a species, they may generate amenity values to adjacent property owners and residents. These amenity values are derived from the associated visual amenities and other environmental and ecosystem benefits that may arise from the CHD. The existence and magnitude of economic values for environmental amenities are well documented in the environmental economics literature. If a CHD provides additional protection of the area, habitat, or ecosystem from which such environmental services may flow, the existence of positive values (negative costs) from a CHD is possible.

In the case of a CHD, owners of adjacent or nearby residential property may benefit from the “internalization” of the environmental public goods arising from the CHD. However, the extent of the impact on the welfare of owners of undeveloped land and developers in general is not always clear. For example, landowners and developers would not have an incentive to provide open space or related amenities unless they could capture some of the resulting value in the price of lots and houses. Some land developers of larger areas have voluntarily set aside portions of the potential development as open space, and have built in price premiums in remaining parcels to account for the advertised amenity. However, it is expected that owners of smaller parcels would have to engage in cooperative behavior with adjacent property owners to provide sufficient open space to provide price premiums adequate to offset the loss of revenue from reduced numbers of developable lots.

In the literature, the existence of amenity values has been demonstrated in a wide variety of settings and these values have been quantified with a number of non-market valuation techniques. Time and resource constraints often prohibit the performance of original, site-specific research to measure amenity values. Instead, potential amenity values are often quantified via the “benefits transfer” approach. This approach essentially borrows (transfers) estimates of value for the same non-marketed commodity (e.g., open space) from extant studies and applies them to a new site or setting. The conditions under which such procedures are valid are well discussed in the literature. The OMB also provides guidance for an appropriate use of benefits transfer methods, including criteria for their use.²⁹ In general, however, the closer the two sites are in terms of key physical and economic factors, the more likely it is that the transferred value is appropriate for the new setting. In addition, the literature cautions that values be used conservatively; i.e., that among those previous estimates judged to be appropriate, lower bound estimates should be used for the new application or setting. This analysis recognizes the potential for the existence of amenity values within the navarretia CHD, but leaves such values unquantified.

²⁹ U.S. Office of Management and Budget, September 17, 2003, “Circular A-4,” <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

1.3 ANALYTIC TIME FRAME

The analysis examines activities taking place both within and adjacent to the proposed CHD and lands excluded from or not included in the proposed CHD, and considers activities that have occurred since the final listing (October 1998) and prior to the final designation (October 2005), as well as activities anticipated to occur after designation. Estimates of post-designation effects are based on activities that are “reasonably foreseeable,” including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. The analysis estimates economic effects of activities from 1998 (year of the final rule for listing) through 2025 (20 years from the year of final CHD). The year 2025 is the latest period for which local projections of growth and development in the areas encompassing critical habitat are available.

1.4 INFORMATION SOURCES

The analysis contained in this report is based on data and information collected from a wide range of sources. Communications with and data provided by Service personnel include maps and geographical information system (GIS) data, information on past section 7 consultation project modification and terms and conditions, copies of informal and formal navarretia consultation documents such as Biological Opinions (BOs), and other material directly related to the proposed designation. The Service’s recovery plan addressing the navarretia was also consulted.³⁰ Other Federal, State, and local agencies provided information, as well as independent or private sector entities and individuals. The specific sources used to address the effects of navarettia conservation efforts are identified within each section, and citations are provided where appropriate. The reference section at the end of this document includes a full list of information sources.

1.5 BACKGROUND OF THE NAVARRETIA LISTING

The Service published a notice of review of plants in the Federal Register on December 15, 1980, which included navarretia as a category 1 candidate.³¹ Category 1 species are defined as “those for which the Service had on file substantial information on biological vulnerability and threats to support preparation of listing proposals.”³² Supplements to the plant notice of review were published in 1983, 1985, and

³⁰ U.S. Fish and Wildlife Service, September 1998, *Vernal Pools of Southern California Recovery Plan*, Portland, Oregon.

³¹ U.S. Fish and Wildlife Service, December 15, 1980, “Review of Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review,” *Federal Register*, Vol. 45, pp. 82480-82569.

³² U.S. Fish and Wildlife Service, October 13, 1998, “Determination of Endangered or Threatened Status for Four Southwestern California Plants from Vernal Wetlands and Clay Soils, Final Rule,” *Federal Register*, Vol. 63, No. 197, p. 54978.

1990 listing the navarretia as a category 2 candidate.³³ Category 2 species include those for which “information in the possession of the Service indicated that a listing proposal was possibly appropriate, but for which sufficient data on biological vulnerability and threat were not available to support a proposed rule.”³⁴ Navarretia was again listed as a category 1 candidate species in a notice of review published September 30, 1993.³⁵

The Service proposed threatened status for the navarretia on December 15, 1994, in a proposed rule which included three other plant species.³⁶ Following an extended comment period, the Service published a final rule listing the navarretia as threatened in the October 13, 1998, edition of the Federal Register.³⁷ At that time, the Service also determined the designation of critical habitat was not prudent for the navarretia as such designation would provide no benefit to the species beyond that provided by listing.³⁸

1.6 BACKGROUND OF THE NAVARRETIA CRITICAL HABITAT DESIGNATION

As noted earlier, critical habitat was not designated for navarretia at the time of its final threatened listing in October 1998. Lawsuits challenging the Service’s determination that designation of critical habitat for navarretia (and seven other listed plant species) was not prudent were filed in November 2001 by the Center for Biological Diversity and California Native Plant Society and Building Industry Legal Defense Foundation.³⁹ The parties in both cases agreed to a remand of the critical habitat determinations to the Service for additional consideration. On July 1, 2002, the U.S. District Court ordered the Service to

³³ U.S. Fish and Wildlife Service, November 28, 1983, “Review of Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review,” *Federal Register*, Vol. 48, pp. 53640-53670; U.S. Fish and Wildlife Service, September 27, 1985, “Review of Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review” *Federal Register*, Vol. 50, No. 188, pp. 39526-39577; and U.S. Fish and Wildlife Service, February 21, 1990, “Review of Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review,” *Federal Register*, Vol. 55, No. 35, pp. 6184-6229.

³⁴ U.S. Fish and Wildlife Service, October 13, 1998, “Determination of Endangered or Threatened Status for Four Southwestern California Plants from Vernal Wetlands and Clay Soils, Final Rule” *Federal Register*, Vol. 63, No. 197, p. 54978.

³⁵ U.S. Fish and Wildlife Service, September 30, 1993, “Review of Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review,” *Federal Register*, Vol. 58, No. 188, pp. 51144-51190.

³⁶ U.S. Fish and Wildlife Service, December 15, 1994, “Proposed Rule to List Four Southwestern California Plants as Endangered or Threatened, Proposed Rule,” *Federal Register*, Vol. 59, No. 240, pp. 64812-64823.

³⁷ U.S. Fish and Wildlife Service, October 13, 1998, “Determination of Endangered or Threatened Status for Four Southwestern California Plants from Vernal Wetlands and Clay Soils, Final Rule” *Federal Register*, Vol. 63, No. 197, pp. 54975-54994.

³⁸ *Ibid.*, pp. 54991-54992.

³⁹ *Center for Biological Diversity, et al. v. Norton*, No. 01-CV-2101 (S.D. Cal.); and *Building Industry Legal Defense Foundation v. Norton*, No. 01-CV-2145 (S.D. Cal.).

reconsider the not prudent finding and publish a proposed critical habitat rule by January 30, 2004. At the Service's request, the court extended the deadline for the proposed rule until October 1, 2004. The proposed rule designating critical habitat for the navarretia was published in the October 7, 2004, edition of the Federal Register, complying with the court order.⁴⁰

1.7 DESCRIPTION OF THE SPECIES AND HABITAT⁴¹

The navarretia is a low, mostly spreading or ascending, annual herb of the phlox family (*Polemoniaceae*), and is about four to six inches tall. The lower portion of the stem is mostly bare, while the upper portion has soft and finely divided leaves, which appear long and spine-tipped when dry. The navarretia flowers from May to June, with blooms that are white to lavender-white in color and made up of linear petals that are arranged in flat-topped, compact, leafy heads. The navarretia also produces small, egg-shaped fruit containing 5 to 25 seeds. After fruiting, the plant dries out and loses color rapidly, making it difficult to detect late in the dry season or during dry years.

The navarretia grows in vernal pools, clay flats, irrigation ditches, alkali grasslands, alkali playas, and alkali sinks. It is primarily associated with vernal pools at elevations between sea level and 4,250 feet, and on flat to gently sloping terrain. It is distributed from northwestern Los Angeles County and western Riverside County, south through coastal San Diego County, California, to northwestern Baja California, Mexico. The navarretia requires areas that are ephemerally wet in the winter and spring and dry in the summer and fall, where neither upland plants that live in a dry environmental year round nor wetland plants that require year round moisture can become established. This exclusion of strictly upland and wetland plants in such habitats benefits specialized plants such as the navarretia.

Fewer than 45 populations of navarretia are known to exist in the United States, and 60 percent are concentrated in three locations: Otay Mesa in southern San Diego County, along the San Jacinto River in western Riverside County, and near Hemet in Riverside County. The largest of these populations, with an estimated 100,000 and 375,000 individuals, occur within eight acres of habitat in Riverside County. Most other populations are estimated to contain fewer than 1,000 individuals and occupy less than one acre of habitat. The Service estimates that less than 300 acres of habitat is occupied by the species in the United States; this includes only the areas where navarretia is physically found and does not include adjacent areas which are necessary to provide the hydrology required by this species.

Past human activities have resulted in the conversion of an estimated 90 percent or more of the vernal pool habitat in Southern California. The navarretia continues to be threatened by habitat destruction and

⁴⁰ U.S. Fish and Wildlife Service, October 7, 2004, "Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule," *Federal Register*, Vol. 69, No. 194, pp. 60110-60134.

⁴¹ Information on the navarretia and its habitat is derived from the October 7, 2004, "Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule," *Federal Register*, Vol. 69, No. 194, pp. 60110-60134. It is provided in summary form only; specific citations have been omitted here.

fragmentation due to a number of activities, identified in the proposed rule designating critical habitat as the following:

“...urban and agricultural development, pipeline construction, alteration of hydrology and floodplain dynamics, excessive flooding, channelization, off-road vehicle activity, trampling by cattle and sheep, weed abatement, fire suppression practices (including discing and plowing to remove weeds and create fire breaks), and competition from alien plant species.”⁴²

Using the best available scientific data, the Service has determined the primary constituent elements essential to the conservation of the navarretia. The physical ranges described in the primary constituent elements may not capture all of variability that is inherent in natural systems that support the navarretia. In summary, these primary constituent elements include:

1. Vernal pool, alkali grassland, alkali playa, or alkali sink habitats, at elevations between sea level and 4,250 feet (1,300 m), and on flat to gently sloping terrain;
2. Clay soils that retain water for sufficient amounts of time, especially in the winter and spring months, to support vernal pool, alkali grassland, alkali playa, or alkali sink habitats; and
3. Watershed area immediately surrounding vernal pool, alkali grassland, alkali playa, or alkali sink habitats with hydrology necessary to maintain these specialized habitats.

1.8 CRITICAL HABITAT DESIGNATION

The Service has identified 31,086 acres of habitat in Riverside, Los Angeles, and San Diego counties as essential for the conservation of the species (“essential habitat”). Portions of the essential habitat are located within approved and pending HCPs, training areas on Department of Defense (DOD) lands the Service classifies as “mission critical” in the proposed rule, and areas covered by Integrated Natural Resource Management Plans (INRMPs) on DOD lands; a total of 26,785 acres of these lands have been excluded from or not included in the proposed CHD for navarretia (excluded and not included lands are discussed in more detail in Sections 1.8.6 and 1.8.7). The remaining area, 4,301 acres in San Diego and Los Angeles counties, represents the essential habitat proposed as critical habitat.⁴³

The Service divided the 4,301 acres of proposed critical habitat into five units (Units 1 through 5). These units are based on the Management Areas for navarretia as identified in the Service’s 1998 Recovery Plan

⁴² U.S. Fish and Wildlife Service, October 7, 2004, “Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule,” *Federal Register*, Vol. 69, No. 194, p. 60113.

⁴³ U.S. Fish and Wildlife Service, October 7, 2004, “Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule,” *Federal Register*, Vol. 69, No. 194, pp. 60110-60134.

for Vernal Pools of Southern California (Recovery Plan).⁴⁴ Units 1, 4, and 5 were further divided by the Service into nine subunits (Units 1A and 1B, Units 4A through 4E, and Units 5A through 5D).

The majority of the land area proposed for critical habitat is in private ownership, with 4,123 acres privately owned, of which 3,527 acres are in San Diego County while 596 acres are in Los Angeles County. The remainder, 178 acres, is in Federal ownership, and all of the Federal lands are located within San Diego County. The five critical habitat units (CHUs) are described briefly below and shown in the Map Attachment to this report.

1.8.1 UNIT 1: TRANSVERSE RANGE CHU

The proposed Transverse Range CHU encompasses 596 acres of privately owned land located in northern Los Angeles County. The unit is located within the Transverse Management Area as identified in the Recovery Plan. This unit has been further divided into two subunits (Units 1A and 1B), which are shown on maps included with this report and the proposed critical habitat rule. The proposed critical habitat in this unit includes the occupied vernal pools at Cruzan Mesa. *Navarretia* also occurs in a vernal pool in nearby Plum Canyon. These vernal pools are the last remaining vernal pools in Los Angeles County.

1.8.2 UNIT 2: SAN DIEGO NORTH COASTAL MESAS CHU

The proposed San Diego North Coastal Mesas CHU encompasses 143 acres of privately owned land within San Diego County. This unit is within the San Diego North Coastal Management Area as identified in the Recovery Plan. This unit includes one occupied vernal pool complex in the City of Carlsbad, located at the Poinsettia Lane train station. This complex is one of the last remaining coastal occurrences of *navarretia* outside the boundaries of Marine Corps Base (MCB) Camp Pendleton. Occupied vernal pools on Camp Pendleton are located within the same management area, but have been excluded from the proposed CHD (see Section 1.8.6).

The City of Carlsbad has completed a subarea plan as a part of the Multiple Habitat Conservation Program (MHCP) in northwestern San Diego County. Under this plan, the City of Carlsbad is undertaking conservation and management actions to allow for the coverage of *navarretia*. As part of this plan, the portions of the Poinsettia Lane vernal pool complex that are under the jurisdiction of the City of Carlsbad will be managed for the conservation of *navarretia*. The other portion of this vernal pool complex is on land owned by the North County Transit District (NCTD). NCTD is not a participant in the MHCP and incidentally their land is not covered by the MHCP.

⁴⁴ U.S. Fish and Wildlife Service, September 1998, *Vernal Pools of Southern California Recovery Plan*, Portland, Oregon.

1.8.3 UNIT 3: SAN DIEGO CENTRAL COASTAL MESAS CHU

The proposed San Diego Central Coastal Mesas CHU encompasses 143 acres of privately owned land in San Diego County and includes occupied vernal pools not on Marine Corps Air Station (MCAS) Miramar or included in the San Diego Multiple Species Conservation Program (MSCP). The unit is located within the San Diego Central Coast Mesas Management Area as identified in the Recovery Plan. The management area also includes other occupied pools on MCAS Miramar that are not included in proposed critical habitat (see Section 1.8.7), as well as occupied pools that are within the San Diego MSCP that are excluded from proposed critical habitat (see Section 1.8.6).

1.8.4 UNIT 4: SAN DIEGO INLAND VALLEYS CHU

The proposed San Diego Inland Valleys CHU encompasses 3,027 acres of privately owned land within San Diego County, and is divided into five subunits (Units 4A through 4E), which are shown on maps included with this report and the proposed critical habitat rule. This unit is located within the San Diego Inland Valleys Management Area identified in the Recovery Plan. Each proposed critical habitat subunit contains one or more occupied vernal pool complexes and the subunits are located within the jurisdiction of the City of San Marcos and the community of Ramona. One complex in the community of Ramona is located within the boundaries of the Ramona Airport. Vernal pools in San Marcos are identified in the Recovery Plan as essential to navarretia recovery because of their role in stabilizing populations and preventing habitat loss. Vernal pools in this unit are within the easternmost edge of the geographical distribution of navarretia.

1.8.5 UNIT 5: SAN DIEGO SOUTHERN COASTAL MESAS CHU

The San Diego Southern Coastal Mesas CHU is located within San Diego County and encompasses 392 acres within the Southern Coastal Mesas Management Unit as identified in the Recovery Plan. The unit contains several vernal pools and other physical features essential to the conservation of navarretia. A majority of the pools in the Management Unit are part of the San Diego MSCP, and these areas are excluded from the proposed critical habitat (see Section 1.8.6). Only vernal pools and their watersheds that occur on lands not protected by the MSCP are proposed as critical habitat. The unit is divided into four subunits (Units 5A through 5D), which are shown on maps included with this report and the proposed critical habitat rule. Federal lands within this proposed critical habitat unit include approximately 44 acres in Unit 5A that are managed by the Service as part of the San Diego National Wildlife Refuge, and approximately 122 acres under unknown Federal management in Unit 5D.⁴⁵ The remainder of the unit is comprised of privately owned lands.

⁴⁵ The proposed rule designating critical habitat did not provide detailed ownership information for essential lands. Estimates of ownership by unit were developed by NEA using GIS data from the California Resources Legacy Project. As such, the acreage data presented in these descriptions may differ slightly from that presented in the proposed rule.

1.8.6 EXCLUDED LANDS

Section 4(b)(2) of the Act states that critical habitat shall be designated, and revised, on the basis of the best available scientific data after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. An area may be excluded from critical habitat if it is determined that the benefits of exclusion outweigh the benefits of specifying a particular area as critical habitat, unless the failure to designate such area as critical habitat will result in the extinction of the species.⁴⁶ In the case of the navarretia, the Service has excluded some areas of essential habitat from the proposed critical habitat pursuant to section 4(b)(2).

Of the 31,086 acres of habitat identified by the Service as essential to the conservation of the navarretia, a total of 26,011 acres have been excluded from the proposed CHD under section 4(b)(2) of the Act. These “excluded lands” include 67 acres of habitat located within training areas on MCB Camp, as well as 25,944 acres of essential habitat covered by completed HCPs. Areas within the approved San Diego County MSCP and approved subarea plans of the MSCP (including the City of San Diego, City of Chula Vista, and San Diego County) are among these excluded lands. All areas of essential habitat for the navarretia in Riverside County occur within the approved Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), and have therefore been excluded pursuant to the section 4(b)(2). The proposed rule published in the Federal Register provides greater detail describing the excluded lands and the basis for exclusion under section 4(b)(2).⁴⁷ These HCPs are also discussed in Section 4.4 of this report.

While the proposed critical habitat areas for the navarretia were clearly named and numbered by unit in the proposed rule, unit names and numbers were not provided for the excluded lands. For the purpose of this economic analysis, the excluded lands are divided into 20 units based on geographic separation and numbered Units E1 through E20 (shown on Maps 3 through 6 in the Map Attachment to this report).

1.8.7 NOT INCLUDED LANDS

The Sikes Act Improvements Act of 1997 (Sikes Act) requires each military installation that includes land and water suitable for the conservation and management of natural resources to complete an Integrated Natural Resources Management Plan (INRMP).⁴⁸ Section 4(a)(3) of the Act prohibits the Service from designating as critical habitat any lands or other geographical areas owned or controlled by the

⁴⁶ U.S. Fish and Wildlife Service, October 7, 2004, “Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule,” *Federal Register*, Vol. 69, No. 194, p. 60118.

⁴⁷ *Ibid.*, pp. 60110-60134.

⁴⁸ 16 U.S.C. 670a.

Department of Defense, or designated for its use, that are subject to an INRMP, if such plan provides a benefit to the species for which critical habitat is proposed for designation.⁴⁹

Occupied vernal pools located on MCAS Miramar have been identified by the Service as essential habitat for the navarretia. MCAS Miramar has an INRMP in place that provides for the conservation of vernal pool resources located on the base through management and monitoring, providing a benefit for the navarretia. Therefore, areas considered essential for the conservation of navarretia at MCAS Miramar are not included in proposed critical habitat pursuant to section 4(a)(3) of the Act. These “not included lands” encompass 774 acres of habitat area.

The proposed rule describes in more detail the essential habitat areas of MCAS Miramar and the justification for not including these lands as proposed critical habitat. The proposed rule did not, however, provide unit names or numbers for the not included lands. For the purpose of this economic analysis, the “not included” lands are divided into three units numbered NI1 through NI3, based on geographic separation of the habitat areas. These units are shown on Map 5 included in the Map Attachment to this report.

1.9 ORGANIZATION OF THE REPORT

The remainder of this report is divided into six sections. The following section describes the framework for analyzing the economic impacts associated with navarretia conservation efforts in the proposed critical habitat and excluded and not included areas. This includes a description of the general analytic approach to estimating economic effects, operating definitions of pre-designation and post-designation effects, general categories of economic effects, and assumptions such as time frame of analysis and discount rate.

The next section provides a socioeconomic profile of the counties encompassing the essential habitat for navarretia, including proposed critical habitat and excluded and not included lands. The profile is presented in terms of the affected counties as the smallest unit of measure for much of the data presented. This is followed by a discussion of the regulatory environment, which includes the Federal, State, and local laws and regulations that are relevant to the analysis.

The different categories of economic effects are examined in the next two sections. The first addresses the effects on residential and commercial development; the application of an “open city” model of development is presented. The second of the two sections on economic effects addresses the other categories that may apply. Finally, the last section of the report presents a summary of the findings and discussion of the results for the navarretia.

⁴⁹ U.S. Fish and Wildlife Service, October 7, 2004, “Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule,” *Federal Register*, Vol. 69, No. 194, p. 60120.

A number of appendices are included with this report. Appendix A addresses the economic effects of navarretia conservation efforts on small entities and the nation's energy supply. Appendix B includes a presentation of the analytic framework for determining effects on residential and commercial development. Appendix C includes a list of the acronyms used in the report. A Map Attachment is also provided and contains all maps referenced in the text of the report.

This section describes the framework used in measuring the economic impacts associated with conservation actions to protect navarretia and its habitat.⁵⁰ This section first describes the general concepts that underlie the estimation of economic costs of a CHD, as well as the costs associated with conservation-related measures that are likely to be associated with future economic activities that may adversely affect the habitat within the proposed boundaries. These concepts include efficiency and distributional effects, as well as pre-designation and post-designation effects. Methods used to evaluate each of the different general categories of economic effects, such as efficiency effects on Federal or private entities, as well as distributional effects, are then described. The time frame and discount rate used in the analysis are also described and the cost categories used to report the results of the analysis (i.e., economic impacts) are defined. Finally, this section describes general caveats and assumptions that apply to all categories of costs examined.

2.1 PRE-DESIGNATION AND POST-DESIGNATION EFFECTS

The economic analysis includes both pre-designation and post-designation effects. Pre-designation effects include those that have accrued since the time that the navarretia was listed as threatened but prior to the final designation of critical habitat. This pre-designation analysis begins with the October 1998 final rule listing the navarretia as threatened.⁵¹ The final designation of critical habitat for navarretia is expected in October 2005, which represents the end of the pre-designation period. Pre-designation impacts include costs associated with *implementing* navarretia conservation efforts between 1998 and 2005, even if the impetus for those efforts was a Federal, State, or local regulation promulgated prior to 1998. Post-designation impacts include likely future cost associated with navarretia conservation efforts following the final designation of critical habitat in October 2005, effectively 2006 through 2025. The post-designation analysis attempts to forecast the costs of conservation efforts likely to occur within the essential habitat, including lands excluded from and not included in the proposed CHD, assuming the proposed CHD remains unchanged.

2.2 GENERAL CATEGORIES OF ECONOMIC EFFECTS

The impacts associated with past and potential future species and habitat management efforts are manifested in economic efficiency effects (i.e., social welfare) as outlined below.

⁵⁰ Much of the general framework discussion represents guidance from the Service and incorporates language employed in prior economic analyses of CHD.

⁵¹ U.S. Fish and Wildlife Service, October 13, 1998, "Determination of Endangered or Threatened Status for Four Southwestern California Plants from Vernal Wetlands and Clay Soils, Final Rule" *Federal Register*, Vol. 63, No. 197, pp. 54975-54994.

Administrative Costs: Costs associated with engaging in section 7 consultation, including time spent attending meetings, preparing letters and biological assessments, and in the case of formal consultations, the development of a Biological Opinion (BO) by the Service are quantified as administrative costs. Section 7 consultation can require substantial administrative effort on the part of all participants. These impacts are measured as the cost of labor required to fulfill these managerial duties. Estimates of per-effort costs associated with informal and formal consultations are presented in Table 1. Costs of the biological assessment (BA) are typically borne by the action agency. Unless otherwise stated, this table is used to develop total administrative costs for consultations associated with activities within the navarretia essential habitat.⁵²

Table 1
Estimated Administrative Costs of Section 7 Consultations (2005 dollars)

Party	Formal	Informal
Service		
Consultation Cost	\$4,908	\$2,187
Action Agency		
Consultation Cost	\$5,548	\$2,774
BA Cost	\$18,137	\$2,134
Third Party Costs		
Consultation Cost	\$3,734	\$2,187

Source: Industrial Economics, April 2005, “Final Economic Analysis of Proposed Critical Habitat Designation for the Lane Mountain Milk-Vetch,” as modified by NEA. The administrative cost model is based on data from the Federal Government Schedule Rates, Office of Personnel Management, a review of consultation records from several Service Field offices across the country, and communications with Biologists in the Service. Average costs by type of consultation for each party, brought to 2005 dollars using the “Consumer Price Index – All Urban Consumers” from the U.S. Department of Labor, Bureau of Labor Statistics (Series ID: CUUROOOSAO Not Seasonally Adjusted).

Project Modification Costs: Management efforts taken to protect the species and or its habitat are likely to result in project modifications to comply with the goals of the management efforts. Costs

⁵² This analysis employs a consultation cost model (see Table 1) to represent a likely range of administrative costs of informal and formal section 7 consultations. The cost model is based on anticipated administrative effort from a survey of a number of Federal agencies and Service Field Offices across the country. The administrative effort is typically defined in number of hours spent, and then translated into a dollar value by applying the appropriate average government salary rates. In interviewing the agencies relevant to this analysis, the representatives were asked if the estimated administrative costs seemed reasonable. In the case that the agency anticipated a different range of costs for their particular activities within the proposed designation that cost range was applied to the relevant consultations in place of the generic cost model estimates. That is, where improved information was available regarding the level of effort for a particular consultation, the unique cost estimates were applied.

of implementing these modifications are associated with changes in labor or material requirements that may occur at one point in time and/or be ongoing.

2.2.1 FEDERAL

Federal agencies incur costs that are directly attributable to compliance with the Act. As noted above, the Service is charged with enforcement, administration, consultation, and monitoring; these costs are predominantly programmatic, and some may be discernable as attributable to the navarretia listing. However, action agencies—those responsible for authorizing or carrying out projects or activities that could have an impact on an endangered species or its habitat—also incur costs through consultations, environmental studies, or project modifications that can be directly or indirectly attributable to navarretia conservation efforts.

2.2.1.1 Section 7 Consultations, Technical Assistance, and Project Modifications

All Federal agencies are required by the Act to ensure the activities they authorize, fund, or carry out do not jeopardize a listed species or adversely modify or destroy designated critical habitat. Consultations may be formal or informal, but in either case the action agency incurs costs to interact with the Service. Costs include preparing Biological Assessments (BAs), meeting with Service staff to discuss project details, and implementing project modifications to avoid, minimize, or offset impacts to listed species. Federal agencies may also incur costs for monitoring habitat conditions.

Administrative costs of consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and CHD. In this report, the number and types of consultations with the Service are identified and presented. The costs associated with compliance and project modifications are addressed, and administrative costs are included.

2.2.2 PRIVATE

The CHD for the navarretia or any other threatened or endangered species has the potential to impose costs on private individuals or groups of individuals if there is a connection or nexus between private activities and Federal actions. For example, if a Federal permit is required before developers can begin construction or if there is Federal funding for a private activity, then it is possible that the provisions of the Act, including CHD, may potentially restrict private actions if the action results in a section 7 consultation.

This section identifies and briefly discusses a framework for analyzing economic impacts on development activities that may occur in or near the proposed critical habitat areas.

2.2.2.1 Framework for Residential, Industrial, and Commercial Development Effects

When a federally listed species occurs or when critical habitat areas are designated in a region, developers may face the following three types of restrictions and costs: 1) development may be prohibited in the areas, which will impose costs to developers and landowners; 2) development may be allowed in the areas, but developers in these areas are required to take additional on-site measures (i.e., project modifications) to reduce the impact of their activities on the listed species and its habitat; and/or 3) development may be allowed in the areas, but appropriate habitat conservation plan-related mitigation fees must be paid and conservation and mitigation activities must be taken to offset the impact of their activities on the listed species and its habitat. The conservation and mitigation activities can be on-site or off-site. Thus, the impact of a federally listed species or its designated critical habitat on residential, industrial, and commercial development may include the following components:

- Cost of development restrictions (e.g., prohibit development in designated areas and thus reduce the supply of developable land);
- Cost of project modifications for development (e.g., employ biological monitoring and flagging of vernal pools during construction activities, protect the vernal pool site by fencing and signage, prohibit the planting of exotic plants, and restrict the use of pesticides); and
- Cost of habitat conservation plan-related mitigation fees and activities for development (e.g., vernal playa habitat restoration, enhancement, creation, and conservation).

Two types of models are used by economists to evaluate the effect of land use regulations. The first is the “closed city model,” and the second is the “open city model.” The open city model is more appropriate for measuring the potential impacts of CHD on urban development. The closed city model assumes that the total number of households in a metropolitan area is fixed and does not respond to market conditions. Thus, if the supply of land is reduced, more people must fit into less space or must live in less desirable locations. The open city model assumes that the number of households in a particular market is determined in a multi-market equilibrium, and households will relocate in response to changes in economic conditions. Housing markets in California, including the southern California counties examined in this analysis, feature a large volume of in- and out-migration and are better described using an open city model.

In this analysis, the costs to residential, industrial, and commercial development arising from navarretia conservation efforts are estimated based on the assumption that development is allowed in the designated areas if appropriate project modifications and/or mitigation activities are taken, and/or mitigation fees paid. Thus, this analysis assumes that no land is removed from potential development as a result of development restrictions. The costs for these project modifications and/or mitigation fees and activities are paid by developers or landowners. Thus, of the three cost components, only the last two are relevant for this analysis. The method for calculating these components is discussed below. The method for calculating the first component of cost is discussed in Appendix B.

Cost of Project Modification and Mitigation Activities

The net present value approach is used to measure the cost of project modification and mitigation fees and activities to past and future developments that may be associated with the listing of the species and/or designation of critical habitat. This approach allows us to estimate the cost by different types of development (e.g., commercial, residential) and by region (e.g., a particular unit or subunit). The framework requires several pieces of information, including: a) projected acres of each type of development in each area designated for critical habitat, b) percent of development actually “burdened” by project modification and mitigation fees and activities, and c) per-acre costs of project modification and mitigation fees and activities for the “burdened” development. With these data, the post-designation cost of CHD for commercial, industrial, and residential development during a given time period (e.g., from 2006 to 2025) can be estimated by the following formula, where total cost (TC) is measured in 2005 dollars:

$$(1) \quad TC = \sum_{t=2006}^{2025} \sum_{i=1}^I \frac{A_t^i S_t^i C_t^i}{(1+r)^{t-2005}}$$

i = types of development (e.g., low-density residential, high-density residential, commercial, mixed development, etc.)

A_t^i = projected acres of type i development in year t

S_t^i = percent of type- i development actually burdened

C_t^i = per-acre project modification and mitigation activity cost

r = discount rate

Likewise, the pre-designation cost of habitat designation for commercial, industrial, and residential development during a given time period (e.g., from 1998 to 2005) can be estimated by the following formula, where the pre-designation cost is also measured in 2005 dollars:

$$(2) \quad TC = \sum_{t=1998}^{2005} \sum_{i=1}^I [A_t^i S_t^i C_t^i (1+r)^{2005-t}]$$

2.2.3 EFFECTS ON SMALL ENTITIES

This analysis considers how small entities, including small businesses, organizations, and governments, might be affected by future navarretia conservation efforts. The analysis follows guidelines appropriate

for the Regulatory Flexibility Act (RFA).⁵³ Those activities involving small entities are identified, affected small entities described, and potential effects estimated, depending on the availability of data. This analysis is included in Appendix A of this report.

2.2.4 EFFECTS ON ENERGY SUPPLY

In adherence with Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” the analysis considers the future impacts of conservation efforts on the energy industry and its customers.⁵⁴ This involves analyzing impacts associated with changes in existing or proposed energy generating facilities as a result of the CHD. If the proposed designation results in a reduction of more than 500 megawatts of installed capacity, the potential electricity price impacts are also considered. This analysis is included in Appendix A of this report.

2.3 PROJECT LIFE, PERIOD OF ANALYSIS, AND DISCOUNT RATE

The period of analysis and discounting is guided by the availability of information concerning the start date and duration of the activity. Each potential cost component has a time period that is appropriate for that specific activity or investment. The time period used is therefore discussed in each section describing the effects of individual types of activities. For example, in evaluating the effects of conservation efforts on residential, industrial, and commercial development, a time frame of 20 years was used to reflect the availability of county forecasts of land use.

The time frame associated with each activity is important because as the time horizon for an economic analysis is expanded, the forecast of future projects becomes increasingly speculative. As a result, a consistent time frame of 20 years is applied to all activities. This provides a time frame within which economic assumptions and forecasts are likely to remain viable. Also, from a practical standpoint, any values beyond 20 years will be substantially reduced by the process of discounting, and thus would have little effect on the present value of the activity or action in question.

Some costs are recurring while others are one time costs. These costs are presented both as net present values and as annualized costs. The total cost per unit of essential habitat represents the summation of annualized costs obtained for each of the component economic impacts. Post-designation (future) costs are presented using both a seven and three percent discount rate.

⁵³ 5 U.S.C. § 601 *et seq.*

⁵⁴ Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use.”

2.4 DEFINITION OF ECONOMIC IMPACTS

This report presents four results for each land use category analyzed: (1) pre-designation economic impacts; (2) “undiscounted” post-designation economic impacts; (3) “present value” of post-designation economic impacts (at a three and seven percent discount rate); and (4) “annualized” post-designation economic impacts (also at a three and seven percent discount rate). Procedures used to calculate each set of results are described below.

For each land use category, this analysis first determines and then presents the “undiscounted” economic costs of navarretia conservation efforts. The undiscounted cost is the sum of the future costs in 2005 dollars that are not adjusted for inflation (expected changes in purchasing power). That is, the economic costs across time are not subject to the process of “discounting.” Discounting converts a series of future cash flows (in this case, future costs) to their present value in terms of today’s dollars. Discounting is employed in economic analyses involving multiple time periods because it is assumed that an individual or society would not be indifferent between receipt of a dollar today and a dollar received in the future. This is because a dollar today could either be invested, for example, in the bond market, to earn a positive rate of return over time, or the dollar could be used today for present consumption. The process of discounting places the future dollar values into a present value context, and thus facilitates comparison of alternative investments or activities which occur over time. Typically, the greater the opportunities for investment of that dollar today, the higher will be the discount (interest) rate that is applied in the discounting process. Since the present value of a series of payments or costs will usually vary with the number of payments (time periods), the present value estimate is often converted to an annualized value to compare activities or investment alternatives which occur over multiple time periods.

This analysis also presents the economic impacts incurred during the pre-designation and post-designation time periods in common dollar terms. First, the cost of pre-designation conservation efforts known to occur in specific years between 1998 and 2005 are adjusted to 2005 dollars using the Bureau of Labor Statistics’ Consumer Price Index accessed at <http://www.bls.gov/cpi/>. Pre-designation costs are adjusted to 2005 dollars so that they may be expressed in common terms and compared with future costs, which are also adjusted to 2005 dollars through the discounting process.

Next, the cost of post-designation conservation efforts forecast to occur in specific years between 2006 and 2025 are discounted and presented in present value terms. As noted above, present value terms are used to compare economic costs incurred in different time periods. The present value represents the value of a payment or stream of payments to be made in the future in common dollar terms. In the context of CHD activities involving future costs, translation of these future economic costs to present value terms requires the following: a) projected future costs of navarretia conservation efforts (the undiscounted costs); and b) the specific years in which these impacts are expected to be incurred. With these data, the

present value of the future stream of impacts (PV_c) of navarretia conservation efforts from year t to T is measured in 2005 dollars according to the following standard formula:⁵⁵

$$PV_c = \sum_t^T \frac{C_t}{(1+r)^{t-2005}}$$

C_t = forecast cost of navarretia conservation efforts in year t

r = discount rate⁵⁶

As a final output of this analysis, costs of future conservation efforts for each land use category in each unit are expressed as annualized values. Annualized values are calculated to provide comparison of impacts across activities with varying time periods (T). For this analysis, however, all land use categories employ a forecast period of 20 years, 2006 through 2025. Annualized impacts of future navarretia conservation efforts (APV_c) are calculated by the following standard formula:

$$APV_c = PV_c \left[\frac{r}{1 - (1+r)^{-N}} \right]$$

N = number of years in the forecast period (in this analysis, 20 years)

2.5 CAVEATS AND ASSUMPTIONS

The assumptions presented here include only those which in general apply to all activity areas included in the analysis. Similar information on assumptions and possible bias that apply to specific activities appear later in the report, within the particular section related to each activity analyzed.

These general caveats, and those presented later relevant to each activity, describe factors that introduce uncertainty into the results of this analysis. Table 2 contains a summary of these key assumptions. These caveats and assumptions may be revised as additional information becomes available. The Service therefore solicits from the public further information on any of the issues presented in the discussions and tables of caveats. Additionally, information pertaining to the following questions is requested:

- Are data available to develop more accurate estimates of the number of future consultations, project modifications, and costs for the activities related to private or public lands?

⁵⁵ To derive the present value of future conservation efforts, t is 2006 and T is 2025.

⁵⁶ To discount and annualize costs, guidance provided by the OMB specifies the use of a discount (interest) rate of seven percent and three percent. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 Federal Register 5492, February 3, 2003.).

- Are data available on additional land use practices, or current or planned activities in essential habitat areas, that are not specifically or adequately addressed in this analysis?
- Are data available on additional co-extensive impacts (such as additional regulatory burdens from State or local laws triggered by the designation of critical habitat) that are not specifically or adequately addressed in this analysis?

Table 2
Assumptions and Uncertainties Applicable to the General Analysis^{a/}

Assumption	Direction of Bias
The analysis considers the cost of conservation and protection efforts for the navarretia including those attributable to the listing, to CHD, or other State and local regulations.	+
Inevitably, actions taken to protect navarretia provide benefits to other listed species. When conservation efforts are implemented in areas of habitat overlap between navarretia and other listed species, the analysis attributes the costs of the conservation efforts co-extensively to navarretia.	+
Non-market benefits are not easily measured without additional resources, unless directly applicable and peer-reviewed analyses are readily available. Consequently, apart from recreational benefits on public lands, this analysis makes no attempt to measure the non-market benefits that may be associated co-extensively with CHD.	+

+ : This assumption is likely to produce an upward bias in cost estimates.

- : This assumption is likely to produce a downward bias in cost estimates.

+/- : No direction of bias can be determined.

a/ This table summarizes general caveats and assumptions related to the approach of the analysis. Detailed caveats and assumptions are described under relevant sections for each analyzed activity.

3.0

SOCIOECONOMIC PROFILE OF THE CRITICAL HABITAT AREA

Key economic and demographic information, including population characteristics and general economic activity, for the counties containing essential habitat (including proposed critical habitat, lands excluded from proposed critical habitat, and lands not included in the proposed CHD) for the navarretia is presented in this section. The smallest area for which socioeconomic data are available most reliably is at the county level, so county data are presented in order to provide context for the discussion of potential economic impacts later in this report. The county data also might serve to illuminate trends within the essential habitat areas that could influence the potential economic impacts, and therefore aid in the analysis of those impacts. Although county level data may not precisely reflect the socioeconomic characteristics of the areas immediately surrounding the navarretia essential habitat, these data provide the best context for the broader analysis.

3.1 GEOGRAPHIC DESCRIPTION OF THE REGION

The navarretia is primarily found in portions of Los Angeles, Riverside, and San Diego counties in Southern California. The combined region occupies the bottomlands and foothills of the broad Los Angeles basin, west and southwest from the San Gabriel and San Bernardino Mountains. Elevations range from near sea level to mountain peaks exceeding 10,000 feet above sea level. The climate of the region is characterized inland by a strong desert influence, moderated at times by marine air from the Pacific Ocean, and near the coast by mild marine conditions year round. Summer temperatures are cool along the fog-laden coast, and warm to hot inland, with an average daily maximum in July in Riverside near 100°F. Annual precipitation averages 15 inches in the lowlands to more than 30 inches in the mountains, with rainfall primarily in the winter and almost non-existent in the months of May through September. The region as a whole is flat and highly urbanized in the lowlands, hilly grasslands in the southern portion, and forested mountains in the uplands.

3.2 POPULATION CHARACTERISTICS AND DEMOGRAPHICS

Essential habitat for the navarretia has been identified within three California counties, although only two counties, Los Angeles and San Diego, contain lands proposed as critical habitat. Riverside County contains essential habitat for the navarretia which has been excluded from proposed critical habitat under section 4(b)(2) of the Act. A portion of those lands in San Diego County identified as essential habitat for the navarretia have also been excluded from or not included in the proposed critical habitat, pursuant to sections 4(b)(2) and 4(a)(3) of the Act. Proposed critical habitat, excluded lands, and not included lands are described in Section 1.8. Because navarretia conservation efforts apply to all identified essential habitat whether proposed for critical habitat, or excluded or not included, socioeconomic data for all three counties are presented here. Table 3 presents the population size, change in population from 1990 to 2004, per capita income, and poverty rates for the three counties and the State of California. The three counties combined account for over 41 percent of the total population of the State, or nearly 15 million

people. The three counties are some of the most populated in the United States; based on 2004 population estimates, Los Angeles was the largest county in the nation, while San Diego was the sixth largest, and Riverside County ranked thirteenth.⁵⁷ Los Angeles County represents nearly 28 percent of the State’s total population.

Table 3
Socioeconomic Profile of Counties Containing Navarretia Essential Habitat

County/State	Population (2004)	Percent of State (2004)	Percent Change (1990-2004)	Per Capita Income (2002)	Poverty Rate (2002)
Los Angeles County	9,937,739	27.7%	+12.1%	\$30,804	17.3%
Riverside County	1,871,950	5.2%	+59.9%	\$24,814	12.9%
San Diego County	2,931,714	8.2%	+17.4%	\$34,872	10.9%
California State	35,893,799	100.0%	+20.6%	\$32,989	13.3%

Sources:

2004 population estimates: U.S. Census Bureau, “Table 1: Annual Estimates of the Population for Counties of California: April 1, 2000 to July 1, 2004 (CO-EST2004-01-06),” downloaded from <http://www.census.gov/popest/counties/CO-EST2004-01.html>, April 15, 2005.

2002 poverty estimates: U.S. Census Bureau, December 2004, “Small Area Income and Poverty Estimates,” accessed at <http://www.census.gov/hhes/www/saipe/tables.html>, April 15, 2005.

1990-2004 population change: U.S. Census Bureau, “Ranking Tables for Counties,” downloaded from <http://www.census.gov/population/www/cen2000/phc-t4.html>, May 12, 2004; and U.S. Census Bureau, “Table 1: Annual Estimates of the Population for Counties of California: April 1, 2000 to July 1, 2004 (CO-EST2004-01-06),” downloaded from <http://www.census.gov/popest/counties/CO-EST2004-01.html>, April 15, 2005.

2002 per capita income: U.S. Department of Commerce, May 2004, Bureau of Economic Analysis, *Regional Economic Information System 1969-2002*, CD-ROM.

From 1990 to 2004, the population of Los Angeles County has increased by just 12.1 percent, lagging behind the Statewide average of 20.6 percent. Population growth in San Diego County has also lagged slightly behind that of the State, increasing by 17.4 percent over the same time period. The population of Riverside County has grown significantly since 1990, increasing by nearly 60 percent from 1990 to 2004. In recent years (2000 to 2004), Riverside County’s population increased by 21.1 percent, making it the second fastest growing county in the State.⁵⁸

⁵⁷ U.S. Census Bureau, April 14, 2005 (Release Date), “Table CO-EST2004-08 - Population Estimates for the 100 Largest U.S. Counties Based on July 1, 2004 Population Estimates: April 1, 2000 to July 1, 2004,” <http://www.census.gov/popest/counties/CO-EST2004-08.html>.

⁵⁸ U.S. Census Bureau, “Table 1: Annual Estimates of the Population for Counties of California: April 1, 2000 to July 1, 2004 (CO-EST2004-01-06),” downloaded from <http://www.census.gov/popest/counties/CO-EST2004-01.html>, April 15, 2005.

Per capita incomes for the three counties range from a low of \$24,814 in Riverside County to a high of \$34,872 in San Diego County. Per capita incomes for Los Angeles and Riverside Counties are lower than the Statewide average of \$32,989, while per capita income in San Diego County exceeds the State average.

The poverty rate for a region is the percentage of people who are estimated to live below the poverty level, which is based on national levels set for minimum income requirements for various sizes of households. Poverty rates for the three counties range from a low of 10.9 percent in San Diego County to a high of 17.3 percent in Los Angeles County. Poverty rates in Riverside and San Diego counties are both less than the State average of 13.3 percent.

3.3 EMPLOYMENT AND ECONOMIC ACTIVITY

Employment is a key economic indicator, as patterns of growth and decline in a region's employment are largely driven by economic cycles and local economic activity. Current employment figures can be examined to provide a "snapshot" of a region's economy, highlighting key industries. Recent employment data for the three counties containing essential habitat for the navarretia are presented in Table 4. Employment is given for each industry group in terms of the number of jobs, which includes both full-time and part-time jobs, and as a percentage of the total jobs for each county.

Total employment in Los Angeles County is 5,554,695, accounting for nearly 28 percent of total employment in the State of California. The county has a very diverse economic base, with employment spread among a number of industries. The largest employer is the trade, transportation, and utilities industry group, with nearly one million jobs, or just less than 18 percent of total employment in the county. About 400,000 of these jobs are related to retail trade, and another 218,000 jobs are related to wholesale trade.⁵⁹ Other major employers in Los Angeles County are professional and business services, with about 16 percent of total jobs, and government and educational and health services, each with about 11 percent of total jobs. Natural resource related industries, such as farming and mining, provide only a small portion of the total employment in the county, with less than one percent of all jobs found in agricultural production, mining, and forestry, hunting, fishing, and related activities.

⁵⁹ California Employment Development Department, 2003, "County Snapshots: Los Angeles," Labor Market Information Division.

Table 4
2002 Employment in Counties Containing Navarretia Essential Habitat
(Number of Jobs and Percentage of Total Jobs)

	Los Angeles	Riverside	San Diego	
Total Employment	5,554,695	719,804	1,806,321	
Goods Producing:	Agricultural Production (Farm)	9,204 (0.2%)	13,909 (1.9%)	16,903 (0.9%)
	Forestry, Hunting, Fishing, and Related Activities ^{a/}	4,783 (0.1%)	10,566 (1.5%)	4,168 (0.2%)
	Mining	8,237 (0.1%)	1,057 (0.1%)	1,668 (0.1%)
	Construction	215,159 (3.9%)	72,830 (10.1%)	103,215 (5.7%)
	Manufacturing	574,021 (10.3%)	54,027 (7.5%)	123,954 (6.9%)
Service Providing:	Trade, Transportation, and Utilities ^{b/}	996,558 (17.9%)	124,923 (17.4%)	267,650 (14.8%)
	Leisure and Hospitality ^{c/}	501,292 (9.0%)	71,808 (10.0%)	163,739 (9.1%)
	Financial Activities ^{d/}	526,332 (9.5%)	60,086 (8.3%)	173,632 (9.6%)
	Information	251,368 (4.5%)	8,594 (1.2%)	45,810 (2.5%)
	Professional and Business Services ^{e/}	891,871 (16.1%)	84,098 (11.7%)	304,288 (16.8%)
	Educational and Health Services ^{f/}	583,323 (10.5%)	65,711 (9.1%)	161,213 (8.9%)
	Other Services	362,214 (6.5%)	45,081 (6.3%)	99,168 (5.5%)
	Government	630,333 (11.3%)	107,114 (14.9%)	340,913 (18.9%)

a/ also includes Agricultural Services

b/ includes Utilities, Transportation and Warehousing, Retail Trade, and Wholesale Trade

c/ includes Accommodation and Food Services, and Arts, Entertainment, and Recreation

d/ includes Finance and Insurance, and Real Estate and Rental and Leasing

e/ includes Professional, Scientific, and Technical Services, Administrative Support, Waste Management, and Remediation Services, and Management of Companies and Enterprises

f/ includes Education Services and Health Care and Social Assistance

Source: U.S. Department of Commerce, May 2004, Bureau of Economic Analysis, *Regional Economic Information System 1969-2002*, CD-ROM.

Riverside County employment is 719,804 jobs, or about 3.6 percent of total employment in the State of California. About 17 percent of jobs in the county are found in trade, transportation, and utilities; retail trade represents over 70 percent of those jobs.⁶⁰ Government is also a significant employer, contributing nearly 15 percent of total county jobs, while the professional and business services sector provides nearly 12 percent of total county jobs. Construction and leisure and hospitality each provide more than ten percent of the total jobs in Riverside County. About two percent of Riverside County employment is related to agricultural production on farms, and another 1.5 percent is found in the forestry, hunting, fishing, and related activities sector, which includes agricultural services jobs.

Employment in San Diego County is 1,806,321 jobs, or about 9.1 percent of total employment in the State of California. The largest county employer is government, with nearly 19 percent of total employment, followed by professional and business services with nearly 17 percent of total employment. Nearly 15 percent of county jobs are in trade, transportation, and utilities, of which about half are related to retail trade.⁶¹ Farm employment in San Diego County makes up less than one percent of total employment, and an even smaller share of employment is related to forestry, hunting, fishing, and related activities.

Earnings from employment in counties containing essential habitat for the navarretia are presented in Table 5, broken out by industry group as employment was in the previous table. Earnings represent the sum of three components of personal income: wage and salary disbursements, other labor income (includes employer contribution to pension and profit-sharing, health and life insurance, and other non-cash compensation), and proprietors' income. Earnings reflect the amount of income that is derived directly from work and work-related factors. Earnings can be used as a proxy for the income that is generated within a geographical area by industry sectors, and can be used to identify the significant income-producing industries of a region or to show trends in industry growth or decline.

⁶⁰ California Employment Development Department, June 24, 2004, "Riverside County – Industry Employment and Labor Force by Annual Average," downloaded from <http://www.calmis.cahwnet.gov/htmlfile/county/river.htm>.

⁶¹ California Employment Development Department, June 24, 2004, "San Bernardino County – Industry Employment and Labor Force by Annual Average," downloaded from <http://www.calmis.cahwnet.gov/htmlfile/county/sbern.htm>.

Table 5
2002 Earnings from Employment in Counties Containing Navarretia Essential Habitat
(Millions of Dollars and Percentage of Total Earnings)

		Los Angeles	Riverside	San Diego
	Total Earnings	\$254,950.3	\$24,015.2	\$79,407.3
Goods Producing:	Agricultural Production (Farm)	\$261.9 <i>(0.1%)</i>	\$251.6 <i>(1.0%)</i>	\$395.6 <i>(0.5%)</i>
	Forestry, Hunting, Fishing, and Related Activities ^{d/}	\$137.9 <i>(0.1%)</i>	\$225.5 <i>(0.9%)</i>	\$125.1 <i>(0.2%)</i>
	Mining	\$595.8 <i>(0.2%)</i>	\$41.5 <i>(0.2%)</i>	\$46.4 <i>(0.1%)</i>
	Construction	\$10,384.1 <i>(4.1%)</i>	\$3,151.7 <i>(13.1%)</i>	\$5,321.7 <i>(6.7%)</i>
	Manufacturing	\$30,147.7 <i>(11.8%)</i>	\$2,432.4 <i>(10.1%)</i>	\$7,892.3 <i>(9.9%)</i>
Service Providing:	Trade, Transportation, and Utilities ^{b/}	\$41,087.7 <i>(16.1%)</i>	\$4,053.0 <i>(16.9%)</i>	\$9,950.5 <i>(12.5%)</i>
	Leisure and Hospitality ^{c/}	\$13,334.5 <i>(5.2%)</i>	\$1,319.6 <i>(5.5%)</i>	\$3,225.5 <i>(4.1%)</i>
	Financial Activities ^{d/}	\$25,268.8 <i>(9.9%)</i>	\$1,605.4 <i>(6.7%)</i>	\$7,750.7 <i>(9.8%)</i>
	Information	\$22,360.6 <i>(8.8%)</i>	\$347.4 <i>(1.4%)</i>	\$3,700.8 <i>(4.7%)</i>
	Professional and Business Services ^{c/}	\$45,338.3 <i>(17.8%)</i>	\$2,286.0 <i>(9.5%)</i>	\$14,493.7 <i>(18.3%)</i>
	Educational and Health Services ^{f/}	\$23,989.7 <i>(9.4%)</i>	\$2,275.0 <i>(9.5%)</i>	\$6,206.5 <i>(7.8%)</i>
	Other Services	\$7,959.1 <i>(3.1%)</i>	\$1,081.9 <i>(4.5%)</i>	\$2,207.5 <i>(2.8%)</i>
	Government	\$34,084.3 <i>(13.4%)</i>	\$4,944.2 <i>(20.6%)</i>	\$18,091.0 <i>(22.8%)</i>

a/ also includes Agricultural Services

b/ includes Utilities, Transportation and Warehousing, Retail Trade, and Wholesale Trade

c/ includes Accommodation and Food Services, and Arts, Entertainment, and Recreation

d/ includes Finance and Insurance, and Real Estate and Rental and Leasing

e/ includes Professional, Scientific, and Technical Services, Administrative Support, Waste Management, and Remediation Services, and Management of Companies and Enterprises

f/ includes Education Services and Health Care and Social Assistance

Source: U.S. Department of Commerce, May 2004, Bureau of Economic Analysis, *Regional Economic Information System 1969-2002*, CD-ROM.

