

FINAL ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR VERNAL POOL SPECIES

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EXECUTIVE SUMMARY

1. The purpose of this report is to identify and analyze the potential economic effects of the designation of critical habitat for vernal pool species (including four vernal pool crustaceans and 11 plants) on 1,663,442 acres west of the Sierra Nevada in 37 counties extending from Jackson County, Oregon, in the north through Riverside County, California, in the south.¹ The U.S. Fish and Wildlife Service (Service) proposed critical habitat for these crustaceans and plants on September 24, 2002.
2. A notice of the availability of a draft economic analysis (DEA) for this proposed designation was published on November 23, 2002, marking the beginning of a 30-day comment period that ended December 23, 2002. A second comment period was opened on March 14, 2003 and was closed 14 days later on March 28, 2003. Based on the issues raised in both public comment periods about the DEA and additional information received through personal communication with Action agencies and other stakeholders, this report will serve as the final economic analysis (FEA) for the proposed critical habitat designation. Both reports were prepared by Economic & Planning Systems, Incorporated (EPS), under subcontract to Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service's Division of Economics.
3. Section 4(b)(2) of the Endangered Species Act (Act) requires that the Service base the designation of critical habitat upon the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas in critical habitat, provided the exclusion will not result in extinction of the species.

REPORT ORGANIZATION

4. This report is organized into seven chapters and eight appendices. **Chapter I** provides an introduction to the analysis, describes the species and its habitat, and lays out the framework and methodology for the analysis. **Chapter II** summarizes the cost impacts of section 7 implementation on private land development and includes discussion of baseline regulations and regional economic impacts. **Chapter III** continues the evaluation of section 7 impacts on private land development by looking at indirect effects, such as time delay, regulatory uncertainty, and California Environmental Quality Act (CEQA) implementation costs.

¹Acres shown throughout the report are different from those in the proposed rule dated September 24, 2002. The difference, which is caused by geographic information systems software spatial analysis estimation routines, is minor and generates a difference of no more than 0.04 percent of the total.

5. **Chapter IV** presents a wide range of public land development impacts both in terms of administrative expense and project modification costs, **Chapter V** estimates the portion of total section 7 impacts that are solely attributable to the designation. In **Chapter VI**, a screening level analysis is performed to evaluate the designation's impacts on small businesses and governments. **Chapter VII** discusses benefits potentially associated with the designation.
6. The eight appendices supply the detailed assumptions, methods, and results of the land consumption modeling (**Appendices A through C**), baseline analysis (**Appendices D and E**), private land development impacts (**Appendix F**), consultation cost modeling (**Appendix G**), and alternate discount rate modeling (**Appendix H**).

PROPOSED CRITICAL HABITAT

7. The Service proposes to designate critical habitat for vernal pool species in 37 counties in California and Oregon. Only one county in Oregon, Jackson County, is included in the proposed critical habitat designation. The county is treated in this analysis as its own region, even if it functions as part of a larger economic region in the State of Oregon.
8. California's share of the 1,663,442 acres of proposed critical habitat represents 1.7 percent of California's total land area, and Jackson County, Oregon's share represents 0.01 percent of Oregon's total land area.² The 1,663,442 acres of land area (100 percent of total proposed critical habitat) are distributed across 10 regions of the two States as follows:
 - San Joaquin Valley Region, 715,812 acres (43 percent)
 - Upper Sacramento Valley Region, 273,361 acres (17 percent)
 - Central Coast Region, 254,445 acres (15 percent)
 - Sacramento Valley Region, 160,955 acres (10 percent)
 - San Francisco Bay Area, 110,004 acres (7 percent)
 - Southern California, 77,467 acres (5 percent)
 - Mountain Region, 33,147 acres (2 percent)
 - Sierra Nevada Foothills Region, 23,806 acres (1 percent)
 - Jackson County, Oregon, 7,621 acres (<1 percent)
 - Northern Coast Region, 6,824 acres (<1 percent)
9. **Map 1** illustrates the regions and the counties included in each region. Not every county within each region has proposed critical habitat. In addition, the regions do not encompass every county in California. When counties did not have proposed vernal pool species critical habitat and were not part of a region containing proposed critical habitat, the counties were not assigned to a region.

²Acres shown throughout the report are different from those in the proposed rule dated September 24, 2002. The difference, which is caused by geographic information systems software spatial analysis estimation routines, is minor and generates a difference of no more than 0.04 percent of the total.

SUMMARY OF ANALYTIC APPROACH

10. The Final Economic Analysis, like the Draft Economic Analysis, provides an estimate of the economic effects of the designation of critical habitat, as proposed on September 24, 2002, for vernal pool species.³ These effects include direct costs that result from compliance with section 7 of the Act, such as administrative costs of completing informal and formal consultations with the Service and the project modification costs occurring as a result of these activities. The FEA also measures indirect effects of the designation, such as costs of project delays and regulatory uncertainty, and costs associated with changes in implementation of other laws such as the California Environmental Quality Act (CEQA).
11. This analysis does not consider any costs that would occur in the absence of the designation, such as other land use regulation by Federal, State, or local governments. The one exception to this statement is the total cost associated with section 7, which may result either from the listing of the species (the jeopardy standard) or from the designation itself (the adverse modification standard). Because it can be difficult to pre-determine the standard that drives a section 7 consultation, all costs related to the implementation of section 7 are included in the total cost estimates presented in the FEA. Where available data identify section 7 impacts that would not have occurred but for the designation of critical habitat, the analysis provides supplemental information on the potential fraction of total costs attributable solely to the designation.
12. The direct compliance costs mentioned above represent a reasonable approximation of how society as a whole will be affected by the designation when compliance activity is not expected to significantly affect housing or other markets. Where the FEA finds that the price or quantity of housing may change as a result of the designation, changes in consumer and producer surplus within the market for new homes are also measured to capture the additional impact of the designation on society.
13. Other economic effects considered in the analysis include the benefits of the designation and distributional impacts on small entities and energy production, supply, and distribution. Potential benefits of the designation are discussed qualitatively.
14. The economic effects estimated in the FEA occur within a 20-year time frame, beginning on the date the public receives the proposed rule.

GENERAL ANALYTIC STEPS

15. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts of the designation. These are the steps followed in this analysis:

³Acreage and location of proposed critical habitat analyzed in the FEA are the same as that published by the U.S. Fish and Wildlife Service, *Proposed Designation of Critical Habitat for Vernal Pool Species*, September 24, 2002 (66 FR 133).

- Describing current and projected economic activity within and around the proposed critical habitat area;
 - Identifying whether such activities are likely to involve a Federal nexus;
 - For activities with a Federal nexus, evaluating the likelihood that these activities will require consultations under section 7 of the Act and, in turn, result in any modifications to projects.
 - Estimating the direct costs of expected section 7 consultations, project modifications and other economic impacts associated with the designation;
 - Estimating the likelihood that current or future activities may require additional compliance with other Federal, State, and local laws as a result of new information provided by the designation;
 - Estimating the likelihood that projects will be delayed by the consultation process or other regulatory requirements triggered by the designation;
 - Estimating the likelihood that economic activity will be affected by regulatory uncertainty, and/or property values affected;
 - Estimating the indirect costs of the designation, as reflected in the cost of compliance with State and local laws, project delays, regulatory uncertainty, and effects on property values;
 - Estimating the potential fraction of total section 7 costs that likely would not have occurred but for the designation of critical habitat (i.e., attributable solely to the designation);
 - Assessing the extent to which critical habitat designation will create costs for small businesses as a result of modifications or delays to projects;
 - Assessing the effects of administrative costs and project modifications on the supply, distribution, and use of energy; and
 - Determining the benefits that may be associated with the designation of critical habitat.
16. As noted above, this analysis considers both the efficiency effects and distributional effects that could result from this designation. It begins by considering direct compliance costs associated with the designation, as well as potential indirect effects, such as those effects associated with compliance with other Federal, State, and local laws, project delays, and impacts to property values. As necessary, regional economic impacts are described, as are impacts on significantly affected markets. Impacts on small entities are discussed

separately, in **Chapter VI**. Potential benefits of critical habitat are discussed qualitatively, in **Chapter VII**.

MAJOR CHANGES TO THE OCTOBER 2002 DEA

17. This report reflects a number of major and minor changes in methods, assumptions, and organization. The changes made to the DEA from October 2002 incorporate information contained in public comments received at the end of December 2002 and at the end of March 2003. Many responses to the public comments are provided throughout the report in footnote form, and others have resulted in new methods or assumptions without reference to the comment itself. The most important differences between the DEA and this report are highlighted below:

- **Uniform discounting methods.** This report implements consistent treatment of cost impacts projected to occur over the next 20 years. Because the timing of costs associated with the designation are uncertain, the costs for the entire time period are spread equally over 20 years and discounted into present-year dollars. This analysis applies a 12 percent discount rate that accounts for the opportunity cost of investment decisions in the private development market, and a 7 percent discount rate for public investment decisions.
- **Additional section 7 requirements.** The 15 crustaceans and plants included in the proposed rule had been divided into two groups according to the level of project modifications expected from the implementation of section 7 during the next 20 years. One group is allowed off-site mitigation, while the other group, whose populations occur with much lower frequency, requires on-site avoidance of habitat and reduces the development potential of the project. This report moves Contra Costa goldfields from the off-site mitigation group to the costlier on-site avoidance group. Effectively, a greater proportion of the acreage affected by the designation is subject to costlier project modifications than was the case in the DEA.
- **Expansion of acreage subject to section 7.** A third source of information about sites of urban growth was incorporated into the land consumption model used in the analysis. Once the acreage required for growth over 20 years in each county was calculated, the Service's field offices generated maps of sites likely to require some level of additional development approvals after the designation of critical habitat. These maps include an inventory of land development projects for which a section 7 consultation had not yet begun, but where it was reasonably expected that a consultation would begin in the next 20 years. The inventory from the Service was used to supplement acreage of urban growth projected by the land consumption model.
- **Inclusion of impacts related to project delay.** This analysis assumes that re-initiation of section 7 consultations will cause some delay in the final approvals for a portion of private land development projects. The affected projects are those expected to obtain final development approvals within a year after critical habitat designation. Each

final development approvals within a year after critical habitat designation. Each delay requires landowners to miss out on other investment opportunities, with higher impacts to projects with longer delays and to projects located in counties with the most expensive land.

- **Inclusion of impacts related to regulatory uncertainty.** Because the outcome of a section 7 consultation for a particular property is uncertain, land buyers are assumed to reduce the value of land until more is known about the Service's requirements on proposed projects or the habitat characteristics of the property. The size of the impact caused by regulatory uncertainty will vary with the section 7 requirements for the acreage in question and the variation anticipated in the project modifications recommended by the Service.
- **Estimation of the designation's affect on CEQA implementation.** Using estimates of consultant costs for preparation of CEQA documents, this analysis presumes that designation will trigger higher levels of CEQA review for particular types of projects. Projects that formerly could claim a CEQA exemption or could submit a negative declaration may be required by CEQA to undergo a more complex review process.
- **New assumptions about the surface area of vernal pools on an average project site.** Based on conversation with Service personnel, the percentage of a typical project site that is covered by vernal pool surface area has been increased from 3 percent to 7 percent. This assumption has the effect of raising the cost for off- or on-site project modifications, as greater impacts from development occur if the wetted area is larger.
- **Additional information from Action agencies.** Where indicated by public comments, Action agencies were contacted to verify the estimated number of section 7 consultations and associated project modifications. This exercise increased the accuracy of reported section 7 impacts from public land development activities.
- **Reorganization of report sections.** The assumptions and calculations explained in this report have been streamlined to increase the user friendliness of the report to the reader. Details of major assumptions and findings are now located in eight appendices, and the length of each chapter preceding the appendices has been reduced. The number of tables corresponding to results in the seven chapters has been reduced, with detail tables appearing in the appropriate appendix.

ECONOMIC IMPACTS SUMMARIZED

18. This section will begin with a brief discussion of total direct and indirect impacts of the designation and continues with a breakdown of those impacts by project type and geography. The section concludes with a comparison between these direct cost estimates and changes in consumer surplus for regions where the designation may impact housing markets.

TOTAL COST IMPACTS OF DIRECT AND INDIRECT EFFECTS

19. Over the next 20 years, section 7 activities are anticipated to result in 1,057 informal consultations and 370 formal consultations.⁴ Section 7-related activities for vernal pool species are estimated to cost the parties involved \$4.5 to \$9.7 million in administrative costs, and \$573 million in project modification costs. Indirect effects impose an additional \$127.6 million over 20 years, and consumers in two counties are estimated to be worse off by \$736 million during the same time frame, as shown in **Table ES-1**.
20. On an annuity basis, these impacts are estimated to sum to an \$124 million per year for all public and private entities. The actual costs are likely to vary unevenly from year to year, as fiscal and market conditions change, with some years receiving a greater share of the costs than others.

BY PROJECT TYPE: TOTAL DIRECT AND INDIRECT EFFECTS

21. On a project type basis, the largest share of administrative (~40 percent), project modification (~99 percent), and indirect or consumer (100 percent) costs occur in private land development. This industry experiences most of the cost impacts because of the large area and high value of private land within the designation that is likely to be developed during the next 20 years. Some 48,000 acres are assumed to be affected by the designation, largely due to urban growth, and each acre may have a value between \$100,000 and \$300,000. Hence, large losses are possible.
22. Indirect costs include three kinds of costs imposed only on private landowners affected by the designation.

Overall, the total cost impacts associated with the critical habitat designation were estimated in the October 2002 DEA at \$128 to \$135 million over 20 years. The increase in the FEA's total estimated regulatory impact to \$1.4 billion over 20 years comes primarily from four changes in the methods used to calculate private land development impacts (each change's approximate share of the total increase is given in parentheses):

- Doubling of the vernal pool "wetted acre" density assumption (0.1%)
- Addition of Service-identified project sites to the total acreage impacted by the designation, plus the transfer of one plant's critical habitat from the low-cost project modification category into the high-cost project modification category (28%)
- Addition of CEQA implementation, regulatory uncertainty, and project delay cost impacts (9.2%)
- Addition of consumer (homebuyer) impacts in two selected counties where real estate production and prices may change as a result of the designation (53%)

New information regarding various Action agency costs, such as military training and base closure costs, and implementation of uniform out-year cost discounting explains the remaining 9–10% of the change in the estimated total regulatory impact number.

⁴In addition, private parties and action agencies are expected to seek technical assistance from the Service in 434 instances.

Most of the indirect impacts result from time delay costs and regulatory uncertainty costs, with a minor contribution to the indirect effects cost total from CEQA-related additional costs. The first of the cost impacts relates to forgone investment opportunities by landowners when critical habitat regulation delays land development. The FEA applies this cost only to projects in the final year of approval and permitting processing, where critical habitat designation would require a re-initiation of a section 7 consultation.

23. The second indirect cost related to private land development is the cost of internalizing regulatory uncertainty into land transactions required for development projects. This uncertainty effect lowers the value of property where the exact level of wetlands compensation required by the Service and the ACOE as part of a section 7 consultation is unknown when the property changes hands. Finally, the third indirect cost involves the implementation of a California State law, CEQA, will likely generate indirect economic effects on proponents of a variety of small projects that occur in areas proposed for designation. Higher costs are likely to be borne by project proponents who must prepare more complex CEQA documents required by the statute once critical habitat is designated.
24. Other project types responsible for more than \$500,000 in total administrative and project modification costs over the 20 year period include military base operations and training (\$1.7 million), construction and maintenance of State highways (\$2.1 million), airport runway extensions (\$1.1 million), military base closure and reuse (\$0.7 million), and casino construction (\$0.4 million). For each project type, administrative low to high costs are averaged.

BY GEOGRAPHY: TOTAL DIRECT AND INDIRECT EFFECTS

25. Three regions bear the majority of private land development impacts estimated across the 37 counties included in the proposed designation, as shown in **Table ES-2**. The San Francisco Bay Area (\$383 million), Sacramento Valley Region (\$711 million), and San Joaquin Valley Region (\$120 million) together account for nearly 93 percent of all direct impacts. For each region, administrative low to high costs are averaged.
26. Indirect impacts would be distributed similarly. Within each region, a single county typically generates the majority of the impact. Because of large areas proposed for critical habitat for which species impacts are very costly to address in section 7 consultations, Solano County in the San Francisco Bay Area, Sacramento County in the Sacramento Valley Region, and Merced County in the San Joaquin Valley Region rank the highest in terms of cost.

BY GEOGRAPHY: IMPACTS ATTRIBUTED TO CRITICAL HABITAT DESIGNATION

27. Based on data describing the history of section 7 consultations for vernal pool species, most of the administrative activity, project modifications, and indirect effects presented in **Table ES-1** are likely to occur over the next 20 years, even if critical habitat is not designated. Based on responses from Action agency personnel concerning public land development projects, section 7 activity is entirely associated with the listing of the species. No public

projects were identified that would be subject to section 7 regulation because of the designation.

28. Because of the informational value of the designation to many jurisdictions where private land development projects have undergone few section 7 consultations to date, the designation is expected to increase compliance costs for private land development in certain areas. Within the land development category, based on the history of section 7 consultations, nearly 15 percent (\$195 million of the \$1.3 billion in total consultation and project modification costs) are expected to occur solely because of the designation of critical habitat. These cost shares are reported by county in **Table ES-2**. It is expected that a portion of indirect costs are also attributable to the designation. The calculation of the designation's approximate indirect cost share would be identical to the 15 percent of total direct costs completed above.
29. All of the costs attributable to critical habitat occur in San Francisco Bay Area counties. These counties have historically accounted for very few section 7 consultations, and the next 20 years of growth are expected to accelerate the rate of their consultations and increase the value of their project modifications. The FEA attributes the costs of these counties' future activities to the information contained in the critical habitat maps. Other counties, including San Joaquin, Stanislaus, Yolo, Mendocino, San Benito, Amador, and Calaveras Counties, share a similar likelihood of generating future consultations from information contained in the designation, but no land development is projected for acreage proposed for designation in these counties.

CHANGES IN CONSUMER AND PRODUCER SURPLUS

30. Of the 37 counties with land proposed for critical habitat designation, four counties will have significant land area set aside on the development sites through the section 7 consultation process. For Sacramento and Solano Counties, these acres of lost development potential may increase housing prices and result in impacts on homebuyers (consumers). Consumers lose as they must pay higher prices for the same housing product. These losses are measured by reductions in consumer surplus.
31. Over the next 20 years these economic efficiency effects could penalize consumers by \$736 million as shown in the Consumer Surplus and Other Costs column of **Table ES-1**. Sacramento County homebuyers are expected to see reductions in consumer surplus of \$550 million.
32. Solano County homebuyers are expected to see reductions in consumer surplus of \$186 million.

Table ES-1
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Total Section 7 and Indirect Costs by Affected Party and Activity [1]

Affected Party/Activity	Action Agency	Administrative Costs [2]		Project Modification Costs [3]	Consumer Surplus Losses and Other Costs [4]	TOTAL COST	
		Low	High			Low	High
Department of Defense							
Base operations and training	DOD	\$261,059	\$526,085	\$1,331,932	-	\$1,592,991	\$1,858,017
Facilities construction	DOD	\$6,235	\$10,315	-	-	\$6,235	\$10,315
Base closure and re-use	DOD	\$307,761	\$581,629	\$283,390	-	\$591,151	\$865,019
State and Local Governments							
Runway extensions	FAA	\$31,513	\$50,557	\$1,054,210	-	\$1,085,723	\$1,104,767
Construction of high speed rail systems	FRRA	\$7,878	\$12,639	-	-	\$7,878	\$12,639
Construction of transit maintenance facilities	FTA	\$7,878	\$12,639	-	-	\$7,878	\$12,639
Construction and maintenance of state highways	FHWA	\$879,189	\$2,379,115	\$433,020	-	\$1,312,209	\$2,812,134
Disaster response	FEMA	\$47,269	\$75,835	-	-	\$47,269	\$75,835
Public and Private Entities							
Discharge to US waters	EPA	\$28,838	\$56,701	-	-	\$28,838	\$56,701
Characterization and cleanup of contaminated sites	EPA	\$74,770	\$127,276	-	-	\$74,770	\$127,276
Public and Private Utilities; Energy Companies							
Operation of hydroelectric facilities	FERC	\$21,810	\$61,915	-	-	\$21,810	\$61,915
Authorization to establish an interconnection	WAPA	\$47,326	\$85,640	-	-	\$47,326	\$85,640
Oil pipeline conversion	FERC	\$2,278	\$6,439	-	-	\$2,278	\$6,439
Western Area Power Administration							
Maintenance of power lines	WAPA	\$30,153	\$57,131	-	-	\$30,153	\$57,131
Bureau of Reclamation							
Maintenance of water facility ROW	BOR	\$5,214	\$15,870	-	-	\$5,214	\$15,870
Power plant construction	BOR	\$6,235	\$10,315	-	-	\$6,235	\$10,315
Water supply and delivery contracts	BOR	\$288,491	\$531,639	-	-	\$288,491	\$531,639
Native American Governments							
Fire protection	BIA	\$84,677	\$137,727	\$230,113	-	\$314,789	\$367,840
Casino construction	BIA	\$5,814	\$12,639	\$359,728	-	\$365,543	\$372,368
Private Landowners							
Land development	ACOE	\$1,752,264	\$3,791,622	\$568,932,537	\$127,602,932	\$698,287,733	\$700,327,092
Agricultural conversion	ACOE	-	-	-	-	-	-
Consumers							
Land development	ACOE	-	-	-	\$735,773,500	\$735,773,500	\$735,773,500
Fish and Wildlife Service							
National Wildlife Refuge operations	FWS	\$6,235	\$10,315	-	-	\$6,235	\$10,315
National Wildlife Refuge mosquito/weed control	FWS	\$62,346	\$103,154	-	-	\$62,346	\$103,154
Habitat Conservation Program	FWS	\$14,340	\$43,642	-	-	\$14,340	\$43,642
Forest Service							
Forestry research	USFS	\$12,469	\$20,631	-	-	\$12,469	\$20,631
Forest management	USFS	\$213,393	\$398,333	\$144,529	-	\$357,921	\$542,862
20 YEAR TOTAL		\$4,451,829	\$9,734,101	\$572,769,460	\$863,376,432	\$1,440,597,721	\$1,445,879,992
ANNUALIZED TOTAL [5]		\$426,100	\$923,700	\$68,356,900	\$54,868,071	\$123,651,071	\$124,148,671

"All_Sect_7"

- [1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.
[2] Administrative costs include technical assistance, informal consultations, formal consultations, and biological assessments.
[3] Some activities of federal agencies have zero projection modification costs.
[4] Other category includes costs related to project time delays, regulatory uncertainty, and CEQA.
[5] Excludes first year time delay effects. All other impacts occur over a 20 year period. Values are rounded to nearest hundreded dollars.

Table ES-2
U.S. Fish and Wildlife Service
Vernal Pools Species Critical Habitat Designation Final Economic Analysis
Portion of Private Land Development Costs and Consumer Surplus Losses Attributable to Critical Habitat [1] [2]

ID	Region or County	Total Costs Attributable to Critical Habitat	Total Costs Attributable to Section 7			
			Administration Costs		Land Value and Consumer Surplus Losses	Total [3]
			Low	High		
San Francisco Bay Area						
1	Alameda	\$54,368,800	\$54,879	\$118,752	\$60,322,982	\$60,409,800
2	Contra Costa	\$2,000	\$0	\$42	\$2,217	\$2,200
3	Napa	\$0	\$8,533	\$18,447	\$2,433,061	\$2,446,600
4	Solano	\$141,023,300	\$192,246	\$416,030	\$320,203,362	\$320,507,500
	Subtotal	\$195,394,100	\$255,658	\$553,271	\$382,961,621	\$383,366,100
San Joaquin Valley Region						
5	Fresno	\$0	\$57,557	\$124,566	\$3,673,705	\$3,764,800
6	Kings	\$0	\$42	\$84	\$1,757	\$1,800
7	Madera	\$0	\$453,634	\$981,598	\$23,716,015	\$24,433,600
8	Merced	\$0	\$134,062	\$290,083	\$91,146,352	\$91,358,400
9	San Joaquin	\$0	\$0	\$0	\$0	\$0
10	Stanislaus	\$0	\$0	\$0	\$0	\$0
11	Tulare	\$0	\$7,236	\$15,644	\$427,784	\$439,200
	Subtotal	\$0	\$652,531	\$1,411,976	\$118,965,613	\$119,997,800
Mountain Region						
12	Lassen	\$0	\$0	\$0	\$0	\$0
13	Modoc	\$0	\$0	\$0	\$0	\$0
14	Plumas	\$0	\$17,986	\$38,901	\$1,036,520	\$1,065,000
15	Siskiyou	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$17,986	\$38,901	\$1,036,520	\$1,065,000
Upper Sacramento Valley Region						
16	Butte	\$0	\$111,307	\$240,893	\$63,758,890	\$63,935,000
17	Colusa	\$0	\$38,441	\$83,198	\$3,043,972	\$3,104,800
18	Glenn	\$0	\$0	\$0	\$0	\$0
19	Shasta	\$0	\$73,075	\$158,071	\$5,785,437	\$5,901,000
20	Tehama	\$0	\$3,681	\$7,947	\$816,374	\$822,200
	Subtotal	\$0	\$226,503	\$490,109	\$73,404,672	\$73,763,000
Sacramento Valley Region						
21	Placer	\$0	\$211,027	\$456,604	\$29,026,736	\$29,360,600
22	Sacramento	\$0	\$159,368	\$344,837	\$682,091,566	\$682,343,700
23	Yolo	\$0	\$0	\$0	\$0	\$0
24	Yuba	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$370,395	\$801,441	\$711,118,302	\$711,704,300
Northern Coast Region						
25	Lake	\$0	\$0	\$0	\$0	\$0
26	Mendocino	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$0	\$0	\$0	\$0
Central Coast Region						
27	Monterey	\$0	\$24,512	\$53,039	\$5,580,224	\$5,619,000
28	San Luis Obispo	\$0	\$47,852	\$103,568	\$6,990,778	\$7,066,500
29	San Benito	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$72,364	\$156,607	\$12,571,002	\$12,685,500

Table ES-2
U.S. Fish and Wildlife Service
Vernal Pools Species Critical Habitat Designation Final Economic Analysis
Portion of Private Land Development Costs and Consumer Surplus Losses Attributable to Critical Habitat [1] [2]

ID	Region or County	Total Costs Attributable to Critical Habitat	Total Costs Attributable to Section 7			
			Administration Costs		Land Value and Consumer Surplus Losses	Total [3]
			<i>Low</i>	<i>High</i>		
Sierra Nevada Foothills Region						
30	Amador	\$0	\$0	\$0	\$0	\$0
31	Calaveras	\$0	\$0	\$0	\$0	\$0
32	Mariposa	\$0	\$0	\$0	\$0	\$0
33	Tuolumne	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$0	\$0	\$0	\$0
Jackson County, Oregon						
34	Jackson	\$0	\$38,190	\$82,612	\$3,492,461	\$3,552,900
Southern California						
35	Riverside	\$0	\$128,289	\$277,618	\$1,155,858	\$1,358,800
36	Santa Barbara	\$0	\$0	\$0	\$0	\$0
37	Ventura	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$128,289	\$277,618	\$1,155,858	\$1,358,800
TOTAL [4]		\$195,394,100	\$1,752,300	\$3,791,600	\$1,304,706,000	\$1,307,478,000
37 COUNTY AREA ANNUALIZED COST [4]		\$23,356,400	\$209,500	\$453,200	\$114,838,300	\$115,169,700

"CH_Portion"

Source: Table 16

[1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.

[2] Outside of land development activities, there is not likely to be additional cost attributable solely to critical habitat designation.

[3] Reflects the average of the low and high range of consultation costs. Does not include indirect cost effects (time delay, uncertainty, and CEQA).

[4] Costs for Private Land Development only. Totals/Annualized Costs may not equal the sum of the county costs due to rounding.

TOTAL COST IMPACTS IN THE CONTEXT OF REGIONAL ECONOMIC ACTIVITY

33. Regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy's jobs and revenues resulting from regulatory action. As explained in **Chapter I**, these measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses and cannot be compared with the estimates of compliance costs or changes in consumer and producer surplus noted above.
34. In many instances, regulatory compliance costs can be used as an input for regional effects modeling to generate regional impacts in terms of industry-specific job and revenue losses. For example, producer cost increases, if attributable to specific industries in which regulatory costs cause a quantifiable loss of profits, may be used. However, the cost impacts estimated in the FEA do not estimate the 20 year compliance costs that would be paid by owners of property where development actually occurs. Instead, the FEA evaluates impacts on those landowners whose property includes proposed critical habitat.
35. Because regional economic models depend on a reliable estimate of impacts to the profits of owners of property where development actually occurs, the results of the FEA must be carefully used in any regional effects modeling. Analysis explained in **Chapter II** supports the finding that, in 35 of 37 counties containing some proposed critical habitat, a reduction in the acreage of private land developed over 20 years is unlikely and will leave real estate sector output unchanged. Insignificant regional economic effects resulting from the designation are expected for those counties.
36. For the two counties where real estate production may decline because of critical habitat designation, producers experience both positive and negative impacts. Producers in these two regions increase profits when their projects are located outside critical habitat and therefore benefit from higher prices for finished real estate in the region. Producers lose profits when their projects are located in critical habitat, there is a Federal nexus, and the project is reduced in size or the land falls in value because of project modifications associated with the implementation of section 7. The overall net effect is uncertain and is of limited value to regional economic models.
37. Consumers in these two counties, by way of contrast, pay more for housing after critical habitat regulation. However, regional economic effects require industry-specific job losses or reductions in profit as input to the model. Higher costs faced by consumers cannot be classified as either job losses or profit losses, and as a result, broad consumer impacts are also of limited value to regional economic models.
38. In sum, 35 of 37 counties are expected to be minimally impacted in terms of jobs and output as a result of critical habitat designation. In the two counties expected to experience a decline in real estate production, the designation has an uncertain but likely small effect on producers, hence the regional model is indeterminate as well. Lacking better data on the overall producer impacts resulting from the designation (see **Chapter II** for more details),

the FEA did not attempt to apply regional economic modeling to the cost impacts the analysis generated.

SENSITIVITY TEST FOR IMPACTS ON PRIVATE LAND DEVELOPMENT

39. To examine how sensitive the overall total cost impact results are to assumptions about the project modifications recommended by the Service, an alternative set of project modifications were used in place of the existing 6:1 preservation ratio discussed in **Chapter II** and **Appendix F**. This requirement is not an assumption that has been drawn from the species' consultation histories but instead serves as an analytical proxy for recommendations the Service may make in the future. This ratio also produces results more likely to overestimate than to underestimate regulatory impacts. Because of the very low frequency of six of the 15 species included in the designation, this analysis assumes that projects cannot fulfill this requirement in any way except to set aside acreage on the project site in accordance with the 6:1 ratio.
40. The 6:1 on-site preservation ratio (and accompanying 3:1 restoration ratio) were adjusted downward to approximate the 2:1 preservation ratio historically used in section 7 consultations involving the vernal pool fairy shrimp. All of these ratios are expressed as net of the Clean Water Act (CWA) requirements of the ACOE. Such an adjustment would allow for approximately 33 percent of a property to be developed instead of the nearly 13 percent allowed using a strict 6:1 ratio (see **Table F-2** for the detailed acreage calculations).
41. Using a 2:1 preservation ratio, the total landowner impacts drop to \$465 million from \$569 million. In addition, the consumer surplus impacts drop to \$574 million from \$736 million. In total, the change in preservation ratio reduces the economic impact of the designation by \$205 million, or about 14 percent of the \$1.4 billion total.

SOURCES OF UNCERTAINTY

42. The impacts estimated in this analysis are subject to several sources of uncertainty in the assumptions made about activities likely to take place in critical habitat and how these activities change after critical habitat designation. The effect of each uncertain variable on the analysis is described below in order of declining importance to the results:
 - **Credits for Open Space or Other Development Requirements:** The analysis assumes that any preservation of habitat in a land development project, such as a specific plan for a part-residential and part-commercial project, is a land use restriction unrelated to requirements of any other land use regulatory authority, such as a city government. In other words, the assumption is that compensation required by the Service cannot be used by the developer in other project review processes to satisfy local conditions governing new development. This assumption will likely overestimate the cost impact of critical habitat designation, in that projects may receive credit for vernal pool preservation as a public use that would have been required by land dedication to parks or other open space corridors in the absence of any ESA regulation. However, the

magnitude of this overestimation requires detailed study of numerous local development approval processes and could not be addressed in this analysis.

- **Twenty Years of Urban Growth:** The analysis relies on multicounty growth models and specific area growth analysis in order to predict what land areas become urbanized over the next 20 years. However, the rate of this growth and its precise location are highly dependent on economic conditions, development trends, and the timing of planning processes and real estate transactions.⁵ Cities do not simply grow outward geographically, as development projects on undeveloped land require participating landowners, approvals from land use authorities, and sufficient demand for the product or they do not occur. These variables cannot be predicted for any future period of time, although some variables are likely to occupy a limited range of values in the next one to three years. It is not clear how the methods and growth models used in this analysis are likely to underestimate or overestimate the results.
- **Project Footprint and Vernal Pool Geometry:** Implicit in the assumptions about project modifications required of land developers is an average project geometry containing a fixed amount of wetted vernal pool acreage and, in some cases, a corresponding amount of vernal pool upland that must be kept intact to avoid adverse impacts to the listed species. In actual section 7 usage, these geophysical measurements differ for each project site and change the course of the consultation or technical assistance. It is not clear whether the average assumptions adopted by the analysis bias the results upwards or downwards, as examples can be found of a wide range of habitat impacts for the same size of project footprint.
- **Action Agency Uncertainty:** Numerous Federal agencies that appear in the Service's consultation history of vernal pool species were asked about the likelihood of future consultations after critical habitat is designated. Biologists in the agencies were often familiar with vernal pool habitat but did not know what lands were destined for proposed designation by the Service, because the proposed rule had not yet been published in the Federal Register. Their answers to questions about likely regulatory impacts depend on their perceptions of the likely boundaries of the proposed critical habitat designation in relation to their perception of the extent of vernal pool habitat within areas likely to contain the agency's future project sites. Their answers also depend on their understanding of thresholds for consultations due to potential impacts to critical habitat. It is difficult to say whether agency personnel are likely to underestimate or overestimate these impacts.

⁵One public comment suggested that agricultural agencies and county government could have provided better information regarding future growth projections. However, farmland mapping programs provide snapshots of current or past land use, and do not project future land use. The DEA also recognized that projects being planned by counties are often a guide to the next 3 to 5 years of development, although many events that change larger development plans, such as public and private financing issues, can modify or cancel planned development at any time. As the time horizon for the DEA is 20 years, a more reliable and standardized method for estimating urbanizing land in each county was needed. The CURBA model (explained in **Appendix B**) generates this data consistently for each county.

- **Non-Residential Land Uses:** This analysis bases its project modification costs on prices paid for residential land uses, including one data series on home prices and another estimating the prices paid for entitled, developable land approved for residential construction. However, urbanization in a region typically includes other land uses besides residential, such as land approved for industrial, retail, or office construction. The entitled land values for these non-residential uses vary by region but are likely to be different from residential values. Depending on local market conditions for each of the 37 counties, the section 7 costs estimated in this analysis could overstate or understate actual costs.
- **Consultation History:** For many activities of the Action agencies, the historical record on consultations and technical assistance contributed to the estimate of future consultations and project modifications to be performed by the agencies or third parties. However, this historical record has been strongly influenced by agency activities that may not be annually reoccurring or that may not have shifted since the 1995–2001 time period that defines the consultation and technical assistance database obtained from the Service. For instance, Central Valley Project consultations that span dozens of entries in the historical record for San Joaquin Valley Counties do not themselves indicate a probably level of future consultations with the Bureau of Reclamation. When possible, Action agency personnel elaborated on the specific project inventory likely to generate a Federal nexus under section 7.

TREATMENT OF ECONOMIC BENEFITS

43. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop [1978, 1980], Brookshire and Eubanks [1983], Boyle and Bishop [1986], Hageman [1985], Samples et al. [1986], Stoll and Johnson [1984]). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran [1994] and Fausold and Lillieholm [1999]) both of which are associated with species conservation. Likewise, regional economies can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend (ECONorthwest [2002]).
44. However, a purpose of the Act is to provide for the conservation of endangered and threatened species. Thus, the benefits of actions taken under the Act are primarily measured in terms of the value placed by the public on species preservation (e.g., avoidance of extinction and/or an increase in a species' population). Such social welfare values may reflect both use and nonuse (i.e., existence) values. For example, use values might include the potential for recreational use of a species, should recovery be achieved. Nonuse values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist.
45. It is not feasible to fully describe and accurately quantify the benefits of this designation in the context of this economic analysis. The benefits discussed in this report are derived

primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act in general or critical habitat designation in particular. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

I. RELEVANT BACKGROUND AND ANALYTICAL FRAMEWORK

46. The purpose of this report is to identify and analyze the potential economic effects of the designation of critical habitat for vernal pool species (including four aquatic crustaceans and 11 plants) on 1,663,442 acres west of the Sierra Nevada in 37 counties extending from Jackson County, Oregon in the north through Riverside County, California in the south.⁶ The U.S. Fish and Wildlife Service (Service) proposed critical habitat for these crustaceans and plants on September 24, 2002.
47. A notice of the availability of a draft economic analysis (DEA) for this proposed designation was published on November 23, 2002, marking the beginning of a 30 day comment period that ended December 23, 2002. A second comment period was opened on March 14, 2003 and was closed 14 days later on March 28, 2003. Based on the issues raised in both public comment periods about the DEA and additional information received through personal communication with Action agencies and other stakeholders, this report will serve as the final economic analysis (FEA) for the proposed critical habitat designation. Both reports were prepared by Economic & Planning Systems, Incorporated (EPS), under subcontract to Industrial Economics, Incorporated (IEc), under contract to the Service's Division of Economics.
48. Section 4(b)(2) of the Endangered Species Act (Act) requires that the Service base the designation of critical habitat upon the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas as critical habitat, provided the exclusion will not result in extinction of the species. To evaluate the economic impacts of the designation, this analysis is performed exclusively on the full acreage of the proposed designation, and does not examine the costs or benefits of alternative configurations of critical habitat units that may be proposed.⁷
49. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize,

⁶Acreages shown throughout the report are different from those in the proposed rule dated September 24, 2002. The difference, which is caused by geographic information systems software spatial analysis estimation routines, is minor and generates a difference of no more than 0.04 percent of the total.

⁷One of the public comments suggested that costs and benefits estimated in this analysis should assist the Service in choosing from a menu of alternative locations for the designation of critical habitat.

permit, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat currently is construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.

DESCRIPTION OF HABITAT AND SPECIES

50. Vernal pool species live either in vernal pools, swales (shallow drainages that carry water seasonally), or other ephemeral freshwater habitats.⁸ Vernal pools are a subset of wetlands, characterized by seasonally specific timing and duration of inundation. These habitats form in regions with “Mediterranean” climates where shallow depressions fill with water during fall and winter rains and then evaporate in the spring. Downward percolation of standing water is prevented by the presence of an impervious subsurface layer, such as a claypan, hardpan, or volcanic stratum. The physical factors most important in determining the types and kinds of species found in vernal pools are these:

- Pool size
- Depth
- Shape
- Water and soil chemistry
- Hydrology
- Soil type
- Geologic formation
- Landform

51. Vernal pools are usually clustered into interconnected systems of pools, swales, and uplands forming an interwoven matrix of uplands and wetlands called vernal pool complexes. Water remains in the pools and swales between a few days to a few months.

CRUSTACEAN SPECIES

52. Four vernal pool crustacean species are included in the proposed critical habitat designation. Three of the four (Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp) were federally listed as endangered, and the fourth, the vernal pool fairy shrimp, was federally listed as threatened in 1994.

53. Tadpole shrimp (*Lepidurus packardii*) have dorsal compound eyes, a large shield-like shell that covers most of their body, and a pair of long cercopods or appendages at the end of the last abdominal segment. They live primarily at the bottoms of the pools, climbing or scrambling over objects, and plowing along bottom sediments as they forage for food. Their diet consists of organic detritus and living organisms, such as fairy shrimp and other invertebrates.

⁸Information on vernal pool species and their habitat is taken from the U.S. Fish and Wildlife Service, *Proposed Designation of Critical Habitat for Vernal Pool Species*, September 24, 2002 (66 FR 133).

54. In contrast to tadpole shrimp, all fairy shrimp have delicate elongated bodies, large stalked compound eyes, and 11 pairs of phyllopods, or gill-like structures that also serve as swimming legs. Fairy shrimp are filter feeders and consume algae, bacteria, protozoa, rotifers, and bits of detritus as they swim through the water on their backs.
55. Fertilized eggs of both species form a protective protein layer that allows the eggs to withstand heat, cold, and prolonged dehydration. These dormant eggs are known as cysts and they can remain viable in the soil for decades after deposition. Cysts may hatch within days after the vernal pools fill with water and the early stages of the fairy shrimp develop rapidly into adults.
56. Conservancy fairy shrimp (*Branchinecta conservatio*) look similar to other fairy shrimp species. Distinguishing characteristics include the male second antennae, used in clasping the female during copulation. The end segment of each second antenna is about 30 percent shorter than the basal segment, and has a 90 degree bend at the tip. Observations suggest this species is often found in pools that are relatively large and turbid. In general, the Conservancy fairy shrimp have very large populations within a given pool and are usually the most abundant fairy shrimp when more than one fairy shrimp species is present.
57. The longhorn fairy shrimp (*Branchinecta longiantenna*) are named for their relatively long second antennae and are extremely rare. Three disjunct locations along the eastern margin of the central coast range, from the vicinity of Livermore in Contra Costa County to Soda Lake in San Luis Obispo County, form the only known locations of the crustacean.
58. Vernal pool fairy shrimp (*Branchinecta lynchi*) are characterized by the presence of several bulges on the male's antenna and by the female's short pyriform, or pear-shaped, brood pouch. Although the vernal pool fairy shrimp is distributed more widely than most other fairy shrimp species, it is generally uncommon throughout its range and rarely abundant where it does occur.

PLANT SPECIES

59. Eleven listed species of vernal pool plants are included in the proposed critical habitat designation. Fleshy owl's clover (*Castillejoa campestris* spp. succulenta) is an annual whose distribution is primarily along the Southern Sierra foothills of Merced, Fresno, Madera, Stanislaus, and San Joaquin Counties. The plant displays yellow or orange petals and produces capsules with numerous brown, spindle shaped seeds. It was federally listed as threatened in 1997.
60. Hoover's spurge (*Chamaesyce hooveri*) grows close to the ground in the shape of gray-green mats 2 to 40 inches in diameter. It has small structures between each pair of leaves which resemble single flowers, but which are actually flower clusters, consisting of five male and one female flowers. The flowers themselves lack petals, but each flower cluster sits in a cup-like structure with small white appendages that resemble petals. Tiny, white seeds are

contained in a spherical capsule which extends on a stalk beyond the edge of the cup. Hoover's spurge was also federally listed as threatened in 1997.

61. Contra Costa goldfields (*Lasthenia conjugens*) is a member of the Aster family and is found most prominently in Solano County east and south of the City of Fairfield. The species is still extant throughout many other Bay/Delta region counties. Each flower head is yellow with tiny disk flowers in addition to 6 to 13 ray flowers. The plant is 4 to 12 inches tall and was federally listed as endangered in 1997.
62. Butte County meadowfoam (*Limnanthes floccosa* ssp. *californica*) has always been confined to Butte County and occurs primarily on intermediate fan terraces in annual grasslands with a landform characterized by small piles of soil. Stems are typically less than ten inches tall, and produce small, yellow-veined, white flower next to each upper leaf. Each of five pistils in the flower is capable of producing an egg-shaped nutlet 0.1 to 0.2 inches long. Butte County meadowfoam was federally listed as endangered throughout its range in 1992.
63. The remaining seven plant species are members of the grass family and of the Orcuttiae tribe. The Orcuttiae grasses are endemic to vernal pools and have several unusual characteristics. They sprout under water, producing both aquatic and terrestrial leaves as circumstances require, and exude an aromatic coating which likely helps to repel herbivores.
64. Colusa grass (*Neostapfia colusana*) has zigzag stems 4 to 12 inches tall and has the broadest ecological range among the seven grass species included in the proposed critical habitat designation. Existing populations are concentrated in Merced, Solano, Stanislaus, and Yolo Counties. Colusa grass has fan-shaped lower bracts that subtend the flower. The plant was federally listed as threatened in 1997.
65. Sacramento Orcutt grass (*Orcuttia viscida*) is densely tufted, bluish green, and covered with hairs. It grows on high terrace sites in acidic soils with an iron-silica hardpan. Sacramento Orcutt grass has always been restricted to Sacramento County and currently 70 percent of occupied habitat is located in a small area at a short distance from Mather Field. The plant was federally listed as endangered in 1997.
66. San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*) is found in Fresno, Merced, Madera, and Tulare Counties and grows underwater for 3 months or more in vernal pools located on alluvial fans, tabletop lava flows, and stream terraces. The erect stems are 2 to 12 inches in length and have long hairs, giving them a grayish-green color. San Joaquin Valley Orcutt grass was federally listed as threatened in 1997.
67. Hairy Orcutt grass (*Orcuttia pilosa*) stems are 2 to 8 inches tall and grow either erect or laying on the ground with the tips turned upward. The hairiness of the plant gives it a grayish appearance. The species is currently located in Glenn, Madera, and Tehama Counties and prefers stream terraces and alluvial fans. It was federally listed as endangered in 1997.

68. Slender Orcutt grass (*Orcuttia tenuis*) grows in a variety of soil and vegetation types as a single stem or in small tufts of stems 2 to 8 inches tall. The plant's inflorescence (or grouping of flower structures) typically makes up half of the plant's height. Slender Orcutt grass is found primarily in Tehama County, but occurrences have also been reported in Lake, Lassen, Plumas, Shasta, Siskiyou, and Sacramento Counties. It was federally listed as threatened in 1997.
69. Greene's tectaria (*Tectaria greenei*) grows in the Northern Basalt Flow, Northern Claypan, and Northern Hardpan types of vernal pools, typically at shallower depths than the six other grass species included in the critical habitat designation. It can be distinguished from those other species by the shape and arrangement of the scales enclosing flower parts, among other ways. In Central Valley counties the plant lives in grasslands, but in Shasta County the plant is surrounded by pine forests. It was federally listed as endangered in 1997.
70. Solano grass (*Tuctoria mucronata*) has leaves 0.5 to 1.5 inches long that are rolled inward and have pointed tips. It appears grayish-green, hairy, and sticky, with stems that lay on the ground with tips turned upward. The species exists today only in Solano and Yolo counties in vernal pools with Northern Hardpan soil types. The plant was federally listed as endangered in 1978.

PRIMARY CONSTITUENT ELEMENTS

71. In identifying areas as critical habitat for vernal pool species, the Service considered those physical and biological habitat features which are essential to the conservation of the species. These essential features are referred to as the species' primary constituent elements (PCEs). Areas which do not contain any PCEs at the time of critical habitat designation are not considered critical habitat, whether or not they occur within a mapped critical habitat unit. The Service established PCEs for vernal pool crustacean species based on those habitat components essential for the primary biological needs of foraging, sheltering, reproduction, and dispersal.
72. Similarly, PCEs for the vernal pool plant species are based on those habitat components essential for the primary biological needs of germination, growth, reproduction, and dispersal. The PCEs established by the Service for each species tend to fall into two categories: (1) characteristics of areas such as vernal pools with seasonal periods of inundation and drying; and (2) characteristics of surrounding watersheds which maintain the hydrologic features of the seasonally inundated areas.
73. Because of limitations in Geographic Information Systems data, the Service did not exclude all developed areas, such as towns, housing developments, or other lands unlikely to contain the PCEs essential for the conservation of vernal pool species. In addition, the fragmented and isolated nature of remaining vernal pool habitats prevent an easy grouping of the habitats into cohesive units without including some areas that do not contain the PCEs. Existing features and structures within the boundaries of the mapped units, such as buildings, roads, most intensively farmed areas, etc., are unlikely to contain one or more of

the PCEs, and are therefore not considered critical habitat. As a result, Federal actions in those areas would not trigger section 7 consultation unless the actions affect the species or PCEs in adjacent critical habitat.