4.1 OTHER SPECIES LISTED UNDER THE ACT

The final rule listing navarretia as threatened also determined endangered status for *Atriplex coronata* var. *notatior* (San Jacinto Valley crownscale) and *Allium munzii* (Munz's onion), as well as threatened status for *Brodiaea filifolia* (thread-leaved brodiaea).⁶² These flowering plants occur in vernal pools and other wetlands or on clay soils and moist grasslands in the same region as the navarretia. Furthermore, the San Diego fairy shrimp (*Branchinecta sandiegonensis*) and Riverside fairy shrimp (*Streptocephalus woottoni*) are often found in the same vernal pool complexes with the navarretia as is California Orcutt grass (*Orcuttia californica*).⁶³

It is important to consider other species in the region listed under the Act, as protections for other threatened and endangered species and any of their designated critical habitats may also benefit the navarretia. When a consultation is triggered for any listed species, the Service will also take into account all other listed species known or thought to occupy areas on or near the project lands. For example, past section 7 consultations on the approved HCPs in Riverside and San Diego counties have included navarretia and a number of other federally listed species:

- San Diego County MSCP Plan provides protection for 21 federally listed species and species proposed for Federal listing.⁶⁴
- The BO for the City of San Diego subarea plan of the MSCP considers protection for 28 federally listed species and species proposed for Federal listing.⁶⁵
- The BO for the City of Chula Vista subarea plan of the MSCP considers protection for 29 federally listed species and species proposed for Federal listing.⁶⁶

⁶² U.S. Fish and Wildlife Service, October 13, 1998, "Determination of Endangered or Threatened Status for Four Southwestern California Plants from Vernal Wetlands and Clay Soils, Final Rule," *Federal Register*, Vol. 63, No. 197, pp. 52975-54994.

⁶³ Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, May 20, 2005.

⁶⁴ The City of San Diego, Multiple Species Conservation Program (MSCP), Plan Summary, <http://www.sandiego.gov/mscp/plansum.shtml>.

⁶⁵ U.S. Fish and Wildlife Service, June 6, 1997, Biological and Conference Opinions on Issuance of Take Permit to the City of San Diego pursuant to the Multiple Species Conservation Program (1-6-97-FW-47).

- The BO for the San Diego County subarea plan of the MSCP considers protection for 28 federally listed species and species proposed for Federal listing.⁶⁷
- San Diego County MHCP provides protection for 20 federally listed species.⁶⁸
- The BO for City of Carlsbad subarea plan of the MHCP considers protection for 18 federally listed species.⁶⁹
- The BO for the Western Riverside County MSHCP considers protection for 25 federally listed species.⁷⁰

Moreover, seven past section 7 consultations for the navarretia since listing have also involved the crownscale. In its recent proposed designation of critical habitat for the navarretia, the Service identified 31,086 acres of essential habitat for the species. This navarretia essential habitat overlaps with all but 32 acres (crownscale Unit 3) of the essential habitat identified for crownscale.⁷¹ Thus, the navarretia will likely benefit from conservation efforts taken to protect the crownscale in Units E1 and E2.⁷²

The Service maintains lists of threatened and endangered species, and organizes the list by State (http://ecos.fws.gov/tess_public). For California, there are 298 listed species, second among states only

⁶⁶ U.S. Fish and Wildlife Service, July 18, 2003, Biological and Conference Opinions on Issuance of Take Permit to the City of Chula Vista pursuant to the Multiple Species Conservation Program, San Diego County, California (FWS-SDG-882.1).

⁶⁷ U.S. Fish and Wildlife Service, March 12, 1998, Biological and Conference Opinions on Issuance of an Incidental Take Permit to the County of San Diego under the Multiple Species Conservation Program for their Subarea Plan (1-6-98-FW-03).

⁶⁸ Multiple Habitat Conservation Program, Public Review Draft MHCP Plan, November 2000.

⁶⁹ U.S. Fish and Wildlife Service, November 9, 2004, Subregional Multiple Habitat Conservation Plan and the City of Carlsbad Subarea Plan/Habitat Management Plan, San Diego County, California (FWS-SDG-87.4).

⁷⁰ U.S. Fish and Wildlife Service, July 22, 2004, Intra-Service Formal Section 7 Consultation/Conference for Issuance of an Endangered Species Act Section 10(a)(1)(B) Permit (TE-088609-0) for the Western Riverside County Multiple Species Habitat Conservation Plan, Riverside County, California (FWS-WRIV-870.19).

⁷¹ U.S. Fish and Wildlife Service, October 7, 2004, "Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule," *Federal Register*, Vol. 69, No. 194, pp. 60110-60134.

⁷² Although conservation is also spurred by the presence of other federally listed plant species, including the crownscale and thread-leaved brodiaea, this analysis assumes that 100 percent of the cost of conservation is attributable solely to the navarretia. Thus, this cost analysis method likely results in an overstatement of navarretia costs.

to Hawaii, including 119 animal species and 179 plant species.⁷³ Some conservation efforts may have been in place for many of these species that may provide incidental protection for the navarretia.

4.2 FEDERAL AND CALIFORNIA STATE STATUTES AND REGULATIONS

4.2.1 FEDERAL SECTION 7 CONSULTATIONS

Federal agencies are required to consult with the Service on activities that they fund, permit, authorize, or carry out in order to avoid jeopardizing the continued existence of a listed species. When critical habitat is designated, the agencies are also required to ensure that the activity will not result in an appreciable reduction in the value of the habitat to protect the listed species. In some cases, third parties such as local government or private entities participate in the consultation process along with the Federal action agency when the proposed project has a Federal nexus.

Section 7 consultations can take a variety of forms including informal, formal and conference. Informal consultations occur when the Service, action agency, and the applicant are able to identify and resolve potential concerns to the listed species at an early stage in the planning process. In some cases, it is determined that the proposed action may adversely affect the listed species or designated critical habitat. These instances can require “formal” consultation whereby the Service issues a Biological Opinion stating if the proposed action is likely to jeopardize a species or adversely modify critical habitat and provides recommendations on appropriate conservation measures to avoid, minimize or offset the impacts. The Service also conducts “conference” consultations that can be formal or informal. A conference consultation involves a process of early interagency cooperation involving informal or formal discussions between a Federal agency and the Services pursuant to section 7(a)(4) of the Act regarding the likely impact of an action on proposed species or proposed critical habitat. Conferences are: (1) required for proposed Federal actions likely to jeopardize proposed species, or destroy or adversely modify proposed critical habitat; (2) designed to help Federal agencies identify and resolve potential conflicts between an action and species conservation early in a project's planning; and (3) designed to develop recommendations to minimize or avoid adverse effects to proposed species or proposed critical habitat.⁷⁴

⁷³ U.S. Fish and Wildlife Service, “Threatened and Endangered Species System (TESS), Listings by State and Territory as of 04/18/2005, California,” http://ecos.fws.gov/tess_public/TESSWebpageUsaLists?state=CA, accessed April 18, 2005.

⁷⁴ U.S. Fish and Wildlife Service and National Marine Fisheries Service, March 1998, “Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act,” pp. xi-xii.

4.2.2 CLEAN WATER ACT

The purpose of the Clean Water Act (CWA) is to restore the physical, biological, and chemical integrity of the waters of the United States using two basic mechanisms: (1) direct regulation of discharges pursuant to permits issued under the National Pollutant Discharge Elimination System (NPDES) of section 402, as well as the discharge of dredge or fill materials under section 404; and (2) the Title III water quality program.⁷⁵

Under the NPDES program, U.S. Environmental Protection Agency (EPA) sets pollutant-specific limits on the point source discharges for major industries and provides permits to individual point sources that apply these limits. EPA has delegated responsibility for the NPDES permitting program to most states.⁷⁶ State-issued NPDES permits are treated as non-Federal actions. As such, the issuance of NPDES permits by states is not subject to the consultation requirements of the Act. The Service consults with the EPA on the triennial review to ensure that threatened and endangered species impacts are contemplated in the development of standards.

Under the water quality standards program, EPA has issued water quality criteria to establish limits on the ambient concentration of pollutants in surface waters that will still protect the health of the water body. States issue water quality standards that reflect the Federal water quality criteria and submit the standards to EPA for review. State water quality standards are subject to review every three years (triennial review). States apply the standards to NPDES discharge permits to ensure that discharges do not violate the water quality standards.⁷⁷

Section 404 of the CWA prescribes a permit program for the discharge of dredged or fill material into navigable waters. Under section 404 of the CWA, all applicants for a Federal license or permit to conduct activity that may result in discharge to navigable waters of the United States are required to submit a State certification to the licensing or permitting agency. Specifically, pursuant to section 404, permit applicants are required to show that they have “taken steps to avoid wetland impacts, where practicable, minimized potential impacts to wetlands, and provided compensation for any remaining, unavoidable impacts through efforts to restore or recreate wetlands.”⁷⁸

⁷⁵ 33 U.S.C. §1251 (1987).

⁷⁶ 33 U.S.C. §402.

⁷⁷ 33 U.S.C. §303, 305.

⁷⁸ U.S. Environmental Protection Agency, September 26, 2003 (last updated), “Section 404 of the Clean Water Act: An Overview,” <http://www.epa.gov/owow/wetlands/facts/fact10.html>.

4.2.3 PORTER-COLOGNE WATER QUALITY CONTROL ACT

The Porter-Cologne Act of 1969 is the organic act for the California State and Regional Water Quality Control Boards. The Act made the Regional Boards the “principal state agencies with primary responsibility for the coordination and control of water quality” with jurisdiction over the “waters of the state,” defined as “any surface water or groundwater, including saline waters, within the boundaries of the state.”⁷⁹ Regional Boards are the licensing and/or permitting agencies for any California State certification requisite under Section 401 of the CWA for activities requiring a Federal license or permit to conduct activities that may result in discharge into navigable waters.⁸⁰ Included as Federal licenses and permits subject to Section 401 are Sections 402 and 404 permits, Federal Energy Regulatory Commission hydropower licenses, and Rivers and Harbors Act Sections 9 and 10 permits.⁸¹

As a result of a 2001 United States Supreme Court Decision in *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers* (USACE), USACE jurisdiction over wetlands has been redefined to exclude isolated vernal pools not adjacent to open waters.⁸² However, the decision is not expected to have a significant effect on future USACE jurisdiction over vernal pools in Riverside County, as seasonally flooded alkali vernal playas are generally connected to USACE jurisdictional waters in the County.⁸³ For vernal pools where the USACE does not retain jurisdiction over an isolated wetland, the corresponding Regional Board could retain permitting authority through its permitting and licensing function under Section 401 of the CWA, and its jurisdiction over waters of the State. In cases where the San Diego Regional Board has assumed jurisdiction, the level of protection afforded to wetlands has been consistent with that when the USACE assumes jurisdiction.⁸⁴

⁷⁹ California Environmental Resources Evaluation System, “California Wetlands Information System (CWIS) Agency Roles and Responsibilities: State Water Resources Control Board”, <http://ceres.ca.gov/wetlands/agencies/swrcb.html>, accessed April 2005, and California Water Code, § 13050(e).

⁸⁰ Personal communication with David Acuff, Biologist, City of San Marcos, April 18, 2005.

⁸¹ U.S. Environmental Protection Agency, March 4, 2005 (last updated), “Section 401 of the Clean Water Act: An Overview,” <http://www.epa.gov/owow/wetlands/facts/fact24.html>, accessed April 2005.

⁸² Schoenbaum, Thomas J., Ronald H. Rosenberg, and Holly D. Doremus, 2002, *Environmental Policy Law: Problems, Cases and Readings*, Fourth Edition, Foundation Press, New York, pp. 392-397.

⁸³ U.S. Fish and Wildlife Service, 2003, “Final Economic Analysis of Critical Habitat Designation for Vernal Pool Species, Appendix E: Implementation of the Federal Clean Water Act and State Water Statutes,” p. E-3; personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, May 11, 2005.

⁸⁴ Personal communication with Pat Mock, Ph.D., Senior Biologist, URS Corporation, San Diego, California, April 18, 2005.

4.2.4 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) (P.R.C. 21000 et seq.) establishes State policy to prevent actions or project modifications from causing significant, avoidable damage to the environment by requiring changes through the use of alternatives or mitigation measures. In a manner comparable to section 7 of the Act, CEQA applies to actions undertaken, financed, or permitted by State lead agencies. Regulations for implementation are published in the State CEQA Guidelines, which establish an overall process for the environmental evaluation of projects that is similar to that promulgated under the National Environmental Policy Act (NEPA).

CEQA applies to certain activities of State and local public agencies. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a “project.” A project is an activity undertaken by a public agency or a private activity which must receive some discretionary approval from a government agency which may cause either a direct physical change in the environment or a reasonably foreseeable indirect change in the environment. Most proposals for physical development in California are subject to the provisions of CEQA, as are many governmental decisions which do not immediately result in physical development (such as adoption of a general or community plan). Every development project that requires discretionary governmental approval will likely require at least some environmental review pursuant to CEQA.⁸⁵

Article 14 of CEQA applies to projects that are subject to both CEQA and NEPA. NEPA applies to projects which are carried out, financed, or approved in whole or in part by Federal agencies. Accordingly, this article applies to projects which involve one or more State or local agencies *and* one or more Federal agencies.

An EIR is required to assess potential environmental impacts of a project, the components of which are detailed in Sections 15120 to 15132. In general, projects must identify potential environmental impacts and design alternatives where feasible for the project to avoid those impacts. If impacts are unavoidable, the project must provide a finding explaining why impacts are unavoidable, and subsequently design alternatives to minimize and mitigate environmental impacts.

CEQA provides protection for the navarretia by requiring project descriptions that identify the environmental setting of a project. If impacts are found to be unavoidable, alternatives to minimize impacts to navarretia habitat are required to be designed through the EIR process.

⁸⁵ California Resources Agency, “California Environmental Quality Act: Frequently Asked Questions,” http://ceres.ca.gov/topic/env_law/ceqa/more/faq.html, accessed July 22, 2004.

4.3 CONSERVATION PROGRAMS

4.3.1 THE SOUTHERN CALIFORNIA WETLANDS RECOVERY PROJECT

The Southern California Wetlands Recovery Project (WRP) is a cooperative of Federal, State, and local agencies working with businesses and non governmental organizations to acquire, restore, and expand coastal wetlands and watershed habitat along the coasts of Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties.⁸⁶ The WRP area also extends inland from the coast and into Western San Bernardino and Riverside Counties. At its core, the main policy goal of the WRP is to create regional prioritization plan to accelerate acquisition, restoration, and enhancement efforts.

The WRP is organized around a governing board of 5 Federal agencies and 12 State agencies, including the Army Corps of Engineers (USACE), the Service, the U.S. and California Environmental Protection Agency (EPA), the State Water Resources Control Board and Regional Boards, the California Department of Fish and Game (CDFG), and the Coastal Conservancy, among others. The Public Advisory Committee and the Southern California Wetlands Managers Group coordinate with the Governing Board, while the Scientific Advisory Panel identifies regional goals, priorities, project criteria, specific objectives. A five county task force consisting of Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties implement resulting work plans, projects, and other efforts for wetlands in their respective jurisdictions.

Project funding is provided through various mediums. At the Federal level, the USACE, the Service, the National Marine Fisheries Service, the United States Department of Agriculture, and the U.S. EPA provide funding for the WRP through various programs related to wetlands, conservation, and water quality. Also, 18 California wetland programs provide funding for the WRP. At the local level, counties and private donors, including local businesses, corporations, and public entities, have all provided funding for the WRP.

The “Regional Restoration Strategy” and the “Work Plan” are the two documents that influence of the work of the WRP. Within the Regional Restoration Strategy are descriptions of regional goals for wetland and watershed protection as well as specific goals for the counties of the task force. Project proposals are submitted through the Work Plan and reviewed by the Wetlands Managers Group. Also, the Work Plan is periodically updated to include recent projects. The most recent work plan (2003) lists 74 total projects, 26 of which are currently funded.⁸⁷ The estimated total cost of all funded projects is \$42,149,722, resulting in an average need for approximately \$1.62 million per project undertaken by the WRP.

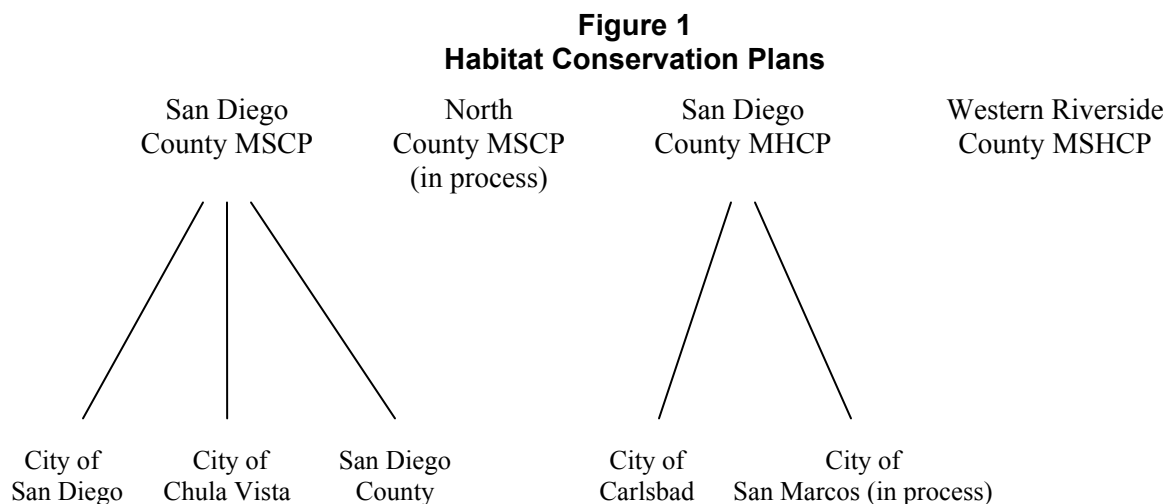
⁸⁶ Southern California Wetlands Recovery Project, <http://www.scwrp.org/>, accessed April 2005.

⁸⁷ Southern California Wetlands Recovery Project, 2003, “Southern California Wetlands Recovery Project 2003 Work Plan Summary,” <http://www.scwrp.org/documents/WorkPlan/2003-Work-Plan-Summary.pdf>, accessed April 2005.

Navarretia occurring in coastal areas in southern California may benefit from projects of the WRP. Although the WRP area extends inland, the main focus of the project is on coastal wetlands and watersheds. Therefore, it is unlikely that inland proposed navarretia essential habitat units, such as those occurring in Western Riverside County, Los Angeles County, and inland areas of San Diego County, would benefit from the WRP. However, coastal essential habitat units and those just inland may benefit from the efforts of the WRP.

4.4 HABITAT CONSERVATION PLANS

The essential habitat units for the navarretia are located in four subregional HCPs (see Maps 7 and 10): the San Diego County MSCP, the San Diego County MHCP, the North County (San Diego) MSCP (in process), and the Western Riverside County MSHCP. These subregional HCPs act as “umbrella documents” that guide local jurisdictions in creating subarea plans regarding preserve design, habitat and species criteria, and management and monitoring criteria. There are five subarea plans contained within the subregional plans that are relevant to navarretia essential habitat (see Maps 8 and 9 and Figure 1). This section describes the four subregional plans and their respective subarea plans.



4.4.1 THE SAN DIEGO COUNTY MULTIPLE SPECIES CONSERVATION PROGRAM

The San Diego County MSCP Plan was the first comprehensive HCP in San Diego County. Completed in 1997, the purpose of the plan was to provide for the protection of the wide range of rare, threatened, and endangered species in San Diego, while at the same time accommodating economic development in the region. In total, there are 85 covered species under the plan,⁸⁸ 21 of which are federally listed as

⁸⁸ San Diego County, 1998, *Multiple Species Conservation Program (MSCP), Final*, Section 3.3 “Covered Species.”

threatened or endangered or proposed for Federal listing.⁸⁹ Through approved jurisdictional subarea plans implemented by participating jurisdictions and San Diego County, the MSCP serves as a HCP pursuant to section 10 (a)(1)(b) of the Act, as well as a Natural Community Conservation Plan (NCCP) pursuant to the California Natural Community Conservation Planning Act of 1991.

The MSCP Study Area covers approximately 582,243 acres of the southwestern portion of San Diego County, including approximately 5,215 acres of essential habitat, encompassing ten participating jurisdictions including unincorporated areas of the County. In the south, the MSCP Study Area is bounded by the U.S./Mexican border and in the east by unincorporated areas of San Diego County comprised mainly of national forest land. The Pacific Ocean borders the Study Area in the west while the San Deguito River Valley comprises its northern boundary.

Just over half of the MSCP Study Area, 315,940 acres, is inhabited by various vegetation communities. Distribution of navarretia is limited to vernal pools within the MSCP Study Area. For the portion of San Diego County covered by the MSCP Study Area, the Service has identified 5,214 acres of essential habitat for navarretia within 17 units (excluding those located on military lands). Of the 17 essential habitat units, the Service has proposed five to be designated as critical habitat.

As a subregional plan, the MSCP acts as an “umbrella document” for jurisdictions formulating subarea plans. Conservation for covered species is accomplished through conservation measures for a preserve system that constitutes the Multiple Habitat Planning Area (MHPA). Each jurisdiction participating in the MSCP Plan implements a portion of the MHPA preserve system. In order to maximize conservation and identify lands where development would not interfere with habitat, 16 Biological Core Areas and linkages between those areas were prioritized for conservation.⁹⁰ The MHPA is approximately 172,000 acres.⁹¹

The navarretia occurs exclusively in vernal pools. Conservation measures for vernal pool species are determined through MSCP Subarea Plans of the respective jurisdictions. Federal programs that preserve vernal pools are enacted through the MSCP. At the time the plan was completed in 1998, the Service was looking to expand the San Diego National Wildlife Refuge through the Vernal Pools Stewardship Project where 8,200 acres of vernal pool complexes in Del Mar Mesa, Otay Mesa, Lopez Ridge, Montgomery Field, and Sweetwater and Otay Reservoirs would be acquired for preservation.⁹²

⁸⁹ Personal communication with Keith Greer, Deputy Planning Director, City of San Diego, March 25, 2005.

⁹⁰ San Diego County, 1998, *Multiple Species Conservation Program (MSCP), Final*, Section 2.2 “Biological Core and Linkage Areas.”

⁹¹ California Department of Fish and Game, Natural Community Conservation Planning, April 26, 2005 (last modified), “Status of NCCP Planning Efforts,” <http://www.dfg.ca.gov/nccp/status.htm>.

⁹² San Diego County, 1998, *Multiple Species Conservation Program (MSCP), Final*, Section 4.2.2 “Habitat Acquisition by Federal and State Governments.”

Section 3.2.1 of the MSCP outlines regulations pertaining to impacts of vernal pool habitat in the MSCP Study Area. In general, impacts to jurisdictional wetlands will continue to be regulated through USACE consultations with the Service via the USACE authorization of Section 404 permits, while the CDFG will simultaneously work with the Service, the USACE, and local MHCP jurisdictions to ensure that Fish and Game Code 1600 agreements “are consistent with (1) the mitigation required for MSCP covered species by Section 404 permits (including section 7 consultations) and (2) the MSCP Plan.”⁹³ Conservation measures to avoid, minimize, or offset unavoidable impacts to vernal pools is determined through biological opinions (BOs) written by the Service during section 7 consultation.

Within the San Diego County MSCP subregional area, proposed navarretia essential habitat is covered by three subarea plans: the City of San Diego Subarea Plan, the City of Chula Vista Subarea Plan, and the San Diego County Subarea Plan. These three MSCP subarea plans are described below.

4.4.1.1 The City of San Diego MSCP Subarea Plan

The City of San Diego Subarea Plan (CSDSAP) encompasses the incorporated areas of the City of San Diego and a small portion of unincorporated areas of San Diego County owned by the City. Approximately 206,124 acres within the MSCP study area are contained within the jurisdiction of CSDSAP, including approximately 3,880 acres of essential habitat, which is characterized mainly by urban land use. The CSDSAP Multiple Habitat Planning Area (MHPA) is 56,831 acres and comprises 29 percent of the regional MHPA.⁹⁴

Excluding habitat at Marine Corps Air Station (MCAS) Miramar, the CSDSAP contains five essential habitat units constituting approximately 3,730 acres of navarretia habitat that the Service has determined to be essential for the plant’s conservation. These units include: E10; E12; E18; E19; and E20. Unit 5D is also located within the general area covered by the CSDSAP, however this specific area is not a part of the plan. Since it is not covered by the plan it is proposed as critical habitat.⁹⁵

Vernal pool species are to be protected through avoidance, enhancement, management, and or transplantation to areas identified for preservation.⁹⁶ In general, wetlands and vernal pools within the bounds of the CSDSAP MHPA will be avoided. Outside the MHPA boundaries, unavoidable impacts to wetlands and vernal pools shall be minimized according to CEQA and Federal no net loss requirements.⁹⁷

⁹³ San Diego County, 1998, *Multiple Species Conservation Program (MSCP), Final*, Section 3.2.1 “Wetlands.”

⁹⁴ City of San Diego, 1997, *City of San Diego MSCP Subarea Plan*, Section 1.2 “Description of Subarea”

⁹⁵ Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, May 20, 2005.

⁹⁶ City of San Diego, 1997, *City of San Diego MSCP Subarea Plan*, Section 1.6.4 “Conservation Estimates”

⁹⁷ Personal communication with Randy Rodriguez, Associate Planner, MSCP Regulations, City of San Diego, March 18 2005; and City of San Diego, 1997, *City of San Diego MSCP Subarea Plan*, Section 1.6.4 “Conservation Estimates”

Conservation measures to avoid, minimize, or offset unavoidable impacts is determined by the service in BOs during consultation. CSDSAP imposes mitigation ratios ranging from 2:1 to 4:1.⁹⁸

4.4.1.2 The City of Chula Vista MSCP Subarea Plan

Approved in 2003 and permitted in 2005, the City of Chula Vista received incidental take permits for approximately 86 species from the Service and CDFG under the City of Chula Vista Subarea Plan (CVSAP).⁹⁹ The CVSAP Area encompasses the City of Chula Vista and extends north, east, and south, where it is bordered by CSDSAP and the San Diego County MSCP Subarea Plan. In total, 33,045 acres of habitat are enclosed in the CVSAP Study Area.¹⁰⁰ Within the CVSAP Area, there are three units (E13, E14, and E16) of *navarretia* essential habitat covering approximately 234 acres.

The MHPA is approximately 9,243 acres.¹⁰¹ Within the City of Chula Vista, MHPA lands are required to be either 100 percent preserved or “75 to 100” percent preserved. The 100 percent conservation areas are mapped by “hard line” boundaries while the “75 to 100” percent preserved areas are defined by quantitative biological preservation targets. A conveyance ratio will be determined for all development projects covered under the CVSAP; this ratio is calculated as the ratio of projected need for habitat conservation (acres) to total development (acres). Assembly of the CVSAP MHPA will occur primarily through the development process.

The CVSAP outlines conservation guidelines for the protection of vernal pools. In general, vernal pools should be avoided, and where impacts are unavoidable, they should be minimized. Strategies for protecting vernal pools include: avoidance and minimization; management; enhancement; and transplantation where feasible. Mitigation for vernal pools species ranges in like kind from 1:1 to 3:1, depending on the sensitivity of the species.¹⁰² Impacts to USACE and CDFG jurisdictional vernal pools

⁹⁸ Personal communication with Keith Greer, Deputy Director, City of San Diego Planning Department, March 25, 2005; and City of San Diego, 2001(amended), *Land Development Manual: Biology Guidelines*, San Diego Municipal Code

⁹⁹ California Department of Fish and Game, Natural Community Conservation Planning, April 26, 2005 (last modified), “Status of NCCP Planning Efforts,” <http://www.dfg.ca.gov/nccp/status.htm>.

¹⁰⁰ City of Chula Vista, 2003, *City of Chula Vista MSCP Subarea Plan*, Section 2.0 “Description of the Chula Vista MSCP Planning Area.”

¹⁰¹ California Department of Fish and Game, Natural Community Conservation Planning, April 26, 2005 (last modified), “Status of NCCP Planning Efforts,” <http://www.dfg.ca.gov/nccp/status.htm>.

¹⁰² City of Chula Vista, 2003, *City of Chula Vista MSCP Subarea Plan*, Section 5.2.3 “Avoidance and Minimization of Impacts to Narrow Endemic Species.”

will be assessed through consultation with the Service. CVSAP mitigation requirements range from 2:1 to 4:1 for impacts to vernal pools.¹⁰³

4.4.1.3 The San Diego County MSCP Subarea Plan

Adopted by the County Board of Supervisors in 1997, the San Diego County Subarea Plan (SDCSAP) encompasses 252,132 acres of unincorporated areas in San Diego County, including approximately 1,100 acres of essential habitat, and 101,268 will be conserved within the MHPA.¹⁰⁴ Three key segments of the SDCSAP include Metro-Lakeside-Jamul, Lake Hodges, and South County. Within the boundaries of the SDCSAP jurisdiction are eight essential habitat units for the navarretia. Spanning approximately 1,100 acres, these units are 3, 5A, 5B, 5C, E9, E11, E15, and E17. Although all units are considered essential habitat, the Service determined that only four units, 3, 5A, 5B, and 5C, should be proposed for designation as critical habitat for the navarretia as these areas are in major and minor amendment areas and not covered by the subarea plan.

Conservation measures to avoid, minimize, or offset impacts to vernal pool species will continue to be regulated and determined through USACE and CDFG consultations with the Service on a project-by-project basis. The Biological Mitigation Ordinance (BMO) guides the segments of the SDCSAP regarding regulation and mitigation of impacts to biological resources. The navarretia is listed as a sensitive plant species in San Diego County and is therefore a Group A species. Mitigation ratios for impacts to navarretia found in vernal pool habitat range from 1:1 to 5:1, corresponding to the Tier 1 level of the BMO.¹⁰⁵ Although this range is outlined in the BMO, much of the development impacting vernal pool habitat in the SDCSAP Area occurred before the plan was adopted, and typical ranges of compensatory mitigation have been closer to 3:1 than to 5:1.¹⁰⁶

4.4.2 THE SAN DIEGO COUNTY MULTIPLE HABITAT CONSERVATION PROGRAM

A second subregional plan, the San Diego County (MHCP), was completed in 2003, and includes the navarretia as a covered species. The creation of this MHCP was prompted by the goal of accommodating economic growth in rapidly developing San Diego County while at the same time protecting and

¹⁰³ Personal communication with Josie Gabriel, Associate Planner, City of Chula Vista, April 1, 2005; and City of Chula Vista, 2003, *City of Chula Vista MSCP Subarea Plan*, Section 5.2.4 “Wetlands Protection Program,” Table 5-6.

¹⁰⁴ California Department of Fish and Game, Natural Community Conservation Planning, April 26, 2005 (last modified), “Status of NCCP Planning Efforts,” <http://www.dfg.ca.gov/nccp/status.htm>.

¹⁰⁵ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, March 30, 2005; and County of San Diego, 2004, “Attachment M: Table of Mitigation Ratios,” Document 0769999, Clerk of the Board of Supervisors.

¹⁰⁶ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, March 30, 2005, via the Parks and Recreation Department, County of San Diego.

conserving numerous rare, threatened, and endangered species. In total, the MHCP covers 51 species, of which 20 are federally listed. When all seven jurisdictions participating in the MHCP have completed approved subarea plans, the MHCP will serve as a HCP pursuant to section 10 (a)(1)(b) of the Act, as well as a NCCP pursuant to the California Natural Community Conservation Planning Act of 1991.

The MHCP Study Area encompasses approximately 111,908 acres and seven jurisdictions, including approximately 304 acres of essential habitat. Currently, the City of Carlsbad is the only jurisdiction operating a permitted MHCP Subarea Plan. Marine Corp Base Camp Pendleton borders the MHCP Study Area to the north, while in the east the Study Area is bounded by unincorporated areas of San Diego County that will soon be covered by the North County MSCP and the East San Diego County HCP. In the west the Study Area is bounded by the Pacific Ocean and in the south by the San Diego County MSCP Plan Area.

Since the navarretia occurs exclusively in vernal pools, its distribution is severely restricted within the MHCP Study Area. Vernal pool habitat constitutes just 0.07 percent of the MHCP Study Area, with two “important concentrations” located in the railroad right-of-way of the Poinsettia Lane Commuter Train Station in Carlsbad, and the downtown area of San Marcos.¹⁰⁷ The Service considers both of these areas to be essential habitat for the conservation of the navarretia and has proposed as critical habitat both Unit 2 containing the Poinsettia Lane Commuter Train Station, and Units 4A through 4D containing vernal pool habitat in downtown San Marcos.

As a subregional plan, the San Diego County MHCP is an “umbrella” document that presents guidelines for jurisdictions to follow in creating their Subarea Plans. Conservation for covered species is accomplished through the creation and management of a multi-jurisdictional system of preserve areas known as Focused Planning Areas (FPA), defined by both “hardline” and “softline” boundaries. Hardline boundaries represent areas that are 100 percent preserved, while softline boundaries represent areas of varying levels preservation. Levels of and regulations pertaining to habitat conservation are not uniform for habitat contained inside and outside the FPA of the MHCP Study Area. The FPA is approximately 20,593 acres.¹⁰⁸

In general, the MHCP indicates that impacts to species contained within vernal pool habitat will continue to be regulated through USACE consultations with the Service via its authorization of Section 404 permits, while the CDFG will simultaneously work with the Service, the USACE, and MHCP subarea jurisdictions to ensure that Fish and Game Code 1600 agreements “are consistent with (1) the mitigation required for MHCP covered species by Section 404 permits (including section 7 consultations of the Act)

¹⁰⁷ San Diego Association of Governments, 2003, *Multiple Habitat Conservation Program, Volume 1 – Final*, Section 3.7 “Requirements for Subarea Plans to Protect Biological Resources.”

¹⁰⁸ California Department of Fish and Game, Natural Community Conservation Planning, April 26, 2005 (last modified), “Status of NCCP Planning Efforts,” <http://www.dfg.ca.gov/nccp/status.htm>.

and (2) the MHCP Plan.”¹⁰⁹ Regardless of Federal regulations, the MHCP requires mitigation for impacts to wetland/vernal pool species ranging from 2:1 to 4:1.¹¹⁰ While the Service recommends conservation measures to avoid, minimize, or offset a project’s impacts through BOs during formal consultation, should the recommended conservation measures be at a level less than that required by the MHCP plan, applicants could be subject to MHCP mitigation ratios.

Due to the small percentage of vernal pool habitat in the MHCP Study Area, the navarretia is defined as a narrow endemic species in the MHCP Plan. Table 3-7 of Volume 1 of the Final MHCP Plan lists the known critical locations of narrow endemic species. Narrow endemic species are given particular protection under the MHCP Plan. Within the FPA, jurisdictions cannot permit “more than 5 percent loss of narrow endemic populations or occupied acreage (whichever measure is biologically most appropriate for the species based on the best available science)”, whereas outside the FPA, jurisdictions cannot allow “more than 20 percent loss of narrow endemic locations, population numbers, or occupied acreage within the city (whichever measure is biologically most appropriate for the species).”¹¹¹ This language implies protection to a known population of navarretia on an exact acreage in a specific location, and does not necessarily encompass all lands the Service has determined to be essential habitat for the conservation of the navarretia.

Within the San Diego County MHCP, navarretia essential habitat is under the jurisdiction of two MHCP Subarea Plans: the City of Carlsbad MHCP and the City of San Marcos MHCP (in process). These two subarea plans are described below.

4.4.2.1 The City of Carlsbad MHCP Subarea Plan

Recently permitted in 2004, the City of Carlsbad’s Habitat Management Plan (HMP), a subarea plan of the MHCP, encompasses 24,570 acres, including approximately 143 acres of proposed critical habitat in Unit 2, and 6,400 will be conserved within the FPA.¹¹² Contained within this unit are the Poinsettia Lane Commuter Train Station and its railroad right-of-way in which are located vernal pools containing navarretia. The railroad right-of-way is contained within a “hardline” FPA, therefore providing 100 percent preservation for the navarretia occurring in vernal pools contained therein as defined by the MCHP Plan.

¹⁰⁹ San Diego Association of Governments, 2003, *Multiple Habitat Conservation Program, Volume 1 – Final*, Section 3.6 “Wetlands.”

¹¹⁰ San Diego Association of Governments, 2003, *Multiple Habitat Conservation Program, Volume 1 – Final*, Section 3.6 “Wetlands.”

¹¹¹ San Diego Association of Governments, 2003, *Multiple Habitat Conservation Program, Volume 1 – Final*, Section 3.7 “Requirements for Subarea Plans to Protect Biological Resources.”

¹¹² California Department of Fish and Game, Natural Community Conservation Planning, April 26, 2005 (last modified), “Status of NCCP Planning Efforts,” <http://www.dfg.ca.gov/nccp/status.htm>.

4.4.2.2 The City of San Marcos MHCP Subarea Plan

Although not yet permitted by the CDFG and the Service, the City of San Marcos MHCP Subarea Plan (CSMSAP) will encompass approximately 160 acres of Units 4A through 4D proposed as navarretia critical habitat. These units are located in downtown San Marcos. Unit 4D is partially contained within a “softline” FPA of the MHCP that provides for 90 percent preservation of navarretia habitat located therein. The City’s draft plan does not specify the total plan area, but the jurisdiction of the City is 15,914 acres and the FPA is approximately 3,534 acres.¹¹³ The draft covers seven federally listed species, and the list of covered species does not include the navarretia.¹¹⁴ However, some navarretia occurs in a major amendment area which has not yet come into the CSMSAP. However, the Service asserts that MHCP standards regarding narrow endemic species and MHCP mitigation ratios for impacts to vernal pool species (ranging from 2:1 to 4:1) still apply in this area.¹¹⁵

4.4.3 THE NORTH COUNTY MULTIPLE SPECIES CONSERVATION PROGRAM

During 1992, in conjunction with the San Diego Association of Governments (SANDAG), the County of San Diego began creating a jurisdictional subarea plan for the unincorporated areas of north San Diego County under the MHCP Plan. The County stopped participating in the common effort and has since been creating a separate HCP known as the North County MSCP, which remains at least one year from being permitted.¹¹⁶ The North County MSCP plan will cover 58 species, including navarretia, 40 of which are federally listed.¹¹⁷ The North County MSCP plan area encompasses approximately 314,000 acres, including approximately 2,866 acres of essential habitat, and it is estimated that the HCP will protect 148,000 acres.¹¹⁸

The North County MSCP will encompass Unit 4E proposed by the Service for navarretia critical habitat. Within Unit 4E is the unincorporated community of Ramona. The unit spans narrow portions of downtown Ramona as well as a major grassland area west of the community known as the Ramona grasslands. Under the North County MSCP, the County of San Diego, through the Department of Parks

¹¹³ “Natural Community Conservation Plan for the City of San Marcos,” May 2001, available at http://www.sandag.cog.ca.us/whats_new/publications/environmental/mhcp_sanmarcos_toc.pdf.

¹¹⁴ “Natural Community Conservation Plan for the City of San Marcos,” Section 1.1, May 2001, available at http://www.sandag.cog.ca.us/whats_new/publications/environmental/mhcp_sanmarcos_toc.pdf.

¹¹⁵ Personal communication with David Acuff, Biologist, City of San Marcos, March 29, 2005.

¹¹⁶ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, March 30, 2005.

¹¹⁷ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, April 29, 2005.

¹¹⁸ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, April 1, 2005.

and Recreation, will acquire, restore, enhance, and manage for preservation approximately 10,000 square feet of vernal pool habitat.¹¹⁹ This conservation plan is based on the notion that future development and redevelopment in the Downtown area will result in unavoidable impacts to scattered vernal pools located there. The County anticipates that if some portion of existing habitats is preserved outright, development creating unavoidable impacts in the future will pay a fee to help offset the costs of upfront preservation association with the 10,000 square feet of vernal pools.¹²⁰

4.4.4 WESTERN RIVERSIDE COUNTY MULTIPLE SPECIES HABITAT CONSERVATION PLAN

A fourth subregional HCP, the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was completed by Riverside County in 2003. The MSHCP was completed in four years for a cost in excess of \$11 million.¹²¹ The MSHCP covers 146 species, including the navarretia, 25 of which are federally listed.¹²² The MSHCP is designed to create, manage, and monitor a system of habitat preserves in Western Riverside County and provides a framework for complying with State and Federal endangered species regulations while at the same time accommodating future growth.¹²³ The MSHCP was prepared pursuant to section 10 (a)(1)(b) of the Act, as well as the California's Natural Community Conservation Planning Act, passed in 1991.

The MSHCP "Plan Area" includes approximately 1.26 million acres, including approximately 20,986 acres of essential habitat, and encompasses 14 incorporated cities, as well as unincorporated portions of western Riverside County. Approximately 500,000 acres are included in the conservation area.¹²⁴ The Plan Area is bounded on the west by Orange and San Bernardino counties, with San Bernardino County to the north and San Diego County to the south. The eastern boundary of the Plan Area is formed by Banning Pass and the crest of the San Jacinto Mountains. The Service identified six essential habitat units for navarretia within the MSHCP Area; Units E1 through E6. All of these units are excluded from the proposed designation of critical habitat.

¹¹⁹ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, April 1, 2005.

¹²⁰ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, April 1, 2005.

¹²¹ Personal communication with Ellen Showalter Laney, Riverside County, July 2004.

¹²² U.S. Fish and Wildlife Service, July 22, 2004, Intra-Service Formal Section 7 Consultation/Conference for Issuance of an Endangered Species Act Section 10(a)(1)(B) Permit (TE-088609-0) for the Western Riverside County Multiple Species Habitat Conservation Plan, Riverside County, California (FWS-WRIV-870.19).

¹²³ Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP)*, Volume 4 – Final EIR/EIS, Section 2.3 "Proposed Action."

¹²⁴ California Department of Fish and Game, Natural Community Conservation Planning, April 26, 2005 (last modified), "Status of NCCP Planning Efforts," <http://www.dfg.ca.gov/nccp/status.htm>.

Due to the plant's limited geographic distribution resulting from its dependence on specialized habitat, the navarretia is considered a Group 3 species in the MSHCP. Consisting of 14 known populations, the distribution of navarretia is mainly restricted to the alkali floodplains of the San Jacinto River, Mystic Lake, and Salt Creek, and is commonly associated with three types of soils including: Willows; Domino; and Traver soils.¹²⁵ Eleven of the 14 populations of navarretia within the MSHCP Area are concentrated in the alkali soils of Upper Salt Creek drainage west of Hemet, and along the San Jacinto River.¹²⁶ The navarretia has also been known to occur in two additional locations within the MSHCP Area; Santa Rosa Plateau and Skunk Hollow.

The MSHCP is a criteria-based plan, meaning a description of the conservation focus is provided for land units. Section 3.3 of the MSHCP identifies 16 area plans covered by the MSHCP with the criteria addressed by sub-unit. The navarretia is mentioned as a "planning species" in five MSHCP area plans and subunits therein, including: Lakeview/Nuevo; Mead Valley; Reche Canyon/Badlands; San Jacinto Valley; and Harvest Valley/Winchester. Various "core" habitat linkages are found in these five MSHCP area plans. Subunits in each MSHCP Area Plan outline specific conservation measures related to the planning species listed therein. Conservation measures relevant to the navarretia for the MSHCP area plans in which it is listed include: conserving alkali soils; conserving Willow-Domino-Travers soils supporting sensitive plants; conserving wetland habitats and floodplain along the San Jacinto River; and conserving existing vernal pool complexes associated with the San Jacinto River floodplain.

Section 9 of Volume I and Volume II-B of the MSHCP describe in detail the conservation objectives, and conservation measures specifically related to the navarretia and its habitat. The navarretia is protected under the riparian and vernal pool species policies of section 6.1.2 of Volume 1. Permittees are required to avoid riparian and vernal pool habitat, and if they cannot avoid such habitat, alternatives must be developed through the CEQA process to minimize any adverse impacts. Under the MSHCP, mitigation for impacts to riparian and vernal pool habitat must be biologically equivalent or superior preservation "to ensure replacement of any lost functions and values of Habitat as it relates to covered species."¹²⁷ Although a range of mitigation ratios is not written into the MSHCP Plan, typical mitigation ratios for impacts to vernal pool species within the MSHCP Area have ranged from one-to-one (1:1) to three-to-one (3:1).¹²⁸ Specific measures to protect the navarretia are outlined by the following five objectives:

¹²⁵ Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP), Volume 1 – The Plan*, Section 9.3 "Minimization and Mitigation."

¹²⁶ Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP), Volume 1 – The Plan*, Section 9.3 "Minimization and Mitigation."

¹²⁷ Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP), Volume 1 – The Plan*, Section 6.1.2 "Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools."

¹²⁸ Personal communication with Ron Rempol, General Manager, Regional Conservation Authority, Riverside County, April 6, 2005.

- **Objective 1:** Include within the MSHCP Conservation Area at least 6,900 acres of suitable habitat;
- **Objective 2:** Include within the MSHCP Conservation Area Include within the MSHCP Conservation Area at least 13 of the 14 known locations of naverretia;
- **Objective 3:** Navarretia located as a result of survey efforts shall be conserved in accordance with procedures described for narrow endemic species within Section 6.1.3 of the MSHCP, Volume I;
- **Objective 4:** Include within the MSHCP Conservation Area the floodplain along the San Jacinto River consistent with Objective 1. Floodplain processes will be maintained along the river in order to provide for the distribution of the species to shift over time as hydrologic conditions and seed bank sources change; and
- **Objective 5:** Include within the MSHCP Conservation Area the floodplain along Salt Creek generally in its existing condition from Warren Road to Newport Road and the vernal pools in Upper Salt Creek west of Hemet. Floodplain processes will be maintained in order to provide for the distribution of the species to shift over time as hydrologic conditions and seed bank sources change.

The navarretia is also considered a narrow endemic species in the MSHCP Plan, and survey efforts have shown the plant occurs in alkali soil based vernal pools in area three of the Narrow Endemic Plant Species survey areas (NEPSSA).¹²⁹ As a narrow endemic, the navarretia receives additional measures of protection to meet species specific conservation objectives. Aside from Federal avoidance and minimization requirements for vernal pool species, impacts to 90 percent of “those portions of the property that provide for long-term conservation value of the identified Narrow Endemic Plant Species shall be avoided until it is demonstrated that conservation goals for the particular species are met.”¹³⁰

4.4.5 MARINE CORPS AIR STATION (MCAS) MIRAMAR INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN (INRMP)

The MCAS Miramar 2000 INRMP, required by the Sikes Act Improvements Act of 1997, provides a framework for managing the base’s natural resources. The primary purpose of the INRMP is to integrate

¹²⁹ Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP), Volume 1 – The Plan*, Section 6.1.2 “Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools”. NEPSSA were chosen based on soil characteristics and data on existing occurrence of narrow endemic species from the UC Riverside database and the California Natural Diversity Database (CNDDDB), as well as determined through personal communication with the Service.

¹³⁰ Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP), Volume 1 – The Plan*, Section 6.1.3 “Protection of Narrow Endemic Plant Species.”

Marine Corps Air Station Miramar's land use needs, in support of its military mission, with the management and conservation of natural resources. The INRMP establishes MCAS Miramar's approach and guidelines relative to natural resources to accomplish this objective.¹³¹

Among MCAS Miramar's natural resources is the largest and most contiguous vernal pool resource in southern California.¹³² The MCAS Miramar INRMP states that protection of vernal pools has been given the highest priority at MCAS Miramar, with the aim to prevent the degradation or destruction of vernal pools. MCAS Miramar's INRMP specifies several vernal pool management actions: monitoring and surveying vernal pool habitat, removing/controlling exotic plants, developing various media to further public awareness, protecting habitat through fencing and field markers, and working with project planners to minimize impacts to vernal pool areas.

MCAS Miramar's vernal pool conservation actions provide benefits to six federally listed threatened or endangered vernal pool species: the San Diego button celery, California Orcutt grass, San Diego mesa mint, Riverside fairy shrimp, San Diego fairy shrimp, and the navarretia.

4.4.6 MARINE CORPS BASE CAMP PENDLETON INTEGRATED NATURAL RESOURCE MANAGEMENT PLAN (INRMP)

The Camp Pendleton 2001 INRMP, required by the Sikes Act Improvements Act of 1997, provides a framework for managing the base's natural resources. The purpose of the INRMP is to integrate natural resources management with the base's training and mission support requirements. The INRMP encompasses all elements of natural resources management applicable to the Camp Pendleton military installation.

Natural resources on the base include eighteen federally listed threatened or endangered species, four of which are associated with vernal pools: navarretia, San Diego button-celery, Riverside fairy shrimp, and the San Diego fairy shrimp. The Camp Pendleton INRMP includes the objective of protecting ephemeral wetlands and proactive action to prevent damage to vernal pools. Past conservation actions include two base-wide inventories of isolated ephemeral wetlands (including vernal pools). Priority future actions include maintenance of GIS mapping of vernal pools, public education efforts, working with project planners to avoid or minimize impacts to vernal pools, and placement of field markers, signs, or fencing around vernal pools.

In addition to the current INRMP, The Service is in formal consultation (since March 30, 2000) with the Marine Corps regarding their activities on upland areas of Camp Pendleton that include vernal pool habitat. The programmatic instructions resulting from the completed upland consultation will be

¹³¹ MCAS Miramar INRMP, http://www.miramar.usmc.mil/miramar/Environ_naturalresource.htm, accessed March 14, 2005.

¹³² Ibid.

incorporated into the Camp Pendleton INRMP, and the Marine Corps will implement the programmatic instructions to avoid adverse effects on the plant.

ECONOMIC EFFECTS ON RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL DEVELOPMENT

A general framework for estimating the costs of land use restrictions imposed on landowners and developers by conservation efforts associated with navarretia was described in Section 2.2.2.1 of this report. The framework lays out procedures for estimating two types of economic effects on development: those associated with reductions in the supply of developable land and those associated with added development costs (project modifications, mitigation fees, and mitigation activities). In this section, the cost of navarretia conservation to residential, commercial, and industrial development during the pre-designation period (1998-2005) is estimated, and then the framework is applied to estimate the conservation costs to residential, commercial, and industrial development forecast to occur during the post-designation period (2006-2025). These costs include both the administrative cost of the section 7 consultation process and the cost of HCP-related mitigation fees and conservation efforts.

5.1 COSTS OF PRE-DESIGNATION ACTIVITIES

Seven section 7 consultations involving navarretia and residential development projects have occurred since the navarretia listing in 1998, including two informal consultations and five formal consultations (see Table 6).¹³³ Four of the consultations occurred in Unit E2 and one in Unit E19; the remaining two involved development activity outside the bounds of the essential habitat. These section 7 consultations required time and effort for the Service, action agencies (i.e., the USACE), and the developer and resulted in administrative costs to the various parties. The total pre-designation administrative costs are presented in Table 7 and were calculated by multiplying the average costs per type of consultation (see Section 0) by the number of section 7 consultations.

¹³³ Two formal navarretia-related section 7 consultations on development activities occurred prior to the navarretia listing in October 1998. One involved Robinhood homes, a 204 acre 625 dwelling unit development project on Otay Mesa, and the other involved Pardee Construction Company's Cal Terraces project, an 864 acre project also on Otay Mesa. While these consultations involved the navarretia, the consultations occurred prior to the listing of the species and therefore, the costs of these consultations are outside the scope of this report. However, the cost of navarretia conservation efforts resulting from these consultations, but incurred after the listing of the species, are captured in this analysis.