PROPOSED CRITICAL HABITAT

74. Habitat units for the 11 plant species and 4 crustacean species are proposed for 36 counties in California and 1 county in Oregon. The total critical habitat acreage proposed for each species and the number of proposed habitat units for that species is shown in **Table 1**. Included in this table is also a shorthand abbreviation for each species taken from Service activity logs that will be used in later tables. Most species are associated with three to seven separate proposed habitat units. However, three shrimp species and two plant species have more than seven habitat units, and one plant species, Solano Grass, has only two proposed habitat units. The species with the greatest number of proposed habitat units is the vernal pool fairy shrimp, with 35 units and at least 1 unit in 27 of the 37 counties.
75. In total, there are 128 habitat units covering 1,663,442 acres, or 3 percent of the land area of the counties included in the proposed designation.
76. Because vernal pool species are often located together, many proposed critical habitat units overlap. Habitat units located partially or wholly within each county are shown in **Table 2**, and the total acres covered by at least one critical habitat unit is shown in comparison to the land area of the entire county. For example, the seven-county San Joaquin Valley Region (defined in the next section) contains nearly 716,000 acres of proposed habitat units and ranks first among the regions for total land area proposed for critical habitat. On the other hand, the Northern Coast Region, consisting of two counties with proposed habitat units, has only 6,800 acres of proposed critical habitat. Areas of overlap are only counted once, a necessary step that avoids an overestimation of these land areas.
77. The Service has labeled each species' habitat units by numbering them, starting with habitat unit 1. For example, because there are 15 species named in the proposed critical habitat designation, there are 15 habitat unit 1's. The habitat unit numbers generally increase moving from north to south. For the purposes of this analysis, the 37 counties have been grouped into 10 regions. Descriptions of the 15 species' proposed critical habitat units by region are provided after the regional groupings of the counties are explained.

Table 1
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Summary of Species and Proposed Acreage

Species Common Name	Species Taxonomic Name	Abbreviation	Number of Proposed Units	Proposed Acres [1]
Succulent Owl's Clover	<i>Castilleja Campestris Succulenta</i>	CACAS	8	309,406
Conservancy Fairy Shrimp	<i>Branchinecta Conservatio</i>	CFYS	8	409,735
Hoover's Spurge	<i>Chamaesyce Hooveri</i>	CHHO	7	201,986
Contra Costa Goldfields	<i>Lasthenia Conjugens</i>	LACO	9	38,298
Longhorn Fairy Shrimp	<i>Branchinecta Longiantenna</i>	LFS	3	100,334
Butte County Meadowfoam	<i>Limnanthes Floccosa Californica</i>	LIFLC	4	40,326
Colusa Grass	<i>Neostapfia Colusana</i>	NECO	7	327,668
San Joaquin Valley Orcutt Grass	<i>Orcuttia Inaequalis</i>	ORIN	6	249,715
Hairy Orcutt Grass	<i>Orcuttia Pilosa</i>	ORPI	6	162,271
Slender Orcutt Grass	<i>Orcuttia Tenuis</i>	ORTE	6	175,522
Sacramento Orcutt Grass	<i>Orcuttia Viscida</i>	ORVI	3	60,864
Greene's Tuctoria	<i>Tuctoria Greenei</i>	TUGR	8	353,308
Solano Grass	<i>Tuctoria Mucronata</i>	TUMU	2	18,149
Vernal Pool Fairy Shrimp	<i>Branchinecta Lynchi</i>	VPFS	35	1,130,606
Vernal Pool Tadpole Shrimp	<i>Lepidurus Packardi</i>	VPTS	18	719,965

"species_summary"

Source: U.S. Fish and Wildlife Service, Proposed Designation of Critical Habitat for Vernal Pools Species, September 24, 2002, (66 FR 133); U.S. Fish and Wildlife Service data.

[1] The sum of all 15 species' proposed critical habitat acreage does not equal the total acres designated for critical habitat. Some habitat units overlap each other.

Table 2
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Summary of Habitat Units by County

ID	Region or County	Proposed Habitat Units [1]			Total Acreage In Proposed Units [2]	Total Acreage In County
San Francisco Bay Area						
1	Alameda	LFS 1 LACO 8	VPFS 19	VPTS 14	3,187	472,000
2	Contra Costa	LFS 1	VPFS 19	LACO 6, 7	7,630	460,980
3	Napa	VPFS 17	LACO 2, 3		3,229	482,470
4	Solano	CFYS 3,4 NECO 2	VPFS 15, 16 LACO 4, 5	VPTS 11, 12 TUMU 2	95,956	530,030
	Subtotal				110,002	1,945,480
San Joaquin Valley Region						
5	Fresno	VPFS 24 CACAS 5, 6	VPTS 17	ORIN 4, 5	35,635	3,816,450
6	Kings	VPFS 26			839	889,270
7	Madera	CFYS 7 NECO 7 CHHO 6	VPFS 24, 25 TUGR 7, 8 ORIN 2, 3, 5	VPTS 16 ORPI 5, 6 CACAS 4, 6	112,551	1,368,590
8	Merced	CFYS 6, 7 VPTS 13, 15, 16 ORPI 4 CACAS 3	VPFS 21, 22, 23 NECO 5, 6, 7 CHHO 5, 6	LFS 2 TUGR 7 ORIN 1, 2	338,210	1,234,490
9	San Joaquin	VPFS 18	VPTS 9	CACAS 1	19,952	895,640
10	Stainislaus	CFYS 5, 7 VPTS 13, 16 ORPI 4	LFS 2 NECO 3, 4, 5, 7 CHHO 4, 5, 6	VPFS 20, 21 TUGR 6 CACAS 2	155,146	956,520
11	Tulare	VPFS 26, 27 ORIN 6	VPTS 18	CHHO 7	53,042	3,087,570
	Subtotal				715,375	12,248,530
Mountain Region						
12	Lassen	TUGR 1	ORTE 1		23,719	2,916,790
13	Modoc	ORTE 1			2,413	2,524,390
14	Plumas	ORTE 1			1,287	1,634,540
15	Siskiyou	ORTE 1			5,728	4,023,850
	Subtotal				33,147	11,099,570

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ID	Region or County	Proposed Habitat Units [1]			Total Acreage In Proposed Units [2]	Total Acreage In County
Upper Sacramento Valley Region						
16	Butte	CFYS 1 LIFLC 1, 2, 3, 4 CHHO 1, 2	VPFS 7, 9 TUGR 2, 3, 4 ORTE 4	VPTS 3, 4 ORPI 1, 2	69,716	1,049,340
17	Colusa	CFYS 2 TUGR 5	VPFS 10 ORPI 3	VPTS 5, 6 CHHO 3	5,038	736,500
18	Glenn	CFYS 2 TUGR 5	VPFS 10 ORPI 3	VPTS 5, 6 CHHO 3	10,687	841,530
19	Shasta	VPFS 5 ORTE 1, 2, 3	VPTS 1, 2	TUGR 1	40,352	2,422,820
20	Tehama	CFYS 1 LIFLC 1 CHHO 1	VPFS 6, 7, 8 TUGR 2 ORTE 3, 4	VPTS 2, 3 ORPI 1	147,568	1,888,670
	Subtotal				273,361	6,938,860
Sacramento Valley Region						
21	Placer	VPFS 11,12	VPTS 7		47,761	612,900
22	Sacramento	VPFS 13, 14 ORTE 6	VPTS 8 CACAS 1	ORVI 1, 2, 3	105,815	618,040
23	Yolo	VPTS 10	NECO 1	TUMU 1	474	647,960
24	Yuba	VPFS 11	VPTS 4, 7		7,046	403,490
	Subtotal				161,096	2,282,390
Northern Coast Region						
25	Lake	ORTE 5			4,189	805,420
26	Mendocino	LACO 1			2,635	2,245,940
	Subtotal				6,824	3,051,360
Central Coast Region						
27	Monterey	VPFS 28, 29	LACO 9		77,935	2,126,040
28	San Luis Obispo	LFS 3	VPFS 29, 30		85,328	2,114,880
29	San Benito	VPFS 28			91,181	889,050
	Subtotal				254,444	5,129,970

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Summary of Habitat Units by County

ID	Region or County	Proposed Habitat Units [1]			Total Acreage In Proposed Units [2]	Total Acreage In County
Sierra Nevada Foothills Region						
30	Amador	VPTS 9	ORVI 3		3,407	379,240
31	Calaveras				100	652,920
32	Mariposa	CFYS 6 NECO 6	VPFS 22 TUGR 7	VPTS 13, 15 ORIN 1, 2	17,986	928,780
33	Tuolumne	VPTS 13 CHHO 4	NECO 4 CACAS 2	TUGR 6	2,313	1,430,820
	Subtotal				23,806	3,391,760
Jackson County, Oregon						
34	Jackson	VPFS 1, 2, 3, 4			7,621	1,792,647
Southern California						
35	Riverside	VPFS 33, 34, 35			10,209	4,613,220
36	Santa Barbara	VPFS 31			20,746	1,725,620
37	Ventura	CFYS 8	VPFS 32		46,511	1,181,410
	Subtotal				77,466	7,520,250
GRAND TOTAL					1,663,142	55,400,817

"habitat_summary"

Source: U.S. Fish and Wildlife Service, Proposed Designation of Critical Habitat for Vernal Pools Species, September 2002 (66 FR 133).

- [1] The habitat units for each species are numbered starting with Unit 1. Each habitat unit is designated for a single species. The common names for the species can be found in Table 1.
- [2] Equal to the non-overlapping acreage for all habitat units in each county. The total acreage amount is different from that shown in the proposed rule dated September 24, 2002. The difference, which is caused by Geographic Information Systems software spatial analysis estimation routines, is minor and less than 0.04% of the total.

78. California includes a diverse array of cities, counties, and regions. Counties can be divided into regions in various ways. The division of counties into the regions described below follows Association of Government organizations in some cases, and the regional divisions used by W. Fulton in his *Guide to California Planning*, Second Edition, 1999. Regions with counties having no proposed critical habitat are excluded, as are counties on the periphery of regions if no habitat units have been proposed in them.
- **San Francisco Bay Area:** The San Francisco Bay Area, as defined by the Association of Bay Area Governments, consists of nine counties: Sonoma, Marin, Napa, Solano, Alameda, Contra Costa, San Francisco, San Mateo, and Santa Clara. Four counties – Napa, Solano, Alameda, and Contra Costa – contain proposed critical habitat units.
 - **San Joaquin Valley:** The San Joaquin Valley Region consists of eight counties: Fresno, Kern, Kings, Madera, Merced, Tulare, San Joaquin, and Stanislaus. All but Kern have proposed critical habitat units.
 - **Mountain:** The Mountain Region consists of six counties: Lassen, Modoc, Nevada, Plumas, Sierra, and Siskiyou. All counties except Nevada and Sierra contain proposed critical habitat units.
 - **Upper Sacramento Valley:** The Upper Sacramento Valley Region consists of five counties: Butte, Colusa, Glenn, Shasta, and Tehama. All five contain proposed critical habitat units.
 - **Sacramento Valley:** The Sacramento Valley Region, as defined by the Sacramento Area Council of Governments, consists of six counties: Sacramento, Yolo, Sutter, Yuba, Placer, and El Dorado. Placer, Sacramento, Yuba, and Yolo all contain proposed critical habitat units.
 - **North Coast:** The North Coast Region consists of five counties: Del Norte, Humboldt, Lake, Mendocino, and Trinity. Only Mendocino and Lake contain proposed critical habitat units.
 - **Central Coast:** The Central Coast Region consists of four counties: Santa Barbara, San Luis Obispo, Monterey, and Santa Cruz. All except Santa Cruz contain proposed critical habitat units.
 - **Sierra Nevada Foothills:** The Sierra Nevada Foothills Region consists of four counties: Amador, Calaveras, Mariposa, and Tuolumne. All contain proposed critical habitat units.
 - **Jackson County, Oregon:** This Southern Oregon county has several proposed critical habitat units and lies to the north of Siskiyou County, California.

- **Southern California:** Southern California, for the purposes of this analysis, includes eight counties: San Diego, Imperial, Riverside, San Bernardino, Orange, Los Angeles, Ventura, and Santa Barbara. Only Riverside, Ventura, and Santa Barbara have proposed critical habitat units.

UNITS IN THE SAN FRANCISCO BAY REGION

79. This region contains 19 proposed habitat units for seven species. One longhorn fairy shrimp unit, four vernal pool fairy shrimp units, three vernal pool tadpole shrimp units, seven Contra Costa goldfields units, two Conservancy fairy shrimp units, one Colusa grass unit, and one Solano grass unit are proposed on 110,004 acres in the four counties. The longhorn fairy shrimp unit is the Altamont Hills Unit. The vernal pool fairy shrimp units include the Vacaville Unit, the Jepson Prairie Unit, the Napa River Unit, and the Altamont Hills Unit. Combined, the proposed critical habitat acreage represents 5.7 percent of the region's land area.

UNITS IN THE SAN JOAQUIN VALLEY REGION

80. This region contains 46 proposed habitat units for ten species. Nine vernal pool fairy shrimp units, six vernal pool tadpole shrimp units, six San Joaquin Valley Orcutt grass units, six succulent owl's clover units, three Conservancy fairy shrimp units, five Colusa grass units, three Greene's tectaria units, three hairy Orcutt grass units, four Hoover's spurge units, and two longhorn fairy shrimp units are proposed on 715,812 acres in the seven counties.
81. The vernal pool fairy shrimp units are the San Joaquin Unit, the Caswell Unit, the Stanislaus unit, the Merced Unit, the Grassland Ecological Unit, the Madera Unit, the Kennedy Table Unit, the Cross Creek Unit, and the Pixley Unit. The vernal pool tadpole shrimp units include the Consumnes Unit, the Stanislaus Unit, the Merced Unit, the Grassland Ecological Unit, the Table Mountain Unit, and the Tulare Unit. The San Joaquin Valley Orcutt units are the Merced Unit, the Le Grand Unit, the Madera Unit, the Fresno Unit, the Table Mountain Unit, and the Tulare Unit. The succulent owl's clover units include the Southeast Sacramento Valley Unit, the Waterford Unit, the Merced Unit, the Madera Unit, the Fresno Unit, and the Table Mountain Unit. The Conservancy fairy shrimp units are the Northern San Joaquin Valley Unit, the Merced Unit, and the Grassland Ecological Unit.
82. The Colusa grass units include the Farmington Unit, the Waterford Unit, the Turlock Unit, the Merced Unit, and the Grassland Ecological Unit. The Greene's tectaria units are the Waterford Unit, the Merced Unit, and the Madera Unit. The hairy Orcutt grass units include the Turlock Unit, the Madera Unit, and the Cottonwood Creek Unit. The Hoover's spurge units include the Waterford Unit, the Turlock Unit, the Grasslands Unit, and the Tulare Unit. The longhorn fairy shrimp unit is the Grassland Ecological Unit. Combined, the proposed critical habitat acreage represents 5.8 percent of the region's land area.

UNITS IN THE MOUNTAIN REGION

83. This region contains two proposed habitat units for two species. One Greene's tectaria unit and one slender Orcutt grass unit is proposed on 33,147 acres in the four counties. The Greene's tectaria unit is called the Modoc Plateau Unit and the slender Orcutt grass unit is also called the Modoc Plateau Unit. Combined, the proposed critical habitat acreage represents 0.3 percent of the region's land area.

UNITS IN THE UPPER SACRAMENTO VALLEY REGION

84. This region contains 33 proposed habitat units for eight species. Two Conservancy fairy shrimp units, six vernal pool fairy shrimp units, five vernal pool tadpole shrimp units, four Butte County meadow foam units, five Greene's tectaria units, three hairy Orcutt grass units, three Hoover's spurge units, and two slender Orcutt grass units are proposed on 273,361 acres in the five counties. The Conservancy fairy shrimp units are known as the Vina Plains Unit and the Colusa Unit. The vernal pool fairy shrimp units are known as the Redding Unit, the Red Bluff Unit, the Vina Plains Unit, the Orland Unit, the Oroville Unit, and the Sacramento National Wildlife Refuge Unit. The vernal pool tadpole shrimp units include the Vina Plains Unit, the Oroville Unit, the Sacramento National Wildlife Refuge Unit, the Dolan Unit, and the Suisun Marsh Area Unit.
85. The Butte County meadowfoam units are the Rock Creek Unit, the Chico Unit, the Doe Mill Unit, and the Oroville Unit. The Greene's tectaria units include the Modoc Plateau Unit, the Vina Unit, the Butte Unit, the Richvale Unit, and the Sacramento National Wildlife Refuge Unit. The hairy Orcutt grass units are the Vina Plains Unit, the Butte Unit, and the Sacramento Refuge Unit. The Hoover's spurge units are the Vina Plains Unit, the Butte Unit, and the Sacramento National Wildlife Refuge Unit as well. Finally, the slender Orcutt grass units include the Inskip Hill Unit and the Vina Plains Unit. Combined, the proposed critical habitat acreage represents 3.9 percent of the region's land area.

UNITS IN THE SACRAMENTO VALLEY REGION

86. This region contains 15 proposed habitat units for seven species. Four vernal pool fairy shrimp units, four vernal pool tadpole shrimp units, three Sacramento Orcutt grass units, and one unit each of slender Orcutt grass, succulent owl's clover, Colusa grass, and Solano grass are proposed on 160,955 acres in the four counties. The vernal pool fairy shrimp units include the Beale Unit, the Western Placer County Unit, the Mather Unit, and the Consumnes Unit. The vernal pool tadpole shrimp units are the Oroville Unit, the Beale Unit, the Mather Unit, and the Davis Communications Annex Unit. The Sacramento Orcutt grass units include the Phoenix Field and Phoenix Park Unit, the Southeast Sacramento Valley Unit, and the Rancho Seco Unit. The slender Orcutt grass unit and the succulent owl's clover unit are both called the Southeast Sacramento Valley Unit, the Colusa grass unit and the Solano grass units are both called the Davis Communications Annex and Grasslands Area Unit. The proposed critical habitat acreage represents 7.1 percent of the region's land area.

UNITS IN THE NORTHERN COAST REGION

87. This region contains two proposed habitat units for two species. One slender Orcutt grass unit and one Contra Costa goldfields unit are proposed on 6,824 acres in the two counties. The slender Orcutt grass unit is known as the Bogg's Lake Unit, and the Contra Costa goldfields unit is known as the Manchester Unit. Combined, the proposed critical habitat acreage represents 0.2 percent of the region's land area.

UNITS IN THE CENTRAL COAST REGION

88. This region contains five proposed habitat units for three species. Three vernal pool fairy shrimp units, one Contra Costa goldfields unit, and one longhorn fairy shrimp unit are proposed on 254,445 acres in three counties. The vernal pool fairy shrimp units consist of the San Benito County Unit, the Central Coastal Ranges Unit, and the Carrizo Plain Unit. The Contra Costa goldfields unit is called the Fort Ord Unit, and the longhorn fairy shrimp unit is called the Carrizo Plain Unit. The proposed critical habitat acreage represents 5.0 percent of the region's land area.

UNITS IN THE SIERRA NEVADA REGION

89. This region contains 14 proposed habitat units for nine species. Three vernal pool tadpole shrimp units, one Sacramento Orcutt grass unit, one Conservancy fairy shrimp unit, one vernal pool fairy shrimp unit, two Colusa grass units, two Greene's tectaria units, two San Joaquin Valley Orcutt grass units, one Hoover's spurge unit, and one succulent owl's clover unit are proposed on 23,806 acres in the four counties. The vernal pool tadpole shrimp units are the Consumnes Unit, the Stanislaus Unit, and the Merced Unit. The Sacramento Orcutt grass unit is the Rancho Seco Unit, and the Conservancy fairy shrimp unit and the vernal pool fairy shrimp units are both called the Merced Unit. Both the Colusa grass units and the Greene's tectaria units are called Waterford Unit and the Merced Unit. The San Joaquin Valley Orcutt grass units are the Merced Unit and the Le Grand Unit. Finally, the Hoover's spurge unit and the succulent owl's clover units are both called the Waterford Unit. Combined, the proposed critical habitat acreage represents 0.7 percent of the region's land area.

UNITS IN JACKSON COUNTY, OREGON

90. This county contains four proposed habitat units for one species only. Four vernal pool fairy shrimp units are proposed on 7,621 acres in Jackson County. The units include the North Agate Desert Unit, the White City East Unit, the White City West Unit, and the Table Rocks Unit. The proposed critical habitat acreage represents 0.4 percent of the county's land area.

UNITS IN SOUTHERN CALIFORNIA

91. This region contains six proposed habitat units for two species. One Conservancy fairy shrimp unit and five vernal pool fairy shrimp units are proposed on 77,467 acres in three

counties. For the vernal pool fairy shrimp, the units are the Lake Cachuma Area Unit, the Ventura County Unit, the Hemet-San Jacinto Unit, the Santa Rosa Plateau Unit, and the Skunk Hollow Unit. The unit for the Conservancy fairy shrimp is the Ventura County Unit. The proposed critical habitat acreage represents 1.0 percent of the region's land area.

FRAMEWORK AND METHODOLOGY

92. The primary purpose of this analysis is to estimate the economic impact that will result from the designation of critical habitat for vernal pools species.⁹ This information is intended to assist the Secretary in making decisions about whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.¹⁰ 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).¹¹
93. This chapter provides the framework for this analysis. First, it defines the economic effects considered in the analysis. Second, it establishes the baseline against which these effects are measured. Third, it describes the measurement of direct compliance costs, which include costs associated with, and generated as a result of, section 7 consultations. Fourth, it identifies potential indirect economic effects of the rule resulting from (1) compliance with other parts of the Act potentially triggered by critical habitat, (2) compliance with other laws, and (3) time delays and regulatory uncertainty. Fifth, it discusses the need for an economic assessment of the benefits of critical habitat designation. Finally, the section concludes by discussing the time frame for the analysis and the general steps followed in the analysis.

TYPES OF ECONOMIC EFFECTS CONSIDERED

94. This economic analysis considers both the economic efficiency and distributional effects that may result from the designation. In the case of critical habitat designation, economic efficiency effects generally reflect the "opportunity costs" associated with the commitment of resources required to comply with the Act. For example, if the activities that can take place on a parcel of private land are limited as a result of a designation, and thus the market value of the land reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal Action

⁹This analysis considers the effects of the regulatory action as proposed in the Federal Register on September 24, 2002 (66 *Federal Register* 133, September 24, 2002).

¹⁰16 U.S.C. § 1533(b)(2).

¹¹Executive Order 12866, "Regulatory Planning and Review," September 30, 1993; Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001; 5 U.S.C. §§ 601 *et seq*; and Pub Law No. 104-121; and 2 U.S.C. §§658-658g and 1501-1571.

agency to consult with the Service under section 7 represent opportunity costs of the designation.

95. This analysis also addresses how the impacts of the designation are distributed, including an assessment of any local or regional economic impacts of the designation and the potential effects of the designation on small entities, the energy industry, or governments. This information can be used by decision-makers to assess whether the effects of the designation might unduly burden a particular group or economic sector.
96. For example, while the designation may have a relatively small impact when measured in terms of changes in economic efficiency, individuals employed in a particular sector of the economy in the geographic area of the designation may experience relatively greater effects. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

Efficiency Effects

97. 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 understand how society, as a whole, will be affected by a regulatory action.¹² In the context of this regulatory action, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of critical habitat designation. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.¹³
98. 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 need to 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 represents an economic opportunity cost, because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When 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 can provide a reasonable estimate of the change in economic efficiency.

¹²Executive Order 12866, "Regulatory Planning and Review," September 30, 1993; Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001; 5 U.S.C. §§ 601 *et seq.*; and Pub Law No. 104-121; and 2 U.S.C. §§658-658g and 1501-1571.

¹³For 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., *A Guide to Benefit-Cost Analysis (2nd Ed.)*, Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, September 2000, available at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

99. Where a designation is 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 can be measured by considering changes in producer and consumer surplus in the real estate market.
100. This analysis begins by measuring reasonably foreseeable compliance costs resulting from the designation. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the designation is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

Distributional and Regional Economic Effects

101. Measurements of changes in economic efficiency focus on the net impact of the regulation, without consideration for how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations concerning groups that may be disproportionately affected. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.¹⁴ This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply distribution and use; impacts on governments; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

Impacts on Small Entities, Energy Supply, Distribution and Use

102. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by critical habitat designation.¹⁵ 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 critical habitat on the energy industry and its customers.^{16,17}

Regional Economic Effects

103. Regional economic impact analysis provides an assessment of the potential localized effects of critical habitat designation. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional

¹⁴Office 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.

¹⁵U.S.C. § 601 *et seq.*

¹⁶U.S.C. § 601 *et seq.*

¹⁷2 U.S.C. §§ 658g and 1501-1571.

economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., hydroelectric power generation) and the effect of that change on economic output, income, or employment in other local industries (e.g., manufacturers relying on the electricity generated). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

104. The use of regional input/output models in an analysis of the impacts of critical habitat 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. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the designation, compensating for a potential decrease in economic activity within the region.
105. 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 losses. These types of distributional effects, therefore, should be reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects.

DEFINING THE BASELINE

106. OMB guidelines for conducting economic analysis of environmental regulation direct Federal agencies to measure the costs of a regulatory action against a baseline¹⁸. In its guidance, OMB states, the “baseline should be the best assessment of the way the world would look absent the proposed action” (i.e., absent the designation of critical habitat). In other words, the baseline includes the currently existing regulatory and socioeconomic burden imposed on landowners and managers potentially affected by the designation of critical habitat. The baseline burden may include, for example:
- Local zoning laws;
 - State natural resource laws;
 - Enforceable management plans and best management practices applied by other State and Federal agencies;

¹⁸U.S. Office of Management and “Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice,” 68 *Federal Register* 5492, February 3, 2003; and U.S. Office of Management and Budget, “Appendix 4: Guidelines to Standardize Measure of Costs and Benefits and the Format of Accounting Statements,” in *Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000.

- Federal, State, and local protections already in place in the same geographic area for other (Federal and State) listed species;¹⁹ and/or
 - Statutory protections provided for the species by the Act that exist in the absence of designated critical habitat
107. Existing baseline laws, regulations, and policies are described in greater detail in **Chapter II** and in **Appendices D and E** of this analysis.
108. This analysis describes impacts that are expected to occur above and beyond the baseline. In other words, it measures the costs of compliance with the Act that would not occur in the absence of the currently proposed critical habitat. Importantly, economic impacts associated with section 9 and 10 of the Act, with a few exceptions, are considered to be part of the regulatory baseline and thus are not addressed in this report. These costs are considered to be part of the baseline because they remain unaffected by the designation of critical habitat.

Direct Compliance Costs Associated With Section 7 of the Act

109. The measurement of direct compliance costs focuses on the implementation of section 7 of the Act. This section 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 critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent the direct compliance costs of designating critical habitat.
110. The estimate of total section 7 impacts presented in this analysis does not differentiate between consultations that result from the listing of the species (i.e., the jeopardy standard) and consultations that result from the presence of critical habitat (i.e., the adverse modification standard). Consultations resulting from the listing of the species, or project modifications meant specifically to protect to the species as opposed to its habitat, may occur even in the absence of critical habitat. However, 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 critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes.²⁰ Given the similarity in regulatory definitions between the terms “jeopardy” and “adverse modification,” in practice it can be difficult to pre-determine the standard that drives a section 7 consultation. Consequently, in an effort to ensure that this economic analysis complies with the instructions of the 10th Circuit as well as to ensure that no costs of the designation are omitted, the potential effects associated with all section 7 impacts in or near proposed critical habitat are fully considered. In doing so, the analysis ensures that any critical habitat impacts that are co-extensive with the listing of the species

¹⁹Certain regulations that provide baseline protection for the species and its habitat may also be the source of indirect costs resulting from new information provided by the designation.

²⁰*New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001).

are not overlooked. As a result, this analysis likely overstates the regulatory effects under section 7 attributable to the designation of critical habitat.

111. Where available data identify section 7 impacts that would not have occurred absent the designation of critical habitat, the analysis provides supplemental information on the potential fraction of total costs attributable solely to the designation (i.e., rather than attributable co-extensively to other causes). Specifically, **Chapter V** of this analysis isolates a subset of private land development costs associated with consultations that are driven by the informational value of the designation. Without maps of the designation highlighting the potential presence of vernal pool species in certain locations, these consultations may not occur. This subset of costs provides perspective on the relative contribution of the designation to total section 7 impacts.

Indirect Costs

112. The designation may, under certain circumstances, affect actions that do not have a Federal nexus or otherwise are not subject to the provisions of section 7 under the Act. The potential exists for several types of such indirect effects: three examples are discussed in this section. First, some landowners may voluntarily elect to complete a habitat conservation plan (HCP) in response to having their land designated as critical habitat. Second, some State laws may require landowners and managers to consider the effects of their actions on sensitive species and habitat. Thus, designation of critical habitat could trigger additional regulatory burden due to new information provided by the designation. Third, the consultation process may result in time delays for upcoming or ongoing projects, and the designation may foster regulatory uncertainty for prospective projects. If such additional efforts would not have occurred in the absence of critical habitat (i.e., “but for” critical habitat), then they are considered by this analysis to be an impact of the designation. The three most common categories of indirect effects are discussed further below.

Creation of HCPs

113. Under section 10(a)(1)(B) of the Act, a non-Federal entity (i.e., a landowner or local government) may develop an HCP for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.²¹ The HCP intends to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with section 9 of the Act and to meet the requirements of section 10 of the Act. HCPs are not necessarily precipitated by a critical habitat designation.

²¹U.S. Fish and Wildlife Service, “Endangered Species and Habitat Conservation Planning.” From: <http://endangered.fws.gov/hcp/>, as viewed on August 6, 2002. Sections 9 and 10 of the Act do not apply to plants.

114. However, a connection may exist between the creation of HCPs and the costs these plans impose and the designation of critical habitat. The Service, being a Federal entity, must formally consider whether an HCP will jeopardize a listed species or adversely modify its designated critical habitat before approving the plan. This review process may be a direct impact under section 7 of the Act. However, in certain circumstances, the effort involved in creating the HCP and associated conservation actions may also generate indirect effects associated with the designation of critical habitat. For example, in one past instance, landowners preemptively developed HCPs in an effort to avoid having their property designated as critical habitat.²² In this case, the effort involved in creating the HCP and undertaking associated conservation actions were considered to be an effect of designation.
115. The following scenarios regarding HCP creation provide general guidance regarding the degree to which associated costs should be considered within the context of a critical habitat economic analysis:
- In cases in which an HCP existed prior to a proposed designation, the costs of developing the HCP and the added costs of management imposed by the HCP should not be considered in the analysis of the effects of the designation. These costs are appropriately considered to be part of the regulatory baseline, because their creation was driven by the listing of the species and the need to avoid take, which is prohibited under section 9 of the Act. However, in cases where designated critical habitat overlaps with completed HCPs, the economic analysis will need to consider the cost to the Service to re-consult on the plan's impact to critical habitat and whether or not this process may result in additional conservation actions.
 - In cases in which an HCP is proposed, or reasonably foreseeable absent the designation of critical habitat, the administrative costs associated with the required internal section 7 consultation should be included in the economic analysis of total section 7 costs, because the Service will need to consider the effects of the plan on designated critical habitat. In addition, if as a result of the designation additional project modifications will be recommended by the Service and incorporated into the HCP in order to avoid adversely modifying critical habitat, the costs of these project modifications also should be included in the economic analysis of critical habitat.²³

²²See Industrial Economics, Incorporated, *Draft Economic Analysis of Critical Habitat Designation for the Nine Bexar County Texas Invertebrate Species*, prepared for the U.S. Fish and Wildlife Service, October 2002.

²³Project modification costs associated with the jeopardy standard are not considered for the following reason. Section 10(a)(2)(B) of the Act requires that for the issuance of an incidental take permit, the HCP must assure that "the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild." According to the Service's *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, "the wording of this criterion is identical to the "jeopardy" definition under the section 7 regulations (50 CFR Part 402.02)...Congress was explicit about this link, stating in the Conference Report on the 1982 ESA amendments that the Services will determine whether or not to grant a permit, "in part, by using the same standard as found in section 7(a)(2) of the ESA, as defined by the [Services'] regulations." (U.S. Department of the Interior and U.S. Department of Commerce, *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, November 4, 1996). As a result, during the HCP process, actions undertaken to meet the jeopardy provision of section 7 are also required under section 10 of the Act and are

- In cases in which development of one or more HCPs can be documented as being precipitated by critical habitat designation (i.e., to avoid designation or to reduce the costs of the designation), the costs of development of the HCP and the added costs of management imposed by the HCP should be included in the critical habitat economic analysis. In such cases the analysis should be presented with appropriate caveats as to the uncertainty regarding the extent to which the HCP would have existed absent critical habitat designation.

Other State and Local Laws

116. Under certain circumstances, the designation of critical habitat 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 “but for” the designation of critical habitat, they are included in this economic analysis.
117. For example, the California Environmental Quality Act (CEQA) requires that lead agencies – public agencies responsible for project approval – consider the environmental effects of proposed projects that are considered discretionary in nature and not categorically or statutorily exempt. Among other effects, the CEQA statutes specifically require lead agencies to consider a project’s effects on rare or endangered plant and animal communities. To approve qualifying projects, lead agencies must require applicants, who are not “categorically exempt,” to mitigate effects to less than significant levels for projects that are not granted a “statement of overriding considerations.”²⁴
118. In some instances, the designation of critical habitat can have an indirect effect on CEQA-related requirements. This is most likely to occur in areas where the Federal designation provides clearer information on the importance of particular areas as habitat for a listed species. In addition, applicants who were “categorically exempt” from preparing an EIR under CEQA may no longer be exempt once critical habitat is designated. In cases where the designation triggers the CEQA significance test or results in a reduction of categorically exempt activities, associated costs are considered to be an indirect effect of the designation.
119. In these and other cases in which costs are incurred by landowners and managers above and beyond what would be required under State or local law and policy in the absence of the designation, these costs are considered to be an indirect effect of the designation. As such, these economic effects are reported in the analysis.

therefore considered to be part of the baseline of this economic analysis.

²⁴Article 19 of CEQA provides a list of categorical exemptions, which are descriptions of types of projects that usually do not have a significant effect on the environment (e.g., replacement or reconstruction of existing facilities, actions taken by regulatory agencies as authorized by State law or local ordinance to assure the maintenance, restoration, or enhancement of a natural resource.) (<http://ceres.ca.gov/ceqa/flowchart/exemptions/categorical.html>, as viewed on April 21, 2003.)

Time Delays and Regulatory Uncertainty

120. In addition to the indirect effects of compliance with other laws triggered by the designation, project proponents, land managers and landowners may face additional indirect impacts. These can include costs due to project delays associated with the consultation process or compliance with other regulations, or, in the case of land location within or adjacent to the designation, loss in property values due to regulatory uncertainty, and loss (or gain) in property values resulting from public perceptions regarding the effects of critical habitat. These categories of potential effects are described in greater detail below.

Time Delays

121. 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 triggered by 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 baseline 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. To the extent that delays result from the designation, they are considered in the analysis. Specifically, the analysis considers costs associated with any incremental time delays associated with section 7 consultation or other requirements triggered by the designation above and beyond project delays resulting from baseline regulatory processes.

Regulatory Uncertainty

122. The Service conducts each section 7 consultation on a case-by-case basis and issues a Biological Opinion on formal consultations based on species-specific and site-specific information. As a result, government agencies and affiliated private parties who need to consult with the Service under section 7 may face uncertainty concerning whether project modifications will be recommended by the Service and what the nature of these modifications will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. However, a degree of regulatory uncertainty may persist. In some cases, this uncertainty may be incorporated by the project proponent into the costs of completing a proposed activity. For example, mining companies uncertain about potential restrictions to their activities in designated areas of critical habitat may lease mining rights at a reduced rate. Additionally, landowners may incur costs determining whether their property constitutes critical habitat.²⁵ They may retain outside experts or legal counsel to better understand their responsibilities with regard to critical habitat. Where appropriate, the analysis considers the potential costs associated with regulatory uncertainty.

²⁵Designated critical habitat may also reduce such costs in the sense that boundaries are legally defined in the rule, which in some cases, clarifies the importance of specific land parcels.

Stigma

123. In some cases, the public may perceive that critical habitat designation may result in incremental changes to private property values, above and beyond those associated with anticipated project modifications and regulatory uncertainty described above. That is, the public may perceive that, all else being equal, a property that is designated as critical habitat will have lower market value than an identical property that is not within the boundaries of critical habitat. Public attitudes about the limits and costs that critical habitat may impose can cause real economic effects to the owners of property, regardless of whether such limits are actually imposed.
124. Conversely, the direction of property value effects resulting from critical habitat may be positive rather than negative. For example, property owners may believe that critical habitat designation will increase property values, if they believe that such designation will slow sprawling development in a given community (i.e., protect the rural character of an area) or increase water quality of neighborhood streams and rivers. This perception alone may result in real increases in land values, even in cases where the economic analysis predicts no additional requirements on activities taking place in the area. In either case, as the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets should decrease. This analysis considers the implications of public perceptions related to critical habitat on private property values within the proposed designation.

BENEFITS

125. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species. Such benefits have also been ascribed to preservation of open space and biodiversity, both of which are associated with species conservation. Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.
126. In Executive Order 12866, OMB directs Federal agencies to provide an assessment of costs and benefits of a proposed regulatory actions.²⁶ However, in its guidance for implementing Executive Order 12866, OMB acknowledges that often, it may not be feasible to monetize, or even quantify, the benefits of environmental regulations. Where benefits cannot be quantified, OMB directs agencies to describe the benefits of a proposed regulation qualitatively.²⁷ This report provides insight into the potential economic benefits of critical habitat designation based on information obtained in the course of developing the economic

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

²⁷U.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; and U.S. Office of Management and Budget, "Appendix 4: Guidelines to Standardize Measure of Costs and Benefits and the Format of Accounting Statements," in *Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000.

analysis. It is not intended to provide a complete analysis of all of the benefits that could result from the designation. Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

ANALYTIC TIME FRAME

127. The analysis examines activities taking place both within and adjacent to the proposed designation. It estimates impacts 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. Accordingly, the analysis bases estimates on activities that are likely to occur within a 20-year time frame, beginning on the day that the current proposed rule becomes available to the public.
128. Twenty years is an appropriate time frame for this analysis for several reasons. First, the land use model chosen for this economic analysis provides mapping output for 1998 and 2020. As an approximation of baseline conditions, the 1998 output describes land that is already urbanized in 20 counties. Additional land developed by 2020 provides a good foundation for estimating consultation requirements between the Service and the United States Army Corps of Engineers (ACOE) in these counties, as described in **Appendix E**. The acreage transformed from agricultural or undeveloped uses into urban uses between 1998 and 2020 (as projected by the model) is not significantly different than an estimate of newly urbanized acreage between 2003 and 2023 and errs on the conservative side.
129. Second, the scale of the proposed critical habitat designation requires the use of regional and county level growth data. In the State of California, this data is readily available beyond the ten year horizon. A 20-year time frame is very common among a number of planning and development tools including: California State-mandated jurisdictional General Plans, population and employment projections by regional associations of governments, and project planning and the calculation of absorption rates and financial rates of return by real estate developers. If the proposed critical habitat designation had been restricted to a handful of local, single-county sites, this data would not have been useful and a shorter interval period, perhaps 10 years, would have been more appropriate.
130. In addition, speculative real estate transactions in high growth communities in the Central Valley, for instance, frequently occur involving land not yet annexed into cities and land upon which development is not likely to occur for 15 to 20 years. Master planned communities consisting of hundreds, if not thousands, of acres of raw land increasingly require more than ten years to receive planning approvals from local, State and Federal agencies. Certain land development interests that precede the ownership by the eventual land developer, therefore, often financially control property more than a decade in advance of the first project application. Farming or ranching may continue, but critical habitat designation has the potential to affect development potential and associated speculative land value at a very early stage in the development process. Changes in these land values are a major focus of this analysis and establish the value of a 20-year interval for growth impacts.

GENERAL ANALYTIC STEPS

131. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts of the designation. The steps followed in this analysis are these:

- Describing current and projected economic activity within and around the proposed critical habitat area;
- Identifying whether such activities are likely to involve a Federal nexus;
- For activities with a Federal nexus, evaluating the likelihood that these activities will require consultations under section 7 of the Act and, in turn, result in any modifications to projects.
- Estimating the direct costs of expected section 7 consultations, project modifications and other economic impacts associated with the designation;
- Estimating the likelihood that current or future activities may require additional compliance with other Federal, State, and local laws as a result of new information provided by the designation;
- Estimating the likelihood that projects will be delayed by the consultation process or other regulatory requirements triggered by the designation;
- Estimating the likelihood that economic activity will be affected by regulatory uncertainty, and/or property values affected;
- Estimating the indirect costs of the designation, as reflected in the cost of compliance with State and local laws, project delays, regulatory uncertainty, and effects on property values;
- Estimating the potential fraction of total section 7 costs that likely would not have occurred but for the designation of critical habitat (i.e., attributable solely to the designation);
- Assessing the extent to which critical habitat designation will create costs for small businesses as a result of modifications or delays to projects;
- Assessing the effects of administrative costs and project modifications on the supply, distribution, and use of energy; and
- Determining the benefits that may be associated with the designation of critical habitat.

132. As noted above, this analysis considers both the efficiency effects and distributional effects that could result from this designation. It begins by considering direct compliance costs associated with the designation, as well as potential indirect effects, such as those effects associated with compliance with other Federal, State, and local laws, project delays, and impacts to property values. As necessary, regional economic impacts are described, as are impacts on significantly affected markets. Impacts on small entities and energy production and consumption are discussed separately, in **Chapters IV and VI**. Potential benefits of critical habitat are discussed qualitatively, in **Chapter VII**.

INFORMATION SOURCES

133. The methodology outlined above relies on input and information supplied by staff from the Service; the Department of Defense (DoD); the Federal Aviation Administration (FAA); the Federal Highway Administration (FHWA) and its State counterpart, the California Department of Transportation (Caltrans); the Environmental Protection Agency (EPA); the Bureau of Reclamation (BoR); the Bureau of Indian Affairs (BIA); the U.S. Forest Service (USFS); the Federal Energy Regulatory Commission (FERC); the Western Area Power Administration (WAPA); ACOE; the Federal Railroad Administration (FRA); and the Federal Transit Administration (FTA). Each time an agency provided information in a phone or in person interview, the citation provides the staff position, the location of agency office where the staff person is based, and the date of the interview.²⁸
134. Land value and land consumption modeling information was obtained from RAND California, the Institute of Urban and Regional Development at the University of California, Berkeley, the Sacramento Area Council of Governments, the Association of Bay Area Governments, the Southern California Association of Governments, the California State Department of Finance, and numerous city and county planning departments.
135. Comments and information on land uses and the effects of critical habitat designation were not available from private landowners during the preparation of this analysis, so this analysis uses information from the possible Action agencies regarding activities occurring on the private land and the likelihood of Federal nexuses being associated with these activities. During the public comment period, many individuals, including landowners, commented in writing on issues in the proposed rule. This final report benefits from both agency and private landowner information submitted during the public comment period.²⁹

²⁸One public comment suggested that information obtained from personal interviews should be better documented. However, the information collected in the course of preparing the DEA has been sufficiently documented for a second party to reproduce the information if needed.

²⁹One public comment suggested that information should have been obtained from private land owners prior to the DEA. The comment period is intended to allow such sources to supply additional information should it be necessary. When information provided is superior to that previously used, it is incorporated into the final report.

II. DESIGNATION IMPACT ON PRIVATE LAND DEVELOPMENT

136. This chapter evaluates the economic impact of the proposed critical habitat designation on real estate land development activities and markets. Specifically, it focuses on the effect the designation may have on the supply and demand for land used in urban development, associated real estate production, and agriculture. An overview of our general methodology and approach is provided first, followed by a presentation of the analysis and estimated administrative and project modification costs. The chapter concludes with a brief evaluation of impacts to agriculture. Additional cost impacts on private land development are explained and estimated in **Chapter III**.

ANALYTICAL APPROACH AND METHODOLOGY

137. The regulation of land use through section 7 and the designation of critical habitat can potentially affect the land market and associated landowners as well as the real estate market and associated consumers (e.g., homebuyers) and producers (e.g., residential developers). The total economic impact will depend on the scope and intensity of section 7 consultations and project modifications, the pre-existing regulatory framework in the region, and the nature of regional land and real estate markets. In order to accurately account for all of these factors, and to estimate the corresponding economic impacts, this analysis employs a series of methodological tasks, as described below and summarized in Figure 1.

DETERMINE PRIVATE LAND AFFECTED BY DESIGNATION

138. The first step in evaluating the effect of critical habitat designation on private development is to identify the amount, type and location of land included in the designation. The effect on private development should only include private land that can be developed during the time frame of the analysis and those development projects that are likely to have a Federal nexus. Public infrastructure projects are evaluated separately in Chapter IV.

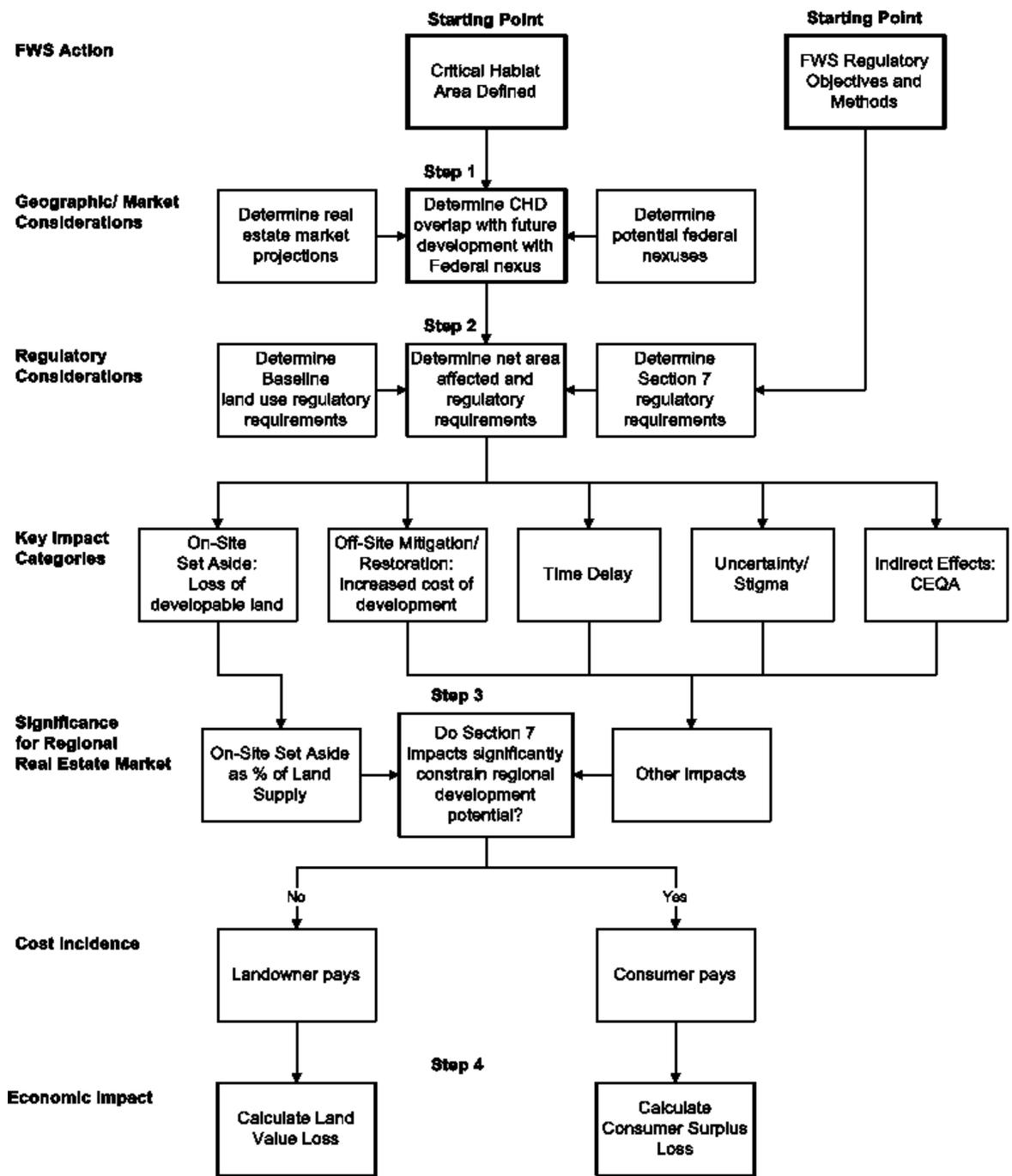
DETERMINE REGULATORY REQUIREMENTS AND IMPACT CATEGORIES

139. The actual effects of critical habitat designation on applicable land development projects will be determined by the type and level of project modifications likely to result from section 7 consultations. Thus, the second step in the evaluation process is to estimate the compliance requirements and costs associated with the designation, including required wetlands compensation and administrative costs. This step must also subtract the requirements or costs associated with pre-existing regulations or land use restrictions, including other Federal regulations and State, local, or regional laws and agreements. As part of this step, the type of impacts associated with each regulatory requirement should be clearly identified.

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Figure 1
Conceptual Framework for Economic Analysis
for Economic Analysis of section 7 Effects

Private Land Development - Conceptual Framework for Economic Analysis of Section 7 Effects



QUANTIFY EFFECTS OF LAND MARKET IMPACTS AND ADMINISTRATIVE COSTS

140. Section 7 will have a number of direct effects through administrative costs as well as project modification requirements. The third step focuses on estimating the economic costs of these direct effects. Project modification costs occur due to both land set-aside requirements and compliance costs, such as payments to mitigation banks. These costs will affect the land market and the value of directly regulated land, so this step estimates the reduction in land values associated with project modifications. Administrative consultation costs are also estimated as part of this step, and total direct section 7 costs are estimated.

EVALUATE EFFECTS ON REGIONAL REAL ESTATE MARKET DYNAMICS

141. Under certain circumstances, section 7 compliance requirements may affect the regional real estate market dynamics. In these cases, the economic impacts may extend beyond individually regulated landowners and affect the real estate market as a whole, including consumers of real estate products. Such cases may arise if the following circumstances exist:
- The on-site set-aside requirements associated with section 7 are high relative to the developable land in the region, and/or
 - The total compliance costs are high relative to real estate development value and cover a significant proportion of developable land.
142. Conversely, if compliance costs are low or the designation only affects a small fraction of the total developable land supply in a region, then the economic effects are likely to be limited to the small subset of individual landowners or projects with a Federal nexus. These landowners will not be able to pass on their increased costs to consumers and their development projects will either relocate to other available sites or proceed at a reduced value. Thus, the fourth step in this analysis is to determine the significance of the additional designation-related constraints relative to local real estate demand and supply dynamics.

QUANTIFY EFFECTS OF REAL ESTATE MARKET IMPACTS

143. If the real estate market as a whole is unaffected by the designation, the burden falls on individual property owners or projects and no additional economic losses are estimated. If the designation is expected to have an appreciable effect on specific regional real estate markets, resulting in a marketwide increase in price or decline in production, for example, then an additional burden will fall on the consumers and producers of real estate. Under these circumstances, net changes in consumer and producer surplus represent additional economic losses, and are calculated based on the best available data.³⁰ These additional

³⁰Consumer surplus is the difference between the total value consumers receive from a particular good and the total amount they pay for that good. When the price of a good rises, consumer surplus falls since some consumers seek other options for housing and the consumers who remain in the market pay a higher price for the same good at a higher price.

economic costs are then added to the other economic costs, including the direct costs estimated under step three and the indirect costs estimated in **Chapter III**.

PRIVATE LAND SUBJECT TO A FEDERAL NEXUS

144. *Over 20 years, approximately 48,000 acres of the 1.7 million acres proposed for designation are expected to have a Federal nexus as a result of urban growth projected to occur in the 37 counties.*
145. Following the methodology outlined above, this section estimates the number of acres of projected development within proposed critical habitat that will involve a Federal nexus. This calculation starts with the total number of acres within proposed critical habitat and deducts land area that is unlikely to be affected by the designation (i.e., there is no nexus, or it would not be developed in the 20-year time horizon considered in this analysis). A summary of this calculation is provided in **Tables 3a and 3b** and further described below.

PROJECTED GROWTH IN PROPOSED CRITICAL HABITAT

146. The estimate of land area proposed for critical habitat and likely to be developed is based on the critical habitat unit maps provided by the Service and urbanized land estimates for each of the 37 counties included in the designation. The time frame for this analysis is 20 years, a period that corresponds well with the planning horizon for most jurisdictions as well as the most comprehensive land urbanization data available for California counties. Adequate data is not available for periods beyond 2020 for most counties.
147. The urbanized land estimates are based on three elements:
- The California Urban Biodiversity Assessment (CURBA) model, designed and run by faculty of the University of California, Berkeley;
 - Service data describing known locations of likely development projects where section 7 consultations will be required;³¹ and
 - Growth projection data and interviews with local government planning officials concerning the 20 year growth path of communities in each county.
148. It was not necessary to use all three information sources to determine the amount of land slated for development and proposed for critical habitat in each county. First, on a county-

³¹Numerous authors of comments suggested that specific properties identified in the comments have economic impacts resulting from the designation that were not addressed in the DEA, or that the CURBA model has underestimated the acreage likely to be developed over 20 years. As explained in **Appendix B**, the FEA combined land consumption estimates from three sources to estimate a total amount of affected acreage in each county over the next 20 years. One of those sources identifies specific properties. However, the impacts will be estimated correctly if the total acreage affected is estimated correctly. Thus, only where knowledge of specific projects would add additional acreage to the land consumption estimate was this information used.

Table 3a
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Urban Growth in Counties with Proposed Critical Habitat [1]

ID	Region or County	County Total Land Area	Proposed Critical Habitat Land Area		Projected Urban Growth Over 20 Years [2]	Urban Growth Projected Within Critical Habitat	
			Group A [3]	Group B [3]		Group A [3]	Group B [3]
		<i>acres</i>			<i>acres</i>		
	San Francisco Bay						
1	Alameda	472,000	2,056	1,131	44,404	872	981
2	Contra Costa	460,980	3,626	4,004	31,044	0	0
3	Napa	482,470	1,620	1,609	9,454	276	12
4	Solano	530,030	55,312	40,644	40,844	3,320	3,172
	Subtotal	1,945,480	62,614	47,388	125,746	4,468	4,165
	San Joaquin Valley Region						
5	Fresno	3,816,450	35,635	0	38,188	1,944	0
6	Kings	889,270	839	0	14,492	1	0
7	Madera	1,368,590	112,551	0	22,031	15,318	0
8	Merced	1,234,490	50,364	287,846	17,569	408	4,119
9	San Joaquin	895,640	19,952	0	85,176	0	0
10	Stanislaus	956,520	4,476	150,670	30,399	0	0
11	Tulare	3,087,570	53,042	0	30,696	244	0
	Subtotal	12,248,530	276,859	438,516	238,552	17,915	4,119
	Mountain Region						
12	Lassen	2,916,790	23,719	0	[4]	0	0
13	Modoc	2,524,390	2,413	0	[4]	0	0
14	Plumas	1,634,540	1,287	0	[4]	607	0
15	Siskiyou	4,023,850	5,728	0	[4]	0	0
	Subtotal	11,099,570	33,147	0	[4]	607	0
	Upper Sacramento Valley Region						
16	Butte	1,049,340	24,857	44,859	[4]	1,041	2,718
17	Colusa	736,500	1,298	3,740	[4]	1,298	0
18	Glenn	841,530	304	10,383	[4]	0	0
19	Shasta	2,422,820	40,352	0	[4]	2,467	0
20	Tehama	1,888,670	116,450	31,118	[4]	98	26
	Subtotal	6,938,860	183,261	90,100	[4]	4,904	2,744
	Sacramento Valley Region						
21	Placer	612,900	47,761	0	27,538	7,285	0
22	Sacramento	618,040	47,495	58,320	48,527	605	4,776
23	Yolo	647,960	0	474	3,664	0	0
24	Yuba	403,490	7,046	0	[4]	0	0
	Subtotal	2,282,390	102,302	58,794	79,729	7,890	4,776
	Northern Coast Region						
25	Lake	805,420	4,189	0	[4]	0	0
26	Mendocino	2,245,940	2,635	0	[4]	0	0
	Subtotal	3,051,360	6,824	0	[4]	0	0

Table 3a
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Vernal Pool Species Critical Habitat Designation Final Economic Analysis
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ID	Region or County	County Total Land Area	Proposed Critical Habitat Land Area		Projected Urban Growth Over 20 Years [2]	Urban Growth Projected Within Critical Habitat	
			Group A [3]	Group B [3]		Group A [3]	Group B [3]
		<i>acres</i>			<i>acres</i>		
	Central Coast Region						
27	Monterey	2,126,040	69,607	8,328	52,528	828	0
28	San Luis Obispo	2,114,880	85,328	0	37,374	1,616	0
29	San Benito	889,050	91,181	0	9,853	0	0
	Subtotal	5,129,970	246,116	8,328	99,755	2,444	0
	Sierra Nevada Foothills Region						
30	Amador	379,240	725	2,682	[4]	0	0
31	Calaveras	652,920	0	100	[4]	0	0
32	Mariposa	928,780	978	17,008	[4]	0	0
33	Tuolumne	1,430,820	1,307	1,006	[4]	0	0
	Subtotal	3,391,760	3,010	20,796	[4]	0	0
	Jackson County, Oregon						
34	Jackson	1,792,647	7,621	0	[4]	1,289	0
	Southern California						
35	Riverside	4,613,220	10,209	0	419,176	4,332	0
36	Santa Barbara	1,725,620	20,746	0	25,552	0	0
37	Ventura	1,181,410	0	46,511	71,919	0	0
	Subtotal	7,520,250	30,955	46,511	516,647	4,332	0
37 COUNTY AREA GRAND TOTAL [5]		55,400,817	952,709	710,433	1,060,429	43,849	15,804

"overlap"

Sources: CURBA Model (J. Landis et al., 1998), U.S. Census Bureau, California State Department of Finance, Sacramento Area Council of Governments, Association of Bay Area Governments, Southern California Association of Governments, Fresno and Merced Counties, and Oregon State Office of Economic Analysis.

[1] All figures are in acres.

[2] Projected urban growth data is taken from CURBA model results.

[3] All land area within critical habitat units designated for species with few remaining populations (Butte County Meadowfoam, Colusa Grass, Conservancy Fairy Shrimp, Sacramento Orcutt Grass, Contra Costa Goldfields, or Solano Grass) is classified by this analysis as acres of Group B habitat. Land area within critical habitat solely designated for the ten other vernal pool species is classified as acres of Group A habitat. The distinction is made to capture differences in expected section 7 regulation between the two.

[4] These counties are not included in the CURBA Model and do not have an easily calculated land area for urban growth over 20 years. Alternative methods were applied to determine county sub-area land needs given projected population growth.

[5] Total acres of proposed critical habitat for the 15 species is 1,663,442 acres.

Table 3b
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
County Estimates of Land with a Federal Nexus in Proposed Critical Habitat Areas

Co. #	County Name	Gross Acres of Overlap by 2020		Gross Acres Overlap Following Developer Avoidance [2]		Gross Acres Overlap with Federal Nexus [3]		Net Acres Overlap with Fed. Nexus & Avail. For Development [4]	
		Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
San Francisco Bay Area									
1	Alameda County	872	981	785	883	706	795	530	596
2	Contra Costa County	0	0	0	0	0	0	0	0
3	Napa County	276	12	248	11	224	10	168	7
4	Solano County	3,320	3,172	2,988	2,855	2,689	2,569	2,017	1,927
	Subtotal	4,468	4,165	4,022	3,749	3,619	3,374	2,715	2,530
San Joaquin Valley Region									
5	Fresno County	1,944	0	1,750	0	1,575	0	1,181	0
6	Kings County	1	0	1	0	1	0	1	0
7	Madera County	15,318	0	13,786	0	12,408	0	9,306	0
8	Merced County	408	4,119	367	3,707	330	3,336	248	2,502
9	San Joaquin County	0	0	0	0	0	0	0	0
10	Stanislaus County	0	0	0	0	0	0	0	0
11	Tulare County	244	0	220	0	198	0	148	0
	Subtotal	17,915	4,119	16,124	3,707	14,511	3,336	10,883	2,502
Mountain Region									
12	Lassen County [5]	0	0	0	0	0	0	0	0
13	Modoc County [5]	0	0	0	0	0	0	0	0
14	Plumas County [5]	607	0	546	0	492	0	369	0
15	Siskiyou County [5]	0	0	0	0	0	0	0	0
	Subtotal	607	0	546	0	492	0	369	0
Upper Sacramento Valley Region									
16	Butte County [5]	1,041	2,718	937	2,446	843	2,202	632	1,651
17	Colusa County [5]	1,298	0	1,168	0	1,051	0	789	0
18	Glenn County [5]	0	0	0	0	0	0	0	0
19	Shasta County [5]	2,467	0	2,220	0	1,998	0	1,499	0
20	Tehama County [5]	98	26	88	23	79	21	60	16
	Subtotal	4,904	2,744	4,414	2,470	3,972	2,223	2,979	1,667
Sacramento Valley Region									
21	Placer County	7,285	0	6,557	0	5,901	0	4,426	0
22	Sacramento County	605	4,776	545	4,298	490	3,869	368	2,901
23	Yolo County	0	0	0	0	0	0	0	0
24	Yuba County [5]	0	0	0	0	0	0	0	0
	Subtotal	7,890	4,776	7,101	4,298	6,391	3,869	4,793	2,901

Table 3b
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
County Estimates of Land with a Federal Nexus in Proposed Critical Habitat Areas

Co. #	County Name	Gross Acres of Overlap by 2020		Gross Acres Overlap Following Developer Avoidance [2]		Gross Acres Overlap with Federal Nexus [3]		Net Acres Overlap with Fed. Nexus & Avail. For Development [4]	
		Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
Northern Coast Region									
25	Lake County [5]	0	0	0	0	0	0	0	0
26	Mendocino County [5]	0	0	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0	0	0
Central Coast Region									
27	Monterey County	828	0	745	0	671	0	503	0
28	San Luis Obispo County	1,616	0	1,454	0	1,309	0	982	0
29	San Benito County	0	0	0	0	0	0	0	0
	Subtotal	2,444	0	2,200	0	1,980	0	1,485	0
Sierra Nevada Foothills Region									
30	Amador County [5]	0	0	0	0	0	0	0	0
31	Calaveras County [5]	0	0	0	0	0	0	0	0
32	Mariposa County [5]	0	0	0	0	0	0	0	0
33	Tuolumne County [5]	0	0	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0	0	0
Jackson County, Oregon									
34	Jackson County, OR [5]	1,289	0	1,160	0	1,044	0	783	0
Southern California									
35	Riverside County	4,332	0	3,899	0	3,509	0	2,632	0
36	Santa Barbara County	0	0	0	0	0	0	0	0
37	Ventura County	0	0	0	0	0	0	0	0
	Subtotal	4,332	0	3,899	0	3,509	0	2,632	0
	TOTAL	43,849	15,804	39,464	14,224	35,518	12,801	26,639	9,601

"net_acres"

- [1] Based on urban growth estimates based on the CURBA model. Acreage total only includes data for counties for which the CURBA model provides urban growth estimates. See footr
- [2] Assumes that, due to certain project designs, 10 percent of remaining gross acres will not require a Section 404 permit, and no Federal nexus exists.
- [3] Based on the estimate that the U.S. Army Corps of Engineers will not assert jurisdiction over 10 percent of all vernal pool habitat acreage because of the SWANCC decision.
- [4] Assumed 75 percent of land is the net privately developable area. Remainder is public lands, including roads, parks, and schools.
- [5] These counties are not included in the CURBA Model and do not have an easily calculated land area for urban growth over 20 years. Alternative methods were applied to determine county sub-area land needs given projected population growth.

by-county basis, CURBA output was preferred to projections data and interviews. This model's operation is described in Appendix B. Available information from the Service on initiated consultations for future development projects was used to supplement either CURBA output or the projections data and interviews.

149. Land areas affected by the designation of critical habitat were differentiated for two kinds of species: Group A and Group B. These groupings address the different section 7 requirements issued by the Service, depending on the relative abundance of each species. The species with the higher frequencies of occurrence are referred to as belonging to Group A. The species with the lower frequency of occurrence and for which conservation banks are very unlikely to be established are referred to as belonging to Group B. All land development projects affected by section 7 will be subject to one or the other of the corresponding conservation requirements for each group. The next section explains the two sets of requirements in the context of baseline regulations.
150. **Table 3a** displays the total land area of each county where critical habitat has been proposed, the land area by Group A and Group B of the proposed designation, and the projected amount of urban growth over the next 20 years. The table also provides the measurement of overlap between this growth and the proposed critical habitat, in terms of acres of Group A habitat and Group B habitat. This measurement is known as the overlap acreage. The total overlap acreage is 59,600 acres, including 43,800 acres for Group A species habitat and 15,800 acres for Group B species habitat.

FEDERAL NEXUS ASSUMPTIONS

151. Section 7 regulation cannot occur for development projects that do not require any Federal agency actions. There are two types of development projects that could occur in the overlap acreage without a Federal nexus:
- Development projects (and their associated land area) that are designed in such a way that no vernal pools are affected and no Federal nexus is present, and
 - Project impacts (and their wetlands) that, because of the recent Supreme Court SWANCC Decision, are no longer considered jurisdictional to the ACOE.
152. **Table 3b** calculates the gross acreage of overlap with a Federal nexus. Included in the calculation is a subtraction of 10 percent of overlap acres expected because of developer avoidance of vernal pool impacts. This land area is further decreased by 10 percent because of the ACOE's reduced jurisdiction over vernal pool habitat resulting from the SWANCC decision. Details about SWANCC and developer avoidance are given in Appendix E.
153. As shown, the gross acres of overlap with a Federal nexus total 48,300 acres, including 35,500 acres in proposed Group A habitat and 12,800 acres in proposed Group B habitat.

SECTION 7 PROJECT MODIFICATIONS AND BASELINE REQUIREMENTS

154. *Net of Clean Water Act (CWA) requirements, private development projects located in critical habitat proposed for Group A species are subject under section 7 to a 2:1 compensation ratio requirement that may be satisfied by purchasing credits from an off-site conservation bank. Net of the same baseline requirements, projects in Group B proposed critical habitat are subject to a 6:1 on-site avoidance ratio and a 3:1 on-site restoration ratio. These requirements are not assumptions that have been drawn from the species' consultation histories but instead serve as an analytical proxy for recommendations the Service may make in the future. For the purposes of this analysis, however, the assumptions apply to section 7 implementation across all 37 counties except for projects in Riverside County, where mitigation consists of all CWA restoration measures, in addition to vernal pool enhancement measures.*³²
155. Appendix E describes the major Federal nexus that generates section 7 activity for most private land development: the implementation of the CWA by the ACOE. The essential finding of the analysis of the CWA's regulation of impacts to vernal pool habitat is that the ACOE, on average, will require landowners to restore an acre of wetted vernal pools (and associated uplands) for each acre proposed to be filled in the construction of the project. This requirement becomes the central baseline regulation cost that will be subtracted from additional section 7 requirements.

GROUP A HABITAT SECTION 7 REQUIREMENTS NET OF BASELINE REGULATIONS

156. Net of CWA requirements, Service personnel estimate that the average private development project sited in Group A proposed critical habitat will be subject to a 2:1 compensation ratio for impacts to each wetted acre of vernal pool habitat. This requirement is not an assumption that has been drawn from the species' consultation histories but instead serves as an analytical proxy for recommendations the Service may make in the future. Projects may fulfill the requirement for compensation by purchasing conservation credits from a conservation bank, purchasing suitable habitat and managing that habitat in perpetuity, or dedicating land already owned by the project applicant and having suitable vernal pool habitat.
157. Land proposed for Group A species critical habitat designation in Riverside County is subject to different section 7 requirements. In that county historical section 7 requirements consist primarily of a CWA baseline supplemented by enhancement measures for each acre of restored vernal pool habitat. No compensation ratios are in effect for projects with a Federal nexus in that county.

³²Enhancement of restored vernal pools refers to the collection of soils from the impact site that contain the species, storage of those soils, and application of the soil to the restoration site so that more viable populations of crustaceans may be established. In addition, with regard to the baseline requirements, this analysis conservatively assumes that CEQA and other environmental regulations provide no baseline protection of vernal pool habitat. See **Appendix D** for full details.

GROUP B HABITAT SECTION 7 REQUIREMENTS NET OF BASELINE REGULATIONS

158. Net of CWA requirements, EPS estimates that the average private development project sited in Group B proposed critical habitat will be subject to a 6:1 on-site avoidance ratio for each acre of impacts to vernal pool habitat. Service personnel have little experience with development projects impacting Group B species, so this ratio was chosen to fit general knowledge about the level of protection required for Group B species habitat. This requirement is not an assumption that has been drawn from the species' consultation histories but instead serves as an analytical proxy for recommendations the Service may make in the future. This ratio also produces results more likely to overestimate than to underestimate regulatory impacts. Because of the very low frequency of Group B species populations, this analysis assumes that projects cannot fulfill this requirement in any way except to set aside acreage on the project site in accordance with the 6:1 ratio.

DIRECT SECTION 7 IMPACTS ON PRIVATE LAND DEVELOPMENT

159. This section summarizes the direct economic impacts associated with the designation on private land development. Direct impacts include all project modification and administrative costs associated with implementation of section 7. The next chapter explains methods used to estimate the indirect impacts on private land development, including costs because of project delays, regulatory uncertainty, and implementation of State laws governing the assessment of project impacts and mitigation alternatives.

PROJECT MODIFICATIONS

160. *Project modification costs are estimated to be \$569 million over 20 years. These costs will be borne by regulated landowners through losses in land values. This change in land values does not represent the overall effect of the designation on all landowners in a region, but rather the impact on those landowners with property included in the proposed designation.*
161. The loss to landowners associated with section 7 requirements was estimated by calculating these factors:
- The loss in land values where vernal pool habitat is set aside on the project site under section 7 requirements net of the regulatory baseline
 - The cost of purchasing off-site conservation credits or equivalent compensation under section 7 requirements net of the regulatory baseline
 - The cost of restoring vernal pool habitat under section 7 requirements net of the regulatory baseline
162. These costs are described further below, and are summarized for each county in **Table 4**. Details of the section 7 requirements at the project level are presented in Appendix F. Costs

were calculated assuming proposed development is distributed evenly over 20 years, and assuming a discount rate of 12 percent to account for the opportunity cost of investment decisions in the private development market (**Table 4**).

163. Raw land and residential price data for each of the 37 counties was used to calculate the loss in land value associated with on-site set-aside acres. A 37-county summary of the indexed market data is presented in Appendix F. The variation in land values by county relies on a raw, entitled land value expressed in terms of value per net acre³³. The net area of development is the location of private development. The remainder of the gross area includes a range of publicly or privately funded infrastructure, including roads, schools, parks and other land uses supporting the private lot development.
164. Raw, entitled land value per net acre is the correct basis for calculation of a regulatory impact because a developer will not invest in infrastructure or other improvements for a property if the land is required to be set aside because of a 404b permit condition or a section 7 consultation.
165. The analysis also collected market data from several private vernal pool conservation banks in the Sacramento Region to determine average off-site mitigation prices by county. Conservation bank prices are used to estimate the project modification costs associated with section 7 requirements for Group A species. The largest prevalence of existing conservation banks is in the Sacramento Region, where each conservation credit costs about \$60,000 per acre. Assuming that rising demand for credits in other counties induces market entry for conservation bank operators, this compensation cost is used to derive credit prices for all counties. Compensation costs are expected to vary in line with land value.³⁴
166. The analysis assumes that the cost of restoration of vernal pool acreage is approximately \$15,000 per wetted acre. This fee is charged by conservation banks for the full restoration process, including contouring of the restoration site, the collection of soils from the impact site containing the species, storage of those soils, and application of the soil to a restoration site so that healthy populations of crustaceans are established. Even if in some counties the net section 7 requirement does not involve recontouring the restoration site, the full cost, including recontouring, was chosen so that the real economic impact on the project applicant is more likely to be overestimated and not underestimated.

³³Several commenters suggested alternative land values, including some sources of home price data. While home prices were used as an indexing function to allow land prices to vary across the counties affected by the designation, the resale price of homes is not the appropriate basis of impact. Land uses restricted by the designation will not involve the deconstruction of homes or other infrastructure, but rather raw land that has been targeted for development by landowners seeking entitlement prior to the construction of basic infrastructure. The land values used to estimate impacts from the designation were supplied by private firms specializing in land development deals.

³⁴One public comment questioned why conservation bank credit prices differed from mitigation costs paid by other Federal and State agencies following section 7 consultations. The short answer is that the DEA's data source for credit prices applies to land development activities, while other agencies use a variety of mitigation measures for a range of different projects.

Table 4
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Lost Land Development Value Associated with Section 7 Project Modifications [1]

ID	County Name	Value Loss Due to Section 7 Project Modifications			Percent of State
		Group A	Group B	Total	Total
San Francisco Bay Area					
1	Alameda County	\$5,102,467	\$55,220,535	\$60,323,002	10.4%
2	Contra Costa County	\$2,231	\$0	\$2,231	0.0%
3	Napa County	\$1,715,546	\$717,534	\$2,433,080	0.4%
4	Solano County	\$13,152,791	\$120,887,363	\$134,040,154	23.1%
	Subtotal	\$19,973,034	\$176,825,432	\$196,798,466	33.9%
San Joaquin Valley Region					
5	Fresno County	\$3,673,710	\$0	\$3,673,710	0.6%
6	Kings County	\$1,753	\$0	\$1,753	0.0%
7	Madera County	\$23,716,006	\$0	\$23,716,006	4.1%
8	Merced County	\$928,947	\$90,217,392	\$91,146,339	15.7%
9	San Joaquin County	\$0	\$0	\$0	0.0%
10	Stanislaus County	\$0	\$0	\$0	0.0%
11	Tulare County	\$427,771	\$0	\$427,771	0.1%
	Subtotal	\$28,748,187	\$90,217,392	\$118,965,579	20.5%
Mountain Region					
12	Lassen County	\$0	\$0	\$0	0.0%
13	Modoc County	\$0	\$0	\$0	0.0%
14	Plumas County	\$1,036,527	\$0	\$1,036,527	0.2%
15	Siskiyou County	\$0	\$0	\$0	0.0%
	Subtotal	\$1,036,527	\$0	\$1,036,527	0.2%
Upper Sacramento Valley Region					
16	Butte County	\$2,441,285	\$61,317,601	\$63,758,886	11.0%
17	Colusa County	\$3,043,985	\$0	\$3,043,985	2.7%
18	Glenn County	\$0	\$0	\$0	0.0%
19	Shasta County	\$5,785,447	\$0	\$5,785,447	1.0%
20	Tehama County	\$229,823	\$586,555	\$816,379	0.1%
	Subtotal	\$11,500,541	\$61,904,157	\$73,404,697	14.8%
Sacramento Valley Region					
21	Placer County	\$29,026,734	\$0	\$29,026,734	5.0%
22	Sacramento County	\$1,721,853	\$130,759,367	\$132,481,220	22.8%
23	Yolo County	\$0	\$0	\$0	0.0%
24	Yuba County	\$0	\$0	\$0	0.0%
	Subtotal	\$30,748,587	\$130,759,367	\$161,507,954	27.8%
Northern Coast Region					
25	Lake County	\$0	\$0	\$0	0.0%
26	Mendocino County	\$0	\$0	\$0	0.0%
	Subtotal	\$0	\$0	\$0	0.0%
Central Coast Region					
27	Monterey County	\$5,580,237	\$0	\$5,580,237	1.0%
28	San Luis Obispo County	\$6,990,778	\$0	\$6,990,778	1.2%
29	San Benito County	\$0	\$0	\$0	0.0%
	Subtotal	\$12,571,015	\$0	\$12,571,015	2.2%
Sierra Nevada Foothills Region					
30	Amador County	\$0	\$0	\$0	0.0%
31	Calaveras County	\$0	\$0	\$0	0.0%
32	Mariposa County	\$0	\$0	\$0	0.0%
33	Tuolumne County	\$0	\$0	\$0	0.0%
	Subtotal	\$0	\$0	\$0	0.0%

Table 4
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Lost Land Development Value Associated with Section 7 Project Modifications [1]

ID	County Name	Value Loss Due to Section 7 Project Modifications			Percent of State
		Group A	Group B	Total	Total
34	Jackson County, Oregon Jackson County, OR	\$3,492,452	\$0	\$3,492,452	0.6%
35	Southern California Riverside County [2]	\$1,155,847	\$0	\$1,155,847	0.2%
36	Santa Barbara County	\$0	\$0	\$0	0.0%
37	Ventura County	\$0	\$0	\$0	0.0%
	Subtotal	\$1,155,847	\$0	\$1,155,847	0.2%
Total		\$109,226,189	\$459,706,348	\$568,932,537	100%

"in_text_404"

[1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.

[2] Riverside County projects involve only minor section 7 costs: \$15,000 per wetted acre of soil removal from project site, storage, and use in establishing newly restored pools on a compensation site.

167. Finally, the section 7 compensation ratios net of baseline regulations summarized in Step Two were applied to these entitled land values, conservation credit prices, and restoration costs to estimate county by county impacts in **Table 4**. Because the combination of on-site set-asides, credit purchases, and restoration commitments varies according to whether the land is proposed Group A species or Group B species critical habitat, the section 7 impact is expressed as a percentage of land value loss per net acre.
168. Appendix F explains the project modification required in each case. The project modification requirements associated with Group A species are estimated to reduce the land value of each acre on a project site by 9 percent. The project modification requirements associated with Group B species are estimated to reduce the land value of each acre on a project site by nearly 86 percent.

CONSULTATION COSTS

169. Administrative consultation costs are estimated to be between \$1.7 million and \$3.8 million, depending a range of unit costs and the discount rate applied.
170. As shown in **Table 5**, this analysis assumes that 158 future private residential projects will require section 7 consultations in the next 20 years, based on a historical consultation rate. Each of these is expected to be a formal consultation, and consultations are assumed to be distributed evenly throughout the time period.
171. Along with the formal consultations and their project modifications discussed in the previous section, the consultation record suggests that there will be 473 informal consultations and 394 instances of technical assistance between landowners and the Service over 20 years.
172. Costs for all activities were estimated using the consultation cost model described and shown in Appendix G. Total costs were calculated by multiplying the number of consultations by the average cost per participant.³⁵ Because this calculated value essentially represents the administrative costs assuming all consultations occurred in Year One, it was adjusted to reflect discount rates of 12 percent, before being shown in Table ES-1.

³⁵Two public comments suggested that the consultation costs paid by third parties (private landowners, for instance) were too low. The properties associated with these comments represent thousands of acres and understandably might generate higher total costs for the administrative processes of section 7. When averaged with projects at the lower end of the distribution (i.e., 5 acres in size), the 157 formal consultations projected to occur over 37 counties are likely to produce a cost closer to the average amounts shown in **Appendix G**.

Table 5
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Consultations Associated With Land Development, By County

ID	Region or County	Formal Consultations	Informal Consultations	Technical Assistance Efforts
	San Francisco Bay Area			
1	Alameda	5	15	12
2	Contra Costa	0	0	0
3	Napa	1	2	2
4	Solano	17	52	43
	Subtotal	23	69	57
	San Joaquin Valley Region			
5	Fresno	5	16	13
6	Kings	0	0	0
7	Madera	41	123	102
8	Merced	12	36	30
9	San Joaquin	0	0	0
10	Stanislaus	0	0	0
11	Tulare	1	2	2
	Subtotal	59	176	146
	Mountain Region			
12	Lassen	0	0	0
13	Modoc	0	0	0
14	Plumas	2	5	4
15	Siskiyou	0	0	0
	Subtotal	2	5	4
	Upper Sacramento Valley Region			
16	Butte	10	30	25
17	Colusa	3	10	9
18	Glenn	0	0	0
19	Shasta	7	20	16
20	Tehama	0	1	1
	Subtotal	20	61	51
	Sacramento Valley Region			
21	Placer	19	57	47
22	Sacramento	14	43	35
23	Yolo	0	0	0
24	Yuba	0	0	0
	Subtotal	33	99	83
	Northern Coast Region			
25	Lake	0	0	0
26	Mendocino	0	0	0
	Subtotal	0	0	0
	Central Coast Region			
		0		
27	Monterey	2	6	5
28	San Luis Obispo	4	12	11
29	San Benito	0	0	0
	Subtotal	6	18	16

Table 5
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Consultations Associated With Land Development, By County

ID	Region or County	Formal Consultations	Informal Consultations	Technical Assistance Efforts
	Sierra Nevada Foothills Region			
30	Amador	0	0	0
31	Calaveras	0	0	0
32	Mariposa	0	0	0
33	Tuolumne	0	0	0
	Subtotal	0	0	0
	Jackson County, Oregon			
34	Jackson	3	10	9
	Southern California			
35	Riverside	12	35	29
36	Santa Barbara	0	0	0
37	Ventura	0	0	0
	Subtotal	12	35	29
37 COUNTY AREA GRAND TOTAL		158	473	394

"county_consult"

Sources: Sacramento Fish and Wildlife Office Data, CURBA Model (J. Landis et al., 1998), and Proposed Designation of Critical Habitat for Vernal Pools Species, September 2002 (66 FR 133).

TOTAL DIRECT COSTS

173. **Table 4** summarizes the project modification costs because of section 7 regulation of private land development in proposed critical habitat for vernal pool species. Using an average of administrative cost ranges for land development shown in Appendix G as well as **Table ES-1**, the total section 7 direct costs estimate is \$576 million, applying a 12 percent discount rate.

SECTION 7-RELATED CHANGES TO CONSUMER/PRODUCER SURPLUS

174. *For most regions, the scale and significance of the additional project modifications associated with section 7 and CHD are not sufficient to affect regional real estate market dynamics. In other words, although some land may not be developed as a result of CHD, plenty of substitute land is available. In these geographic areas, the overall number of new housing units built over the next 20 years is not expected to change as a result of the designation. The cost burden of project modifications falls on regulated landowners. However, in two, more land-constrained counties, Solano and Sacramento Counties, the setting-aside of vernal pool habitat may result in a reduction in the number of new homes that are built. This change in the quantity of new homes may result in an increase in housing prices with associated losses in consumer surplus for new home buyers. These consumer surplus losses are estimated to be \$186 million in Solano County and \$550 million in Sacramento County, applying a three percent discount rate. They are additive with the direct section 7 costs. The overall economic costs of section 7 in these counties are thus \$320 million in Solano County and \$682 million in Sacramento County, as shown in **Table ES-2**.*

DESCRIPTION OF CONSUMER AND PRODUCER SURPLUS EFFECTS

175. The significance of project modifications to the functioning of the regional real estate market (i.e., overall real estate production and prices) will determine if and how consumers and/or producers of real estate (i.e., homebuyers and home-builders) are affected by section 7. These additional parties will be affected only if recommended project modifications are expected to significantly constrain development opportunities. This is most likely to occur in regions where development opportunities are already significantly constrained and project modifications and associated on-site set-aside requirements affect a significant proportion of the remaining developable land.
176. In such supply-constrained counties, there may be losses in addition to the compliance costs already calculated in this chapter. In these counties, reductions in available land attributable to designation may increase costs to developers, thereby affecting the supply and market price of housing. A simple, partial-equilibrium model of a competitive market for new housing provides the conceptual framework for analyzing such changes.
177. **Figure 2** depicts a conventional downward-sloping demand curve for housing (D), intersecting an upward-sloping supply curve (S, equal to producers' marginal costs, MC) at the prevailing market price and quantity (P_0, Q_0). Gains or losses associated with price

changes are measured in terms of consumer and producer surplus. Consumer surplus represents the (positive) difference between what consumers are willing to pay (as represented by the demand curve) and what they actually pay (P_0) for units of housing below the equilibrium quantity (Q_0). Graphically, consumer surplus (CS) is represented by the triangular area above the market price line (P_0), but below the demand curve (D).

178. Correspondingly, producer surplus represents the difference between what producers receive (P_0) and what they are willing to supply housing for (as represented by the supply curve) for housing less than the equilibrium quantity. Graphically, producer surplus (PS) is the triangular area below the market price, but above the supply curve. As the marginal cost curve for supplying housing shifts, consumer and producer surplus may increase or decrease. Measuring changes in surplus provides a consistent means of assessing the efficiency of resource reallocation brought about by changes in policies and regulations.
179. In reality, changes in a given market do not occur in isolation. For example, markets rely upon other markets for inputs, and some commodities are compliments or substitutes in consumption. A reduction in developable land due to critical habitat designation could affect the markets for land, new and existing housing, and potentially other markets, such as rental markets, as relative prices change. The appropriate measure of societal welfare is the net change in surplus across all affected markets. Thus, one approach would be to construct a general model that characterizes and links each of these markets. Practically, however, adequate data do not exist to support such an effort. The approach taken in this analysis (i.e., calculation of direct administrative and project modification costs plus changes in consumer surplus) provides a reasonable approximation of the effects of welfare across these markets.
180. In developing a conceptual model of the new housing market, this analysis assumes that producers' marginal costs are constant, which implies a horizontal supply curve and no producer surplus. Although limited data are available on the slope of the housing supply curve in the housing markets evaluated, in reality the curve is likely to be slightly upward-sloping. Nevertheless, assuming a flat housing supply curve when it is in reality less than perfectly elastic has negligible impact on the estimated net economic impact. A slightly sloping curve results in a small amount of producer surplus. As the marginal cost curves shifts, the amount of producer surplus will also shift. Some producers will gain as a result of increasing housing prices while others will lose. The overall net effect is difficult to determine but likely to be small relative to the overall change in economic efficiency.
181. It is also assumed, when considering a 20-year time frame, that housing markets are competitive, and that housing developers (producers) do not have the market power to charge prices above marginal costs. That is, any developers charging prices above their marginal costs will ultimately be forced to lower their prices due to market entry from other housing developers operating in California.
182. Under these conditions, **Figure 3** demonstrates the loss in surplus associated with increased development costs. Because marginal cost is constant, there is no producer surplus in this case. Consumer surplus is initially represented by the area EFG. Reduction in developable

land associated with habitat designation increases the marginal cost of development (and therefore market price) from $MC_0 = P_0$ to $MC_1 = P_1$ and the equilibrium quantity of housing falls from Q_0 to Q_1 .³⁶ Under these conditions, consumer surplus is now represented by the area EHI. The residual, HIGF, represents a loss of surplus to society. It is this area that is measured in the relevant counties in subsequent sections.

DETERMINATION OF AFFECTED HOUSING MARKETS

183. To determine whether section 7-related project modifications will significantly affect regional real estate markets, in terms of production and pricing, a two-part test was applied. Counties passing both tests could experience real impacts in the regional real estate market due to section 7. These impacts are considered in subsequent sections. The tests include:

- **Reduction in Development Opportunities.** A general assessment was made of the potential reduction in development opportunities as a result of the land set-aside resulting from section 7 in each of the 37 counties. If the amount of expected land set-aside exceeds a defined percentage threshold of development opportunities in a county, then counties pass the first test.
- **Historical Housing Price Changes.** A historical analysis of population growth and real housing price increases is conducted for each of the counties that pass the first test. If over the last 10 years housing prices, in inflation-adjusted terms, have not increased despite diminishing development opportunities because of ongoing land consumption via population growth, the county was not considered land-constrained and does not pass the second test.

Test 1: Reduction in Development Opportunities

184. To determine the significance of section 7-related project modifications for regional real estate markets, the lost development potential associated with the project modifications should be compared to the total regional development potential. Specifically, the assumed on-site land set-aside requirements are compared with the total supply of developable land in the region. In reality, accurate estimates of total regional development potential are not

³⁶ This shift in the MC curve results in a reduction in the total remaining amount of developable land in the region. A reduction in the amount of developable land generates increased prices for the remaining acres. Producers, paying this increased price, are assumed to pass this cost on to consumers of housing units in the form of higher prices. Project modification costs (e.g., reduction in land value for designated acres, mitigation bank purchases, and administrative section 7 costs) are assumed to be borne by landowners, and, because of the competitive nature of land markets, are not passed on to home builders or home buyers (i.e., do not affect consumer or producer surplus in the housing market). These project modification costs, referred to as direct costs, are calculated separately in the first half of this chapter.

Figure 2
Conventional Supply and Demand Curves for a Competitive Market

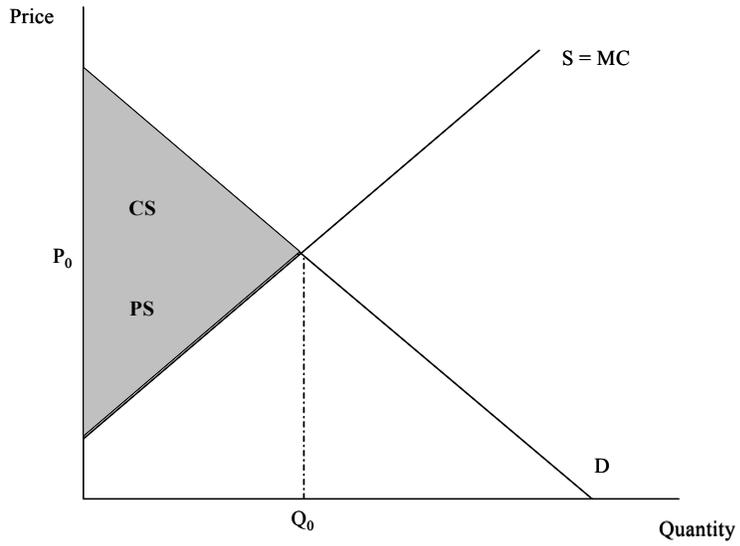
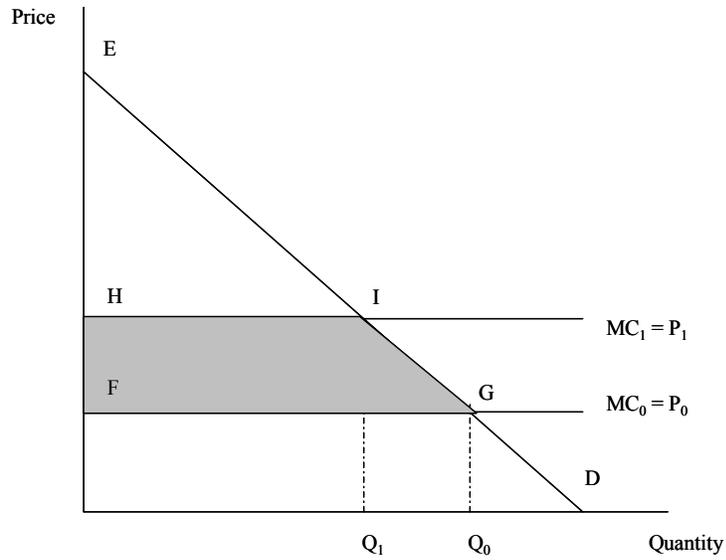


Figure 3
Change in Consumer Surplus Under Critical Habitat Designation:
Market for New Housing



readily available.³⁷ As a result, for the purposes of this analysis, projected acres of growth between 2000 and 2020 in each of the 37 counties covering the CHD are used as a proxy.

185. A comparison of the total acres of on-site habitat set-aside stemming from section 7 consultations with the total projected acres of growth through 2020 for each of the 10 regions and the associated 37 counties affected is provided in **Table 6**. Only development projects proposed for Group B species critical habitat generate on-site set-aside requirements. Projects proposed in Group A species critical habitat are assumed to comply with section 7 through the purchase of off-site conservation credits and not through on-site set-asides.
186. As shown, in the 10 regions affected by CH, the ratio of land set-aside to total growth through 2020 ranges from 0 and 3.8 percent. However, the following factors suggest that the section 7-related on-site habitat set-aside actually will represent a much smaller proportion of the regional real estate market:
- Regional land supply is greater than projected demand through 2020. The above estimate relies on projected land consumption through 2020 as a proxy for long-term supply. In reality, the long-term land supply is greater than demand through 2020, because almost all of the communities in the 37-county area are expected to reach build-out significantly beyond that date.
 - Developers will adjust to reduced land supply by increasing density. The above estimate assumes that development in areas unaffected by CHD cannot occur at higher densities. In practice, densification and revitalization of under-utilized “in-fill” sites can continue to provide significant development opportunities in land constrained markets.
 - Developers will integrate on-site habitat set-asides into project design. The above analysis assumes that the set-aside acres represent a 1-to-1 reduction in development capacity. In reality, many developers will incorporate habitat reserve acres into their project design, thereby minimizing the impact on total project size. In addition, habitat reserves often serve as an open space amenity that can enhance the value of the remaining developable areas.

³⁷Off-site set-aside requirements are not included in this analysis as they are assumed to be satisfied by the large amount of non-developable land proposed for designation as critical habitat.

Table 6
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Land Removed from the Development Market by County [1]

ID	Region or County	Projected Urban Growth Over 20 Years	Urban Growth Projected Within Critical Habitat	Developable Land Removed due to Critical Habitat [2]	Percentage of Urban Growth Removed Due to Critical Habitat
		<i>acres</i>	<i>Group B [3]</i>	<i>acres</i>	
	San Francisco Bay Area				
1	Alameda	44,404	981	681	1.5%
2	Contra Costa	31,044	0	0	0.0%
3	Napa	9,454	12	8	0.1%
4	Solano	40,844	3,172	2,202	5.4%
	Subtotal	125,746	4,165	2,892	2.3%
	San Joaquin Valley Region				
5	Fresno	38,188	0	0	0.0%
6	Kings	14,492	0	0	0.0%
7	Madera	22,031	0	0	0.0%
8	Merced	17,569	4,119	2,860	16.3%
9	San Joaquin	85,176	0	0	0.0%
10	Stanislaus	30,399	0	0	0.0%
11	Tulare	30,696	0	0	0.0%
	Subtotal	238,552	4,119	2,860	1.2%
	Mountain Region				
12	Lassen	2,666	0	0	0.0%
13	Modoc	384	0	0	0.0%
14	Plumas	480	0	0	0.0%
15	Siskiyou	1,765	0	0	0.0%
	Subtotal	5,294	0	0	0.0%
	Upper Sacramento Valley Region				
16	Butte	17,626	2,718	1,887	10.7%
17	Colusa	3,924	0	0	0.0%
18	Glenn	3,826	0	0	0.0%
19	Shasta	29,690	0	0	0.0%
20	Tehama	5,544	26	18	0.3%
	Subtotal	60,610	2,744	1,905	3.1%
	Sacramento Valley Region				
21	Placer	27,538	0	0	0.0%
22	Sacramento	48,527	4,776	3,316	6.8%
23	Yolo	3,664	0	0	0.0%
24	Yuba	6,550	0	0	0.0%
	Subtotal	86,278	4,776	3,316	3.8%
	Northern Coast Region				
25	Lake	7,226	0	0	0.0%
26	Mendocino	6,245	0	0	0.0%
	Subtotal	13,471	0	0	0.0%
	Central Coast Region				
27	Monterey	52,528	0	0	0.0%
28	San Luis Obispo	37,374	0	0	0.0%
29	San Benito	9,853	0	0	0.0%
	Subtotal	99,755	0	0	0.0%

Table 6
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Land Removed from the Development Market by County [1]

ID	Region or County	Projected Urban Growth Over 20 Years	Urban Growth Projected Within Critical Habitat	Developable Land Removed due to Critical Habitat [2]	Percentage of Urban Growth Removed Due to Critical Habitat
		<i>acres</i>	<i>Group B [3]</i>	<i>acres</i>	
	Sierra Nevada Foothills Region				
30	Amador	1,355	0	0	0.0%
31	Calaveras	4,869	0	0	0.0%
32	Mariposa	1,608	0	0	0.0%
33	Tuolumne	5,053	0	0	0.0%
	Subtotal	12,885	0	0	0.0%
	Jackson County, Oregon				
34	Jackson	9,460	0	0	0.0%
	Southern California				
35	Riverside	419,176	0	0	0.0%
36	Santa Barbara	25,552	0	0	0.0%
37	Ventura	71,919	0	0	0.0%
	Subtotal	516,647	0	0	0.0%
	37 COUNTY AREA GRAND TOTAL [4] [5]	1,168,700	15,804	10,972	0.9%

"acres lost"

Sources: CURBA Model (J. Landis et al., 1998), U.S. Census Bureau, California State Department of Finance, Sacramento Area Council of Governments, Association of Bay Area Governments, Southern California Association of Governments, Fresno and Merced Counties, and Oregon State Office of Economic Analysis.