**Table 6
Pre-Designation Section 7 Consultations Related to Development and Navarretia Conservation**

Year	Type	Project Description	Species and CHD Unit	Summary of Conservation/Mitigation	Conservation/Mitigation Activity Costs
2004	Informal	Corman Leigh Community, Inc., LLC - Tres Cerritos West, a 121.3 acre development project consisting of 178 residential units on 71.4 acres.	Navarretia and crownscale in Unit E2.	<ol style="list-style-type: none"> 1. The project is expected to impact up to 0.38 acres of vernal pools (0.43 acres of vernal pools are on site). Deed restriction or conservation easement to protect 53.4 acres on-site, including conservation, enhancement and restoration of 3.5 acres of vernal pool habitat (2.24 acres restored for this project and 1.26 acres restored to offset impacts to vernal pools resulting from the adjacent JP Ranch project described below). Mitigation will include the creation of vernal pools based on a 1:1 mitigation ratio. Mitigation is in response to impacts to non-navarretia and non-crownscale vernal pool habitat (i.e., vernal pools that do not contain crownscale and navarretia).¹³⁴ 2. Install a drainage and spreader system to collect and distribute run-off to the vernal pools on-site (non-navarretia and non-crownscale habitat), and a system to collect, retain, and distribute street drainage from the development for release through the spreader system (non-navarretia and non-crownscale habitat). The water then is transferred to vernal playa habitat south of the site (navarretia and crownscale habitat in Unit E2) through the transfer system constructed as part of the JP Ranch project (described below). 3. Other costs – Implement best management practices (BMP) during construction, employ biological monitoring and flagging of vernal pools during construction, provide funding for the long-term management of the conservation site, protect the site by fencing and signage, prohibit planting of invasive exotic plants, restrict the use of pesticides, and develop an educational program for owners and visitors. 	<ol style="list-style-type: none"> 1. Cost to restore 2.24 acres of on-site vernal pool habitat at Tres Cerritos West is \$340,100 and includes 10 years of weed control and monitoring.¹³⁵ The cost to restore the on-site vernal pool habitat is not related to navarretia or crownscale conservation as the species are not present and none of the activities benefit the species or their habitats. 2. Cost of the on-site water collection and distribution system is not related to navarretia or crownscale conservation. Cost of the off-site water collection and distribution system to transfer water to the vernal playa habitat in Unit E2 is related to navarretia or crownscale conservation. The cost of this system is described in the discussion of the JP Ranch project below. 3. Other costs are not related to navarretia or crownscale conservation as the species are not present and none of the activities benefit the species or their habitats.

¹³⁴ U.S. Fish and Wildlife Service, December 17, 2004, Section 7 Consultation for Tres Cerritos West, Riverside County, California (FWS-WRIV-4202.2), LSA Associates, Inc., October 25, 2004, “Tres Cerritos West (BTTM 31513) Project Hemet, California, Determination of Biologically Equivalent or Superior Preservation,” L&L Environmental, Inc., July 2004, “Tres Cerritos West Specific Plan Amendment, Hemet, Riverside County, California, General

Year	Type	Project Description	Species and CHD Unit	Summary of Conservation/Mitigation	Conservation/Mitigation Activity Costs
2004	Formal	Corman Leigh Community, Inc., LLC - JP Ranch, a 28 acre development project consisting of 85 single-family homes on 22 acres.	Navarretia and crownscale in Unit E2.	<ol style="list-style-type: none"> 1. The project is expected to impact up to 0.48 acres (20,905 square feet (sf)) of vernal pools. Conservation easement to protect 2.6 acres on site. Acquire (by December 2006) an additional 1.26 acres of off-site vernal pool habitat from the Tres Cerritos West Project (described above) for vernal pool restoration/creation, which will include the introduction navarretia and crownscale seeds or seedlings into the area. Mitigation will include the creation/restoration of vernal pool surface area (30,000 sf), based on a 1.5:1 mitigation ratio. If the purchase from Tres Cerritos West does not occur, purchase 1.5 acres of vernal pool habitat within the Salt Creek Vernal Pool Complex. Mitigation is in response to impacts to non-navarretia and non-crownscale vernal pool habitat (i.e., vernal pools that do not contain crownscale and navarretia).¹³⁶ 2. Install and maintain a water collection and distribution system to capture and divert clean flows from the north of the project site, south to the vernal playa habitat (navarretia and crownscale habitat in Unit E2) in perpetuity. 3. Other costs – Implement standard BMPs during construction, employ biological monitoring and flagging of vernal pools during construction, provide funding for the long-term management of the conservation site, protect the site by fencing and signage, prohibit planting of invasive exotic plants, restrict the use of pesticides, and develop an educational/informational program. 	<ol style="list-style-type: none"> 1. Cost to restore 1.26 acres of off-site vernal pool habitat at Tres Cerritos West is \$207,600, and 10 years of weed control, monitoring, and reporting.¹³⁷ The cost to restore the off-site vernal pool habitat is not related to navarretia or crownscale conservation as the species are not present and none of the activities benefit the species or their habitats. 2. Cost of the off-site water collection and distribution system (\$264,000) to transfer water to the vernal playa habitat in Unit E2 is related to navarretia and crownscale conservation. The bi-furcated storm-drain system will be constructed in 2005 at a cost of approximately \$2,800 per developed acre (22 acres at JP Ranch and 71.4 acres at Tres Cerritos).¹³⁸ 3. Other costs are not related to navarretia or crownscale conservation as the species are not present and none of the activities benefit the species or their habitats.

Biological Survey Report 2003 and Biological Summary Report 2004 With an Environmental Assessment,” and personal communication with Sharon Lockhart, Lockhart and Associates, March 30, 2005, and Service Biologist, Carlsbad Fish and Wildlife Office, March 31, 2005.

¹³⁵ Personal communication with Robert MacAller, Senior Restoration Biologist, RECON, March 31, 2005.

¹³⁶ U.S. Fish and Wildlife Service, July 2, 2004, Section 7 Consultation for JP Ranch, Riverside County, California (FWS-WRIV-3611.1), LSA Associates, Inc., July 28, 2004, “JP Ranch Project, Hemet, California, Determination of Biologically Equivalent or Superior Preservation,” and personal communication with Sharon Lockhart, Lockhart and Associates, March 30, 2005, and Service Biologist, Carlsbad Fish and Wildlife Office, March 31, 2005.

¹³⁷ RECON, November 3, 2004, “Vernal Pool Habitat Restoration and Ten-Year Mitigation Monitoring Plan for the JP Ranch Specific Plan, City of Hemet, California.”

Year	Type	Project Description	Species and CHD Unit	Summary of Conservation/Mitigation	Conservation/Mitigation Activity Costs
2004	Formal	Lennar/U.S. Home, Clayton Ranch Project, a 58.75 acre development of 149 single-family residential lots on 41 acres and 2 open space lots on 17.7 acres.	Navarretia, and 2 other listed species. Not near any unit, unallocated.	<ol style="list-style-type: none"> 1. The proposed action will impact a 0.36 acre ephemeral basin, including a 0.08 acre ponding area, occupied by navarretia. To offset the effects of the action, the developer will conserve, restore, and manage 2 acres of off site habitat containing a 0.27 acre ephemeral basin (with a 0.12 acre ponding area), and create two ephemeral ponds totaling 0.02 acres on the off site habitat. Conservation activities include biological assistance and coordination, seed salvage and storage, site preparation and introduction of salvaged soils, 5 years of maintenance and protection, monitoring during construction, protection of site, and off-site acquisition of land (\$15,000).¹³⁹ 2. Salvage remaining navarretia seeds on site and introduce to the off-site habitat. Conservation activities include monitoring of construction, site preparation and introduction of salvaged soils, biologist coordination of relocation, annual monitoring for 3 years, and protection of site, including 5 years of maintenance. 3. Impact to development costs due to project delay (additional interest) and additional grading, geotechnical, and erosion control, utility and street improvements. 	<ol style="list-style-type: none"> 1. \$52,895 was spent in 2004 and 2005 and \$21,680 will be spent during 2006 to 2013.¹⁴⁰ 2. \$18,700 will be spent during 2006 to 2010. 3. Additional interest on bank loans due to project delay was \$375,000, other activities cost \$218,000. These costs were incurred in 2004.
2004	Formal	Page Ranch Project, a 109 acre development of 429 single-family residential lots.	Navarretia and 7 other listed species in Unit E2	<ol style="list-style-type: none"> 1. Habitat suitable for navarretia was not found to occur on the proposed project site.¹⁴¹ 	<ol style="list-style-type: none"> 1. No conservation or mitigation costs incurred.

¹³⁸ Personal communication with Dan Beal, Senior Project Manager, Corman Leigh Communities, Inc., LLC., April 7, 2005.

¹³⁹ U.S. Fish and Wildlife Service, September 7, 2004, Reinitiation of Formal Section 7 Consultation for Lennar/U.S. Home, Clayton Ranch Project, Riverside County, California, and personal communication with Randall R. Schroeder, Lennar – Corona, April 8, 2005.

¹⁴⁰ Ibid.

Year	Type	Project Description	Species and CHD Unit	Summary of Conservation/Mitigation	Conservation/Mitigation Activity Costs
2004	Formal	Orchard Stone Creek Project, the construction of a commercial center on approximately 54 acres of land.	Navarretia and 10 other listed species. Not near any unit, unallocated.	1. Habitat assessment conducted and suitable for navarretia was not found to occur on the proposed project site. ¹⁴²	1. No conservation or mitigation costs incurred.
2000	Informal	Heartland / MSK Realty Ventures, LLC - Heartland Village, a 665-acre project consisting of golf course and 1,775 residential units.	Navarretia and crownscale in Unit E2	<p>1. Revised project's drainage to provide historical flows to navarretia and crownscale habitat (Unit E2). Install a wet well and pumping system to supply storm flows diverted by the development to the navarretia and crownscale vernal playa habitat down slope. The pumping system, two 275 HP and two 150 HP pumps (designed rate of 125 cfs (cubic feet per second)), will deliver a 2-year flood event (62 acre-feet of runoff) over a six hour duration, and a 10-year storm event (92 acre-feet) over approximately nine hours.¹⁴³</p> <p>2. The City of Hemet will be responsible for monitoring, maintaining, and operating the system. The annual costs will be provided through tax assessments levied against the Heartland Village property and administered through a landscape lighting maintenance district.</p>	<p>1. The capital costs of revising project's drainage are \$624,000, including design (\$60,000).¹⁴⁴ These costs are related to navarretia and crownscale conservation. No information is available on the timing of the capital costs; therefore, this analysis assumes the costs were uniformly distributed during the period 2001 through 2005.</p> <p>2. Annual costs of operating the drainage system are related to navarretia and crownscale conservation. An annual repair and maintenance budget for a submersible pumping system should approximate one percent of capital costs, or \$5,640.¹⁴⁵ While the system is designed to operate at a greater than 2-year flood event, annual operating costs are estimated at \$2,000 (operating a full day).¹⁴⁶</p>

¹⁴¹ U.S. Fish and Wildlife Service, November 17, 2004, Formal Section 7 Consultation for Page Ranch, City of Hemet, Riverside County, California (FWS-WRIV-4125.1).

¹⁴² U.S. Fish and Wildlife Service, November 17, 2004, Formal Section 7 Consultation for Orchard-Stone Creek, City of Murrieta, Riverside County, California (FWS-WRIV-4138.1).

¹⁴³ U.S. Fish and Wildlife Service, October 17, 2004, Section 7 Consultation for Heartland, Riverside County, California, and Heartland Village, July 12, 2000, "Project Description, Hydrology Analysis, and Proposed Drainage System Modification.

Year	Type	Project Description	Species and CHD Unit	Summary of Conservation/Mitigation	Conservation/Mitigation Activity Costs
2000	Formal	Construction of Otay Mesa High school on 58 acres located on Otay Mesa. The developed area will total 49 acres and 11 acres will be dedicated to permanent open space.	Navarretia and 2 other listed species in Unit E19	<ol style="list-style-type: none"> 1. A total of 2,916 sf (0.07 acres) of vernal pools and fairy-shrimp supporting road pools will be impacted by this project. The project's proposed measures to offset impacts to vernal pools includes preservation/enhancement (3,924 sf), re-creation (3,000 sf), and procedures for long-term management of the total (6,924 sf), at a mitigation ratio of approximately 2.4:1. A total of 2,162 sf of vernal pool habitat will be on site and 4,762 sf off site. Navarretia was not detected on the project site, but existed in the past in two vernal pools (371 sf) that were plowed by a previous owner. Impacts to the former 371 sf of vernal pools will be offset, at a 2:1 mitigation ratio, with four vernal pools (742 sf) that support navarretia.¹⁴⁷ 2. BMPs, such as timing of grading activities, flagging of vernal pools, and silt fences, and biological monitoring during restoration activities will also be implemented. 3. Maintenance and monitoring program will monitor the project for 5 years, exotic weed control will be implemented, and permanent fencing, signage, and an education program will be established. 4. An endowment fund to finance the perpetual management of the site, or a written conformation that the City of San Diego will assume management responsibilities. <p>Note: This analysis assumes the project began in early 2000,</p>	<ol style="list-style-type: none"> 1. Assuming a 10:1 ratio of watershed to vernal pool habitat and a 2:1 restoration ratio, 6,924 sf of vernal pool habitat would require the development restore approximately 1.5 acres.¹⁴⁸ With restoration, enhancement, and creation costing approximately \$75,000 per acre, a restoration mitigation cost of approximately \$112,500 is estimated. 2. The project's BMPs are assumed to be similar to BMP costs experienced by the Clayton Ranch project, a similar sized project. The BMP portion of this project's conservation measures totaled \$19,450. 3. The project's 5-year maintenance and monitoring program is assumed to also be similar to maintenance and monitoring costs experienced by the Clayton Ranch project. The maintenance, monitoring, and protection portion of this project's conservation measures totaled \$22,875. 4. An estimate of the per acre cost of endowments to maintain an acre of

¹⁴⁴ Heartland Village, July 12, 2000, "Project Description, Hydrology Analysis, and Proposed Drainage System Modification."

¹⁴⁵ Personal communication with Dan Murdock, Irrigation Engineer, NRCE Inc., April 11, 2005

¹⁴⁶ Personal communication with Richard Masyszek, Head of Planning, City of Hemet, March 30, 2005.

¹⁴⁷ U.S. Fish and Wildlife Service, February 11, 2000, Biological Opinion on the proposed construction of Otay Mesa High School site for the Sweetwater Union High School District, San Diego County, California (1-6-99-F-77).

¹⁴⁸ Personal communication with Robert MacAller, Senior Restoration Biologist, RECON, March 31, 2005.

Year	Type	Project Description	Species and CHD Unit	Summary of Conservation/Mitigation	Conservation/Mitigation Activity Costs
				following consultation, that restoration was uniformly distributed in years 1-2, that BMPs and monitoring followed same schedule as Clayton Ranch, and that the endowment was paid up front at time of permitting. Absent project specific information, all costs are assumed to have occurred.	restored vernal pool habitat in perpetuity is approximately \$18,000. ¹⁴⁹ For this sized project, the endowment is estimated to total approximately \$27,000.
1998	Formal	Robinhood Homes Residential Project, a 204 acre development of 625 dwelling units on Otay Mesa. Developed and open space acreage is not defined.	Navarretia and 5 other listed species in Unit E19	<ol style="list-style-type: none"> Impacts to 71 (0.077 acres) vernal pools and their associated watersheds will be mitigated through preservation and enhancement (at a 2:1 ratio) of 71 (0.15 acres) vernal pools within two on-site vernal pool preserve areas that are approximately 1 acre and 8 acres in size. The one vernal pool known to support navarretia will be preserved in the western vernal pool preserve. The project's open space system will include 45 acres of vernal pool preserves.¹⁵⁰ Maintenance and monitoring program will monitor the project for 5 years (consistent with Pardee's consultants). Exotic weed control will also be implemented. BMPs, such as timing of grading activities, flagging of vernal pools, and silt fences, and biological monitoring during restoration activities will also be implemented. <p>Note: This analysis assumes the project began in early 1998, following consultation, that restoration was uniformly distributed in years 1-2, that BMPs and that monitoring followed same schedule as Clayton Ranch. Absent project specific information, all costs are assumed to have occurred.</p>	<ol style="list-style-type: none"> Assuming a 10:1 ratio of watershed to vernal pool habitat and a 2:1 restoration ratio, 0.23 acres of vernal pool habitat would require the development restore approximately 4.5 acres.¹⁵¹ With restoration, enhancement, and creation costing approximately \$75,000 per acre, a restoration mitigation cost of approximately \$337,500 is assumed. The consultation took place in February 1998, prior to the species listing in October 1998, and \$168,750 in restoration costs are assumed to have occurred prior to listing and are not included in the pre-designation costs of navarretia conservation. Considering this project is expected to restore approximately twice the habitat area as the Clayton Ranch project, the maintenance and monitoring costs are assumed to be double those budgeted for Clayton Ranch, or approximately \$45,750.¹⁵² \$11,950 of these expenses are

¹⁴⁹ Based on personal communication with Robert MacAller, Senior Restoration Biologist, RECON, March 31, 2005, and Jeremy Buegge, Director of Planning and Land Use, MSCP Division of San Diego County, April 8, 2005.

¹⁵⁰ U.S. Fish and Wildlife Service, February 27, 1998, Biological Opinion/Conference for Robinhood Homes Residential Project (No. 97-20133-DAZ), Otay Mesa, City of San Diego, San Diego County, California (1-6-97-F-57).

¹⁵¹ Personal communication with Robert MacAller, Senior Restoration Biologist, RECON, March 31, 2005.

¹⁵² Research efforts did not identify a contact for this project. Therefore, costs from the Clayton Ranch project were used to estimate costs for this project.

Year	Type	Project Description	Species and CHD Unit	Summary of Conservation/Mitigation	Conservation/Mitigation Activity Costs
					<p>assumed to have occurred prior to the listing and are not included in the pre-designation costs of navarretia conservation.</p> <p>3. The project's BMPs are assumed to also be double the BMP costs experienced by the Clayton Ranch project. The maintenance, monitoring, and protection portion of this project's conservation measures totals approximately \$38,900. \$7,500 of these expenses are assumed to have occurred prior to the listing and are not included in the pre-designation costs of navarretia conservation.</p>
1997	Formal	Pardee Construction Company development projects, Cal Terraces (including South Palm Vista), Otay Corporate Center North, and Otay Corporate Center South, (residential, commercial, industrial, and public facilities) on 864 acres on	Navarretia and 8 other listed or proposed species in Unit E19	<ol style="list-style-type: none"> 1. Six areas encompassing 39 acres on-site will be dedicated for restoration and preservation of vernal pools to offset impacts to 162 vernal pools (55,426 sf of ponded surface area, or 1.27 acres) at a 2:1 mitigation ratio. The proposed mitigation to offset impacts to vernal pool species includes on-site preservation of 57 vernal pools (34,342 sf) and restoration/creation of approximately 72 vernal pools (76,510 sf). Navarretia will be impacted in 2 vernal pools (3,076 sf). To offset these impacts, 1 vernal pool containing navarretia (180 sf) will be preserved and 3 vernal pools that support reproducing populations of navarretia (5,972 sf) will be restored/created.¹⁵³ 2. Grading will be phased, project and avoidance area boundaries clearly delineated, and fuels management activities will be conducted under the supervision of a biologist. 3. Maintenance and monitoring program will monitor the project for 5 years, and exotic weed control will be implemented. 	<ol style="list-style-type: none"> 1. Assuming a 10:1 ratio of watershed to vernal pool habitat and a 2:1 restoration ratio, 55,426 sf of vernal pool habitat would require the development restore approximately 25.5 acres (although more may be protected).¹⁵⁴ With restoration, enhancement, and creation costing approximately \$75,000 per acre, a restoration mitigation cost of approximately \$2 million is assumed. The consultation took place in January 1997, prior to the species listing in 1998, and the restoration costs are assumed to have occurred prior to listing and are not included in the pre-designation costs of navarretia conservation. 2. Considering this project is expected to

¹⁵³ U.S. Fish and Wildlife Service, January 14, 1997, Biological Opinion/Conference Opinion (1-6-95-F-35) for Pardee Construction Company (File No. 95-20130-DZ), Otay Mesa, San Diego County, California.

¹⁵⁴ Personal communication with Robert MacAller, Senior Restoration Biologist, RECON, March 31, 2005.

Year	Type	Project Description	Species and CHD Unit	Summary of Conservation/Mitigation	Conservation/Mitigation Activity Costs
		Otay Mesa. The preserved open space is estimated at 287 acres and the developed area is estimated at 577 acres.		<p>4. An endowment fund to finance the perpetual management of the site, or a written conformation that the City of San Diego will assume management responsibilities.</p> <p>Note: This analysis assumes the project began in early 1997, following consultation, that restoration was uniformly distributed in years 1-2, that BMPs and monitoring followed same schedule as Clayton Ranch, and that the endowment was paid up front at time of permitting. Absent project specific information, all costs are assumed to have occurred.</p>	<p>restore approximately 20 times the vernal habitat area as the Clayton Ranch project, BMP costs are assumed to be 20 times those budgeted for Clayton Ranch, or approximately \$400,000.¹⁵⁵ \$150,000 of these expenses are assumed to have occurred prior to the listing and are not included in the pre-designation costs of navarretia conservation.</p> <p>3. The project's maintenance and monitoring costs are also assumed to be 20 times the maintenance and monitoring costs experienced by the Clayton Ranch project. The maintenance, monitoring, and protection portion of this project's conservation measures totals approximately \$480,000. \$204,000 of these expenses are assumed to have occurred prior to the listing and are not included in the pre-designation costs of navarretia conservation.</p> <p>4. An estimate of the per acre cost of endowments to maintain an acre of restored vernal pool habitat in perpetuity is approximately \$18,000.¹⁵⁶ For this sized project (39 acres), the endowment is estimated to total approximately \$700,000. The endowment expense is assumed to have occurred prior to the listing and is not included in the pre-designation costs of navarretia conservation.</p>

¹⁵⁵ Research efforts did not identify a contact for this project. Therefore, costs from the Clayton Ranch project were used to estimate costs for this project.

¹⁵⁶ Based on personal communication with Robert MacAller, Senior Restoration Biologist, RECON, March 31, 2005, and Jeremy Buegge, Director of Planning and Land Use, MSCP Division of San Diego County, April 8, 2005.

Table 7
Pre-Designation Administrative Cost of Section 7 Consultations to Development, by
Habitat Unit (2005 dollars)

Habitat Unit	Informal Consultation	Formal Consultation	Pre-Designation (Total)
E2	2	2	\$82,200
E19	0	1	\$32,300
Not Allocated	0	2	\$63,600
Total Essential Habitat	2	5	\$178,200

Note: Numbers may not sum due to rounding.

Mitigation at Tres Cerritos West and JP Ranch involves the conservation, creation, and restoration of vernal pool habitat without navarretia (or crownscale) to offset impacts associated with construction. The restoration, enhancement, and creation occur at a ratio of 1:1 to 1.5:1. Conservation also includes ten years of monitoring, weed control, and reporting, the installation of on-site water collection and distribution systems to capture and divert clean flows from the north of the project sites, south to the vernal playa habitat (navarretia and crownscale habitat in Unit E2) and numerous best management practices (BMPs) and project modifications (e.g., employ biological monitoring and flagging of vernal pools during construction, protect the site by fencing and signage, and prohibit planting of invasive exotic plants) to protect the plant during and after construction activities. The cost of the off-site water collection and distribution system to transfer water to vernal play habitat in Unit E2 is related to navarretia and crownscale conservation (see Table 6 for more detail).

Heartland Village is located outside the boundaries of Unit E2; however, the project incorporates conservation measures to protect navarretia (and crownscale) in Unit E2 (see Table 6 for more detail). Similar to Tres Cerritos West and JP Ranch, Heartland Village conservation included maintaining historical water flows to navarretia (and crownscale) habitat down slope (Unit E2). However, rather than the gravity system adopted at Tres Cerritos West and JP Ranch, this development installed a wet well and pumping system to supply storm flows diverted by the development to the navarretia and crownscale vernal playa habitat down slope. The developer paid \$624,000 to revise, design, and install the pumping system and the City of Hemet is responsible for the annual monitoring, maintenance, and operation of the system. The annual monitoring, maintenance, and operating cost, estimated at \$7,640, is provided through tax assessments levied against the Heartland Village property and administered through a landscape lighting maintenance district.

While these three projects incurred a variety of vernal pool-related conservation measures, only the water projects are related to navarretia in Unit E2. The remaining habitat restoration, enhancement, and creation, BMPs, and project modifications are related to non-navarretia vernal pool habitat conservation and protection. Furthermore, this analysis assumes that 100 percent of the costs are attributable to the navarretia even though the crownscale also benefits from the wet well and pumping system constructed by Heartland Village. This cost analysis method likely results in an overstatement of navarretia costs.

Two other projects, Page Ranch (Unit E2) and Orchard Stone Creek (located outside the bounds of the essential habitat), completed formal section 7 consultation with the Service, however, habitat suitable for navarriata was not found on the proposed project sites. Aside from the administrative cost of the section 7 consultation, these projects did not incur conservation or mitigation activity costs.

Of the four remaining projects, one (Lennar/U.S. Home's Clayton Ranch Project) is located outside the bounds of the essential habitat and three (Otay Mesa High School, a Robinhood Homes' project, and Pardee Construction Company's Cal Terraces project) are located on Otay Mesa (Unit E19).

Construction at the Lennar/U.S. Homes' Clayton Ranch project was delayed six months when navarretia was found on site. The delay cost the company approximately \$375,000 in additional bank loan interest.¹⁵⁷ The company also estimates it incurred an additional \$218,000 in expenses for additional grading and geotechnical work, erosion control, and utility and street improvements related to the navarretia, as well as another \$60,000 (including \$15,000 for the purchase of land) for off-site vernal pool habitat restoration, conservation, and creation to offset impacts associated with construction activities. The mitigation ratio was approximately 1:1, and conservation activities also included five years of site maintenance, three years of site monitoring, biological monitoring during construction and mitigation activities, and protection of the site.

Mitigation at Otay High School, a Robinhood Homes' project, and Pardee Construction Company's Cal Terraces project involved the preservation, restoration, enhancement, and creation of vernal pool habitat at a mitigation ratios ranging from 2:1 to 2.4:1. Conservation activities also involved BMPs and project modification, such as timing of grading activities, flagging of vernal pools, biological monitoring during restoration activities, silt fences, permanent fencing, and signage to protect the sites, exotic weed control, an educational program, five years of maintenance and monitoring, and endowments to fund the perpetual management of the sites. While navarretia-related section 7 consultations involving Robinhood Homes and Cal Terraces took place prior to the navarretia listing in 1998, it is likely that some of the conservation and mitigation activities occurred over a number of years following the final listing of the plant. Therefore, as described in Table 6, this analysis assumes that the some of the project modification costs occurred after the listing, but prior to the designation of critical habitat, and include these costs in the pre-designation estimate of navarretia conservation. The total pre-designation cost of navarretia conservation for these costs is estimated at \$1.1 million.

The estimated pre-designation cost of these conservation measures for the navarretia are summarized in Table 8. Even though these projects began during the pre-designation period, certain conservation measures are expected to occur in years following the final designation of critical habitat. These post-designation conservation costs are presented in this discussion of pre-designation economic impacts as the conservation measures are a result of section 7 consultations that occurred prior to the final designation of

¹⁵⁷ Personal communication with Service Biologists (May 20, 2005) state that the delay was caused by an inadequate biological survey during pre-construction. Nevertheless, this analysis reports the cost of delay as a pre-designation cost of species conservation.

critical habitat. The first column of Table 8 reports the costs incurred during the pre-designation period (1998-2005) in 2005 dollars. The second column presents the total undiscounted post-designation costs from 2006 to 2025, and the third and fourth columns report the post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns report the annualized cost for each habitat unit, also using discount rates of three percent and seven percent, respectively.¹⁵⁸

Table 8
Pre-Designation Conservation Costs to Development, by Habitat Unit (2005 dollars)¹⁵⁹

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total) ^{a/}			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E2	\$926,300	\$152,800	\$113,700	\$80,900	\$7,600	\$7,600
E19	\$1,095,300	\$1,700	\$1,600	\$1,500	\$100	\$100
Not Allocated	\$664,000	\$40,400	\$37,600	\$34,500	\$2,500	\$3,300
Total Essential Habitat	\$2,685,600	\$194,900	\$152,900	\$116,900	\$10,300	\$11,000

^{a/} Costs in the post-designation period reflect future costs for projects initiated prior to the designation.

Note: Numbers may not sum due to rounding.

Table 9 illustrates the total economic impacts attributable to development-related section 7 consultations that occurred during the pre-designation period (1998 to 2005). The table combines the administrative costs of the section 7 consultation process presented earlier in Table 7 with the conservation costs presented in Table 8.

¹⁵⁸ The annualized post-designation conservation costs discounted at three and seven percent are equal for Unit E2 because the annual undiscounted dollar conservation costs are constant during the post-designation period (i.e., \$7,640 in annual monitoring, maintenance, and operating costs at Heartland Village over the next 20 years). The remaining conservation costs vary throughout the forecast period (however, the annualized costs are equal in Unit E19 because of rounding). Because of this annual variability in undiscounted dollar costs during the post-designation period, the annualized costs at discount rates of three and seven percent are not equal.

¹⁵⁹ Table 8 and Table 9 present conservation costs of projects begun in the pre-designation period, but include post-designation costs since projects from the pre-designation period often incur costs that continue into the post-designation period.

Table 9
Pre-Designation Total Economic Impacts to Development, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total) ^{a/}			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E2	\$1,008,500	\$152,800	\$113,700	\$80,900	\$7,600	\$7,600
E19	\$1,127,600	\$1,700	\$1,600	\$1,500	\$100	\$100
Not Allocated	\$727,700	\$40,400	\$37,600	\$34,500	\$2,500	\$3,300
Total Essential Habitat	\$2,863,800	\$194,900	\$152,900	\$116,900	\$10,300	\$11,000

^{a/} Costs in the post-designation period reflect future costs for projects initiated prior to the designation.

Note: Numbers may not sum due to rounding.

5.2 COSTS OF POST-DESIGNATION ACTIVITIES

5.2.1 MITIGATION FEES

Within the confines of the Western Riverside County MSHCP Plan Area, developers pay a fee for development. These mitigation fees vary by the type (e.g., commercial, residential, or industrial) and density of proposed development projects and contribute to a fund used by the Regional Conservation Authority (RCA) to purchase valuable habitat for preservation in the MSHCP Conservation Area. The MSHCP established the following development mitigation fees: \$1,651 per dwelling unit for residential development with density less than 8.0 dwelling units per acre; \$1,057 per dwelling unit for residential development with density between 8.1 and 14.0 dwelling units per acre; \$859 per dwelling unit for residential development with density greater than 14.0 dwelling units per acre; and \$5,620 per acre for commercial and industrial development.¹⁶⁰ All new development within the bounds of the essential habitat in Western Riverside County must pay these fees, regardless of whether or not the development impacts the plant and/or its habitat.¹⁶¹

In addition to the mitigation fee paid in Western Riverside County, developers in all three counties also incur other conservation activity costs. These additional conservation costs fall into three categories: (1) habitat restoration and enhancement or creation; (2) perpetual management of the restored and enhanced or created habitat; and (3) other project modifications and BMPs.

¹⁶⁰ Riverside County Ordinance 810.2, <http://www.tlma.co.riverside.ca.us/ordinances/ord810.2.html>, accessed April 18, 2005.

¹⁶¹ Personal communication with Ken Graff, Administrative Services Officer, Regional Conservation Authority, Riverside County, April 18, 2005.

5.2.2 CONSERVATION ACTIVITIES

As previously discussed in Section 4.3, the navarretia is protected by the San Diego County MSCP (including the City of San Diego, San Diego County, and Chula Vista MSCP subarea plans), the San Diego County MHCP (including the City of Carlsbad HMP Subarea Plan), and Western Riverside County MSHCP. These HCPs have measures in place to conserve vernal pool species. In general, mitigation ratios for impacts to vernal pools typically range from one-to-one (1:1) to five-to-one (5:1). Two HCPs are also in process, the City of San Marcos MHCP subarea plan and North County MSCP. These HCPs will eventually provide protection to the navarretia.

In addition to the protection provided by the various HCPs, regulatory measures of the CWA (see Section 4.2.2) also require that development projects proposing to dredge or fill vernal pools obtain a section 404 permit from the USACE, and through this permit, consult with the Service under section 7 of the Act. Efforts to avoid, minimize, or offset adverse impacts to the habitat of listed vernal pool species is generally determined through biological opinions (BOs) written by the Service during section 7 consultation and embody both the avoidance and minimization measures required by the USACE to achieve no net loss, as well as additional conservation measures recommended by the Service to avoid, minimize, or offset the project's impacts to the habitat of listed species. The section 7 consultation records for the navarretia (summarized in Table 6) illustrate that development projects have offset impacts to vernal pool habitat at mitigation ratios ranging from 1:1 to 2.4:1.

Assuming developers cannot avoid vernal pools altogether, several options exist for meeting USACE, HCP, and Service minimization or offsetting requirements. Measures for achieving USACE no net loss can include: creating vernal pool habitat to support a wetted acre on-site; purchasing land off-site and creating vernal pool habitat sufficient to support a wetted acre; or restoring and enhancing a historic wetted acre to at least the functional value exhibited by the wetted acre lost.¹⁶² Meeting required minimization or avoidance over and above the USACE no net loss as determined by the Service or through HCP mitigation requirements can be accomplished by: restoration and enhancement; creation; purchasing preservation credits from a conservation bank; or purchasing vernal pool habitat from a private land owner and preserving wetted acreage.¹⁶³ The section 7 consultation records indicate that habitat restoration/enhancement and creation have been recommended by the Service as conservation measures for urban development within the navarretia essential habitat since the species was listed, however, the Service is not likely to recommend habitat creation unless the appropriate soils and hydrology are present.¹⁶⁴

¹⁶² Personal communication with Eric Nickell, Vice President, Economic and Planning Systems, Inc., Sacramento, California, April 12, 2005.

¹⁶³ Personal communication with Eric Nickell, Vice President, Economic and Planning Systems, Inc., Sacramento, California, April 12, 2005.

¹⁶⁴ Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, May 11, 2005.

To account for the range of mitigation ratios among HCPs and the variety of mitigation measures available to the developer for conservation, the analysis presents the costs incurred by development for navarretia conservation as a range. Other options are acknowledged to exist (e.g., purchasing credits from conservation banks); however, by applying the least costly measure to the low-end of the range of mitigation ratios and the most costly measure to the high-end of the range of mitigation ratios, the analysis captures and reports the costs associated with other combinations of mitigation ratios and conservation efforts used to offset impacts to the species and its habitat.

At the low-end of the range, the analysis uses the minimum mitigation ratio that meets the Federal goal of no net loss of wetlands (1:1) and any requisite mitigation over and above no net loss (2:1 to 3:1),¹⁶⁵ and then applies the least costly of the conservation efforts (i.e., habitat restoration and enhancement) to mitigate impacts. The cost range for habitat restoration and enhancement is approximately \$40,000 to \$75,000 per acre; the analysis uses \$40,000 as the low-end cost attributable to mitigation.¹⁶⁶ Habitat restoration and enhancement of the wetted vernal playa habitat can occur either on- or off-site. For off-site habitat restoration and enhancement, it is assumed the vernal playa habitat was either already owned by the developer, or that habitat can be restored and enhanced without requiring that the developer purchase land.

In addition to the \$40,000 cost of habitat restoration and enhancement efforts, developers are increasingly being required at the time of permitting to also fund an endowment for the perpetual management of the vernal pool habitat they are restoring and enhancing. These management costs range from \$550 to \$750 per acre annually,¹⁶⁷ or approximately \$18,000 per acre if paid by the developer as an endowment up front.¹⁶⁸ In some cases, such as the MSHCP, the county or city will take over long-term management of restored or created vernal pool habitat if it occurs within a particular city or county's HCP Conservation

¹⁶⁵ The low-end mitigation ratio for essential habitat covered by the Western Riverside County MSHCP or located in Los Angeles County is 1:1. The low-end mitigation ratio for essential habitat covered by the City of San Diego and Chula Vista MSHCP subarea plans, the City of Carlsbad and City of San Marcos MHCP subarea plans, and the North San Diego County HCP (ongoing) is 2:1. The low-end mitigation ratio for essential habitat covered by the San Diego County MSCP subarea plan is 3:1.

¹⁶⁶ Personal communication with Robert MacAller, Senior Restoration Biologist, RECON, April 8, 2005; restoration and enhancement costs range typically range from \$40,000 to \$75,000 per acre and include restoration/enhancement of vernal pool habitat to a level of required functional value and the first five years of management costs for the restored vernal pool habitat.

¹⁶⁷ Personal communication with Robert MacAller, Senior Restoration Biologist, RECON, March 31, 2005.

¹⁶⁸ Assuming the average annual per acre cost for management of restored vernal pool habitat, \$650, and that the average capitalization rate used by public and private entities to calculate restoration management endowments in San Diego County, 3.625 percent, is comparable for Riverside County endowment calculations, this analysis uses the formula for the present value of a perpetuity, C/r , where C is \$650 per acre annually, and r is 0.03625, to arrive at an estimated endowment of \$17,931 per acre. Source of capitalization rate is personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division of San Diego County, April 8, 2005.

Area.¹⁶⁹ To avoid underestimating forecast impacts to developers, this analysis assumes that all habitat restoration occurs outside the boundaries of the various HCP Conservation Areas and that developers pay the endowment to manage the restored habitat. This assumption is motivated by the ambiguous boundaries of the HCP Conservation Areas, and the uncertain spatial distribution of future restoration relative to the HCP Conservation Areas. Should the restoration take place within the bounds of an HCP's Conservation Area, the management costs would simply transfer from the developer to the relevant city or county.

As illustrated in the section 7 consultation history for navarretia, developers implement BMPs and other project modifications (e.g., employ biological monitoring and flagging of vernal pools during construction activities, protect the vernal pool site by fencing and signage, prohibit the planting of exotic plants, and restrict the use of pesticides) to protect the plant and/or its habitat during and after construction activities. This analysis estimates that the cost to developers of implementing these BMPs and project modifications is approximately \$20,000 per acre.¹⁷⁰ In total, the low-end cost of conservation activities, assuming habitat restoration and enhancement, varies by HCP and ranges from \$78,000 to \$234,000 per wetted acre of vernal playa habitat impacted.

At the high-end of the cost range, the analysis uses the highest mitigation ratio (3:1 to 5:1),¹⁷¹ and then applies the most costly conservation measure (i.e., habitat creation) to offset impacts.¹⁷² The cost of creating vernal playa habitat (i.e., enhancing a wetted acre to a typical measure of equivalent functional value) and managing the created habitat for five years following creation is approximately \$75,000 per acre.¹⁷³ Thus, under this set of high cost assumptions, the cost of offsetting impacts to one acre of habitat is \$225,000. Similar to habitat restoration and enhancement, habitat creation can occur either on- or off-site. For off-site habitat creation, it is assumed the vernal playa habitat was either already owned by the developer, or that habitat can be restored and enhanced without requiring that the developer purchase

¹⁶⁹ Personal communication with Ron Rempol, Regional Conservation Authority, Riverside County, April 6, 2005.

¹⁷⁰ Personal communication with Randall R. Schroeder, Lennar – Corona, April 8, 2005.

¹⁷¹ The high-end mitigation ratio for essential habitat covered by the Western Riverside County MSHCP is 3:1. The high-end mitigation ratio for essential habitat covered by the City of San Diego and Chula Vista MSHCP subarea plans, the City of Carlsbad and City of San Marcos MHCP subarea plans, and the North San Diego County HCP (ongoing) is 2:1. The high-end mitigation ratio for essential habitat covered by the San Diego County MSCP subarea plan or located in Los Angeles County is 5:1.

¹⁷² The section 7 consultation records for the navarretia (summarized in Table 6) illustrate that development projects have mitigated at ratios ranging from 1:1 to 1.5:1. Although not explicitly written into the MSHCP, compensatory mitigation ratios for impacts to vernal pools typically range from one-to-one (1:1), to three-to-one (3:1). Personal communication with Ron Rempol, Regional Conservation Authority, Riverside County, April 6, 2005.

¹⁷³ Personal communication with Robert MacAller, Senior Restoration Biologist, RECON, April 8, 2005.

land. For on-site creation, it is also assumed that the creation of wetted acres of vernal playa habitat occurs on land that would have been unfit for development regardless of the existence of vernal pools.¹⁷⁴

In addition to the cost of habitat creation (ranging from \$225,000 at a 3:1 mitigation ratio to \$375,000 at a 5:1 mitigation ratio), developers will also fund the endowment for the perpetual management of the created vernal playa habitat at the time of permitting and implement BMPs and project modifications to protect the plant and/or its habitat during and after construction activities. As described previously, the estimated per acre cost of the endowment and BMPs/project modifications is \$18,000 and \$20,000, respectively, or \$114,000 to \$190,000 per acre for the acres created under the high-end scenario (i.e., 3:1 to 5:1 mitigation ratio). In total, the high-end cost of conservation efforts, assuming habitat creation, varies by HCP and ranges from \$339,000 to \$565,000 per wetted acre of vernal playa habitat impacted.

The estimated post-designation costs are presented in the subsections below, as well as the assumptions, data, and methods used to arrive at the estimates of post-designation costs incurred by development for navarretia conservation.

5.2.3 ASSUMPTIONS

All vernal playa habitat within essential habitat are assumed to fall under USACE jurisdiction and therefore, all development activity taking place within the bounds of essential habitat result in a section 7 consultation with the Service. Although a 2001 court decision issued in *Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers* alters current USACE jurisdiction of isolated wetlands, the decision is not expected to have a significant effect on future USACE jurisdiction over vernal pools in Riverside County as seasonally flooded alkali vernal playas are generally connected to USACE jurisdictional waters in the County.¹⁷⁵ Because the result of the SWANCC decision has not been formalized through any policy action, it is assumed that vernal playa habitat occurring in San Diego and Los Angeles counties also remain under USACE jurisdiction. Should the nature of USACE jurisdiction over vernal playa habitat change due to the SWANCC decision, the Service would likely continue to recommend conservation measures to avoid, minimize, or offset unavoidable impacts that are similar in magnitude to the compensatory mitigation ratios imposed prior to USACE jurisdictional restructuring, given a Federal nexus. Moreover, the boundaries of several HCPs encompass certain units of essential habitat, and these HCPs require greater compensatory mitigation ratios than the Federal net loss goal administered by USACE. Therefore, the analysis assumes mitigation would likely continue regardless of USACE jurisdiction.

¹⁷⁴ Land must have the requisite characteristics and soil composition in order to support the creation of vernal pool habitat. If a development project is required to mitigate on-site for vernal pool impacts, then implicit in that requirement is the fact that the land on which the development is planned either currently supports or at one time supported vernal pools.

¹⁷⁵ U.S. Fish and Wildlife Service, 2003, "Final Economic Analysis of Critical Habitat Designation for Vernal Pool Species, Appendix E: Implementation of the Federal Clean Water Act and State Water Statutes," p. E-3; personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, May 11, 2005.

A uniform distribution of navarretia and its vernal playa habitat throughout the essential habitat is also assumed in this analysis. This assumption will clearly bias upward the estimate of post-designation impact incurred by development as it implies that every acre of future development within the bounds of the essential habitat will affect navarretia habitat and require conservation¹ and/or mitigation.

5.2.4 DEVELOPMENT PROJECTIONS

5.2.4.1 Methods

Projections on residential (low-, medium-, and high-density), commercial, and industrial development in the essential habitat from 2006 to 2025 for use in the post-designation cost estimation are made for each habitat unit in the three affected counties. For Riverside County, the projections are made for each habitat unit based on: 1) the detailed current land use data as of 2000, and 2) annual county-level population projections. Specifically, acres of commercial, industrial, and residential (low-, medium-, and high-density) development in each year from 2006 to 2025 are estimated for each essential habitat unit in Riverside County by assuming that commercial, industrial, and residential development will grow at the same rate as population in Riverside County.

For Los Angeles and San Diego counties, more data are available for making development projections. In addition to 1) the detailed current land use data, and 2) annual county-level population projections, land use projections are also available for a single point in the future. Specifically, the SANDAG has forecast land use for San Diego County as of 2030, and Los Angeles County has land use projections for the County as of 2025.¹⁷⁶ SANDAG land use projections are made based on the “best-practices” methodology adapted to local conditions. These projections are used with the existing land use data (as of 2000 for Los Angeles County and 2003 for San Diego County) and population projections to forecast acres of commercial, industrial, and residential (high-, medium-, and low-density) development in each year from 2006 to 2025 for each essential habitat unit in Los Angeles and San Diego counties. More specifically, the following formula is used to estimate land development in a habitat unit:

$$\begin{aligned}
 A_1 &= A_0(1+r_1)\alpha, \\
 A_2 &= A_1(1+r_2)\alpha, \\
 &\dots \\
 A_N &= A_{N-1}(1+r_{N-1})\alpha,
 \end{aligned}$$

where:

¹⁷⁶ Personal communication with Chris Morneau, Department of Regional Planning, GIS Section, Los Angeles County, April 11, 2005.

A_0 = acres of a particular type of land development (e.g., high-density residential) at the beginning year of the forecasting period,

r_t = the projected population growth rate in year t ,

α = an adjustment factor to guarantee that the projected acres of development at the end of the period match those forecasted by SANDAG and Los Angeles County. α is given by:

$$\alpha = \left(\frac{A_N}{A_0 \sum_{t=1}^N (1 + r_t)} \right)^{1/N}$$

This method of projecting development takes advantage of three datasets that are currently available: the detailed land use in 2000 (Los Angeles County) and 2003 (San Diego County), the projected annual population growth, and the SANDAG 2030 land use projections and Los Angeles County 2025 land use projections.

5.2.4.2 Data

Annual population projections for the counties that encompass the essential habitat were obtained from the California Department of Finance, Demographic Research Unit (see Table 10). Based on these population projections, the annual growth rates of population are calculated for each county containing the essential habitat.

**Table 10
Population Projections and Annual Growth in Counties
Containing Navarretia Essential Habitat**

Year	Riverside County		Los Angeles County		San Diego County	
	Projected Population	Annual Growth Rate	Projected Population	Annual Growth Rate	Projected Population	Annual Growth Rate
1998	1,466,497	2.10%	9,265,790	0.87%	2,725,701	1.71%
1999	1,514,581	3.28%	9,394,216	1.39%	2,776,308	1.86%
2000	1,553,902	2.60%	9,559,635	1.76%	2,832,563	2.03%
2001	1,616,704	4.04%	9,730,885	1.79%	2,887,104	1.93%
2002	1,682,408	4.06%	9,889,170	1.63%	2,944,585	1.99%
2003	1,758,719	4.54%	10,047,236	1.60%	2,989,178	1.51%
2004	1,815,394	3.22%	10,083,225	0.36%	3,024,720	1.19%

Year	Riverside County		Los Angeles County		San Diego County	
	Projected Population	Annual Growth Rate	Projected Population	Annual Growth Rate	Projected Population	Annual Growth Rate
2005	1,871,587	3.10%	10,145,640	0.62%	3,063,322	1.28%
2006	1,929,377	3.09%	10,208,754	0.62%	3,102,421	1.28%
2007	1,986,790	2.98%	10,272,169	0.62%	3,141,622	1.26%
2008	2,045,620	2.96%	10,335,497	0.62%	3,180,835	1.25%
2009	2,105,041	2.90%	10,398,495	0.61%	3,219,978	1.23%
2010	2,165,148	2.86%	10,461,007	0.60%	3,258,951	1.21%
2011	2,214,692	2.29%	10,503,981	0.41%	3,298,668	1.22%
2012	2,264,798	2.26%	10,546,804	0.41%	3,338,149	1.20%
2013	2,315,369	2.23%	10,589,476	0.40%	3,377,294	1.17%
2014	2,366,327	2.20%	10,632,009	0.40%	3,416,025	1.15%
2015	2,417,508	2.16%	10,674,359	0.40%	3,454,153	1.12%
2016	2,468,892	2.13%	10,716,818	0.40%	3,491,639	1.09%
2017	2,520,404	2.09%	10,759,290	0.40%	3,528,365	1.05%
2018	2,572,090	2.05%	10,801,614	0.39%	3,564,288	1.02%
2019	2,623,874	2.01%	10,843,655	0.39%	3,599,376	0.98%
2020	2,675,648	1.97%	10,885,092	0.38%	3,633,572	0.95%
2021	2,724,967	1.84%	10,926,474	0.38%	3,672,143	1.06%
2022	2,774,280	1.81%	10,966,861	0.37%	3,710,309	1.04%
2023	2,823,839	1.79%	11,006,206	0.36%	3,748,121	1.02%
2024	2,873,652	1.76%	11,044,449	0.35%	3,785,604	1.00%
2025	2,923,758	1.74%	11,081,252	0.33%	3,822,821	0.98%
2026	2,974,209	1.73%	11,116,463	0.32%	3,859,825	0.97%
2027	3,025,077	1.71%	11,149,867	0.30%	3,896,648	0.95%
2028	3,076,378	1.70%	11,181,206	0.28%	3,933,218	0.94%
2029	3,128,139	1.68%	11,210,306	0.26%	3,969,586	0.92%
2030	3,180,411	1.67%	11,044,449	0.35%	4,005,624	0.91%

Source: California Department of Finance, Demographic Research Unit.
http://www.dof.ca.gov/html/Demograp/DRU_datafiles/DRU_datafiles.htm.

Current acres of low-density residential (RL), medium-density residential (RM), high-density residential (RH), commercial (C), and industrial (I) development within each habitat unit are estimated based on the GIS analysis of land use data. The Southern California Association of Governments (SCAG) maintains

GIS data describing land use in Riverside and Los Angeles counties for 2000 and the SANDAG maintains similar GIS data describing land use in San Diego County for 2003.¹⁷⁷ These GIS data were intersected with the essential habitat to describe land use within the affected region. The SCAG and SANDAG land use categories were aggregated to the five categories mentioned above. Table 11 and Table 12 detail the aggregation of the SCAG and SANDAG land use classes.

**Table 11
Aggregation of SCAG Land Use Data**

SCAG Land Use Classification	C	I	RH	RM	RL	DV	UD
High-Density Single Family Residential			X				
Trailer Parks and Mobile Home Courts, High-Density	X						
Rural Residential, High-Density				X			
Rural Residential, Low-Density					X		
Regional Shopping Center	X						
Modern Strip Development	X						
Fire Stations		X					
Manufacturing, Assembly, and Industrial Services		X					
Open Storage	X						
Mineral Extraction - Other Than Oil and Gas		X					
Airports	X						
Freeways and Major Roads	X						
Water Storage Facilities	X						
Water Transfer Facilities	X						
Improved Flood Waterways and Structures							X
Maintenance Yards	X						
Mixed Transportation	X						
Mixed Transportation and Utility		X					
Under Construction			X				
Golf Courses	X						
Wildlife Preserves and Sanctuaries							X
Other Open Space and Recreation							X

¹⁷⁷ Southern California Association of Governments, Region Land Use - 2000, www.scag.ca.gov; San Diego Association of Governments, Land Use, http://www.sandag.cog.ca.us/resources/maps_and_gis/gis_downloads/land.asp.

SCAG Land Use Classification	C	I	RH	RM	RL	DV	UD
Irrigated Cropland and Improved Pasture Land						X	
Non-Irrigated Cropland and Improved Pasture Land						X	
Orchards and Vineyards						X	
Nurseries						X	
Dairy, Intensive Livestock, and Associated Facilities						X	
Poultry Operations		X					
Other Agriculture						X	
Horse Ranches						X	
Vacant Undifferentiated						X	
Water, Undifferentiated							X

Table 12
Aggregation of SANDAG Land Use Data

SANDAG Land Use Classification	C	I	RH	RM	RL	DV	UD
Spaced Rural Residential					X		
Single Family Residential				X			
Multi-Family Residential			X				
Mobile Home Parks	X						
Hotel/Motel (Lo-Rise)	X						
Resort	X						
Industrial Parks		X					
Light Industry – General		X					
Warehousing & Public Storage	X						
Extractive Industry		X					
Junkyard/Dump/Landfill		X					
Military Airports							X
General Aviation Airports	X						
Rail Station/Transit Centers		X					
Freeways	X						
Communications and Utilities		X					
Railroad Right of Ways							X
Road Right of Ways							X
Other Transportation	X						
Wholesale Trade	X						
Community Shopping Centers	X						
Neighborhood Shopping Centers	X						

SANDAG Land Use Classification	C	I	RH	RM	RL	DV	UD
Automobile Dealerships	X						
Store-Front Commercial	X						
Other Retail Trade and Strip Commercial	X						
Office – Low Rise	X						
Government Office/Civic Centers	X						
Religious Facilities	X						
Post Offices		X					
Fire/Police Stations		X					
Other Public Services	X						
Other Health Care		X					
Military Training							X
Junior Colleges	X						
Senior High School	X						
Junior High Schools and Middle Schools	X						
Elementary Schools	X						
Golf Courses	X						
Other Recreations							X
Parks – Active							X
Open Space Reserves, Preserves							X
Landscape Open Space						X	
Residential Recreation							X
Intensive Agriculture						X	
Field Crops						X	
Vacant Land						X	
Lakes, Reservoirs, Large Ponds							X
Commercial Under Construction	X						
Regional Shopping Centers	X						
Specialty Commercial	X						
Military Use							X
Agriculture						X	
Public/Semi-Public	X						

Acres of commercial, industrial, and residential (low-, medium-, and high-density) development within each essential habitat unit in the three affected counties as of 2005 is then estimated by assuming that commercial, industrial, and residential development grew at the same annual rate as the population in each of the counties leading up to 2005. Table 13 presents the acreage by current land use category within each habitat unit.