[1] All figures are in acres.

[3] Calculates the portion of Group B net acres of overlap with federal nexus (Table 3b) that is preserved on-site (left undeveloped). For projects in Group B species critical habitat, the percent left undeveloped is 85.7%.

[3] All land area within critical habitat units designated for species with few remaining populations (Butte County Meadowfoam, Colusa Grass, Conservancy Fairy Shrimp, Sacramento Orcutt Grass, Contra Costa Goldfields, or Solano Grass) is classified by this analysis as acres of Group B habitat. Land area within critical habitat solely designated for the ten other vernal pool species is classified as acres of Group A habitat. The distinction is made to capture differences in expected section 7 regulation between the two.

[4] Some counties are not included in the CURBA Model and do not have an easily calculated land area for urban growth over 20 years (see Table 3a). Alternative methods were applied to determine county sub-area land needs given projected population growth.

[5] Total acres of proposed critical habitat for the 15 species is 1,663,442 acres.

187. Given the numerous ways in which this ratio over-estimates the project modification-related constraint on regional development opportunities, this analysis assumes a countywide threshold of 5 percent of total demand through 2020 as a trigger indicator of potential “significant impact” on the dynamics of the regional real estate market. Because the real estate sector is affected by regional market conditions, the region rather than the county is the most appropriate scale of analysis. However, this analysis defines the regional real estate market at the county-level of geography and by doing so is more likely to overestimate than to underestimate the cost impacts.³⁸
188. Even at the county level, most counties have minimal on-site set-asides, though four counties-Solano, Sacramento, Merced, and Butte-all have ratios above the 5-percent threshold. 28 The projected on-site regional set-aside requirements are about 3,316 acres for Sacramento County, 2,860 acres for Merced County, 2,202 acres for Solano County, and 1,887 acres for Butte County. These represent 6.8 percent (Sacramento), 16.3 percent (Merced), 5.4 percent (Solano), and 10.7 percent (Butte) of each County’s projected urbanization in the next 20 years.

Test 2: Historical Housing Price Increases

189. In development opportunity-constrained markets, reductions in developable land would be expected to increase housing prices, because the ability of alternative supply opportunities to replace the set-aside areas is limited. In unconstrained markets, alternative development opportunities will be readily available, housing supply over the 20-year time frame will be relatively unchanged and housing prices will not increase significantly due to the land set-asides. This test reviews historical inflation-adjusted housing price increases to assess whether development opportunity constraints are present and the extent to which future losses in developable land will lead to future increases real housing prices.
190. **Table 7** shows historical housing price fluctuations in Sacramento, Merced, Solano, and Butte counties, between 1991 and 2001, based on data from RAND. As shown, all of the counties except Sacramento experienced a decline in real housing prices over the ten year period despite considerable population growth. Merced and Butte counties, both located in more rural, agricultural- or resource-based regions, experienced particularly steep declines in real housing prices. Meanwhile, Solano County experienced a modest decline of 3 percent while in Sacramento real housing prices increased by about 2 percent. Although nominal housing prices increased in all of the counties, an annual inflation rate of about 2.7 percent or 30 percent over the entire period, wiped out most of these gains in real terms.
191. Of course, housing prices are affected by a variety of factors other than land supply, including changes in the business cycle, interest rates, construction costs, home ownership rates, and housing product types (e.g., size, density, amenities). However, since 1991 and 2001 represent relative highs in the real estate market, the change between them is likely to represent a trend-line growth rate rather than a business cycle effect. In addition, many of

³⁸A sensitivity test of this threshold suggests that the threshold would have to be reduced to below 2 percent to result in a different set of results.

Table 7
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Real Housing Price Increase, 1991-2001

Year	Price				Population			
	Sacramento	Merced	Solano	Butte	Sacramento	Merced	Solano	Butte
	<i>New Homes - Median Prices - Nominal Dollars</i>				<i>County Population</i>			
2001	\$220,500	\$144,700	\$285,000	\$179,500	1,246,961	213,442	398,913	204,888
2000	\$189,900	\$136,100	\$275,000	\$157,300	1,223,499	210,554	394,930	203,171
1999	\$182,000	\$122,100	\$218,000	\$158,000	1,205,000	209,800	389,200	203,200
1998	\$162,100	\$112,000	\$209,000	\$152,100	1,177,400	207,200	382,100	202,400
1997	\$159,400	\$105,500	\$194,000	\$155,700	1,157,000	204,300	376,400	201,200
1996	\$152,500	\$100,400	\$204,000	\$146,000	1,143,300	203,100	373,400	200,300
1995	\$154,500	\$111,000	\$180,000	\$139,300	1,135,600	203,700	374,000	199,500
1994	\$160,000	\$108,500	\$187,700	\$147,300	1,132,500	202,000	374,400	197,500
1993	\$158,600	\$107,000	\$196,800	\$148,000	1,124,000	198,400	371,500	195,500
1992	\$155,000	\$116,500	\$199,900	\$142,000	1,110,000	194,600	366,500	193,300
1991	\$166,500	\$138,500	\$225,000	\$146,500	1,086,400	189,500	357,200	189,800
Total Percent Increase, 1991-2001	32%	4%	27%	23%	15%	13%	12%	8%
Total Percent Increase, 1991-2001 [1] Housing Price in Real Dollars	2%	-26%	-3%	-7%				

"Housing"

Sources: CA DOF, Construction Industry Research Board, BLS, ENR, Economic & Planning Systems, Inc.

[1] Real price increase equals nominal price increase minus inflation increase. Data from RAND, Engineering News Record, and BLS Consumer Price Indices all indicate an inflation of over 30 percent for the period 1991-2001, equivalent to an annual rate of about 2.66 percent each year (compounded yearly). Applying a rate of 30 percent suggests that only Sacramento County experienced a real increase in prices.

the other factors were more likely to increase rather than decrease real housing prices during the time period. For example, interest rates have declined, home ownership rates have increased, and, most importantly population growth remained strong. In general, one would expect housing prices to increase in real terms, or at least keep pace with inflation, in growing areas that have land shortages. In areas where real housing prices actually decline despite increased population and housing demand, land supply factors are not likely to be a significant factor.

Test Conclusions

192. Based on the above analysis, it is assumed that only in Sacramento and Solano County will section 7 potentially affect the functioning of the regional real estate market. Hence the quantity of housing production and level of housing prices in 35 of the 37 counties in the CHD are unlikely to be affected, and regulated landowners will be the primary group affected by section 7 and CH. Some growth will be distributed to other parts of the respective counties, while other growth will proceed with higher mitigation costs and lower land values.
193. Although Solano County did not pass the second test described above, (e.g. real housing prices do not appear to be affected by land supply constraints) it is included as a potentially affected county because of its location in a heavily populated and rapidly growing region. Specifically, although land supply constraints may not have historically affected housing prices in Solano, its proximity to the San Francisco metropolitan area and the likelihood that it will serve as an overflow housing market or bedroom community in this broader region, suggests that land supply may become an issue in the future. Butte and Merced Counties are not included. Neither county comes close to passing the second test, and they are both predominantly rural counties, far from major metropolitan areas.

MEASUREMENT OF CONSUMER/PRODUCER SURPLUS EFFECTS

Section 7-Related Increase in Housing Prices

194. As described above, the section 7 related on-site land set-asides may have an appreciable impact on the market supply of land in Solano and Sacramento Counties, potentially filtering through to the housing market and increasing housing prices. A reduction or “shift” in the housing supply curve and corresponding price increase will reduce consumer surplus and potentially affect producer surplus. This analysis assumes that these countywide market impacts will occur soon after the designation of CH with the housing market adjusting quickly to the loss of developable land.
195. An estimation of the potential section 7-related housing price increase for Sacramento and Solano Counties is presented in **Table 8**. As shown, the 3,316 acres of land set-aside in Sacramento County and 2,202 acres in Solano County are projected to increase average housing prices by 1.9 percent and 1.6 percent, respectively. This calculation assumes the following:

Table 8
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Real Housing Price Increases due to CHD Land Set-Asides

Item	County	
	Sacramento	Solano
Acres Set-Aside (1)	3,316	2,202
Population Increase - 2000-2040	900,242	298,589
Population per Urbanized Acre (2)	9.1	3.7
Developable Land [Urbanized Acreage (2000-2040)] (3)	99,458	80,096
Set-Aside as Percent of Developable Land	3.3%	2.7%
Assumed Reduction in Housing Development (4)	3.3%	2.7%
Ratio of Price Increase to Housing Reduction (5)	0.57	0.57
Increase in Housing Price	1.9%	1.6%

"price increase"

Sources: CA DOF, Construction Industry Research Board, ABAG, Economic & Planning Systems, Inc.

- [1] Acres set-aside represent acres removed from development; see Table 4.
- [2] Based on DOF 2000-2020 population projection divided by estimated urbanized acres for the same period from Table 4.
- [3] Estimate of urbanized acreage from 2000-2040 represents proxy for developable land. This is likely an under estimate as developable land may be available for development beyond 2040.
- [4] Assumes reduction in housing is production equal to reduction in developable land. This is a conservatively high estimate as it does not allow for any densification.
- [5] The increase in housing price resulting from a reduction in production is based on the price elasticity of demand. Academic literature suggests that the long-term price elasticity of demand (the response of quantity demanded to a price increase) is 1.75. A proxy for the responsiveness of price to housing production is 1 divided by 1.75, or 0.57.

- **Land Supply Exhausted by 2040 in Both Counties.** The estimated amount of urbanized acres from 2000 to 2040 is used as a proxy for total developable land supply in both counties. In reality, this represents an under-estimate of the true supply since both counties are likely to have land available for development beyond 2040.
- **Reduced Housing Supply Is Proportional to Reduced Land Supply.** The analysis assumes that the percentage reduction in housing development will be proportional to the percentage reduction in land availability. This approach is conservative since, in reality, land is an input into housing production and as land becomes more scarce real estate producers will shift away from land as an input and towards higher density development.
- **Price Elasticity of Demand Approximates the Slope of the Demand Curve.** The potential effect of reduced housing supply on price will depend on the sensitivity of housing prices to quantity constraints. The price elasticity of demand is used as a proxy for this relationship (i.e. price elasticity of demand represents the slope of the demand curve). An academic literature review revealed long run price elasticity of demand estimates of between -1.0 and -2.5. This suggests that a 1 percent reduction in housing production will result in price increases of between 0.4 and 1 percent. A mid-point elasticity of -1.75 is used for the purposes of this analysis, or a 0.57 percent price increase for every 1 percent quantity reduction.

Calculation of Reduced Consumer Surplus

196. As discussed above, housing price increases in Solano and Sacramento Counties are expected to result in consumer surplus losses. This loss is in addition to the landowner and other costs associated with direct section 7 impacts as estimated in this report. The economic loss calculations are presented in **Table 9**. The estimated annual surplus loss is derived from the multiplying the following two variables:
- The real housing price increase in each County, based on the percentage price increase multiplied by the predesignation median housing price.
 - The midpoint of the pre- and post-designation annual housing production.
197. This represents an estimate of the area, HIGF, presented in **Figure 3**. These annual surplus losses are converted into present value terms, based on a discount rate of 3 percent. As shown in **Table 9**, the resulting consumer surplus loss totals about \$736 million, including \$550 million in Sacramento County and \$186 million in Solano County.

TOTAL COST IMPACTS IN THE CONTEXT OF REGIONAL ECONOMIC ACTIVITY

198. Regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy's jobs and revenues that result from a regulatory action. As explained in **Chapter I**, these measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses and cannot be

Table 9
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Consumer Surplus Losses due to CHD Land Set-Asides

Item	County		
	Sacramento	Solano	Total
Pre-CHD Median House Price 2003 (2003 Dollars) [1]	\$233,021	\$298,844	--
Housing Price % Increase [2]	1.9%	1.6%	--
Housing Price Increase	\$4,439	\$4,695	--
Post-CHD Median House Price 2003 (2003 Dollars)	\$237,460	\$303,540	--
Pre-CHD Annual Housing Production (units) [3]	8,216	2,623	--
Housing Production % Decrease [4]	3.3%	2.7%	--
Housing Production Decrease (units)	274	72	--
Post-CHD Annual Housing Production (units)	7,942	2,551	--
Annual Consumer Surplus Loss [5]	\$35,866,454	\$12,148,632	--
Total Consumer Surplus Loss [6]	\$549,610,300	\$186,163,200	\$735,773,500

"surplus losses"

Sources: Construction Industry Research Board, ABAG, Economic & Planning Systems, Inc.

[1] Increases between 2001 and 2003 based on historical nominal increase in prices.

[2] See Table 8.

[3] Based on DOF population projections between 2000 and 2020 divided by 2002 persons per household.

[4] See Table 8.

[5] Consumer surplus loss equals the price change multiplied by the average of the pre-CHD and post-CHD housing production.

[6] Net present value of consumer surplus losses over next 20 years. Discounted at 3 percent.

compared with the estimates of compliance costs or changes in consumer and producer surplus that are noted above.

199. In many instances, regulatory compliance costs can be used as an input for regional effects modeling to generate regional impacts in terms of industry-specific job and revenue losses. For example, producer cost increases, if attributable to specific industries where regulatory costs cause a quantifiable loss of profits, may be used as an input in regional impact models. However, the cost impacts estimated in the FEA do not estimate the 20-year compliance costs that would be paid by owners of property where development actually occurs. Instead, the FEA evaluates impacts on those landowners whose property includes proposed critical habitat.
200. Because regional economic models depend on a reliable estimate of impacts to the profits of owners of property where development actually occurs, the results of the FEA must be carefully used in any regional effects modeling. Analysis explained in **Chapter II** supports the finding that, in 35 of 37 counties containing some proposed critical habitat, a reduction in the acreage of private land development over 20 years is unlikely and will leave real estate sector output unchanged. Insignificant regional economic effects resulting from the designation are expected for those counties.
201. For the two counties in which real estate production may decline because of critical habitat designation, producers experience both positive and negative impacts. Producers in these two regions increase profits when their projects are located outside of critical habitat and therefore benefit from higher prices for finished real estate in the region. Producers lose profits when their projects are located within critical habitat, there is a Federal nexus, and the project is reduced in size or the land falls in value because of project modifications associated with the implementation of section 7. The overall net effect is uncertain and is of limited value to regional economic models.
202. Consumers in these two counties, by way of contrast, pay more for housing after critical habitat regulation. However, regional economic effects require industry-specific job losses or reductions in profit as input to the model. Higher costs faced by consumers cannot be classified as either job losses or profit losses, and as a result, broad consumer impacts are also of limited value to regional economic models.
203. In sum, 35 of 37 counties are expected to be minimally impacted in terms of jobs and output as a result of critical habitat designation. In the two counties expected to experience a decline in real estate production, the designation has an uncertain but likely small effect on producers, and hence the regional model is indeterminate as well. As this chapter explains, because better data on the overall producer impacts resulting from the designation was not available, the FEA did not attempt to apply regional economic modeling to the cost impacts the analysis generated.

SENSITIVITY TEST FOR IMPACTS ON PRIVATE LAND DEVELOPMENT

204. To examine how sensitive the overall total cost impact results are to assumptions about the project modifications recommended by the Service, an alternative set of project modifications were used in place of the existing 6:1 preservation ratio discussed in **Chapter II** and **Appendix F**. This requirement is not an assumption that has been drawn from the species' consultation histories but instead serves as an analytical proxy for recommendations the Service may make in the future. This ratio also produces results more likely to overestimate than to underestimate regulatory impacts. Because of the very low frequency of six of the 15 species included in the designation, this analysis assumes that projects cannot fulfill this requirement in any way except to set aside acreage on the project site in accordance with the 6:1 ratio.
205. The 6:1 on-site preservation ratio (and accompanying 3:1 restoration ratio) were adjusted downward to approximate the 2:1 preservation ratio historically used in section 7 consultations involving the vernal pool fairy shrimp. All of these ratios are expressed as net of the CWA requirements of the ACOE. Such an adjustment would allow for approximately 33 percent of a property to be developed instead of the nearly 13 percent allowed using a strict 6:1 ratio (see **Table F-2** for the detailed acreage calculations).
206. Using a 2:1 preservation ratio, the total landowner impacts drop to \$465 million from \$569 million. In addition, the consumer surplus impacts drop to \$574 million from \$736 million. In total, the change in preservation ratio reduces the economic impact of the designation by \$205 million, or about 14 percent of the \$1.4 billion total.

REVIEW OF OTHER COST-ESTIMATING EFFORTS

207. The California Resource Management Institute (CRMI) commissioned a paper ("Sunding analysis") by the Department of Agriculture and Natural Resource Economics at the University of California, Berkeley, that provides comments on the DEA, including an alternative estimate of the costs of vernal pool critical habitat designation (Sunding [2003]). This section discusses this alternative analysis, including the manner in which these comments have been incorporated in this FEA. Overall:
208. Sunding et al. present a model and analysis that purports to measure economic impacts not addressed in the DEA. While illustrative, it is important to note that the results presented by these authors are based on simulations that rely largely on hypothetical inputs. No basis or corroborating information is provided for several of these inputs. Thus, while the Sunding et al. analysis claims to provide a more comprehensive estimate of economic impacts associated with CHD by addressing categories previously unrecognized (e.g., "third-party costs"), some of these quantified impacts are derived from unsubstantiated assumptions.
209. In reality, the "framework" presented by Sunding et al. is based upon the same basic principles applied in estimating impacts in the DEA, and some of the information presented

by these authors is used to revise assumptions made in the FEA. Specifically, this analysis now assumes that in areas with limited development opportunities (e.g., few substitute sites for development), reductions in developable land may be passed on to consumers in the form of higher real estate prices, generating consumer surplus losses. In addition, this analysis calculates the cost of delay to development projects as a result of the designation.

210. However, the Sunding et al. analysis differs from the revised analysis presented in this FEA in several key ways. For example, the Sunding housing market model assumes a baseline condition with price above, and quantity of housing below, the efficient equilibrium. This approach presumes some loss to society associated with an inefficiently operating market, the implications of which under baseline and CHD conditions are not discussed. This assumption affects how impacts are distributed between consumers and producers in the authors' hypothetical simulations. Again, it is not clear what the implications of this assumption are in terms of the absolute magnitude of economic impacts, as the underlying input values appear to be arbitrarily established.
211. As stated, the Sunding analysis makes several important, but unsubstantiated assumptions regarding the California real estate market, the most important of which is an implied absence of substitute development sites in all regions of critical habitat. The calculations presented by Sunding et al. are described as being based on "stylized facts," and as such are simply example calculations, not valid alternative economic impact estimates. Thus, the author's conclusion that the DEA understated actual economic impacts by "7 to 14 times" is not supported by valid assumptions or empirical data. While such simulations are useful for understanding the sensitivity of modeling results to varying assumptions, final analyses must be based on defensible assumptions.
212. Below, a category-by-category comparison of the Sunding et al. analysis and the FEA is presented. This is followed by a detailed discussion of the various assumptions underlying the Sunding et al. analysis.

CATEGORIES OF ECONOMIC IMPACT CONSIDERED

213. The Sunding analysis states that the DEA considers only a subset of the impacts of the designation. The table below compares the effects addressed by the FEA to those addressed in the Sunding analysis, and the text below discusses these factors further.

Economic Effect	FEA	Sunding Analysis
Development Cost Increases	Yes	Yes
Land Set-Aside Requirement	Yes	Yes
Time Delay	Yes	Yes
Uncertainty/Stigma	Yes	No
CEQA and other Indirect Effects	Yes	Unclear
Consumer Surplus Effects	Yes	Yes
Effects on Landowners	Yes	No
Changes in Producer Surplus	No	Yes
Incorporate Differences in Regional Real Estate Markets in Calculating Consumer Surplus Losses	Yes	No
Regional and “indirect costs” (i.e., sprawl)	No	Yes

- **Development Cost Increases.** The FEA quantifies increased development costs in the form of required mitigation payments/investments under section 7. These payments directly increase the cost of developing real estate in specific locations.
- **Land-Set Aside Requirements.** The FEA evaluates on-site land-set aside requirements associated with section 7 consultations. These requirements have a direct effect on land values and the potential to affect regional real estate markets.
- **Time Delay.** The FEA evaluates the potential time delays to entitlements associated with section 7/CHD. It also quantifies the associated economic impacts to landowners.
- **Uncertainty and Stigma.** The FEA explains the uncertainty/ stigma effects and provides an estimate of the potential economic impacts of uncertainty on landowners. These effects are not considered by Sunding et al.
- **Indirect Regulatory Effects.** CHD may trigger further review and requirements under other land use regulations. The FEA evaluates the potential for higher costs associated with CEQA review as a result of CHD and quantifies the potential effects. It is not clear whether these effects are included in the Sunding analysis.

- **Landowner Effects.** CHD will affect a number of landowners by reducing the value of their land. The FEA calculates these land value losses. These effects are not estimated in the Sunding analysis.
- **Producer Surplus.** The FEA discusses potential changes in producer surplus in the residential real estate market, but does not calculate these impacts. The Sunding analysis finds such effects to be positive (i.e., gains in surplus), under some scenarios, which serves to offset some of the losses experienced by consumers, thereby reducing the overall net effect on welfare losses imposed by this designation.
- **Consumer Surplus.** In cases where the regional real estate market is expected to be affected (in the form of changes in real estate production and prices), impacts to consumers are estimated in the FEA. These impacts reflect consumer surplus losses to new homebuyers due to real estate price increases. The Sunding analysis assumes that all markets in designated areas are development constrained, and thus calculates consumer surplus losses in all markets.
- **Regional Real Estate Markets.** The FEA considers and evaluates regional real estate markets affected by vernal pools CHD, and allocates the effects of development cost increases and land-set aside requirements.
- **Regional Impacts.** The Sunding analysis considers the economic impact of increased commuting associated with a reduction in the number of homes built in the area of the designation (e.g., “avoided congestion costs, employment and productivity benefits, and reduced sprawl and pollution”). The FEA does not consider such impacts, because (1) the extent to which critical habitat designation would lead to such effects is uncertain, and (2) no empirical data could be identified to support the modeling of such an assumption.

DISCUSSION OF ASSUMPTIONS MADE IN THE SUNDING ANALYSIS

214. While several of the points raised in the Sunding analysis are valid, and have been incorporated into this FEA, many are not supported by empirical data nor do they reflect an understanding of the varied California real estate markets. These issues are discussed further below.

- **Real Estate Markets.** The Sunding analysis fails to consider the specifics of the vernal pool CHD. Specifically, the Sunding analysis assumes that all land and real estate markets in the 37 California counties affected by this designation are identical. An analysis of the impacts of critical habitat designation must consider the specific project modifications that will be required by the Service (and the indirect effects of the designation), as well as the unique characteristics of the major regional land and real estate markets affected.

Specifically, the economic impacts of the designation are likely to extend beyond the regulated landowners and affect the real estate market, real estate consumers, and the regional economy only if several conditions are met. These conditions include: (1) the land set-aside requirements need to be significant relative to the total area of developable land in the region, and thus result in an appreciable reduction in the number of developed units (i.e., no substitute developable land), and/or (2) compliance costs are significant relative to the total cost of developing a property and apply to a significant proportion of developable land. In these cases, the designation may result in a shift in the supply of housing, and landowners and developers may be able to pass on the costs of the designation to real estate consumers in the form of higher prices. Conversely, if compliance costs are low and/or the designation only affects a small fraction of the total developable land supply in a region, the economic effects are likely to be limited to the sub-set of individual landowners and/or projects. In this case, the regulated landowners will not be able to pass on their increased costs to consumers and their development projects will either relocate to other available sites or proceed at a reduced land value to the owner/developer.

Several studies support the notion that California is experiencing a demand for housing that exceeds supply (e.g., Landis [2000]). In addition, real estate development in California is a complex process influenced by many existing state and local regulations. However, these facts do not lead to the conclusion that substitute developable parcels are unavailable in all areas of the state effected by critical habitat. The Sunding analysis assumes that conditions in all real estate markets in the 37 relevant California counties are identical; specifically, that they are development constrained. That is, Sunding et al. assume that there are no substitute development opportunities in any of these regions. Hence, any additional constraints on land development result in losses in residential development and associated housing price increases. No consideration is given to possibilities for densification (i.e. more intense use of land) or re-distribution of development to alternative areas. The only basis provided for this assumption is a set of stylized facts about the development process, and references to the fact that some markets in California are significantly development constrained. No empirical consideration is given to whether the regional real estate markets actually affected by the designation are significantly constrained in development opportunity.

- **Geography and Development.** Contrary to the approach used in this FEA, the Sunding analysis provides no information on the likely locations of future development with respect to CH. It makes no attempt to use spatial analysis tools to consider the actual location of the designation, the topography of the area, the area's proximity to existing urban areas or infrastructure, or projected future development trends.
- **Land Set-Aside Requirements.** The Sunding analysis assumes that 20 percent of land is set-aside as a result of critical habitat designation, with a corresponding reduction in the number of units of housing constructed. No basis is provided for

this assumption, to which the analysis presented is highly sensitive. The Sunding analysis does not evaluate the likelihood of Federal nexuses, historical section 7 consultations on vernal pool species, or baseline regulations in making this assumption. In addition, the Sunding analysis does not consider the fact that other local, state, and federal regulations might require that land be set aside for other purposes within a given development; such set-asides can address the Service's concerns regarding critical habitat without any additional regulatory burden.

- **Sprawl.** Sunding et al. state “another implication of the analysis is that by reducing the density of development in areas deemed to be critical habitat, designation can change the shape of urban areas and squeeze growth into more remote locations.” Significant land set-asides may result in a change in the urban pattern in parts of a region, though the outcome could be either more compact forms of development (i.e. denser development, less land urbanization) or a more sprawling, dispersed development pattern. The Sunding analysis presumes CHD will lead to more sprawl and places an arbitrary cost of \$5,000 per unit on this effect. No basis is provided for this estimate, despite the fact that it plays a significant role in the analysis.

More importantly, the Sunding analysis applies a different definition of the market area to calculate the economic impacts of sprawl than is applied to estimate consumer surplus losses in the housing market. That is, the analysis first assumes a loss in developable land will result in a loss in regional residential development. It then switches to an assumption that CHD will result in the shift of residential development to more remote locations – in effect, assuming that substitute building locations are available. Consideration of sprawl effects, while potentially important, would need to be performed in a manner consistent with other portions of the analysis.

- **Benefits of Reduced Congestion:** While the Sunding analysis describes the potential costs of “sprawl” associated with reduced development density, it ignores the potential benefits of reduced congestion to residents of these areas. Reduced development in a given area may generate social benefits that exceed the estimated costs. For example, if new developments bring additional costs to existing members of the community (e.g., traffic, crowded schools, less open space) that are not internalized in the developers’ production costs, there may be a net gain in social welfare associated with regulations that limit such development. In fact, such negative effects of growth leads some communities to pass zoning regulations and other rules that limit overall growth, despite the fact that fewer housing units might be provided. Understanding the true effect of reduced density, should it occur, would require a more sophisticated and complete approach than that proposed by Sunding et al. Estimates of the net effect of controls on growth are not currently available.

IMPACTS OF SECTION 7 IMPLEMENTATION ON AGRICULTURAL ACTIVITIES

215. Vernal pool habitat can be impacted by the conversion of rangeland or other rural land uses into cultivated cropland. While annual crop types can be converted to permanent crops (tree-grown, for instance), uncultivated land can be converted to grow these crops as well. Sometimes shifts in local water availability can induce land conversion. Price shifts in commodity markets can also apply pressures leading to land conversion. Over the past 10 years in California, for example, it is estimated that many acres have been converted to viticultural (wine grapes) use. A significant amount of that planting occurred on land with no previous cultivation.
216. As part of the 1991 Amendments to CWA, Congress gave the U.S. Department of Agriculture (USDA) authority to delineate wetlands, including vernal pools on agricultural lands. This program had been designed to inform agricultural landowners about wetlands and to allow for ACOE regulation if those wetlands are impacted by farming activities. Regulation of fill activity had been directed especially at farmers receiving USDA crop subsidies.³⁹
217. To date, officials in the ACOE and the USDA report very few applications for 404 permits from agricultural land uses. According to the USDA, many agricultural activities may co-exist with vernal pools and not be defined as filling or discharging into the pool or its associated hydrological structures.⁴⁰ Given the record of negligible numbers of permit applications from agricultural landowners, this analysis did not assume that the ACOE or Service will involve themselves in agricultural operations in the future. The issue has moved through one cycle of litigation, however, and the likely regulatory future of these activities, as implemented by the ACOE, is uncertain.⁴¹

³⁹Personal communication with biologists, Red Bluff and Elk Grove Service Centers, Natural Resources Conservation Service, March 20, 2002.

⁴⁰Personal communication with Biologists, Red Bluff and Elk Grove Service Centers, Natural Resources Conservation Service, March 20, 2002.

⁴¹Numerous comment authors have suggested that large impacts to agriculture are likely once critical habitat is designated. Eliminating any agricultural operations without a Federal nexus from consideration, it is possible that limited water supply-related section 7 activity may occur. These impacts are discussed under the heading of Municipal, Industrial, and Agricultural Water Supply in **Chapter IV**. Other impacts involving wetlands regulation are less clear, and no policies have been clearly articulated by the ACOE regarding this subject.

III. INDIRECT EFFECTS ON PRIVATE LAND DEVELOPMENT

218. This chapter evaluates the other economic effects of critical habitat designation on private land development activities. It focuses on the designation's potential to result in project delays, increase costs because of regulatory uncertainty, or trigger other regulatory requirements in the implementation of CEQA.⁴²

COSTS ASSOCIATED WITH TIME DELAY

219. *Critical habitat designation for vernal pool species is likely to impose a 3-month delay on 24 land development projects and a 12-month delay on 8 land development projects. The delay forces private landowners to miss out on investment opportunities valued at approximately \$70.3 million.*
220. Critical habitat designation of vernal pool species adds a series of regulatory requirements to private land development projects. These requirements include the obligation to complete section 7 technical assistance, informal consultations, or formal consultations. For formal consultations, a 135 day statutory standard is in place for the completion of a formal consultation, once the Service has received adequate project information.
221. The need to conduct a section 7 consultation does not automatically delay private development projects, as these consultations are usually coordinated within existing baseline regulatory processes and do not necessarily increase the time required to obtain project or permit approvals. However, critical habitat designation could cause time delays to some private land development projects that are within a short period of time before beginning construction activities. For this analysis, the applicable time period is assumed to be one year prior to beginning construction. This section describes how such a delay occurs and how its impact is estimated.
222. Entitlement for larger land development projects in California may require three, five, ten, or even fifteen years and is always predicated on a variety of approvals by local government. Some local government approvals of project plans must be preceded by approvals by State or Federal agencies with regulatory authority over water supply, wastewater treatment standards, air quality, or other natural resource categories. Because of variation in local government practices, many different sequences of the project approval process are possible.

⁴² Several authors of comments suggested that an important impact from the designation was the development of rural land that receives additional interest after development is restricted within proposed critical habitat, or after ranching operations are unable to sustain themselves once urbanized land uses encroach on the rural qualities needed to sustain ranching. While displacement or substitution of lands to be developed is a possibility after designation, the growth likely to happen without designation is also taking place on rural lands with potentially similar negative effects on ranching. It is not possible to say whether the designation results in higher impacts to rural economies on the question of lands chosen for development.

223. For a typical project, however, this analysis will assume that development in vernal pool habitat requires local government approval of a CEQA document. This local government's notice of decision (NOD) is assumed to be contingent on the issuance of a 401 certification by State authorities who have reviewed a 404b individual permit issued by the ACOE for consistency with State law. The 404b permit itself is not issued until the issuance of a biological opinion by the Service as part of a formal section 7 consultation.
224. Project applicants may alternatively receive a conditional CEQA document approval from the local government if the section 7 consultation involving the ACOE has not been completed. If, however, a project is positioned less than one year from final approvals and critical habitat is designated for land on the project site, the completion of a section 7 consultation or the requirement for re-initiation of a consultation will likely cause the project to pass for a second time through the chain of Federal-state-local approvals before construction may begin. Although full-length CEQA, 404b permit, or even section 7 regulatory processes are unlikely to take place once critical habitat is designated, the implementation of section 7 based on designation will be assumed to extend the approval process by a number of months.
225. The period of time is expected to vary according to the section 7 requirements unique to the development project. For projects not likely to adversely affect critical habitat (subject to an informal consultation), this analysis assumes that designation will add another 3 months to the project approval time frame. Those projects requiring a formal consultation with project modifications will be delayed by a full year.
226. The following assumptions were made to estimate the economic cost of time delay associated with designation of critical habitat:
- Private land development will occur at a constant rate over the next 20 years. Five percent of (or 1 in 20) projects will be impacted by delay.
 - The land value loss associated with this delay can be estimated by applying the appropriate discount rate – a measure of the time value of money. As discussed above, the private land developer annual discount rate is about 12 percent. The discount period is set at a one year time period or a three month time period, depending on the type of section 7 consultation required for the project in question.
227. **Table 10** summarizes the results of the economic cost of time delay across the 37 county designation. As shown, given that five percent of all projects with informal and formal consultations are affected, 24 projects are expected to be delayed for 3 months and 8 additional projects are expected to be delayed for 12 months. A land value and investment rate for the first year following designation provides the basis for lost opportunity costs of investment capital for affected landowners. Using an average land value for counties with substantial acreages of proposed critical habitat, this time delay results in a total land value loss of about \$70.3 million.

Table 10
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Cost of Time Delay [1]

Item	Value/Calculation	Source
Number of Development Projects		
Formal	158	Table 5
Informal	473	Table 5
% Affected by CHD [2]	5%	
Number of Development Projects Affected		
Formal	8	
Informal	24	
Value of Land per Acre (Avg) [3]	\$141,389	Table F-3
Acres per Project	300	EPS Assumption
Total Entitled Land Value of Impacted Land		
Formal	\$334,630,320	
Informal	\$1,003,890,961	
Time Value of Money	12%	
Amount of Delay (Months)		
Formal	12	EPS Assumption
Informal	3	EPS Assumption
Cost of Delay		
Formal	\$40,155,638	
Informal	\$30,116,729	
TOTAL	\$70,272,367	

"time delay"

- [1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.
- [2] As projects will take place over 20 years, it is assumed that 1/20th, or 5%, of all projects will take place within the first year. Only those projects will be affected by time delay.
- [3] Average per acre cost for all counties with over 50 acres of critical habitat/20 year development overlap.

228. The remaining 95 percent of private development projects positioned earlier in the sequence of regulatory approvals are not expected to be affected. Any re-initiation of a consultation is assumed to be coordinated within existing baseline regulatory processes and will not necessarily increase the time required to obtain project or permit approvals.

COSTS ASSOCIATED WITH REGULATORY UNCERTAINTY/ STIGMA EFFECT

229. *Because landowners are risk averse, each land buyer's uncertainty about the actual cost of compliance with section 7 may result in additional reductions in willingness to pay for land intended for development. Using an upper bound of the maximum compensation and avoidance ratios expected from implementation of section 7, this analysis estimates that regulatory uncertainty could cost landowners approximately \$51.1 million over 20 years.*
230. Developers face uncertainty over the required project modifications because of critical habitat designation. The outcome of section 7 consultations are by their nature uncertain. The Service conducts each consultation on a case by case basis, issues Biological Opinions, and recommends associated project modification requirements based on species-specific and site-specific considerations. While some differences in project modification requirements are clearly linked to habitat quality and other determinable factors, an element of uncertainty remains. The costs estimated in **Chapter II** considered the economic costs associated with the average expected project modifications. While these represent the average economic costs, costs for individual project applicants will fluctuate above and below this level.
231. The economic effects of this uncertainty depend on the degree to which developers are risk-averse. If developers are only mildly risk averse, they will discount the value of potential land purchases at close to the average project modification cost. If, however, they are significantly risk averse, the element of uncertainty introduced by critical habitat designation will result in a further discounting of the land value. The quantity of discount will never, however, exceed the level of discount associated with a likely upper-end estimate of the project modification cost. In reality, the level of discount will fall between the discount associated with the average project modification cost and the likely upper-end project modification cost. This analysis estimates a likely upper-end project modification scenario, and infers that one-third of the incremental cost is the potential economic impact associated with uncertainty.
232. Interviews with Service personnel suggest that a reasonable upper-end scenario involves a compensation ratio for projects in Group A habitat of 3:1, 50 percent above the average (see **Table 11**). These interviews also suggest that a reasonable upper-end scenario for projects in Group B habitat involves a compensation ratio of 9:1, also 50 percent above the average

Table 11
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Cost of Uncertainty [1]

Item	Value/Calculation	Source
Group A		
Average Compensation Rate [2] (acres compensated per acre destroyed)	2:1	Table F-1
Highest Possible Compensation Rate	3:1	EPS
Avg Case Impact on Land Values	-9.0%	Table F-1
Worst Case Impact on Land Values	-13.4%	Calculation
Change in Impact	4.5%	
Raw Entitled Land Value, All Group A Acres [3]	\$2,593,316,212	Table F-3
Worst Case Property Value Loss	\$116,180,566	Calculation
Risk Premium [4]	33%	Calculation
Additional Property Value Loss Using Risk Premium	\$38,339,587	Calculation
Group B		
Average Compensation Rate [2] (acres compensated per acre destroyed)	6:1	Table F-2
Highest Possible Compensation Rate	9:1	EPS
Avg Case Impact on Land Values	-86.2%	Table F-2
Worst Case Impact on Land Values	-90.3%	Calculation
Change in Impact	4.1%	
Raw Entitled Land Value, All Group B Acres [3]	\$934,670,602	Table F-3
Worst Case Property Value Loss	\$38,699,517	Calculation
Risk Premium [4]	33%	Calculation
Additional Property Value Loss Using Risk Premium	\$12,770,841	Calculation
TOTAL (Groups A and B)	\$51,110,428	

"uncertainty"

[1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.

[2] Net of baseline.

[3] Land value calculated using acreage from Table 3a, land values from Table F-3, and appropriate discount rate.

[4] Assumes that landowners are willing to pay one third of maximum section 7 project modification losses to be protected from the risk of such losses.

ratio used to calculate project modifications. The Service's field offices with jurisdiction over proposed critical habitat have little experience to date with large projects in Group B habitat, so compensation ratios for Group B projects are more speculative.

233. The 50 percent increment in ratio was applied to the calculation of land value losses on an average project site shown in **Appendix F**. For Group A, the additional land value loss for the upper-end scenario is 4.5 percent. For Group B projects, the additional land value loss is 4.1 percent. These results are also shown in **Table 11**.
234. To apply these upper-end percentage losses in land value, the analysis assumes that land buyers can be made whole by reducing the price paid for land by one-third of the upper-end incremental losses because of section 7 compensation and avoidance ratios. This reduction in land value amounts to \$38.2 million in Group A habitat land and \$12.7 million in Group B habitat land, or a total of \$51.1 million over 20 years (see **Table 11**).⁴³ Uncertainty is not expected to impact the cost of credits sold by conservation banks, so the impact is applied to overlap (growth and critical habitat) acreage only.

STIGMA

235. The uncertainty costs estimated above do not include stigma-related effects. Stigma effects are a form of uncertainty that relate less to actual fluctuations in project modifications and more to perceived fluctuations when there is limited information on actual outcomes. Stigma effects last for a limited time period as increasing levels of information erode the perceived fluctuations, replacing them with a more accurate assessment of the actual uncertainty. They also tend to last only as long as the "fastest learners" remain unclear about the actual uncertainty associated with critical habitat designation.
236. In a situation where some market actors are clear about the effects and are able to appropriately discount the land values, while others incorporate a stigma and discount the land further, arbitrage is likely to occur – the "fastest learners" will buy the land from others, gradually increasing the land price until it reaches the value of land associated with actual uncertainty discounting only.⁴⁴
237. Overall, the stigma effect primarily results in a land value distribution to the "fastest learners" from others, all on the same site. This analysis recognizes that a small fraction of the 48,000 acres of land affected by the designation is subject to a short-term stigma effect and that the magnitude of the actual stigma costs – the transaction costs associated with

⁴³As explained earlier in this section, these costs are incurred in addition to the compliance costs estimated in **Chapter II**, because the developer's uncertainty is measured in terms of the *incremental* costs that could be incurred above the average, or typical, compliance costs.

⁴⁴ The FEA's treatment of stigma as an element of a dynamic marketplace points out that comment authors who suggest that real losses are possible through stigma effects have looked only at the first seller and not at the transfers of perceived land value that happen through arbitrage. The FEA also permits stigma effects to occur in residential, commercial, industrial, or any other type of land transaction, including agricultural land transactions.

arbitrage and the investment made in understanding the project modification requirements—is small. Hence, no estimate of the effect is provided.

CEQA IMPLEMENTATION COSTS

238. *Critical habitat designation is unlikely to indirectly impose additional CEQA costs on private land development for large projects, according to consultants who specialize in environmental impact report (EIR) services. For smaller land development projects, designation may trigger more stringent CEQA review requirements, eliminating exemptions from CEQA in some cases, and raise document preparation costs by approximately \$6.2 million over 20 years.*

LARGER LAND DEVELOPMENT PROJECTS

239. The development projects that are responsible for nearly all housing construction and a large share of industrial and commercial construction in California counties are required under CEQA to submit an EIR for public review and consider project alternatives. A lower level of CEQA review, perhaps taking the route of a negative declaration, is highly unlikely. In the process of doing this analysis, a series of consultants who specialize in EIRs were asked whether the presence of critical habitat on the project site added to the cost of preparing the EIR and moving the EIR through public hearings as part of the project's entitlement process.
240. The consensus view in the consultant community is that critical habitat designation adds no measurable CEQA-related cost for the project applicant above the CEQA baseline.⁴⁵ First, where listed species are present on the project site, the EIR's biological component will be required to discuss and evaluate habitat impacts, as well as present project alternatives. This requirement is unchanged after Federal designation of critical habitat.
241. Second, where species are not present on the project site, CEQA directs the EIR to inventory the important natural resources on the project site and characterize project impacts to important habitat types. CEQA makes no reference to critical habitat, and methods used by EIR biologists are unlikely to change if critical habitat is designated. In fact, according to State officials, State agency oversight of the quality and completeness of a project EIR concentrates wholly on the biological values of habitat in proximity to the project and on potential project impacts to that habitat, and not on the property's status as federally designated critical habitat.
242. In conclusion, this analysis finds that critical habitat designation for vernal pool species is unlikely to increase EIR costs above the CEQA baseline for any large projects in the counties included in the designation.

⁴⁵ Personal communication with senior staff from RBF Consulting (San Jose, California), EDAW (Sacramento, California) and HT Harvey & Associates (Watsonville, California), February 24–28, 2003.

SMALLER LAND DEVELOPMENT PROJECTS

243. The question of whether critical habitat designation can change the public review process for a smaller project that requires a discretionary action by lead agencies in California does not appear to have been answered either by the implementation of CEQA or litigation over the allowable extent of CEQA's exemption language. Most likely, the next 10 to 20 years will establish a regulatory record or the judicial review required for an adequate assessment of critical habitat designation's actual effects.
244. In the absence of empirical evidence, this analysis will adopt an approach that is likely to overestimate rather than underestimate the additional critical habitat-related costs imposed on small project applicants through CEQA. The first necessary assumption is that State law will disqualify certain classifications of projects from claiming a categorical exemption, if the project is located within designated critical habitat. The exemption does not apply *where a project may impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by Federal, State, or local agencies.*⁴⁶ As a result of this first assumption, projects similar to the following classifications, if located within critical habitat, will be required to file a negative declaration or a mitigation negative declaration instead of a less costly categorical exemption:
- Smaller development projects such as restaurants smaller than 2500 square feet
 - Certain projects involving landscaping or temporary trenching
 - Lot line adjustments
 - Experimental management or research
 - Signs and small parking lots⁴⁷
245. Project applicants will pay the difference between CEQA-related consultant costs for a categorical exemption and the consultant costs for a mitigated negative declaration or a negative declaration. These costs apply to all categorical exemption projects that are disqualified by the designation of critical habitat on the project site.
246. The second necessary assumption for the analysis is that projects that would have submitted either a mitigated negative declaration or a negative declaration under CEQA prior to critical habitat designation must now complete an EIR because of assumed unavoidable impacts to an environmental resource of critical concern. As a result, there will be additional time and effort required for EIR consultants to complete documents evaluating biological, air quality,

⁴⁶ California Natural Resources Code, §15300.2(a).

⁴⁷ The categorical exemption classes referenced in the statute are 3, 4, 5, 6, and 11. Other project examples fall within the classes but are not mentioned in the bulleted list.

traffic, and many other types of impacts, across a range of project alternatives. The EIR will not be a large one compared to an average EIR in California, because were it not for critical habitat designation, the project would have no impacts across all impact categories. Hence, few impacts are likely to require evaluation and mitigation within the EIR.

247. The change in costs for project applicants in this case equals the difference between consultant costs for a mitigation negative declaration or a negative declaration and a EIR of lesser complexity. The estimate of the number of affected projects over 20 years and the total additional cost is shown in **Table 12** and explained in greater detail in **Appendix D**.

Table 12
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
CEQA-Related Cost Impacts [1]

Item	Assumption or Calculation [2]	Units	Source
ASSUMPTIONS			
Project Applicant Cost for a CE	\$500	2003\$	EIR Consultants
Project Applicant Cost for an ND or MND	\$7,500	2003\$	EIR Consultants
Project Applicant Cost for an EIR of Low Complexity	\$50,000	2003\$	EPS Estimate
Incremental Cost for Applicants Now Claiming a CE	\$7,000	2003\$	Calculated over 20 year time frame
Incremental Cost for Applicants Now Claiming a ND/MND	\$42,500	2003\$	Calculated over 20 year time frame
Percent of Future CEs Affected	0.150%	percent of total	EPS Estimate
Percent of Current NDs or MNDs Affected	0.250%	percent of total	EPS Estimate
Annual Number of EIRs in Affected Counties [3]	326	EIRs per year	<i>California Planner's 2000 Book of Lists</i>
Annual Number of NDs or MNDs in Affected Counties [3]	5,843	NDs or MNDs per year	<i>California Planner's 2000 Book of Lists</i>
Ratio of CEs to ND/MNDs in Affected Counties [4]	2	CE:ND/MND	EPS Estimate
Years in Analysis Horizon	20	years	DEA Assumption
Total Number of CEs Impacted by Critical Habitat	351	CEs	Calculated
Total Number of ND/MNDs Impacted by Critical Habitat	292	NDs or MNDs	Calculated
Discount Rate	12.0%	percent	DEA Assumption
INCREMENTAL COSTS TO APPLICANTS [5]			
Subtotal, CE-related Incremental Costs	\$1,026,506	2003\$	Calculated
Subtotal, ND- or MND-related Incremental Costs	\$5,193,631	2003\$	Calculated
Total CEQA-Related Costs over 20 years	\$6,220,137		Calculated

"ceqa"

[1] Abbreviations used here include: CE=Categorical Exemption, ND=Negative Declaration, MND=Mitigated Negative Declaration, and EIR=Environmental Impact Statement.

[1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.

[3] From the California Planner's 2000 Book of Lists, pp. 55-57. EIR and ND/MND values are based on a survey of all CA counties and cities. All jurisdictions in California Counties (including the counties themselves) where critical habitat has been proposed have been included.

[4] There are assumed to be two categorical exemptions for every negative declaration or mitigated negative declaration.

[5] These costs are the applicant additional costs due to critical habitat designation. The costs are grouped by CEQA action that the applicant would have had in the absence of critical habitat.

IV. DESIGNATION IMPACT ON PUBLIC LAND DEVELOPMENT

248. **Chapter I** and **Appendices A** and **C** describe the geographic areas where the Service is proposing to designate critical habitat for vernal pool species. This chapter will identify the public land development activities within proposed critical habitat designation as well as the location, nature, and extent of future activities that may be affected by section 7 implementation in the critical habitat area. Projects are likely to have a Federal nexus if they are located on Federal land or are funded or permitted by Federal agencies.
249. Project modification costs for affected public land development projects will be estimated using a discount rate of 7 percent. **Appendix G** contains the consultation cost model and a summary of the number and cost of section 7 consultations associated with critical habitat designation for all public land uses.
250. Because consultation costs and project modifications are similar for projects of the same type, this chapter discusses impacts by Federal agency and type of development project. It first addresses impacts associated with agriculture. Next, it addresses impacts associated with all other Action agency activities identified in proposed critical habitat areas.

IMPACTS OF SECTION 7 IMPLEMENTATION ON OTHER FEDERAL ACTIVITIES AFFECTING CRITICAL HABITAT UNITS

251. *Over 20 years, section 7 implementation will generate 212 formal consultations, 405 informal consultations, and 40 instances of technical assistance from public land development. These activities will cost the Service, Action agencies, and third parties involved in the consultations between \$2.7 and \$5.9 million over 20 years, depending on a low to high range of administrative costs.*
252. Many land uses occurring in critical habitat units involve Federal agency funding or approval. These projects include electric power generation and transmission, water supply and delivery, and forest management and fire suppression, among others. The number of technical assistance activities, formal and informal consultations, and programmatic consultations associated with vernal pool species are covered below.⁴⁸ A detailed summary of these activities can be found in **Appendix G**. For the purposes of cost estimation, a programmatic consultation will be treated as a formal consultation.

⁴⁸A public comment suggested that delayed flood control projects funded by FEMA would increase economic impacts of the designation for certain regions of California. After numerous interviews with FEMA officials, the claim of large delays and damages is unlikely. FEMA does not believe that local agencies can assume FEMA participation for any future project that the agency wishes to build. Furthermore, FEMA programs are not meant to replace local planning for disasters such as flooding. Both statements make the connection of critical habitat designation and flood control facilities with a Federal nexus more dubious.

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MILITARY FACILITIES CONSTRUCTION AND MILITARY TRAINING OPERATIONS

253. Four military bases (all operated by DoD) have land that has been included in proposed critical habitat for vernal pool species. Each base hosts a number of training, housing, repair, fueling, armament storage, office and communications facilities, and construction of new facilities or changes in the nature of base operations may require a section 7 consultation with the Service if adverse impacts to vernal pool habitat or the species are possible.
254. Travis Air Force Base, located in Solano County, has staff biologists who have identified the vernal pool habitat and produced resource management strategies used by base management to protect some of the listed vernal pool plant species. Air Force personnel believe that no additional runways or roads are likely to be constructed in the next two decades at Travis, resulting in the need for no additional consultations after critical habitat is designated.⁴⁹
255. Similarly, Beale Air Force Base, located in Yuba County, has land within proposed critical habitat for vernal pool fairy shrimp and tadpole shrimp. Staff biologists anticipate that the proposed critical habitat will coincide with areas already protected by Beale land management policies.⁵⁰ Consequently, no additional consultations are expected for any military activities at this installation.⁵¹
256. Staff at Fort Hunter Liggett estimate that 16 new formal consultations and 36 informal consultations will be required in the next 20 years. Fort Hunter Liggett, located on 165,000 acres in southern Monterey County, conducts field training that includes firing ranges and tank squadron maneuvers. The installation's Draft Integrated Natural Resources Management Plan (INRMP) has an endangered species component and the Fort's biologists consulted during the mid-1990s with the Service on several species, including some vernal pool plants and crustaceans.
257. In addition, the installation recently underwent a series of firing range upgrades and modernizations and consulted with the Service on these activities. The majority of future operations at Fort Hunter Liggett will be the subject of a re-initiated consultation that will address critical habitat issues among others. Personnel expect that at least two of the sixteen

⁴⁹Personal communication with Bob Holmes, Environmental Specialist, Travis Air Force Base, Solano County, California, February 20, 2002.

⁵⁰Personal communication with Kirsten Kristoferson, Biologist, Beale Air Force Base, Yuba County, California, May 14, 2002.

⁵¹One public comment suggested that the economic output generated (or potential loss of output because of critical habitat) in the operation of Beale Air Force Base should have been considered in the analysis. However, these economic benefits are not the result of critical habitat designation, and this analysis estimates no costs to the installation because of existing protections for vernal pools at the base. Hence, no regional economic losses are expected.

new formal consultations will pertain to various activities likely to occur before the conclusion of the programmatic consultation.⁵²

258. Camp Roberts staff estimate that 15 formal, 16 informal, and one reinitiated formal section 7 consultation will be required in the next 20 years. Camp Roberts is located on 43,000 acres in San Luis Obispo County and Monterey counties and hosts a variety of training and logistics functions for the National Guard and all four branches of the military. In the past, the installation consulted once with the Service programmatically on military training and training zone maintenance activities. In addition, one informal consultation was held to review burning and grazing practices on the property, one informal consultation occurred when the installation planned to demolish 460 buildings over a 5-year period, and a formal consultation was required when McMillan Airfield expanded.
259. After vernal pool critical habitat is designated, personnel at Camp Roberts expect to reinitiate the programmatic consultation on training and training area maintenance, and over the next two decades, various maintenance, construction, and training activities not addressed in the programmatic consultation will likely require 15 more individual formal consultations and 16 more individual informal consultations under section 7.
260. The consultations will address the 31 projects planned for the next 20 years at the installation. These projects cover maintenance and new construction within Camp Roberts' cationment area, firing ranges, and other training sites.⁵³ One of the 31 projects involves the relocation of an ammunition storage facility, for which a single formal consultation is planned. Because each project is largely conceptual at this time, no project descriptions or construction schedules are available. For this reason, it is assumed that every project not addressed by programmatic consultations will result in an individual consultation.

MILITARY BASE RE-USE AND REDEVELOPMENT

261. As part of a multi-year plan to reuse Fort Ord, a former military base in Monterey County, the U.S. Army has begun to transfer the base's land to local entities and other Federal agencies. With over half the base's acreage awaiting cleanup and transfer of title, section 7 consultations will likely be required of both the current military landowner and the recipient agencies.
262. Officials in the U.S. Army's local Office of Environmental Management believes that proposed designation of critical habitat on the base will require a reinitiation of a programmatic consultation on vernal pool species for its program of cleanup, disposal, and

⁵²Personal communication with Rob Pike, Contract Biologist, Fort Hunter Liggett, Monterey County, California, February 6, 2002, and Addendum to the Draft Economic Analysis of Critical Habitat Designation for the Purple Amole and Camatta Canyon Amole, Industrial Economics, Inc., September 2002.

⁵³Personal communication with Julie Eliason, Environmental Specialist, Camp Roberts, San Luis Obispo and Monterey Counties, California, January 30, 2002.

re-use of the base.⁵⁴ In addition, the BLM, an agency slated to receive title to more than 15,000 acres of Fort Ord land, estimates that it will be required to conduct two informal and two formal consultations each year for activities that may affect critical habitat for vernal pool species.⁵⁵ Over 20 years, these section 7 consultations will amount to 40 informal and 40 formal consultations between the Service and the BLM.

AIRPORT EXPANSION

263. The FAA estimates that several runway expansion projects that are planned within the next 20 years may overlap with vernal pool critical habitat. The construction of runway extensions has the potential to impact critical habitat if the proposed construction requires vernal pools to be filled or if associated activities (the movement of heavy equipment, surface grading, etc.) disturb the vernal pools themselves or their upland components. Runway expansions constitute a Federal nexus because, on average, 90 percent of construction costs are funded by aviation grants through the FAA, with the remainder paid for by the participating county.
264. In particular, one ongoing expansion and three proposed expansions are likely to result in a total of three formal section 7 consultations and biological assessments with the Service because of the presence of vernal pools. The FAA is currently in the process of initiating a section 7 consultation with the Service because of endangered species other than vernal pool species for the ongoing construction of a runway extension at the Colusa County Airport. Although a formal consultation is already anticipated for this project, the presence of vernal pool critical habitat has the potential to increase the complexity of this consultation and to impose additional administrative or project modification requirements. The FAA has made aviation grants available for three additional future runway extensions within critical habitat boundaries: one at the Turlock Municipal Airport in Merced County, one at Mefford Field in Tulare County, and one at the Chico Municipal Airport in Butte County. FAA personnel anticipate that both of these projects will require formal consultations and biological assessments with the Service because of the presence of vernal pools.

RAIL TRANSPORTATION SYSTEM CONSTRUCTION

265. The FTA and the Sacramento Regional Transit District (SacRT) estimate that one formal section 7 consultation will be required in the next 20 years for light rail transportation. SacRT currently has plans to construct a light rail transit maintenance facility on a 40 acre parcel near the town of Rancho Cordova, ten miles east of Sacramento. The project is currently on hold pending environmental findings related to the presence of wetlands and the elderberry shrub, host plant of the endangered Valley Elderberry Longhorn Beetle. A wetland delineation survey that was conducted as part of the environmental assessment did not identify any vernal pools on the parcel. County maps, however, indicate that the parcel

⁵⁴Personal communication with Bill Collins, Program Manager, U.S. Army, Fort Ord, California, March 11, 2003.

⁵⁵Personal communication with Eric Morgan, Branch Chief, BLM, Monterey, California, March 11, 2003.

likely overlaps with critical habitat boundaries. Construction of the maintenance facility would be partially funded by FTA grants, which creates a Federal nexus under section 7. SacRT has been involved in formal consultations with the Service in the past regarding the Sacramento light rail transit South Corridor and Folsom Corridor.

266. The FRA and the California High Speed Rail Authority (CHSRA) anticipate that one programmatic formal section 7 consultation and biological assessment will be required in the next 20 years for development of a high-speed rail system in California. The CHSRA is a State agency charged with planning, constructing, and operating a high speed rail system serving California's major metropolitan areas. The proposed rail system would include more than 700 miles of track and would serve the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County and San Diego.
267. The CHSRA is preparing a program-level EIR/EIS for the high-speed rail system. Although the environmental study phase has not been completed, it is clear that this project has the potential to impact vernal pool critical habitat as it traverses virtually every county south of Sacramento that contains critical habitat for vernal pools. The project is funded both by State funds and by Federal grants from the FRA, which establishes a Federal nexus under section 7. If the project continues following completion of the environmental review phase, it is virtually certain that at least one formal consultation, possibly a large and complex programmatic consultation, and a biological assessment would be required. As a relatively new State agency, the CHSRA has not been involved in any previous section 7 consultations.

ROAD SYSTEM CONSTRUCTION AND MAINTENANCE

268. The California Department of Transportation (Caltrans) estimates that nine future highway projects in District 3 (Marysville), District 6 (Fresno), and District 10 (Stockton) will overlap with vernal pool habitat and require formal consultations and biological assessments. In addition, approximately 400 informal consultations will take place across all of Caltrans' districts in the context of discussions with the Service after project site surveys for vernal pool species. Caltrans receives Federal funding from the Federal Highways Administration (FHWA) to perform maintenance and construction of the State's highway system, thus establishing a Federal nexus.⁵⁶
269. Caltrans regional office personnel with knowledge of District 3 estimate that two projects on State Route (SR) 70 in Yuba County, a connection between the Yuba County Amphitheater

⁵⁶Several public comments stated that county road projects would be impacted by the designation. After numerous interviews with Caltrans environmental staff and local agency staff who program county funds for projects that are "off system" — that is, not in the State highway system but under control of cities or counties—no information could be produced to describe the rate of consultations or their costs. Caltrans does not track such information, and neither do the local agencies who might receive Federal funds through Caltrans.

and SR 65, and maintenance on Highway 149 in Butte County and on Highway 65 in Placer County are all expected to require formal consultation because of vernal pools.⁵⁷

270. Caltrans regional office personnel with knowledge of Districts 6 and 10 estimate that four projects with direct and indirect impacts to vernal pools will result in formal consultations in the Central Valley: State Route 145 in Madera County, State Route 120 in Stanislaus County, State Route 26 in San Joaquin and Calaveras Counties, and State Route 180 in Fresno County. Each consultation would involve the FHWA, Caltrans, and the jurisdictional county.⁵⁸
271. Across all 12 districts, Caltrans headquarters staff cite ongoing activity concerning vernal pool species located on road project sites. During the course of planning each project, Caltrans conducts surveys for vernal pool species on its project sites and reports the results to the Service. This analysis will consider each survey to be an informal consultation. Over the next 20 years, the San Joaquin Region's districts are expected to survey 160 times, the Bay Area Region's districts are expected to survey 80 times, the Southern California Region's districts are expected to survey 20 times, and the Sacramento Valley Region's districts are expected to survey 120 times.⁵⁹ In total, the agency will require 400 informal consultations on projects in the next 20 years.

CWA ENFORCEMENT

272. The EPA shares nationwide enforcement responsibility for provisions of the CWA with the ACOE. When suspected illegal fill of wetlands occurs in areas of critical habitat and EPA determines that restoration of the affected site will be part of the settlement of the enforcement action, a section 7 consultation with the Service is required. Based on conversations with the EPA, future consultations with the Service are likely to mirror the past consultation history. Personnel in the Region IX Offices of the EPA believe that three formal and three informal vernal pool critical habitat consultations are likely in the coming 20-year period.⁶⁰

SUPERFUND PROGRAM IMPLEMENTATION

273. Activities related to the characterization and cleanup of contaminated sites under EPA's Superfund Program may create a Federal nexus for the responsible parties and EPA.⁶¹ If

⁵⁷Personal communication with Chris Colofson, State Highway Planner, California Department of Transportation, District 3 Office, on March 15, 2002.

⁵⁸Personal communication with Terry Marshall, Biology Branch Chief, Caltrans Central Region, Fresno, CA, September 27, 2002.

⁵⁹Personal communication with Richard Hill, ESA Administrator, Caltrans Headquarters Office, Sacramento, California, September 24, 2002.

⁶⁰Personal communication with Wetlands Enforcement Program, EPA Northern California Office, San Francisco, California, February 5, 2002.

⁶¹42 U.S.C. § 9601 et seq. (1980).

remediation or other assessment measures, such as soil removal, water treatment, or test well drilling, have the potential to adversely modify habitat, a formal consultation and biological assessment will be required under section 7. Based on caseload experience over the past 10 years and general knowledge of the distribution of vernal pool habitat, personnel in EPA's Superfund Technical Support Team Office expect that ten formal consultations and biological assessments related to EPA Superfund projects in critical habitat units will take place in the next 20 years.⁶²

FEDERAL ELECTRIC POWER GRID INTERCONNECTION

274. The Western Area Power Administration (WAPA) markets and delivers hydroelectric power generated by the Bureau of Reclamation, ACOE, and the International Boundary and Water Commission. Within its service territory of 15 central and western states, WAPA provides the transmission lines and other power grid facilities for 55 hydropower plants with a total capacity of 10,600 megawatts.
275. WAPA is authorized to grant interconnections to its transmission systems. The private entity or Federal agency with the power generating facility submits an application to WAPA and, while systems and facility studies are undertaken prior to the execution of systems and facility agreements, an environmental review process is launched. The application review process provides a Federal nexus for section 7 consultations if adverse impacts may occur to vernal pool habitat. Agency personnel estimate that a total of four informal consultations and five formal consultations with biological assessments will be needed to comply with section 7 over the next 20 years.⁶³

HYDROPOWER FACILITIES RELICENSING AND CONSTRUCTION

276. The Federal Energy Regulatory Commission (FERC) licenses private and public utility-operated hydropower facilities. Through the licensing process, FERC places conditions on the operations of the dam and power generation facilities to achieve energy supply, safety, and environmental objectives. Historically, the agency has consulted under section 7 for species impacts from transmission lines that connect the hydropower project to the electric grid. However, because of a new arrangement between FERC and other Federal landowners, such the Forest Service and the Bureau of Land Management, future FERC consultations on facilities within proposed vernal pool critical habitat will be restricted in scope to the power generation facilities only. The land management agencies will assume responsibility for section 7 consultations involving critical habitat lying underneath power lines or located near other types of utility infrastructure.

⁶²This analysis considers the effects of the regulatory action as proposed in the Federal Register on September 24, 2002 (66 *Federal Register* 133, September 24, 2002).

⁶³Personal communication with John Bridges, Biologist, Western Area Power Administration, Denver, Colorado, February 6, 2002.

277. FERC personnel could recall approximately five previous informal consultations on FERC licensing activities, each resulting in a “no effect” determination made in each of the five biological opinions issued by the Service. As an estimated 25 licenses expire for California hydropower projects over the next 20 years, the agency projects that 10 informal consultations and 18 technical assistance calls to the Service will be required to screen possible impacts to vernal pool habitat.⁶⁴

NATURAL GAS PIPELINE FACILITIES RELICENSING AND CONSTRUCTION

278. FERC also licenses the construction and operation of natural gas and oil pipelines if the pipeline crosses State lines. One project, the Kern River Pipeline Expansion, is currently engaged in an informal consultation with the Service concerning vernal pool impacts. The Kern River project is an example of “pipeline loop” construction that utilizes the footprint of the existing gas line to add capacity along the same route. FERC staff believe that all indications point to a “no effect” determination, so that no reinitiation of the consultation process will be necessary after critical habitat designation.
279. Another licensing project proposes to convert a pipeline transporting oil from Texas to Santa Barbara, California (the All American Pipeline) into a facility transporting natural gas instead. This project will also make use of the existing footprint of pipeline facilities, although transport of the natural gas requires installation of compressor stations at periodic intervals. The 10 to 30 acres of land required for each of these structures will also obligate the agency to consult with the service under section 7. FERC expects there to be a single informal consultation for this project’s licensing.⁶⁵

ELECTRIC POWER TRANSMISSION FACILITIES MAINTENANCE

280. WAPA has also conducted a programmatic consultation related to vernal pools for the broad range of maintenance activities expected on lands adjacent to or beneath WAPA power lines. Agency staff expect that this consultation will need to be reinitiated after critical habitat designation. In addition, for maintenance activities not addressed in the programmatic consultation, staff expect that four separate informal section 7 consultations and four formal consultations with biological assessments will be required over the next two decades.⁶⁶

MUNICIPAL, INDUSTRIAL, AND AGRICULTURAL WATER SUPPLY

281. The Bureau of Reclamation operates dams, power plants, and canals throughout the Western states and expects that section 7 consultations on vernal pool species habitat will be required

⁶⁴Personal communication with Lon Crow, Hydropower Branch Chief, Federal Energy Regulatory Commission, Washington, DC, January 25, 2002.

⁶⁵Personal communication with Bob Arvelund, Oil and Gas Project Manager, Federal Energy Regulatory Commission, Washington, DC, February 5, 2002.

⁶⁶Personal communication with John Bridges, Biologist, Western Area Power Administration, Denver, Colorado, February 6, 2002.

for maintenance activities on canal rights-of-way, agency participation in power plant construction, and the Bureau's renewal of 40-year water service contracts.⁶⁷ Its heavy equipment operations adjacent to canal and pump facilities throughout California's Central Valley have the potential to adversely impact vernal pool habitat, according to personnel in several of the Bureau's area offices. Personnel anticipate that four informal consultations will be required in the 20 years following designation of critical habitat.⁶⁸

282. Second, the proposed construction of a power plant in Colusa County that will use Bureau water for cooling purposes may also have vernal pool impacts and could require a single formal consultation and biological assessment on critical habitat issues.⁶⁹ Third and last, the activity generating the largest demand for consultations by the Bureau is its authority to enter into long-term water supply agreements with water purveyors located throughout the State. Many of these contracts were established in the 1960s and 1970s, and their staggered renewal over the next 20 years will require a series of formal and informal consultations whenever the contract's service territory overlaps with proposed critical habitat for vernal pools.
283. Bureau personnel expect that approximately 40 contract renewals in the next two decades involve impacts from end uses for the delivered water that are serious enough to require formal consultation and biological assessment under section 7. In the same time period, 30 other contract renewals will likely require informal consultations.⁷⁰
284. The Bureau also participates in several mitigation programs referenced in a programmatic consultation on vernal pool species completed in the last ten years to address land conversion issues. As beneficiaries of Bureau water have converted land out of agricultural use or between agricultural uses, the agency receives funds under the Habitat Restoration Program of the Central Valley Project Improvement Act and under its own Conservation Program to acquire and protect vernal pool habitat. These funds, partially generated through water rate surcharges, are likely to increase above \$3 million in the coming years

⁶⁷ A public comment projected large impacts to a municipal water supply system because of the designation. Upon examination of the projects identified for the regulatory impacts, it was determined that no estimate of the acres of vernal pool impacts were possible, because the basic size or final location of the water storage and delivery infrastructure projects were unknown as well. They have not been included in the FEA.

⁶⁸Personal communication with Rosalie Faubion and Rob Shroeder, Environmental Specialists, North Central California and South Central California Area Offices, Bureau of Reclamation, January 23 and 25, 2002.

⁶⁹Personal communication with Buford Holt, Environmental Specialist, Northern California Area Office, Bureau of Reclamation, January 25, 2002.

⁷⁰Personal communication with Rosalie Faubion and Rob Shroeder, Environmental Specialists, North Central California and South Central California Area Offices, Bureau of Reclamation, January 23 and 25, 2002. One public comment suggested that large impacts would occur in areas of the Central Valley once critical habitat was designated. Bureau officials interviewed after the publication of the DEA do not foresee these kinds of large effects on agricultural water supply and delivery operations.

before leveling off. However, the Bureau set up these programs prior to and independent of requirements established through section 7 consultations for any the vernal pool species. As agency staff anticipate that no reinitiation of the programmatic consultation will be necessary in the future, no cost will be attributable to critical habitat designation.⁷¹

TRIBAL LANDS DEVELOPMENT

285. The Natural Resources Branch of the Bureau of Indian Affairs anticipates engaging in one formal consultation and biological assessment with the Service over the proposed construction of a casino on reservation land in the vicinity of Chico, in Butte County. The proposed development consists of a 50,000 square foot gaming casino on approximately 600 acres of land. The BIA would provide Federal funds for trust acquisition on behalf of the Mechoopda Tribe, which would constitute a Federal nexus under section 7. BIA personnel estimate that vernal pools may be present on approximately 400 of the 600 acres, and that these acres may also be occupied by the red-legged frog, a federally listed endangered species. The BIA has already participated in a similar formal consultation over a 49 acre trust acquisition for construction of a casino on the Auburn Rancheria.

WILDLIFE REFUGE OPERATIONS

286. The Service manages Stone Lakes National Wildlife Refuge, a 18,200 acre property in Sacramento County that includes land designated as critical habitat for vernal pool species. Many of the refuge's resource management activities have the potential to impact proposed critical habitat. These activities include habitat restoration and creation, cattle grazing, invasive plant species monitoring and control, and construction of public education facilities, and may require section 7 consultations with the Service.
287. As a result of critical habitat designation, personnel assigned to Stone Lakes expect to initiate a programmatic consultation to address the full range of resource management activities planned for the refuge. The programmatic consultation will be able to address critical habitat and species impacts for all resource management activities except for insect and weed control. Because of the resistance that develops in plants and insects targeted for chemical control and the continuous introduction of new herbicide and pesticide products to the end user market, a new consultation must be initiated for each new control chemical. Personnel at the refuge estimate that ten new chemicals will be rotated into use in the next 20 years, each requiring a formal consultation and biological assessment.⁷²

HABITAT CONSERVATION PROGRAM

⁷¹Personal communication with Chuck Solomon, Environmental Specialist, Regional Office, Bureau of Reclamation, Sacramento, California, January 25, 2002.

⁷²Personal communication with Tom Harvey, Refuge Manager, Stone Lakes National Wildlife Refuge, Sacramento County, California, January 23, 2002.

288. The Service's Habitat Conservation Plan (HCP) branch estimates that 22 informal section 7 consultations will be required in the next 20 years. When newly designated critical habitat overlaps with lands that are regulated under an existing HCP, the Service is required to evaluate the extent to which the existing HCP is protective of the designated critical habitat and to amend the HCP, if necessary, by reinitiating a previous section 7 consultation. The Service's HCP branch estimates that one established HCP will need to be updated to include protections for vernal pool critical habitat.⁷³ A reinitiated consultation for the San Joaquin multi-species conservation plan would therefore be required under section 7. In essence, this represents an internal consultation within the Service between section 7 and section 10 regulators to ensure that past private party exemptions from the Act continue to comply with more recent Federal actions.
289. In addition, Service personnel estimate that approximately 20 HCPs currently under preparation might need to be reviewed to determine whether they would be protective of vernal pool habitat as proposed. The administrative process of reviewing all 20 HCPs for completeness is estimated to require approximately ten full days of one staff member's time. Following review, the Service estimated that approximately ten HCPs would ultimately need to be revised, which would require 1 to 2 days effort each, or a total of 15 days. This analysis assumes the administrative effort required for this review process is approximately equivalent to 11 informal section 7 consultations. Service personnel pointed out that revisions in the HCPs are not likely to impose any projection modification costs on the participating parties.

FOREST RESOURCE MANAGEMENT

290. There are a number of planned forestry and fire control projects over the next 20 years that have the potential to overlap with vernal pool critical habitat. The projects fall into two main groups as defined by their Federal funding source. The Forestry Branch of the BIA conducts fire control measures on tribal lands using funds from the National Fire Plan, while the Forest Service conducts forestry research projects and maintains management plans that guide the use and protection of forest resources. Both of these Federal funding sources constitute a Federal nexus with respect to section 7.
291. Fire protection projects carried out by the Forestry Branch of the BIA include habitat alterations such as fuel breaks and roadside brushing that have the potential to impact vernal pool critical habitat. BIA personnel estimate that such activities could result in approximately six individual formal consultations and biological assessments due exclusively to the presence of vernal pool habitat, and another six programmatic consultations that might be required because of the presence of several endangered species, including vernal pool species.⁷⁴ The BIA has consulted with the Service several times in the

⁷³Personal communication with Marie Sullivan, Division Chief of Conservation Planning, U.S. Fish and Wildlife Service, Sacramento Field Office, February 25, 2002.

⁷⁴Personal communication with Environmental Compliance Coordinator, Bureau of Indian Affairs, Pacific Region Forestry Branch, February 15, 2002.

- past about fire protection projects in areas containing endangered species and/or critical habitat.
292. USFS's Pacific Southwest (PSW) Research Station estimates that two formal consultations and biological assessments may be required in the next 20 years because of forestry research practices.⁷⁵ The PSW Research Station has been involved in one historical section 7 consultation related to research on grazing practices at its San Joaquin range research facility. This consultation, including the preparation of a Biological Analysis, was required because of the presence of both the red legged frog and protected vernal pool species. PSW personnel indicated that both future consultations might also be required because of the presence of multiple protected species, including vernal pool species.
293. USFS personnel also indicated that future formal consultations might be required because of the development of management strategies in northern California forests where the slender Orcutt grass (*Orcuttia tenuis*) is present, although it was unable to specify how many such consultations would be likely to occur. This analysis assumes that two such management strategies (similar to the Sierra Nevada Forest Plan Amendment) will be developed in the next 20 years, each requiring a formal consultation and biological assessment.
294. In addition, the issuance of livestock permits and the use, maintenance, and construction of off-highway vehicle (OHV) trails would likely result in a number of future consultations because of the presence of slender Orcutt grass. Approximately five grazing allotment consultations per year for the next 10 years are anticipated in Lassen, Plumas, and Modoc National Forests. Fifty percent are assumed to be informal and 50 percent are assumed to be formal, neither of which are expected to require biological assessments.
295. Two formal consultations are also expected for OHV road-related issues within critical habitat areas, which would require biological assessments. The Forest Service has been involved in one previous consultation over the development of its Sierra Nevada Forest Plan Amendment. The Amendment required one formal consultation with the Service, which was required because of the presence of a number of protected species, including the slender Orcutt grass.⁷⁶

ESTIMATED TOTAL COSTS OF CONSULTATIONS

296. **Table 13** displays the total cost of Service, Action agency, and third party administrative costs over the next 20 years by type of section 7 activity. These costs include private land development administrative costs. Based on this analysis, the public land development portion of these estimates is between \$2.6 million and \$5.8 million.

⁷⁵Personal communication with Laurie Fenwood, Range Conservationist, U.S. Department of Agriculture, Pacific Southwest Research Station, Forestry Services Lab, March 6, 2002.

⁷⁶Personal communication with wildlife biologist for the Sierra Nevada Framework, March 26, 2002.

Table 13
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Economic Analysis
Consultation and Technical Assistance Cost Summary [1]

Category	Technical Assistance		Informal Consultation		Formal Consultation [2]		TOTAL	
USFWS	\$64,023	\$167,444	\$599,283	\$1,857,778	\$649,714	\$1,278,470	\$1,313,020	\$3,303,691
Action Agency	\$0	\$0	\$779,068	\$2,337,204	\$817,382	\$1,362,304	\$1,596,450	\$3,699,508
Third Party	\$109,037	\$272,592	\$440,884	\$1,065,468	\$248,409	\$351,199	\$798,329	\$1,689,259
Biological Assessments								
Public	\$0	\$0	\$0	\$0	\$478,362	\$669,707	\$478,362	\$669,707
Private	\$0	\$0	\$0	\$0	\$265,668	\$371,935	\$265,668	\$371,935
TOTAL	\$173,060	\$440,036	\$1,819,235	\$5,260,450	\$2,459,535	\$4,033,614	\$4,451,829	\$9,734,101

"By_Agency"

[1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.

[2] Formal Consultation cost totals include Biological Assessment costs.

ESTIMATED COSTS OF PROJECT MODIFICATIONS, OTHER ACTION AGENCY PROJECTS

297. *Public land development projects for which section 7 consultations are likely to require project modifications include selected activities of the Department of Defense, Federal Aviation Administration, Federal Highways Administration, the Bureau of Indian Affairs, and the U.S. Forest Service. In total, these costs are estimated to be \$3.9 million over 20 years.*
298. The following section includes project modifications that are likely to be included as a part of formal consultations within vernal pool species critical habitat. They are based on the modifications required in past formal consultations and on conversations with the Service and Action agencies regarding the types of modifications likely to be required in future formal consultations. Categorized by type of project, these costs are shown in **Table 14** and discounted by 7 percent.
299. It should be noted that critical habitat designation is not expected to increase the annual budgets of government agencies. While the designation will require effort on the part of Service staff, the agency does not believe its budget will increase in size to accommodate this need.⁷⁷

FOREST RESOURCE MANAGEMENT

300. The Forestry Branch of the BIA estimated that a number of the Bureau's fire protection projects would be subject to formal consultations related to the designation of vernal pool critical habitat. It was estimated that six individual consultations would be required due solely to vernal pool habitat, and that six additional programmatic consultations would need to address vernal pool habitat. The average total cost of conducting each fire protection project is approximately \$70,000. Based on varying degrees of complexity regarding section 7 mitigation measures, BIA personnel estimated that vernal pool critical habitat designation would require project modifications that would increase project costs by approximately 25 percent for four individual consultations and would increase costs by approximately 50 percent for the remaining two individual consultations. The estimated cost of project modifications related to these individual consultations is therefore approximately \$140,000. The BIA expects that the mitigation measure costs would likely stem from complying with the "3:1 mitigation ratio" that the Service has relied upon in previous section 7 consultations involving listed species or critical habitat.⁷⁸

⁷⁷One public comment suggested that Federal agencies would require larger budgets because of increased workload after critical habitat designation.

⁷⁸Personal communication with Environmental Compliance Coordinator, Bureau of Indian Affairs, Pacifica Region Forestry Branch, February 15, 2002.

Table 14
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Project Modification Costs, Excluding Private Land Development [1]

Project Owner/Activity	Action Agency	Number of Consultations Requiring Modifications	Project Modification Costs Per Effort	Project Modification Cost Total	Party Paying for Modifications
Department of Defense					
Base operations and training	DOD	various	various	\$1,331,932	DOD
Base closure and re-use	DOD	1	\$500,000	\$283,390	DOD
State and Local Governments					
Runway extensions	FAA	4	\$465,000	\$1,054,210	Local government
Construction and maintenance of state highways	FHWA	9	variable	\$433,020	Local government
Native American Governments					
Fire protection	BIA	6	variable	\$230,113	Tribe
Casino construction	BIA	1	\$860,000	\$359,728	Tribe
Forest Service					
Forest management	USFS	27	variable	\$144,529	USFS
TOTAL		47		\$3,836,922	

"Project_Mods"

Sources: Action agencies and U.S. Fish and Wildlife Service.

[1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.

301. The BIA Forestry Branch estimates that total costs for programmatic fire protection project consultations range from \$40,000 to \$50,000, including administrative and project modification costs. This analysis assumes the project modification cost of each project is \$44,355, which is \$50,000 minus \$5,634 in administrative costs. These project modification costs assume that the tribe would need to hire an outside environmental consultant (using BIA funds) and that an environmental assessment would be required because of vernal pool critical habitat. The programmatic consultations would likely already have been initiated because of the presence of other endangered species but, to avoid underestimating the costs of vernal pool species critical habitat designation, all of the costs are attributed to vernal pool critical habitat designation. The total estimated cost of project modifications for programmatic consultations is \$266,000.
302. The U.S. Forest Service's consultation over the Sierra Nevada Forest Plan Amendment resulted only in administrative costs associated with hiring a variety of biological specialists to survey National Forest lands for the presence of protected species. It is therefore assumed that the two future management plan consultations associated with Slender Orcutt Grass will not result in any project modification costs. Forest Service personnel also indicated that approximately 25 informal and 25 formal consultations will be required because of the issuance of grazing allotments on National Forest land. The informal consultations are not assumed to require project modifications, while each formal consultation is assumed to require approximately \$9,000 in project modifications, consisting primarily of fencing installation and maintenance. Finally, two future formal consultations are assumed for OHV road-related issues. These consultations are expected to be relatively extensive and to result in approximately \$15,000 each in project modification costs related to fencing and habitat avoidance. The total project modification costs for these 27 formal consultations is therefore estimated to be \$255,000.⁷⁹

TRIBAL LANDS DEVELOPMENT

303. The BIA's Natural Resources Branch has been involved in one formal vernal pool consultation in the past over trust acquisition for a gaming facility. Project modification costs for this previous consultation were approximately \$860,000, which included on-site vernal pool mitigation (set aside), off-site vernal pool creation, fees to hire an outside biological consultant, and project infrastructure modifications to avoid vernal pools. Given the similarities between the casino development that resulted in this historical consultation and the casino development proposed by the Mechoopda Tribe, project modification costs for the proposed gaming facility are also estimated to be \$860,000. BIA personnel pointed out that the majority of these costs would be borne directly by the Mechoopda Tribe, especially those required to comply with the Service's habitat mitigation requirements.

⁷⁹Personal communication with Laurie Fenwood, Range Conservationist, U.S. Department of Agriculture, Pacific Southwest Research Station, Forestry Services Lab, March 6, 2002.

AIRPORT EXPANSION

304. The four future runway extension projects identified by the FAA will all result in both administrative and project modification costs. The FAA has completed at least one vernal pool species consultation related to runway extension, for which the project modification costs were estimated to be approximately \$465,000. These costs included a 3:1 mitigation ratio for approximately five acres of impacted pools, as well as associated environmental monitoring and reporting costs.⁸⁰ Applying an average cost of \$465,000 to the four proposed airport projects results in a total cost of \$1,860,000. FAA personnel point out that previous consultation costs are not necessarily an accurate indicator for future costs, as regulatory requirements and costs vary widely on a project-specific basis. With little project-specific information available, however, this analysis considers historical cost information to be the most reliable data source.
305. The additional runway extension project costs are not included in the estimates of section 7 related land development costs in Section 4.3.1, because of the public nature of airport projects. Section 4.3.1 reflects impacts to private land development only.

ROAD SYSTEM CONSTRUCTION AND MAINTENANCE

306. Caltrans personnel estimate that at least nine formal consultations will be required because of highway construction and maintenance projects in Districts 3, 6, and 10 over the next 20 years. Caltrans District 3 has been involved in two formal consultations in the past that resulted in project delays and modification costs. Formal consultation for vernal pools has typically resulted in one-year project delays and significant vernal pool mitigation costs. Each of District 3's five proposed projects is expected to result in both project delays and mitigation requirements. However, district personnel were not able to estimate the number of vernal pool acres likely to be affected as a result of these projects.
307. One previous District 3 consultation for State Highway 99 in Butte County required vernal pool mitigation in the form of credits purchased at a conservation bank for approximately \$70,000 per credit.⁸¹ Traditionally, Caltrans has discussed its project impacts with the Service using the terms *direct impact* and *indirect impact* to better separate the effects of the project's construction activity from effects caused by changed drainage patterns and connectivity between the pools. Assuming each of the five proposed projects disturbs one vernal pool

⁸⁰Personal communication with Tara Tighe, Senior Airport Planner, Federal Aviation Administration, and airport engineering consultant, February 2, 2002 and with Endangered Species Division Chief, Sacramento Fish & Wildlife Office, October 11, 2002.

⁸¹One public comment questioned why conservation bank credit prices differed from mitigation costs paid by other Federal and State agencies following section 7 consultations. The short answer is that the DEA's data source for credit prices applies to land development activities, while other agencies use a variety of mitigation.

acre directly and one vernal pool indirectly, total project modification costs are estimated at approximately \$700,000.^{82/83}

308. The consultations occurring in Districts 6 and 10 since vernal pool species were Federally listed have resulted in Caltrans purchasing a mitigation property known as the Jensen Ranch for \$1.5 million. Its 190 acres of vernal pool habitat will supply the agency with section 7 mitigation at an average land cost of \$8,000 per acre. The level of administrative costs borne by Caltrans in the allocation of project mitigation credits required by the Service could not be estimated. Using the District 3 estimate of one acre of direct and one acre of indirect impacts per highway project, Districts 6 and 10 will likely pay \$64,000 in section 7-related project mitigation costs during the next 20 years for their four proposed projects.⁸⁴

MILITARY FACILITIES CONSTRUCTION AND MILITARY TRAINING

309. Staff at Fort Hunter Liggett estimate that 16 new formal consultations and 36 informal consultations will be required in the next 20 years. The Army Reserve provided cost estimates for certain conservation measures it believes would be necessary to meet the Service's recommendations to protect habitat of other listed species living on military lands such as the purple amole and the Camatta Canyon amole. The measures include additional monitoring requiring the employment of two GS-11 equivalent biologists at a cost of \$2.1 million over 20 years, and fencing of protected areas at a total cost of \$250,000. Similar measures might be implemented by Fort personnel to protect vernal pool species after critical habitat designation. To potentially overstate, rather than understate costs, this analysis assumes that the actual costs of implementing a revised monitoring protocol and installing fencing will not exceed Fort Hunter Liggett's estimate of \$2.35 million over the next 10 years. The Service does not necessarily recommend permanent fencing for vernal pool areas.
310. Personnel at Camp Roberts expect to reinstate the programmatic consultation on training and training area maintenance after vernal pool critical habitat is designated. In addition, over the next two decades, various maintenance, construction, and training activities not addressed in the programmatic consultation will likely require 15 more individual formal consultations and 16 more individual informal consultations under section 7. Because the projects are largely conceptual at this time and no project descriptions or construction schedules are available, it is not possible to estimate project modification costs.
311. The outcome of these 31 consultations is not likely to be the discontinuation of all military training at Camp Roberts, an event that the Air National Guard anticipates would result in military equipment relocation, cancellation of capital projects, and regional employment losses. Instead, it is more likely that significant training activities at the installation will be

⁸²Personal communication with Chris Colofson, Biological Mitigation Coordinator, Caltrans, March 15, 2002.

⁸³Personal communication with Chris Colofson, Biological Mitigation Coordinator, Caltrans, March 15, 2002.

⁸⁴Personal communication with Terry Marshall, Biology Branch Chief, Caltrans Central Region, Fresno, CA, September 27, 2002.

permitted through the outcome of programmatic consultations.⁸⁵ In the past, these consultations have permitted larger than normal exercises, the deployment of new military aircraft and land vehicles during exercises, and the construction and operation of new firing ranges. Even if future training missions at Camp Roberts differ from the military's current training needs, training activities are likely to be addressed by section 7 in a similar manner.⁸⁶

MILITARY BASE RE-USE AND REDEVELOPMENT

312. Officials overseeing the cleanup of land at Fort Ord suggest that, over 20 years, one programmatic consultation will be re-initiated by the U.S. Army after the designation of critical habitat, and 80 total formal and informal consultations will take place with the BLM. The programmatic consultation concerns the Army's cleanup of land formerly used as a live firing range. The major project modification for this activity stipulates that, before harmful materials are removed from a cleanup site, the equivalent of one week of surveying and monitoring of vernal pool species and habitat will take place. The Army's local Environmental Management office believes that this process will cost \$25,000 per year in consultant fees for five new cleanup sites that are surveyed each year.⁸⁷
313. The BLM's consultations are expected to incur administrative costs only, and no project modification costs apply to the agency's land management activities.⁸⁸

ESTIMATED TOTAL COSTS OF PROJECT MODIFICATIONS

314. **Table 14** displays the per-effort estimates of total project modification costs associated with all public land development activities affecting critical habitat for vernal pool species. Based on this analysis, the total cost of modifications attributable to section 7 based on the designation is estimated at \$3.8 million over the next 20 years.

ENERGY IMPACT ANALYSIS

315. Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and

⁸⁵Correspondence dated July 1, 2000, from Lieutenant Colonel Lawrence A. Kimmel, Commanding Officer, California Army National Guard Headquarters, Camp Roberts, California.

⁸⁶Personal communication with Carol Tyson, Field Biologist, U.S. Fish and Wildlife Service, Ventura, California, July 22, 2002.

⁸⁷Personal communication with Bill Collins, Program Manager, U.S. Army, Fort Ord, California, March 11, 2003.

⁸⁸Personal communication with Eric Morgan, Branch Chief, Bureau of Land Management, Monterey, California, March 11, 2003.

consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy." OMB has provided guidance for implementing this executive order that outlines nine outcomes that may constitute "a significant adverse effect" when compared with the regulatory action under consideration:

- Reductions in crude oil supply in excess of 10,000 barrels per day;
- Reductions in fuel production in excess of 4,000 barrels per day;
- Reductions in coal production in excess of 5 million tons per year;
- Reductions in natural gas production in excess of 25 million mcf
- Reductions in electricity production in excess of 1 billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed the thresholds above;
- Increases in the cost of energy production in excess of 1 percent;
- Increases in the cost of energy distribution in excess of 1 percent; or
- Other similarly adverse outcomes.

316. The analysis finds that no project modifications are anticipated to occur in any energy producing industries from the implementation of section 7 following designation of critical habitat. Furthermore, no additional energy use is likely to be required as a result of designation.
317. Based on information from Federal agencies involved in the construction of new energy production facilities or the maintenance of energy facilities, the total impact on energy producing industries is expected to be as high as \$221,400 of administrative costs over 20 years. These section 7 administrative costs are estimated to be less than \$20,000 per year, assuming a 7 percent rate of return on capital. Because of this minimal impact in relation to the annual economic activity associated with each component of the energy production industry (petroleum production or refining, coal or natural gas production, electricity generation, etc.), this analysis concludes that the designation is unlikely to cause a significant adverse effect on the industry as measured by any of the nine screening criteria.

V. ECONOMIC IMPACTS ASSOCIATED SOLELY WITH THE DESIGNATION

While public land development projects affected by the implementation of section 7 have been identified, little information is available as to whether those projects would have taken place in the absence of the designation. Based on a review of the historical consultation record and historical development patterns, however, this analysis estimates that 15 percent of all future administrative and project modification costs of private land development are attributable solely to the designation.

318. This section estimates the fraction of the total costs associated with the designation of critical habitat that are not attributable co-extensively to the listing of vernal pool species. In other words, these are the economic impacts associated solely with critical habitat designation.

COSTS OCCURRING IN THE ABSENCE OF DESIGNATION

319. **Table 15** reports total direct and indirect costs associated with the implementation of section 7 and requirements resulting from the designation. Costs resulting from the section 7 process include protections pursuant to both the jeopardy and adverse modification provisions of section 7. As noted in **Chapter I**, significant overlap exists between the economic implications of listing and critical habitat designation (i.e., application of jeopardy versus adverse modification provisions of the Act). By reporting estimates of total section 7 impacts, the analysis ensures that all of the potential critical habitat impacts are captured.
320. This “total section 7 impacts” methodology may, however, capture some impacts that would have occurred in the absence of critical habitat designation, and thus may overstate the effects attributable to the designation. In fact, the listing of the vernal pool species is likely to trigger a portion of the impacts presented in the above analysis. For the following two reasons, it is expected that many consultations would occur absent critical habitat designation.
321. First, the consultation history in the 37 counties since the listing of vernal pool species indicates that the Service has consulted on the same range of activities in the absence of critical habitat designation. The records for the period of 1995 through 2001 from one field office covering 27 of these counties indicate a very large program of more than 1,800 technical assistance activities, informal consultations, and formal consultations, of which ACOE and Bureau of Reclamation activities have the largest share of Service consultations.
322. Second, consultations between the Service and landowners occur because of the presence of vernal pools and the presumed presence of vernal pool species on the property. To obtain conclusive evidence that species do not inhabit a property’s wetlands, landowners must follow a multiyear survey protocol. Because of the time and expense required to conduct such a survey, landowners generally choose to proceed as if vernal pool species are present.