Table 13
Acreeage by Current Land Use Category and Habitat Unit

Habitat Unit	Developed 2005						Developable (2005)
	RL	RM	RH	C	I	Total	
1A	9.1	0.0	0.0	0.0	53.5	62.7	471.1
1B	3.3	0.0	0.0	0.0	0.0	3.3	58.5
2	0.0	1.7	23.4	16.3	0.0	41.5	68.5
3	46.8	0.5	1.5	0.0	0.0	48.8	93.1
4A	0.0	0.0	0.0	0.0	3.5	3.5	4.7
4B	0.0	0.0	0.0	0.0	9.3	9.3	22.6
4C	0.0	0.0	0.0	4.2	17.1	21.3	60.7
4D	0.0	0.0	0.0	8.4	0.8	9.2	0.0
4E	186.4	55.1	9.9	317.9	25.1	594.4	1,446.6
5A	0.0	0.0	0.0	1.0	0.0	1.0	36.7
5B	1.9	0.0	0.0	0.0	1.0	2.9	39.1
5C	1.7	0.0	0.0	0.0	0.0	1.7	46.2
5D	0.0	0.0	0.0	1.4	1.3	2.7	0.0
Proposed	249.1	57.3	34.9	349.2	111.7	802.2	2,347.7
E1	20.9	0.1	0.0	106.9	3.8	131.7	5,401.2
E2	92.8	0.0	162.8	185.7	60.2	501.5	3,459.8
E3	55.9	0.0	0.0	0.0	0.0	55.9	188.7
E4	0.5	0.0	0.0	0.0	5.4	5.9	23.8
E5	2.2	0.0	12.0	1.1	0.0	15.3	291.1
E6	5.2	0.0	0.0	1.5	0.0	6.7	716.9
E7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E8	0.0	0.0	0.0	165.5	40.8	206.3	0.0
E9	0.0	0.3	0.0	1.1	0.0	1.4	75.4
E10	0.3	0.2	0.0	0.2	0.0	0.7	36.7
E11	0.0	0.0	0.0	2.6	0.0	2.6	66.6
E12	0.0	0.0	0.0	0.0	0.0	0.0	14.9
E13	1.1	0.2	0.0	2.1	0.0	3.4	63.3
E14	0.0	0.0	0.0	0.0	0.0	0.0	41.6
E15	0.0	0.0	0.0	0.0	0.0	0.0	2.5
E16	0.0	1.5	0.0	0.0	0.0	1.5	122.0

Habitat Unit	Developed 2005						Developable (2005)
	RL	RM	RH	C	I	Total	
E17	21.7	0.0	0.0	0.7	6.3	28.7	518.3
E18	2.1	0.0	0.0	94.2	3.3	99.6	324.2
E19	0.0	36.4	14.8	88.8	15.5	155.6	736.0
E20	0.0	0.0	0.0	21.2	45.6	66.8	521.5
Excluded	202.6	38.7	189.6	671.5	181.0	1,283.4	1,283.4
NI1	0.0	0.0	0.0	8.7	6.0	14.6	32.6
NI2	0.0	0.0	0.0	0.0	0.0	0.0	80.0
NI3	0.0	0.0	0.0	0.0	0.6	0.6	18.5
Not Included	0.0	0.0	0.0	8.7	6.6	15.2	131.1
Total	451.7	96.0	224.5	1,029.4	299.3	2,100.8	15,083.6

Note: Numbers may not sum due to rounding.

5.2.4.3 Forecasted Acres of Land Development

Based on the methods and data discussed above, acres of commercial, industrial, and residential (low-, medium-, and high-density) development in each year from 2006 to 2025 are estimated for each essential habitat unit in Riverside, Los Angeles and San Diego counties. Table 14 presents the total number of acres that are forecasted to be developed during the post-designation period (2006-2025).

5.2.5 ESTIMATION RESULTS: COST OF MITIGATION FEES AND CONSERVATION ACTIVITIES

Post-designation costs incurred by developers and landowners as a result of navarretia conservation are estimated based on the projected acres of land development and costs associated with different conservation efforts. The estimation procedure is described below.

Step 1: Estimate the costs incurred by development for mitigation fees and activities required to conserve the navarretia. As discussed previously, costs associated with different conservation measures were obtained from the Western Riverside County MSHCP, a restoration biologist familiar with vernal pool restoration, creation, and enhancement in southern California, from developers impacted by vernal pool habitat at their project site, and from the historic section 7 consultation records obtained from the Service. The typical range of mitigation ratios was obtained from discussions with the MSCP Division of the County of San Diego Department of Planning and Land Use, the City of Chula Vista Planning Department, the City of San Marcos, the Riverside County RCA, and the MHCP Final Plan, and corroborated with historic section 7 consultation records.¹⁷⁸

¹⁷⁸ Absent specific mitigation ratios for the ongoing City of San Marcos MHCP subarea plan and North San Diego County HCP, the range of mitigation ratios outlined in the subregional MHCP plan (2:1 to 4:1) are applied to

Table 14
Forecasted Acres of Land Developed Between 2006 and 2025 by Habitat Unit

Habitat Unit	Developed 2006-2025						
	RL	RM	RH	C	I	Total	Percent
1A	12.0	0.0	0.0	0.0	70.7	82.7	2.8%
1B	16.3	0.0	0.0	0.0	0.0	16.3	0.5%
2	0.0	0.4	27.2	9.1	0.0	36.7	1.2%
3	62.7	4.7	0.2	0.0	0.0	67.6	2.3%
4A	0.0	0.0	0.0	0.0	3.1	3.1	0.1%
4B	0.0	0.0	0.0	0.0	13.3	13.3	0.4%
4C	0.0	0.0	0.0	9.2	32.6	41.7	1.4%
4D	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
4E	732.5	30.9	25.1	47.3	66.5	902.3	30.4%
5A	0.0	0.0	0.0	10.2	0.0	10.2	0.3%
5B	18.6	0.0	0.0	0.4	20.0	39.0	1.3%
5C	17.5	0.0	0.0	0.0	0.0	17.5	0.6%
5D	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
Proposed Critical Habitat	859.5	36.0	52.5	76.2	206.0	1,230.2	41.4%
E1	11.8	0.0	0.0	60.1	2.1	74.1	2.5%
E2	52.2	0.0	91.5	104.4	33.9	281.9	9.5%
E3	31.4	0.0	0.0	0.0	0.0	31.4	1.1%
E4	0.3	0.0	0.0	0.0	3.0	3.3	0.1%
E5	1.2	0.0	6.7	0.6	0.0	8.6	0.3%
E6	2.9	0.0	0.0	0.8	0.0	3.8	0.1%
E7	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
E8	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
E9	0.0	3.0	0.0	11.3	0.0	14.3	0.5%
E10	2.9	1.6	0.0	2.1	0.0	6.7	0.2%
E11	0.0	0.0	0.0	25.6	0.0	25.6	0.9%

estimate the associated costs incurred by developers impacting essential habitat in the essential lands covered by these HCPs. In addition, the essential habitat in Los Angeles County and MCAS Miramar are not protected by the HCPs. The full range of mitigation ratios observed in the various HCPs for development that occurs on essential habitat in Los Angeles County (1:1 to 5:1), and the range of mitigation ratios from the City of San Diego MSCP subarea plan (2:1 to 4:1) are applied to development that occurs on the base as the base is surrounded by the subarea plan.

Habitat Unit	Developed 2006-2025						
	RL	RM	RH	C	I	Total	Percent
E12	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
E13	10.9	2.4	0.0	20.6	0.0	33.9	1.1%
E14	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
E15	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
E16	0.0	15.0	0.0	0.0	0.0	15.0	0.5%
E17	216.8	0.0	0.0	7.2	62.6	286.6	9.7%
E18	34.6	0.0	0.0	30.3	86.4	151.3	5.1%
E19	0.0	144.1	148.1	150.4	40.5	483.2	16.3%
E20	0.0	0.0	0.0	57.8	251.2	309.0	10.4%
Excluded Habitat	364.9	166.2	246.4	471.3	479.8	1,728.6	58.2%
NI1	0.0	0.0	0.0	0.0	4.4	4.5	0.2%
NI2	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
NI3	0.0	0.0	0.0	0.0	5.9	5.9	0.2%
Not Included Habitat	0.0	0.0	0.0	0.0	10.4	10.4	0.4%
Total Essential Habitat	1,224.4	202.2	298.9	547.9	696.2	2,969.2	100.0%

Note: Numbers may not sum due to rounding.

Table 15 provides a summary of the mitigation fees that developers pay for each acre of adversely modified habitat impacted on lands within the Western Riverside County MSHCP. These development mitigation fees are specific to the MSHCP and will be used by the County to finance the acquisition of lands and certain improvements necessary to implement the goals and objectives of the MSHCP.¹⁷⁹ Total mitigation fees incurred by developers for species conservation range from \$5,620 to \$17,180 per acre impacted, depending on the type (e.g., commercial, residential, or industrial) of proposed development. Although conservation is also spurred by the presence of 146 other species identified in the MSHCP, including the navarretia, this analysis assumes that 100 percent of the cost of mitigation fees is attributable solely to the navarretia. Thus, this cost analysis method likely results in an overstatement of navarretia costs.

¹⁷⁹ Riverside County Ordinance 810.2, <http://www.tlma.co.riverside.ca.us/ordinances/ord810.2.html>, accessed April 2005.

Table 15
Per Acre MSHCP Mitigation Fees by Land Use Category

	RL	RM	RH	C	I
One-Time Mitigation Fee per Dwelling Unit	\$1,651	\$1,057	\$859		
Average Dwelling Units per Acre	5	10	20		
One-Time Mitigation Fee per Acre	\$8,255	\$10,570	\$17,180	\$5,620	\$5,620

Source: Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP), Volume 1 – The Plan*, <http://www.rcip.org/mshcpdocs/vol1/mshcpvol1toc.htm>; and Riverside County Ordinance 810.2, <http://www.tlma.co.riverside.ca.us/ordinances/ord810.2.html>, accessed April 2005.

In addition to the mitigation fees paid by developers in western Riverside County, developers in all three affected counties must mitigate if their development activities impact vernal pool habitat. Table 16 provides a summary of the mitigation activity costs and corresponding mitigation ratios applied in this analysis. Total mitigation activity costs incurred by developers for the conservation of the navarretia range from \$78,000 to \$565,000 per wetted acre of essential habitat impacted, depending on the measure of mitigation negotiated and mitigation ratio imposed.

This analysis focuses on developed acres, not wetted acres, and assumes development on any portion of essential habitat will result in mitigation activity. However, developers typically incur mitigation activity costs and no net loss obligations on impacts to only the wetted acreage.¹⁸⁰ Hence the need to adjust the acres of essential habitat used in the estimation of development costs to wetted acres by a scalar. In general, for every wetted acre, i.e., the vernal pool itself, there exists another eight to ten acres of upland habitat that surrounds the wetted acre.¹⁸¹ Therefore, implicit in the assumption of uniform distribution of vernal pool habitat, it is also assumed that nine acres of upland habitat is required for each wetted acre of vernal pool habitat. Based on this assumption, a scalar of 0.10 is applied to the mitigation activity cost estimates in an effort to better represent the propensity for future development to impact vernal pools containing navarretia within the essential habitat and incur costs for conservation measures determined through section 7 consultations. Furthermore, the limited section 7 consultation history indicates the development of upland acres has not required conservation. Therefore, this analysis assumes that development of upland acres requires only the payment of the MSHCP mitigation fees, and for only those acres of forecasted development within the boundaries of the MSHCP. This latter assumption may bias results downward if additional mitigation is required for development of upland acres.

¹⁸⁰ Personal communication with Eric Nickell, Vice President, Economic and Planning Systems, Inc., Sacramento, California, April 12, 2005.

¹⁸¹ Personal communication with Robert MacAller, Senior Restoration Biologist, RECON, April 8, 2005

Table 16
Cost of Conservation and Mitigation Incurred by Development in Essential Habitat

Components of Conservation and Mitigation	CSDSAP, CVSAP, HMP, CSMSAP North County MSCP, MCAS Miramar		SDCSAP		Los Angeles County		MSHCP	
	Habitat Restoration / Enhancement	Creation of Habitat	Habitat Restoration / Enhancement	Creation of Habitat	Habitat Restoration / Enhancement	Creation of Habitat	Habitat Restoration / Enhancement	Creation of Habitat
Cost of Conservation Activity ^{d/}	\$40,000	\$75,000	\$40,000	\$75,000	\$40,000	\$75,000	\$40,000	\$75,000
Endowment for Maintenance ^{d/}	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000
Cost of Best Management Practice	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Total Per Acre ^{c/}	\$78,000	\$113,000	\$78,000	\$113,000	\$78,000	\$113,000	\$78,000	\$113,000
Mitigation Ratio	2:1 ^{a/}	4:1 ^{a/}	3:1 ^{b/}	5:1 ^{b/}	1:1	5:1	1:1 ^{c/}	3:1 ^{c/}
Total Cost	\$156,000	\$452,000	\$234,000	\$565,000	\$78,000	\$565,000	\$78,000	\$339,000
Scalar	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total Scaled Cost	\$15,600	\$45,200	\$23,400	\$56,500	\$7,800	\$56,500	\$7,800	\$33,900

Sources:

a/ Personal communication with Keith Greer, Planning Director, City of San Diego, March 25, 2005; Personal communication with Josie Gabriel, Planning Department, City of Chula Vista, April 1, 2005; and San Diego Association of Governments, 2003, "Volume I Final MHCP Plan", Table 4-7, p. 4-22;

b/ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, March 30, 2005.

c/ Personal communication with Ron Rempol, Regional Conservation Authority, Riverside County, April 6, 2005.

d/ Based on personal communication with Robert MacAller, Senior Restoration Biologist, RECON, March 31, 2005, and Jeremy Buegge, Director of Planning and Land Use, MSCP Division of San Diego County, April 8, 2005.

Definition of acronyms: City of San Diego Subarea Plan (CSDSAP), Chula Vista Subarea Plan (CVSAP), City of Carlsbad MHCP Plan (HMP), City of San Marcos Subarea Plan (CSMSAP), San Diego County Subarea Plan (SDCSAP), Western Riverside County Multiple Species HCP (MSHCP), and Marine Corps Air Station Miramar (MCAS Miramar).

Step 2: Estimate the undiscounted conservation and mitigation costs and present value of conservation and mitigation costs from 2006 to 2025 in each habitat based on the projected acres of each type of development and the per-acre conservation and mitigation costs. The annualized costs are discounted using discount rates of three and seven percent. The estimated costs of conservation efforts for the navarretia for residential, commercial, and industrial development are summarized in Table 17. The table combines the forecasted acres of development presented earlier in Table 14 with the costs presented in Table 15 and Table 16. The low-end cost assumes the payment of mitigation fees and the implementation of habitat restoration and enhancement while the high-end cost range assumes the payment of the same mitigation fees, but mitigation is through habitat creation. The first column of Table 17 presents the total undiscounted post-designation costs from 2006 to 2025, and the second and third columns report the post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns report the annualized cost for each habitat unit, also using discount rates of three percent and seven percent, respectively.¹⁸²

Table 17
Post-Designation Conservation Cost to Development, by Habitat Unit (2005 dollars)¹⁸³

Habitat Unit	Post-Designation (Total)			Post-Designation (Annualized)	
	Undiscounted	3%	7%	3%	7%
1A	\$644,900 - \$4,671,700	\$462,000 - \$3,346,700	\$313,700 - \$2,272,600	\$31,100 - \$225,000	\$29,600 - \$214,500
1B	\$126,800 - \$918,100	\$94,300 - \$683,000	\$67,100 - \$486,300	\$6,300 - \$45,900	\$6,300 - \$45,900
2	\$571,800 - \$1,656,700	\$413,500 - \$1,198,100	\$284,200 - \$823,600	\$27,800 - \$80,500	\$26,800 - \$77,700
3	\$1,582,400 - \$3,820,800	\$1,136,900 - \$2,745,000	\$774,700 - \$1,870,600	\$76,400 - \$184,500	\$73,100 - \$176,600
4A	\$47,800 - \$138,500	\$34,700 - \$100,400	\$23,900 - \$69,300	\$2,300 - \$6,800	\$2,300 - \$6,500
4B	\$2,067,000 - \$599,700	\$148,000 - \$428,700	\$100,200 - \$290,300	\$9,900 - \$28,800	\$9,500 - \$27,400
4C	\$651,000 - \$1,886,100	\$460,700 - \$1,334,800	\$307,800 - \$891,800	\$31,000 - \$89,700	\$29,100 - \$84,200

¹⁸² The annual conservation costs, a function of the number of acres developed to low-, medium-, and high-density residential, commercial, and industrial land classes, vary with the forecasted annual population growth rate for the three counties during the post-designation period. Because of this annual variability in undiscounted dollar costs during the post-designation period, the annualized costs at discount rates of three and seven percent are not equal.

¹⁸³ Tables 17, 19, and 20 present post-designation costs of projects initiated in the post-designation period only; figures presented in these tables do not include the post-designation costs of projects initiated in the pre-designation period.

Habitat Unit	Post-Designation (Total)			Post-Designation (Annualized)	
	Undiscounted	3%	7%	3%	7%
4E	\$14,075,900 - \$40,783,900	\$9,802,800 - \$28,403,000	\$6,412,900 - \$18,581,000	\$658,900 - \$1,909,100	\$605,300 - \$1,753,900
5A	\$238,500 - \$575,900	\$177,400 - \$428,400	\$126,300 - \$305,100	\$11,900 - \$28,800	\$11,900 - \$28,800
5B	\$912,100 - \$2,202,400	\$678,500 - \$1,638,300	\$483,200 - \$1,166,600	\$45,600 - \$110,100	\$45,600 - \$110,100
5C	\$409,100 - \$987,700	\$304,300 - \$734,700	\$216,700 - \$523,200	\$20,500 - \$49,400	\$20,500 - \$49,400
Proposed Critical Habitat	\$19,467,200 - \$58,241,600	\$13,713,000 - \$41,041,100	\$9,110,800 - \$27,280,200	\$921,700 - \$2,758,600	\$860,000 - \$2,575,100
E1	\$1,025,100 - \$2,958,000	\$769,400 - \$2,220,200	\$554,400 - \$1,599,700	\$51,700 - \$149,200	\$52,300 - \$151,000
E2	\$4,979,200 - \$12,337,700	\$3,737,300 - \$9,260,500	\$2,692,800 - \$6,672,500	\$251,200 - \$622,500	\$254,200 - \$629,800
E3	\$504,600 - \$1,324,900	\$378,700 - \$994,400	\$272,900 - \$716,500	\$25,500 - \$66,800	\$25,800 - \$67,600
E4	\$45,000 - \$131,200	\$33,800 - \$98,500	\$24,300 - \$71,000	\$2,300 - \$6,600	\$2,300 - \$6,700
E5	\$196,100 - \$420,100	\$147,200 - \$315,300	\$106,100 - \$227,200	\$9,900 - \$21,200	\$10,000 - \$21,400
E6	\$58,100 - \$156,000	\$43,600 - \$117,100	\$31,400 - \$84,400	\$2,900 - \$7,900	\$3,000 - \$8,000
E9	\$334,900 - \$808,600	\$249,100 - \$601,500	\$177,400 - \$428,300	\$16,700 - \$40,400	\$16,700 - \$40,400
E10	\$103,800 - \$300,700	\$77,200 - \$223,700	\$55,000 - \$159,300	\$5,200 - \$15,000	\$5,200 - \$15,000
E11	\$598,200 - \$1,444,400	\$445,000 - \$1,074,400	\$316,900 - \$765,100	\$29,900 - \$72,200	\$29,900 - \$72,200
E13	\$528,300 - \$1,530,700	\$393,000 - \$1,138,700	\$279,900 - \$810,800	\$26,400 - \$76,500	\$26,400 - \$76,500
E16	\$234,500 - \$679,500	\$174,500 - \$505,500	\$124,200 - \$360,000	\$11,700 - \$34,000	\$11,700 - \$34,000
E17	\$6,706,300 - \$16,192,500	\$4,988,600 - \$12,045,200	\$3,552,300 - \$8,577,200	\$335,300 - \$809,600	\$335,300 - \$809,600
E18	\$2,360,000 - \$6,838,000	\$1,573,300 - \$4,558,500	\$970,500 - \$2,811,800	\$105,700 - \$306,400	\$91,600 - \$265,400
E19	\$7,537,800 - \$21,840,400	\$5,382,600 - \$15,595,800	\$3,641,000 - \$10,549,500	\$361,800 - \$1,048,300	\$343,700 - \$995,800
E20	\$4,821,000 - \$13,968,600	\$3,302,900 - \$9,569,900	\$2,112,200 - \$6,120,100	\$222,000 - \$643,300	\$199,400 - \$577,700

Habitat Unit	Post-Designation (Total)			Post-Designation (Annualized)	
	Undiscounted	3%	7%	3%	7%
Excluded Habitat	\$30,032,900 - \$80,931,307	\$21,696,200 - \$58,319,100	\$14,911,200 - \$39,953,300	\$1,458,300 - \$3,920,000	\$1,407,500 - \$3,771,300
NI1	\$69,800 - \$202,400	\$51,200 - \$148,400	\$35,800 - \$103,800	\$3,400 - \$10,000	\$3,400 - \$9,800
NI3	\$92,700 - \$268,400	\$68,900 - \$199,700	\$49,100 - \$142,200	\$4,600 - \$13,400	\$4,600 - \$13,400
Not Included Habitat	\$162,500 - \$470,800	\$120,100 - \$348,100	\$84,900 - \$246,000	\$8,100 - \$23,400	\$8,000 - \$23,200
Total Essential Habitat	\$49,662,600 - \$139,643,700	\$35,529,300 - \$99,708,300	\$24,106,900 - \$67,479,500	\$2,388,100 - \$6,702,000	\$2,275,500 - \$6,369,600

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

5.2.6 ESTIMATION RESULTS: ADMINISTRATIVE COST OF SECTION 7 CONSULTATION

During the pre-designation (essentially 1999 through 2005) and post-designation (essentially 2006 through 2025) periods, the population of Riverside County is expected to grow 3.9 percent and 3.5 percent per year, on average, compared to base year 1998. The average annual growth for Los Angeles County during the pre- and post-designation periods is 1.4 percent and 0.5, respectively, and for San Diego County, the average annual growth during the pre- and post-designation period is 1.8 percent and 1.4 percent respectively. While population growth for Riverside, Los Angeles, and San Diego counties during both periods is strong, the annual population growth during the post-designation period is 12, 63, and 23 percent less than the annual growth during the pre-designation period, respectively. Considering the slower growth, this analysis expects that the rate of section 7 consultations during the post-designation period will not exceed the rate experienced during the pre-designation period. Hence, the analysis assumes that future consultations will occur at the same rate. As previously described, seven development-related section 7 consultations took place during the seven year pre-designation period (1998-2005), two informal and five formal. Based on this rate of consultation activity, the analysis forecasts approximately six informal and 14 formal consultations during the post-designation period for residential, commercial, and industrial development. The analysis then allocates these post-designation section 7 consultations to each of the appropriate habitat units (see Table 29) based the proportion of acres developed in each during the post-designation period (see Table 14).

The estimated administrative cost of section 7 consultation for residential, commercial, and industrial development is summarized in Table 19. Total post-designation administrative costs are calculated by multiplying the average administrative section 7 consultation cost by type of consultation (see Section 2.2) by the number of section 7 consultations forecast (see Table 18). The first column of Table 19 presents the total undiscounted post-designation costs from 2006 to 2025, and the second and third columns report the post-designation costs using discount rates of three percent and seven percent,

respectively. The last two columns report the annualized cost for each habitat unit, also using discount rates of three percent and seven percent, respectively.¹⁸⁴

Table 18
Post-Designation Section 7 Consultations to Development, by Habitat Unit

Habitat Unit	Informal Consultation	Formal Consultation
1A	0.16	0.40
1B	0.03	0.08
2	0.07	0.18
3	0.13	0.33
4A	0.01	0.01
4B	0.03	0.06
4C	0.08	0.20
4D	0.00	0.00
4E	1.74	4.34
5A	0.02	0.05
5B	0.08	0.19
5C	0.03	0.08
5D	0.00	0.00
Proposed Critical Habitat	2.37	5.92
E1	0.14	0.36
E2	0.54	1.36
E3	0.06	0.15
E4	0.01	0.02
E5	0.02	0.04
E6	0.01	0.02
E7	0.00	0.00
E8	0.00	0.00
E9	0.03	0.07
E10	0.01	0.03
E11	0.05	0.12
E12	0.00	0.00

¹⁸⁴ Because the time frame of the future section 7 consultations is unknown, the analysis assigns a uniform probability to administrative consultation costs being incurred in each year. As a result, the annualized post-designation administrative consultation costs are equal at three and seven percent discount rates.

Habitat Unit	Informal Consultation	Formal Consultation
E13	0.07	0.16
E14	0.00	0.00
E15	0.00	0.00
E16	0.03	0.07
E17	0.55	1.38
E18	0.29	0.73
E19	0.93	2.32
E20	0.59	1.49
Excluded Habitat	3.33	8.32
NI1	0.01	0.02
NI2	0.00	0.00
NI3	0.01	0.03
Not Included Habitat	0.02	0.05
Total Essential Habitat	5.71	14.29

Note: Numbers may not sum due to rounding.

Table 19
Post-Designation Administrative Cost of Section 7 Consultation to Development, by
Habitat Unit (2005 dollars)

Habitat Unit	Post-Designation (Total)			Post-Designation (Annualized)	
	Undiscounted	3%	7%	3%	7%
1A	\$13,400	\$10,000	\$7,100	\$700	\$700
1B	\$2,600	\$2,000	\$1,400	\$100	\$100
2	\$6,000	\$4,400	\$3,200	\$300	\$300
3	\$11,000	\$8,200	\$5,800	\$600	\$600
4A	\$500	\$400	\$300	<\$100	<\$100
4B	\$2,200	\$1,600	\$1,100	\$100	\$100
4C	\$6,800	\$5,000	\$3,600	\$300	\$300
4E	\$146,600	\$109,100	\$77,700	\$7,300	\$7,300
5A	\$1,700	\$1,200	\$900	\$100	\$100
5B	\$6,300	\$4,700	\$3,400	\$300	\$300
5C	\$2,800	\$2,100	\$1,500	\$100	\$100
Proposed Critical Habitat	\$199,900	\$148,700	\$105,900	\$10,000	\$10,000
E1	\$12,000	\$9,000	\$6,400	\$600	\$600
E2	\$45,800	\$34,100	\$24,300	\$2,300	\$2,300
E3	\$5,100	\$3,800	\$2,700	\$300	\$300

Habitat Unit	Post-Designation (Total)			Post-Designation (Annualized)	
	Undiscounted	3%	7%	3%	7%
E4	\$500	\$400	\$300	<\$100	<\$100
E5	\$1,400	\$1,000	\$700	\$100	\$100
E6	\$600	\$500	\$300	<\$100	<\$100
E9	\$2,300	\$1,700	\$1,200	\$100	\$100
E10	\$1,100	\$800	\$600	\$100	\$100
E11	\$4,200	\$3,100	\$2,200	\$200	\$200
E13	\$5,500	\$4,100	\$2,900	\$300	\$300
E16	\$2,400	\$1,800	\$1,300	\$100	\$100
E17	\$46,600	\$34,600	\$24,700	\$2,300	\$2,300
E18	\$24,600	\$18,300	\$13,000	\$1,200	\$1,200
E19	\$78,500	\$58,400	\$41,600	\$3,900	\$3,900
E20	\$50,200	\$37,400	\$26,600	\$2,500	\$2,500
Excluded Habitat	\$280,900	\$209,000	\$148,800	\$14,000	\$14,000
NI1	\$700	\$500	\$400	<\$100	<\$100
NI3	\$1,000	\$700	\$500	<\$100	<\$100
Not Included Habitat	\$1,700	\$1,300	\$900	\$100	\$100
Total Essential Habitat	\$482,600	\$359,000	\$255,600	\$24,100	\$24,100

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

5.2.7 ESTIMATION RESULTS: TOTAL POST-DESIGNATION ECONOMIC COSTS

Table 20 illustrates the post-designation total economic impacts attributable to residential, commercial, and industrial development forecast to occur during the post-designation period (2006 to 2025). The table combines the post-designation costs attributable to conservation and presented in Table 17 with the post-designation administrative cost of section 7 consultation provided in Table 19.

Table 20 does not include the post-designation costs presented in Table 8 that resulted from pre-designation development; these costs are included in Table 21 which presents total pre- and post-designation economic impacts.

Table 20
Post-Designation Total Economic Impacts to
Development, by Habitat Unit (2005 dollars)

Habitat Unit	Post-Designation (Total)			Post-Designation (Annualized)	
	Undiscounted	3%	7%	3%	7%
1A	\$658,400 - \$4,685,200	\$472,000 - \$3,356,700	\$320,900 - \$2,279,700	\$31,700 - \$225,600	\$30,300 - \$215,200
1B	\$129,400 - \$920,800	\$96,300 - \$684,900	\$68,500 - \$487,700	\$6,500 - \$46,000	\$6,500 - \$46,000
2	\$577,700 - \$1,662,600	\$417,900 - \$1,202,600	\$287,400 - \$826,700	\$28,100 - \$80,800	\$27,100 - \$78,000
3	\$1,593,400 - \$3,831,800	\$1,145,000 - \$2,753,100	\$780,600 - \$1,876,500	\$77,000 - \$185,100	\$73,700 - \$177,100
4A	\$48,300 - \$139,000	\$35,000 - \$100,800	\$24,200 - \$69,500	\$2,400 - \$6,800	\$2,300 - \$6,600
4B	\$209,100 - \$601,800	\$149,600 - \$430,300	\$101,300 - \$291,500	\$10,100 - \$28,900	\$9,600 - \$27,500
4C	\$657,800 - \$1,892,900	\$465,700 - \$1,339,800	\$311,400 - \$895,400	\$31,300 - \$90,100	\$29,400 - \$84,500
4E	\$14,222,500 - \$40,930,600	\$9,911,900 - \$28,512,100	\$6,490,600 - \$18,658,700	\$666,200 - \$1,916,500	\$612,700 - \$1,761,200
5A	\$240,200 - \$577,600	\$178,700 - \$429,600	\$127,200 - \$305,900	\$12,000 - \$28,900	\$12,000 - \$28,900
5B	\$918,500 - \$2,208,700	\$683,200 - \$1,643,000	\$486,500 - \$169,900	\$45,900 - \$110,400	\$45,900 - \$110,400
5C	\$411,900 - \$990,500	\$306,400 - \$736,800	\$218,200 - \$524,700	\$20,600 - \$49,500	\$20,600 - \$49,500
Proposed Critical Habitat	\$19,667,200 - \$58,441,500	\$13,861,700 - \$41,189,800	\$9,216,700 - \$27,386,200	\$931,700 - \$2,768,600	\$870,000 - \$2,585,100
E1	\$1,037,100 - \$2,970,000	\$778,400 - \$2,229,200	\$560,800 - \$1,606,100	\$52,300 - \$149,800	\$52,900 - \$151,600
E2	\$5,025,000 - \$12,383,500	\$3,771,400 - \$9,294,600	\$2,717,100 - \$6,696,700	\$253,500 - \$624,700	\$256,500 - \$632,100
E3	\$509,700 - \$1,330,000	\$382,500 - \$998,200	\$275,600 - \$719,200	\$25,700 - \$67,100	\$26,000 - \$67,900
E4	\$45,600 - \$131,800	\$34,200 - \$98,900	\$24,600 - \$71,300	\$2,300 - \$6,600	\$2,300 - \$6,700
E5	\$197,500 - \$421,500	\$148,200 - \$316,400	\$106,800 - \$227,900	\$10,000 - \$21,300	\$10,100 - \$21,500
E6	\$58,700 - \$156,600	\$44,100 - \$117,600	\$31,700 - \$84,700	\$3,000 - \$7,900	\$3,000 - \$8,000

Habitat Unit	Post-Designation (Total)			Post-Designation (Annualized)	
	Undiscounted	3%	7%	3%	7%
E9	\$337,200 - \$810,900	\$250,800 - \$603,200	\$178,600 - \$429,500	\$16,900 - \$40,500	\$16,900 - \$40,500
E10	\$104,800 - \$301,700	\$78,000 - \$224,500	\$55,500 - \$159,800	\$5,200 - \$15,100	\$5,200 - \$15,100
E11	\$602,400 - \$1,448,500	\$448,100 - \$1,077,500	\$319,100 - \$767,300	\$30,100 - \$72,400	\$30,100 - \$72,400
E13	\$533,800 - \$1,536,200	\$397,100 - \$1,142,800	\$282,800 - \$813,700	\$26,700 - \$76,800	\$26,700 - \$76,800
E16	\$237,000 - \$682,000	\$176,300 - \$507,300	\$125,500 - \$361,200	\$11,800 - \$34,100	\$11,800 - \$34,100
E17	\$6,752,900 - \$16,239,100	\$5,023,300 - \$12,079,900	\$3,577,000 - \$8,601,900	\$337,600 - \$812,000	\$337,600 - \$812,000
E18	\$2,384,600 - \$6,862,600	\$1,591,600 - \$4,576,800	\$983,500 - \$2,824,800	\$107,000 - \$307,600	\$92,800 - \$266,600
E19	\$7,616,400 - \$21,919,000	\$5,441,000 - \$15,654,200	\$3,682,600 - \$10,591,100	\$365,700 - \$1,052,200	\$347,600 - \$999,700
E20	\$4,871,200 - \$14,018,800	\$3,340,300 - \$9,607,300	\$2,138,800 - \$6,146,700	\$224,500 - \$645,800	\$201,900 - \$580,200
Excluded Habitat	\$30,313,800 - \$81,212,200	\$21,905,100 - \$58,528,100	\$15,060,000 - \$40,102,100	\$1,472,400 - \$3,934,000	\$1,421,600 - \$3,785,400
NI1	\$70,600 - \$203,100	\$51,800 - \$148,900	\$36,200 - \$104,200	\$3,500 - \$10,000	\$3,400 - \$9,800
NI3	\$93,600 - \$269,400	\$69,600 - \$200,400	\$49,600 - \$142,700	\$4,700 - \$13,500	\$4,700 - \$13,500
Not Included Habitat	\$164,200 - \$472,500	\$121,400 - \$349,300	\$85,800 - \$246,900	\$8,200 - \$23,500	\$8,100 - \$23,300
Total Essential Habitat	\$50,145,200 - \$140,126,300	\$35,888,300 - \$100,067,300	\$24,362,500 - \$67,735,200	\$2,412,300 - \$6,726,100	\$2,299,700 - \$6,393,700

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

5.3 TOTAL ECONOMIC COST OF DEVELOPMENT ACTIVITIES

Table 21 presents the total economic impacts attributable to residential, commercial, and industrial development. Total economic impacts are calculated by summing the economic impacts for development activity during the period 1998 to 2005 (see Table 9) with the economic impacts for development activity during the period 2006 to 2025 (see Table 20).

The first column of Table 21 presents the total pre-designation (1998-2005) costs in 2005 dollars. The second column reports the total pre- and post-designation costs from 1998 to 2025 in undiscounted

dollars, and the third and fourth columns report the total pre- and post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent and seven percent, respectively. More than 99 percent of these costs will be borne by developers.

Five units are expected to bear more than 75 percent of the post-designation forecast annualized costs, Unit 4E in Ramona in San Diego County (approximately 27 percent), Units E19 (15 percent), E17 (15 percent), and E20 (9 percent) on Otay Mesa in San Diego County, and Unit E2 (10 percent) near Hemet in Riverside County. San Diego County is forecasting almost 800 acres of rural residential development in Unit 4E,¹⁸⁵ 290 acres of low-density residential and industrial development in Unit E17, 150 acres each of medium-density residential, high-density residential, and commercial and 40 acres of industrial in Unit E19, and 60 acres of commercial and 250 acres of industrial in Unit E20. Based on the current level of developed acres in Unit E2 in Riverside County (500 acres), and the strong growth rate forecast in the County, almost 300 acres are forecast to be developed in this unit.

Conversely, Units 4D, 5D, E7, E8, E12, E14, E15, and NI2 are forecast to have no new development during the next 20 years. These lands are either fully developed as of 2005 (Unit 4D near San Marcos and Unit E8, Montgomery Airfield), undeveloped open space preserves/reserves (Units E12, E14, and E15 located near Lower Otay Reservoir), vacant Federal lands (Unit 5D along the border of Mexico), military training lands (Unit E7 on MCB Camp Pendleton), or a military airfield (Unit NI2 on MCAS Miramar).

Table 21
Total Economic Impacts to Development, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
1A	\$0	\$658,400 - \$4,685,200	\$472,000 - \$3,356,700	\$320,900 - \$2,279,700	\$31,700 - \$225,600	\$30,300 - \$215,200
1B	\$0	\$129,400 - \$920,800	\$96,300 - \$684,900	\$68,500 - \$487,700	\$6,500 - \$46,000	\$6,500 - \$46,000
2	\$0	\$577,700 - \$1,662,600	\$417,900 - \$1,202,600	\$287,400 - \$826,700	\$28,100 - \$80,800	\$27,100 - \$78,000
3	\$0	\$1,593,400 - \$3,831,800	\$1,145,000 - \$2,753,100	\$780,600 - \$1,876,500	\$77,000 - \$185,100	\$73,700 - \$177,100

¹⁸⁵ The 2030 SANDAG development forecast did not incorporate the recent land purchases by The Nature Conservancy (TNC) and the County, which removed 721 acres of potentially developable land from development in Unit 4E. In 2003 and 2004, TNC purchased 647 acres and in 2004 the County purchased 74 acres to add to the Ramona Grasslands Preserve. These lands will be protected and not developed as projected by SANDAG in its 2030 forecast. This analysis adjusts the results of the SANDAG development forecast to account for these protected and undevelopable lands.

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
4A	\$0	\$48,300 - \$139,000	\$35,000 - \$100,800	\$24,200 - \$69,500	\$2,400 - \$6,800	\$2,300 - \$6,600
4B	\$0	\$209,100 - \$601,800	\$149,600 - \$430,300	\$101,300 - \$291,500	\$10,100 - \$28,900	\$9,600 - \$27,500
4C	\$0	\$657,800 - \$1,892,900	\$465,700 - \$1,339,800	\$311,400 - \$895,400	\$31,300 - \$90,100	\$29,400 - \$84,500
4E	\$0	\$14,222,500 - \$40,930,600	\$9,911,900 - \$28,512,100	\$6,490,600 - \$18,658,700	\$666,200 - \$1,916,500	\$612,700 - \$1,761,200
5A	\$0	\$240,200 - \$577,600	\$178,700 - \$429,600	\$127,200 - \$305,900	\$12,000 - \$28,900	\$12,000 - \$28,900
5B	\$0	\$918,500 - \$2,208,700	\$683,200 - \$1,643,000	\$486,500 - \$169,900	\$45,900 - \$110,400	\$45,900 - \$110,400
5C	\$0	\$411,900 - \$990,500	\$306,400 - \$736,800	\$218,200 - \$524,700	\$20,600 - \$49,500	\$20,600 - \$49,500
Proposed Critical Habitat	\$0	\$19,667,200 - \$58,441,500	\$13,861,700 - \$41,189,800	\$9,216,700 - \$27,386,200	\$931,700 - \$2,768,600	\$870,000 - \$2,585,100
E1	\$0	\$1,037,100 - \$2,970,000	\$778,400 - \$2,229,200	\$560,800 - \$1,606,100	\$52,300 - \$149,800	\$52,900 - \$151,600
E2	\$1,008,600	\$5,177,800 - \$12,536,300	\$3,885,000 - \$9,408,200	\$2,798,000 - \$6,777,700	\$261,135 - \$632,400	\$264,115 - \$639,800
E3	\$0	\$509,700 - \$1,330,000	\$382,500 - \$998,200	\$275,600 - \$719,200	\$25,700 - \$67,100	\$26,000 - \$67,900
E4	\$0	\$45,600 - \$131,800	\$34,200 - \$98,900	\$24,600 - \$71,300	\$2,300 - \$6,600	\$2,300 - \$6,700
E5	\$0	\$197,500 - \$421,500	\$148,200 - \$316,400	\$106,800 - \$227,900	\$10,000 - \$21,300	\$10,100 - \$21,500
E6	\$0	\$58,700 - \$156,600	\$44,100 - \$117,600	\$31,700 - \$84,700	\$3,000 - \$7,900	\$3,000 - \$8,000
E9	\$0	\$337,200 - \$810,900	\$250,800 - \$603,200	\$178,600 - \$429,500	\$16,900 - \$40,500	\$16,900 - \$40,500
E10	\$0	\$104,800 - \$301,700	\$78,000 - \$224,500	\$55,500 - \$159,800	\$5,200 - \$15,100	\$5,200 - \$15,100
E11	\$0	\$602,400 - \$1,448,500	\$448,100 - \$1,077,500	\$319,100 - \$767,300	\$30,100 - \$72,400	\$30,100 - \$72,400
E13	\$0	\$533,800 - \$1,536,200	\$397,100 - \$1,142,800	\$282,800 - \$813,700	\$26,700 - \$76,800	\$26,700 - \$76,800
E16	\$0	\$237,000 - \$682,000	\$176,300 - \$507,300	\$125,500 - \$361,200	\$11,800 - \$34,100	\$11,800 - \$34,100

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E17	\$0	\$6,752,900 - \$16,239,100	\$5,023,300 - \$12,079,900	\$3,577,000 - \$8,601,900	\$337,600 - \$812,000	\$337,600 - \$812,000
E18	\$0	\$2,384,600 - \$6,862,600	\$1,591,600 - \$4,576,800	\$983,500 - \$2,824,800	\$107,000 - \$307,600	\$92,800 - \$266,600
E19	\$1,127,600	\$7,618,055 - \$21,920,600	\$5,442,600 - \$15,655,800	\$3,684,100 - \$10,592,600	\$365,800 - \$1,052,300	\$347,800 - \$999,900
E20	\$0	\$4,871,200 - \$14,018,800	\$3,340,300 - \$9,607,300	\$2,138,800 - \$6,146,700	\$224,500 - \$645,800	\$201,900 - \$580,200
Excluded Habitat	\$2,136,100	\$30,468,300 - \$81,366,724	\$22,020,400 - \$58,643,400	\$15,142,500 - \$40,184,600	\$1,480,100 - \$3,941,800	\$1,429,300 - \$3,793,100
NI1	\$0	\$70,600 - \$203,100	\$51,800 - \$148,900	\$36,200 - \$104,200	\$3,500 - \$10,000	\$3,400 - \$9,800
NI3	\$0	\$93,600 - \$269,400	\$69,600 - \$200,400	\$49,600 - \$142,700	\$4,700 - \$13,500	\$4,700 - \$13,500
Not Included Habitat	\$0	\$164,200 - \$472,500	\$121,400 - \$349,300	\$85,800 - \$246,900	\$8,200 - \$23,500	\$8,100 - \$23,300
Not Allocated ^{a/}	\$727,700	\$40,400	\$37,600	\$34,500	\$2,500	\$3,300
Total Essential Habitat	\$2,863,800	\$50,340,100 - \$140,321,200	\$36,041,200 - \$100,220,200	\$24,479,500 - \$67,852,100	\$2,422,500 - \$6,736,300	\$2,310,700 - \$6,404,700

a/ Clayton Ranch is residential development project by Lennar/U.S. Home located outside the bounds of the essential habitat. Formal consultation with the Service on the project occurred in 2004, the company incurred conservation costs for the navarretia in 2004 and 2005, and navarretia-related conservation efforts are expected to continue from 2006 through 2013.

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

6.1 EFFECTS ON TRANSPORTATION

6.1.1 ROAD PROJECTS

This section examines the costs of conservation efforts associated with past and future road projects in essential habitat for the navarretia. The consultation history reveals that the Service and the California Department of Transportation (Cal Trans) have consulted on one road-related project located in Riverside County since the navarretia was listed in 1998, an ongoing consultation for the State Route 79 Project. In addition, protective measures have also been voluntarily implemented by Cal Trans on the State Route 125 project in San Diego County. According to Cal Trans, conservation efforts to protect navarretia are not implemented for work performed in the existing roadway.¹⁸⁶ Therefore, this analysis focuses on road projects that may occur outside of the existing easement in navarretia essential habitat.

6.1.1.1 Pre-Designation Activities

The State Route 125 project is an ongoing project in San Diego County that is expected to be completed in 2005. The project will result in a 9.5 mile toll road running north and south between State Route 905 and State Route 54. The construction of the toll road is expected to impact four non-navarretia vernal pools in or near Units E17-20 and 5D. Eighteen alternatives were designed and the alternative that impacted the least amount of sensitive habitat was chosen. However, there was no cost difference between the preferred and chosen alternatives.¹⁸⁷

To offset impacts to other vernal pool species, Cal Trans has purchased 273 acres of land in the Otay area; approximately 50 acres of this land will be used for vernal pool restoration. The total cost of the conservation effort is estimated at \$5.4 million.¹⁸⁸ However, the conservation effort was undertaken for other listed species and is not attributed to the navarretia.

During surveys, navarretia were found in the northern end of the project area. Conservation efforts taken by Cal Trans for the navarretia included collecting seed from the project area. The seed was given to the Sweetwater Reservoir group, who is in the process of restoring a vernal pool area near the seed collection

¹⁸⁶ Personal communication with Quyen Tang, Biologist, District 8 (Riverside) Cal Trans Office, March 24, 2005.

¹⁸⁷ Personal communication with Bruce April, Environmental Planning Department, San Diego Cal Trans Office, April 6, 2005.

¹⁸⁸ Personal communication with Bruce April, Environmental Planning Department, San Diego Cal Trans Office, April 6, 2005.

site. Navarretia seed will also be planted in the Otay mitigation area, 11 miles away, however, a seed source closer to Otay will be used. Some of the navarretia seed collected in the project area was also placed in a banking program at the San Diego Zoo.¹⁸⁹

According to estimates obtained from the Cal Trans office in San Diego County, the collection of seed and restoration of navarretia habitat will likely cost less than \$100,000.¹⁹⁰ For purposes of this analysis, a pre-designation cost of \$100,000 was allocated uniformly to Units E17-20 and 5D.

6.1.1.2 Post-Designation Projects

Post-Designation Projects, 2006–2009

Riverside County

In Riverside County, six road projects are planned in or around the essential habitat areas near the east-west Route 74, the north-south Route 215, and Route 79 during 2006 through 2009.¹⁹¹ The relevant projects for these units are as follows:

Route 215 – Two projects are planned on Route 215:¹⁹²

- Installing exit numbering signs between milepost 8.4 and 45.3. Activities will not occur outside of the easement; therefore, navarretia-related conservation efforts are not expected.
- Construction of a concrete swale between milepost 24.4 and 24.5. This project will likely extend beyond the road easement in Unit E3. Navarretia-related conservation efforts are anticipated, but no estimate is available as to when construction will begin on this project.

¹⁸⁹ Personal communication with Bruce April, Environmental Planning Department, San Diego Cal Trans Office, April 6, 2005.

¹⁹⁰ Personal communication with Susan Scatolini, Biologist, District 11 (San Diego) Cal Trans Office, April 5, 2005.

¹⁹¹ As identified by Cal Trans Office (personal communication with Gary Green, Senior Transportation Planner, Regional Planning and Special Studies, Cal Trans, March 25, 2005).

¹⁹² Personal communication with Gary Green, Senior Transportation Planner, Regional Planning and Special Studies, Cal Trans, March 25, 2005.

Route 74 –Four projects are planned on Route 74, including:¹⁹³

- Construction of a two-way left turn lane, curve realignment, and pavement widening between milepost 35 and 36, which is in Unit E2. Activities will take place outside of the easement; therefore, navarretia-related conservation efforts are anticipated.¹⁹⁴ Riverside County Transportation Commission (RCTC) is the lead agency on this project and project funding is expected in June 2007.
- Rubberized asphalt concrete resurfacing between mileposts 28 and 38. Activities will not occur outside of the easement; therefore, navarretia-related conservation efforts are not expected.
- Install traffic signals/safety lighting and curb ramps at Route 74 and Cawston Avenue at milepost 37.9, which is in Unit E2. Activities will likely occur outside of the easement; therefore, navarretia-related conservation efforts are anticipated. No estimate is available as to when construction will begin on this project.
- Construct curb ramps and sidewalks between mileposts 14 and 45, in Units E1 and E2. Activities are expected to occur outside of the easement; therefore, navarretia-related conservation efforts are anticipated. Costs associated with this project will be divided equally between habitat Units E1 and E2. No estimate is available as to when construction will begin on this project.

Route 79 - Realignment of Route 79 is planned between Domenigoni Parkway and Gilman Springs Road, which is in Unit E2. Consultation between the Service and Cal Trans has commenced, and it is likely that conservation efforts will be implemented specifically for the navarretia. However, consultants hired by Cal Trans indicate that it is too early to estimate what these protective efforts may entail.¹⁹⁵

Conservation for the Route 79 and Route 74 projects is also spurred by the presence of the crownscale, however, this analysis assumes that 100 percent of the cost of conservation is attributable solely to the navarretia. Thus, this cost analysis method likely results in an overstatement of navarretia costs.

¹⁹³ Personal communication with Gary Green, Senior Transportation Planner, Regional Planning and Special Studies, Cal Trans, March 25, 2005.

¹⁹⁴ Personal communication with Tim Merdey, Project Manager, Cal Trans, March 25, 2005.

¹⁹⁵ Personal communication with Carolyn Washburn, Consultant, CH2M Hill, April 4, 2005.

San Diego County

In San Diego County several projects in or around essential habitat are either under construction or planned to take place between now and 2008.¹⁹⁶ Conservation efforts are anticipated for all of these projects because they involve activities that will occur outside of the existing roadway. A description of each project is found below:

Route 56 Widening Project – A planning study for a widening project east of Rancho Santa Fe and near Unit 3 is currently being developed. There is no indication of when construction is likely to begin.

Route 52 Middle HOV Lane – A planning study is underway for a middle High Occupancy Vehicle (HOV) lane on Route 52 through the intersection of Route 163, near Unit NI3.¹⁹⁷ The planning study is expected to be completed by late 2005, with construction estimated to start in 2007. Navarretia-related conservation efforts are anticipated once construction begins.

Interstate 805/Interstate 5 Freeway Expansion – A planning study is underway for a freeway expansion of the Interstate 805 and Interstate 5 corridor near Unit E8, with study completion expected in early 2005. There is no estimate of when construction will begin.

Sweetwater Reservoir – A gap and connector project at the intersection of Route 54 and Route 125 is currently underway and should be completed in late 2005. It is one of the final phases of the Route 125 project; see “pre-designation activities” above for a description of the conservation efforts and cost estimates associated with this project. An HOV Lane is planned along the Route 54 and Route 125 near Units 5A and E9, with construction scheduled to begin in 2006.

Route 905 – A new freeway is planned between Interstate 805 and Route 125, through or near Units E17, E18, E19, and E20, as well as 5D. A southbound truck route which could impact Unit E20 is also planned. Construction of the freeway and possible truck route is expected to begin in 2006.

Interstate 5 Realignment – An environmental study of a realignment of Interstate 5 at Virginia Avenue is underway and due to be completed in mid-2006. This project is in Unit E19.

¹⁹⁶ As identified by Cal Trans Office (personal communication with Farnaz Badiei, Cal Trans San Diego County Office, March 30, 2005).

¹⁹⁷ Personal communication with Farnaz Badiei, Cal Trans San Diego County Office, March 30, 2005.

Los Angeles County

According to Cal Trans in Los Angeles County, no transportation projects are planned in Units 1A and 1B from 2006 through 2009.¹⁹⁸

Table 22 presents a summary of the total number of planned projects, by year, found in the essential habitat for the navarretia across the three counties (Riverside, San Diego, and Los Angeles).

Table 22
Planned Road Projects in Essential Habitat, 2006-2009

Year	2006	2007	2008	2009	Undetermined
Projects Planned	3	2	0	0	6
Average Annual Number of Projects	2.75				

Source: Planning Department, Cal Trans Riverside and San Diego County Offices.

Post-Designation Projects, 2010–2025

Cal Trans transportation project projections only extend to 2009. To estimate post-designation costs associated with road projects beyond 2009, this analysis assumes that future Cal Trans projects during the period 2010 through 2025 will occur at the same rate as projects planned during the period 2006 through 2009 (see Table 22 above). Therefore, this analysis estimates that 44 road projects will occur between 2010 and 2025.

Furthermore, at the County level, the navarretia has not been identified in any County road projects that have progressed through the environmental planning and design stages.¹⁹⁹ Of the planned roads identified in the MSHCP,²⁰⁰ the Winchester to Temecula CETAP corridor will likely involve navarretia impacts.²⁰¹ However, the environmental documentation for this project has not progressed to a point where estimates can be made as to whether the navarretia will be impacted, what the likely project

¹⁹⁸ Personal communication with Paul Caron, Senior Environmental Planner, District 07 Cal Trans, April 25, 2005.