Table 15
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Total Costs Associated with the Implementation of Section 7 [1]

Critical Habitat Impact Activity/Project Type (Agency)	Cost Range	Costs to the Service	Costs to the Action Agencies	Costs to the Third Parties	Total Section 7 Costs
Consultations and Technical Assistance					
Technical Assistance	<i>low</i>	\$64,023		\$109,037	\$173,060
	<i>high</i>	\$167,444		\$272,592	\$440,036
Informal Consultations	<i>low</i>	\$599,283	\$779,068	\$440,884	\$1,819,235
	<i>high</i>	\$1,857,778	\$2,337,204	\$1,065,468	\$5,260,450
Formal Consultations	<i>low</i>	\$649,714	\$817,382	\$248,409	\$1,715,505
	<i>high</i>	\$1,278,470	\$1,362,304	\$351,199	\$2,991,972
Biological Assessments	<i>low</i>		\$478,362	\$265,668	\$744,030
	<i>high</i>		\$669,707	\$371,935	\$1,041,642
Subtotal, Consultations [2]	<i>low</i>	\$1,313,020	\$2,074,813	\$1,063,997	\$4,451,829
	<i>high</i>	\$3,303,691	\$4,369,215	\$2,061,194	\$9,734,101
Project Modifications					
Land Development (ACOE)				\$568,932,537	\$568,932,537
Base Operations and Training (DOD)			\$1,331,932		\$1,331,932
Base Closure and Re-Use (DOD)			\$283,390		\$283,390
Runway extensions (FAA)				\$1,054,210	\$1,054,210
Construction and maintenance of state highways (FHWA)				\$433,020	\$433,020
Fire protection (BIA)				\$230,113	\$230,113
Casino construction (BIA)				\$359,728	\$359,728
Forest management (USFS)			\$144,529		\$144,529
Subtotal, Project Modifications			\$1,759,851	\$571,009,609	\$572,769,460
Indirect Costs					
Time Delay				\$70,272,367	\$70,272,367
Uncertainty				\$51,110,428	\$51,110,428
CEQA				\$6,220,137	\$6,220,137
Subtotal, Indirect Costs				\$127,602,932	\$127,602,932
Consumer Surplus Loss					
				\$735,773,500	\$735,773,500
TOTAL [2]					
	<i>low</i>				\$1,440,597,721
	<i>high</i>				\$1,445,879,992

"Total"

Sources: Action agencies and U.S. Fish and Wildlife Service.

[1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.

[2] Biological Assessment costs are reflected in the Total section 7 column only. Biological Assessment costs are divided between public and private agencies using the following ratio: (Private BAs)/(Total BAs) = (BA Costs to Private Agencies)/(Total BA Costs)

Hence, for projects containing vernal pool features where the presence of listed species is uncertain, landowners and relevant action agencies have historically consulted with the Service to avoid possible section 7 violations or illegal take of listed species. Critical habitat designation is not likely to change this practice.

ESTIMATION OF COSTS ATTRIBUTABLE ONLY TO THE DESIGNATION

323. The designation of critical habitat is likely to provide helpful information relative to land development projects in counties that are under-represented in the consultation history for these species. For several counties with large amounts of proposed critical habitat, population growth over the past decade has resulted in only a small number of consultations. Other counties with similar habitat resources and population growth are represented with significantly larger numbers of consultations. Based on this information, this analysis makes the assumption that several counties have historically been under-represented in the consultation history. Aside from other factors, the demand for urbanized land generated by population growth should generally be associated with a larger number of vernal pool species consultations with the Service.
324. This analysis assumes that by virtue of the Service's full rule-making process, from the publication of the draft rule on vernal pool species critical habitat, to the public comment period, to the final designation, and finally to the regulation's implementation, counties under-represented in the consultation history will in the future be represented in proportion to the recent rate of population growth in each county. The difference between actual rates of consultations in these counties during the 1995–2001 time period and each county's expected "full representation" rate of consultation with the Service constitutes the share of impacts due solely to critical habitat.
325. **Table 16** shows the total costs of technical assistance calls, informal and formal consultations, and project modifications for private development projects attributable solely to critical habitat designation.⁸⁹ The value of these impacts were calculated based on the difference between the rate at which consultations should have occurred historically (based on population growth and the presence of habitat) and the rate at which consultations actually occurred. In other words, if developers in a county could reasonably have been expected to participate in 100 consultations between 1995 and 2001, and instead the record only shows 10 consultations during that time frame, the analysis assumes that in the future, 90 percent of consultations will be undertaken as a result of new awareness of the potential presence of these species. Counties for which a high percentage of the total consultations is

⁸⁹One public comment suggested that the portion of section 7 costs solely attributable to critical habitat are only those costs from projects located in unoccupied habitat. However, the designation may provide new information about the extent of potential vernal pool species habitat, causing landowners who were unaware of the species in the past to consider the species' potential presence. The methods used in this analysis to attribute costs solely to critical habitat designation, therefore, do not rely on the singular question of whether the cost occurs with a project in unoccupied habitat.

Table 16
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Portion of Private Land Development Costs and Consumer Surplus Losses Attributable to Critical Habitat [1] [2]

ID	Region or County	20 Year Total Consultation Costs		Total Consumer Surplus and Land Value Loss	TOTAL COST [3]	Percent Attributable to Critical Habitat	Total Costs Attributable to Critical Habitat
		low	high				
San Francisco Bay Area							
1	Alameda	\$54,879	\$118,752	\$60,322,982	\$60,409,800	90%	\$54,368,800
2	Contra Costa	\$0	\$42	\$2,217	\$2,200	90%	\$2,000
3	Napa	\$8,533	\$18,447	\$2,433,061	\$2,446,600	0%	\$0
4	Solano	\$192,246	\$416,030	\$320,203,362	\$320,507,500	44%	\$141,023,300
	Subtotal	\$255,658	\$553,271	\$382,961,621	\$383,366,100		\$195,394,100
San Joaquin Valley Region							
5	Fresno	\$57,557	\$124,566	\$3,673,705	\$3,764,800	0%	\$0
6	Kings	\$42	\$84	\$1,757	\$1,800	0%	\$0
7	Madera	\$453,634	\$981,598	\$23,716,015	\$24,433,600	0%	\$0
8	Merced	\$134,062	\$290,083	\$91,146,352	\$91,358,400	0%	\$0
9	San Joaquin	\$0	\$0	\$0	\$0	78%	\$0
10	Stanislaus	\$0	\$0	\$0	\$0	91%	\$0
11	Tulare	\$7,236	\$15,644	\$427,784	\$439,200	0%	\$0
	Subtotal	\$652,531	\$1,411,976	\$118,965,613	\$119,997,800		\$0
Mountain Region							
12	Lassen	\$0	\$0	\$0	\$0	0%	\$0
13	Modoc	\$0	\$0	\$0	\$0	0%	\$0
14	Plumas	\$17,986	\$38,901	\$1,036,520	\$1,065,000	0%	\$0
15	Siskiyou	\$0	\$0	\$0	\$0	0%	\$0
	Subtotal	\$17,986	\$38,901	\$1,036,520	\$1,065,000		\$0
Upper Sacramento Valley Region							
16	Butte	\$111,307	\$240,893	\$63,758,890	\$63,935,000	0%	\$0
17	Colusa	\$38,441	\$83,198	\$3,043,972	\$3,104,800	0%	\$0
18	Glenn	\$0	\$0	\$0	\$0	0%	\$0
19	Shasta	\$73,075	\$158,071	\$5,785,437	\$5,901,000	0%	\$0
20	Tehama	\$3,681	\$7,947	\$816,374	\$822,200	0%	\$0
	Subtotal	\$226,503	\$490,109	\$73,404,672	\$73,763,000		\$0
Sacramento Valley Region							
21	Placer	\$211,027	\$456,604	\$29,026,736	\$29,360,600	0%	\$0
22	Sacramento	\$159,368	\$344,837	\$682,091,566	\$682,343,700	0%	\$0
23	Yolo	\$0	\$0	\$0	\$0	73%	\$0
24	Yuba	\$0	\$0	\$0	\$0	0%	\$0
	Subtotal	\$370,395	\$801,441	\$711,118,302	\$711,704,300		\$0
Northern Coast Region							
25	Lake	\$0	\$0	\$0	\$0	0%	\$0
26	Mendocino	\$0	\$0	\$0	\$0	73%	\$0
	Subtotal	\$0	\$0	\$0	\$0		\$0
Central Coast Region							
27	Monterey	\$24,512	\$53,039	\$5,580,224	\$5,619,000	0%	\$0
28	San Luis Obispo	\$47,852	\$103,568	\$6,990,778	\$7,066,500	0%	\$0
29	San Benito	\$0	\$0	\$0	\$0	64%	\$0
	Subtotal	\$72,364	\$156,607	\$12,571,002	\$12,685,500		\$0

Table 16
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Portion of Private Land Development Costs and Consumer Surplus Losses Attributable to Critical Habitat [1] [2]

ID	Region or County	20 Year Total Consultation Costs		Total Consumer Surplus and Land Value Loss	TOTAL COST [3]	Percent Attributable to Critical Habitat	Total Costs Attributable to Critical Habitat
		low	high				
	Sierra Nevada Foothills Region						
30	Amador	\$0	\$0	\$0	\$0	61%	\$0
31	Calaveras	\$0	\$0	\$0	\$0	69%	\$0
32	Mariposa	\$0	\$0	\$0	\$0	0%	\$0
33	Tuolumne	\$0	\$0	\$0	\$0	0%	\$0
	Subtotal	\$0	\$0	\$0	\$0		\$0
	Jackson County, Oregon						
34	Jackson	\$38,190	\$82,612	\$3,492,461	\$3,552,900	0%	\$0
	Southern California						
35	Riverside	\$128,289	\$277,618	\$1,155,858	\$1,358,800	0%	\$0
36	Santa Barbara	\$0	\$0	\$0	\$0	0%	\$0
37	Ventura	\$0	\$0	\$0	\$0	0%	\$0
	Subtotal	\$128,289	\$277,618	\$1,155,858	\$1,358,800		\$0
37 COUNTY AREA GRAND TOTAL [4]		\$1,752,254	\$3,791,621	\$1,304,706,049	\$1,307,477,986	15%	\$195,394,100

"CH Portion2"

Sources: USFWS and California State Department of Finance

- [1] Assumes an annual discount rate of 12% for all private costs, 7% for all public costs, and 3% for consumer surplus losses.
- [2] Outside of land development activities, there is not likely to be additional cost attributable solely to critical habitat designation.
- [3] Reflects the average of the low and high range of consultation costs.
- [4] Costs for Private Land Development only. Totals/Annualized Costs may not equal the sum of the county costs due to rounding.

attributed solely to critical habitat were the most under-represented in the consultation history compared to the expected amount.

326. Across all 37 counties, more than 90 percent of the technical assistance efforts, section 7 consultations, and project modifications are likely to occur over the next 20 years even if critical habitat is not designated. In other words, these impacts can be attributed co-extensively to the listing of the species.⁹⁰ It is estimated that for private land development activities for which the ACOE is the action agency, 12 of the 158 consultations, or about 7.6 percent of the total, would be triggered solely by critical habitat designation. The value of these activities and the project modifications associated with them is estimated to be \$195 million, about 15 percent of the total cost.
327. These estimates apply only to ACOE permitting activities related to land development within critical habitat units. With regard to other action agencies besides ACOE, personnel responsible for section 7 compliance were generally well informed about the listings of vernal pool species and the impact those listings have had on their agency's activities in the last decade. Hence, other Federal agencies are not likely to be under-represented in the consultation history, and no future consultations that could be attributed solely to critical habitat designation are predicted.

⁹⁰For the purposes of this analysis, consumer surplus losses, which are linked to the project modifications resulting from section 7 consultations, are also attributed to critical habitat based on the same ratios for counties in which these effects occur. Other indirect costs, such as time delays associated with the section 7 consultation process and regulatory uncertainty, are more difficult to attribute to specific geographic regions. Therefore, this analysis does not attempt to attribute these costs specifically to the listing or the designation.

VI. POTENTIAL IMPACTS ON SMALL BUSINESSES

337. Under the Regulatory Flexibility Act (as amended by the SBREFA of 1996), 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 (i.e., small businesses, small organizations, and small government jurisdictions).⁹¹ 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.⁹² SBREFA amended the Regulatory Flexibility Act 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. Accordingly, the following represents a screening level analysis of the potential effects of critical habitat designation on small entities to assist the Secretary in making this certification.
338. This analysis estimates the number of small entities potentially affected by the designation of critical habitat for vernal pool species. It also estimates the level of effect the designation will have on small entities. For both estimates, this analysis conservatively examines the total estimated section 7 costs calculated in earlier sections of this report.
339. This analysis begins by identifying all formal and informal consultation activities generated by the proposed rule that may involve small entities (business or governments). The analysis, then, estimates the number of small entities that are potentially affected. Finally, the level of impacts on those entities is examined.
340. Federal courts and Congress have indicated that an RFA/SBREFA analysis should be limited to direct and indirect impacts on entities subject to the requirements of the regulation. As such, entities indirectly impacted by the vernal pool species listing and critical habitat, and, therefore, not directly regulated by the listing or critical habitat designation, are not considered in this screening analysis.

IDENTIFICATION OF ACTIVITIES THAT MAY INVOLVE SMALL ENTITIES

341. **Chapters II, III and IV** of this report identifies those land use activities that are within the proposed critical habitat designation for vernal pool species and expected to be affected by section 7 of the Act. The land use activities identified as being potentially impacted by

⁹¹5 U.S.C. 601 et. seq.

⁹²Thus, 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).

section 7 implementation (i.e., requiring consultations or project modifications) under the "with section 7" scenario are listed in **Table 17**.

342. Of the projects that are potentially affected by section 7 implementation for vernal pool species, some do not have third party involvement (i.e., only the action agency and the Service are expected to be involved). Thus, small entities should not be affected by section 7 implementation for affected projects with the following agencies:
- DOD – base operations and training; facilities construction; base closure and re-use
 - Service – National Wildlife Reserve (NWR) operations; NWR mosquito/weed control; Habitat Conservation Program
 - USFS – forestry research; forestry management
 - BOR – maintenance of water facility right-of-way; water supply and delivery contracts; power plant construction
 - FERC – operation of hydroelectric facilities; oil pipeline conversion
 - WAPA – maintenance of power lines
343. Finally, the following projects that are potentially affected by section 7 implementation contain project modifications that take place within the power generation industry. Utilities operating in California are likely to be large corporations (i.e., exceeding the Small Business Association annual sales threshold) such as Pacific, Gas, & Electric (PG&E) and Southern California Edison, which exceed the Small Business Administration's annual sales threshold for small utilities and therefore do not fit the category of small businesses.
- WAPA – authorization for interconnection establishment
344. After excluding these two sets of action agencies and consultations noted above from the total universe of impacts identified in the body of the analysis, eight action agencies and associated consultations remain. This subset represents the group of action agencies and consultations that may produce significant impacts on small entities:
- ACOE – land development
 - FAA – runway extensions
 - FHWA – construction and maintenance of State highways
 - FTA – construction of transit maintenance facilities
 - FRA – construction of high-speed rail systems
 - FEMA – disaster response
345. **Table 18** summarizes the number of consultations for all activities that pertain to the SBREFA analysis. The number of consultations for both private businesses and local governments is shown on a 20-year basis, and annual basis.

Table 17
U.S. Fish and Wildlife Service
Vernal Pools Species Critical Habitat Designation Economic Analysis
Estimated Number of Future Section 7 Consultations on Land Uses Affecting Vernal Pool Species or Critical Habitat (20 years)

Federal/Nexus Activity	Potentially Affected Activities	Formal Consultations With 3rd Party	Informal Consultations With 3rd Party
Department of Defense	Base operations and training	0	0
Department of Defense	Facilities construction	0	0
Department of Defense	Base closure and re-use	0	0
Federal Aviation Administration	Runway extensions	4	0
Federal Railroad Administration	Construction of high-speed rail systems	1	0
Federal Transportation Authority	Construction of transit maintenance facilities	1	0
Federal Highway Administration	Construction and maintenance of state highways [1]	9	400
Federal Emergency Management Agency	Disaster response	6	0
Environmental Protection Agency	Discharge to U.S. waters	1	1
Environmental Protection Agency	Characterization and cleanup of contaminated sites	4	0
Federal Energy Regulatory Commission	Operation of hydroelectric facilities	0	0
Federal Energy Regulatory Commission	Oil pipeline conversion	0	0
Western Area Power Administration	Authorization to establish an interconnection	5	4
Western Area Power Administration	Maintenance of power lines	0	0
Bureau of Reclamation	Maintenance of water facility ROW	0	0
Bureau of Reclamation	Power plant construction	0	0
Bureau of Reclamation	Water supply and delivery contracts	0	0
Bureau of Indian Affairs	Fire protection	6	0
Bureau of Indian Affairs	Casino construction	1	0
Army Corps of Engineers	Land development	158	473
U.S. Fish and Wildlife Services	National Wildlife Refuge operations	0	0
U.S. Fish and Wildlife Services	National Wildlife Refuge mosquito/weed control	0	0
U.S. Fish and Wildlife Services	Habitat Conservation Program	0	0
U.S. Forestry Service	Forestry research	0	0
U.S. Forestry Service	Forestry management	0	0
TOTAL		196	878

"future_consult_T17"

[1] Only nine of the eighteen consultations involving third parties for state highway projects will involve local governments.

Table 18
U.S. Fish & Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Estimated Number of Future Section 7 Consultations included in Small Business Analysis (SBREFA)

Project Type	Potentially Affected Activities	Number of Consultations			
		Formal	Informal	Formal	Informal
Affecting Private Business Entities		<i>Over 20 years</i>		<i>In any given year</i>	
Army Corps of Engineers	Land development	158	473	7.9	23.7
Affecting Local Government Entities		<i>Over 20 years</i>		<i>In any given year</i>	
Federal Aviation Administration	Runway extensions	4	0	0.2	0.0
Federal Railroad Administration	Construction of high speed rail systems	1	0	0.1	0.0
Federal Transit Administration	Construction of transit maintenance facilities	1	0	0.1	0.0
Federal Highway Administration	Construction of maintenance of state highways	9	400	0.5	20.0
Federal Emergency Management Agency	Disaster response	6	0	0.3	0.0
Total Private Business		158	473	8	24
Total Local Government		21	400	1	20

"SBREFA_consult_T18"

DESCRIPTION OF AFFECTED SMALL ENTITIES

346. This section describes the industries most likely to be affected by section 7 implementation for vernal pool species. More information about affected projects can be found in **Chapters II and IV** of this report. All project modification costs considered in this section are not discounted to make them comparable to recent year annual report and annual government revenue data.

LAND DEVELOPMENT/REAL ESTATE (SIC 6552)

347. The Small Business Administration defines small businesses within the land development and real estate industry category as having less than \$6 million in average annual receipts (also referred to as sales or revenues). Projects permitted by the ACOE that involve section 7 consultations for vernal pool species may affect small businesses under Standard Industrial Classification (SIC) Code 6552.
348. Significant levels of Federal agency review and permitting are often required for land development projects by public and private entities. This analysis assumes that the primary Federal nexus for future private development activities is the issuance of section 404(b) permits by the ACOE under the CWA for impacts to “waters of the U.S.” If the project is located within proposed critical habitat, the requirement that a project obtain a 404 permit from the ACOE also means that a section 7 consultation is likely to be initiated with the Service.
349. To determine the likelihood that development will occur within critical habitat Geographic Information Systems (GIS) analysis was used to calculate overlap between proposed critical habitat and the development projections of an urban growth model designed at the University of California, Berkeley. City & Regional Planning professors at the University developed an urban growth model called the CURBA model. The CURBA model uses GIS technology to provide spatial predictions of the extent of urban growth in the year 2020. By overlaying the proposed critical habitat unit areas over CURBA predictions, tentative conclusions can be made about where development is likely to take place within critical habitat.
350. The GIS analysis in combination with historical consultation rates was instrumental in identifying the location and number of section 7 consultations that are likely to occur across the 37 county study area. It is estimated that 158 formal consultations and 473 informal consultations will take place involving small businesses in the land development and real estate industry over the next 20-year period.

ACTIVITIES FUNDED BY SMALL GOVERNMENTS

351. The SBREFA defines a “small governmental jurisdiction” as “governments of counties with a population of less than fifty thousand.”⁹³ This analysis assumes that all small governments having partnerships with the Federal government are affected by consultation activity on those partnerships. All small governments for cities and counties that have a population that is less than 50,000 persons within the total study area constitute the universe of small governments in this analysis. There are a maximum of 30 unique small governments that are required to undertake formal consultations regarding vernal pool habitat designation. Local governments act as third parties in these consultations. The nexus agencies include the FAA, the FHWA, the FTA, the FRA, and FEMA. In addition, 400 informal consultations are proposed involving the construction of and maintenance of State highways by the FHWA.
352. The FAA estimates that several runway expansion projects that are planned within the next 20 years may overlap with vernal pool critical habitat. In particular, one ongoing expansion and three proposed expansions are likely to result in consultations with the Service because of the presence of vernal pools. The construction of runway extensions has the potential to impact critical habitat if the proposed construction requires vernal pools to be filled or if associated activities (the movement of heavy equipment, surface grading, etc.) disturb the vernal pools themselves or their upland complexes. Runway expansions constitute a Federal nexus in that 90 percent of the construction costs are funded by aviation grants through the FAA, with the remainder paid for by the participating County. The four project modifications have an undiscounted value of \$1.9 million.
353. Caltrans estimates that nine future highway projects involving local governments in District 3 (Marysville), District 6 (Fresno), and District 10 (Stockton) will overlap with vernal pool habitat and require formal consultations and biological assessments. In addition, approximately 400 informal consultations will take place across all of Caltrans’ districts in the context of discussions with the Service as project site surveys for vernal pool species are performed. Local governments will assume third party roles during these consultations. Caltrans receives Federal funding from the FHWA to perform maintenance and construction of the State’s highway system, thus establishing a Federal nexus. The nine project modifications have an undiscounted value of \$764,000.
354. There is currently one rail transportation system construction project planned in California that may overlap with vernal pool critical habitat. The Sacramento Regional Transit District (SacRT) currently has plans to construct a light rail transit maintenance facility ten miles east of Sacramento. SacRT will participate as a third party in the section 7 consultation for this project. County maps indicate that the parcel on which the transit rail is to be development overlaps with critical habitat boundaries. Construction of maintenance facility would be partially funded by Federal Transit Administration grants, which creates a Federal nexus under section 7. No project modification costs are associated with the project. Therefore, this analysis includes only administrative costs for the rail project.

⁹³U.S.C § 601.

355. The California High Speed Rail Authority is a State agency charged with planning, constructing, and operating a high-speed rail system serving California's major metropolitan areas. The governments of these metropolitan areas will be required to participate as third parties in the section 7 consultations for this project. The project has the potential to impact vernal pool critical habitat as it traverses virtually every county south of Sacramento that contains critical habitat for vernal pools. The project is funded both by State funds and by Federal grants from the Federal Railroad Administration. The nature of the project's funding constitutes a Federal nexus under section 7. At least one formal consultation, and a possible programmatic consultation, would be required for this project.
356. FEMA is charged with coordinating Federal preparedness for response to, and recovery from, national emergencies. While the scope and location of emergency response activities is by definition difficult to forecast, FEMA nonetheless estimates, based on previous response rates, that approximately six formal section 7 consultations will be required in the next 20 years because of vernal pool species, both related to emergency flood control projects. The local governments of the areas where FEMA projects will take place will participate as third parties during all required section 7 consultations.

ESTIMATED NUMBER OF SMALL ENTITIES AFFECTED: THE "SUBSTANTIAL NUMBER TEST"

357. To be conservative, (i.e., more likely to overstate impacts than understate them), this analysis assumes that a unique small business will undertake no more than one project requiring a consultation in a given year, so the number affected is equal to the total annual number of consultations (both formal and informal). This analysis also limits the universe of potentially affected entities to include only those within the counties in which critical habitat units lie; this interpretation produces a more conservative analysis than including all entities nationwide.
358. First, the number of small businesses affected under the land development and real estate (SIC 6552) industry are estimated. As shown in **Table 19**, the following calculations are used to arrive at this estimate:
- **Estimate the *number* of businesses within the study area affected by section 7 implementation annually (assumed to be equal to the number of annual consultations).** For the ACOE projects that fall under the land development real estate industry, there are 158 estimated formal consultations and 473 estimated informal consultations. In any given year of the 20-year time frame, 8 formal consultations, and 24 informal consultations may occur.
 - **Calculate the *percent* of businesses in the affected industry that are likely to be small.** This is calculated by dividing the total number of small businesses in the

Table 19
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Estimated Annual Number of Small Businesses Affected by Critical
Habitat Designation

Industry Name		Land Development SIC 6552
Number of affected businesses in the industry in any given year	By Formal Consultation	8
	By Informal Consultation	24
Number of small businesses in industry within study area		1,551
Total number of all businesses in industry within study area		1,692
Percent of businesses that are small (number of small businesses) / (total number of businesses)		92%
Number of small businesses affected in any given year = (number of affected businesses) * (percent of small businesses)		29
Percentage of small businesses affected in any given year = (number of small businesses affected) / (total number of small businesses)		2%

"bus_number_T19"

Sources: Dun and Bradstreet; Economic & Planning Systems, Inc.

study area for each SIC code (using the annual sales thresholds from the Small Business Administration described in the previous section) by the total number of businesses in the study area that fall under the same SIC code.⁹⁴ The analysis shows that 92 percent of the land development and real estate (SIC 6552) businesses within the study area are small.

- **Calculate the *number of affected small businesses in each affected industry.*** This is calculated by multiplying the percent of small businesses by the total number of consultations (formal plus informal). According to this calculation, 29 small businesses in the land development and real estate industry (SIC 6552) are expected to be affected annually.
- **Calculate the *percent of small businesses likely to be affected by critical habitat.*** This is done by dividing the number of affected small businesses by the total number of small businesses in the study area. This analysis reveals that on an annual basis, two percent of all the small businesses in the study area for the land development and real estate industry is likely to be affected by vernal pool critical habitat designation.

ESTIMATED EFFECTS ON REVENUES OF SMALL BUSINESSES

359. First, the number of small businesses affected under the land development and real estate (SIC 6552) is estimated.
360. As concluded in the previous section, two percent of small businesses (29 businesses) for land development and real estate industry in the study area are expected to be affected by section 7 consultation activities. Costs of critical habitat designation to small businesses consist primarily of the cost of participating in section 7 consultations and the cost of project modifications.
361. **Table 20** estimates the level of effect a small business will experience from critical habitat designation for vernal pools. **Table 20** lays out assumptions that calculate the revenues expected from smaller development projects (those undertaken by small businesses) and the number of development projects a small business in this industry may be able to process concurrently. The following steps were taken to estimate the effects on small business revenues:
- **Calculate the Average Small Business Gross Revenue.** For small development firms, the Per-business Annual Gross Revenue consists of a weighted average of the product of the number of firms in each RMA revenue bin⁹⁵ and their respective

⁹⁴Dun Market Identifiers, File 516: Dun and Bradstreet, June 2000.

⁹⁵ The annual number of affected small businesses are distributed into different revenue bins as categorized by RMA Annual Statement Studies: 2001-2002, which provides data on the distribution of annual sales in an industry within the following ranges: \$0-1 million, \$1-3 million, \$3-5 million, \$5-10 million, \$10-25

average annual revenue. For small land development businesses, the annual gross revenues per business are estimated to be \$1.2 million.

- **Calculate the Average Cost Impact per Small Development Project.** The Per-business cost for small development projects is calculated dividing the sum of the total project modification costs, discounted time delay costs, and undiscounted uncertainty costs, by the number of formal consultations. This analysis assumes that all time delay costs, unlike uncertainty costs, will be incurred in the first year of a development project, and is therefore discounted. This result is further ratioed by an average project size of 3.6 acres that is derived from the average gross revenues of firms in this size class compared to the 300 acre project size the Service has experienced in the consultation record. The Per-business cost for each small development project is approximately \$118,000 per year.
- **Estimate an Average Number of Projects and Average Number of Affected Projects per Small Business.** This analysis calculates that small businesses may develop as much as 53,000 acres of the 58,000 acres developed each year in the 37 counties where critical habitat has been proposed. If the average project duration is 3 years and each firm develops 3.2 acres annually (consistent with average small business revenue data), there will be 1,550 small business firms engaged in 4,900 projects during any given year. This ratio projects that each small business has on average 3.2 projects underway at any given time. Based on an assumption that each firm is impacted by no more than one project requiring a section 7 consultation, 31 percent of the Average Cost Impact per Small Development Project will be incurred by the small business each year.
- **Calculate the Per-Business Effect on Annual Revenues.** The ratio of Per-Business cost in the affected project to Per-business annual gross revenues for the firm's 3.2 projects in total shows that small businesses in the land development industry are likely to experience a 3.1 percent impact on their annual revenues as a result of vernal pools critical habitat designation.

million, and \$25+ million. As mentioned above, the Small Business Administration defines small businesses within the land development and real estate industry as having less than \$6 million in average revenue. As such, the affected small businesses in this industry are distributed into four bins: \$0-1 million, \$1-3 million, \$3-5 million, and \$5-6 million.

Table 20
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Estimated Annual Effects on Small Businesses in Land Development and Real Estate Industry

Item	Small Businesses SIC 6552
Per-business Annual Gross Revenue [1]	\$1,240,000
Average improved land value per acre [2]	\$344,392
Maximum acres developed per year per small business [3]	3.60
Average project duration for small projects [4]	3 years
Annual acres developed by small business, 37 counties [5]	53,080
Number of small projects per year, 37 counties [6]	4,914
Total small firms in industry, 37 counties [7]	1,551
Number of active projects per small firm, any given year [8]	3.17
Projects affected by critical habitat per small business	1
Per-business Cost [9]	\$118,350
Per-business Effect (per-business cost/annual gross revenue) [10]	3%

"bus_effects_T20"

- [1] This is derived by taking a weighted average of the product of the number of consultations in each RMA revenue bin and their respective average annual revenue.
- [2] Improved land value per acre is assumed to be 2.5 times greater than the calculated average of all entitled land values per acre seen in Appendix Table F-3.
- [3] Equals the per-business annual gross revenue for a small business divided by the average improved land value per acre.
- [4] It is assumed that it takes an average of three years for a small business to complete a land development project.
- [5] This is derived by subtracting the total number of acres developed by large businesses from the total acres developed annually by all businesses within the study area. Acres developed by large businesses was derived from annual gross revenues of large businesses in this industry.
- [6] Equals the total acres developed by small businesses divided by the maximum acres per small business, divided by the average project duration.
- [7] See Table 19.
- [8] Equals the number of projects per year for small firms divided by the total number of small firms.
- [9] Calculated by multiplying the ratio of acres per project of small to large projects by the per business cost of a large business in the land development industry.
- [10] Equals the Per-business Cost divided by 3.2 projects underway in an average small business. This analysis shows that small businesses in the land development industry are likely to experience a 3% impact to their annual revenues as a result of critical habitat designation.

EFFECTS ON SMALL GOVERNMENTS

362. First, the number of affected small governments in the study area is estimated.⁹⁶ As shown in **Table 21**, the following calculations are used to arrive at this estimate:

- **Estimate the annual number of governments within the study area affected by section 7 implementation (assumed to be equal to the annual number of consultations).** One annual formal consultation, and 20 informal consultations are estimated for activities that would involve government entities in the study area.
- **Calculate the percent of governments in the study area that are likely to be small.** This is calculated by dividing the number of small governments by the total number of governments in the study area. The analysis shows that 74 percent of the governments within the study area are small.
- **Calculate the number of affected small governments in the study area.** This is calculated by multiplying the percent of small governments by the total number of annual consultations. This analysis shows that 16 small governments in the study area is affected annually.
- **Calculate the percent of small governments likely to be affected by critical habitat.** This is done by dividing the number of affected small governments in the study area by the total number of small governments in the study area. This analysis reveals that eight percent of the small governments in the study area is likely to be affected by vernal pool consultation activities. A closer examination of this result shows that the majority of consultations involving small governments are informal, indicating in most cases that a phone call is made by transportation project managers to the Service to discuss potential impacts by the project on vernal pool species and habitat.

363. Given that eight percent of small governments in the study area are estimated to be affected by section 7 consultation activities, the following steps describe the methodology used to estimate the effect of section 7 consultation activities on the revenues of small governments in the study area (see **Table 22**).

364. Two scenarios were generated for the examination of section 7 effects on the annual revenues of small governments. Scenario A assumes that the life of a local government project requiring a consultation is one year. Therefore, Scenario A assumes that a local government will bear the total cost of each consultation in a 1-year period. Scenario B, on the other hand, assumes that the life of a government project will span a period of 7 years. While Scenario A takes a conservative approach to calculating section 7 cost impacts borne by local governments, Scenario B assumes a more realistic time frame over which costs are

⁹⁶ Population count for the study area was obtained from California County Profiles—A Companion to the 2000 California Statistical Abstract, California Department of Finance, 2002. All cities and counties within the study area that have a total population less than or equal to 50,000 persons was considered small (according to Small Business Administration guidelines).

Table 21
U.S. Fish & Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Estimated Number of Small Governments Affected by Critical Habitat Designation

Industry Name		Small Governments
Annual number of affected governments	By formal consultation	1
	By informal consultation	20
Number of small governments in industry within study area		194
Total number of all governments (equal to number of annual consultations)		262
Percent of governments that are small (Number of small governments) / (Total number of governments)		74%
Annual number of small governments affected (Number of affected governments) / (Percent of small governments)		16
Annual percentage of small governments affected (Number of small governments affected) / Total number of small governments		8%

"small_gov_T21"

Sources: Table 6, 2001 California County Profiles, California Department of Finance.

spread. Conducting both scenarios for this analysis is helpful for determining the range of impacts of section 7 on local government revenues.

- **Calculate the per-government costs.** This calculation consists of a third party's cost to participate in a section 7 consultation as well as all project modification costs associated with public development projects. The average per-government cost for section 7 consultations for future development projects is estimated at approximately \$2.8 million. For Scenario A, this estimate is derived by dividing total consultation costs for the small governments by the total number of consultations. For Scenario B, the consultation costs for the small governments are divided by the total number of consultations, and then dividing that total by seven (to spread the costs over a 7-year time frame).
- **Determine the per-government revenue for the small governments in the study area.** This is derived by listing the revenues of all 194 small governments in the study area in ascending order and taking the midpoint – i.e., the median.⁹⁷
- **Estimate the level of effect on small governments.** This is calculated by taking the per-government cost and dividing it by the median revenue to determine the percent of revenue represented by the per-government cost of a consultation. As presented in **Table 22**, small governments are likely to experience impacts to their median revenue equal to 6 percent in Scenario A, and 1 percent in Scenario B.

SUMMARY

365. Section 7 costs for vernal pool critical habitat designation are likely to affect small businesses in the land development and real estate industry (SIC 6552) and small governments in the study area. According to the calculations above, about 29 small businesses in the land development and real estate industry are affected annually, representing 2 percent of the total number of small businesses in the industry for the study area. These affected small businesses are likely to experience an impact of 3.1 percent on their annual revenues as a result of the vernal pool critical habitat designation.
366. For the small governments in the study area, one agency is likely to be affected annually, or about 8 percent of the total number of small governments in the study area. A closer examination of this result shows that the majority of consultations involving small governments are informal, indicating in most cases that a phone call is made by transportation project managers to the Service to discuss potential impacts by the project on vernal pool species and habitat. Informal consultations have relatively minimal affects on small government revenues.

⁹⁷The 194 small governments in the study area have a wide range of revenue from \$1 million to \$75 million. Because the specifics of small governments likely to be affected by future section 7 consultation activities are unknown, the analysis uses the median to represent the per-government revenue.

367. Affected small governments are likely to experience impacts that fall in the range of 1 percent to 6 percent of the median revenue of small governments in the study area. However, for a small government to experience a 6 percent impact to its annual revenues, the project must be funded and completed within a year. Transportation infrastructure projects will typically span anywhere from 3 to 10 years, suggesting that most of the small governments in this analysis will experience closer to a 1 percent impact to their annual revenues from vernal pool critical habitat designation.

Table 22
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Estimated Annual Effects on Small Governments

Item	Scenario A [1]	Scenario B [2]
Median revenue of all affected small governments[3]	\$2,099,806	\$2,099,806
Total Cost of Project Modifications = X	\$2,802,400	\$2,802,400
Total Number of Formal Consultations = Y	21	21
Project Lifetime (years) = Z	1	7
Per-government cost = (X/Y) / Z	\$133,448	\$19,064
Per-government effect (per-government cost/median revenue)	6%	1%

"gov_cost_T22"

- [1] Scenario A assumes that the life of a local government project requiring a consultation is one year. Therefore, Scenario A assumes that a local government will bear the total cost of each consultation within a one-year period.
- [2] Scenario B assumes that the life of a local government project requiring a consultation will span a period of seven years. While Scenario 1 takes a conservative approach to calculating section 7 cost impacts borne by local governments, Scenario 2 assumes a more realistic time frame over which costs are spread.
- [3] The median is calculated based on 1999 Cities Annual Report, California State Controller.

VII. POTENTIAL BENEFITS OF PROPOSED CRITICAL HABITAT

368. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop [1978, 1980], Brookshire and Eubanks [1983], Boyle and Bishop [1986], Hageman [1985], Samples et al. [1986], Stoll and Johnson [1984]). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran [1994] and Fausold and Lilieholm [1999]) both of which are associated with species conservation. Likewise, regional economies can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend (ECONorthwest [2002]).⁹⁸
369. However, a purpose of the Act is to provide for the conservation of endangered and threatened species. Thus, the benefits of actions taken under the Act are primarily measured in terms of the value placed by the public on species preservation (e.g., avoidance of extinction, and/or an increase in a species' population). Such social welfare values may reflect both use and non-use (i.e., existence) values. For example, use values might include the potential for recreational use of a species, should recovery be achieved. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist.
370. In addition, as a result of actions taken to preserve endangered and threatened species, various other benefits may accrue to the public. Such benefits may be a direct result of modifications to projects made following section 7 consultation or may be collateral to such actions. For example, a section 7 consultation may result in the requirement that residential construction projects avoid removal of soils on certain steep slopes where listed species occur. The relocation of the building site may directly benefit the listed species or its critical habitat, while reduced sedimentation into nearby creeks from the building site may provide the collateral benefits of improving water quality and fish habitat.
371. The remainder of this chapter describes the categories of benefits resulting from implementation of section 7 of the Act in the context of areas affected by the designation. It addresses both the benefits associated with species preservation as well as habitat protection. The chapter concludes with a discussion of the extent to which existing valuation studies can be used to monetize these benefits.

⁹⁸One public comment questioned whether social welfare benefits exist for the vernal pools species discussed in this analysis. Although no literature on the existence values specific to these species is known, the sources listed above provide a more general discussion of the literature on species as a public good and the benefits associated with such a good.

372. As discussed below, it is not feasible to fully describe and accurately quantify the benefits of this designation in the context of this economic analysis. The discussion presented in this report provides examples of potential benefits, which derive primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act in general or critical habitat designation in particular. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

CATEGORIES OF BENEFITS

373. Implementation of section 7 of the Act is expected to substantially increase the probability of recovery for the species. Such implementation includes both the jeopardy provisions afforded by the listing, as well as the adverse modification provisions provided by the designation. Specifically, the section 7 consultations that address vernal pool species will assure that actions taken by Federal agencies do not jeopardize the continued existence of the species or adversely modify its critical habitat. Note that these measures are separate and distinct from the section 9 “take” provisions of the Act, which also provide protection to this species.
374. The benefits of critical habitat designation can therefore be placed into two broad categories: those associated with the primary goal of species recovery, and those that derive mainly from the habitat protection required to achieve this primary goal. The sections below describe these two categories of benefits.

BENEFITS ASSOCIATED WITH SPECIES RECOVERY

Existence Value

375. A number of published studies have demonstrated that the public holds values for endangered and threatened species separate and distinct from any expected direct use of these species (i.e., a willingness to pay to simply assure that a species will continue to exist). These studies include Boyle and Bishop (1987), Elkstrand and Loomis (1998), Kotchen and Reiling (2000), and Loomis and White (1996). While the public’s willingness to pay for preservation and enhancement of a wide-range of species has been studied, no studies have addressed the non-use values associated with endangered vernal pool species. Thus, it is not possible to develop a monetary measure of this category of benefit.

Genetic Preservation

376. The possibility that a particular species might someday yield significant biological, medical, or commercial value that has yet to be discovered is a common argument for species preservation. By this reasoning, even comparatively small populations warrant preservation, especially those that exhibit significant genetic differentiation from related taxa. Although this is a potential economic benefit related to species protection under section 7, it is impossible to predict the likelihood that a given species will yield potentially

valuable information in the future, and within a specific time frame (i.e., 20 years) in particular.

377. One notable example involves the potential future commercial use of one of the vernal pool plant species. According to the California Environmental Resource Education System (CERES), the Butte County Meadowfoam (*Limnanthes* spp.) is currently being investigated as a new source of oil to replace animal-based oils in industrial applications. The likelihood that this plant will yield a commercially viable source of industrial lubricant is impossible to determine at this time, as is a quantification of the economic benefits that could potentially result. To the extent that protections under section 7, and critical habitat designation in particular, contribute to the continued existence of the species, future commercial revenue from the Butte County Meadowfoam, or other protected vernal pool species, can be considered a benefit of the designation.

BENEFITS ASSOCIATED WITH HABITAT PROTECTION

Ecosystem Health

378. The federally listed vernal pool species are an integral part of the ecosystems in which they live. Likewise, these vernal pool ecosystems are essential to the healthy function of neighboring and regional ecosystems. Many other species rely on vernal pool habitat for foraging, habitation, and reproduction. A variety of waterfowl species migrate bi-annually across the Central Valley, which is part of the pacific flyway between Alaska and South America (Heitmeyer, et al., 1989). In the spring, a variety of waterfowl species have been observed feeding and resting in vernal pools, and feeding on the flora and fauna that inhabit these pools.
379. A study conducted by the Service's Sacramento office observed 86 different avian species flying over, foraging, resting, or feeding in vernal pool habitat in northern California and California's Central Valley (Silveira, 1998). In addition, a number of other species live and forage in vernal pool habitat, including the State listed Swainson's hawk, California red-legged frog, and San Joaquin kit fox, as well as deer and other non-endangered game species. The importance of vernal pool habitat to other endangered species is evidenced by the Service's acceptance of "nested" mitigation acres, whereby a single preserved or created vernal pool acre may also count towards mitigation requirements for other species, like the Swainson's hawk and red-legged frog.

Recreational Benefits

380. The proposed critical habitat designation includes over 1.6 million acres of land in California and Oregon, which provides habitat for a number of plant and animal species, both federally listed and otherwise. In addition, the designation may result in the preservation of habitat for recreational uses, including sightseeing, photography, hiking, biking, birdwatching, and hunting. Conservation of vernal pool habitat may lead to increased tourism and contribute to the expansion of a tourist and resource-based

economies in certain communities⁹⁹. In addition, such activities are likely to generate social welfare benefits to recreators. No data is available, however, that would allow a quantification of the incremental recreational use benefits provided by the designation.

Other Benefits

381. Measures undertaken to protect vernal pool habitat could lead to other benefits including protection and enhancement of property values. While the designation of critical habitat could lead to a decrease in the market value of some land and an increase in the market value of other land (see **Chapter II**), certain properties may experience an increase in property values associated with the positive benefits of being located within or adjacent to preserved and scenic open space¹⁰⁰. Again, however, quantification and monetization of these categories of benefits would require additional, detailed information.
382. Additional benefits of designating critical habitat for vernal pool species may include educational/informational benefits (increased awareness by the public of the extent of vernal pool habitat), cultural benefits, increased support for existing conservation efforts, and reduced uncertainty regarding the extent of vernal pool habitat. From a cultural perspective, for example, vernal pools may hold clues to California's early history as archaeological evidence suggests that Native Americans focused hunting efforts in and around vernal pools (CERES database, 2002). From a regulatory perspective, critical habitat designation will provide a firm legal definition of the extent of vernal pool habitat, which may reduce regulatory uncertainty. Though such benefits may result from the designation, at this time sufficient information does not exist to quantify them.

PLACING MONETARY VALUE ON THE BENEFITS OF SECTION 7 IMPLEMENTATION

383. Sufficient information does not exist to allow for quantification of the primary benefits (e.g., species recovery) or secondary benefits (e.g., habitat enhancement for other species and of property values) of habitat protection. One kind of useful data for this purpose would be a measure of the public's willingness to pay to enhance the probability of recovery of an endangered plant or crustacean species. At this time, studies of the monetary value of vernal pool species recovery and protection of vernal pool habitat do not exist in the economics literature.

²¹Of course, if designation of critical habitat somehow constrains these activities, these constraints will be manifest as a cost of the designation.

¹⁰⁰One public comment suggested that any resulting open space benefits should not be considered in this analysis because open space is not a policy goal of critical habitat designation. However, in general, as regulatory impact analyses seek to exclude the costs and benefits that occur in the absence of the regulation and include the costs and benefits occurring as a result of the regulation, the important factor is whether the identified, potentially quantifiable benefit or cost is caused by the regulation. Open space benefits that are generated by the regulation, even by accident, are no different.

384. In general, benefits transfer is the method used by economists to apply the results of existing valuation studies to a new policy question. Two core principals of defensible benefits transfer are (1) similarity between the good being valued in the literature and the good being valued in the policy context to which the transfer is being made, and (2) the use of studies that apply acceptable techniques to generate welfare values.¹⁰¹ Three wetland valuation studies were identified that are useful in framing the potential economic value of vernal pool habitat from a benefits transfer perspective, because they provide peer-reviewed economic estimates of wetland habitats. Nevertheless, these studies fail to meet the first principal listed above, in that they are generalized studies of wetlands in other parts of the world and are insufficiently similar to the seasonal vernal pool wetlands in California. Therefore, a defensible benefits transfer of the values identified in the existing literature is not possible. Because of the inherent difference between the types of goods studied in the literature and vernal pool habitat, no attempt was made to assess the quality of existing studies.

¹⁰¹A detailed description of the criteria for selecting studies in a benefits transfer exercise are discussed in greater detail by OMB in its draft 2003 guidance for compliance with E.O. 12866 (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.)

APPENDIX A: GROWTH CONTEXT BY REGION

1. This section provides a description of the expected growth patterns in counties where section 7 consultations are likely to occur. It also places these patterns in their proper statewide and regional context.
2. This section is divided into three subsections. The first discusses growth at the state level and the basic land uses that characterize that growth. The second section identifies the counties relevant to this analysis and places them into regional groupings, while the third section gives an overview of growth by region.
3. Because of the large area and number of regions covered, this analysis is gross in nature. Consistent California-wide statistics have been used where possible, with standard estimating techniques used where no prior research was available.

CALIFORNIA GROWTH OVERVIEW

4. As shown in **Table A-1**, the State of California has grown exponentially over the last 50 years, from 10.6 million persons in 1950 to 34.1 million in 2000, an average annual growth rate of 2.3 percent. A large proportion of this growth has been from migration from other states and countries (slightly more than 50 percent). This pattern and speed of growth is expected to continue over the next 20 years. By that time, a total of 11.3 million more people are expected to reside in California. About 4.8 million of these persons are expected to reside in the 36 counties with proposed critical habitat units, and about 3.5 million in counties with critical habitat but outside of U.S. Army Corps of Engineers (ACOE) Los Angeles District jurisdiction.¹
5. Land development will inevitably overlap with proposed critical habitat units in certain counties. This land development may be in the form of private real estate development, including residential, commercial, and industrial development, or may include infrastructure or other public works projects conducted by local agencies, State agencies, or developers. Residential land uses generally require the largest amount of land compared to the other major land uses in urban areas, including commercial, industrial, office, and public uses. As a result, it is often used as the key estimating variable of land development.

¹State of California, Department of Finance, Interim County Population Projections, Sacramento, California, June 2001.

Table A-1
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Population in Select California Counties and Regions, 1950-2000

Region	Population [1]		
	1950	1970	2000
San Francisco Bay Region	1,190,700	1,878,700	2,928,900
San Joaquin Valley Region	907,300	1,300,100	2,662,200
Mountain Region	72,400	69,200	109,200
Upper Sacramento Valley Region	147,700	239,100	471,300
Sacramento Valley Region	383,800	848,500	1,709,600
Northern Coast Region	52,300	70,600	145,700
Central Coast Region	196,300	371,400	704,800
Sierra Nevada Foothills Region	36,800	53,600	147,900
Southern California	382,900	1,099,700	2,712,600
CALIFORNIA [2]	10,586,223	19,971,069	34,088,000

"pop_growth"

Source: CA Department of Finance Report I 90-00 July, I 1970 to 1980, and Intercensal Estimates, 1940-69.

- [1] The population shown is for counties having proposed critical habitat within each region and not the entire region.
- [2] The selected regions above do not include all counties in California. Therefore, the total population in California will not equal the sum of the above regions.

6. Residential development does, however, occur within a range of densities. Higher density projects that expand outwards from existing land development can reach densities of over ten units per acre. More typical are residential subdivisions in the three to five units per acre range. A much smaller number of persons, less than 6 percent of California residents, reside outside of urbanized areas.² These persons, however, often reside, whether as a primary or secondary residence, on rural residential or rural estate parcels with densities of one unit per 5, 10, 20 or more acres. While a small proportion of overall persons, the acreage ownership covered by these parcels is large.

RELEVANT COUNTIES AND REGIONAL GROUPINGS

7. Critical habitat units are present in 37 counties, including 36 of California's 58 counties and one Oregon county. California includes a diverse array of cities, counties, and regions. Counties can be divided into regions in a number of ways. The division of counties into the regions described below follows Association of Government organizations in some cases, and the regional divisions used by W. Fulton in his *Guide to California Planning*, Second Edition, 1999. Regions with counties having no proposed critical habitat are excluded, as are counties on the periphery of regions if no habitat units have been proposed in them.
- **San Francisco Bay Area:** The San Francisco Bay Area, as defined by the Association of Bay Area Governments, includes consists of counties: Sonoma, Marin, Napa, Solano, Alameda, Contra Costa, San Francisco, San Mateo, and Santa Clara. Four counties – Napa, Solano, Alameda, and Contra Costa – include proposed critical habitat units.
 - **San Joaquin Valley:** The San Joaquin Valley Region consists of eight counties: Fresno, Kern, Kings, Madera, Merced, Tulare, San Joaquin, and Stanislaus. All but Kern have proposed critical habitat units.
 - **Mountain:** The Mountain Region consists of six counties: Lassen, Modoc, Nevada, Plumas, Sierra, and Siskiyou. All counties except for Nevada and Sierra include proposed critical habitat units.
 - **Upper Sacramento Valley:** The Upper Sacramento Valley Region contains five counties: Butte, Colusa, Glenn, Shasta, and Tehama. All five include proposed critical habitat units.
 - **Sacramento Valley:** The Sacramento Valley Region, as defined by the Sacramento Area Council of Governments, consists of six counties: Sacramento, Yolo, Sutter, Yuba, Placer,

²Census 2000 Summary File 3 for the State of California as reported by <http://factfinder.census.gov>.

and El Dorado. Placer, Sacramento, Yuba, and Yolo all include proposed critical habitat units.

- **North Coast:** The North Coast Region consists of five counties: Del Norte, Humboldt, Lake, Mendocino, and Trinity. Only Mendocino and Lake Counties include proposed critical habitat units.
- **Central Coast:** The Central Coast Region consists of four counties: Santa Barbara, San Luis Obispo, Monterey, and Santa Cruz. All except Santa Cruz include proposed critical habitat units.
- **Sierra Nevada Foothills:** The Sierra Nevada Foothills Region consists of four counties: Amador, Calaveras, Mariposa, and Tuolumne. All include proposed critical habitat units.
- **Jackson County, Oregon:** Lying to the north of Siskiyou County, California, this Southern Oregon county has several proposed critical habitat units
- **Southern California:** Southern California, for the purposes of this analysis, includes eight counties: San Diego, Imperial, Riverside, San Bernardino, Orange, Los Angeles, Ventura, and Santa Barbara. Only Riverside, Ventura, and Santa Barbara have proposed critical habitat units.

REGIONAL GROWTH OVERVIEW

SAN FRANCISCO BAY REGION

8. The San Francisco Bay Area Region encompasses Alameda, Contra Costa, Napa, Marin, Sonoma, Solano, San Francisco, San Mateo, and Santa Clara Counties. Alameda, Contra Costa, Napa and Solano Counties are the only counties that contain proposed critical habitat units. The population of these four counties is projected to increase by 22 percent, or 642,100 people, over the 20-year period ending in 2020. Approximately 95 percent of these people are expected to reside in Alameda, Contra Costa, and Solano counties.³
9. The region's diverse and fast growing economic base has attracted considerable numbers of new residents in the past five to ten years, many from other countries. High housing prices in Alameda, Santa Clara, and San Mateo Counties are likely to continue to decentralize population growth, pushing it toward the edge of the region where workers are able to find less expensive housing. Real estate prices have already caused some of these workers to live outside of the

³Association of Bay Area Governments (ABAG), *Projections 2002*, p. 44.

region in the northern San Joaquin Valley or southern Sacramento Valley and commute long distances to their jobs. Nonetheless, growth prospects remain strong for the San Francisco Bay Area Region, in part because of its numerous cultural and recreational amenities.

SAN JOAQUIN VALLEY REGION

10. The San Joaquin Valley region encompasses the counties of Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. Kern County does not contain proposed critical habitat and will therefore be excluded from this discussion. The population of the remaining seven counties is projected to increase by 51 percent, or approximately 1.4 million people, over the 20-year period ending in 2020. About 65 percent of these people are expected to reside in Fresno, San Joaquin, and Stanislaus Counties.⁴
11. The region will likely be California's fastest growing in the coming ten years, due in part to the low cost of housing and land in comparison to the Bay Area and Southern California. Because of the region's agricultural economic base, wages are generally low and contribute to lower rates of migration to the San Joaquin region from other states and higher rates of migration out of the region to other places. However, natural population increases and strong immigration rates from Asia and Mexico compensate for these trends and bring additional people to the region.

THE MOUNTAIN REGION

12. The Mountain Region encompasses Lassen, Modoc, Nevada, Plumas, Sierra, and Siskiyou Counties. Sierra and Nevada Counties do not contain proposed critical habitat and will therefore be excluded from this discussion. The population of the remaining four counties is projected to increase by 25 percent, or 27,600 people, over the 20-year period ending in 2020. Over 81 percent of these people are expected to reside in Lassen, Modoc, and Siskiyou Counties.⁵
13. This region, sparsely populated and far from major metropolitan areas, has historically depended on lumber and wood product sales from a natural resource base located largely on public lands. Over time, timber harvest rates have been substantially reduced, and today a growing share of employment in this region depends on the seasonal nature of tourism and recreation. For the next 20 years, growth in the Mountain Region's year-round population and job base is likely to be more moderate than the rest of the State, with government, retail trade,

⁴*Interim County Population Projections*, California Department of Finance, June 2001.
<http://www.dof.ca.gov/HTML/DEMOGRAP/P1.doc>

⁵State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001.
<http://www.ce.berkeley.edu/Courses/E11/lectures/califpop.pdf>

and other service sector employment categories providing more than 90 percent of all job growth.⁶

UPPER SACRAMENTO VALLEY REGION

14. The Upper Sacramento Valley Region encompasses Butte, Colusa, Glenn, Shasta, and Tehama Counties. The population of this region is projected to increase by 44 percent, or 103,500 people, over the 20-year period ending in 2020. Over 70 percent of these people are expected to reside in Butte and Shasta Counties.⁷
15. The Upper Sacramento Valley Region includes a mixture of cultivated lands on the Valley floor with Coastal and Cascade Range forested upland. East and north of prime farmland, the region has two fast-growing cities, Chico and Redding, and a mostly agricultural economy in Colusa, Glenn, Tehama, and western Butte Counties. The region has several growth-generating attributes, including low housing prices, abundant energy supplies, available land for commercial and industrial enterprises, a strong quality of life component, and a low-cost but highly trained workforce. The area's growth over the next 20 years will, however, be constrained by its distance from a major metropolitan areas and its historical focus on agriculture.⁸

SIERRA NEVADA FOOTHILL REGION

16. The Sierra Nevada Foothills region includes Amador, Calaveras, Mariposa, and Tuolumne Counties. The population of this region is projected to increase by 38 percent, or 56,000 people, over the 20-year period ending in 2020. Over 75 percent of these people are expected to reside in Calaveras and Tuolumne Counties.⁹
17. Relocation because of retirement and the expansion of nearby regional job markets for commuters have been responsible for recent population growth in the Sierra Nevada Foothills Region. Retirement of increasing numbers of baby boomers are likely to maintain the pace of

⁶State of California, Employment Development Dept., *County Snapshot* (Lassen, Modoc, Siskiyou, Plumas), 2001. www.calmis.ca.gov.

⁷State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001. <http://www.ce.berkeley.edu/Courses/E11/lectures/califpop.pdf>

⁸Economic Development Council of Shasta County webpages visited August 15, 2002 at <http://www.shastaedc.org/targeted-industries.asp> and the City of Redding's Metro Redding Report Web pages visited August 15, 2002 at <http://www.ci.redding.ca.us/metro/aboutmet.htm>.

⁹Farmland Mitigation and Mapping Program (FMMP), Division of Land Resource Protection, "1998 Acreage Summary." http://www.consrv.ca.gov/dlrp/fmmp/pubs/1996_1998/9698excel/1998_acreage_summary.xls and 2000 U.S. Census.

homebuilding in these counties, although job growth within the region is less certain. Many communities in the region are dependent on tourism and recreation, offering seasonal employment growth in the service industries when economic and weather conditions favor expansion, and additional construction activity for second homes in certain areas. However, the low price of housing and land in relation to prices in nearby job centers such as Sacramento, Stockton, and Modesto will supply these counties with growing numbers of new residents for many years to come.¹⁰

SACRAMENTO VALLEY REGION

18. The Sacramento Region encompasses El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba Counties. El Dorado and Sutter Counties do not contain proposed critical habitat and are excluded from this discussion. The population of the six county Sacramento Region is projected to increase by 35 percent, or 810,000 people, over the 20-year period ending 2020. Nearly 90 percent of these people are expected to reside in Placer, Sacramento, Yolo, or Yuba Counties.¹¹
19. A combination of low land and housing prices relative to the Bay Area, its location at the crossroads of major State transportation corridors, and its accumulation of a critical mass of population have all driven strong economic growth in the Sacramento region. New jobs have been plentiful, with the larger employers concentrated in high technology manufacturing, homebuilding, and processed foods industries. Population growth in this region over the last ten years is due primarily (55 percent) to migration. For the Sacramento Valley Region, migration's share of new residents is the highest among all of California's major regions, and is expected to remain high to keep pace with a job market that is projected to continue its strong expansion.¹²

THE NORTH COAST REGION

20. The North Coast Region encompasses Del Norte, Humboldt, Lake, Mendocino, and Trinity Counties. Del Norte, Humboldt, and Trinity do not contain proposed critical habitat and will therefore be excluded from this discussion. The population of the remaining two counties is projected to increase by 43 percent, or 63,200 people, over the 20-year period ending in 2020.

¹⁰State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001. <http://www.ce.berkeley.edu/Courses/E11/lectures/califpop.pdf>.
EPS professional experience.

¹¹Sacramento Area Council of Governments' Web site (www.sacog.org) information dated January 30, 2002.

¹²*California County Projections 2001*, Center for the Continuing Study of the California Economy, pp. 3-37 through 43.

Approximately 54 percent of these people are expected to reside in Lake County and 46 percent in Mendocino County.¹³

21. Population growth in these counties will be driven in part by continued expansions in the tourist industry and associated demands for primary and second homes, as well as by the option of commuting into increasingly expensive Sonoma County. In the past, the distance of both counties in this region from larger job markets has limited employment growth. Today, strong quality of life factors related to these counties' rural character and lower cost of housing make them desirable to cottage industries and smaller visitor-centered businesses. Recent urban growth in Sonoma County and intense upward pressure on housing prices there has created strong demand for unincorporated Mendocino County land for single family housing along the State Highway 101 corridor, where workers can live and still commute to jobs in Sonoma County. Future population growth in more geographically isolated Lake County will be moderated by a less skilled workforce and the scarcity of land available for employment sites.¹⁴

CENTRAL COAST REGION

22. The Central Coast region encompasses San Luis Obispo, Monterey, San Benito, and Santa Cruz Counties. Santa Cruz County does not contain proposed critical habitat and will therefore be excluded from this discussion. The population of the remaining three counties subregion is projected to increase by 44 percent, or 307,200 people, over the 20-year period ending in 2020. Approximately 90 percent of these people are expected to reside in Monterey and San Luis Obispo Counties.¹⁵
23. Population growth in the northern portion of Monterey and San Benito Counties is linked to economic activity to the north in the San Jose Metropolitan Area. Coastal amenities and smaller, more family-friendly communities in Monterey County will continue to attract the wealthier and higher income workers who can afford some of the highest housing prices in California. Most coastal areas will have limited land available for development because of local environmental and water supply constraints.
24. However, housing is less expensive and less restricted farther inland in San Benito County, where families with workers who commute to the Bay Area are likely to choose to reside

¹³State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001.

¹⁴Personal communication with Executive Director Mendocino Council of Governments, August 16, 2002 and the *Lake County Economic Development and Strategic Marketing Plan* found on the Lake County Web site August 16, 2002 at <http://www.co.lake.ca.us/edsite/plan.pdf>

¹⁵State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001.

wherever highway access is available. The southernmost and fastest growing county in the region, San Luis Obispo County, by contrast, is much less influenced by Bay Area job and housing markets and, in many cases, may attract the self-employed and retired resident because of its coastal location and relaxed pace of life. To keep pace with the varied needs of new residents in the region, significant service sector employment growth is projected.¹⁶

JACKSON COUNTY, OREGON

25. The population of Jackson County, Oregon is projected to increase by 22 percent, or 40,400 people, over the 20-year period ending in 2020.¹⁷ Historically a forest products and product distribution center, this region's future population growth will be driven in part by retirement immigration made possible because of lower land prices and a desirable quality of life. Job growth, however, is more limited and expected to be concentrated largely in government and retail trade occupations within the service sector.¹⁸

RIVERSIDE COUNTY

26. The population of Riverside County is projected to increase by 62 percent, or 980,000 people, over the 20-year period ending in 2020.¹⁹ Expected to be the second fastest growing county in the State in the coming decade, Riverside County is part of the densely populated five-county Los Angeles Basin, the region of the State where the supply of land for new home and job sites is the least constrained. Riverside County will continue to receive large flows of new residents from Orange and Los Angeles Counties, as housing prices prove advantageous in comparison to more coastal communities.²⁰

¹⁶EPS project experience.

¹⁷Jackson, Oregon 2000 population taken from 2000 U.S. Census. Populations for 2005-2020 taken from Oregon Office of Economic Analysis.

¹⁸Personal communication with Jackson County Planning and Development Department, August 16, 2002.

¹⁹State of California, Dept. of Finance, *Interim County Population Projections*, Sacramento, CA, July 2001.

²⁰*California County Projections 2001*, Center for the Continuing Study of the California Economy, pp. 3-32 through 37.

APPENDIX B: URBAN GROWTH ESTIMATION METHODS

27. This appendix provides details of the methods used to derive the county by county estimate of overlap acreage referenced in **Chapter II**. Overlap acreage forms the centerpiece of private land development impacts and refers to the gross acreage affected by the proposed designation and likely to develop over the next 20 years, according to the best available data on land use at the county level of geography. Three sources of this data are described below:
- The California Urban Biodiversity Assessment (CURBA) model, designed and run by faculty of the University of California, Berkeley;
 - Growth projection data and interviews with local government planning officials concerning the 20-year growth path of communities in each county; and
 - U.S. Fish and Wildlife Service (Service) data describing known locations of likely development projects where section 7 consultations will be required.

CALIFORNIA URBAN AND BIODIVERSITY ANALYSIS MODEL

28. To determine the likelihood of development occurring within proposed critical habitat areas, a GIS analysis combined the results of an urban growth model with the proposed critical habitat areas. Researchers at the Institute of Urban and Regional Development and the University of California, Berkeley have developed an urban growth model called the CURBA model.
29. The CURBA model uses GIS technology to provide spatial predictions of the extent of urban growth in the year 2020. The model relies on the current location and type of farmland and urban development, slope and elevation data, location of roads and hydrographic features, wetlands and flood zones, proximity to jurisdictional boundaries, local growth policies, recent population and job growth, and population projections by county.²¹ The CURBA model defines

²¹One public comment suggested that past rates of consultations on land development projects would have been a better indicator of the likely rate of future consultations than the predictions made by the CURBA model. However, the pace of development in any region fluctuates broadly from year to year because of unevenness in market timing and planning practices, and CURBA a more standard method of forecasting the acreage required to accommodate new growth in specific regions. Interviews with local planning officials yielded information about projects planned for the short term only and were rarely useful at gauging growth over a 20-year time frame.

and occupied by structures with a building density of at least one unit every 1.5 acres as urbanized land.²²

30. Some improvement to land area in the next 20 years will be intermediate between urban and agricultural in nature. Single family rural homebuilding, for instance, will account for a significant portion of total residential construction in the 37 counties. The impact of critical habitat designation on this type of development is less certain.
31. A likely outcome is that the larger parcel sizes (in many instances 2.5-acre, 5-acre, or 10-acre lots) allow the landowner, without reducing the size of the home or the value of the property, to choose the development footprint carefully and avoid triggering a Federal nexus as described in Chapter 2. Given that CURBA does not capture the areas in which these rural homes are built at densities less than one unit every 1.5 acres, the acres of projected growth do not include the rural single family unit projects.²³
32. The CURBA model also does not consider local development restrictions or land ownership in its calculations. Because some lands that are predicted to become urbanized may in fact be designated as park or open space areas, the model is likely to overestimate the amount of growth that is likely to occur. This potential overestimation is one way in which the CURBA analysis is more likely to overstate, rather than understate, potential impacts associated with development.
33. By overlaying the proposed critical habitat unit areas over CURBA predictions, planning level conclusions can be drawn about where, and the extent to which, development is likely to take place within proposed critical habitat areas. Approximately 50,000 acres projected in CURBA scenarios for urban growth within 20 years has also been proposed for designation (another 10,000 acres are estimated using a different method described in the next section).
34. The size of the land area, more than 1 million acres in total, described by CURBA's 20-year growth projections was shown earlier in **Chapter II** in **Table 3a**. Some counties such as San Joaquin County in the Central Valley have no overlap between projected future development and proposed critical habitat. This outcome does not suggest that no development will occur in

²²J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

²³One public comment suggested that the costs of rural land development of fewer than 1.5 homes per acre should be considered. However, as these projects can easily be designed with little effort or cost to avoid a Federal nexus, it is unlikely that section 7 consultations will take place for any rural development at these lower densities.

the county. Rather, growth in the county is not expected to occur *in* areas proposed as critical habitat.²⁴

PROJECTIONS IN COUNTIES WITH NO CURBA DATA

35. When counties contain proposed critical habitat units but no CURBA scenarios are available, a different methodology was followed. First, population growth forecasts were collected from county planning departments for each community or city adjacent to or overlapping with critical habitat units.
36. Second, to estimate overlap between proposed critical habitat and areas to be urbanized, the analysis assumes that land area within the Census-defined boundaries of cities or communities will be urbanized in the next 20 years. GIS spatial analysis techniques were used to calculate the overlap in acres between the municipal or community boundaries and the proposed habitat units. Population to urbanized land ratios were collected from CURBA, State farmland resources agency, and Census sources for the region in question, and these ratios were applied to the 20-year population growth projection to generate an estimate of demand for developable land. CURBA ratios were preferred when available; otherwise, the data source with land area data at the most appropriate geographic scale (city versus county, for instance) was chosen.²⁵
37. Third, if the needed area of developable land was not available within existing municipal or community boundaries and annexation would be needed to augment the land supply, then the city or community was allowed to grow through annexation by the required acreage. Local planning department staff were contacted to ascertain the sites that would have the highest likelihood of development approval. To estimate the impact in a way that is more likely to overstate, rather than understate, impacts, the full required acreage for growth was assumed to occur within the proposed habitat unit if the unit was located close to the community or city and on the path of projected growth.

²⁴One public comment inquired why critical habitat designation would have no impacts in a county with likely to experience significant growth.

²⁵One public comment suggested that rural areas are more likely to have a larger population of older residents who tend to live in smaller households. The implication is that rural areas may require greater land per person as new growth occurs in rural areas. Because most rural counties do not have an available CURBA analysis and the amount of land required for development was calculated using existing population densities, current demographic patterns of land use are already reflected in land consumption estimates for those counties.

38. Vacant, undevelopable land and already developed land located within proposed critical habitat units, including airports, railyards, and other public uses, was not added to the inventory of land area that would accommodate the expected growth over 20 years. As shown earlier in **Chapter II** in **Table 3a**, of the 17 counties having no CURBA model output, six were determined to have communities or cities likely to urbanize over 20 years a total of 8,138 acres of land included in proposed critical habitat units. Proposed critical habitat in the other 11 counties are not directly in the likely path of future urban growth.

MODIFICATIONS TO CURBA OUTPUT

39. The FEA recognizes that CURBA was not designed to specify the precise location of growth at the county level but rather the probable locations of growth and its approximate magnitude. For non-CURBA counties, interviews with planning officials and basic land consumption ratios may produce estimates that are equally imprecise. As a means of increasing the accuracy of the land consumption estimate used to measure overlap with proposed critical habitat, the FEA employed another data source with predictive power on the specific location of future development. The Service's field offices receive periodic notices of Federal actions that may result in section 7 consultations, and also receive technical information and maps copied to Service staff from development consultants, e.g. civil engineering and planning firms.
40. In addition to CURBA data and estimates of non-CURBA county growth requirements, the FEA gathered this project inventory data from the Service's field offices to assess whether additional acreage within each county should be included in the calculation of the overlap acreage. Each property identified by the Service was screened for its location within proposed critical habitat, and if not already identified in CURBA's GIS spatial analysis or by the non-CURBA county estimates of land consumption, the property's land area was added to **Table 3a**'s calculation of urban growth projected within proposed critical habitat (the overlap acreage) shown in **Chapter II**.
41. The FEA assumes that each project sited within proposed critical habitat would be developed within a 20-year timeframe. This assumption will increase the likelihood of overestimated rather than underestimated impacts from the designation. For several counties, the overlap acreage increased significantly once the project inventory was added to the estimate of acres affected by the designation. Depending on the species for which critical habitat was designated on those properties, these acres were placed in the Group A species or Group B species columns.

APPENDIX C: LAND DEVELOPMENT ESTIMATES BY REGION

42. Based on the regional growth drivers explained in **Appendix A** and the land consumption methodology outlined in **Appendix B**, this appendix quantifies the amount and location of growth projected on a regional level. In each region, total growth is reported first, followed by areas of overlap with proposed critical habitat on a county by county basis within the region.

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE SAN FRANCISCO BAY AREA REGION

43. The CURBA model estimates that urban growth in Alameda, Contra Costa, Napa, and Solano Counties will require approximately 125,700 additional acres of currently rural land by 2020, representing an average new population to land area ratio of 5.1 persons per acre on newly developed land.²⁶
44. A total of 110,000 acres have been proposed for critical habitat in these counties. The total overlap between areas of expected urban growth and proposed critical habitat is approximately 8,600 acres.
45. Solano, Alameda, and Napa Counties are expected to have projects proposing development on 8,600 acres of proposed vernal pool critical habitat. The breakdown of this overlap includes 6,500 acres in Solano County on the eastern edges of the cities of Fairfield and Vacaville along Interstate 80; 1,900 acres in Alameda County just north of the City of Livermore, along State Highway 580; and nearly 300 acres in Napa County southwest of the junction of State Highways 12 and 121. These projects will require extensive ACOE consultations as vernal pools are filled prior to homebuilding, road building, and other non-residential construction.
46. In contrast, critical habitat proposed for Contra Costa County does not appear to be in the path of urban growth through 2020.

²⁶J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE SAN JOAQUIN VALLEY REGION

47. The CURBA model estimates that urban growth in the seven counties will require approximately 238,600 additional acres of currently rural land by 2020, based on an average new population to land area ratio of 5.8 persons per acre.²⁷
48. A total of 438,000 acres have been proposed for critical habitat in the seven counties. The total overlap between areas of expected urban growth and proposed critical habitat is approximately 4,100 acres.
49. Fresno, Madera, Merced, and Tulare Counties are expected to have the most significant amount of overlap. Projects proposing development are expected on approximately 22,000 acres in four locations: over 1,900 acres in Fresno County, approximately 15,318 acres in Madera County just east of State Highway 99, bordering the community of Madera Acres; nearly 4,500 acres in Merced County between State Highway 140 and State Highway 17, just north of the towns of Merced and Planada; and approximately 240 acres in Tulare County just east of State Highway 63, near the towns of London and Goshen. These projects will require extensive ACOE consultations as vernal pools are filled prior to homebuilding, road building, and other non-residential construction.
50. In 1995, the University of California, which administers the State's system of major research universities, selected Merced County as its preferred location for its tenth campus. The campus is expected to open in 2004. Over the last several years, a broad planning effort has been undertaken to determine the preferred location, size, design, and financing for both the core campus and the associated university community. Many variables for the project remain undetermined at this time.²⁸ Possible sites encompass the development of about 3,000 acres, including about 910 acres for the campus and about 2,100 acres for the community.²⁹ Campus

²⁷J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

²⁸One public comment inquired about the draft economic analysis' (DEA's) estimate of impacts to the UC Merced project. Because the acreage needed to accommodate new growth in Merced County was determined by the CURBA model, the project modification and administrative costs for UC Merced are included in the overall county costs.

²⁹Gibson & Skordal, Section 404 Permit Application, UC Merced Campus Project, February 8, 2002.

and community development will impact about 66.5 acres of wetted vernal pools, pools/swales, and seasonal wetlands.³⁰

51. Preliminary estimates of mitigation costs for an early campus and community development prototype estimated the wetlands mitigation costs at about \$90,000 per wetted acre affected. At this unit cost, total mitigation costs associated with the current estimate of wetted vernal pool loss would be about \$6 million. These costs would be payable over the course of University of California development and are not in present value dollars. These estimates were based on very approximate and preliminary assumptions.³¹
52. The actual mitigation and other costs associated with campus and community development will be determined over the next few years, as the Merced County Natural Community Conservation Plan/Habitat Conservation Plan is developed. At this time, the precise levels of conservation and mitigation associated with this project are not possible to predict until the Service has issued its Biological Opinion and the Army Corps of Engineers has approved a 404 permit for the project. A general association between the mitigation costs for the University of California project and other project costs under section 7 is expected, however, given the involvement of the Service in consultations that have occurred to date.
53. In this region, critical habitat proposed for Kings, San Joaquin, and Stanislaus Counties does not appear to be in the path of urban growth through 2020.

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE MOUNTAIN REGION

54. Based on a new population to land area ratio of 5.2 persons per acre in these counties, approximately 5,300 additional acres of land will be developed by 2020.³²
55. A total of 33,147 acres have been proposed for critical habitat in the four counties. Projects proposing development are expected on approximately 607 of those acres in Plumas County,

³⁰EIP Associates, Section 404 Permit Application, University Community Plan, February 8, 2002.

³¹Economic & Planning Systems, Inc., Preliminary UC Merced Habitat Conservation Cost Estimate, March 14, 2000.

³²Farmland Mitigation and Mapping Program (FMMP), Division of Land Resource Protection, "1998 Acreage Summary." http://www.consrv.ca.gov/dlrp/fmmp/pubs/1996_1998/9698excel/1998_acreage_summary.xls, and 2000 U.S. Census.

near the town of Almanor between Lake Almanor and Highway 89. Other proposed critical habitat areas in the region do not appear to be in the path of urban growth through 2020.

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE UPPER SACRAMENTO VALLEY REGION

56. Based on a new population to land area ratio of 5.1 persons per acre in these counties, approximately 60,600 additional acres of land will be developed by 2020.
57. A total of 273,361 acres have been proposed for critical habitat in the five counties. Projects proposing development of these areas are expected on approximately 7,200 acres in four locations: nearly 2,500 acres in Shasta County near the City of Redding along Highway 44 and within the southeast corner of the City boundary; nearly 1,300 acres in Colusa County near the City of Colusa along Highway 20; over 3,800 acres in Butte County near the City of Chico along its northern and eastern edges; and approximately 125 acres in Tehama County within the southwestern corner of the City of Red Bluff.
58. In contrast, critical habitat proposed for Glenn County does not appear to be in the path of urban growth through 2020.

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE SIERRA NEVADA FOOTHILLS REGION

59. Based on a new population to land area ratio of 4.4 persons per acre in these counties, approximately 12,890 additional acres of undeveloped land will develop by 2020.³³
60. A total of 23,807 acres have been proposed for critical habitat in the four counties. Critical habitat proposed for all four counties does not appear to be in the path of urban growth through 2020.

³³Farmland Mitigation and Mapping Program (FMMP), Division of Land Resource Protection, "1998 Acreage Summary." http://www.consrv.ca.gov/dlrp/fmmp/pubs/1996_1998/9698excel/1998_acreage_summary.xls

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE SACRAMENTO VALLEY REGION

61. A total of 84,300 acres of land is expected to be urbanized in the four counties over the next 20 years. The CURBA model estimates that urban growth in three of the six counties (Placer, Sacramento, and Yolo Counties) will require 80,000 additional acres of land by 2020, yielding an average new population to land area ratio of 8.4 persons per acre on newly developed land. A moderate amount of land in Yuba County (fewer than 6,600 acres, based on these densities) will be urbanized by 2020.
62. A total of 161,000 acres have been proposed for critical habitat in the four counties. The total overlap between areas of expected urban growth and proposed critical habitat is approximately 12,670 acres. Most of the overlap is expected to occur in Sacramento and Placer Counties. Projects proposing development within vernal pool critical habitat units are expected on nearly 5,300 acres in Sacramento County between State Highway 50 and State Highway 16 and on nearly 7,300 acres in Placer County north and west of the Cities of Rocklin and Roseville. These projects will require extensive ACOE consultations as vernal pools are filled prior to homebuilding, roadbuilding, and other non-residential construction.
63. In contrast, critical habitat proposed for Yolo and Yuba Counties do not appear to be in the path of urban growth through 2020.³⁴

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE NORTH COAST REGION

64. Based on a new population to land area ratio of 4.7 persons per acre in the counties, approximately 13,500 additional acres of land will be developed by 2020.³⁵
65. A total of 6,800 acres have been proposed for critical habitat in both counties. Both counties in the North Coast region do not contain proposed critical habitat in the path of urban development.

³⁴Yolo County may have as much as 1 acre of development overlapping with critical habitat.

³⁵Farmland Mitigation and Mapping Program (FMMP), Division of Land Resource Protection, "1998 Acreage Summary." http://www.consrv.ca.gov/dlrp/fmmp/pubs/1996_1998/9698excel/1998_acreage_summary.xls

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN THE CENTRAL COAST REGION

66. The CURBA model estimates that urban growth in the three counties will require approximately 99,800 additional acres of currently rural land by 2020, representing an average new population to land area ratio of 3.1 persons per acre.³⁶
67. A total of 254,445 acres have been proposed for critical habitat in the three counties. The total overlap between areas of expected urban growth and proposed critical habitat is approximately 2,400 acres.
68. San Luis Obispo County has the most significant amount of overlap. Projects proposing development within vernal pool critical habitat units are expected on nearly 1,620 acres in San Luis Obispo County on the edges of the City of Paso Robles along State Highway 46. Proposed development projects in Monterey County are expected to develop 800 acres of critical habitat mostly on the county's southern border along State Highway 14. These projects will require extensive ACOE consultations as vernal pools are filled prior to homebuilding, road building, and other non-residential construction.
69. In contrast, critical habitat proposed for San Benito County does not appear to be in the path of urban growth through 2020.

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN JACKSON COUNTY, OREGON

70. Based on a new population to land area ratio of 4.3 persons per acre in the county, approximately 9,460 additional acres of land will be developed by 2020.
71. A total of 7,600 acres have been proposed for critical habitat in Jackson County. The total overlap between areas of expected urban growth and proposed critical habitat consists of approximately 1,300 acres near the unincorporated town of White City along Highway 227 and in the western portion of the Urban Unincorporated Community Boundary.

³⁶J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

LAND DEVELOPMENT ACTIVITIES AFFECTING CRITICAL HABITAT UNITS IN RIVERSIDE COUNTY

72. The CURBA model estimates that urban growth in the county will require approximately 419,000 additional acres of currently rural land by 2020, representing an average new population to land area ratio of 2.3 persons per acre.³⁷
73. A total of 10,209 acres have been proposed for critical habitat in Riverside County. The total overlap between areas of expected urban growth and proposed critical habitat consists of approximately 4,300 acres in the southern portion of the San Jacinto Valley near the cities of Hemet and San Jacinto.

³⁷J.D. Landis et al., *Development and Pilot Application of the California Urban and Biodiversity Analysis (CURBA) Model*, University of California - Berkeley, Institute of Urban and Regional Development, 1998.

APPENDIX D: IMPLEMENTATION OF CALIFORNIA ENVIRONMENTAL QUALITY ACT

74. This analysis will discuss whether implementation of California Environmental Quality Act (CEQA) may indirectly impose costs attributable to critical habitat designation. Looking at CEQA costs broadly, this analysis finds that CEQA requirements will result in the imposition of certain indirect costs as a result of critical habitat designations, but these costs do not apply to every project. No additional costs paid by project applicants are expected as a result of CEQA requirements for large land development projects and other major public infrastructure projects, because these projects are already subject to the highest level of CEQA review, and the presence of critical habitat does not increase the level of effort the applicant will apply in seeking project approval. Instead, this analysis concludes that additional CEQA-related costs are expected for smaller projects located in areas designated as critical habitat for vernal pool species.
75. This subsection will explain how CEQA functions to protect species and habitat and to what degree any CEQA-imposed costs may be linked to the designation of critical habitat. Special attention will be paid to the distinction that CEQA makes between projects with impacts to State or Federally listed species and projects with impacts to Federally designated critical habitat.
76. CEQA is a California State statute that requires State and local agencies (known here as “lead agencies”) to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. Projects carried out by Federal agencies are not subject to CEQA provisions. CEQA regulations require a lead agency to initially presume that a project will result in a potentially significant adverse environmental impact and to prepare an *environmental impact report* (EIR) if the project may produce certain types of impacts, including these circumstances:
77. *The project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory.*³⁸

³⁸ California Natural Resources Code §15065(a).

78. State law instructs the lead agency (typically a county or city community development or planning department in the case of land development projects) to examine impacts from a very broad perspective, taking into account the value of animal and plant habitats to be modified by the project. The lead agency must determine which, if any, project impacts are potentially significant and, for any such impacts identified, whether feasible mitigation measures or feasible alternatives will reduce the impacts to a level less than significant. It is within the power of a lead agency to decide that negative impacts are acceptable in light of economic, social, or other benefits generated by the project.
79. Projects without a mandatory finding of significance and in which the applicant finds no significant impact according to CEQA regulations may be approved by a lead agency in what is known as a *negative declaration*. Alternative project scenarios are not examined in a negative declaration, and the expenditures are typically much lower than what would be required to complete an EIR.
80. Alternatively, an applicant may request that a lead agency issue a permit or some other discretionary approval for a project that is redesigned to either avoid or mitigate all impacts to the environment. Typically, the project is accompanied by mitigation measures in the form of a *mitigation negative declaration*. Similar to a negative declaration, the expenditures required for the approval of a project with a mitigated negative declaration are on average much lower than costs associated with an EIR.
81. Finally, minor projects that fit one of eleven classifications as defined by the CEQA statutes may be found to have no significant effect on the environment. These classifications include:
- Certain alterations of existing facilities
 - Replacement or reconstruction of existing structures
 - Smaller development projects such as restaurants smaller than 2500 square feet
 - Certain projects involving landscaping or temporary trenching
 - Lot line adjustments
 - Experimental management or research
 - Habitat restoration
 - Certain safety inspections and mortgage lending
 - Signs and small parking lots
82. Many of these types of minor projects are eligible for a *categorical exemption* from the provisions of CEQA altogether, and project applicants usually have minimal costs to comply with the paperwork required with the lead agency.

BASELINE CEQA REQUIREMENTS AND COSTS

83. One method for assessing the baseline levels of CEQA protections for vernal pool habitat is to examine what occurs in projects where no Federal nexus is present. Using this method, it is possible to describe what kinds of regulatory activities undertaken by State and local government will NOT be attributable to critical habitat designation through section 7 regulation, but instead would be expected if critical habitat designation did not occur.
84. For State level regulation applicable in situations where no section 7 protection is afforded to vernal pool species or habitat, it is possible that CEQA regulation of vernal pool impacts may occur through regulatory powers vested in nine regional entities known as the Regional Water Quality Control Boards (RWQCBs). Because of the SWANCC decision referenced earlier is likely, over time, to remove several types of water features from the jurisdiction of the U.S. Army Corps of Engineers, regulation of discharge to water bodies jurisdictional to the State of California by the RWQCBs is evolving.
85. Officials at the regional board with the largest overlap of jurisdiction with proposed critical habitat assert that provisions of the State Water Code and CEQA provides the means through which the board is likely to address vernal pool fill activity. Just over half of the regional boards are expected to initiate review of proposed fill activity for projects in which no Federal nexus exists. As part of regional board participation in the CEQA process, including permitting that would authorize impacts to vernal pool wetlands, these boards may ask that project applicants replicate.
86. This analysis considers this level of State regulation to be part of the regulatory baseline and wholly dependent on the regional boards' response to jurisdictional changes following the SWANCC decision. This assumption is dependent on the statutory authority for RWQCBs to regulate the fill of vernal pools if vernal pools are considered waters of the State of California in the future.
87. Other agencies besides the RWQCBs may influence baseline CEQA outcomes as well. In areas of California where vernal pool wetlands represent a unique habitat type with few remaining examples, the State Department of Fish and Game may also ask that the lead agency impose baseline mitigation conditions through CEQA. These conditions would also be requested if the project had significant impacts to any State- or federally listed species. In the absence of a Federal nexus, it is not known what California Department of Fish and Game's (DFG's) recommended conditions would be, but it is possible that they would be similar to the Service's compensation, restoration and avoidance requirements currently supported by DFG in the CEQA process each time a Federal nexus is present.

88. It is important to recognize that DFG and RWQCB recommendations may or may not be implemented by the lead agency, because lead agencies may find the project's negative impacts to be acceptable given the project's benefits. The result is that the actual costs faced by project applicants because of CEQA review vary widely between jurisdictions in California. Jurisdictions with strong citizen interest in the evaluation of certain kinds of project impacts through CEQA can be expected to require the development and implementation of more extensive mitigation measures.
89. Because this analysis adopts methods more likely to overestimate rather than underestimate cost impacts, the level of the CEQA-related costs imposed on project applicants in a world without section 7 will be considered to be zero. Setting the CEQA baseline to zero reflects the likely outcome in some jurisdictions where the impacts on vernal pool habitat are deemed to be acceptable in light of the project's benefits. More importantly, instead of suggesting that CEQA is the process by which critical habitat imposes costs on project, this assumption attributes 100 percent of the costs imposed on a project with a Federal nexus to section 7 processes net of the costs imposed by the Army Corps of Engineers. This is a key economic assumption of the analysis of the proposed rule.
90. The next subsection covers costs associated with provisions of CEQA that may be triggered by the presence of a map of critical habitat for vernal pool species. This kind of map would be produced each time the Service designates critical habitat for a species.

INDIRECT EFFECTS ON LARGE PROJECTS THROUGH CEQA

91. The development projects that are responsible for nearly all housing construction and a large share of industrial and commercial construction in California counties are required under CEQA to submit an EIR for public review and consider project alternatives. A lower level of CEQA review, perhaps taking the route of a negative declaration, is highly unlikely. In the process of doing this analysis, a series of consultants who specialize in EIRs were asked whether the presence of critical habitat on the project site added to the cost of preparing the EIR and moving the EIR through public hearings as part of the project's entitlement process.
92. The consensus view in the consultant community is that critical habitat designation adds no measurable CEQA-related cost for the project applicant above the CEQA baseline.³⁹ First, where listed species are present on the project site, the EIR's biological component will be

³⁹ Personal communication with senior staff from RBF Consulting (San Jose, California), EDAW (Sacramento, California) and HT Harvey & Associates (Watsonville, California), February 24-28, 2003.

required to discuss and evaluate habitat impacts, as well as present project alternatives. This requirement is unchanged after Federal designation of critical habitat.

93. Second, where species are not present on the project site, CEQA directs the EIR to inventory the important natural resources on the project site and characterize project impacts to important habitat types. CEQA makes no reference to critical habitat, and methods used by EIR biologists are unlikely to change if critical habitat is designated. In fact, according to State officials, State agency oversight of the quality and completeness of a project EIR concentrates wholly on the biological values of habitat in proximity to the project and on potential project impacts to that habitat, and not on the property's status as federally designated critical habitat.
94. In conclusion, this analysis finds that critical habitat designation for vernal pool species is unlikely to increase EIR costs above the CEQA baseline for any large projects in the counties included in the designation.

INDIRECT EFFECTS ON SMALLER PROJECTS THROUGH CEQA

95. The question of whether critical habitat designation can change the public review process for a smaller project that requires a discretionary action by lead agencies in California does not appear to have been answered either by the implementation of CEQA or litigation over the allowable extent of CEQA's exemption language. It is likely that the next 10 to 20 years will establish a regulatory record or the judicial review required for an adequate assessment of critical habitat designation's actual effects.
96. In the absence of empirical evidence, this analysis will adopt an approach that is likely to overestimate rather than underestimate the additional critical habitat-related costs imposed on small project applicants through CEQA. The first necessary assumption is that State law will disqualify certain classifications of projects from claiming a categorical exemption, if the project is located within designated critical habitat. The exemption does not apply *where a project may impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by Federal, Federal, or local agencies.*⁴⁰ As a result of this first assumption, projects similar to the following classifications, if located within critical habitat, will be required to file a negative declaration or a mitigation negative declaration instead of a less costly categorical exemption:
- smaller development projects such as restaurants smaller than 2500 square feet
 - certain projects involving landscaping or temporary trenching

⁴⁰ California Natural Resources Code, §15300.2(a).

- lot line adjustments
- experimental management or research
- signs and small parking lots⁴¹

97. Project applicants will pay the difference between CEQA-related consultant costs for a categorical exemption and the consultant costs for a mitigated negative declaration or a negative declaration. These costs apply to all categorical exemption projects that are disqualified by the designation of critical habitat on the project site.
98. The second necessary assumption for the analysis is that projects that would have submitted either a mitigated negative declaration or a negative declaration under CEQA prior to critical habitat designation must now complete an EIR because of assumed unavoidable impacts to an environmental resource of critical concern. As a result, there will be additional time and effort required for EIR consultants to complete documents evaluating biological, air quality, traffic, and many other types of impacts, across a range of project alternatives. The EIR will not be a large one compared to an average EIR in California, because were it not for critical habitat designation, the project would have no impacts across all impact categories. Hence, few impacts are likely to require evaluation and mitigation within the EIR.
99. The change in costs for project applicants in this case equals the difference between consultant costs for a mitigation negative declaration or a negative declaration and a EIR of lesser complexity.

ESTIMATES OF ADDITIONAL CEQA-RELATED COSTS FOR SMALLER PROJECTS

100. To estimate the CEQA-related additional costs for smaller projects because of vernal pool species critical habitat designation, the following method was used:
- Determine the annual number of EIRs and mitigated negative declarations or negative declarations considered by all lead agencies in counties where critical habitat is proposed.
 - Project the number of categorical exemptions and mitigated negative declarations or negative declarations that will occur in these counties over the next 25 years.
 - Multiply a fraction of the projected number of negative declarations or mitigation negative declarations by the incremental cost between them and a low complexity EIR that results from critical habitat designation.

⁴¹ The categorical exemption classes referenced in the statute are 3, 4, 5, 6, and 11. Other project examples fall within the classes but are not mentioned in the bulleted list.

- Multiply a fraction of the projected number of categorical exemptions by the incremental cost between them and a negative declaration or mitigation negative declaration.
- The total cost is the sum of both estimates.

101. **Table 12 in Chapter III** provides the basic calculation of indirect CEQA effects because of vernal pool species critical habitat designation for 36 California counties. The increase in 20-year CEQA costs for projects that would otherwise have qualified as categorical exemptions is \$1.0 million, and the increase in costs for projects that otherwise would have claimed to be negative declarations or mitigation negative declarations is \$5.2 million. In total, the cost is estimated to be approximately \$6.2 million over 20 years.

APPENDIX E: IMPLEMENTATION OF THE FEDERAL CLEAN WATER ACT AND STATE WATER STATUTES

REGULATION OF WETLANDS BY THE ACOE

102. Section 404 of the Clean Water Act (CWA) establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are generally regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry.
103. The basic premise of the program is that no discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. Land development projects planned in wetland areas require permits from the ACOE under Clean Water Act section 404. When land developers apply for a permit, they must show that they have taken steps to avoid wetland impacts where practicable, that they have minimized potential impacts to wetlands, and that they have provided compensation for any remaining, unavoidable impacts through activities to restore or create wetlands.
104. Regulated activities are controlled by a permit review process. An individual permit is usually required for potentially significant impacts. However, for discharges that will have only minimal adverse effects, the ACOE has the ability to authorize discharge through up-front general permits. These may be issued on a nationwide, regional, or state basis for particular categories of activities (for example, minor road crossings, utility line backfill, and bedding) as a means to expedite the permitting process. Section 404(f) exempts some activities from regulation under Section 404, including many ongoing farming, ranching, and silvicultural practices.

LEAST DAMAGING ALTERNATIVES ANALYSIS FOR LAND DEVELOPMENT PROJECTS

105. Most and development projects are too large to qualify for authorization under a general permit issued by the ACOE, making the project's determination of whether a practicable alternative exists that is less damaging to the aquatic environment a mandatory analysis. In practical terms, meetings are held between the project proponent and ACOE officials to negotiate conditions that allow the project to fill or modify wetlands. The outcome of these meetings and the alternatives analysis is that the project must implement a combination of one or more

measures to receive the 404 permit: wetlands avoidance, off-site preservation, or on- or off-site wetlands creation.

106. Avoidance, also called *on-site preservation* or *land set aside*, refers to the act of leaving wetlands in a natural state where they occur on the project site. Off-site preservation is a mechanism to protect wetlands in a location removed from the project site, either through purchasing land in conservation banks that sell protected natural wetland areas as a business or through purchasing qualified land owned by someone who has natural wetlands and is willing to sell a portion of the property or a conservation easement. A third mechanism, *wetlands restoration or creation*, can mean that a land developer will set aside a qualified amount of land on-site that is suitable for the restoration or construction of functioning wetlands, purchase and manage suitable relic vernal pool habitat off-site and restore wetlands there, or purchase restored or created wetlands and the necessary stewardship services through a conservation bank located off-site.
107. To date, the Sacramento District of the ACOE has had the most extensive experience in issuing 404 permits for projects with vernal pool impacts. The total amount of acres avoided or mitigated (either preserved off-site or created on- or off-site) has depended on the nature of the development project and the physical characteristics of the project site. Each project presents unique challenges to development and wetlands functioning, and a unique set of avoidance and mitigation techniques is required to implement the least damaging practicable project alternative.
108. Overall, ACOE officials believe that the agency has achieved a minimum of 1 acre mitigated for each acre of vernal pool wetlands filled. This mitigation policy is sometimes summarized in terms of a ratio, e.g., a particular project has a mitigation ratio of 1:1. This ratio is likely to remain in place in future regulatory activities, as it is in keeping with the agency's historical policy of a "no net loss" of wetlands in the 404 permitting program.⁴²

JURISDICTIONAL ISSUES

109. Three district-level ACOE regulatory offices are located in California and another is located in Oregon. The relationships between vernal pool complexes and other hydrological features in the environment change between Jackson County, Oregon in the north and Riverside County, California in the south. As a result, the regulatory approach adopted by each ACOE district towards the fill of vernal pools has historically varied. For the Portland, San Francisco, and

⁴²Personal communication with Tom Cavanaugh, Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

Sacramento districts, vernal pools addressed in a 404 permit application are evaluated for their interconnection with neighboring floodplains, seasonal streams, and perennial wetlands.⁴³

110. In contrast, the Los Angeles district of the ACOE does not generally assert jurisdiction over vernal pools occurring within its district, because the pools are more isolated and do not exhibit a hydrologic connection with adjacent hydrological features. In selected areas of vernal pool habitat in Riverside County, however, the Los Angeles district has determined that the impacted wetlands are waters of the U.S. These areas are within the floodplain of seasonal river systems and include all of the San Jacinto-Hemet proposed critical habitat unit in Riverside County.⁴⁴ In all other areas of the district, the history of regulation generally indicates that fill of vernal pools would not require a 404 permit and no baseline cost is imposed.⁴⁵
111. For the rest of the State and for counties in Oregon, many projects proposing to fill a vernal pool require a 404 permit, and under critical habitat designation will also require consultation with the Service. As a baseline requirement for those projects, this economic analysis assumes that each acre of fill would, on average, be accompanied by an ACOE-driven plan for 1 acre of restoration.
112. A recent court decision may change the regulatory approach adopted by the Portland, San Francisco, Sacramento, and Los Angeles districts toward fill activity associated with vernal pools. On January 9, 2001, the U.S. Supreme Court issued a decision in *Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers*. The decision changes the protection given to isolated wetlands under Section 404 of the CWA by ruling that the use of migratory birds to assert jurisdiction over the site exceeded the authority that Congress had granted the ACOE under the CWA.
113. The decision will likely restrict ACOE jurisdiction to navigable waters, their tributaries, and wetlands that are adjacent to these navigable waterways and tributaries, leaving “isolated” wetlands unprotected by the CWA. Prior to the SWANCC decision, the ACOE had adopted a regulatory definition of “waters of the U.S.” that afforded Federal protection for almost all vernal pools.