¹⁹⁹ Personal communication with Mary Zan Bon, Riverside County Department of Transportation, May 20 and 23, 2005.

²⁰⁰ Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP), Volume 1 –The Plan*, Section 7.3.5 “Planned Roads Within the Criteria Area.”

²⁰¹ CETAP stands for "Community and Environmental Transportation Acceptability Process." It is the part of the RCIP (Riverside County Integrated Project) that is looking at where to locate possible new major multimodal transportation facilities to serve the current and future transportation needs of Western Riverside County. Source: Frequently Asked Questions for CETAP, Riverside County Transportation Commission web-site, http://www.rcip.org/pdf_files/CETAP_FAQ_04_14_03.pdf, accessed June 28, 2005; Personal communication with Mary Zan Bon, Riverside County Department of Transportation, May 20 and 23, 2005.

modifications would be, if any, or when the project will occur. Similarly, other projects identified in the MSHCP have not received funding and consequently have not progressed through the environmental planning or design stages.²⁰² While navarretia-related impacts and conservation for each of the planned road projects identified in the MSHCP cannot be estimated at this time, this analysis assumes any road project affected by navarretia conservation is captured by the 44 road projects forecasted during the period 2010-2025 as described above.

This analysis allocates the forecasted road projects to the units based on the proportion of forecasted acres of land developed between 2006 and 2025 (see Table 14). Considering Cal Trans' forecast of planned projects does not extend beyond 2009, forecasted acres of future development are used as an indicator for the location of future road work, as future residential, commercial, and industrial development will require the construction and/or maintenance of a road infrastructure. This method allocates over 75 percent of the transportation projects to Units 4E, E2, E17, E18, E19, and E20.

6.1.1.3 Conservation Efforts and Costs

Cal Trans departments of Riverside and San Diego counties have experience in performing construction activities in the vicinity of sensitive plant species.²⁰³ The typical conservation efforts implemented on past transportation projects in these counties for sensitive plant species form the foundation for the assumptions made in this analysis about future conservation efforts and costs specific to the navarretia. These protective measures are also similar to the protection offered by the Riverside MSHCP for endemic plant species. Based on Cal Trans' past experience, a suite of conservation efforts and costs for a representative road project is developed for protecting a listed plant during construction activities. This representative project's conservation efforts and costs are then applied to each of the planned (2006–2009) and forecasted (2010–2025) road projects to estimate future navarretia-related conservation costs for road projects. The various components that comprise the representative project's conservation efforts and costs are described below.

Before a project begins, the area is surveyed to identify the plant species in the proposed project area. The cost for surveying depends on several factors, including the size of the project area, as well as type and number of plants in the project area. The cost of surveying is generally less than \$30,000,²⁰⁴

²⁰² Personal communication with Mary Zan Bon, Riverside County Department of Transportation, May 20 and 23, 2005.

²⁰³ The navarretia and crownscale have overlapping habitat in Riverside County. The conservation activities and associated costs were developed through joint research efforts using Riverside and San Diego sources.

²⁰⁴ Personal communication with Susan Scatolini, Biologist, District 11 (San Diego) Cal Trans Office, April 5, 2005.

however, navarretia-specific costs are estimated at \$10,000 per project.²⁰⁵ In this analysis, surveying efforts for the navarretia are assumed to cost \$10,000 per project.

If navarretia are identified through the surveys, several methods are available to avoid the plant species in order to minimize disturbance. One method is altering the design of the project to avoid the essential habitat. The cost of re-aligning projects, especially transportation projects, can be considerable. However, it is not possible to anticipate if any of the planned transportation projects will require this method of avoidance.

Fencing off areas that include listed plant species or flagging sensitive plants are also avoidance tactics that will likely be used for the navarretia. Fencing or flagging generally costs a few thousand dollars to implement.²⁰⁶ In this analysis, it is assumed that fencing or flagging tactics will be implemented in the planned project areas at a cost of \$3,000 per project.

A qualified biologist may be required to monitor activities in the project area during construction in order to avoid disturbing the navarretia and/or its habitat. The cost of having a qualified biologist on site during construction activity is estimated at \$25,000 per year.²⁰⁷ It is further estimated by Cal Trans that the projects listed above will require one to three years to complete.²⁰⁸ Because only portions of the above projects will involve navarretia essential habitat, this analysis assumes that a biologist will be required to monitor activity in the planned projects for one year at a cost of \$25,000 per project.

In order to preserve habitat for the navarretia, it is likely that seed collection in the project area will be required. In the past, per project restoration efforts have cost less than \$100,000.²⁰⁹ In order to avoid underestimating costs, this analysis assumes that restoration efforts for the navarretia will likely cost \$100,000 per project.

Following construction activity, it is likely that monitoring will occur in the project area and/or in the mitigation area. Five years of monitoring is standard practice for listed species. The cost for this type of monitoring is typically \$25,000 per year, or \$125,000 over the course of five years.²¹⁰ This analysis assumes that monitoring will be required for each project at a cost of \$25,000 annually, for five years.

²⁰⁵ Personal communication with Quyen Tang, Biologist, District 8 (Riverside) Cal Trans Office, March 24, 2005.

²⁰⁶ Personal communication with Quyen Tang, Biologist, District 8 (Riverside) Cal Trans Office, March 24, 2005.

²⁰⁷ Personal communication with Susan Scatolini, Biologist, District 11 (San Diego) Cal Trans Office, April 5, 2005.

²⁰⁸ Personal communication with Quyen Tang, Biologist, District 8 (Riverside) Cal Trans Office, April 27, 2005.

²⁰⁹ Personal communication with Susan Scatolini, Biologist, District 11 (San Diego) Cal Trans Office, April 5, 2005.

²¹⁰ Personal communication with Susan Scatolini, Biologist, District 11 (San Diego) Cal Trans Office, April 5, 2005.

A summary of the estimated navarretia-related conservation efforts and costs for a representative road project in San Diego, Riverside, and Los Angeles counties is provided in Table 23. The total cost of \$263,000 is used as the per project cost in estimating costs to road projects during the post-designation period (2006-2025).

Table 23
Cost of Navarretia Conservation Efforts for Representative Project

Conservation Activity	Total Project Costs
Surveying	\$10,000
Avoidance (Fence/Flag)	\$3,000
Construction Monitoring	\$25,000
Restoration	\$100,000
Monitoring	\$125,000 ^{a/}
Total Cost	\$263,000

a/ \$125,000 = \$5,000 x 5 years.

Note: Numbers may not sum due to rounding.

Table 24 presents the economic impacts of navarretia-related conservation efforts, excluding the administrative cost of section 7 consultations, attributable to road projects by unit. The first column of Table 24 presents the total pre-designation (1998-2005) costs in 2005 dollars. The second column reports the total post-designation costs from 1998 to 2025 in undiscounted dollars, and the third and fourth columns report the total post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent and seven percent, respectively. In summary, this analysis estimates \$100,000 in pre-designation costs occurred in essential habitat, and forecasts \$14.5 million in post-designation costs (undiscounted dollars), or \$10.5 million and \$7.3 million in present value terms using discount rates of three percent and seven percent, respectively. When annualized, post-designation costs total \$706,900 and \$689,000, also at three and seven percent, respectively.²¹¹

²¹¹ Eleven projects are expected during the 2006-2009 period; the timing for five projects is known and the timing of the remaining six projects is unknown. Likewise, the timing of the 44 projects forecast during the 2010-2025 period is also unknown. The analysis assigns an equal probability of occurrence to conservation costs being incurred in each year across the respective timeframes (i.e., 2006-2009 or 2010-2025) for those projects with unknown timeframes. However, because the known timing of five projects, the annual conservation costs vary during the post-designation period. Thus, the annualized post-designation conservation costs at three and seven percent discount rates are not equal.

Table 24
Conservation Cost for Road Projects, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
1A	\$0	\$289,300	\$196,400	\$122,700	\$13,200	\$11,600
1B	\$0	\$57,900	\$39,300	\$24,500	\$2,600	\$2,300
2	\$0	\$127,300	\$86,400	\$54,000	\$5,800	\$5,100
3	\$0	\$506,000	\$402,800	\$312,800	\$27,100	\$29,500
4A	\$0	\$11,600	\$7,900	\$4,900	\$500	\$500
4B	\$0	\$46,300	\$31,400	\$19,600	\$2,100	\$1,900
4C	\$0	\$150,400	\$102,100	\$63,800	\$6,900	\$6,000
4E	\$0	\$4,316,400	\$2,929,800	\$1,830,900	\$196,900	\$172,800
5A	\$0	\$166,200	\$147,800	\$130,500	\$9,900	\$12,300
5B	\$0	\$138,900	\$94,300	\$58,900	\$6,300	\$5,600
5C	\$0	\$57,900	\$39,300	\$24,500	\$2,600	\$2,300
5D	\$20,000	\$52,600	\$49,700	\$46,300	\$3,300	\$4,400
Proposed Critical Habitat	\$20,000	\$5,920,700	\$4,127,000	\$2,693,600	\$277,400	\$254,300
E1	\$0	\$386,100	\$291,700	\$212,900	\$19,600	\$20,100
E2	\$0	\$1,904,100	\$1,503,500	\$1,157,900	\$101,100	\$109,300
E3	\$0	\$378,700	\$316,400	\$258,800	\$21,300	\$24,400
E4	\$0	\$11,600	\$7,900	\$4,900	\$500	\$500
E5	\$0	\$34,700	\$23,600	\$14,700	\$1,600	\$1,400
E6	\$0	\$11,600	\$7,900	\$4,900	\$500	\$500
E8	\$0	\$263,000	\$237,800	\$209,700	\$16,000	\$19,800
E9	\$0	\$177,800	\$155,700	\$135,400	\$10,500	\$12,800
E10	\$0	\$23,100	\$15,700	\$9,800	\$1,100	\$900
E11	\$0	\$92,600	\$62,800	\$39,300	\$4,200	\$3,700
E13	\$0	\$115,700	\$78,500	\$49,100	\$5,300	\$4,600
E16	\$0	\$57,900	\$39,300	\$24,500	\$2,600	\$2,300
E17	\$20,000	\$1,059,400	\$733,100	\$473,400	\$49,300	\$44,700
E18	\$20,000	\$584,900	\$411,000	\$272,100	\$27,600	\$25,700
E19	\$20,000	\$2,016,700	\$1,452,800	\$999,400	\$97,700	\$94,300
E20	\$20,000	\$1,140,400	\$788,000	\$507,700	\$53,000	\$47,900
Excluded Habitat	\$80,000	\$8,258,200	\$6,125,600	\$4,374,500	\$411,700	\$412,900

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
NI1	\$0	\$11,600	\$7,900	\$4,900	\$500	\$500
NI3	\$0	\$286,100	\$256,900	\$226,200	\$17,300	\$21,300
Not Included Habitat	\$0	\$297,700	\$264,800	\$231,100	\$17,800	\$21,800
Total Essential Habitat	\$100,000	\$14,476,600	\$10,517,400	\$7,299,100	\$706,900	\$689,000

Note: Totals may not sum due to rounding. Units with zero costs are not shown.

6.1.2 RAILWAYS

This analysis examines the costs of conservation efforts associated with future railway projects in navarretia essential habitat. The North San Diego County Transit District (NCTD) is responsible for planning, constructing, and operating the passenger railways in northern San Diego County. Past consultation history reveals that the Service has not consulted on any rail-related projects since the navarretia was listed in 1998. However, the navarretia may receive incidental protection from conservation efforts for the San Diego fairy shrimp in Unit 2, near the Poinsettia Coaster Station.

Two railway expansion projects pass through or within close proximity to essential habitat for the navarretia. Any activities occurring outside of the existing railway may require conservation measures for the navarretia. This cost analysis focuses on these railway expansion projects and estimates costs based on protective measures that Cal Trans has implemented in the past for sensitive plant species.

6.1.2.1 Pre-Designation Activities

The Poinsettia Lane coaster station in Carlsbad is located in Unit 2. The vernal pools located near the station are fenced off. A walking bridge crosses one pool connecting the coaster station to the parking lot. A memorandum of understanding (MOU) has been signed between CDFG and NCTD.²¹² The MOU calls for conservation efforts for the San Diego button celery and the California Orcutt grass. These conservation efforts include establishing a barrier to the vernal pools. Once these activities are completed, NCTD plans to set up an endowment fund with the CDFG with an initial payment of \$50,000. The endowment fund will be used for future management and monitoring of the vernal pools. The navarretia is not a State listed species, so it is not included in the MOU, however, the future management and monitoring of the vernal pools will likely benefit the navarretia.²¹³ Nevertheless, the cost of

²¹² Personal communication with Kate Stonelake, Environmental Projects Division of North San Diego County Transit District, April 11, 2005.

²¹³ Personal communication with Nancy Frost, California Department of Fish and Game, April 11, 2005.

establishing the endowment fund is not included in this analysis as these costs were incurred to protect the California Orcutt grass, and the San Diego button celery.

6.1.2.2 Post-Designation Activities

Post-Designation Projects, 2006–2009

Two railroad expansion projects will occur in navarretia essential habitat in San Diego County. This analysis anticipates that future consultation with the Service on these projects will likely result in conservation efforts similar to those anticipated for roadway projects, as described in Section 6.1.2.3

Los Angeles–San Diego Rail Corridor Agency (LOSSAN) – The Programmatic Environmental Impact Statement for a railway expansion is planned for completion in mid-2005. No indication has been given as to when construction will begin for this project. Unit NI1 is in the area of the existing coaster track for LOSSAN.

NCTD Sprinter Rail – The Sprinter Rail is being constructed along Route 78 between the coast and the intersection of Route 78 and Interstate 15. Construction is planned for completion in late 2007. This project goes through Units 4A, 4B, 4C, and 4D.

Table 25 shows the number of planned projects, by year, found in the essential habitat for the navarretia.

Table 25
Relevant Planned Railway Projects in Essential Habitat

Year	2006	2007	2008	2009	Undetermined
Projects Planned	0	1	0	0	1
Average Annual Number of Projects	0.5				

Source: Planning Department, Cal Trans Riverside and San Diego County Offices.

Post-Designation Projects, 2010–2025

Cal Trans transportation project projections only extend to 2009. To estimate post-designation costs associated with railway projects beyond 2009, this analysis assumes that future railway projects during the period 2010 through 2025 will occur at the same rate as projects planned during the period 2006 through 2009 (see Table 25 above). Therefore, this analysis estimates that eight railway projects will occur between 2010 and 2025.

The analysis allocates the forecasted railway projects to the units based on the proportion of forecasted acres of land developed between 2006 and 2025 (see Table 14). Considering Cal Trans’ forecast of planned projects does not extend beyond 2009, forecasted acres of future development are used as an indicator for the location of future railway work, as future residential, commercial, and industrial

development will require the construction and/or maintenance of a transit infrastructure. This method allocates more than 75 percent of the transportation projects to Units 4E, E2, E17, E18, E19, and E20.

6.1.2.3 Conservation Efforts and Costs

The conservation efforts and costs associated with railway expansion projects are expected to be similar to costs incurred from road projects. For a detailed description of these costs, see Section 6.1.1.3. Table 26 presents the economic impacts of navarretia-related conservation efforts, excluding the administrative cost of section 7 consultations, attributable to railway projects by unit. The first column of Table 26 presents the total pre-designation (1998-2005) costs in 2005 dollars. The second column reports the total post-designation costs from 1998 to 2025 in undiscounted dollars, and the third and fourth columns report the total post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent and seven percent, respectively. In summary, this analysis estimates no pre-designation costs occurred in essential habitat, and forecasts \$2.6 million in post-designation costs (undiscounted dollars), or \$1.9 million and \$1.3 million in present value terms using discount rates of three percent and seven percent, respectively. When annualized, post-designation costs total \$128,800 and \$126,000, also at three and seven percent, respectively.²¹⁴

Table 26
Conservation Cost for Railway Projects, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
1A	\$0	\$52,600	\$35,700	\$22,300	\$2,400	\$2,100
1B	\$0	\$10,500	\$7,100	\$4,500	\$500	\$400
2	\$0	\$23,100	\$15,700	\$9,800	\$1,100	\$900
3	\$0	\$44,200	\$30,000	\$18,700	\$2,000	\$1,800
4A	\$0	\$67,900	\$63,500	\$58,800	\$4,300	\$5,500
4B	\$0	\$74,200	\$67,800	\$61,400	\$4,600	\$5,800
4C	\$0	\$93,100	\$80,700	\$69,500	\$5,400	\$6,600
4D	\$0	\$65,800	\$62,100	\$57,900	\$4,200	\$5,500

²¹⁴ Two projects are expected during the 2006-2009 period; the timing for one project is known and the timing of the other project is unknown. Likewise, the timing of the eight projects forecast during the 2010-2025 period is also unknown. The analysis assigns an equal probability of occurrence to conservation costs being incurred in each year across the respective timeframes (i.e., 2006-2009 or 2010-2025) for those projects with unknown timeframes. However, because the timing of one project is known, the annual conservation costs vary during the post-designation period. Thus, the annualized post-designation conservation costs at three and seven percent discount rates are not equal.

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
4E	\$0	\$784,800	\$532,700	\$332,900	\$35,800	\$31,400
5A	\$0	\$6,300	\$4,300	\$2,700	\$300	\$300
5B	\$0	\$25,200	\$17,100	\$10,700	\$1,200	\$1,000
5C	\$0	\$10,500	\$7,100	\$4,500	\$500	\$400
Proposed Critical Habitat	\$0	\$1,258,200	\$924,000	\$653,600	\$62,100	\$61,700
E1	\$0	\$46,300	\$31,400	\$19,600	\$2,100	\$1,900
E2	\$0	\$178,800	\$121,400	\$75,900	\$8,200	\$7,200
E3	\$0	\$21,000	\$14,300	\$8,900	\$1,000	\$800
E4	\$0	\$2,100	\$1,400	\$900	\$100	\$100
E5	\$0	\$6,300	\$4,300	\$2,700	\$300	\$300
E6	\$0	\$2,100	\$1,400	\$900	\$100	\$100
E9	\$0	\$8,400	\$5,700	\$3,600	\$400	\$300
E10	\$0	\$4,200	\$2,900	\$1,800	\$200	\$200
E11	\$0	\$16,800	\$11,400	\$7,100	\$800	\$700
E13	\$0	\$21,000	\$14,300	\$8,900	\$1,000	\$800
E16	\$0	\$10,500	\$7,100	\$4,500	\$500	\$400
E17	\$0	\$183,000	\$124,200	\$77,600	\$8,400	\$7,300
E18	\$0	\$96,800	\$65,700	\$41,100	\$4,400	\$3,900
E19	\$0	\$309,300	\$209,900	\$131,200	\$14,100	\$12,400
E20	\$0	\$197,800	\$134,200	\$83,900	\$9,000	\$7,900
Excluded Habitat	\$0	\$1,104,600	\$749,800	\$468,600	\$50,400	\$44,200
NI1	\$0	\$265,100	\$239,300	\$210,600	\$16,100	\$19,900
NI3	\$0	\$4,200	\$2,900	\$1,800	\$200	\$200
Not Included Habitat	\$0	\$269,300	\$242,100	\$212,400	\$16,300	\$20,100
Total Essential Habitat	\$0	\$2,632,100	\$1,915,900	\$1,334,600	\$128,800	\$126,000

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

6.1.3 AIRPORTS

Two airports are located within navarretia essential habitat, Ramona Airport and Montgomery Field, both in San Diego County (Units 4A, 4B, 4C, 4D, and 4E). Vernal pools have been identified at both of these airports.

6.1.3.1 Montgomery Field

There are more than 6.7 acres of vernal pool basin in the Montgomery Field area, making it the largest vernal pool basin in the City of San Diego. The majority of the Montgomery Field site is restricted from development by navigational easements. Vernal pools on-site also benefit from the protection provided by the fencing surrounding the airstrip. However, the site is not considered conserved because it fails to meet the criteria designated by the inventory of the City of San Diego MSCP.²¹⁵

While the navarretia may benefit from the navigational easement and existing fencing around Montgomery Field, these are incidental benefits and cost estimates are not included in this analysis.

6.1.3.2 Ramona Airport HMP

The Ramona Airport is located in central San Diego County, near the community of Ramona, California, and makes up a large portion of Unit 4E. A Habitat Management Plan (HMP) was created for vernal pool habitats associated with the Ramona Airport Improvement Project to provide the Federal Aviation Administration and the Airport Division of San Diego County Public Works with a program to address management of vernal pools within the open space areas of Ramona Airport.²¹⁶

The HMP was prepared as a result of a section 7 consultation with the Service to satisfy the conditions of a Biological Opinion (BO).²¹⁷ Costs associated with the formation of the HMP, including the original BO issued by the Service in September 1998, and reinitiated BOs (March 2001, August 2001, and August 2002) are addressed in this analysis.

Pre-Designation Activities

The HMP prepared for the Ramona Airport Improvement Project was completed in 2003 at a total cost of \$100,000.²¹⁸ The HMP addressed two species, the navarretia and the San Diego fairy shrimp. In this analysis, the entire cost of the HMP development (\$106,400 in 2005 dollars) is allocated to the navarretia as a pre-designation activity.

²¹⁵ Multiple Species Conservation Program (MSCP), City of San Diego 2002-2003 Vernal Pool Inventory, pp. 47 and 48, <http://www.sandiego.gov/mscp/vpi.shtml>.

²¹⁶ U.S. Department of Transportation, Federal Aviation Administration, October 2003, *Habitat Management Plan for Vernal Pool Habitats Associated with the Ramona Airport Improvement Project*.

²¹⁷ U.S. Department of Transportation, Federal Aviation Administration, October 2003, *Habitat Management Plan for Vernal Pool Habitats Associated with the Ramona Airport Improvement Project*.

²¹⁸ Personal communication with Julia Quinn, County of San Diego, April 12, 2005.

Post-Designation Activities

The conservation efforts outlined in the HMP include adequate fencing and monitoring to avoid impacts to the navarretia.²¹⁹ For the first five management years (July 2005 – August 2010), monitoring visits of the preservation and restoration pools will be conducted at least twice annually. These visits will occur once during the aquatic period (e.g., November through March) and once during the dry terrestrial period (e.g., April through June). After five years of management, the monitoring visits of the preservation and restoration pools will occur once per year during the vernal pool flowering period between the months of March and May.²²⁰ It is estimated that approximately \$250,000 will be spent for these conservation efforts at the Ramona Airport over the initial five-year period.²²¹ Therefore, this analysis assumes the annual cost of conservation for the navarretia will be \$50,000 over the first five years. After 2010 the rate of visits is reduced in half, therefore, this analysis assigns \$25,000 in annual costs to monitoring for the navarretia during the period 2011 – 2025.

Table 27 presents the economic impacts of navarretia-related conservation efforts, excluding the administrative cost of section 7 consultations, attributable to airport projects by unit. The first column of Table 27 presents the total pre-designation (1998-2005) costs in 2005 dollars. The second column reports the total post-designation costs from 1998 to 2025 in undiscounted dollars, and the third and fourth columns report the total post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent and seven percent, respectively. In summary, this analysis estimates \$106,400 in pre-designation costs occurred in essential habitat, and forecasts \$625,000 in post-designation costs (undiscounted dollars), or \$486,400 and \$367,400 in present value terms using discount rates of three percent and seven percent, respectively. When annualized, post-designation costs total \$32,700 and \$34,700, also at three and seven percent, respectively.²²²

²¹⁹ U.S. Department of Transportation, Federal Aviation Administration, October 2003, *Habitat Management Plan for Vernal Pool Habitats Associated with the Ramona Airport Improvement Project*, p. 31.

²²⁰ U.S. Department of Transportation, Federal Aviation Administration, October 2003, *Habitat Management Plan for Vernal Pool Habitats Associated with the Ramona Airport Improvement Project*, Section 3.6.2 Habitat Monitoring.

²²¹ Personal communication with Julia Quinn, County of San Diego, April 12, 2005.

²²² The annual monitoring costs at the Ramona Airport vary during two time periods, \$50,000 annually during 2006-2010 and \$25,000 annually during 2011-2025. Because the annual conservation costs vary during the post-designation period, the annualized post-designation conservation costs at three and seven percent discount rates are not equal.

Table 27
Conservation Cost for Airports, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
4E	\$106,400	\$625,000	\$486,400	\$367,400	\$32,700	\$34,700
Proposed Critical Habitat	\$106,400	\$625,000	\$486,400	\$367,400	\$32,700	\$34,700
Total Essential Habitat	\$106,400	\$625,000	\$486,400	\$367,400	\$32,700	\$34,700

Note: Numbers may not sum due to rounding.

6.1.4 ADMINISTRATIVE COSTS

For transportation projects, the action agencies responsible for consulting with the Service include the following agencies of the Federal Department of Transportation: Federal Highway Administration, Federal Aviation Administration, Federal Transit Administration, and the Federal Railroad Administration. The local governments that are likely to participate in the consultation process on future transportation projects in navarretia habitat include: Cal Trans, RCTC, County of San Diego Public Works, SANDAG, and NCTD.

Only one consultation has been completed for a transportation project since the navarretia was listed, the Ramona Airport Expansion formal consultation (Section 6.1.3.2). There is also an ongoing road consultation for the State Route 79 Project. In the future, this analysis assumes that every transportation project in essential habitat involving activities that go beyond the right of way easements will require a section 7 consultation. Cal Trans projections were used to determine the number of transportation projects from 2006 through 2009. The annual average rate of 2.75 road projects (Section 6.1.1.2) and 0.5 rail projects (Section 6.1.2.2) during this period was projected forward under the assumption that future projects during the period 2010-2025 will occur at the same rate as projects planned during the period 2006-2009. These projects were then allocated based on the location of forecasted residential, commercial, and industrial development. In order to avoid underestimating administrative costs, all future projects are assumed to require formal consultation, and costs are derived using cost estimates from Section 2.2.1.

In total, this analysis includes one pre-designation consultation, an estimated 13 consultations on transportation projects between 2006 and 2009, and 52 consultations on transportation projects between 2010 and 2025. Table 28 presents the pre-and post-designation administrative costs of section 7 consultations resulting from past and forecasted future transportation projects (i.e., road, railway, and airport projects), by unit. The first column of Table 28 presents the total pre-designation (1998-2005) costs in 2005 dollars. The second column reports the total post-designation costs from 1998 to 2025 in undiscounted dollars, and the third and fourth columns report the total post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent and seven percent, respectively. In summary,

this analysis estimates \$32,300 in pre-designation costs occurred in essential habitat, and forecasts \$2.1 million in post-designation costs (undiscounted dollars), or \$1.7 million and \$1.3 million in present value terms using discount rates of three percent and seven percent, respectively. When annualized, post-designation costs total \$116,100 and \$127,200, also at three and seven percent, respectively.²²³

Table 28
Administrative Cost of Section 7 Consultation to Transportation, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
1A	\$0	\$42,100	\$33,000	\$24,800	\$2,200	\$2,400
1B	\$0	\$8,400	\$6,600	\$5,000	\$500	\$500
2	\$0	\$18,400	\$14,500	\$10,900	\$1,000	\$1,100
3	\$0	\$67,600	\$55,200	\$44,000	\$3,700	\$4,200
4A	\$0	\$9,700	\$8,800	\$7,800	\$600	\$800
4B	\$0	\$14,800	\$12,700	\$10,700	\$900	\$1,000
4C	\$0	\$29,900	\$24,400	\$19,300	\$1,700	\$1,800
4D	\$0	\$8,100	\$7,500	\$6,800	\$500	\$600
4E	\$32,300	\$627,100	\$492,200	\$370,200	\$33,100	\$35,000
5A	\$0	\$21,200	\$19,500	\$18,000	\$1,300	\$1,600
5B	\$0	\$20,200	\$15,800	\$11,900	\$1,100	\$1,200
5C	\$0	\$8,400	\$6,600	\$5,000	\$500	\$500
5D	\$0	\$6,500	\$6,300	\$6,000	\$400	\$600
Proposed Critical Habitat	\$32,300	\$882,400	\$703,100	\$540,400	\$47,500	\$51,300
E1	\$0	\$89,500	\$74,600	\$60,900	\$5,000	\$5,700
E2	\$0	\$256,000	\$207,200	\$164,100	\$14,000	\$15,500
E3	\$0	\$49,200	\$42,000	\$35,300	\$2,800	\$3,300
E4	\$0	\$1,700	\$1,300	\$1,000	\$100	\$100
E5	\$0	\$5,100	\$4,000	\$3,000	\$200	\$200

²²³ Thirteen road and railway projects are expected during the 2006-2009 period; the timing for six projects is known and the timing of the remaining seven projects is unknown. Likewise, the timing of the 52 projects forecast during the 2010-2025 period is also unknown. The analysis assigns an equal probability of occurrence to administrative consultation costs being incurred in each year across the respective timeframes (i.e., 2006-2009 or 2010-2025) for those projects with unknown timeframes. However, because the timing of six project is known, the annual administrative consultation costs vary during the post-designation period. Thus, the annualized post-designation conservation costs at three and seven percent discount rates are not equal.

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E6	\$0	\$1,700	\$1,300	\$1,000	\$100	\$100
E8	\$0	\$32,300	\$30,000	\$27,400	\$2,000	\$2,600
E9	\$0	\$22,900	\$20,800	\$18,800	\$1,400	\$1,800
E10	\$0	\$3,300	\$2,600	\$2,000	\$200	\$200
E11	\$0	\$13,500	\$10,500	\$7,900	\$700	\$700
E13	\$0	\$16,800	\$13,200	\$9,900	\$900	\$900
E16	\$0	\$8,400	\$6,600	\$5,000	\$500	\$500
E17	\$0	\$152,700	\$118,300	\$87,600	\$8,000	\$8,300
E18	\$0	\$83,800	\$65,400	\$49,100	\$4,400	\$4,700
E19	\$0	\$285,900	\$226,800	\$174,000	\$15,200	\$16,400
E20	\$0	\$164,500	\$127,300	\$94,200	\$8,600	\$8,900
Excluded Habitat	\$0	\$1,187,300	\$951,900	\$741,200	\$64,100	\$69,900
NI1	\$0	\$34,000	\$32,700	\$31,200	\$2,200	\$3,000
NI3	\$0	\$35,700	\$34,000	\$32,100	\$2,300	\$3,000
Not Included Habitat	\$0	\$69,700	\$66,700	\$63,300	\$4,500	\$6,000
Total Essential Habitat	\$32,300	\$2,139,400	\$1,721,700	\$1,344,900	\$116,100	\$127,200

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

6.1.5 TOTAL COSTS TO TRANSPORTATION

Table 29 presents the total economic impacts of navarretia-related conservation efforts and section 7 consultations attributable to transportation projects (i.e., road, railway, and airport projects) by unit. The first column of Table 29 presents the total pre-designation (1998-2005) costs in 2005 dollars. The second column reports the total post-designation costs from 1998 to 2025 in undiscounted dollars, and the third and fourth columns report the total post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent and seven percent, respectively. In summary, this analysis estimates \$238,700 in pre-designation costs occurred in essential habitat, and forecasts \$19.9 million in post-designation costs (undiscounted dollars), or \$14.6 million and \$10.3 million in present value terms using discount rates of three percent and seven percent, respectively. When annualized, post-designation costs total \$984,900 and \$977,000, also at three and seven percent, respectively.

Table 29
Total Economic Impacts to Transportation, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
1A	\$0	\$384,000	\$265,100	\$169,800	\$17,800	\$16,100
1B	\$0	\$76,800	\$53,000	\$34,000	\$3,600	\$3,200
2	\$0	\$168,800	\$116,600	\$74,700	\$7,900	\$7,100
3	\$0	\$617,800	\$488,000	\$375,500	\$32,800	\$35,500
4A	\$0	\$89,200	\$80,200	\$71,500	\$5,400	\$6,800
4B	\$0	\$135,300	\$111,900	\$91,700	\$7,600	\$8,700
4C	\$0	\$273,400	\$207,200	\$152,600	\$14,000	\$14,400
4D	\$0	\$73,900	\$69,600	\$64,700	\$4,700	\$6,100
4E	\$138,700	\$6,353,300	\$4,441,100	\$2,901,400	\$298,500	\$273,900
5A	\$0	\$193,700	\$171,600	\$151,200	\$11,500	\$14,200
5B	\$0	\$184,300	\$127,200	\$81,500	\$8,600	\$7,800
5C	\$0	\$76,800	\$53,000	\$34,000	\$3,600	\$3,200
5D	\$20,000	\$59,100	\$56,000	\$52,300	\$3,700	\$5,000
Proposed Critical Habitat	\$158,700	\$8,686,400	\$6,240,500	\$4,254,900	\$419,700	\$402,000
E1	\$0	\$521,900	\$397,700	\$293,400	\$26,700	\$27,700
E2	\$0	\$2,338,900	\$1,832,100	\$1,397,900	\$123,300	\$132,000
E3	\$0	\$448,900	\$372,700	\$303,000	\$25,100	\$28,500
E4	\$0	\$15,400	\$10,600	\$6,800	\$700	\$700
E5	\$0	\$46,100	\$31,900	\$20,400	\$2,100	\$1,900
E6	\$0	\$15,400	\$10,600	\$6,800	\$700	\$700
E8	\$0	\$295,300	\$267,800	\$237,100	\$18,000	\$22,400
E9	\$0	\$209,100	\$182,200	\$157,800	\$12,300	\$14,900
E10	\$0	\$30,600	\$21,200	\$13,600	\$1,500	\$1,300
E11	\$0	\$122,900	\$84,700	\$54,300	\$5,700	\$5,100
E13	\$0	\$153,500	\$106,000	\$67,900	\$7,200	\$6,300
E16	\$0	\$76,800	\$53,000	\$34,000	\$3,600	\$3,200
E17	\$20,000	\$1,395,100	\$975,600	\$638,600	\$65,700	\$60,300
E18	\$20,000	\$765,500	\$542,100	\$362,300	\$36,400	\$34,300
E19	\$20,000	\$2,611,900	\$1,889,500	\$1,304,600	\$127,000	\$123,100
E20	\$20,000	\$1,502,700	\$1,049,500	\$685,800	\$70,600	\$64,700

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Excluded Habitat	\$80,000	\$10,550,000	\$7,827,200	\$5,584,300	\$526,600	\$527,100
NI1	\$0	\$310,700	\$279,900	\$246,700	\$18,800	\$23,400
NI3	\$0	\$326,000	\$293,800	\$260,100	\$19,800	\$24,500
Not Included Habitat	\$0	\$636,700	\$573,700	\$506,800	\$38,600	\$47,900
Total Essential Habitat	\$238,700	\$19,873,100	\$14,641,400	\$10,346,000	\$984,900	\$977,000

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

6.2 EFFECTS ON THE SAN JACINTO FLOOD CONTROL PROJECT

This section examines the cost of conservation efforts associated with the San Jacinto River Flood Control Project in essential habitat for the navarretia. The purpose of the San Jacinto River Flood Control Project is to channelize the San Jacinto River between Ramona Expressway and Railroad Canyon (Reach 3), which is near Unit E1. This is a large floodplain area, and the community would like to reclaim portions of it for development. The applicants in this project will likely be the County of Riverside, the Riverside County Flood Control and Water Conservation District (RCFC), the City of Perris, and the CDFG.

6.2.1 HISTORY OF THE PROJECT

This project has an extensive history, which dates back to the 1972 when a master plan was developed. In the 1980s, a design was formed and the property owners collected sufficient funding for the project. The initial plan called for channelizing the entire San Jacinto River. Before the project was implemented, the economy weakened and the property owners lost the necessary funding. In the late 1990s, the property owners again collected sufficient funding to pursue an USACE 404 permit, and the permit was granted by USACE contingent on the project receiving approval from the Service.²²⁴ Informal consultation between the Service and USACE was initiated in 2001, with the County of Riverside, RCFC, the City of Perris, and the CDFG. The engineers hired by the applicants and the Service could not reach agreement on certain fundamental issues and the consultation process stopped. The project never received approval as the Service indicated that the end result would likely be a “jeopardy finding.” The property owners ultimately terminated the project and a 404 permit was never granted.²²⁵

When the MSHCP was developed, specific conditions were included within the conservation plan for the San Jacinto River Flood Control Project. These project specific measures are addressed in Section 7.5.3 –

²²⁴ Personal communication with Joseph Caldwell, Engineer, Web Associates, April 1, 2005.

²²⁵ Personal communication with Tony Bomkamp, Consultant, Glenn Lukos Associates, April 1, 2005.

Construction Guidelines of the MSHCP, and Appendix C, Best Management Practices. However, the property owners will still require a 404 permit and therefore, will need to initiate a section 7 consultation with the Service. The property owners have spoken with USACE to determine the level of USACE jurisdiction in the matter, but the consultation with the Service has not begun.²²⁶

6.2.2 PROJECT MODIFICATIONS

Initially, the project was to extend over the entire river, but to avoid sensitive habitat, the size of the project was reduced to just Reach 3 of the river. Six alternatives are currently being considered, including the no project alternative. The five feasible project alternatives range in cost from \$80 million to \$150 million. These alternatives consider partial channelization, conserving more lands, and altering the project so that navarretia sensitive areas still receive water during flood times. Even though no final cost estimates have been made, the alternatives are expected to cost \$20 to \$90 million more than the original project (estimated at \$60 million in 2005 dollars).²²⁷ This analysis assumes that these additional costs represent the post-designation cost due of conservation efforts protect the navarretia. The \$20 to \$90 million range represents an annualized cost of \$1,000,000 to \$4,500,000 at both three and seven percent discount rates.²²⁸ Conservation for the project is also spurred by the presence of the crownscale, however, this analysis assumes that 100 percent of the cost of conservation is attributable solely to the navarretia. Thus, this cost analysis method likely results in an overstatement of navarretia costs.

6.2.3 CONSERVATION EFFORTS AND COSTS

6.2.3.1 Past Conservation Efforts

Glenn Lukos and Associates performed navarretia surveys for the project in the late 1990s. The surveys were part of a broader effort to prepare a biological assessment and conservation plan for the County of Riverside, RCFC, the City of Perris, and the CDFG. The preparation of the biological assessment and conservation plan also included attorney effort from Shepard Mullan. The survey and attorney cost approximately \$115,000 and \$75,000, respectively.²²⁹ While work on the biological assessment and conservation plan terminated with the project prior to the Service's "jeopardy" opinion, this analysis

²²⁶ Personal communication with Ed Saul, Consultant, The Sauls Consulting Company, April 1, 2005.

²²⁷ Personal communication with Joseph Caldwell, Engineer, Web Associates, April 1, 2005. Web Associate's role in this project is to develop alternatives for CEQA certification.

²²⁸ Considering the timing of the project is unknown, the analysis assigns an equal probability to project modification costs being incurred in each year across the 20 year time frame of the analysis. Because the project modification costs are spread across the future years evenly, the annualized post-designation project modification costs are equal at three and seven percent discount rates.

²²⁹ Personal communication with Tony Bomkamp, Consultant, Glenn Lukos Associates, April 1, 2005.

attributes the cost for this past work as pre-designation costs of species conservation (\$213,200 in 2005 dollars).²³⁰

6.2.3.2 Future Conservation Efforts

A consultant working for the applicants speculated that there are two ways that the navarretia could be impacted by this project. First, grading and construction work in the floodplain can potentially disturb the habitat. Second, channel widening will remove water from the floodplain, altering the plant's habitat.²³¹

The MSHCP details construction guidelines for this project in Section 7.5.3 – Construction Guidelines. Appendix C also outlines best management practices to follow during construction. While it is likely that these post-designation measures will be implemented to protect the navarretia, the costs of performing these activities have not been estimated by the project's engineers or consultants, and are therefore not included in this analysis.²³²

Table 30 presents the economic impacts of navarretia-related conservation efforts, excluding the administrative cost of section 7 consultations, associated with the San Jacinto Valley Flood Control Project. The first column of Table 30 represents the total pre-designation (1998-2005) costs in 2005 dollars. The second column reports the total post-designation costs from 1998 to 2025 in undiscounted dollars, and the third and fourth columns report the total post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent and seven percent, respectively. In summary, this analysis estimates \$213,200 in pre-designation costs occurred in essential habitat, and forecasts \$20.0 million to \$90.0 million in post-designation costs (undiscounted dollars), or \$14.9 million to \$66.9 million and \$10.6 million to \$47.7 million in present value terms using discount rates of three percent and seven percent, respectively. When annualized, post-designation costs total \$1.0 million to \$4.5 million at both three and seven percent discount rates.²³³

²³⁰ \$190,000 = \$115,000 (surveying done by Glenn Lukos) + \$75,000 (legal fees from Shepard Mulan, were likely between \$50,000 and \$100,000). Inflating these costs to 2005 dollars results in a total cost of \$213,200.

²³¹ Personal communication with Tony Bomkamp, Consultant, Glenn Lukos Associates, April 1, 2005.

²³² Personal communication with Ed Saul, Consultant, The Sauls Consulting Company, April 1, 2005.

²³³ Annualized costs calculated at three percent and seven percent discount rates (based on total present value costs calculated at three and seven percent discount rates, respectively) are equal since the forecast costs are equally distributed across the twenty years in the post-designation period.

Table 30
Conservation Cost for the San Jacinto Valley Flood Control Project,
by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E1	\$213,200	\$20,000,000-\$90,000,000	\$14,878,000 - \$66,949,000	\$10,594,000 - \$47,673,000	\$1,000,000 - \$4,500,000	\$1,000,000 - \$4,500,000
Excluded Habitat	\$213,200	\$20,000,000-\$90,000,000	\$14,878,000 - \$66,949,000	\$10,594,000 - \$47,673,000	\$1,000,000 - \$4,500,000	\$1,000,000 - \$4,500,000
Total Essential Habitat	\$213,200	\$20,000,000-\$90,000,000	\$14,878,000 - \$66,949,000	\$10,594,000 - \$47,673,000	\$1,000,000 - \$4,500,000	\$1,000,000 - \$4,500,000

Note: Numbers may not sum due to rounding.

6.2.4 ADMINISTRATIVE COSTS

As stated above, an informal consultation process was initiated between the Service, USACE, and private landowners in 2001. However, the process terminated prior to completion. Currently, there are plans to re-initiate the consultation process with the Service. In this analysis, it is assumed that a post-designation formal consultation will take place between the Service and the USACE with County of Riverside, RCFC, the City of Perris, and the CDFG. Table 31 summarizes the administrative costs associated with this projected future consultation. No other consultations are expected with regards to flood control activities in navarretia essential habitat. The second column reports the total cost of this post-designation consultation in undiscounted dollars, and the third and fourth columns report the total post-designation cost using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent and seven percent, respectively.²³⁴

6.2.5 TOTAL COSTS

Table 32 presents the total economic impacts of navarretia-related conservation efforts and section 7 consultations attributable to the San Jacinto Valley Flood Control Project by unit. The first column of Table 32 presents the total pre-designation (1998-2005) costs in 2005 dollars. The second column reports the total post-designation costs from 1998 to 2025 in undiscounted dollars, and the third and fourth columns report the total post-designation costs using discount rates of three percent and seven percent, respectively. The last two columns present the annualized costs, also using discount rates of three percent

²³⁴ Considering the time frame of the future section 7 consultation is unknown, the analysis assigns an equal probability to administrative consultation costs being incurred in each year across the 20 year time frame of the analysis. Because the administrative consultation costs are spread across the future years evenly, the annualized post-designation administrative consultation costs are equal at three and seven percent discount rates.

and seven percent, respectively. In summary, this analysis estimates \$213,200 in pre-designation costs occurred in essential habitat, and forecasts \$20.0 to \$90.0 million in post-designation costs (undiscounted dollars), or \$14.9 million to \$67.0 million and \$10.6 million to \$47.7 million in present value terms using discount rates of three percent and seven percent, respectively. When annualized, post-designation costs total \$1.0 million to \$4.5 million at both three and seven percent discount rates.²³⁵

Table 31
Administrative Cost of Section 7 Consultation for the San Jacinto Valley Flood Control Project, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E1	\$0	\$32,300	\$24,000	\$17,100	\$1,600	\$1,600
Excluded Habitat	\$0	\$32,300	\$24,000	\$17,100	\$1,600	\$1,600
Total Essential Habitat	\$0	\$32,300	\$24,000	\$17,100	\$1,600	\$1,600

Note: Numbers may not sum due to rounding.

Table 32
Total Economic Impacts for the San Jacinto Valley Flood Control Project, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E1	\$213,200	\$20,032,300 - \$90,032,300	\$14,901,500 - \$66,972,600	\$10,611,100 - \$47,690,200	\$1,001,600 - \$4,501,600	\$1,001,600 - \$4,501,600
Excluded Habitat	\$213,200	\$20,032,300 - \$90,032,300	\$14,901,500 - \$66,972,600	\$10,611,100 - \$47,690,200	\$1,001,600 - \$4,501,600	\$1,001,600 - \$4,501,600
Total Essential Habitat	\$213,200	\$20,032,300 - \$90,032,300	\$14,901,500 - \$66,972,600	\$10,611,100 - \$47,690,200	\$1,001,600 - \$4,501,600	\$1,001,600 - \$4,501,600

Note: Numbers may not sum due to rounding.

6.3 EFFECTS ON PIPELINE PROJECTS

This section examines the cost of conservation efforts associated with past and future water pipeline projects in essential habitat for the navarretia.

²³⁵ Annualized costs calculated at three percent and seven percent discount rates (based on total present value costs calculated at three and seven percent discount rates, respectively) are equal since the forecast costs are equally distributed across the twenty years in the post-designation period.

6.3.1 METROPOLITAN WATER DISTRICT

The Metropolitan Water District of Southern California (MWD) is a consortium of 26 cities and water districts that provide drinking water to nearly 18 million people throughout Los Angeles, Orange, San Diego, Riverside, San Bernardino, and Ventura counties. MWD's total service area is approximately 5,200 square miles. The mission of MWD is to "provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way."²³⁶

6.3.2 PRE-DESIGNATION

Three MWD projects have occurred or are planned to occur within essential navarretia habitat. These projects include: Inland Feeder Project, San Diego Pipeline Number 6 Project, and the Eastside Pipeline Project.

6.3.2.1 Inland Feeder Project

The Inland Feeder Project involved the construction of a 3.7-meter diameter water pipeline that extended for 43.3 miles through western San Bernardino and Riverside counties.²³⁷ The project provided a high-capacity gravity-fed water delivery system designed to increase Southern California's water supply reliability while minimizing the impact on the San Francisco Bay/Sacramento-San Joaquin Delta environment in northern California. The water project was built to use large volumes of water, when available, from northern California, storing it in surface reservoirs, such as Diamond Valley Lake, and local groundwater basins for use during dry periods and emergencies. The project was also built to improve the quality of the Southland's drinking water by blending water from the State project with Colorado River supplies, which have a higher mineral content.²³⁸ Portions of the Inland Feeder Project pass through the Units E1 and E2.

The environmental review process for this project commenced in 1990, but was not completed until April of 1999. The Service transmitted a final BO to the USACE on behalf of MWD for the Inland Feeder Project at that time. Multiple environmental issues were considered in this review process, including threatened and endangered species.

²³⁶ Metropolitan Water District of Southern California, "About Us," <http://www.mwdh2o.com/mwdh2o/pages/about/about01.html>, accessed April 12, 2005.

²³⁷ U.S. Fish and Wildlife Service, April 14, 1999, "Biological Opinion for Metropolitan Water District of Southern California's Inland Feeder Project," Ecological Services, 1-6-99-F-18.

²³⁸ Metropolitan Water District of Southern California, "Inland Feeder Project at a Glance," http://www.mwdh2o.com/mwdh2o/pdf/at%20a%20glance/if_project.pdf, accessed April 12, 2005.

Conservation Efforts and Costs

The construction of the Inland Feeder Project directly impacted approximately 49 hectares (120 acres) of Riverside alluvial sage scrub, 5 hectares (11 acres) of chaparral, 37 hectares (91 acres) of chaparral/sage scrub, 4 hectares (9 acres) of riparian scrub, 2 hectares (6 acres) of alkaline scrub, 0.8 hectare (2 acres) of unvegetated alluvial wash, and less than one hectare (2 acres) of freshwater marsh/vernal pools.²³⁹ Due to this anticipated disturbance, the Service suggested certain conservation measures through the BO that resulted from formal section 7 consultation for the MWD's Inland Feeder Project. Avoidance and restoration strategies for plant communities and listed plant species included measures for the woolly star, spineflower, crownscale, navarretia, and thread-leaved brodiaea. Specific measures for the navarretia included the following:

- “Minimize direct impacts to individual crownscale plants, and avoid direct impacts to spreading navarretia plants, by exchanging their 43-meter (140 foot) temporary construction easement on the east side of Davis Road for a similar width easement of the west side of Davis Road, and reducing the construction limit to 13.7 meters (45 feet) along a section of Davis Road where these listed species are prevalent.
- [MWD] partially compensated for biological impacts to listed plants on the San Jacinto Wildlife Area [Wildlife Area] by purchasing a 74 acre parcel located adjacent to the wildlife area. This parcel was conferred to the California Department of Fish and Game (CDFG) for inclusion into the San Jacinto Wildlife Area...
- Areas containing listed plants that [MWD] has agreed to avoid will be fenced or cordoned off to provide as much buffer as possible from construction activities and prevent the inadvertent disturbance of these sites. In areas adjacent to vernal basins k-rails, sandbags, and/or silt fencing will be installed along the construction trench to minimize erosion and siltation.”²⁴⁰

The effort and cost involved with moving and narrowing the easement are likely minimal and have not been developed. Costs have, however, been estimated for the remaining conservation efforts described in the BO. MWD purchased the 74 acres for inclusion into the Wildlife Area at a cost of approximately \$15,000 per acre, or \$1.1 million in total.²⁴¹ While this land was purchased as habitat for the navarretia, crownscale, and thread-leaved brodiaea, this analysis assumes that 100 percent of the costs are attributable to the navarretia.

²³⁹ U.S. Fish and Wildlife Service, April 14, 1999, “Biological Opinion for Metropolitan Water District of Southern California’s Inland Feeder Project,” Ecological Services, 1-6-99-F-18.

²⁴⁰ U.S. Fish and Wildlife Service, April 14, 1999, “Biological Opinion for Metropolitan Water District of Southern California’s Inland Feeder Project,” Ecological Services, 1-6-99-F-18.

²⁴¹ Personal communication with Wendy Picht, Environmental Planner, Municipal Water District of Southern California, April 11, 2005.

Under normal conditions, MWD installs a chain link fence around the construction limits. However, due to the presence of sensitive plant species in the construction area, MWD installed special silt fencing to protect plants. MWD estimates that silt fencing cost an additional \$40,000 over the course of the Inland Feeder Project.²⁴²

These conservation costs are entirely attributed to the navarretia, although the conservation efforts were also spurred by the presence of other federally listed plant species, including the crowscale and thread-leaved brodiaea. Thus, this cost analysis method likely results in an overstatement of navarretia costs incurred by MWD in Units E1 and E2. Total pre-designation costs related to navarretia conservation for the Inland Feeder Project are presented in Table 33.

**Table 33
Inland Feeder Project Conservation Efforts**

Conservation Measure	Cost
74 Acres for San Jacinto Wildlife Area	\$1,100,000
Silt Fencing	\$40,000
Total	\$1,140,000

Note: Numbers may not sum due to rounding.

6.3.2.2 Eastside Pipeline Project

MWD owns part of the land in Unit E2, which is excluded from the proposed CHD. The Eastside Pipeline Project is approximately 9 miles of 12-foot diameter water conveyance pipeline. The pipeline brings untreated State Water Project water from the Inland Feeder Project to Diamond Valley Lake. This project was completed in conjunction with the construction for the reservoir project.²⁴³

Project Modifications

Construction methods related to the Eastside Pipeline project were altered to minimize construction disturbance within the essential habitat areas. The specific alterations included vertical excavation trenches, relocation of construction lay down and storage areas, stockpiling and reapplication of topsoil.²⁴⁴ Cost estimates for these project modifications were not made by MWD, and therefore have not

²⁴² Personal communication with Wendy Picht, Environmental Planner, Metropolitan Water District Southern California, April 11, 2005.

²⁴³ Personal communication with Wendy Picht, Environmental Planner, Metropolitan Water District Southern California, April 11, 2005.

²⁴⁴ Personal communication with Wendy Picht, Environmental Planner, Metropolitan Water District Southern California, April 11, 2005.

been included in this analysis. It is likely that these cost estimates are minimal in comparison to the costs incurred from implementing the conservation efforts.

Conservation Efforts

MWD purchased 40 acres of land and established the Upper Salt Creek Wetland Preserve. The preserve was purchased and permanently conserved to mitigate impacts to the navarretia (and other sensitive species) sustained during the construction of the Eastside Pipeline. MWD estimated the land acquisition cost to be approximately \$15,000 per acre, or \$600,000 in total.²⁴⁵

Construction activities took place in a sensitive area approximately three miles long. Construction monitoring was required in this stretch of the construction area. MWD estimated that it incurred \$35,000 in construction monitoring costs annually during two years of construction, for a total cost of \$70,000.²⁴⁶

Within the impacted areas, MWD also re-contoured and re-seeded temporary construction easements and permanent rights-of-way. The Service suggested a four-year post-construction period to monitor and re-establish the permanent right-of-way. MWD estimated this post construction monitoring and re-establishment cost approximately \$20,000 per year, for a total cost of \$80,000 over four years.²⁴⁷

Since all costs were incurred prior to 2006, all costs associated with the Preserve are classified as pre-designation costs. Total pre-designation costs equal \$750,000. These conservation costs are entirely attributed to the navarretia, although the conservation efforts were also spurred by habitat damage to other federally listed plant species, including the crownscale. Thus, this cost analysis method likely results in an overstatement of navarretia costs incurred by MWD in Unit E2. Total pre-designation costs related to navarretia conservation for the Eastside Pipeline Project are presented in Table 34.

²⁴⁵ Personal communication with Wendy Picht, Environmental Planner, Metropolitan Water District Southern California, April 11, 2005.

²⁴⁶ Personal communication with Wendy Picht, Environmental Planner, Metropolitan Water District Southern California, April 11, 2005.

²⁴⁷ Personal communication with Wendy Picht, Environmental Planner, Metropolitan Water District Southern California, April 11, 2005.

Table 34
Eastside Pipeline Project Conservation Efforts

Protective Measure	Cost
Acquisition of 40 acres	\$600,000
Monitoring During Construction	\$70,000
Four-Year Post-Construction Monitoring	\$80,000
Total	\$750,000

Note: Numbers may not sum due to rounding.

6.3.2.3 San Diego Pipeline Number 6

The San Diego Pipeline Number 6 project is a 7-mile, 10-foot diameter water pipeline. The pipeline will originate at MWD’s Lake Skinner facility and extend south to the intersection of Anza and De Portola roads, in unincorporated Riverside County. As part of the project, MWD will connect the San Diego 6 pipeline to the existing Lake Skinner outlet conduit; located approximately 400 feet southwest of the intersection of Borel and Auld roads within MWD-owned property. The project will also include a service connection to the Rancho California Water District, a sub-agency of the Eastern Municipal Water District and Western Municipal Water District. The service connection will occur near the northeast corner of the intersection of Anza and De Portola roads. This section of San Diego 6 pipeline is being constructed to accommodate current demand projects for Rancho California Water District.

Surveys for this project are currently being performed to determine what species are in the project area. MWD does not expect to find navarretia. Thus, this analysis, assumes that no costs will be incurred by MWD for protecting the navarretia during the San Diego Pipeline Number 6 project.

6.3.3 TOTAL PROTECTION COSTS TO PIPELINE PROJECTS

Table 35 presents the estimated costs of navarretia-related conservation efforts (updated to 2005 dollars) associated with the three pipeline projects described above.²⁴⁸ By far, the largest portion of the pre-designation costs is the \$1.1 million to purchase 74 acres for inclusion into the Wildlife Area.

²⁴⁸ The 1999 cost estimates presented above were updated to 2005 dollars through the application of a CPI factor (1.1520608).

Table 35
Conservation Cost to Pipelines, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E1	\$682,600	\$0	\$0	\$0	\$0	\$0
E2	\$1,580,800	\$0	\$0	\$0	\$0	\$0
Excluded Habitat	\$2,263,400	\$0	\$0	\$0	\$0	\$0
Total Essential Habitat	\$2,263,400	\$0	\$0	\$0	\$0	\$0

Note: Numbers may not sum due to rounding.

6.3.4 ADMINISTRATIVE COSTS

As described above, two formal consultations for pipeline projects have occurred between the Service, USACE, and MWD since the species was listed. The administrative costs to all agencies involved in the consultation process are reported in Table 36 according to the administrative costs presented in Section 2.2.1.

6.3.5 TOTAL COSTS TO PIPELINE PROJECTS

Table 37 summarizes the costs of navarretia-related conservation efforts and administrative costs associated with pipeline projects. The largest portion of the costs presented below is due to the purchase of 74 acres for inclusion into the Wildlife Area that was done to protect sensitive plants, including the navarretia, during the Inland Feeder Project. MWD did not identify any future pipeline projects in the proposed navarretia critical habitat; therefore this analysis assumes that MWD will not bear any cost for protecting the navarretia in the future.

Table 36
Administrative Cost of Section 7 Consultation to Pipelines, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E1	\$16,200	\$0	\$0	\$0	\$0	\$0
E2	\$48,500	\$0	\$0	\$0	\$0	\$0
Excluded Habitat	\$64,700	\$0	\$0	\$0	\$0	\$0
Total Essential Habitat	\$64,700	\$0	\$0	\$0	\$0	\$0

Note: Numbers may not sum due to rounding.

Table 37
Total Economic Impacts to Pipelines, by Habitat Unit (2005 dollars)

Habitat Unit	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E1	\$698,800	\$0	\$0	\$0	\$0	\$0
E2	\$1,629,300	\$0	\$0	\$0	\$0	\$0
Excluded Habitat	\$2,328,100	\$0	\$0	\$0	\$0	\$0
Total Essential Habitat	\$2,328,100	\$0	\$0	\$0	\$0	\$0

Note: Numbers may not sum due to rounding.

6.4 FEDERAL LAND MANAGEMENT

6.4.1 MARINE CORPS AIR STATION MIRAMAR INRMP (UNITS NI1, NI2, AND NI3)

MCAS Miramar encompasses over 23,000 acres.²⁴⁹ The Service has identified 722 acres of MCAS Miramar land as essential habitat for the navarretia.²⁵⁰ As mentioned in Section 4.4.5, the Miramar land is covered by the MCAS Miramar's 2000 Integrated Natural Resources Management Plan (INRMP). The INRMP specifies several vernal pool management actions: monitoring and surveying vernal pool habitat, removing/controlling exotic plants, developing various media to further public awareness, protecting habitat through fencing and field markers, and working with project planners to minimize impacts to vernal pool areas. Several of these activities have been ongoing prior to the completion of the 2000 INRMP.²⁵¹

In 1993, Naval Air Station Miramar was realigned to Marine Corps Air Station (MCAS) Miramar. Preparation for the base realignment prompted a vernal pool inventory in 1991, as well as \$2 million in Base Realignment and Closure mitigation of vernal pools. The base realignment also entailed a formal section 7 consultation with the Service, with a record of decision in 1996. Associated with the vernal pool section of this consultation, the base incurred an estimated \$100,000 in administrative and data costs.²⁵² Vernal pool management, vernal pool mapping, and control of exotic species have been ongoing since the realignment. These costs are not included in this analysis as they were incurred prior to the

²⁴⁹ Personal communication with Dave Boyer, Natural Resource Manager, MCAS Miramar, April 8, 2005.

²⁵⁰ Although the proposed rule states that there are 774 acres of essential habitat on MCAS Miramar, GIS data from the San Diego Association of Governments indicates that there are actually 722 acres of Department of Defense land in the three units not included in the proposed CHD for navarretia (Units NI1, NI2, and NI3).

²⁵¹ MCAS Miramar INRMP, <http://www.globalsecurity.org/military/library/report/enviro/inrmp-miramar/>, accessed March 14, 2005.

²⁵² Personal communication with Dave Boyer, Natural Resource Manager, MCAS Miramar, April 8, 2005.

October 1998 final rule listing the navarretia as threatened, and are therefore outside the scope of this analysis.

Although the preparation of the INRMP is required by the 1997 Sikes Act Improvement Act, the cost of preparation of the INRMP is higher due to the presence of listed species on MCAS Miramar. While the natural resources manager at MCAS Miramar estimates that the presence of listed species increases the cost of the INRMP preparation by 30 to 40 percent, the target species for the vernal pool protections in the MAS Miramar INRMP were the San Diego button celery, the San Diego mesa mint, and the San Diego fairy shrimp.²⁵³ The manager believes that there would be no change to the INRMP or to vernal pool conservation efforts on MCAS Miramar if the navarretia did not exist on the base. Therefore, no past or future costs of INRMP preparation or revision at MCAS Miramar are attributed to the navarretia in this analysis.

Since Federal listing of the navarretia in 1998, MCAS Miramar has continued to implement several conservation efforts for vernal pools. The principal direct costs associated with vernal pool conservation are exotic plant control, scientific research, soil inventories, and mapping and surveying. Indirect costs of vernal pool conservation include staff training, GIS equipment, public education and overhead costs. Budgeted costs for fiscal years 1998 through 2010 were obtained from the natural resource manager at MCAS Miramar. Costs for 2011 to 2025 were projected based on the budgeted costs.

All post-designation direct costs for MCAS Miramar vernal pool conservation were attributed to the navarretia, with the exception of vernal pool mapping and surveying costs and the base-wide soil erosion inventory. Costs of vernal pool mapping and surveying are assumed to be proportional to the number of surveyed species; since there are six federally listed vernal pool species on MCAS Miramar, this cost was divided by six. Regarding the soil erosion inventory, the natural resource manager at MCAS Miramar estimates that ten percent of the soil erosion inventory benefits vernal pools, so ten percent of this cost is attributed to the navarretia. Additionally, the natural resource manager at MCAS Miramar estimates that 50 percent of the indirect conservation costs (natural resource division staff training, GIS equipment, public education, and general overhead costs) are associated with vernal pool conservation; thus 50 percent of these costs were attributed to the navarretia.²⁵⁴

There are several potential costs of vernal pool habitat conservation that are difficult to quantify and not included in this analysis. Costs are associated with avoiding maintenance and construction in vernal pool areas during the wet season. Personnel must train farther from headquarters and in a smaller area in order to avoid impacting vernal pool habitat, so they may not be able to exercise skills or prepare for combat as thoroughly. There may also be a cost associated with restricting further development of parts of the essential habitat area. MCAS Miramar is under consideration as the future home base of the MV22

²⁵³ Personal communication with Dave Boyer, Natural Resource Manager, MCAS Miramar, March 25, 2005.

²⁵⁴ Personal communication with Dave Boyer, Natural Resource Manager, MCAS Miramar, April 8, 2005.

Osprey aircraft, but the presence of threatened and endangered vernal pool species may induce the selection of an alternate location.²⁵⁵

Despite excluding several potential cost categories, this cost analysis method likely overstates the costs of navarretia conservation for two reasons. First, MCAS Miramar vernal pools provide habitat for six federally listed threatened or endangered species, all of which benefit from vernal pool habitat conservation. Other than surveying the navarretia, none of the vernal pool conservation efforts were targeted specifically for the navarretia. Second, the distribution of the navarretia on MCAS Miramar is quite limited: the current vernal pool species inventory indicates that the navarretia occupies only 1.8 acres on MCAS Miramar.²⁵⁶ The MCAS Miramar natural resource manager believes that there would be virtually no change to the base's INRMP or to vernal pool conservation efforts if the navarretia did not exist on the base.²⁵⁷

Results of the cost analysis for navarretia conservation on MCAS Miramar are presented in Table 38. Total pre-designation (1998-2005) and post-designation (2006-2025) costs are presented. Pre-designation navarretia costs on MCAS Miramar total approximately \$2.2 million. Post-designation costs in undiscounted dollars are estimated at \$4.5 million, or in present value terms, at \$3.4 million (three percent discount rate) or \$2.4 million (seven percent discount rate). When annualized, post-designation costs total \$227,500 and \$228,800, also at three and seven percent, respectively.²⁵⁸

²⁵⁵ Personal communication with Dave Boyer, Natural Resource Manager, MCAS Miramar, April 8, 2005.

²⁵⁶ MCAS Miramar INRMP, <http://www.globalsecurity.org/military/library/report/enviro/inrnp-miramar/>, accessed March 14, 2005.

²⁵⁷ Personal communication with Dave Boyer, Natural Resource Manager, MCAS Miramar, March 25, 2005.

²⁵⁸ The annualized post-designation conservation costs are similar at three and seven percent because many of the conservation activities recur annually at the same undiscounted dollar amount for the duration of the post-designation period (e.g., overhead, exotic plant control, and staff training). Other costs occur on a regular basis, but not annually (e.g., soil erosion and vernal pool mapping surveys and vernal pool fire effects study). Because of this annual variability in undiscounted dollar costs during the post-designation period, the annualized costs at discount rates of three and seven percent are not equal.

**Table 38
Conservation Costs for MCAS Miramar**

Category	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
INRMP Preparation/Update	\$0	\$0	\$0	\$0	\$0	\$0
Exotic Plant Control	\$148,212	\$400,000	\$297,549	\$211,880	\$20,000	\$20,000
Staff Training	\$31,565	\$50,000	\$37,194	\$26,485	\$2,500	\$2,500
GIS Equipment/Maintenance	\$32,143	\$80,000	\$59,510	\$42,376	\$4,000	\$4,000
Soil Erosion Prevention Survey	\$8,972	\$7,739	\$5,117	\$3,001	\$344	\$283
Vernal Pool Fire Effects Study	\$91,645	\$25,000	\$24,272	\$23,364	\$1,631	\$2,205
Vernal Pool Mapping/Surveys	\$110,498	\$125,000	\$88,903	\$59,652	\$5,976	\$5,631
Vernal Pool Management	\$68,818	\$200,000	\$148,775	\$105,940	\$10,000	\$10,000
Public Education	\$3,817	\$95,000	\$83,591	\$71,085	\$5,619	\$6,710
Overhead	\$1,718,113	\$3,549,290	\$2,640,224	\$1,880,061	\$177,465	\$177,465
Total	\$2,213,784	\$4,532,029	\$3,385,134	\$2,423,845	\$227,534	\$228,794

To allocate these navarretia conservation costs to the three units on MCAS Miramar (Units NI1, NI2, and NI3), total costs were multiplied by the proportion of essential habitat in each unit. For example, Unit NI1 comprises 72 out of the total 722 essential habitat acres on MCAS Miramar, or ten percent. The conservation costs on Unit NI1 were thus calculated as ten percent of the total navarretia conservation costs on MCAS Miramar (see Table 39)

In addition to conservation costs, there are administrative costs associated with section 7 consultations. The only previous formal section 7 consultation on MCAS Miramar related to the navarretia was conducted during the base realignment from Naval Air Station Miramar to Marine Corps Station Miramar. According to the base's natural resource manager, in the absence of CHD, it is projected that the base will conduct a formal navarretia consultation one to two times every decade. However, if Units NI1, NI2, and NI3 were to be designated critical habitat, he estimates that a formal consultation would be necessary every year for the first five years following consultation, and then every fourth year thereafter. Since designation includes operational areas, the frequency would be very high initially.

Table 39
Conservation Cost for MCAS Miramar, by Habitat Unit (2005 dollars)

Habitat Unit	Acres	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
			Undiscounted	3%	7%	3%	7%
NI1	72	\$220,800	\$451,900	\$337,600	\$241,700	\$22,700	\$22,800
NI2	647	\$1,983,800	\$4,061,300	\$3,033,500	\$2,172,100	\$203,900	\$205,000
NI3	3	\$9,200	\$18,800	\$14,100	\$10,100	\$900	\$1,000
Not Included Habitat	722	\$2,213,800	\$4,532,000	\$3,385,100	\$2,423,800	\$227,500	\$228,800

Note: Numbers may not sum due to rounding.

Based on expenditures for past consultations, the base's natural resource manager estimates that each formal consultation costs the base approximately \$45,000. At a cost of \$45,000 for each of the projected eight formal navarretia consultations, the annualized administrative cost to the base is approximately \$22,000. In addition to costs incurred by the base, the Service also incurs costs with every formal consultation; these costs are estimated at \$4,900 per formal consultation (see Table 1). The annualized costs to the service are \$2,400. The annualized value of total administrative costs on MCAS Miramar essential habitat, including costs incurred both by the base and the Service, are estimated at approximately \$24,000 and \$24,100, at three percent and seven percent discount rates, respectively.²⁵⁹ These administrative costs are allocated to the three units in the same manner as conservation costs, and are presented in Table 40.

Table 40
Administrative Cost of Section 7 Consultation for MCAS Miramar, by Habitat Unit (2005 dollars)

Habitat Unit	Acres	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
			Undiscounted	3%	7%	3%	7%
NI1	72	\$0	\$43,500	\$35,600	\$25,500	\$2,400	\$2,400
NI2	647	\$0	\$391,300	\$320,000	\$229,200	\$21,500	\$21,600
NI3	3	\$0	\$1,800	\$1,500	\$1,100	\$100	\$100
Not Included Habitat	722	\$0	\$436,700	\$357,000	\$255,700	\$24,000	\$24,100

Note: Numbers may not sum due to rounding.

²⁵⁹ Section 7 consultations are forecast to occur at the rate of one per year during the first five years and then one every four years thereafter. Because the frequency of consultation varies during the post-designation period, the annual undiscounted dollar administrative consultation cost also varies. Thus, the annualized post-designation conservation costs at three and seven percent discount rates are not equal.

6.4.2 MARINE CORPS BASE CAMP PENDLETON INRMP (UNIT E7)

Marine Corps Base (MCB) Camp Pendleton is the Marine Corps' largest West Coast expeditionary facility, with more than 125,000 acres of terrain.²⁶⁰ The Service has identified 67 acres of MCB Pendleton as essential habitat for the navarretia.²⁶¹ All 67 acres are defined by the Service as mission-critical Department of Defense lands, and are excluded from the proposed navarretia CHD under section 4(b)(2) of the Act. As mentioned in Section 4.4.6, the 67 acres on Camp Pendleton proposed as essential habitat for the navarretia are covered by the base's 2001 INRMP, which includes the objective of protecting ephemeral wetlands and proactive action to prevent damage to vernal pools.

Past conservation efforts include two base-wide inventories of isolated ephemeral wetlands (including vernal pools). Priority future actions include maintenance of GIS mapping of vernal pools, public education efforts, working with project planners to avoid or minimize impacts to vernal pools, and placement of field markers, signs, or fencing around vernal pools.

In addition to the current INRMP, the Service is in formal consultation (since March 30, 2000) with the Marine Corps regarding their activities on upland areas of Camp Pendleton that include vernal pool habitat. The programmatic instructions resulting from the completed upland consultation will be incorporated into the Camp Pendleton INRMP, and the Marine Corps will implement the programmatic instructions to avoid adverse effects on the plant.

The Natural Resources Department at Camp Pendleton declined to provide information for this economic analysis; as such, this analysis is unable to determine or assess costs to the designation of the 67 acres of Unit E7 on Camp Pendleton.²⁶²

6.4.3 FEDERAL LANDS (UNIT 5D)

Ownership of proposed critical habitat Unit 5D has not been determined. GIS data from SANDAG indicates that the land in this Unit is owned by the Federal Government. Based on its proximity to the international border with Mexico, phone calls were made to the Citizenship and Immigration Services (CIS) offices. The CIS public relations office indicated that the CIS does not own land along the border, except at border stations, but does patrol the border.²⁶³ Phone and email contact with the Customs and

²⁶⁰ U.S. Marine Corps Base Camp Pendleton, "Press Kit," <http://www.pendleton.usmc.mil/press/kit.asp>, accessed April 11, 2005.

²⁶¹ U.S. Fish and Wildlife Service, October 7, 2004, "Proposed Designation of Critical Habitat for *Navarretia fossalis* (spreading navarretia), Proposed Rule," *Federal Register*, Vol. 69, No. 194, p. 60116.

²⁶² Personal communication with Deborah Berber, Camp Pendleton, Land Manager, April 8, 2005.

²⁶³ Personal communication with Chris Bentley, Citizenship and Immigration Services, Public Affairs, April 4, 2005.

Border Protection public information and field operations offices has not resulted in additional information.²⁶⁴ Additionally, the General Services Administration (GSA), which owns and manages Federal land, was contacted. This office was also unable to provide ownership information.²⁶⁵ Due to the lack of ownership data, no costs to Federal land owners are attributed to Unit 5D.

6.4.4 SAN DIEGO NATIONAL WILDLIFE REFUGE (UNIT 5A)

The San Diego National Wildlife Refuge was established in 1996 for the purpose of conserving fish or wildlife that are federally listed as endangered or threatened species, and for the development, advancement, management, conservation, and protection of fish and wildlife resources.²⁶⁶ The 43.6 acres of the Refuge located in Unit 5A were purchased for \$1,458,194. This purchase cost is not attributed to the navarretia since the Refuge was established prior to Federal listing of the plant species.

According to the Refuge manager, the Refuge is constrained in its vernal pools conservation efforts due to the fragmented nature of vernal pools identified for acquisition and the cost of land acquisition. Although the Refuge does not have any annual funds targeted specifically for vernal pools management, planning is underway for the small-scale restoration of vernal pool habitat on the Refuge in the near future.²⁶⁷ However, the magnitude and timing of the small-scale vernal pool restoration efforts are uncertain and not quantified in this analysis. Therefore, both the pre-designation and post-designation costs of navarretia conservation are based on the general management cost at the Refuge. According to the Refuge manager, the annual cost of managing the Refuge is approximately \$40 per acre.²⁶⁸

In addition to conserving habitat for species such as the navarretia, the Refuge provides recreational opportunities. The Refuge manager estimates that there are 15,000 visitor days annually at the 7,815 acres of the Refuge.²⁶⁹ Of these, it is estimated that the main uses are equestrian (50 percent), non-motorized bikes (40 percent), and hiking (10 percent). The value of these recreational opportunities is estimated based on several recreational benefit studies. According to a Service study of net economic values for wildlife-related recreation, a conservative estimate of benefits to California wildlife viewers is

²⁶⁴ Customs and Border Protection Public Affairs and Field Operations Offices, April 4, 2005.

²⁶⁵ Personal communication with Brenda Dang, General Services Administration, April 7, and April 11, 2005.

²⁶⁶ San Diego National Wildlife Refuge October 2001 Planning Update, http://www.fws.gov/pacific/sandiegorefuges/new/ccp/planning_update_2.pdf, accessed April 18, 2005.
<http://www.fws.gov/pacific/sandiegorefuges/new/ccp/ccp%202%20process.htm#Resources>.

²⁶⁷ Personal communication with Service Refuge Manager, San Diego National Wildlife Refuge, April 6, 2005.

²⁶⁸ Personal communication with Service Refuge Manager, San Diego National Wildlife Refuge, April 14, 2005.

²⁶⁹ Personal communication with Service Refuge Manager, San Diego National Wildlife Refuge, June 15, 2005.

\$26 per user day.²⁷⁰ Furthermore, a review of recreation studies compiled by the National Park Service found average economic benefit per day of \$48 for hiking and \$31 for picnicking.²⁷¹ Applying a conservative estimate of \$25 of net economic benefit to each day use trip to the Refuge results in an estimated annual recreation benefit of \$345,000 (\$48/acre). Considering the per acre recreational benefit (\$48/acre) of the Reserve exceeds the per acre management cost (\$40/acre), no management costs are attributed to the navarretia. Furthermore, there are no projected administrative costs since the Refuge does not anticipate any section 7 consultations with the Service related to the navarretia.²⁷²

6.4.5 OTHER FEDERAL (BROWN FIELD BOMBING RANGE (UNIT E17) AND BROWN FIELD NAVAL AUXILIARY AIR STATION (UNIT E18))

GIS data from the Service indicate that part of the land in Units E17 and E18 is owned by the Federal Government and used by the United States Navy as a bombing range (Brown Field Bombing Range, E17) and an air station (Brown Field Naval Auxiliary Air Station, E18). SANDAG data indicate that there are 90 acres of federally-owned land in Unit E18, but no federally-owned land in Unit E17. Conversations with local Navy officials, however, indicate that all land in Units E17 and E18 is now owned either privately or by local governments. A public affairs officer at a nearby Navy installation, North Island Naval Air Station, indicated that he was not aware of a Brown Field Bombing Range, and that he did not believe that the Brown Field Naval Auxiliary Air Station still existed.²⁷³ Additionally, a naval regional planner verified that the Navy does not own land in Units E17 and E18.²⁷⁴ Based on this information, no costs to Federal land owners are attributed to Units E17 and E18.

²⁷⁰ U.S. Fish and Wildlife Service, 2001, *Net Economic Values for Wildlife-Related Recreation in 2001: Addendum to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, Report 2001-3. The report estimates with a 95 certainty that benefit per visitor day for wildlife-viewing is between \$26 and \$59 (2005 dollars). The study was based on contingent valuation and travel cost questions from the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

²⁷¹ Rivers, Trails and Conservation Assistance, National Park Service. 1995. "Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors: A Resource Book." Fourth Edition, Revised. These estimates are average willingness to pay estimates derived from an analysis of numerous peer-reviewed publications on the value of outdoor recreation that used a variety of methods, including the travel cost method and the contingent valuation method. Although these estimates are average willingness to pay estimates and not net economic benefit estimates, since most individuals visiting the Reserve are local, average travel costs are expected to be minimal.

²⁷² Personal communication with Service Refuge Manager, San Diego National Wildlife Refuge, April 6, 2005.

²⁷³ Personal communication with Steve Fiebing, North Island Naval Air Station Public Affairs Officer, March 29, 2005.

²⁷⁴ Personal communication with Sheila Donovan, Navy Regional Planner, April 7, 2004.

6.5 STATE OF CALIFORNIA LAND MANAGEMENT

6.5.1 CDFG, SANTA ROSA PLATEAU ECOLOGICAL RESERVE (UNIT E6)

Approximately half of Unit E6, which is primarily comprised of the Santa Rosa Plateau Ecological Reserve, is owned by the CDFG. In 1991, CDFG received funds from the Metropolitan Water District of Southern California (MWD) to purchase Santa Rosa Plateau land. MWD offered to provide \$15.4 million towards a land purchase in exchange for mitigation credits (for damage to Stephens' kangaroo rat habitat) for their future Eastside Reservoir Project. The land is owned by the CDFG, but is managed by The California Nature Conservancy and Riverside County Regional Park and Open Space District. Since the cost of land acquisition was prior to the Federal listing of the navarretia, this cost is not attributed to the navarretia. Although it is expected that CDFG will purchase the land currently owned by The Nature Conservancy (TNC) in the Reserve, this cost is not included as a cost of conservation since the land is already in the Reserve and purchasing costs will be used by TNC to continue managing the Reserve. Additionally, since CDFG does not manage this area, the agency does not incur any conservation costs in this unit. Therefore, no costs are attributed to the CDFG for Unit E6.

6.5.2 CDFG, SAN JACINTO WILDLIFE AREA (UNIT E1)

The California Department of Fish and Game (CDFG) also owns and manages land in the San Jacinto Wildlife Area, which comprises part of Unit E1. Approximately 5,500 acres of the Wildlife Area's 10,000 acres are located in Unit E1, and are excluded from proposed critical habitat for the navarretia. According to the Wildlife Area manager, the Wildlife Area was established in the early 1980s as part of mitigation for the State Water Project. At that time, the Wildlife Area consisted of about 4,800 acres.²⁷⁵

In the early 1990s, the CDFG acquired several more parcels of land, including the Wildlife Area lying in the floodplain of the San Jacinto River. The area excluded from proposed CHD was primarily acquired during this time at a cost of approximately \$8,000 per acre. The primary objective of these acquisitions was to conserve the floodplain ecosystem and species habitat. Protecting habitat for vernal pool species was one of many conservation priorities. The floodplain area of the San Jacinto Wildlife Area provides habitat for three federally listed plant species: thread-leaved brodiaea, San Jacinto Valley crowscale, and spreading navarretia.²⁷⁶ Since the land was acquired prior to Federal listing of the navarretia in 1998, these land acquisition costs are not included in this analysis.

In the late 1990s, MWD purchased and restored a 74-acre parcel adjacent to the Wildlife Area to mitigate for habitat impacts of its inland feeder pipeline project. The navarretia was one of the species that was impacted by the project. This land was later granted to CDFG and incorporated into the San Jacinto

²⁷⁵ Personal communication with Tom Paulek, San Jacinto Wildlife Area, Manager, April 5, 2005.

²⁷⁶ Ibid.

Wildlife Area. The costs of land acquisition and restoration of this parcel are attributed to MWD and are further discussed in Section 6.3.

The general management budget for the 10,000 acres at the San Jacinto Wildlife Area is approximately \$350,000 (\$35 per acre). This management budget includes costs for all recreational use support (e.g., hunting, bird-watching, and hiking) and all species, including employee salaries, water costs, materials, operation and maintenance, interpretative materials, and trail building. The \$350,000 annual management budget also includes costs specifically associated with protecting the vernal playa in the Wildlife Area. These costs, which amount to approximately \$5,000 every third year (\$1,667 per year), are incurred to avoid impacts to the species during development of recreation projects in the vernal playa areas, and include such conservation costs as hiring consultants, conducting surveys, and building fences.²⁷⁷ Since the Wildlife Area examines impacts and avoids sensitive habitat areas, the program manager believes that there are no conflicts between the vernal playa preservation and recreational use in the Wildlife Area.

In addition to providing habitat for the navarretia and other species, the Wildlife Area provides recreational benefits to hunters and wildlife viewers. It is estimated that 20,000 wildlife viewer days and 5,000 hunting days are enjoyed at the Wildlife Area annually.²⁷⁸ According to a Service study of net economic values for wildlife-related recreation, a conservative estimate of benefits to California wildlife viewers is \$26 per user day.²⁷⁹ Furthermore, a separate study of outdoor recreation values found that a conservative estimate of net economic value to migratory waterfowl hunters is \$32 per day.²⁸⁰ Applying these values, respectively, to the 20,000 wildlife viewer days and the 5,000 hunting days enjoyed annually by the public at the San Jacinto Wildlife Area results in an estimated annual recreation benefit of \$679,700 (approximately \$68 per acre).

Per acre recreational benefits (\$68) exceed annual per acre management costs (\$35). This analysis therefore attributes no general management costs of the Wildlife Area to the navarretia. However, it is unknown whether vernal playa conservation increases recreational value at the Wildlife Area. If the vernal playa conservation efforts result in offsetting recreational benefits, then there are no net costs

²⁷⁷ Personal communication with Tom Paulek, San Jacinto Wildlife Area, Manager, April 5, 2005.

²⁷⁸ Ibid.

²⁷⁹ U.S. Fish and Wildlife Service, 2001, *Net Economic Values for Wildlife-Related Recreation in 2001: Addendum to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, Report 2001-3. The report estimates with a 95 percent certainty that benefit per visitor day for wildlife-viewing is between \$26 and \$59 (2005 dollars). The study was based on contingent valuation and travel cost questions from the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

²⁸⁰ Walsh, R.G., D.M. Johnson, and J.R. McKean, 1989, "Issues in Nonmarket Valuation and Policy Application: A Retrospective Glance," *Western Journal of Agricultural Economics*, Vol. 14, No. 1, pp. 178-188. The paper estimates with a 95 percent certainty that benefit per visitor day for migratory waterfowl hunting is between \$37 and \$73 (2005 dollars). This paper is a meta-analysis of numerous peer-reviewed publications on the value of outdoor recreation that used a variety of methods, including the travel cost method and the contingent valuation method.

attributable to the navarretia; if there is no recreational benefit from vernal playa conservation efforts, then the cost of these efforts can not be offset by recreational benefits. The annual cost of navarretia management at the Wildlife Area is therefore presented as a range from \$0 to \$1,667 (approximately \$5,000 in vernal playa conservation efforts every third year). Conservation is also spurred by the presence of the crownscale, however, this analysis assumes that 100 percent of the cost of conservation is attributable solely to the navarretia. Thus, this cost analysis method likely results in an overstatement of navarretia costs.

CDFG may acquire 2,000 additional acres in the San Jacinto floodplain near or adjacent to the Wildlife Area. The Wildlife Area manager estimates that the cost of the floodplain land is \$7,000 to \$8,000 per acre.²⁸¹ Although no plans exist to purchase specific floodplain parcels, in the event of acquisition CDFG would purchase lands from willing sellers. The purpose of the planned acquisition is to preserve habitat for multiple species, including the navarretia. The acquisition of additional land in Unit 1 by CDFG would likely result in increased management costs and either increased visitor days to the Wildlife Area or increased benefit per visitor day. However, the magnitude of increased management costs and recreational benefit due to the prospective land purchase is unknown and is not captured in this analysis.

The possible CDFG acquisition of 2,000 acres may be located within Unit E1. Unit E1 of navarretia essential habitat currently contains 5,511 acres owned and managed by CDFG as part of the San Jacinto Wildlife Area. The unit contains an additional 6,535 acres of private land primarily dedicated to agriculture. Because these acres include San Jacinto floodplain lands, it is possible CDFG could purchase the additional 2,000 acres from private landowners in Unit E1. Whether such prospective land purchases may impact social welfare is uncertain. Considering CDFG would be willingly paying market price for the land, and the landowner would be willingly accepting, CDFG would be valuing the land as Wildlife Area as highly as its potential future alternative uses. Implicit in the market price of a property is the value of the potential future uses of that land. As such, the purchase of land by the CDFG at market price could be characterized as an “arms length” purchase, or a transfer not resulting in welfare impacts.

On the other hand, welfare impacts may result from any private land sale (to CDFG or other entities) in the essential habitat unit if the market price of the land decreases due to critical habitat designation. Lower land values may result from regulatory uncertainty associated with the presence of the navarretia. In this case, the landowner may sell the land to CDFG at a lower price than (s)he would be willing to accept absent the presence of the navarretia, therefore generating some level of consumer surplus loss associated with the land acquisition. The presence and level of effect of regulatory uncertainty, or “stigma,” are difficult to predict; if the landowner is selling the land at a less than desirable price, the difference between the sales price and the value to the landowner of the land is uncertain.

Weighing these factors and the related uncertainty, this analysis does not anticipate or quantify economic efficiency losses associated with CDFG’s future land acquisition. In the case that the lands acquired for

²⁸¹ Personal communication with Tom Paulek, San Jacinto Wildlife Area, Manager, May 24, 2005.

the Wildlife Area contain navarretia habitat, and the presence of the species and/or habitat causes the landowners to accept a lower price for their land than otherwise, the potential associated consumer surplus losses are not captured in this analysis.

As no section 7 consultations due to the navarretia are anticipated, there are no administrative costs associated with the Wildlife Area. Table 41 presents the total management costs and recreation benefits at the San Jacinto Wildlife Area, as well as the projected “net” costs attributable to navarretia conservation for the pre-designation (1998-2005) and post-designation (2006-2025) periods. Pre-designation net costs are estimated to range from \$0 to \$13,300. Post-designation net costs are estimated at \$0 to \$33,300 in undiscounted dollars, or in present value terms, \$0 to \$24,800 (three percent discount rate) and \$0 to \$17,700 (seven percent discount rate). When annualized, post-designation net costs total \$0 to \$1,700, also at three and seven percent, respectively.²⁸²

**Table 41
Wildlife Area Navarretia Conservation Costs and Benefits, Unit E1**

Category	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Vernal Pool Conservation	\$13,300	\$33,300	\$24,800	\$17,700	\$1,700	\$1,700
General Management	\$3,340,100	\$6,900,000	\$5,132,700	\$3,654,900	\$345,000	\$345,000
Total Management Costs	\$3,353,400	\$6,933,300	\$5,157,500	\$3,672,600	\$346,700	\$346,700
Recreational Benefits	-\$9,625,000	-\$27,500,000	-\$20,456,528	-\$14,566,770	-\$1,375,000	-\$1,375,000
Net Conservation Costs	\$0 - \$13,300	\$0 - \$33,300	\$0 - \$24,800	\$0 - \$17,700	\$0 - \$1,700	\$0 - \$1,700

6.6 MANAGEMENT OF OTHER LANDS

6.6.1 TNC AND RIVERSIDE COUNTY PARK AND OPEN SPACE DISTRICT, SANTA ROSA PLATEAU ECOLOGICAL RESERVE (UNIT E6)

A significant portion of Unit E6, which is excluded from the proposed CHD for navarretia, is comprised of the Santa Rosa Plateau Ecological Reserve. This preserve is owned by The Nature Conservancy (TNC) and CDFG, but is managed by TNC and Riverside County Park and Open Space District. In 1984, TNC of California purchased 3,100 acres of Santa Rosa Plateau lands in order to conserve the intense

²⁸² Considering the timing of conservation costs is unknown, the analysis assigns an equal probability to conservation costs being incurred in each year across the 20 year time frame of the analysis. Because the conservation costs are spread across the future years evenly, the annualized post-designation conservation costs are equal at three and seven percent discount rates.

concentration of unique and rare species supported on these lands, including vernal pool species.²⁸³ Additional lands were purchased by State and local governments and MWD in the late 1980s, for which TNC handled negotiations and provided closing costs. Since acquisition costs for the Reserve were incurred before the listing of the navarretia, these costs are not attributed to the navarretia.

Each entity purchased its own property on the Plateau, but the entire site, known as the Santa Rosa Plateau Ecological Reserve, is managed as one biological unit by TNC.²⁸⁴ According to the TNC resource manager at the Reserve, the total annual TNC budget for managing the 8,300 acres of biological resources at the Santa Rosa Plateau Ecological Reserve is \$200,000 (\$24/acre). Of the \$200,000 budget, an estimated \$20,000 annually is directly related to vernal pool management. This \$20,000 is used for such vernal pool management activities as fire management, trails, interpretive signs, and water quality monitoring. Volunteers provide weeding and interpretation services; the cost of their time is not included in this analysis. Although no more trail construction is currently planned, the resource manager believes that annual costs will remain steady since she anticipates an increased emphasis on public education, including additional brochures, programs, and interpretive signs.²⁸⁵ TNC plans to sell its Santa Rosa Plateau Ecological Reserve lands to CDFG, but it will use the income from the sale of the land to continue funding the management of the Reserve.

While TNC manages the biological resources at the Reserve, the Riverside County Park and Open Space District is responsible for visitor management and trails maintenance. The County employs a park interpreter and a reserve ranger full-time and two employees part-time, operates a visitor center, and maintains visitor trails and a ranger residence. The education program costs approximately \$90,000 a year. This includes salary for a full-time interpreter, part-time visitor center employee, and visitor center maintenance and utilities. An additional \$65,000 pays for the ranger salary, ranger residence maintenance, trail maintenance, fences, and signs. Starting in 2005, an additional part-time employee is assisting with maintenance at a cost of approximately \$15,000 per year. Total costs to the County are thus approximately \$170,000 (\$21/acre).

Additional costs at the Reserve associated with the navarretia are future land acquisition costs. According to the natural resources manager at the Reserve, TNC is planning to acquire seven lots in the southwest corner of Unit E6. The purchase of these seven lots, valued on average at \$550,000 each, would cost TNC \$3.85 million. The purpose of this acquisition is to protect the watershed of several of the vernal pools in the essential habitat unit.²⁸⁶ The acquisition of additional land may result in increased

²⁸³ Personal communication with Carole Bell, Santa Rosa Plateau Ecological Reserve, Resource Manager, April 12, 2005.

²⁸⁴ Santa Rosa Plateau Ecological Reserve, "Plateau History," <http://www.santarosaplateau.org/history.html>, accessed April 19, 2005.

²⁸⁵ Personal communication with Carole Bell, Santa Rosa Plateau Ecological Reserve, Resource Manager, April 12, 2005.

²⁸⁶ Ibid.

management costs and either increased visitor days to the Wildlife Area or increased benefit per visitor day. However, the magnitude of increased management costs and recreational benefit due to the prospective land purchase is unknown and is not captured in this analysis.

The acquisition of land at the Reserve would involve a voluntary transfer of property between willing sellers and TNC. By purchasing the land, TNC is implicitly valuing the conservation of the habitat at least as highly as the market price of the land. However, as discussed in Section 6.5.2, the market price of the land may be lower due to the presence of the navarretia and associated regulatory uncertainty or stigma, resulting in a welfare impact. As the presence or magnitude of a stigma effect is uncertain, this analysis does not quantify potential economic efficiency losses associated with TNC land acquisition.

Combined, annual costs to TNC and the County to manage the entire Reserve total approximately \$370,000 (\$45/acre). In undiscounted dollars, the post-designation costs total \$7.4 million, while in present value terms post-designation costs are \$3.9 million evaluated at a seven percent discount rate or \$5.5 million evaluated at a three percent discount rate. This cost is attributed to the conservation of the navarretia. This cost is an overstatement of the cost of management related to the navarretia since the Reserve provides habitat to 200 species of native birds and 49 endangered, threatened, or rare animals and plant species, including red-legged frogs, California newts, southwestern pond turtles, native wildflowers, mountain lions, as well as other vernal pool species such as the California Orcutt grass, the San Diego button celery, the thread-leaved broadiaea, and the Riverside fairy shrimp.²⁸⁷ Furthermore, navarretia essential habitat consists of just 3,760 acres of the 8,300 Reserve acres. Finally, according to the Reserve resource manager, the navarretia is present in only one of the thirteen vernal pools in the Reserve.²⁸⁸

The Santa Rosa Ecological Reserve provides recreational benefits to the more than 55,000 day-use visitors that travel to the Reserve annually for hiking, nature study, photography, horseback riding and mountain biking.²⁸⁹ The value of these recreational opportunities is estimated based on several recreational benefit studies. According to a Service study of net economic values for wildlife-related recreation, a conservative estimate of benefits to California wildlife viewers is \$26 per user day.²⁹⁰ Furthermore, a review of recreation studies compiled by the National Park Service found average net

²⁸⁷ Santa Rosa Plateau Ecological Reserve, "Plateau History," <http://www.santarosaplateau.org/history.html>, accessed April 19, 2005.

²⁸⁸ Personal communication with Carole Bell, Santa Rosa Plateau Ecological Reserve, Resource Manager, April 12, 2005.

²⁸⁹ Personal communication with Kevin Smith, Santa Rosa Plateau Ecological Reserve Ranger, May 31, 2005.

²⁹⁰ U.S. Fish and Wildlife Service, 2001, *Net Economic Values for Wildlife-Related Recreation in 2001: Addendum to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, Report 2001-3. The report estimates with a 95 certainty that benefit per visitor day for wildlife-viewing is between \$26 and \$59 (2005 dollars).

economic benefit per day of \$48 for hiking and \$31 for picnicking.²⁹¹ Applying a conservative estimate of \$25 of net economic benefit to each day use trip to the Reserve results in an estimated annual recreation benefit of \$1,375,000 (\$166/acre). Since the per acre recreational benefit (\$166) of the Reserve exceeds the per acre annual biological and visitor management costs (\$45), no management costs are attributed to the navarretia.²⁹²

Results from this analysis of costs and benefits of navarretia conservation in Unit E6 are presented in Table 42. No administrative cost is attributed to the conservation of the navarretia at Unit E6 since no section 7 consultations are expected on the Santa Rosa Plateau Ecological Reserve.

²⁹¹ Trails and Conservation Assistance, National Park Service. 1995. "Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors: A Resource Book." Fourth Edition, Revised. These estimates are average willingness to pay estimates derived from an analysis of numerous peer-reviewed publications on the value of outdoor recreation that used a variety of methods, including the travel cost method and the contingent valuation method. Although these estimate are average willingness to pay estimates and not net economic benefit estimates, since most individuals visiting the Reserve are local, average travel costs are expected to be minimal.

²⁹² This analysis varies from the similar analysis in section 6.5.2 regarding the San Jacinto Wildlife Area, but differs in that it is anticipated that the \$20,000 targeted annually towards vernal playa conservation does result in recreational benefits. According to the Reserve Ranger, the vernal pool areas are a focal point for many visitors. Therefore, recreational benefits are assumed to offset general management costs as well as vernal playa specific conservation measures.

Table 42
The Nature Conservancy Navarretia Conservation Costs on E6

Category	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
TNC Costs						
Fire Management	\$0	\$20,000	\$19,135	\$18,080	\$1,286	\$1,707
Trails	\$5,325	\$11,000	\$8,183	\$5,827	\$550	\$550
Water Quality Monitoring	\$9,681	\$20,000	\$14,877	\$10,594	\$1,000	\$1,000
Vernal Pool Public Education	\$48,407	\$100,000	\$74,387	\$52,970	\$5,000	\$5,000
General Vernal Pool Conservation	\$120,534	\$249,000	\$185,225	\$131,895	\$12,450	\$12,450
General Reserve Management	\$1,742,660	\$3,600,000	\$2,677,945	\$1,906,923	\$180,000	\$180,000
County Costs						
Education Program	\$1,500,624	\$1,800,000	\$1,338,973	\$953,461	\$90,000	\$90,000
Ranger and Maintenance	\$520,000	\$1,300,000	\$967,036	\$688,611	\$65,000	\$65,000
Maintenance Assistant	\$15,000	\$300,000	\$223,162	\$158,910	\$15,000	\$15,000
Total Management Costs	\$3,962,200	\$7,400,000	\$5,508,900	\$3,927,300	\$370,300	\$370,700
Recreational Benefits	-\$9,625,000	-\$27,500,000	-\$20,456,500	-\$14,566,800	-\$1,375,000	-\$1,375,000
Net Conservation Costs	\$0	\$0	\$0	\$0	\$0	\$0

Note: Numbers may not sum due to rounding.

6.6.2 TNC, WILDLIFE RESEARCH INSTITUTE, AND SAN DIEGO COUNTY, RAMONA GRASSLANDS PRESERVE (UNIT 4E)

The County of San Diego has partnered with The Nature Conservancy (TNC) and the Wildlife Research Institute (WRI) to protect and restore the Ramona Grasslands, which comprise a substantial portion of Unit 4E. Many listed species benefit from the conservation of the Ramona Grasslands, including San Jacinto Valley crowscale, San Diego fairy shrimp, Stephens' kangaroo rat, arroyo toad, and coastal California gnatcatcher. The area also provides habitat for bobcats, golden eagles, and neotropical songbirds.²⁹³

²⁹³ The Nature Conservancy, 2003, "Cagney Property," <http://nature.org/wherewework/northamerica/states/california/preserves/art10619.html>, accessed April 20, 2005; and The Nature Conservancy, 2005, "The Nature Conservancy Takes Another Step in Protecting San Diego County's Remaining Grasslands," http://nature.org/wherewework/northamerica/states/california/press/press_ramona.html, accessed April 20, 2005.

In 2003, TNC purchased 417 acres of the Ramon Grasslands for \$2.7 million. In 2004, TNC purchased another 230 acres for \$1.6 million.²⁹⁴ In 2005 dollars, the value of these purchases is approximately \$4.4 million. The parcel purchased in 2003 has approximately 20 acres of vernal pools, while the parcel purchased in 2004 also has several vernal pools.²⁹⁵ The County also purchased a 74-acre parcel in 2004; the cost of this land acquisition is estimated at approximately \$1 million.²⁹⁶ TNC and the County purchased these lands in order to protect the grassland habitat of many endangered plant and animal species and to connect other grassland areas to form wildlife corridors for migratory animals.²⁹⁷ The conservation of these lands also enhances water quality since the Santa Maria Creek flows through the area.²⁹⁸

TNC anticipates purchasing an additional 4,000 acres of buffering lands in the Ramona Grasslands over the next few years. The total cost of these acquisitions, located both in and around Unit 4E, is expected to be approximately \$27 million. It is unknown how many acres of these lands would provide habitat for the spreading navarretia. The county also anticipates acquiring an additional 500 acres, at an unknown cost.²⁹⁹ TNC and County past and future land acquisition costs are not included as costs in this analysis since land purchases in the Grasslands involve a voluntary transfer of property. (As discussed in Section 6.5.2, economic efficiency may be affected by such transfers if the market price is lower due to the presence of endangered species. This potential stigma effect is not included in this analysis.)

The Ramona Grasslands restoration project is funded by a State Water Resources Control Board Proposition 13 grant of \$1.5 million. The County of San Diego is utilizing this grant to acquire lands and to develop a biological management and monitoring plan.³⁰⁰ Restoring natural vegetation in the grasslands and reducing invasive species are among planned conservation efforts.³⁰¹ According to a San Diego County wildlife biologist, approximately \$200,000 of the monitoring and management plan development money is benefiting vernal pool habitat and species.³⁰² The biologist expects this money to be spent in the next few years. The Wildlife Research Institute (WRI) is involved in these conservation

²⁹⁴ Personal communication with Chris Basilevac, Project Manager, TNC, April 22, 2005.

²⁹⁵ Personal communication with Chris Basilevac, Project Manager, TNC, April 22, 2005.

²⁹⁶ Personal communication with Chris Basilevac, Project Manager, TNC, April 22, 2005.

²⁹⁷ Personal communication with Chris Basilevac, Project Manager, TNC, April 22, 2005.

²⁹⁸ Personal communication with Chris Basilevac, Project Manager, TNC, April 22, 2005.

²⁹⁹ Personal communication with Maeve Hanley, San Diego County Biologist, May 9, 2005.

³⁰⁰ San Diego County Parks and Recreation, "Ramona Grasslands and Santa Maria Creek," <http://www.sdcounty.ca.gov/parks/ramonagrass.html>, accessed April 20, 2005.

³⁰¹ San Diego County Parks and Recreation, *The Ramona Grasslands & Santa Maria Creek Protection and Restoration Project*, <http://www.sdcounty.ca.gov/parks/docs/RamonaGrasslands.pdf>, accessed April 20, 2005.

³⁰² Personal communication with Maeve Hanley, San Diego County Biologist, May 9, 2005.

efforts funded by the Proposition 13 grant. While TNC is currently devoting staff time to assist in the preparation of the management plan that is not funded by the Proposition 13 grant, TNC was unable to estimate these additional costs.³⁰³

As the North County Multiple Species Conservation Program (MSCP) is developed, annual monitoring objectives for the Ramona Grasslands will be identified and funding procured.³⁰⁴ Although the annual funding levels are not yet determined, the per acre monitoring budget for the San Diego County MSCP serves as a guideline. For the 85,000 acres managed by the County under the San Diego County MSCP, the County receives \$3.3 million annually for management and monitoring.³⁰⁵ The per acre cost of management and monitoring in the San Diego County MSCP is thus approximately \$39. Since the County anticipates acquiring the TNC lands in the near future, the County will likely be managing 721 acres (TNC lands plus current County lands) in addition to any future acquisitions. Applying this per acre cost to the 721 acres to be managed by San Diego County in the Ramona Grasslands, the annual management cost is projected at approximately \$28,100.

In addition to management costs, public education efforts are also associated with the Reserve. The WRI, founded in 1997, provides both an adult and a children's winter hawk watch program to the public. The adult program costs WRI \$23,500 annually, while the children's program costs \$25,800 annually. Since this program is un-related to vernal pools or vernal pool conservation, these costs are not included in this analysis. Additionally, it is expected that the estimated 1,350 people enjoying these programs annually³⁰⁶ receive wildlife viewing benefits that offset the costs.

WRI has also conducted general public education programs at the County Fair and at the Chamber of Commerce at a cost of \$17,000, of which \$10,000 is funded by the Proposition 13 grant.³⁰⁷ Therefore, this analysis incorporates an annual public education cost of \$7,000 (since Proposition 13 grant expenditures have already been accounted for in the plan development costs). The Preserve is currently too new to have developed trails or a visitor management program; however, the director of the research at WRI estimates that approximately 500 individuals attend seminars and other events at the WRI headquarters at the Preserve.³⁰⁸ As nature-related recreation is likely not the primary purpose of these visits, no offsetting benefits are estimated.

³⁰³ Personal communication with Chris Basilevac, Project Manager, TNC, April 22, 2005.

³⁰⁴ Personal communication with Maeve Hanley, San Diego County Biologist, May 9, 2005.

³⁰⁵ Personal communication with Maeve Hanley, San Diego County Biologist, May 9, 2005.

³⁰⁶ Personal communication with Dr. Jeff Lincer, Co-founder and Director of Research at WRI, May 31, 2005.

³⁰⁷ Personal communication with Dr. Jeff Lincer, Co-founder and Director of Research at WRI, May 31, 2005.

³⁰⁸ Personal communication with Dr. Jeff Lincer, Co-founder and Director of Research at WRI, May 31, 2005.

In summary, costs associated with vernal playa conservation in Unit 4E include a one-time cost of approximately \$200,000 to develop a monitoring and management plan, an annual cost of approximately \$28,000 to manage the Preserve, and approximately \$7,000 annually in public education. No land acquisition costs are included in this analysis as they are voluntary transfers of land. Furthermore, no administrative costs associated with section 7 consultations are projected in the Ramona Preserve.

Table 43
Conservation Costs in the Ramona Grasslands Preserve, Unit 4E

Category	Pre-Designation (Total)	Post-Designation (Total)			Post-Designation (Annualized) ³⁰⁹	
		Undiscounted	3%	7%	3%	7%
Monitoring and Management Plan	\$66,700	\$133,300	\$127,600	\$120,500	\$8,600	\$11,400
Preserve Management	\$0	\$505,800	\$364,300	\$246,900	\$24,500	\$23,300
Public Education	\$7,000	\$140,000	\$104,100	\$74,200	\$7,000	\$7,000
Total Costs	\$73,700	\$779,100	\$596,000	\$441,600	\$40,100	\$41,700

6.6.3 CENTER FOR NATURAL LANDS MANAGEMENT, SKUNK HOLLOW (UNIT E5)

The Center for Natural Lands Management manages a 138-acre preserve that was set aside by Rancho Bella Vista developers several years ago, after negotiations with the Service and CDFG.³¹⁰ This preserve is also part of the Barry Jones Wetlands Mitigation Bank.³¹¹ Several attempts to contact the Preserve manager to determine conservation costs were unsuccessful.³¹²

³⁰⁹ The annual undiscounted dollar costs vary during the post-designation period. The timeframe for developing the Preserve’s monitoring and management plan is 2005-2007, and this analysis spreads the costs equally during the three year period (i.e., approximately \$66,700 per year). Following the development of the monitoring and management plan in 2007, the estimated annual management costs (i.e., approximately \$28,000) recur every year from 2008-2025. Public education, the remaining cost, recurs annually at the same undiscounted dollar amount for the duration of the post-designation period. Because annual conservation costs during the post-designation period only vary during 2006 and 2007, the annualized costs are similar when discounted at three and seven percent discount rates.

³¹⁰ Downey, Dave, February 27, 2005, “Rain-filled Skunk Hollow May remain on display through summer,” *North County Times*, <http://www.nctimes.com/articles/2005/02/28/news/californian/22705194837.txt>, accessed April 19, 2005.

³¹¹ McCollum Associates, “Conservation Banks,” <http://www.mccollum.com/Mitbanks.htm>, accessed April 19, 2005.

³¹² Phone contact with Ed Stanton, Center for Natural Lands Management, was attempted on April 19, 2005 and April 21, 2005.

6.6.4 SWEETWATER AUTHORITY (UNITS 5A AND E9)

The Sweetwater Authority, a non-profit municipal water authority, owns lands proposed for navarretia critical habitat in Unit 5A and lands excluded from proposed critical habitat in Unit E9. According to the Authority's wildlife biologist, these lands were set aside by the Authority to protect the watershed, but are now also passively managed for habitat. The Authority has performed some reconnaissance and restoration of vernal pool habitat on its lands as mitigation for damage to San Diego fairy shrimp habitat. Additionally, the Authority has mitigated damage to Otay tarplant habitat elsewhere on its land. The vernal pool restoration occurred on 2.7 acres, while the Otay tarplant restoration occurred on 4.36 acres. For both species, the total cost of reconnaissance was \$232,000 and the total cost of monitoring was \$14,000.³¹³ Since the navarretia was not identified in the impacted habitat area, these costs are not associated with the navarretia.

Although the navarretia is a species identified in the Authority's draft NCCP, the Authority has not undertaken any actions in the past specifically to conserve the species and does not have any plans to do so in the future.³¹⁴ Thus, this report does not estimate any costs to the Sweetwater Authority associated with conserving the navarretia on its lands in Units 5A and E9.

6.7 COST OF HABITAT CONSERVATION PLANS

As described in Section 1.2.1, HCPs do not grant incidental take permits for plant species, however, if a listed plant occurs in an area subject to the HCP, the Service must consider whether the proposed activities may adversely affect or jeopardize the continued existence of the plant. While the navarretia will benefit from protective measures provided by approved and proposed HCPs in Riverside and San Diego counties (see Section 4.3), no information is available to allocate costs of developing the HCPs to the navarretia. While there is no clearly defined basis for allocating the costs, it is noted that the navarretia essential habitat comprises less than two percent of any HCP's project/planning area and less than seven percent of any HCP's conservation area. Navarretia-related HCP development efforts were likely a relatively minor component of the overall HCP development efforts, and thus a minor component of the total HCP development costs (see Table 44). Nevertheless, attributing no HCP development costs to the navarretia will understate the overall costs of navarretia conservation efforts.

While this analysis does not allocate the cost of HCP development to the navarretia, the following subsections summarize data and information pertaining to the timing, effort, and cost of developing the relevant HCPs.

³¹³ Personal communication with Pete Famolaro, Sweetwater Authority biologist, April 5, 2005.

³¹⁴ Personal communication with Pete Famolaro, Sweetwater Authority biologist, April 5, 2005.

Table 44
Planning Areas, Conservation Areas, and Essential Habitat, by HCP

	San Diego County MSCP Subregional Plan				MHCP Subregional Plan			MSHCP	North County MSCP
	MSCP	CSDSAP	CVSAP	SDCSAP	MHCP	HMP	CSMSAP		
Essential Habitat, Acres	5,215	3,881	235	1,100	304	143	161	20,986	25,66
Project/Planning Area, Acres	582,243	206,124	33,045	252,132	111,908	24,570	15,914	1,260,000	314,000
Percent Essential Habitat	0.9%	1.9%	0.7%	0.4%	0.3%	0.6%	1.0%	1.7%	0.9%
Conservation Area, Acres	172,000	56,831	9,243	101,268	20,593	6,400	3,534	500,000	148,000
Percent Essential Habitat	3.0%	6.8%	2.5%	1.1%	1.5%	2.2%	4.5%	4.2%	1.9%

6.7.1 COST OF THE SAN DIEGO COUNTY MSCP

Planning for the subregional MSCP began in 1991 and the plan was adopted in 1998, prior to the listing of the navarretia. As described by the City of San Diego, the MSCP provides conservation for 21 federally listed species and species proposed for Federal listing.³¹⁵ According to Keith Greer, Planning Director at the City of San Diego, the MSCP and the City of San Diego MSCP Subarea Plan (CSDSAP) were developed together at a cost of approximately \$6 million; costs were not accounted for separately.³¹⁶ The MSCP was completed in 1998, prior to the listing of the species in October 1998.

6.7.1.1 Cost of the City of San Diego MSCP Subarea Plan

The City of San Diego MSCP Subarea Plan (CSDSAP) was developed concurrently with the MSCP, although it was completed a year before the MSCP. As described in the Biological and Conference Opinion, the CSDSAP provides conservation for 28 federally listed species and species proposed for Federal listing.³¹⁷ As previously mentioned, the cost to create both the MSCP and CSDSAP was approximately \$6 million. The CSDSAP was completed in 1997, prior to the listing of the species in October 1998.

6.7.1.2 Cost of the City of Chula Vista MSCP Subarea Plan

Development of the City of Chula Vista MSCP Subarea Plan (CVSAP) began in 1994. The draft plan was completed during 1996 and the final plan was adopted in 2003.³¹⁸ As described in the Biological and Conference Opinion, the CVSAP provides conservation for 29 federally listed species and species proposed for Federal listing.³¹⁹ According to Marisa Lundstedt, Planning Director for the City of Chula Vista, the plan was developed at a cost of approximately \$1.2 million; developers paid approximately \$700,000 of the costs and the City incurred the remaining \$500,000.³²⁰

³¹⁵ The City of San Diego, Multiple Species Conservation Program (MSCP), Plan Summary, <http://www.sandiego.gov/mscp/plansum.shtml>.

³¹⁶ Personal communication with Keith Greer, Deputy Planning Director, City of San Diego, March 25, 2005.

³¹⁷ U.S. Fish and Wildlife Service, June 6, 1997, Biological and Conference Opinions on Issuance of Take Permit to the City of San Diego pursuant to the Multiple Species Conservation Program (1-6-97-FW-47).

³¹⁸ Personal communication with Josie Gabriel, Associate Planner, City of Chula Vista, April 22, 2005.

³¹⁹ U.S. Fish and Wildlife Service, July 18, 2003, Biological and Conference Opinions on Issuance of Take Permit to the City of Chula Vista pursuant to the Multiple Species Conservation Program, San Diego County, California (FWS-SDG-882.1).

³²⁰ Personal communication with Marisa Lundstedt, Planning Director, City of Chula Vista, March 28, 2005.

A portion of the development costs were incurred prior to the listing of the species in October 1998. Assuming an equal distribution of the development costs annually during the nine year development period (\$133,000 per year) \$667,000 of the development costs were incurred during the pre-designation period. The remaining \$533,000 in development costs were incurred prior to the listing of the species in October 1998.

6.7.1.3 Cost of the San Diego County MSCP Subarea Plan

The San Diego County MSCP Subarea Plan (SDCSAP) was adopted in March 1998, prior to the listing of the navarretia. As described in the Biological and Conference Opinion, SDCSAP provides conservation for 85 species, including 28 federally listed species and species proposed for Federal listing.³²¹ According to Jeremy Buegge, Director of Planning and Land Use, MSCP Division of San Diego County, the plan was developed at a cost of approximately \$736,000.³²² In completing its subarea plan, the County was able to use the Environmental Impact Statement (EIS) completed for the MSCP. Funding was contributed by the CDFG, the Service, the Farm Bureau, and various stakeholders. However, the SDCSAP was completed prior to the listing of the species in October 1998.

6.7.2 COST OF THE SAN DIEGO COUNTY MHCP

Planning on San Diego County's second subregional HCP began in 1992 and was completed in 2003. As described in the Public Review Draft MHCP Plan, Volume I, the MHCP provides conservation for 51 species, including 20 federally listed species.³²³ According to Janet Fairbanks, MHCP Program Manager at SANDAG, the MHCP was developed at a cost of approximately \$2 million.³²⁴

A portion of the development costs were incurred prior to the listing of the species in October 1998. Assuming an equal distribution of the development costs annually during the 11 year development period (\$182,000 per year), \$910,000 of the development costs were incurred during the pre-designation period. The remaining \$1,090,000 in development costs were incurred prior to the listing of the species in October 1998.

³²¹ U.S. Fish and Wildlife Service, March 12, 1998, Biological and Conference Opinions on Issuance of an Incidental Take Permit to the County of San Diego under the Multiple Species Conservation Program for their Subarea Plan (1-6-98-FW-03).

³²² Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, March 30, 2005.

³²³ Multiple Habitat Conservation Program, Public Review Draft MHCP Plan, November 2000.

³²⁴ Personal communication with Janet Fairbanks, MHCP Project Manager, San Diego Association of Governments, March 16, 2005.

6.7.2.1 Cost of the City of Carlsbad MHCP Subarea Plan

The City of Carlsbad MHCP Subarea Plan (HMP) was the first of the subregional MHCP jurisdictions to be approved. Planning on the HMP began in 1992 and was completed in 2004. As described in the Biological and Conference Opinion, the HMP provides conservation for 43 species, including 18 federally listed species.³²⁵ According to Don Rideout, Management Analyst for the City of Carlsbad, HMP was developed at a cost of approximately \$1.0 million.³²⁶ In completing its subarea plan, the City was able to use the EIS completed for the MHCP. Moreover, the costs do not include staff time, only consultant and contract fees.

A portion of the development costs were incurred prior to the listing of the species in October 1998. Assuming an equal distribution of the development costs annually during the 12 year development period (\$831,000 per year), \$500,000 of the development costs were incurred during the pre-designation period. The remaining \$500,000 in development costs were incurred prior to the listing of the species in October 1998.

6.7.2.2 Cost of the City of San Marcos Subarea Plan

The City of San Marcos MHCP Subarea Plan (CSMSAP) is being developed and it is unclear when the work began or when permitting can be expected. According to Jerry Backoff, Planning Director for the City of San Marcos, approximately \$200,000 will be needed to complete the plan (these costs do not include staff time)³²⁷ and the plan is about one-third complete.³²⁸ Based on the preceding information, the cost to develop the CSMSAP is estimated at approximately \$300,000.

While it is unclear when planning commenced, this analysis assumes that one-third of the cost occurs pre-designation (\$100,000) and the remaining two-thirds (\$200,000) post-designation. According to the City's draft conservation plan, the subarea plan will cover seven federally listed species, however, the covered species list does not include navarretia.³²⁹

³²⁵ U.S. Fish and Wildlife Service, November 9, 2004, Subregional Multiple Habitat Conservation Plan and the City of Carlsbad Subarea Plan/Habitat Management Plan, San Diego County, California (FWS-SDG-87.4).

³²⁶ Personal communication with Don Rideout, Management Analyst, City of Carlsbad, March 29, 2005.

³²⁷ Personal communication with Jerry Backoff, Planning Director, City of San Marcos, March 23, 2005.

³²⁸ Personal communication with David Acuff, Biologist, City of San Marcos, March 31, 2005.

³²⁹ "Natural Community Conservation Plan for the City of San Marcos," Section 1.1, May 2001, available at http://www.sandag.cog.ca.us/whats_new/publications/environmental/mhcp_sanmarcos_toc.pdf.

6.7.3 COST OF THE WESTERN RIVERSIDE COUNTY MSHCP

Planning for the subregional MSHCP began in 1999 and the plan was adopted in 2003. As described in the Biological and Conference Opinion, the MSHCP provides conservation for 146 species, including 25 federally listed species.³³⁰ According to Ellen Showalter Laney, Riverside County, the MSHCP was developed at a cost in excess of \$11 million.³³¹ All of the development costs were incurred during the pre-designation period (1998-2005).

6.7.4 COST OF THE NORTH COUNTY MSCP

SANDAG began developing the North County MSCP as a subarea plan under the subregional MHCP in 1992. Subsequently, the County of San Diego took over development of the HCP and is now developing it as a separate subregional MSCP. The North County MSCP will provide conservation for 58 species, including 40 federally listed species.³³² According to Jeremy Buegge, Director of Planning and Land Use, MSCP Division of San Diego County, the Service and CDFG each provided a \$400,000 grant to fund the plan, and the County may be required to match the grants.³³³ Regardless, the North County MSCP is assumed to cost approximately \$1.6 million to develop.

At this time, the North County MSCP is at least one year away from being permitted. This analysis assumes that the grants provided by the Service and CDFG and 75 percent of the matching funding from the County were applied during the pre-designation period (\$1,400,000), and that 25 percent of the County's matching funding (\$200,000) will be incurred during the post-designation period.

6.8 EFFECTS ON AGRICULTURE

Agricultural lands currently comprise approximately one-third of all navarretia essential habitat; of 31,086 acres of essential habitat, 10,300 acres are currently classified agricultural. However, the cost of navarretia conservation on agriculture producers is expected to be minimal as HCPs (the subregional MSCP, MHCP, and MSHCP) overlap with much of the agricultural lands in the navarretia essential habitat, and the HCPs generally do not impose new restrictions on agricultural operations over and above

³³⁰ U.S. Fish and Wildlife Service, July 22, 2004, Intra-Service Formal Section 7 Consultation/Conference for Issuance of an Endangered Species Act Section 10(a)(1)(B) Permit (TE-088609-0) for the Western Riverside County Multiple Species Habitat Conservation Plan, Riverside County, California (FWS-WRIV-870.19).

³³¹ Personal communication with Ellen Showalter Laney, Riverside County, July 2004.

³³² Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, April 29, 2005.

³³³ Personal communication with Jeremy Buegge, Director of Planning and Land Use, MSCP Division, County of San Diego, April 1, 2005.

those already in place under existing regulations.³³⁴ The HCPs indicate that regulations pertaining to agricultural pesticide use will continue to be regulated by the Federal and State Environmental Protection Agencies, and enforced by local agricultural commissioners. Additionally, runoff from existing agricultural lands is not likely to result in substantial adverse impacts to navarretia habitat since agricultural operations are required to have in place a Best Management Plan to manage and control the amount and concentration of runoff.

Future agricultural development through expansion or conversion of vacant land into agricultural production is unlikely within the essential habitat area. Except for Riverside County, agricultural acreage has declined in recent years, and land use projections in the essential habitat areas indicate that agricultural acreage will continue to decline in San Diego and Los Angeles counties over the next 20 years.

In San Diego County, land in farms decreased by 23 percent and the number of farms declined 16 percent from 1987 to 2002.³³⁵ Moreover, of the 2,400 acres of agricultural land within navarretia essential habitat inside San Diego County (as of 2003), SANDAG forecasts that just 300 acres will remain in agriculture in 2030.³³⁶ Agricultural acreage has also declined in Los Angeles County, where land in farms decreased 60 percent and the number of farms declined 24 percent from 1987 to 2002.³³⁷ Furthermore, only 110 acres of the 595 acres of essential habitat within Los Angeles County is agricultural land (as of 2000), and the County forecast indicates that this acreage will either remain in agriculture or be developed into residential or industrial properties by 2025.³³⁸

³³⁴ County of San Diego, 1998, "Final Multiple Species Conservation Program Plan," p. 6-3; San Diego Association of Governments, 2003, "Volume 1 Final MHCP Plan," County of San Diego, p. 6-2; Riverside County Integrated Project, 2003, "MSHCP Final Documents: Volume 1 – The Plan," Riverside County, p. 6-56.

³³⁵ USDA National Agricultural Statistics Service (NASS), "2002 Census of Agriculture," http://www.nass.usda.gov/census/census02/volume1/ca/st06_2_008_008.pdf, accessed March 2005; USDA NASS, "1997 Census of Agriculture: Farms and Land in Farms," <http://www.nass.usda.gov/census/census97/county/farms/cafarms.xls>, accessed March 2005.

³³⁶ San Diego Association of Governments, Planned Land Use, http://www.sandag.cog.ca.us/resources/maps_and_gis/gis_downloads/land.asp.

³³⁷ USDA National Agricultural Statistics Service (NASS), "2002 Census of Agriculture," http://www.nass.usda.gov/census/census02/volume1/ca/st06_2_008_008.pdf, accessed March 2005; USDA NASS, "1997 Census of Agriculture: Farms and Land in Farms," <http://www.nass.usda.gov/census/census97/county/farms/cafarms.xls>, accessed March 2005.

³³⁸ Personal communication with Chris Morneua, Department of Regional Planning, GIS Section, Los Angeles County, April 11, 2005.

While agricultural land in Riverside County increased by 16 percent from 1987 to 2002,³³⁹ it is expected that development pressure and the rising opportunity cost of land will preclude further agriculture expansion within the essential habitat. Furthermore, from existing land use data, it appears that the land suitable for agriculture within the essential habitat is already under agricultural production.³⁴⁰ Thus, although county-level agricultural indicators do not allow for a clear assumption about future agricultural development in Riverside County, existing land use and economic conditions suggest that it is unlikely that agriculture will continue to expand in Riverside County.

6.9 FIRE MANAGEMENT

Fire management activities were identified by the Service in the proposed rule as potentially threatening to navarretia. Clearing brush and flammable vegetation within prescribed distances of homes is vital for reducing risks to human safety and property in California, but is not necessarily conducive to the protection of endangered plant species. In response to this, a MOU among the San Diego County Fire Chief's Association, CDFG, California Department of Forestry, and the Fire Districts Association of San Diego County was drafted in 1996 to assess potential impacts of existing fire management practices on 35 federally listed species, including navarretia, covered under the MSCP and MHCP in San Diego County.³⁴¹

California State Assembly Bill 337, the Bates Bill of 1992, requires that all new development "address fire protection issues within the footprint of the development."³⁴² Section 51182 of AB 337 requires a minimum fire break of 30 feet away from structures (not property lines) and as wide as 100 feet if the 30 foot break is not deemed sufficient by local fire departments, although the habitat of endangered or threatened species is exempt from such requirements under Section 51184.³⁴³ In general, the MSCP and MHCP (approved subregional HCPs in San Diego County) indicate that fire management activities should continue to be carried out in a manner that protects human lives and property and that provides for

³³⁹ USDA National Agricultural Statistics Service (NASS), "2002 Census of Agriculture," http://www.nass.usda.gov/census/census02/volume1/ca/st06_2_008_008.pdf, accessed March 2005; USDA NASS, "1997 Census of Agriculture: Farms and Land in Farms," <http://www.nass.usda.gov/census/census97/county/farms/cafarms.xls>, accessed March 2005.

³⁴⁰ Southern California Association of Governments, Regional Land Use - 2000, www.scag.ca.gov.

³⁴¹ U.S. Fish and Wildlife Service, 1996, "Intra-Service Section 7 Consultation on Fish and Wildlife Service Participation in a Memorandum of Understanding with the San Diego County Fire Chief's Association Addressing Flammable Vegetation Abatement in San Diego County."

³⁴² U.S. Fish and Wildlife Service, 1996, "Intra-Service Section 7 Consultation on Fish and Wildlife Service Participation in a Memorandum of Understanding with the San Diego County Fire Chief's Association Addressing Flammable Vegetation Abatement in San Diego County."

³⁴³ U.S. Fish and Wildlife Service, 1996, "Intra-Service Section 7 Consultation on Fish and Wildlife Service Participation in a Memorandum of Understanding with the San Diego County Fire Chief's Association Addressing Flammable Vegetation Abatement in San Diego County."

the conservation of biological resources.³⁴⁴ The MSHCP (approved subregional HCP in Riverside County) also provides direction on fire management activities in essential habitat stating “the risks of uncontrolled wildfire in proximity to developed areas must be a primary consideration” and any activities undertaken “must consider both biological resource needs and public health and safety considerations.”³⁴⁵

Seasonally flooded vernal playa does not generally present a fire hazard as it is very low growing and wet.³⁴⁶ Therefore, it is unlikely that development will be adversely impacted by increased restrictions on fire breaks to protect navarretia over and above the requirements of Assembly Bill 337 regarding addressing fire protection within the footprint of the development (i.e., that fire breaks begin from the building and not the property line). This analysis assumes that developers can alter or cluster the units of proposed development around any required break or set back such that they do not lose units and revenues. However, direct and opportunity costs associated with alteration of fire management methods such that they aptly consider biological resources may exist.

The Service’s BO outlines guidelines for minimizing impacts of existing fire management practices on the habitat of endangered plant species. Guideline (5) indicates that entry into vernal pool and riparian habitat to undertake management activities should be avoided using the “best available habitat mapping” and that hand clearing should be utilized within 30 feet of a vernal pool, which is “currently practiced by most fire departments.”³⁴⁷ Guideline (6) pertains to narrow endemic species and indicates the landowner work with CDFG and the Service to minimize impacts of vegetation abatement activities to narrow endemics where narrow endemic species are present in the vicinity of abatement activities.

Developers may have to resort to hand clearing in the areas of sensitive vegetation, as opposed to discing, slashing, burning, crushing, or plowing, or avoid fire management activities altogether (to the extent that county regulations allow). While the no action alternative would result in cost savings, hand clearing is more time and labor intensive and higher costs may be borne by developers. However, these types of fire management activities are not evident in the historic section 7 consultation record. The effort and cost involved with hand clearing areas of sensitive habitat are likely minimal and have not been developed for this report.

³⁴⁴ San Diego Association of Governments, 2003, *Multiple Habitat Conservation Program, Volume 1 – Final*, Section 6.3.4 “Fire Management”; and San Diego County, 1998, *Multiple Species Conservation Program (MSCP), Final*, Section 6.3.4 “Fire Management.”

³⁴⁵ Riverside County, 2003, *Riverside County Integrated Project Multiple Species Habitat Conservation Plan (MSHCP) Volume 1 – The Plan*, Section 5.0, “Management & Monitoring.”

³⁴⁶ Personal communication with Service Biologist, Carlsbad Fish and Wildlife Office, May 11, 2005.

³⁴⁷ U.S. Fish and Wildlife Service, 1996, “Intra-Service Section 7 Consultation on Fish and Wildlife Service Participation in a Memorandum of Understanding with the San Diego County Fire Chief’s Association Addressing Flammable Vegetation Abatement in San Diego County.”

7.1 SUMMARY OF FINDINGS

This section provides a summary of the economic effects of conservation efforts attributable to both the listing of the navarretia under the Act and other protective measures triggered by the listing from the time the species was listed in October 1998 until the expected date of final critical habitat designation in October 2005 (pre-designation), and economic effects of conservation activities estimated to occur following the designation of critical habitat, including costs related to the both the listing and designation of critical habitat for 20 years following the expected date of final critical habitat designation (post-designation). All costs are presented in 2005 dollars. Total post-designation costs are presented in undiscounted dollars and with a three percent and seven percent discount rate. Annualized post-designation costs are also presented using three percent and seven percent discount rates. The analysis measures effects on residential, commercial, and industrial development, flood control facilities, water service pipelines, public lands management, and transportation.

Table 45 provides a summary of the economic impacts due to navarretia conservation efforts in essential habitat for each of the activities analyzed. Pre-designation costs total \$7.9 million, with development bearing \$2.9 million of the costs. The remainder of the pre-designation costs is split among water pipelines, public land management, transportation, and flood control. Post-designation costs are estimated to total \$96.0 to \$256.0 million in undiscounted dollars, or \$69.9 to \$186.2 million and \$48.6 to \$129.0 million in present value terms using a discount rate of three percent and seven percent, respectively. Annualized costs are estimated to range from \$4.7 to \$12.5 million and \$4.6 to \$12.2 million, also at three and seven percent, respectively.

The annualized costs at discount rates of three and seven percent are similar, and the similarity is a function of (1) the unknown timing of many of the projects or activities, and (2) recurring equal undiscounted dollar costs for projects or activities during the post-designation period. When the timing of a project or activity is unknown or uncertain, the costs are assumed to have a uniform probability of occurrence across the future years. As such, the annualized post-designation costs at three and seven percent discount rates are equal for that particular project or activity. Similarly, with an undiscounted recurring cost during the forecast period, the annualized post-designation costs for that particular project or activity is equal regardless of discount rate. In this analysis, many of the conservation costs consist of projects and activities of unknown timing, or with recurring undiscounted dollar costs during the post-designation period. Thus, the annualized costs at three and seven percent discount rates are similar. Costs and timing for each project and activity analyzed in this report are discussed in Sections 5.0 and 6.0. Those projects and activities that contribute to similar annualized costs are summarized below:

- Pre-Designation Development Projects: The annual conservation costs for one project are equal during the post-designation period (i.e., \$7,640 in annual monitoring, maintenance, and operating costs during the post-designation period).
- Post-Designation Development Projects: The annual conservation costs, a function of the number of acres developed to low-, medium-, and high-density residential, commercial, and industrial land classes, vary with the forecasted annual population growth rate for the three counties during the post-designation period. The forecasted development and conservation costs vary by year, but not significantly, resulting in similar annualized costs when discounted at three and seven percent.
- Transportation Projects: Thirteen road and railway projects are expected during the 2006 to 2009 period; the timing for six projects is known and the timing of the remaining seven projects is unknown. Likewise, the timing of the 52 projects forecast during the 2010-2025 period is also unknown. The analysis assigns an equal probability of occurrence to conservation costs being incurred in each year within respective timeframes (i.e., 2006-2009 or 2010-2025) for those projects with unknown timing.
- San Jacinto Valley Flood Control Project: The timing of the project is unknown, and the analysis assigns an equal probability of occurrence across the 20 year time frame to project modification costs.
- MCAS Miramar: The annualized post-designation conservation costs are similar at three and seven percent because many of the conservation activities recur annually at the same undiscounted dollar amount for the duration of the post-designation period (i.e., overhead, exotic plant control, staff training, GIS equipment/maintenance, and vernal pool management).
- San Jacinto Valley Wildlife Area: The timing of conservation costs is unknown, and the analysis assigns an equal probability of occurrence to conservation costs being incurred in each year across the 20 year time frame of the analysis.
- Ramona Grasslands Preserve: The timeframe for developing the Preserve's monitoring and management plan is 2005-2007, and this analysis spreads the costs equally during the three year period, or \$66,700 per year. Following the developing of the monitoring and management plan in 2007, estimated annual management costs (i.e., approximately \$28,000) recur every year from 2008-2025. Public education, the remaining cost, recurs annually at the same undiscounted dollar amount for the duration of the post-designation period. Because annual conservation costs during the post-designation period only vary during the first two years of the forecast period, 2006 and 2007, the annualized costs are similar when discounted at three and seven percent discount rates.
- Administrative Cost of Section 7 Consultation: The timing of many of the forecasted section 7 consultations is unknown and the analysis assigns a uniform probability across the 20 year time frame to administrative consultation costs being incurred for these consultations.

Table 45
Summary of Administrative and Conservation Costs for Navarretia by Activity^{a/}

Category of Impact	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (2006-2025)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Development	\$2,863,800	\$50,340,100 - \$140,321,200	\$36,041,200 - \$100,220,200	\$24,479,500 - \$67,852,100	\$2,422,500 - \$6,736,300	\$2,310,700 - \$6,404,700
Flood Control	\$213,200	\$20,032,300 - \$90,032,300	\$14,902,000 - \$66,973,000	\$10,611,100 - \$47,690,100	\$1,001,600 - \$4,501,600	\$1,001,600 - \$4,501,600
Pipelines	\$2,328,100	\$0	\$0	\$0	\$0	\$0
Public Lands	\$2,287,500 - \$2,300,800	\$5,747,900 - \$5,781,200	\$4,338,100 - \$4,362,900	\$3,121,100 - \$3,138,800	\$291,600 - \$293,300	\$294,600 - \$296,200
Transportation	\$238,700	\$19,873,100	\$14,641,400	\$10,346,000	\$984,900	\$977,000
Total Essential Habitat	\$7,931,300 - \$7,944,600	\$95,993,300 - \$256,007,800	\$69,922,800 - \$186,197,500	\$48,557,800 - \$129,027,100	\$4,700,600 - \$12,516,100	\$4,583,900 - \$12,179,700

a/ Table 44 and Table 45 include both the administrative costs (provided in Table 46) and the conservation costs (provided in Table 47). Note: Numbers may not sum due to rounding.

Table 46 provides a summary of the economic impacts due to navarretia conservation measures by habitat unit, or subunit, where so delineated. The costs include all of the categories of impacts shown in Table 45. Pre-designation costs range from \$0 in 24 of the 36 units, to \$2.6 million in Unit E2. Among the three units with pre-designation costs in excess of \$1 million, two are excluded and one is “not included.” Among the units that are proposed for critical habitat, only one (Unit 4E) exceeds \$100,000 in pre-designation costs. More than 70 percent of the post-designation costs in the proposed critical habitat units are also concentrated in Unit 4E, with approximately 70 to 85 percent of the costs in the Unit resulting from impacts to land development.³⁴⁸ Post-designation costs in excluded units are highest in Units E1, E2, E17, E19, and E20. These costs are associated primarily with land development, flood control, and transportation.

³⁴⁸ Post-designation percentages are calculated using undiscounted dollar costs.

Table 46
Summary of Administrative and Conservation Costs for Navarretia by Unit^{a/}

Habitat Unit	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (1998-2005)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
1A	\$0 - \$13,300	\$1,042,300 - \$5,102,500	\$737,100 - \$3,646,600	\$490,600 - \$2,467,100	\$49,600 - \$245,100	\$46,400 - \$233,000
1B	\$0	\$206,200 - \$997,500	\$149,300 - \$738,000	\$102,500 - \$521,700	\$10,000 - \$49,600	\$9,600 - \$49,200
2	\$0	\$746,600 - \$1,831,500	\$534,500 - \$1,319,100	\$362,100 - \$901,500	\$36,000 - \$88,700	\$34,200 - \$85,100
3	\$0	\$2,211,200 - \$4,449,600	\$1,633,100 - \$3,241,200	\$1,156,000 - \$2,251,900	\$109,700 - \$217,800	\$109,100 - \$212,600
4A	\$0	\$137,500 - \$228,200	\$115,300 - \$181,000	\$95,700 - \$141,100	\$7,700 - \$12,200	\$9,100 - \$13,300
4B	\$0	\$344,500 - \$737,200	\$261,500 - \$542,200	\$193,000 - \$383,100	\$17,600 - \$36,500	\$18,300 - \$36,200
4C	\$0	\$931,200 - \$2,166,300	\$672,900 - \$1,547,000	\$464,000 - \$1,048,000	\$45,300 - \$104,000	\$43,800 - \$98,900
4D	\$0	\$73,900	\$69,600	\$64,700	\$4,700	\$6,100
4E	\$212,400	\$21,354,900 - \$48,062,900	\$14,949,000 - \$33,549,200	\$9,833,600 - \$22,001,700	\$1,004,800 - \$2,255,000	\$928,200 - \$2,076,800
5A	\$0	\$433,900 - \$771,300	\$350,200 - \$601,200	\$278,400 - \$457,200	\$23,500 - \$40,400	\$26,200 - \$43,100
5B	\$0	\$1,102,700 - \$2,393,000	\$810,400 - \$1,770,200	\$568,100 - \$1,251,500	\$54,500 - \$119,000	\$53,700 - \$118,200
5C	\$0	\$488,700 - \$1,067,300	\$359,400 - \$789,800	\$252,200 - \$558,700	\$24,200 - \$53,100	\$23,800 - \$52,700
5D	\$20,000	\$59,100	\$56,000	\$52,300	\$3,700	\$5,000
Proposed Critical Habitat	\$232,400 - \$245,700	\$29,126,200 - \$67,933,800	\$20,692,000 - \$48,044,800	\$13,907,200 - \$32,094,500	\$1,390,900 - \$3,229,400	\$1,312,900 - \$3,029,600
E1	\$912,000	\$21,591,300 - \$93,524,200	\$16,078,100 - \$69,599,900	\$11,465,300 - \$49,589,600	\$1,080,600 - \$4,678,100	\$1,082,200 - \$4,680,900
E2	\$2,637,800	\$7,516,700 - \$14,875,200	\$5,717,100 - \$11,240,300	\$4,196,000 - \$8,175,600	\$384,400 - \$755,700	\$396,100 - \$771,800
E3	\$0	\$958,600 - \$1,778,900	\$755,200 - \$1,370,900	\$578,600 - \$1,022,200	\$50,900 - \$92,200	\$54,600 - \$96,400
E4	\$0	\$60,900 - \$147,100	\$44,800 - \$109,500	\$31,400 - \$78,100	\$3,000 - \$7,300	\$3,000 - \$7,400

Habitat Unit	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (1998-2005)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
E5	\$0	\$243,600 - \$467,600	\$180,100 - \$348,200	\$127,200 - \$248,300	\$12,100 - \$23,400	\$12,000 - \$23,400
E6	\$0	\$74,100 - \$172,000	\$54,700 - \$128,200	\$38,500 - \$91,500	\$3,600 - \$8,600	\$3,700 - \$8,700
E8	\$0	\$295,300	\$267,800	\$237,100	\$18,000	\$22,400
E9	\$0	\$546,300 - \$1,020,000	\$433,000 - \$785,400	\$336,400 - \$587,300	\$29,100 - \$52,800	\$31,700 - \$55,400
E10	\$0	\$135,500 - \$332,400	\$99,200 - \$245,700	\$69,200 - \$173,500	\$6,800 - \$16,600	\$6,600 - \$16,400
E11	\$0	\$725,300 - \$1,571,500	\$532,800 - \$1,162,200	\$373,400 - \$821,600	\$35,800 - \$78,100	\$35,200 - \$77,500
E13	\$0	\$687,300 - \$1,689,700	\$503,100 - \$1,248,800	\$350,600 - \$881,600	\$33,900 - \$84,000	\$33,000 - \$83,100
E16	\$0	\$313,700 - \$758,700	\$229,300 - \$560,300	\$159,500 - \$395,300	\$15,400 - \$37,700	\$15,000 - \$37,300
E17	\$20,000	\$8,148,000 - \$17,634,200	\$5,998,800 - \$13,055,400	\$4,215,600 - \$9,240,500	\$403,300 - \$877,600	\$397,900 - \$872,200
E18	\$20,000	\$3,150,100 - \$7,628,100	\$2,133,700 - \$5,118,900	\$1,345,700 - \$3,187,100	\$143,300 - \$344,000	\$127,100 - \$300,900
E19	\$1,147,600	\$10,229,900 - \$24,532,500	\$7,332,100 - \$17,545,300	\$4,988,700 - \$11,897,200	\$492,800 - \$1,179,300	\$470,800 - \$1,122,900
E20	\$20,000	\$6,373,900 - \$15,521,500	\$4,389,800 - \$10,656,800	\$2,824,600 - \$6,832,500	\$295,100 - \$716,300	\$266,600 - \$644,900
Excluded Habitat	\$4,757,400	\$61,050,500 - \$181,948,900	\$44,749,600 - \$133,443,600	\$31,337,800 - \$93,459,000	\$3,008,100 - \$8,969,700	\$2,957,900 - \$8,821,600
NI1	\$220,800	\$876,800 - \$1,009,300	\$704,800 - \$801,900	\$550,100 - \$618,100	\$47,300 - \$53,900	\$52,000 - \$58,400
NI2	\$1,983,800	\$4,452,600	\$3,353,500	\$2,401,300	\$225,400	\$226,600
NI3	\$9,200	\$440,300 - \$616,100	\$379,000 - \$509,800	\$320,800 - \$414,000	\$25,500 - \$34,300	\$30,200 - \$39,000
Not Included Habitat	\$2,213,800	\$5,769,700 - \$6,078,000	\$4,437,300 - \$4,665,200	\$3,272,200 - \$3,433,400	\$298,200 - \$313,600	\$308,800 - \$324,000
Unallocated ^{b/}	\$727,600	\$40,400	\$37,600	\$34,500	\$2,500	\$3,300
Total Essential Habitat	\$7,931,300 - \$7,944,600	\$95,993,300 - \$256,007,800	\$69,922,800 - \$186,197,500	\$48,557,800 - \$129,027,100	\$4,700,600 - \$12,516,100	\$4,583,900 - \$12,179,700

a/ Table 44 and Table 45 include both the administrative costs (provided in Table 46) and the conservation costs (Provided in Table 47).

b/ Clayton Ranch is residential development project by Lennar/U.S. Home located outside the bounds of the essential habitat. Formal consultation with the Service on the project occurred in 2004, the company incurred conservation costs for the navarretia in 2004 and 2005, and navarretia-related conservation efforts are expected to continue from 2006 through 2013.

Note: Numbers may not sum due to rounding. Units with zero costs are not shown.

7.1.1 LANDOWNER AND AGENCY COSTS

Table 47 provides a summary of conservation costs by category of landowner. The landowner types that are relevant in this analysis include private, State of California, Federal agencies, non-profit organizations, and local government (cities and counties). Pre-designation conservation costs total \$7.7 million, with private entities and local and Federal governments each bearing about 30 to 35 percent of the conservation costs. Pre-designation costs for private entities are related to land development and occur primarily in Units E2 and E19, which are excluded from the proposed designation. Pre-designation costs for local governments are also concentrated in Unit E2, as well as Unit E1, and are associated with water supply pipelines. The Federal government's pre-designation costs occur at MCAS Miramar, in Units NI1, NI2, and NI3, which are not included in the proposed designation.

**Table 47
Summary of Conservation Costs by Landowner**

Landowner	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (2006-2025)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Federal Government	\$2,213,800	\$4,532,000	\$3,385,100	\$2,423,800	\$227,500	\$228,800
Local Government	\$2,543,300	\$20,639,100 - \$90,639,100	\$15,369,900 - \$67,440,900	\$10,961,400 - \$48,040,400	\$1,033,100 - \$4,533,100	\$1,034,700 - \$4,534,700
Non-Profit	\$7,000	\$140,000	\$104,100	\$74,200	\$7,000	\$7,000
Private	\$2,685,600	\$49,857,500 - \$139,838,600	\$35,682,200 - \$99,861,200	\$24,223,900 - \$67,596,500	\$2,398,400 - \$6,712,200	\$2,286,600 - \$6,380,600
State Government	\$206,400 - \$219,700	\$17,733,700 - \$17,767,000	\$12,919,700 - \$12,944,500	\$9,001,100 - \$9,018,800	\$868,800 - \$870,500	\$849,800 - \$851,500
Total Essential Habitat	\$7,656,100 - \$7,669,400	\$92,902,300 - \$252,916,800	\$67,461,100 - \$183,735,800	\$46,684,400 - \$127,153,700	\$4,534,800 - \$12,350,300	\$4,406,800 - \$12,0029,600

Note: Numbers may not sum due to rounding.

Post-designation conservation costs are concentrated largely on privately owned lands, which account for more than half the costs. These costs are the result of conservation efforts associated with land development. Local governments bear the next greatest percentage of forecast costs, about 20 to 35 percent; the San Jacinto Valley Flood Control Project in Unit E1 comprises most of these costs. The state

of California bears another 10 to 20 percent of the post-designation costs, primarily related to transportation projects. The remaining landowners and managers, non-profits and the Federal government, together represent less than five percent of post-designation costs.

Table 48 provides a summary of administrative costs that occurred (pre-designation) or are anticipated to occur (post-designation) associated with section 7 consultations and the essential habitat area. Approximately \$275,000 will have been spent on the administrative section 7 consultation process prior to designation, with action agencies incurring more than 70 percent of these administrative costs. Following designation, it is anticipated that \$3.1 million will be spent on the administrative section 7 consultation process in undiscounted dollars, or \$2.5 million and \$1.9 million in present value terms using a discount rate of three percent and seven percent, respectively. Annualized administrative section 7 costs are estimated at \$165,800 and \$177,100, also at three and seven percent, respectively. Action agencies will bear approximately 75 percent of these administrative costs.

Table 48
Summary of Administrative Costs by Agency

Agency	Pre-Designation (Total) (1998-2005)	Post-Designation (Total) (2006-2025)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Action Agency	\$197,800	\$2,328,400	\$1,856,500	\$1,410,400	\$125,100	\$133,300
Service	\$43,300	\$450,100	\$357,600	\$273,000	\$24,000	\$25,700
Third Party	\$34,000	\$312,500	\$247,600	\$190,000	\$16,700	\$18,000
Total Essential Habitat	\$275,200	\$3,091,000	\$2,461,700	\$1,873,400	\$165,800	\$177,100

Note: Numbers may not sum due to rounding.

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5 U.S.C. § 601 *et seq.*

5 U.S.C. § 605(b)

16 U.S.C. 670a.

16 U.S.C. § 1532.

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APPENDIX A: ECONOMIC EFFECTS TO SMALL ENTITIES AND ENERGY

This appendix contains an examination of the extent to which the analytic results presented in the main report reflect impacts to small entities. The analysis of the effect on small entities is conducted pursuant to the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. The appendix also contains an analysis of the effects of the rulemaking on energy markets, as required by Executive Order No. 13211.

POTENTIAL EFFECTS ON SMALL ENTITIES

Under the RFA (as amended by SBREFA), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities. However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.³⁴⁹ SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

To assist in this process, the following represents a screening level analysis of the potential effects of conservation efforts for the navarretia on small entities due to the rulemaking. This analysis is intended to facilitate determination of (1) whether this CHD potentially affects a “substantial number” of small entities in counties and/or supporting critical habitat areas; and (2) the probable number of small entities that are likely to experience a “significant effect.” While some of the essential habitat in Riverside and San Diego counties is excluded from or not included in the proposed designation of critical habitat for the navarretia, the small business analysis presents the results for entire essential habitat area (i.e., Riverside, San Diego, and Los Angeles counties).

DEFINITION OF SMALL ENTITIES

Small entities include small businesses, small organizations, or small governments, as defined by the U.S. Small Business Administration (SBA). Size standards for small businesses are established for different types of economic activity or industry within the North American Industry Classification System (NAICS), and are commonly expressed in terms of the number of employees or annual receipts. For most industries, the size standard is based upon annual revenue for the business. The revenue standard varies from \$750,000 for agriculture to \$28.5 million for general and heavy construction. The size standard is based on number of employees for two industry types: manufacturing (500 employees) and wholesale

³⁴⁹ Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for “significant impact” *and* a threshold for a “substantial number of small entities.” See 5 U.S.C. § 605(b).

trade (100 employees). The SBA publishes a table of current small business size standards on their website (www.sba.gov/size).³⁵⁰ These size standards were most recently published by the SBA in “Table of Small Business Size Standards Matched to North American Industry Classification System Codes,” effective January 28, 2004.³⁵¹ Small organizations are defined as “any non-profit enterprise ... which is independently owned and operated and not dominant in its field.”³⁵² These may include organizations such as irrigation districts, water associations, public utilities, or agricultural co-ops. A small government is defined as any government serving populations of 50,000 or less, and might include county, city, town, or school district governments.

Federal courts have held that an RFA analysis should be limited to impacts on entities subject to the requirements of the regulation (i.e., participants in the section 7 consultation process).³⁵³ These entities include participants in the section 7 consultation process, but not entities suffering the downstream effects of consultation outcomes. In spite of these rulings, in its guidance to Federal agencies on conducting screening analyses, the SBA recommends considering impacts to entities that may be indirectly affected by the proposed regulation.³⁵⁴

IDENTIFICATION OF ACTIVITIES THAT MAY INVOLVE SMALL ENTITIES

The analysis in the main report determined that costs involving conservation measures for the navarretia would be incurred for activities involving residential, commercial, and industrial development, water supply, flood control, transportation, and the management of military bases, other Federal lands, and other public or conservation lands. This section considers the extent to which the costs presented in the main report reflect impacts to small entities.

Residential, Commercial, and Industrial Development

CHD is expected to result in additional costs to real estate development projects due to mitigation and other conservation costs that may be required. The affected land is located within Riverside, San Diego, and Los Angeles counties (although the proposed designation is contained in only Los Angeles and San Diego counties) and under private ownership by individuals who will either undertake a development project on their own or sell the land to developers for development. For businesses involved with land

³⁵⁰ U.S. Small Business Administration, “Table of Small Business Size Standards Matched to North American Industry Classification System Codes,” January 28, 2004, <http://www.sba.gov/size/indexableofsize.html>.

³⁵¹ This table and other information on size standards are available from <http://www.sba.gov/size>.

³⁵² 5 U.S.C. § 601 *et seq.*

³⁵³ U.S. Small Business Administration, Office of Advocacy, May 2003, “A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act,” pp. 69-70.

³⁵⁴ U.S. Small Business Administration, Office of Advocacy, May 2003, “A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act.”

development, the relevant threshold for “small” is annual revenues of \$6 million or less.³⁵⁵ The North American Industry Classification System (NAICS) code 237210 is comprised of establishments primarily engaged in servicing land (e.g., excavation, installing roads and utilities) and subdividing real property into lots for subsequent sale to builders. Land subdivision precedes actual construction, and typically includes residential properties, but may also include industrial and commercial properties.

It is likely that development companies, the entities directly impacted by the regulation, would not bear the additional cost of navarretia conservation (approximately \$2.3 to \$6.7 million annualized) within the essential habitat, but pass these costs to the landowner through a lower land purchase price. Considering approximately 65 percent of the developable land within the essential habitat is classified as agriculture land, it is likely that farmers will bear some of the costs. The remaining 35 percent of the potentially developable land is privately owned and classified as vacant. To comply with the SBA recommendation that Federal agencies consider impacts to entities that may be indirectly affected by the proposed regulation, this screening level analysis presents information on land subdivision and farming businesses for Riverside, San Diego, and Los Angeles counties as these are the businesses that would likely be impacted directly or indirectly by the regulation (see Table A-1). As highlighted in Table A-1, the majority of the land subdivision and farming businesses within the counties are considered small businesses.

It is important to note that the identity and number of land subdivision and farming businesses impacted by the CHD is not known. In addition, the identity and number of affected businesses classified as “small” is also not known. Nevertheless, the county-level information provided in Table A-1 reflects the smallest region for which data relevant to this analysis exist. This clearly over represents the potential number of small businesses impacted by development-related navarretia conservation efforts as the privately owned developable land within the essential habitat (approximately 15,084 acres) comprises less than two-tenths of one percent of the land area in the counties (9,908,520 acres³⁵⁶), and only 2,969 acres of this private land is forecasted to be developed between 2006 and 2025.

The effects on small businesses in the land development sector would be concentrated in San Diego County, where more than 65 percent of the development (primarily within Units 4E, E19, E20, and E17) is expected to take place. Within the proposed critical habitat designation, the effects on small businesses in the land development sector would be concentrated in Ramona, where approximately 30 percent of the development in the proposed critical habitat designation is forecast to take place (Unit 4E).

³⁵⁵ U.S. Small Business Administration, “Table of Small Business Size Standards Matched to North American Industry Classification System Codes,” January 28, 2004, p. 4.

³⁵⁶ Riverside County’s land area is 7,207 square miles, or 4,612,480 acres, San Diego County’s land area is 4,200 square miles, or 2,688,000 acres, and Los Angeles County’s land area is 4,061 square miles, or 2,599,040 acres. Source: U.S. Census Bureau, State and County Quickfacts. Available at: <http://quickfacts.census.gov/qfd/states/06000.html>

**Table A-1
Profile of Potentially Affected Land Subdivision and Farming Businesses in Riverside,
San Diego, and Los Angeles Counties**

Business Type	Land Subdivision Businesses NAICS 237210			Farming Businesses NAICS 111 (Crops) & NAICS 112 (Animals)		
	Riverside	San Diego	Los Angeles	Riverside	San Diego	Los Angeles
Total number of businesses	475 ^{a/}	1,100 ^{a/}	3,045 ^{a/}	3,186 ^{b/}	5,255 ^{b/}	1,543 ^{b/}
Threshold for small ^{c/}	< \$6 million in sales			< \$750,000 in sales		
Number of small businesses	441 ^{a/}	1,039 ^{a/}	2,903 ^{a/}	2,896 ^{d/}	4,982 ^{d/}	1,454 ^{d/}

a/ Dun and Bradstreet, March 2005, accessed through a Dialog search of File 516, Dun and Bradstreet, "Dun's Market Identifiers."

b/ U.S. Department of Agriculture, National Agriculture Statistics Service, "Table 2 Market Value of Agriculture Products Sold Including Direct and Organic: 2000 and 1997, 2002 Census of Agriculture, June 2004."

c/ U.S. Small Business Administration, "Table of Small Business Size Standards Matched to North American Industry Classification System Codes, January 28, 2004."

d/ The 2002 Agriculture Census reports the number of farms at the county level by categories of income. While the largest income category for which data is reported, sales of "\$500,000 or more," exceeds the SBA threshold for a small business (i.e., \$750,000), the number of farms at the county level with annual income less than \$500,000 is presented as the number of "small businesses" in this analysis as this data is the most accurate information available.

While the identity and number of land subdivision and farming business impacted by the CHD is not known, this analysis relates the economic impacts to real estate prices in the three counties that encompass the essential habitat (see Table A-2). Navarretia-related conservation efforts are expected to cost between \$390 and \$11,300 per residential dwelling unit developed, \$0.81 to \$5.90 per square foot of commercial property developed, and \$0.53 to \$3.82 per square foot of industrial property developed, depending on residential dwelling unit density, lot coverage (i.e., the percent of the lot developed), and conservation and mitigation activities required. The median sales price for single family residences in the counties ranged from \$315,000 to \$460,000 in 2004,³⁵⁷ and the weighted average sales price of commercial and industrial properties in 2004 ranged from \$130 to \$293 and \$50 to \$180 per square foot, respectively. Thus, the economic impacts of navarretia conservation to the development industry are equal to 0.1 percent to 2.9 percent of the 2004 median price of a single family residence, 0.4 percent to 4.5 percent of the 2004 weighted average sales price of commercial property, and 0.4 percent to 5.4

³⁵⁷ "SOUTHERN CALIFORNIA HOME SALE ACTIVITY, L.A. Times Sunday Edition Charts – Data for the Year 2004." Available at DataQuick Real Estate News, <http://www.dqnews.com/ZIPLAT2004.shtm>

percent of the 2004 weighted average sales price of industrial property. These costs may be borne by the developer or passed on to the landowner through a lower land purchase price.

**Table A-2
Economic Impacts in Terms of Real Estate Prices in Los Angeles, Riverside, and San Diego Counties**

Development Type	RL	RM	RH	C	I
Dwelling units (du)/acre	5	10	20		
Square feet (sf)/acre				9,583 ^{a/}	14,810 ^{a/}
LOS ANGELES COUNTY					
Development Type	RL	RM	RH	C	I
Forecast acres of development	28.3	0	0	0	70.7
Conservation \$/acre – low	\$7,800	\$7,800	\$7,800	\$7,800	\$7,800
Conservation \$/acre – high	\$56,500	\$56,500	\$56,500	\$56,500	\$56,500
Conservation \$/unit – low	\$1,560/du	\$780/du	\$390/du	\$0.81/sf	\$0.53/sf
Conservation \$/unit – high	\$11,300/du	\$5,650/du	\$2,825/du	\$5.90/sf	\$3.82/sf
Unit sales price, 2004 – low	\$395,000/du ^{b/}	\$395,000/du ^{b/}	\$395,000/du ^{b/}	\$130/sf ^{c/}	\$72/sf ^{c/}
Unit sales price, 2004 – high	\$395,000/du ^{b/}	\$395,000/du ^{b/}	\$395,000/du ^{b/}	\$200/sf ^{c/}	\$130/sf ^{c/}
Conservation cost as a percent of unit sales price, 2004 – low	0.4%	0.2%	0.1%	0.4%	0.4%
Conservation cost as a percent of unit sales price, 2004 - high	2.9%	1.4%	0.7%	4.5%	5.3%
RIVERSIDE COUNTY					
Development Type	RL	RM	RH	C	I
Forecast acres of development	99.8	0	98.3	165.9	39.1
Conservation \$/acre – low	\$16,055	\$18,370	\$24,980	\$13,420	\$13,420
Conservation \$/acre – high	\$42,155	\$44,470	\$51,080	\$39,520	\$39,520
Conservation \$/unit – low	\$3,211/du	\$1,837/du	\$1,249/du	\$1.40/sf	\$0.91/sf
Conservation \$/unit – high	\$8,431/du	\$4,447/du	\$2,554/du	\$4.12/sf	\$2.67/sf
Unit sales price, 2004 – low	\$315,000/du ^{b/}	\$315,000/du ^{b/}	\$315,000/du ^{b/}	\$145/sf ^{c/}	\$50/sf ^{c/}
Unit sales price, 2004 – high	\$315,000/du ^{b/}	\$315,000/du ^{b/}	\$315,000/du ^{b/}	\$185/sf ^{c/}	\$100/sf ^{c/}
Conservation cost as a percent of unit sales price, 2004 - low	1.0%	0.6%	0.4%	0.8%	0.9%
Conservation cost as a percent of unit sales price, 2004 - high	2.7%	1.4%	0.8%	2.8%	5.3%
SAN DIEGO COUNTY					
Development Type	RL	RM	RH	C	I
Forecast acres of development	1,096.4	202.2	200.6	381.6	586.5

Conservation \$/acre – low	\$15,600	\$15,600	\$15,600	\$15,600	\$15,600
Conservation \$/acre – high	\$56,500	\$56,500	\$56,500	\$56,500	\$56,500
Conservation \$/unit – low	\$3,120/du	\$1,560/du	\$780/du	\$1.63/sf	\$1.05/sf
Conservation \$/unit – high	\$11,300/du	\$5,650/du	\$2,825/du	\$5.90/sf	\$3.82/sf
Unit sales price, 2004 – low	\$460,000/du ^{b/}	\$460,000/du ^{b/}	\$460,000/du ^{b/}	\$181/sf ^{c/}	\$71/sf ^{c/}
Unit sales price, 2004 – high	\$460,000/du ^{b/}	\$460,000/du ^{b/}	\$460,000/du ^{b/}	\$293/sf ^{c/}	\$180/sf ^{c/}
Conservation cost as a percent of unit sales price, 2004 - low	0.7%	0.3%	0.2%	0.6%	0.6%
Conservation cost as a percent of unit sales price, 2004 - high	2.5%	1.2%	0.6%	3.3%	5.4%

a/ Assumes 22 percent lot coverage for commercial development and 34 percent lot coverage for industrial development. This coverage represents standard single-story development as described in the “City of Cathedral [Riverside County] City Comprehensive General Plan,” July 31, 2003.

b/ Median residential sales price for Los Angeles, Riverside, and San Diego counties, 2004, “SOUTHERN CALIFORNIA HOME SALE ACTIVITY, L.A. Times Sunday Edition Charts – Data for the Year 2004.” Available at DataQuick Real Estate News, <http://www.dqnews.com/ZIPLAT2004.shtm>.

c/ Society of Industrial and Office Realtors, 2005, “Comparative Statistics of Industrial & Office Real Estate Markets.” Sales price (\$/square foot) for industrial and office property for the Los Angeles – San Fernando Valley (includes the entire San Fernando Valley and the suburban portion of north Los Angeles County), Inland Empire (San Bernardino and Riverside counties), and San Diego.

Flood Control Agencies and Water Districts

It is expected that the Riverside County Flood Control and Water Conservation District (RCFC) will re-initiate the San Jacinto River Flood Control Project, along with the County of Riverside, the California Department of Fish and Game (CDFG), and the City of Perris. In addition, Metropolitan Water District (MWD) is expected to construct a new water pipeline (i.e., San Diego Pipeline Number 6) in Riverside County. Both the RCFC and MWD serve a large population and are not considered further in this analysis.

Transportation

Effects on transportation include costs of conservation efforts associated with road projects, railway projects, and airports. The conservation costs would likely be incurred by California Department of Transportation (Cal Trans), North San Diego Transit District, Los Angeles–San Diego Rail Corridor Agency, Riverside County Transportation Commission, County of San Diego Public Works, or San Diego Association of Governments (SANDAG). These public entities exceed the criteria (service population of 50,000 or less) for “small entities” and are not considered further in this analysis.

Non-Private Land Owners and Managers

Land within the essential habitat is owned or managed by various non-private entities. The Service manages the San Diego Wildlife Refuge; CDFG, The Nature Conservancy (TNC), and Riverside County Park and Open Space District own or manage the Santa Rosa Plateau Ecological Reserve; CDFG owns and manages the San Jacinto Wildlife Area; TNC owns the Ramona Grassland Preserve; Sweetwater Authority owns essential habitat in San Diego County; and the Department of Defense (DOD) manages MCB Camp Pendleton and MCAS Miramar. These entities either exceed the criteria (service population of 50,000 or less) for “small entities” (e.g., the Service or DOD), or are not expected to incur navarretia-related conservation costs (e.g., Sweetwater Authority). In the case of TNC, this organization does not qualify as a “small entity” as it is a non-profit organization dominant in its field. Therefore, these non-private entities are not considered further in this analysis.

Other Small Entities

The boundaries of 12 city governments are either adjacent to or bisect the essential habitat: Moreno Valley (population 142,381), Perris (population 36,189), Lakeview (population 1,619), Nuevo (population 4,135), Winchester (population 2,155), Hemet (population 58,812), Temecula (population 57,716), San Marcos (population 54,977), Carlsbad (population 78,247), Ramona (population 15,691), San Diego (population 1,223,400) and Chula Vista (population 173,556).³⁵⁸ Moreno Valley, Hemet, Temecula, San Marcos, Carlsbad, San Diego, and Chula Vista exceed the criteria (service population of 50,000 or less) for “small entity.”

There is no record of consultation between the Service and the five remaining “small” governments, the City of Perris, Lakeview, Nuevo, Winchester, and Ramona, since the navarretia was listed in 1998. Indeed, it is not likely that these cities would be involved in a land development project involving a section 7 consultation, although a city may be involved in land use planning or permitting, and may play a role as an interested party in infrastructure projects (such as the City of Perris with the San Jacinto River Flood Control Project). Any cost associated with this activity/involvement is anticipated to be a very small portion of the city’s budget.

POTENTIAL EFFECTS ON ENERGY SUPPLY

Executive Order (EO) No. 13211, “Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001 requires Federal agencies to submit a “Statement of Energy Effects” for all “significant energy actions” in order to present consideration of the impacts of a

³⁵⁸ Geographic Data Technology, Inc. (GDT), Department of Commerce, Census Bureau, Geography Division, and ESRI, 20040301, U.S. Populated Place Areas: ESRI ® Data & Maps 2004, ESRI, Redlands, California, USA.

regulation on the supply, distribution, and use of energy.³⁵⁹ Significant adverse effects are defined in the EO by the OMB according to the following criteria:

1. Reductions in crude oil supply in excess of 10,000 barrels per day;
2. Reductions in fuel production in excess of 4,000 barrels per day;
3. Reductions in coal production in excess of five million tons per year;
4. Reductions in natural gas production in excess of 25 million mcf (one thousand cubic feet) per year;
5. Reductions in electricity production in excess of one billion kilowatt-hours (kWh) per year or in excess of 500 megawatts of installed capacity;
6. Increases in energy use required by the regulatory action that exceed any of the thresholds above;
7. Increases in the cost of energy production in excess of one percent;
8. Increases in the cost of energy distribution in excess of one percent; or
9. Other similarly adverse outcomes.

The CHD is expected to have minimal impacts on the energy industry. There is a very small likelihood of energy-related impacts occurring in essential habitat of the size established by the criteria. Utility corridors already exist in the essential habitat, and regulatory cost evidence does not exist to suggest that any project modifications were part of section 7 consultations.

³⁵⁹ Daniels, Mitchel E., July 13, 2001, "Memorandum for Heads of Executive Departments and Agencies, and Independent Regulatory Agencies," M-01-27, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>.

COSTS OF DEVELOPMENT RESTRICTIONS

When development is prohibited in certain areas as a result of species conservation, it may reduce the value of the affected land. This reduction in property value represents a cost to landowners. There are two classes of models that economists use to evaluate such costs. One is the “closed city model” and the other is the “open city model.” The closed city model assumes that the number of households in a city is fixed and migration does not occur when economic conditions change in the city. The open city model assumes that the number of households in a city is determined in a multi-city equilibrium. Therefore, households are free to move from one city to another, and will choose their residential place to maximize their utility. Given that housing markets in U.S. cities feature a large volume of in- and out-migration, the open city model seems to provide a more accurate and realistic description of the development process in the southern California counties examined in this analysis. Based on this premise and technical reviewers’ comments on previous analyses of CHD, the open city model is judged to be appropriate to measure the cost associated with land use restrictions, should such restrictions arise with conservation efforts for the species. In these assessments of CHD, household and landowner decisions are modeled by expanding the stochastic city model developed by Capazza and Helsley (1990). To provide an overview of how this type of model can be implemented in the case of an effect on land values, the following description of key relationships is provided. As in Capazza and Helsley (1990), it is assumed that there is an identifiable Central Business District (CBD), to which all households commute daily. Locations are indexed by their distance from the CBD (z).

In a competitive market, the price of land equals the expected present value of future land rents. Specifically, the price of agricultural land at a given location equals the present value of agricultural rent up to the time of conversion plus the present value of urban rent from the time of conversion onward. Assuming that landowners choose the conversion time to maximize the expected value of land, the price of agricultural land can be derived as (Capozza and Helsley 1990):

$$(A1) \quad P^a(t, z) = \frac{R_a}{r} + \frac{g}{r^2} e^{-\alpha(z^* - z)} + \frac{r - \alpha g}{\alpha r^2} e^{-\alpha(z^* - z)}$$

R_a = the rent of agricultural land

r = the discount rate

g = income growth rate

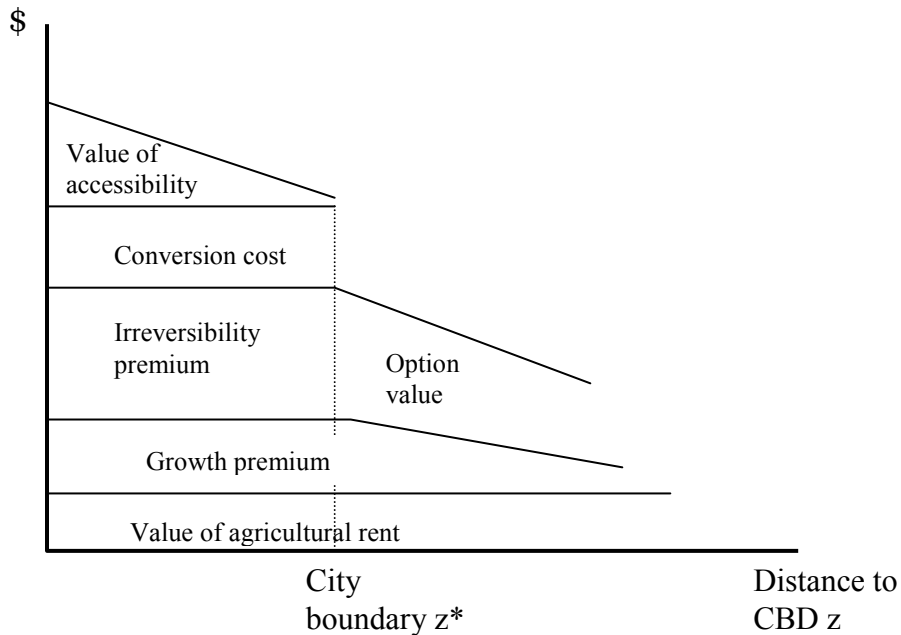
z^* = the distance from the city boundary to the city center

The price of agricultural land has three components: (1) the value of agricultural rents, (2) growth premium, and (3) option value of potential development. Both the growth premium and the option value decrease as the distance from the boundary of the urban area increases and the time of development moves further into the future. The price of urban land can be derived as:

$$(A2) \quad P^u(t, z) = \frac{1}{r} \left\{ R_a + rC + \frac{g}{r} + \frac{r - \alpha g}{\alpha r} + \frac{z^*(t) - z}{(1 + \tau_t)} \right\}$$

In this formula, C is the capital cost of converting a of land to urban use. The price of urban land consists of the value of agricultural rents, the cost of conversion, the growth premium, the irreversibility premium, and the value of accessibility. Graphically, the prices of urban and agricultural land are illustrated as follows in Figure B-1:

Figure B-1
Graphical Representation of the Components of Land Price (Value)



Consider the cost of land use restrictions due to a CHD to landowners in the following scenarios:

- A piece of agricultural land is prohibited from being farmed or developed in the future. The cost to the landowner is given by (A1).
- A piece of agricultural land is prohibited from being developed in the future, but can be farmed. The cost to landowner in this case is given by:

$$\left[P^a(t, z) - \frac{A}{r} \right] = \frac{g}{r^2} e^{-\alpha(z^* - z)} + \frac{r - \alpha g}{\alpha r^2} e^{-\alpha(z^* - z)}$$

- c) A piece of urban land is prohibited from being farmed or developed. The cost to landowner is given by (A2).

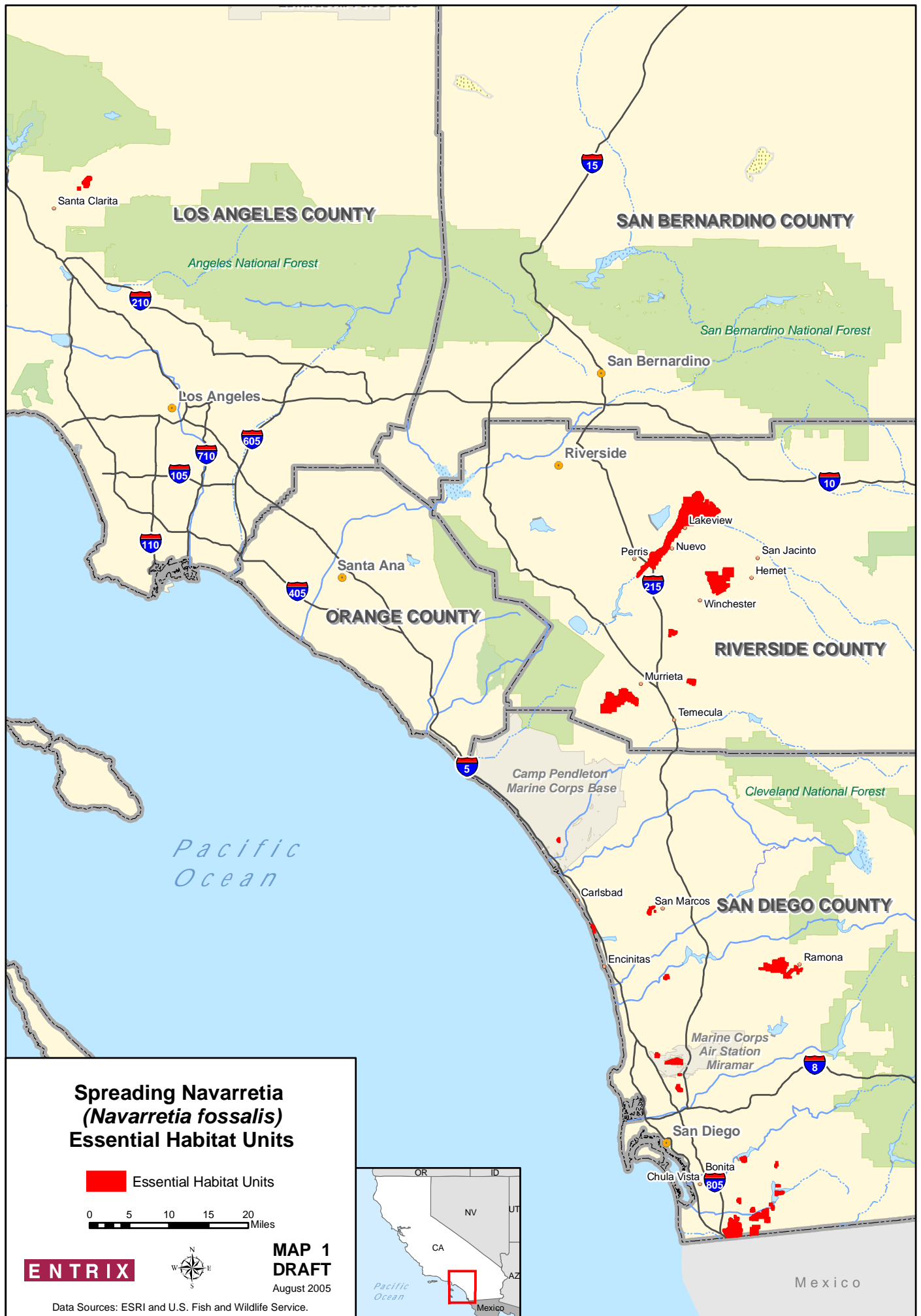
**APPENDIX C:
LIST OF ACRONYMS**

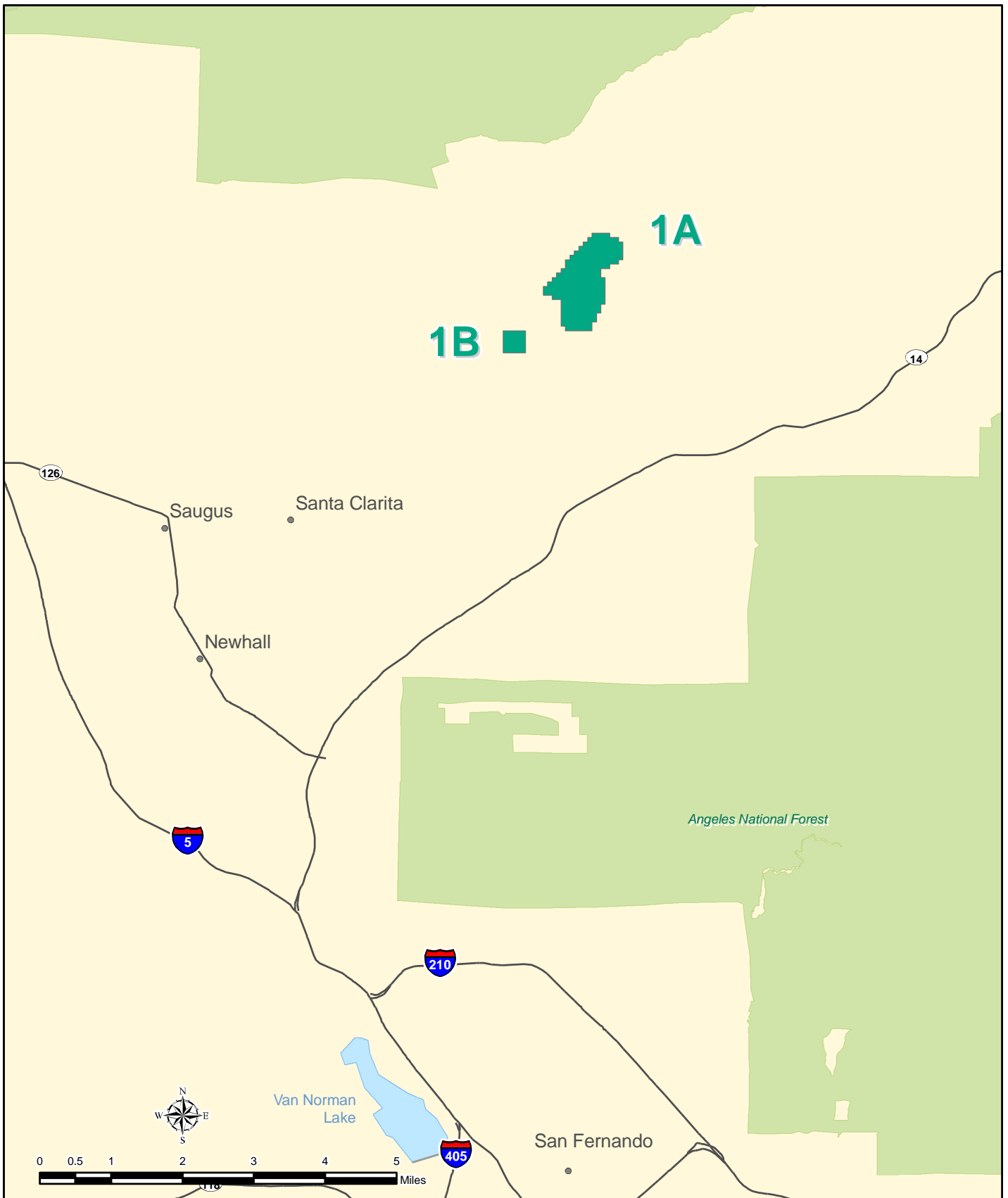
BA	Biological Assessment
BMO	Biological Mitigation Ordinance
BMP	Best Management Practice
BO	Biological Opinion
C	Commercial
CBD	Central Business District
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CETAP	Community and Environmental Transportation Acceptability Process
cfs	Cubic Feet Per Second
CHD	Critical Habitat Designation
CHU	Critical Habitat Unit
CIS	Citizenship and Immigration Services
CNDDDB	California Natural Diversity Database
CSDSAP	City of San Diego MSCP Subarea Plan
CSMSAP	City of San Marcos MHCP Subarea Plan
CVSAP	City of Chula Vista MSCP Subarea Plan
CWA	Clean Water Act
DOD	Department of Defense
du	Dwelling Unit
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency

FPA	Focused Planning Areas
GIS	Geographical Information System
GSA	General Services Administration
HCP	Habitat Conservation Plan
HMP	Habitat Management Plan
HOV	High Occupancy Vehicle
I	Industrial
kWh	Kilowatt-hour
INRMP	Integrated Natural Resource Management Plan
LOSSAN	Los Angeles-San Diego Rail Corridor Agency
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
mcf	One-Thousand Cubic Feet
MHCP	Multiple Habitat Conservation Program
MHPA	Multiple Habitat Planning Area
MOU	Memorandum of Understanding
MSHCP	Western Riverside County Multiple Species Habitat Conservation Plan
MSCP	Multiple Species Conservation Program
MWD	Metropolitan Water District
NAICS	North American Industry Classification System
NCCP	Natural Community Conservation Plan
NCTD	North San Diego County Transit District
NEPA	National Environmental Policy Act
NEPSSA	Narrow Endemic Plant Species Survey Areas
NPDES	National Pollutant Discharge Elimination System
OMB	Office of Management and Budget
RCA	Regional Conservation Authority

RCFC	Riverside County Flood Control and Water Conservation District
RCIP	Riverside County Integrated Project
RCTC	Riverside County Transportation Commission
RFA	Regulatory Flexibility Act
RH	High-Density Residential
RL	Low-Density Residential
RM	Medium-Density Residential
SANDAG	San Diego Association of Governments
SBA	Small Business Administration
SBREFA	Small Business Regulatory Enforcement Fairness Act
SCAG	Southern California Association of Governments
SDCSAP	San Diego County MSCP Subarea Plan
sf	Square feet
SWANCC	Solid Waste Agency of Northern Cook County
TNC	The Nature Conservancy
USBR	U.S. Bureau of Reclamation
USACE	U.S. Army Corps of Engineers
WRI	Wildlife Research Institute
WRP	Wetlands Recovery Project

- MAP 1: SPREADING NAVARRETIA (*NAVARRETIA FOSSALIS*) ESSENTIAL HABITAT UNITS**
- MAP 2: SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS OF LOS ANGELES COUNTY**
- MAP 3: SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS OF RIVERSIDE COUNTY**
- MAP 4: SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS OF NORTHERN SAN DIEGO COUNTY**
- MAP 5: SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS OF SOUTHERN SAN DIEGO COUNTY**
- MAP 6: SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS OF SOUTHERN SAN DIEGO COUNTY**
- MAP 7: SUBREGIONAL HABITAT CONSERVATION PLANS AND SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS IN SAN DIEGO COUNTY**
- MAP 8: SUBAREA PLANS WITHIN THE SAN DIEGO COUNTY MSCP SUBREGIONAL PLAN AND SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS**
- MAP 9: SUBAREA PLANS WITHIN THE SAN DIEGO COUNTY MHCP SUBREGIONAL PLAN AND SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS**
- MAP 10: SUBREGIONAL HABITAT CONSERVATION PLANS AND SPREADING NAVARRETIA ESSENTIAL HABITAT UNITS IN RIVERSIDE COUNTY**





Spreading Navarretia Essential Habitat Units of Los Angeles County

Habitat Unit Boundaries and Status

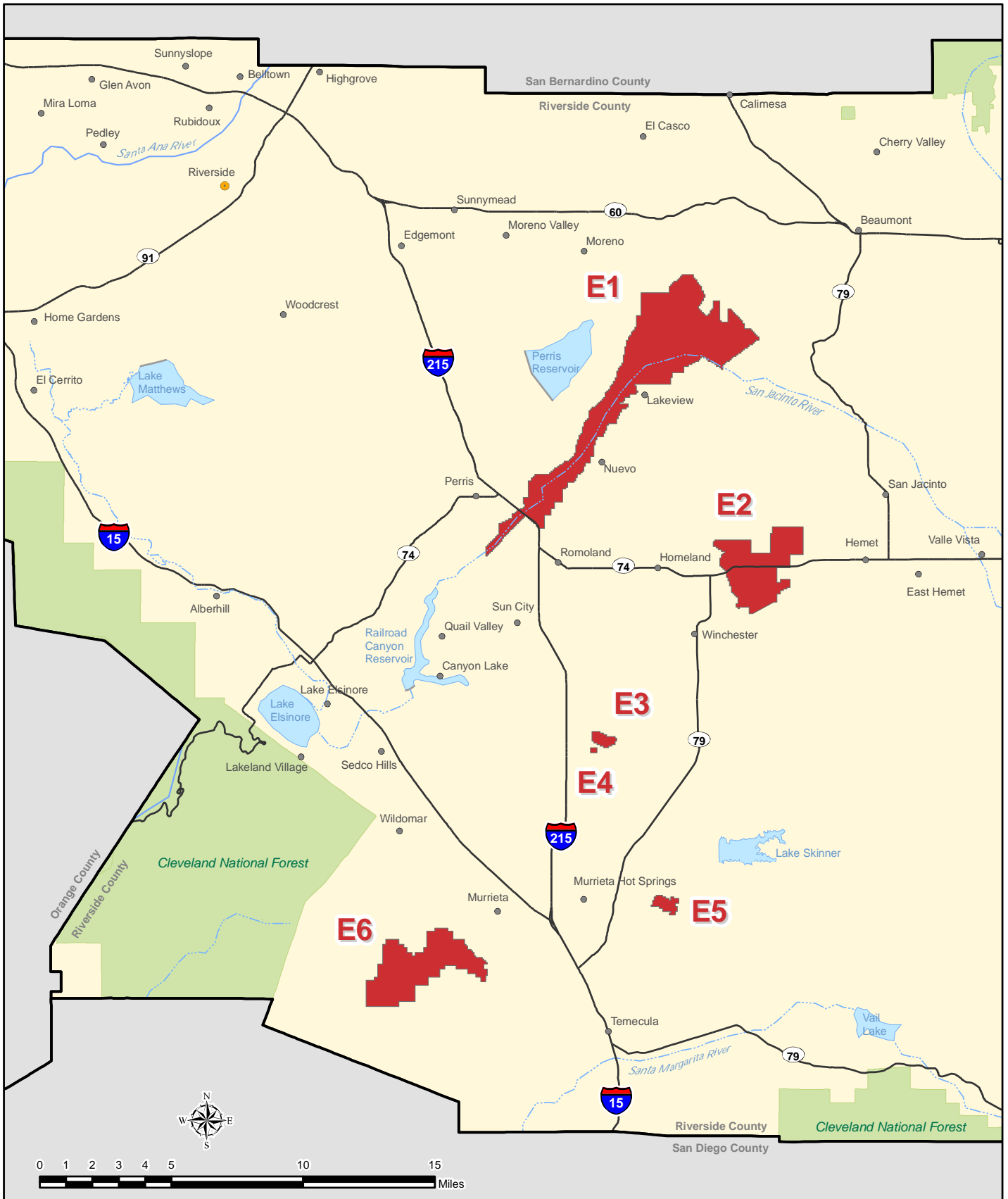
Proposed Critical Habitat

**MAP 2
DRAFT**

August 2005

Data Sources: U.S. Fish and Wildlife Service and ESRI

ENTRIX



Spreading Navarretia Essential Habitat Units of Riverside County

Habitat Unit Boundaries and Status
 Excluded Habitat

**MAP 3
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August 2005

Data Sources: U.S. Fish and Wildlife Service and ESRI



Spreading Navarretia Essential Habitat Units of Northern San Diego County

Habitat Unit Boundaries and Status

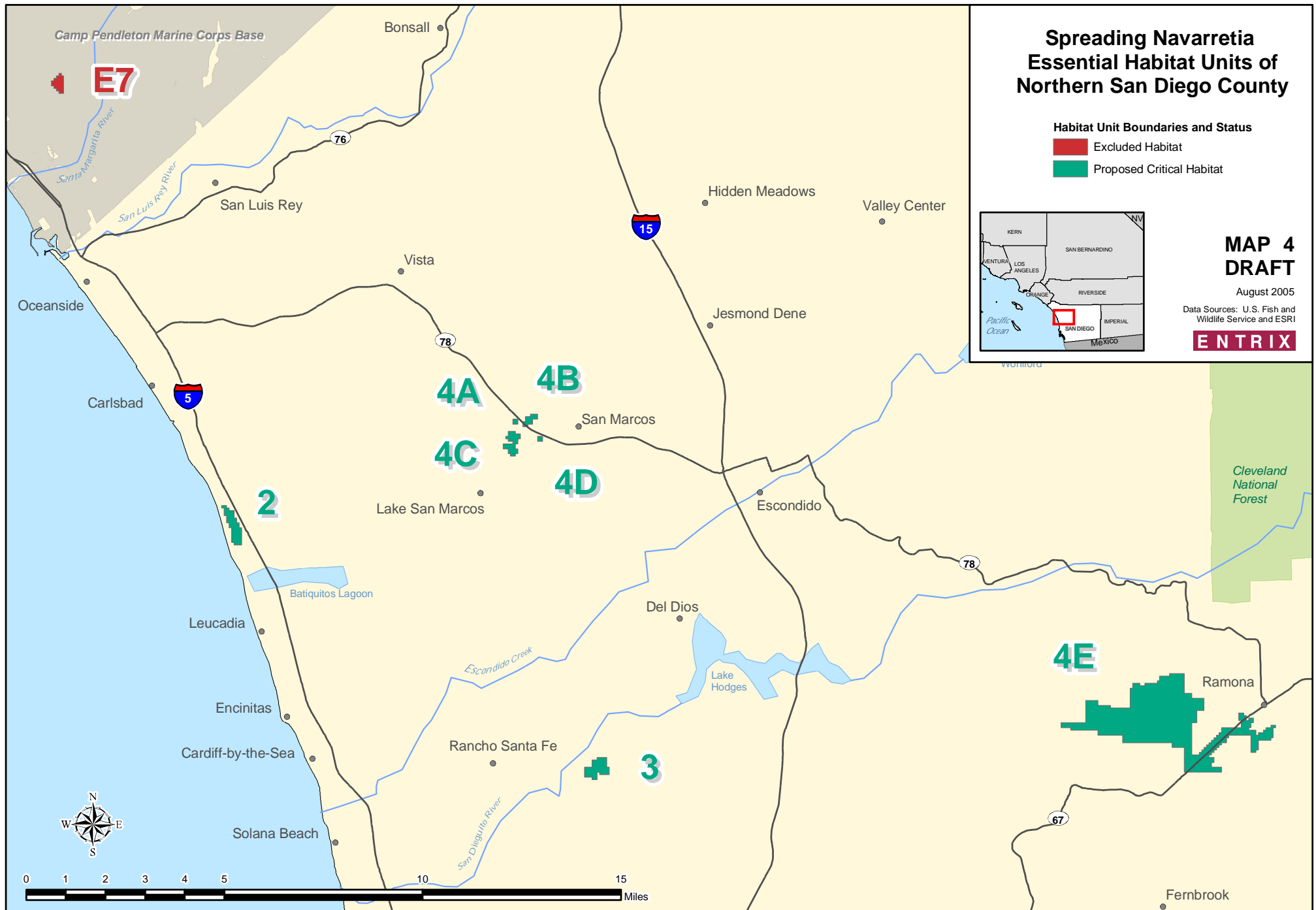
- Excluded Habitat
- Proposed Critical Habitat

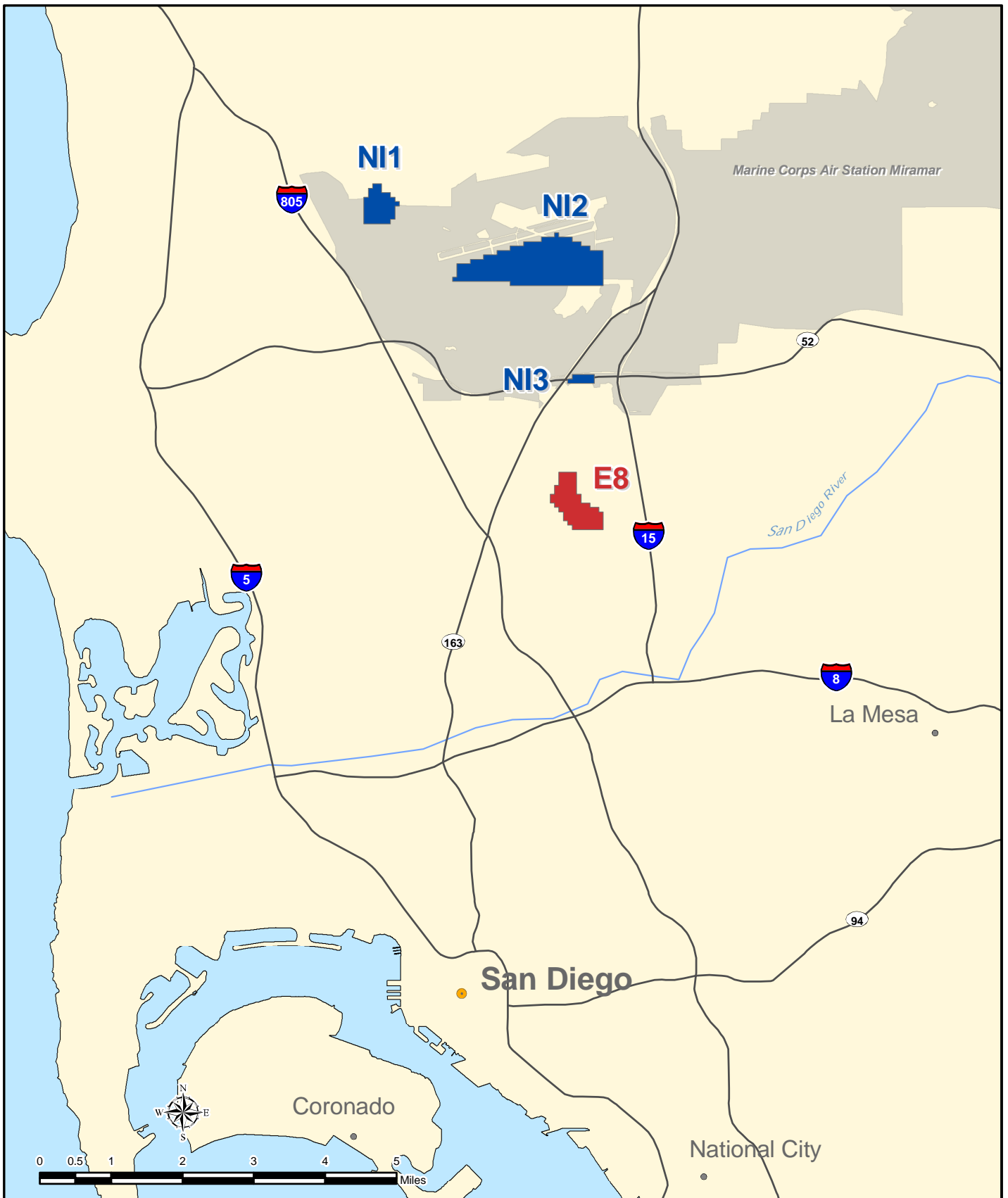


**MAP 4
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August 2005

Data Sources: U.S. Fish and
Wildlife Service and ESRI





Spreading Navarretia Essential Habitat Units of Southern San Diego County

Habitat Unit Boundaries and Status

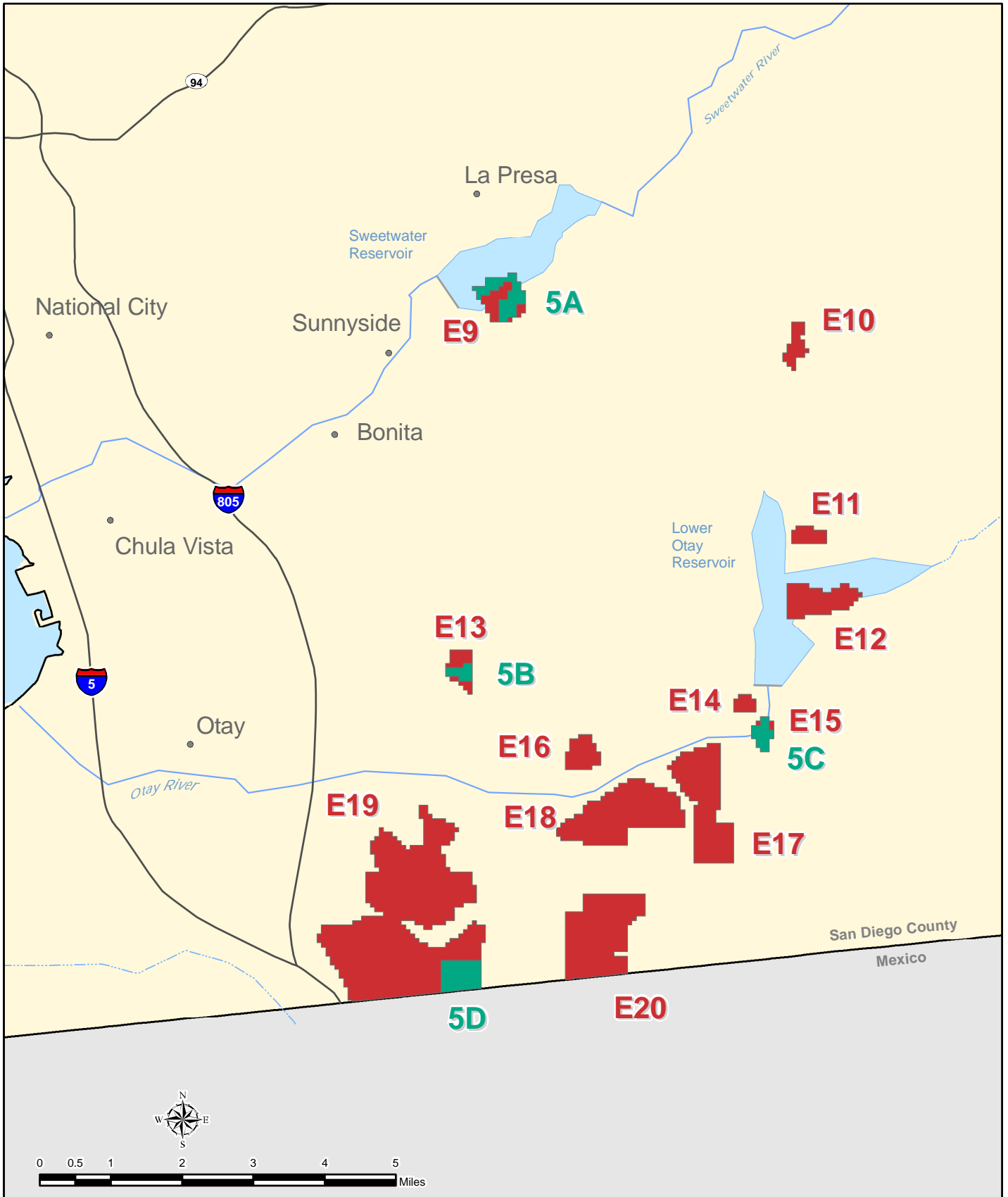
- Excluded Habitat
- Not Included Habitat

**MAP 5
DRAFT**

August 2005

Data Sources: U.S. Fish and Wildlife Service and ESRI

ENTRIX



Spreading Navarretia Essential Habitat Units of Southern San Diego County

Habitat Unit Boundaries and Status

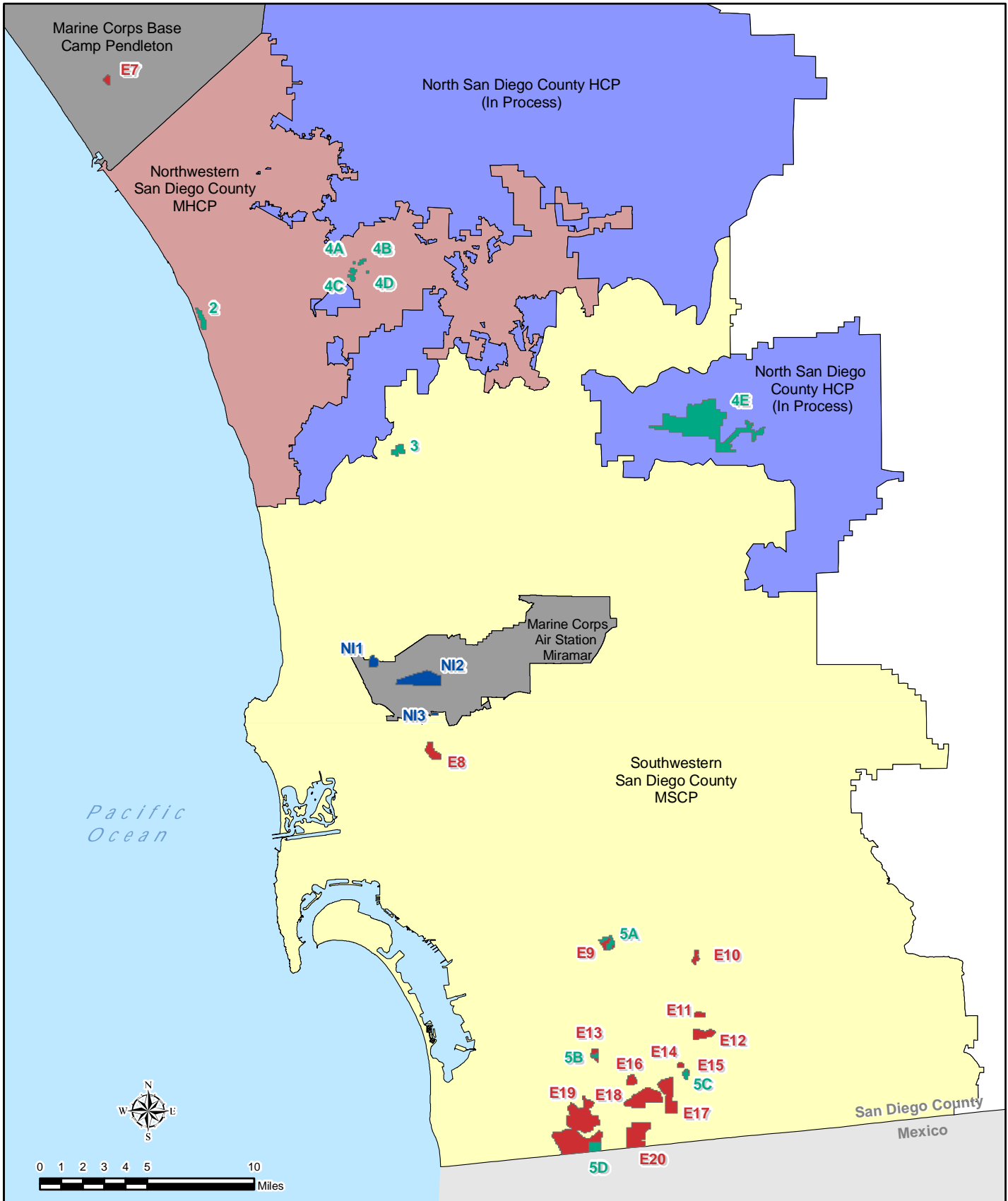
- Excluded Habitat
- Proposed Critical Habitat

**MAP 6
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August 2005

Data Sources: U.S. Fish and Wildlife Service and ESRI

ENTRIX



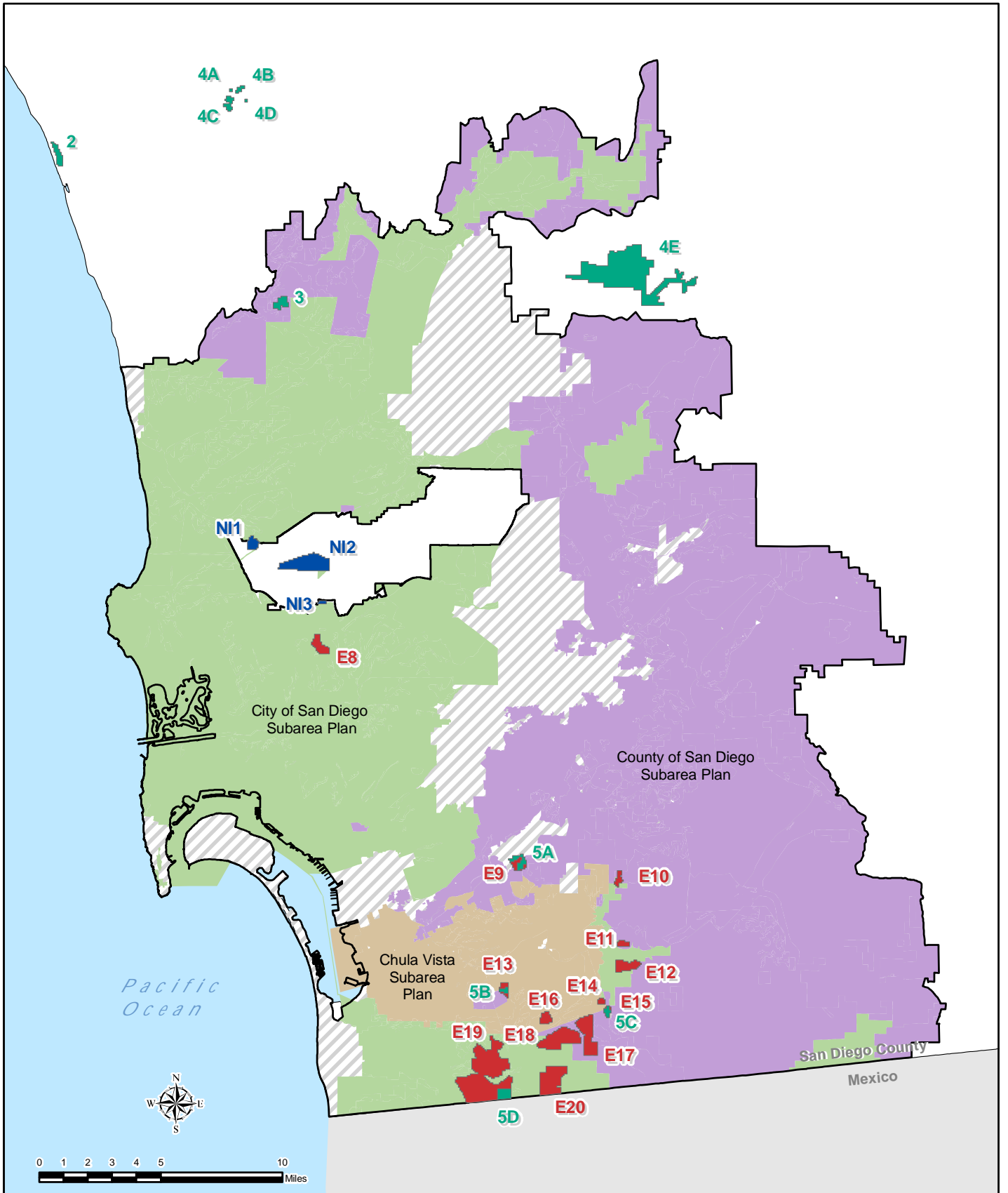
Subregional Habitat Conservation Plans and Spreading Navarretia Essential Habitat Units in San Diego County

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Subregional Habitat Conservation Plans | Habitat Unit Boundaries and Status |
| Northwestern San Diego County MHCP | Excluded Habitat |
| North San Diego County HCP (In Process) | Not Included Habitat |
| Southwestern San Diego County MSCP | Proposed Critical Habitat |
| Military Installations | |

**MAP 7
DRAFT**
August 2005

Data Sources: U.S. Fish and Wildlife Service and SANDAG





Subarea Plans Within the Southwestern San Diego County MSCP Subregional Plan and Spreading Navarretia Essential Habitat Units

Subareas within the Southwestern MSCP Subregion

- County of San Diego Subarea Plan
- City of San Diego Subarea Plan
- Chula Vista Subarea Plan
- Other Subareas within Southwestern MSCP

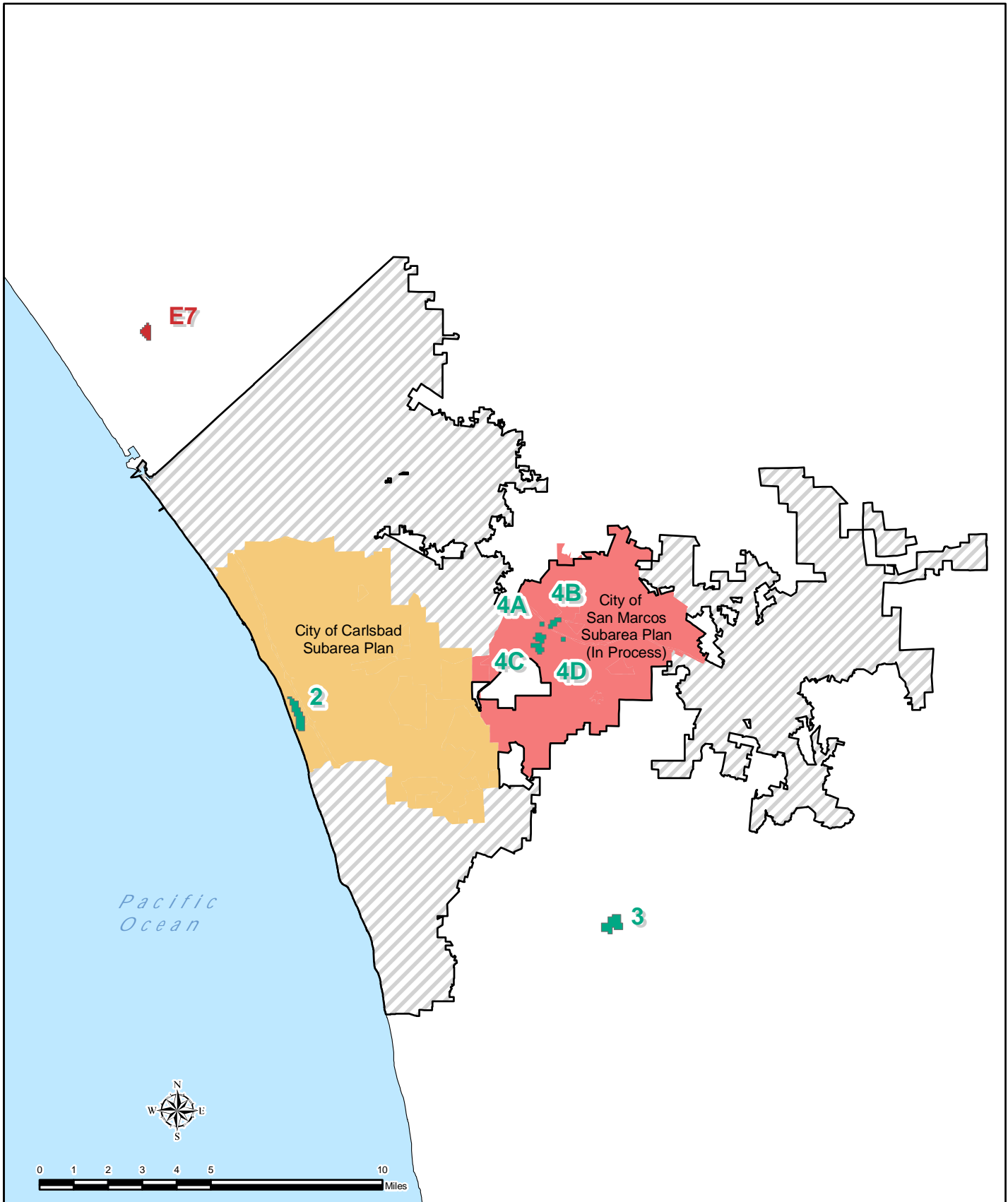
Habitat Unit Boundaries and Status

- Excluded Habitat
- Not Included Habitat
- Proposed Critical Habitat

**MAP 8
DRAFT**
August 2005

Data Sources: U.S. Fish and Wildlife Service and SANDAG





Subarea Plans Within the Northwestern San Diego County MHCP Subregional Plan and Spreading Navarretia Essential Habitat Units

Subareas within the Northwestern MHCP

- City of Carlsbad Subarea Plan
- City of San Marcos Subarea Plan (In Process)
- Other Subareas within the Northwestern MHCP

Habitat Unit Boundaries and Status

- Excluded Habitat
- Not Included Habitat
- Proposed Critical Habitat

**MAP 9
DRAFT**
August 2005

Data Sources: U.S. Fish and Wildlife Service and SANDAG



Subregional Habitat Conservation Plans and Spreading Navarretia Essential Habitat Units in Riverside County

Subregional Habitat Conservation Plans
Western Riverside County MSHCP

Habitat Unit Boundaries and Status
Excluded Habitat



**MAP 10
DRAFT**

August 2005

Data Source: U.S. Fish
and Wildlife Service



**Western Riverside
County MSHCP**

SAN BERNARDINO COUNTY

ORANGE COUNTY

SAN DIEGO COUNTY