⁴³Personal communication with Jim Goudsward, Wetland Specialist, Portland District Office and Regulatory Branch Chief, San Francisco District Offices, U.S. Army Corps of Engineers, March 8, 2002.

⁴⁴Personal communication with Karen Cleary-Rose, Section 10 Conservation Coordinator, Carlsbad Field Office, U.S. Fish & Wildlife Service, October 24, 2002.

⁴⁵Personal communication with Molly Martindale, Project Manager, Ventura Field Office, U.S. Army Corps of Engineers, March 7, 2002.

114. The Portland, San Francisco, and Sacramento districts of the ACOE believe that no more than 10 percent of projects proposing fill of vernal pools will be affected by the SWANCC decision. The remaining 90 percent of vernal pools are believed to contain adequate connectivity to adjacent floodplain, wetland, or stream features for fill projects to require a 404 permit and associated mitigation measures.⁴⁶ It is also conceivable that no more than 10 percent of projects proposing fill of vernal pools in the Riverside County unit will be affected by the SWANCC decision.⁴⁷
115. **Table 3b** shows the land area deducted from total acres impacted by critical habitat designation because of the SWANCC decision. Before netting out land dedicated for public uses as part of urban growth, the analysis estimates 38,503 Group A species acres and 14,819 Group B species acres would be subject to Army Corps jurisdiction. Including the loss of some jurisdiction associated with the SWANCC decision, the analysis lowers this estimate to 34,653 Group A species acres and 13,337 Group B species acres.

CALIFORNIA WATER CODE

116. State level regulation of discharge to water bodies jurisdictional to the State of California is evolving to include fill of vernal pools. The SWANCC decision referenced earlier is likely, over time, to remove several types of water features from the jurisdiction of the U.S. Army Corps of Engineers. In response, nine regional entities known as the Regional Water Quality Control Boards may begin to regulate vernal pool fill in the next 20 years.⁴⁸ This analysis will examine whether critical habitat designation will indirectly result in this kind of additional State regulation of vernal pool fill, potentially leading to higher costs for project applicants.
117. Officials at the regional board with the largest overlap of jurisdiction with proposed critical habitat assert that provisions of the State Water Code and CEQA provides the means through which the board is likely to address vernal pool fill activity.⁴⁹ Just over half of the regional boards are expected to initiate review of proposed fill activity for projects in which no Federal nexus exists. As part of regional board participation in the CEQA process, these boards may

⁴⁶Personal communication with Tom Cavanaugh, Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

⁴⁷Personal communication with Karen Cleary-Rose, Section 10 Conservation Coordinator, Carlsbad Field Office, U.S. Fish & Wildlife Service, October 24, 2002.

⁴⁸Personal communication with Senior Water Resources Engineer, Sacramento Regional Water Quality Control Board, Sacramento, CA, September 23, 2002.

⁴⁹California State Water Code §13260.

ask that project applicants replicate the Service's compensation, restoration and avoidance requirements even when no Federal nexus is present.

118. This analysis considers this level of State regulation to be part of the regulatory baseline and wholly dependent on the regional boards' response to jurisdictional changes following the SWANCC decision. Critical habitat designation, as discussed in the CEQA section above, does not trigger a finding of a significant impact or any project mitigation. In the case of regional water quality control boards, statutory authority is established for regulating the fill of vernal pools because vernal pools are likely to be considered waters of the State of California in the future.

APPENDIX F: DEVELOPMENT OF THE PROJECT MODIFICATION FOR PRIVATE LAND DEVELOPMENT

119. This appendix provides a detailed description of the assumptions that are used to derive the project modification for private land development. The project modification describes a typical result of section 7 consultations for critical habitat designation for vernal pools species. The analysis is based on the record of past informal and formal consultations that involved vernal pool species and, to the extent available, on project-specific information provided by parties familiar with projects currently planned in vernal pool habitat.⁵⁰

SUMMARY OF KEY ASSUMPTIONS

120. The project modification for private land development located within proposed critical habitat is derived from a few key assumptions. Uncertainties associated with some of these assumptions are discussed in the **Executive Summary**. The assumptions are briefly summarized as follows:
- **Land Development, Developer Avoidance, and Federal Nexus.** The primary Federal nexus associated with non-Federal land development is through the 404 permit requirements of the Clean Water Act for vernal pool fill. Some smaller projects within the critical habitat designation are expected to avoid the fill of wetted vernal pools, while some vernal pools will be considered isolated wetlands. Section 7 consultations will not be required in either of these cases. Together these factors are expected to reduce the relevant overlap by about 8,600 acres. The remaining land development acreage requiring section 7 consultations through the 404 permit nexus is shown under “Gross Acres of Overlap with Federal Nexus” in **Table 3b**, and totals about 48,000 acres. The mechanisms that reduce 59,000 acres of land within proposed critical habitat to the 48,000 acres with a Federal nexus are described fully in **Appendix E**.
 - **Baseline and USFWS Additional Regulatory Requirements.** The primary baseline regulatory requirements of relevance for land development are the restoration requirements

⁵⁰One public comment suggested that the number of past consultations for land development activities is not a good indicator of future consultations, as the historical record reflects only those associated with the listing of the species. The Service believes that most future section 7 consultations will involve both critical habitat and species take issues, and that few will be strictly critical habitat related, in particular for land development projects. As a means of estimating the frequency of future consultations, therefore, the historical rate of consultations is a reliable method.

associated with the issuance of a 404 permit by the ACOE under the Clean Water Act. As part of the baseline, this regulatory requirement is subtracted from the USFWS conservation requirements to determine the additional regulatory requirements associated with section 7 consultations. The role of the ACOE's requirements in calculating the impacts of designation is described fully in **Appendix E**.

- **Additional USFWS Requirements by Species Group.** The Service requires two different sets of conservation measures for consultations associated with different species and their critical habitat. The two groups of species are Group A (nine species, more frequently occurring) and Group B (six species, less frequently occurring). Group B species require more restrictive conservation measures, including compensation at a six to one on-site preservation/avoidance ratio and a three to one restoration ratio, once the baseline is subtracted. Group A species require a two to one off-site compensation ratio, once the baseline has been subtracted. These project modification differences are described more fully in this appendix.
- **Project Modification Costs/Land Value Losses.** Project modification costs are expressed in terms of land value losses for the purposes of this analysis (see **Tables F-1** and **F-2**). Project modifications can include avoidance of certain portions of the land area as well as investments in restoration and compensation efforts. It is assumed that all land on a particular development site has equal development, and thus land, value. As a result, the loss of use of a particular portion of the site will reduce the land value of the site by the same proportion. It is also assumed that the compensation and restoration costs, that directly add to the cost of site development, are internalized into the value of the land, reducing land value at the time of development by the additional development cost.
- **Net Acre Valuation Approach.** Raw, entitled land values are often expressed in terms of value per net acre. The net area of development is the location of private development. The remainder of the gross area includes a range of publicly and/or privately funded infrastructure, including roads, schools, parks and other. The land value to the landowner will occur through the sale or lease of the net areas of development. The infrastructure areas will not provide direct revenue to the landowner, but rather, through their presence, add value to the private development portion of the site. The value added by the infrastructure is generally internalized into the private development value and associated land value and is captured in the per net acre expressions of land value. For the purposes of this analysis, a standard assumption that 25 percent of the land area will be used for infrastructure is applied. As a result, a total of about 36,000 net acres of land development will require section 7 consultations (see **Table 3b**).
- **Per Net Acre Land Values.** Reductions in land values associated with section 7 consultation requirements are considered relative to estimates of the current value of land expected to be

developed in the next 20 years. Estimates of land values are distinguished by county and by time to development. Variations in the value of land currently entitled and ready for development by county were based on Sacramento County's average net value per raw, entitled acre of \$125,000 and relative median housing prices by county. This land value was provided by several prominent development consultants in the region.⁵¹ A relative land value index was derived based on median housing data from RAND and the California Association of Realtors (see **Table F-3**), and applied to estimate entitled land value acres for all relevant counties.

- **Conservation Bank Certification and Credit Pricing.** Conservation bank prices are used to estimate the project modification costs associated with compensation requirements for Group A species. Conservation banks are presumed to provide a good estimate for the cost of compensation requirements. The largest prevalence of existing conservation banks is in the Sacramento Region, where each compensation credit costs about \$60,000 per acre. This compensation cost is used to derive equivalent costs in all counties, where compensation costs are expected to vary in line with land value.⁵² This appendix explores this assumption in more detail.
- **Average Size of Land Development Project.** Land development projects vary significantly in size. Based on prior 404 permit consultations, land development projects have an average project size of 300 acres. This is the average project size considered in this analysis. When the above project modifications are applied to acreage within the proposed designation that are likely to be developed within 20 years, the resulting land value losses (undiscounted) are calculated on a county by county basis in **Table F-4**

MORE DETAILED EXPLANATIONS OF SELECTED ASSUMPTIONS

LAND DEVELOPMENT AND FEDERAL NEXUS

121. As first valuated in **Appendix E**, Federal agency review and permitting is often required by land development by public and private entities. In nearly every development project that

⁵¹EPS project experience.

⁵²One public comment questioned why conservation bank credit prices differed from mitigation costs paid by other Federal and State agencies following section 7 consultations. The short answer is that the DEA's data source for credit prices applies to land development activities, while other agencies use a variety of mitigation measures.

Table F-1
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Project Modifications for Land Development
Group A Critical Habitat in Sacramento County [1]

Item	Assumption	Units	Source
EXPECTED LAND USES [2]			
Size of Development Project	300.0	gross acres	U.S. Fish and Wildlife Service
<i>of which</i>			
Vernal Pool Habitat	300.0	acres	
Wetted area	21.0	wetted acres	U.S. Fish and Wildlife Service
Uplands	279.0	dry acres	U.S. Fish and Wildlife Service
<i>of which</i>			
Area to be Developed	300.0	gross acres	U.S. Fish and Wildlife Service
Public Uses: Roads, Parks, Schools, Other Infrastructure	75.0	acres	Economic & Planning Systems
Net Acres for Private Development	225.0	net acres	Economic & Planning Systems
Vernal Pool Wetted Acres to be Filled	21.0	wetted acres	
REGULATORY REQUIREMENTS FOR GROUP A PROJECTS			
Baseline: U.S. Army Corps of Engineers Restoration Required for 404 permit [3]	1:1	ratio of restored acres to filled acres	U.S. Army Corps of Engineers
Above Baseline: U.S. Fish and Wildlife Service Additional Requirements Compensation Required under section 7 [4]	2:1	ratio of compensated acres to filled acres	U.S. Fish and Wildlife Service
Resulting Compensation Purchase [5]	42	preservation credits	
SECTION 7 LAND VALUE IMPACTS FOR GROUP A PROJECTS			
Value of Developable, Entitled Land			
Land Value per Net Acre [6], [7]	\$125,000	per net acre	Area Real Estate Development Consultants
Acres of Private Development	225.0	net acres	
Total Land Valuation per Project	\$28,125,000		
Preservation Credit Purchases			
Price per Credit [8]	\$60,000	per credit	Area Conservation Banks
Credits Purchased	42	preservation credits	
Total Cost to Development	\$2,520,000		
Total Loss in Land Value per Project [9]	(\$2,520,000)		
Total Loss as a Percent of Full Land Value	-9.0%		

"A"

Source: U.S. Fish and Wildlife Service, Economic & Planning Systems, Inc.

[1] Group B critical habitat is the land area within critical habitat units designated for Butte County Meadowfoam, Colusa Grass, Conservancy Fairy Shrimp, Sacramento Orcutt Grass, Contra Costa Goldfields, or Solano Grass. Group A critical habitat is the land area within critical habitat solely designated for any combination of the nine remaining vernal pool species. Sacramento County is chosen for illustrative purposes only. In the larger analysis, land and preservation credit prices are allowed to vary by county. This table does not apply to Riverside County consultation activities. See text for that county's likely section 7 requirements.

[2] Expected land uses are for a typical 300 acre development project sited entirely within proposed critical habitat. The vernal pools are assumed to be distributed evenly around the site, with the pools themselves (the wetted area) occupying 7.0% of the land area. Schools, parks, roads, and other public infrastructure require 25% of the land area. For Group A projects, the regulating agencies

will permit development of the entire site once regulatory requirements are satisfied. In reality, development projects of many sizes are likely to take place on sites with a variety of vernal pool configurations, and a range of project designs will satisfy section 7 requirements. The parameters in the table were chosen to reflect a project with average characteristics, e.g., the consultation history for the Sacramento Fish & Wildlife Office on vernal pool species suggests that the average project size is 300 acres.

- [3] The Clean Water Act gives the Army Corps the authority to regulate fill of all "waters of the United States" and regulation under the Act would apply to projects that propose fill of vernal pools considered jurisdictional by the Corps. Regulatory requirements include an analysis of the least environmentally damaging project alternative, and restoration of one acre of wetted vernal pools for every acre of wetted pools filled by the project. This requirement is also known as the 1:1 restoration ratio. Any loss in private, developable acreage is not calculated in this table as this value loss is part of the regulatory baseline.
- [4] Consultation with the U.S. Fish & Wildlife Service requires that proposed fill of vernal pools be compensated at the rate of two wetted acres of vernal pools for each wetted acre of pools filled, in addition to the same creation requirements as the Clean Water Act. The above baseline section 7 requirement, therefore, is two wetted acres for each acre filled. Projects may fulfill the requirement for compensation by purchasing preservation credits from a conservation bank, purchasing suitable habitat and managing that habitat in perpetuity, or dedicating land already owned by the applicant and having suitable vernal pool habitat.
- [5] The compensation option that is least likely to underestimate the costs to the applicant is the purchase of preservation credits from a conservation bank that has been certified by the U.S. Fish & Wildlife Service.
- [6] Per net acre land values are applied for a project at the stage where land has been fully entitled for development in the planning process and is about to be developed. As discussed elsewhere, actual land values per net acre will be lower for land that is earlier in the entitlement and development timeline. In these cases, the value of land must be discounted from the current entitled land value. This analysis provides land value loss estimates for projects that are about to be developed, as well as an associated percent land value loss that can be applied to land at any stage of the development path.
- [7] Per net acre land values are applied to the acres for private development. This approach recognizes that no revenues accrue from the public infrastructure portion of the development site. The value-added to the private development by the public infrastructure is, however, internalized into the per net acre land value.
- [8] A credit is the amount of compensation required by section 7 for filling one acre of wetted pools on the development site.
- [9] Assumes that land values internalize the additional costs of development, including preservation credit purchases.

Table F-2
U.S. Fish & Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Project Modifications for Land Development
Group B Critical Habitat in Sacramento County [1]

Item	Assumption	Units	Source
EXPECTED LAND USES [2]			
Size of Development Project	300.0	gross acres	U.S. Fish and Wildlife Service
<i>of which</i>			
Vernal Pool Habitat	300.0	acres	
Wetted area	21.0	wetted acres	U.S. Fish and Wildlife Service
Uplands	279.0	dry acres	U.S. Fish and Wildlife Service
<i>of which</i>			
Area to be Developed	300.0	gross acres	U.S. Fish and Wildlife Service
Public Uses: Roads, Parks, Schools, Other Infrastructure	75.0	acres	Economic & Planning Systems
Net Acres for Private Development	225.0	net acres	Economic & Planning Systems
REGULATORY REQUIREMENTS FOR GROUP B PROJECTS			
Baseline: U.S. Army Corps of Engineers Restoration Required for 404 permit [3]	1:1	ratio of restored acres (wetted) to filled acres (wetted)	U.S. Army Corps of Engineers
Above Baseline: U.S. Fish and Wildlife Service Additional Requirements Avoidance Required under section 7 [4]	6:1	ratio of avoided acres (wetted) to filled acres (wetted)	U.S. Fish and Wildlife Service
Restoration Required under section 7 [4]	3:1	ratio of restored acres (wetted) to filled acres (wetted)	U.S. Fish and Wildlife Service
Project Land Uses Once Regulatory Requirements are Fulfilled [5]	300.0	total acres	
Public Uses: Roads, Parks, Schools, Other Infrastructure	10.7	acres	Economic & Planning Systems
Net Acres for Private Development	32.1	net acres	Economic & Planning Systems
Acres Avoided: No Development Permitted <i>of which</i>	257.1	acres	U.S. Fish and Wildlife Service
Vernal Pool Wetted Acres Filled	3.0	wetted acres	
Vernal Pool Wetted Acres Avoided	18.0	wetted acres	6 wetted acres avoided for each acre filled
Vernal Pool Wetted Acres Restored	9.0	wetted acres	3 wetted acres created for each wetted acre filled
SECTION 7 LAND VALUE IMPACTS FOR GROUP B PROJECTS [6]			
Value of Developable, Entitled Land Land Value per Net Acre [7], [8]	\$125,000	per net acre	Area Real Estate Development Consultants
Acres of Potential Private Development	225.0	net acres	
Total Land Valuation per Project	\$28,125,000		
Value of Developable, Entitled Land Once Regulatory Requirements are Fulfilled Land Value per Net Acre [7], [8]	\$125,000	per net acre	Area Real Estate Development Consultants
Acres of Actual Private Development	32.1	net acres	
Total Land Valuation per Project	\$4,018,000		
Change in Land Value	\$24,107,000		

Table F-2
U.S. Fish & Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Project Modifications for Land Development
Group B Critical Habitat in Sacramento County [1]

Item	Assumption	Units	Source
SECTION 7 LAND VALUE IMPACTS FOR GROUP B PROJECTS, cont.			
Restoration Costs			
Price per Wetted Acre of Restored Vernal Pools [9]	\$15,000	per wetted acre wetted acres	Area Conservation Banks
Wetted Acres Restored	9.0		
Total Cost to Development	\$135,000		
Total Impact per Project on Land Value [10]	(\$24,242,000)		
Total Impact as a Percent of Full Land Value	-86.2%		

"B"

Source: U.S. Fish & Wildlife Service, Economic & Planning Systems, Inc.

- [1] Group B critical habitat is the land area within critical habitat units designated for Butte County Meadowfoam, Colusa Grass, Conservancy Fairy Shrimp, Sacramento Orcutt Grass, Contra Costa Goldfields, or Solano Grass. Group A critical habitat is the land area within critical habitat solely designated for any combination of the nine remaining vernal pool species. Sacramento County is chosen for illustrative purposes only. In the larger analysis, land and pool creation prices are allowed to vary by county. This table does not apply to Riverside County consultation activities. See text for that county's likely section 7 requirements.
- [2] Expected land uses are for a typical 300 acre development project sited entirely within proposed critical habitat. The vernal pools are assumed to be distributed evenly around the site, with the pools themselves (the wetted area) occupying 7.0% of the land area. Schools, parks, roads, and other public infrastructure require 25% of the land area. For Group B projects, the regulating agencies will not allow development of the entire site. In reality, development projects of many sizes are likely to take place on sites with a variety of vernal pool configurations, and a range of project designs will satisfy section 7 requirements. The parameters in the table were chosen to reflect a project with average characteristics, e.g., the consultation history for the Sacramento Fish & Wildlife Office on vernal pool species suggests that the average project size is 300 acres.
- [3] The Clean Water Act gives the Army Corps the authority to regulate fill of all "waters of the United States" and regulation under the Act would apply to projects that propose fill of vernal pools considered jurisdictional by the Corps. Regulatory requirements include an analysis of the least environmentally damaging project alternative, and restoration of one acre of wetted vernal pools for every acre of wetted pools filled by the project. This requirement is also known as the 1:1 restoration ratio. Any loss in private, developable acreage is not calculated in this table as this value loss is part of the regulatory baseline.
- [4] Assumes section 7 consultation with U.S. Fish & Wildlife Service will allow limited fill of Group B vernal pools only if there is also on-site avoidance of habitat at the rate of six wetted acres of vernal pools for each wetted acre of pools filled. Also assumes that the Section 7 consultation process will require that four wetted acres of vernal pools be restored for each wetted acre filled. One wetted acre is already covered under baseline regulation, so above baseline additional USFWS regulation requires 3:1 restoration ratio.
- [5] Starting from a 300 acre site, the 6:1 avoidance ratio will require that 257.1 acres be set aside without development, in exchange for 42.8 acres of development. Of the 42.8 acres of development, 10.7 acres or 25% will be for public uses, such as schools, parks, and roads. The remaining acreage, 32.1 acres, will be for private development. Of the 21 wetted acres of vernal pools in the 300 acre site, 18 are protected, while 3 acres are filled. This amount of fill must be accompanied by the restoration of 9 wetted acres of similar habitat.
- [6] The dollar impacts are estimated by considering land value before and after Section 7 regulation.
- [7] Per net acre land values are applied for a project at the stage where land has been fully entitled for development in the planning process and is about to be developed. As discussed elsewhere, actual land values per net acre will be lower for land that is earlier in the entitlement and development timeline. In these cases, the value of land must be discounted from the current entitled land value. This analysis provides land value loss estimates for projects that are about to be developed, as well as an associated percent land value loss that can be applied to land at any stage of the development path.
- [8] Per net acre land values are applied to the acres for private development. This approach recognizes that no revenues accrue from the public infrastructure portion of the development site. The value-added to the private development by the public infrastructure is, however, internalized into the per net acre land value.
- [9] Restoration costs include site preparation, vernal pool inoculation, and long term site protection and monitoring costs.
- [10] Assumes that land values internalize the additional costs of development (habitat restoration costs) as well as the inability to develop a portion of the project site. In this case, 85.7% of the project site is undevelopable as a result of section 7 consultations, and 0.5 percent of land value lost is due to additional development costs.

Table F-3
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Per Acre Land Values by County by Period of Development

ID	County Name	Value Index [1]	Entitled Land Value if Development Occurs in			
			First Year	Any Year in Next 20 Years	Any Year in Next 10 Years	Any Year in Second 10 Years
1	Monterey County	237	\$296,000	\$123,813	\$187,316	\$60,311
2	Napa County	218	\$273,000	\$114,193	\$172,761	\$55,624
3	Alameda County	206	\$257,000	\$107,500	\$162,636	\$52,364
4	San Benito County	187	\$234,000	\$97,880	\$148,081	\$47,678
5	Contra Costa County	184	\$230,000	\$96,206	\$145,550	\$46,863
6	Santa Barbara County	176	\$220,000	\$92,024	\$139,221	\$44,826
7	San Luis Obispo County	152	\$190,000	\$79,475	\$120,237	\$38,713
8	Ventura County	150	\$188,000	\$78,638	\$118,971	\$38,306
9	Placer County	140	\$175,000	\$73,201	\$110,744	\$35,657
10	Solano County	139	\$174,000	\$72,782	\$110,112	\$35,453
11	Lake County	128	\$160,000	\$66,926	\$101,252	\$32,600
12	Mendocino County	128	\$160,000	\$66,926	\$101,252	\$32,600
13	Yolo County	125	\$156,000	\$65,253	\$98,721	\$31,785
14	San Joaquin County	103	\$129,000	\$53,959	\$81,634	\$26,284
15	Sacramento County	100	\$125,000	\$52,286	\$79,103	\$25,469
16	Amador County	100	\$125,000	\$52,286	\$79,103	\$25,469
17	Calaveras County	100	\$125,000	\$52,286	\$79,103	\$25,469
18	Riverside County	97	\$121,000	\$50,613	\$76,572	\$24,654
19	Jackson County, OR	95	\$119,000	\$49,776	\$75,306	\$24,247
20	Stanislaus County	93	\$117,000	\$48,940	\$74,041	\$23,839
21	Butte County	82	\$103,000	\$43,084	\$65,181	\$20,987
22	Colusa County	82	\$103,000	\$43,084	\$65,181	\$20,987
23	Glenn County	82	\$103,000	\$43,084	\$65,181	\$20,987
24	Shasta County	82	\$103,000	\$43,084	\$65,181	\$20,987
25	Tehama County	82	\$103,000	\$43,084	\$65,181	\$20,987
26	Yuba County	82	\$103,000	\$43,084	\$65,181	\$20,987
27	Merced County	80	\$100,000	\$41,829	\$63,282	\$20,375
28	Mariposa County	80	\$100,000	\$41,829	\$63,282	\$20,375
29	Tuolumne County	80	\$100,000	\$41,829	\$63,282	\$20,375
30	Fresno County	66	\$83,000	\$34,718	\$52,524	\$16,911
31	Tulare County	61	\$77,000	\$32,208	\$48,728	\$15,689
32	Kings County	61	\$77,000	\$32,208	\$48,728	\$15,689
33	Lassen County	60	\$75,000	\$31,372	\$47,462	\$15,281
34	Modoc County	60	\$75,000	\$31,372	\$47,462	\$15,281
35	Plumas County	60	\$75,000	\$31,372	\$47,462	\$15,281
36	Siskiyou County	60	\$75,000	\$31,372	\$47,462	\$15,281
37	Madera County	55	\$68,000	\$28,444	\$43,032	\$13,855

"index"

Sources: RAND; California Association of Realtors; EPS.

[1] Value index based on average per-square-foot sales price of all homes in last year. Where RAND did not track data, based on county assessor data or counties were considered equivalent to other counties.

Table F-4

U.S. Fish and Wildlife Service
 Vernal Pool Species Critical Habitat Designation Final Economic Analysis
 Lost Land Development Value Associated with Section 7 Project Modifications

Undiscounted

Co. #	County Name	Net Acres Overlap with Fed. Nexus & Avail. For Development [1]		Avg. Land Value per Net Acre [2]	Total Land Value of Net Overlap Acres [3]		Value Loss Due to Section 7 Project Modifications			Percent of State
		Group A	Group B	Undiscounted	Group A	Group B	Group A	Group B	Total	Total
San Francisco Bay Area										
1	Alameda County	530	596	\$257,000	\$136,143,180	\$153,161,078	\$12,198,429	\$132,015,319	\$144,213,748	10.6%
2	Contra Costa County	0	0	\$230,000	\$59,523	\$0	\$5,333	\$0	\$5,333	0.0%
3	Napa County	168	7	\$273,000	\$45,773,910	\$1,990,170	\$4,101,342	\$1,715,403	\$5,816,745	0.4%
4	Solano County	2,017	1,927	\$174,000	\$350,940,600	\$335,296,260	\$31,444,278	\$289,004,513	\$320,448,791	23.6%
	Subtotal	2,715	2,530	\$233,500 [4]	\$532,917,213	\$490,447,508	\$47,749,382	\$422,735,235	\$470,484,617	34.6%
San Joaquin Valley Region										
5	Fresno County	1,181	0	\$83,000	\$98,021,340	\$0	\$8,782,712	\$0	\$8,782,712	0.6%
6	Kings County	1	0	\$77,000	\$46,778	\$0	\$4,191	\$0	\$4,191	0.0%
7	Madera County	9,306	0	\$68,000	\$632,786,580	\$0	\$56,697,678	\$0	\$56,697,678	4.2%
8	Merced County	248	2,502	\$100,000	\$24,786,000	\$250,229,250	\$2,220,826	\$215,682,044	\$217,902,869	16.0%
9	San Joaquin County	0	0	\$129,000	\$0	\$0	\$0	\$0	\$0	0.0%
10	Stanislaus County	0	0	\$117,000	\$0	\$0	\$0	\$0	\$0	0.0%
11	Tulare County	148	0	\$77,000	\$11,413,710	\$0	\$1,022,668	\$0	\$1,022,668	0.1%
	Subtotal	10,883	2,502	\$93,000 [4]	\$767,054,408	\$250,229,250	\$68,728,075	\$215,682,044	\$284,410,119	20.9%
Mountain Region										
12	Lassen County	0	0	\$75,000	\$0	\$0	\$0	\$0	\$0	0.0%
13	Modoc County	0	0	\$75,000	\$0	\$0	\$0	\$0	\$0	0.0%
14	Plumas County	369	0	\$75,000	\$27,656,438	\$0	\$2,478,017	\$0	\$2,478,017	0.2%
15	Siskiyou County	0	0	\$75,000	\$0	\$0	\$0	\$0	\$0	0.0%
	Subtotal	369	0	\$75,000 [4]	\$27,656,438	\$0	\$2,478,017	\$0	\$2,478,017	0.2%
Upper Sacramento Valley Region										
16	Butte County	632	1,651	\$103,000	\$65,137,973	\$170,072,055	\$5,836,362	\$146,591,529	\$152,427,891	11.2%
17	Colusa County	789	0	\$103,000	\$81,219,105	\$0	\$7,277,232	\$0	\$7,277,232	0.5%
18	Glenn County	0	0	\$103,000	\$0	\$0	\$0	\$0	\$0	0.0%
19	Shasta County	1,499	0	\$103,000	\$154,366,358	\$0	\$13,831,226	\$0	\$13,831,226	1.0%
20	Tehama County	60	16	\$103,000	\$6,132,105	\$1,626,885	\$549,437	\$1,402,274	\$1,951,710	0.1%
	Subtotal	2,979	1,667	\$103,000 [4]	\$306,855,540	\$171,698,940	\$27,494,256	\$147,993,803	\$175,488,059	12.9%
Sacramento Valley Region										
21	Placer County	4,426	0	\$175,000	\$774,486,563	\$0	\$69,393,996	\$0	\$69,393,996	5.1%
22	Sacramento County	368	2,901	\$125,000	\$45,942,188	\$362,677,500	\$4,116,420	\$312,605,438	\$316,721,858	23.3%
23	Yolo County	0	0	\$156,000	\$0	\$0	\$0	\$0	\$0	0.0%
24	Yuba County	0	0	\$103,000	\$0	\$0	\$0	\$0	\$0	0.0%
	Subtotal	4,793	2,901	\$139,750 [4]	\$820,428,750	\$362,677,500	\$73,510,416	\$312,605,438	\$386,115,854	28.4%
Northern Coast Region										
25	Lake County	0	0	\$160,000	\$0	\$0	\$0	\$0	\$0	0.0%
26	Mendocino County	0	0	\$160,000	\$0	\$0	\$0	\$0	\$0	0.0%
	Subtotal	0	0	\$160,000 (4)	\$0	\$0	\$0	\$0	\$0	0.0%
Central Coast Region										
27	Monterey County	503	0	\$296,000	\$148,890,960	\$0	\$13,340,630	\$0	\$13,340,630	1.0%
28	San Luis Obispo County	982	0	\$190,000	\$186,526,800	\$0	\$16,712,801	\$0	\$16,712,801	1.2%
29	San Benito County	0	0	\$234,000	\$0	\$0	\$0	\$0	\$0	0.0%
	Subtotal	1,485	0	\$240,000 [4]	\$335,417,760	\$0	\$30,053,431	\$0	\$30,053,431	2.2%

Table F-4
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Lost Land Development Value Associated with Section 7 Project Modifications

Undiscounted

Co. #	County Name	Net Acres Overlap with Fed. Nexus & Avail. For Development [1]			Avg. Land Value per Net Acre [2]		Total Land Value of Net Overlap Acres [3]			Value Loss Due to Section 7 Project Modifications			Percent of State
		Group A	Group B	Undiscounted	Group A	Group B	Group A	Group B	Total	Group A	Group B	Total	
Sierra Nevada Foothills Region													
30	Amador County	0	0	\$125,000		\$0	\$0	\$0	\$0	\$0	\$0		0.0%
31	Calaveras County	0	0	\$125,000		\$0	\$0	\$0	\$0	\$0	\$0		0.0%
32	Mariposa County	0	0	\$100,000		\$0	\$0	\$0	\$0	\$0	\$0		0.0%
33	Tuolumne County	0	0	\$100,000		\$0	\$0	\$0	\$0	\$0	\$0		0.0%
	Subtotal	0	0	\$112,500 [4]		\$0	\$0	\$0	\$0	\$0	\$0		0.0%
Jackson County, Oregon													
34	Jackson County, OR	783	0	\$119,000		\$93,185,033	\$0	\$8,349,379	\$0	\$8,349,379			0.6%
Southern California													
35	Riverside County [5]	2,632	0	\$121,000		\$318,434,490	\$0	\$2,763,275	\$0	\$2,763,275			0.2%
36	Santa Barbara County	0	0	\$220,000		\$0	\$0	\$0	\$0	\$0	\$0		0.0%
37	Ventura County	0	0	\$188,000		\$0	\$0	\$0	\$0	\$0	\$0		0.0%
	Subtotal	2,632	0	\$176,333 [4]		\$318,434,490	\$0	\$2,763,275	\$0	\$2,763,275			0.2%
Total, Undiscounted		26,639	9,601	\$145,208 [4]		\$3,201,949,630	\$1,275,053,198	\$261,126,231	\$1,099,016,520	\$1,360,142,751			100%

404_impacts

[1] From Table 3b.

[2] See Table F-3. Represent estimates of residential land value associated with average parcel expected to be developed over next 20 years, on a net per acre basis.

[3] Total land value represents net per acre value multiplied by number of net acres. Value of public uses acreage is internalized into the per net private developable land value.

[4] This is a land value average for the specified geographic area, not a sum of the land values in each region.

[5] Riverside County projects involve only minor section 7 costs: \$15,000 per wetted acre of soil removal from project site, storage, and use in establishing newly restored pools on a compensation site.

proposes to fill vernal pools as a means of preparing land for building, Clean Water Act regulations require a project applicant to obtain a 404 permit from the ACOE.

122. Land development may take the form of master planned communities, large office parks, public infrastructure extension, developed parkland, small subdivisions of single owner parcels for estate lots, or other project types. Given the evolution of wetlands regulation since the 1970s and the scale at which most planned residential and commercial developments are built, very few with on-site vernal pools are exempt from section 404 regulation today.⁵³
123. If development of land within a proposed critical habitat unit is proposed, the project will require a 404 permit from the ACOE unless the developer can fully avoid filling the vernal pool through careful project design. This analysis assumes that approximately 10 percent of the total acres of proposed critical habitat will be designed in such a way that no Federal nexus will exist.⁵⁴ **Table 3b** shows the acreage of critical habitat exempted from section 7 regulation because of this situation.
124. Section 7 costs for such projects will be zero, unless project applicants pursue the approval of a habitat conservation plan (HCP) in accord with section 10's incidental take provisions. In the case of a HCP, the Service reviews the HCP for consistency with proposed critical habitat designation. Estimates of the number of these consultations and their likely cost impacts are discussed in **Chapter II**. Without the need for an HCP, a development project without a Federal nexus does not trigger additional requirements under from section 7.
125. More typically, the project applicant will be required to obtain a 404 permit from the ACOE and a section 7 consultation will likely be initiated with the Service. The following sections outline what additional project modifications may occur through the consultation process and what mitigation is already required of land development activities under the Clean Water Act.

BASELINE REGULATORY REQUIREMENTS

126. As detailed in **Appendix E**, a recent court decision may change the regulatory approach adopted by the Portland, San Francisco, Sacramento, and Los Angeles offices toward fill activity associated with vernal pools. On January 9, 2001, the U.S. Supreme Court issued a decision in *Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers*. The decision changes the protection given to isolated wetlands under Section 404 of the CWA

⁵³Personal communication with Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

⁵⁴Based on Census 2000 estimates that 6 percent of all California residents live outside of urban areas where densities would prohibit this design option, and that these non-urban project sites will use more land per person than urban sites.

by ruling that the use of migratory birds to assert jurisdiction over the site exceeded the authority that Congress had granted the ACOE under the CWA.

127. The decision will restrict ACOE jurisdiction to navigable waters, their tributaries, and wetlands that are adjacent to these navigable waterways and tributaries, leaving “isolated” wetlands unprotected by the CWA. Prior to the SWANCC decision, the ACOE had adopted a regulatory definition of “waters of the U.S.” that afforded Federal protection for almost all vernal pools.
128. The Portland, San Francisco, and Sacramento districts of the ACOE believe that no more than 10 percent of the population of vernal pools will be affected by the SWANCC decision. The remaining 90 percent of vernal pools possess connectivity to adjacent floodplain, wetland, or stream features, and their proposed fill will require a 404 permit, itself conditional on mitigation measures.⁵⁵ It is also conceivable that no more than 10 percent of projects proposing fill of vernal pools in the Riverside County unit will be affected by the SWANCC decision.⁵⁶ The reduction in acres of development projects by county is shown in **Table 3b**.
129. For each development project not subject to a SWANCC exemption, meetings are held between the project proponent and ACOE officials to negotiate the 404 permit conditions that allow the project to fill or modify wetlands. The outcome of these meetings and the alternatives analysis is that the project must implement a combination of one or more measures to receive the 404 permit: wetlands on-site preservation/avoidance, off-site preservation, or on- or off-site wetlands restoration.
130. The total amount of acres avoided, restored, and preserved off-site depends on the parameters of the development project and the physical characteristics of the project site. Each project presents unique challenges to development and wetlands functioning, and a unique set of avoidance and conservation techniques is required to implement the least damaging practicable project alternative.
131. Overall, ACOE officials believe that the agency has achieved a minimum of 1 acre mitigated for each acre of vernal pool wetlands filled. This mitigation policy is sometimes summarized in terms of a ratio, e.g., this kind of project has a mitigation ratio of 1:1. This ratio includes the option of the landowner to avoid the filling of the wetland acres in addition to the options of purchasing or restoring wetlands as mitigation. The 1:1 ratio is likely to remain in place in

⁵⁵Personal communication with Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

⁵⁶Personal communication with Section 10 Conservation Coordinator, Carlsbad Field Office, U.S. Fish and Wildlife Service, October 24, 2002.

future regulatory activities, as it is in keeping with the agency's historical policy of a "no net loss" of wetlands in the 404 permitting program.⁵⁷ The ACOE requirements are shown in the middle third of **Tables F-1** and **F-2**.

132. ACOE jurisdiction varies throughout the proposed critical habitat areas in California and Oregon. Four district offices of the agency regulate vernal pools differently, in part because vernal pool characteristics vary by region. In the Los Angeles district of the ACOE does not generally assert jurisdiction over vernal pools occurring within its district, because the pools are more isolated and do not exhibit a hydrologic connection with adjacent hydrological features. In selected areas of vernal pool habitat in Riverside County, however, the Los Angeles district has determined that the impacted wetlands are waters of the United States.
133. These areas include all of the San Jacinto-Hemet proposed critical habitat unit in Riverside County. In all other areas of the district, the history of regulation generally indicates that fill of vernal pools would not require a 404 permit and no baseline cost is imposed. *Only Riverside County's San Jacinto-Hemet critical habitat unit will only generate a Federal nexus* when fill of vernal pools is planned by public or private land developers in the Los Angeles district of the ACOE. As described in **Appendix E**, officials in that district generally consider vernal pools to be isolated wetlands and not subject to Clean Water Act regulation. Development projects in the Riverside County unit as well as the other three districts are expected to be subject to the 1:1 mitigation requirement as well as the Service's section 7 requirements explained below.

USFWS ADDITIONAL REQUIREMENTS

134. In a section 7 consultation, the Service may request an applicant for a 404 permit to compensate each wetted acre of vernal pools filled by performing the following tasks:
- Restoring an equal acreage of wetted vernal pools on-site (the restoration requirement)
 - Preserving a certain number of wetted acres of vernal pools either on- or off-site (the preservation requirement).
135. The Service's restoration requirements are structured to be similar to the "no net loss" requirement of the ACOE, equaling or requiring a greater level of restoration. The Service's preservation requirement represents an additional component. **Appendix E** of this report briefly describes the two major preservation categories for vernal pools: avoidance or on-site preservation, and compensation or off-site preservation.

⁵⁷Personal communication with Chief, Sacramento Valley Office, U.S. Army Corps of Engineers, January 7, 2002.

136. Development projects may be proposed for land located within a single or within overlapping multiple habitat units for the 15 vernal pool species. The section 7 requirements issued by the Service, however, will vary with the relative abundance of each species. This analysis classifies the two kinds of species with regard to their section 7 options: Group A and Group B. The species with the higher frequency of occurrence will be referred to as belonging to Group A. The species with the lower frequency of occurrence and for which conservation banks are very unlikely to be established will be referred to as belonging to Group B. All land development projects affected by section 7 will be subject to one or the other of these conservation requirements depending on the presence of certain species on the project site.
137. Group B species (as defined in this section) include the Butte County meadowfoam, Colusa grass, Conservancy fairy shrimp, Contra Costa goldfields, Sacramento Orcutt grass, and Solano grass. Group A species (as defined in this section) include Greene's tuctuoria, hairy Orcutt grass, Hoover's spurge, longhorn fairy shrimp, San Joaquin Valley Orcutt grass, slender Orcutt grass, succulent owls-clover, vernal pool tadpole shrimp, and vernal pool fairy shrimp.
138. For Group B critical habitat units, additional section 7 conservation requirements will consist of avoidance of 85.7 percent of vernal pools on the project site, a condition which allows only 14.3 percent of the project site to be developed (reference **Table F-2**). The amount of land area avoided permits the project applicant to achieve the 6:1 preservation/avoidance ratio (six wetted acres preserved for each wetted acre of vernal pools filled). In addition, restoration requirements, over-and-above the baseline, will consist of the creation of vernal pool habitat at the rate of three acres created for each acre of vernal pools filled.⁵⁸ Service personnel have little experience with development projects impacting Group B species, so the 6:1 ratio was chosen to fit general knowledge about the level of protection required for Group B species habitat. This requirement is not an assumption that has been drawn from the species' consultation histories but instead serves as an analytical proxy for recommendations the Service may make in the future. This ratio also produces results more likely to overestimate than to underestimate regulatory impacts. Because of the very low frequency of Group B species populations, projects cannot fulfill this requirement in any way except to set aside acreage on the project site in accordance with the 6:1 ratio
139. For Group A critical habitat units in all locations except for Riverside County, conservation banks will provide a major means of satisfying section 7 conservation requirements. For these species, additional section 7 conservation will consist of off-site preservation (compensation) of one credit of vernal pool habitat for each wetted acre of vernal pools filled by the

⁵⁸Personal communication with Section 7 Coordinator, Sacramento Fish and Wildlife Office, June 8, 2002.

development project (reference **Table F-1**).⁵⁹ These preservation credits are purchased at a conservation bank approved by the Service at a price set by the availability of off-site habitat for these species. The 2:1 requirement is not an assumption that has been drawn from the species' consultation histories but instead serves as an analytical proxy for recommendations the Service may make in the future.

140. Riverside County consultations for Group A species do not have additional preservation requirements above the ACOE's 404 permit requirements. However, the Service acts to ensure one of the ACOE conditions, the restoration of vernal pool acreage that usually occurs off-site, is accompanied by measures to enhance the restored pools. This project modification is not shown in **Tables F-1** or **F-2**. That is, soils containing the species on the project site must be collected, stored, and then applied to the new site so that healthy populations of the crustaceans are established.⁶⁰ This analysis assumes that the cost of this section 7-derived measures is approximately \$15,000 per wetted acre of restored vernal pools. This fee is charged by conservation banks for the full restoration process, including the enhancement measures, but was chosen to overestimate and not underestimate the real cost to the project applicant (see the bottom third of **Table F-2**).
141. **Table 3a** shows the expected overlap between land areas expected to be developed in the next 20 years by county with both areas associated with Group A species and areas associated with Group B species. Across both California and Oregon, for land that is likely to urbanize over the next 20 years, nearly 43,800 acres have critical habitat proposed only for Group A species and approximately 40 percent of that amount, or 15,800 acres, have critical habitat proposed for one or more of the Group B species.

CONSERVATION BANK CERTIFICATION AND CREDIT PRICING

142. For projects that are proposed within critical habitat for only Group A species, the Service's additional conservation requirement may be fulfilled by using any one of three mechanisms. In each case, the applicant must locate qualified vernal pool habitat away from the project site, allowing full development of the property. Either the off-site habitat is already owned by the

⁵⁹One public comment inquired about the omission of the cost of preserving vernal pool uplands in the analysis. While not stated explicitly in the description of any project modification, the preservation of wetted acres of vernal pools is tied to the preservation of their associated uplands. For Group A species, costs for conservation bank credits include the cost of upland areas protected in conjunction with the vernal pools themselves. For Group B species, the on-site preservation acres are labeled "Acres Avoided: No Development Permitted" and include uplands in addition to the wetted acres of vernal pools.

⁶⁰Personal communication with Section 10 Conservation Coordinator, Carlsbad Field Office, U.S. Fish & Wildlife Service, October 24, 2002.

applicant, it is purchased for preservation from another landowner, or it is preserved through the purchase of conservation credits at what is known as a vernal pool conservation bank.

143. Conservation banks formalize a relationship with the Service based on the quality and amount of habitat available to the bank's operator. The owner of the conservation bank places a deed restriction on the property that preserves the land as a conservation area in perpetuity, in return for permission by the Service to sell allocations of the land area as conservation for projects that fill vernal pools or otherwise degrade vernal pool habitat. Long-term monitoring and land management of the property, including fencing, road access, exotic plant control, and grazing, is guaranteed by the establishment of a funding endowment and binding conditions of the sale of credits to project applicants.
144. Based on conversations with conservation bank enterprises in the Sacramento Valley Region and the Service's coordinator of mitigation bank regulation, project applicants are likely to pay \$60,000 per preservation credit required to compensate for filling an acre of wetted vernal pools (shown in the bottom third of **Table F-1**). This analysis allows the price of conservation to vary with the relative land values in each county, given that land cost is one of the key determinants of compensation cost. To allow for this variation, a home price index adjusts the \$60,000 price by county before it is applied to activities in a given habitat unit in a given county.
145. Conservation banks are currently not available for projects in every county included in the proposed designation. In general, banks have been in demand and certified by the Service where the greatest number of consultations on land development have occurred, especially in the Sacramento Valley. As future urban growth creates a greater demand for conservation credits for listed species in other regions of California and in Oregon, it is likely that larger numbers of conservation banks will be established to serve each region where critical habitat is proposed.⁶¹
146. The Service requires a higher preservation ratio (larger amounts of habitat preserved for each acre of habitat destroyed) for projects that preserve vernal pools off-site without using a conservation bank. As discussed in **Appendix E**, options for securing preservation off-site without a conservation bank may include the purchase of suitable habitat from another landowner, or the dedication of lands held by the project applicant in another location to preservation. While this analysis recognizes that landowners who possess a less costly solution for preserving vernal pools off-site (such as land purchased at agricultural prices or land purchased many years in advance of the consultation) will do so, the costs applied in this

⁶¹Based on a minimum 20-year, \$100 million credit market active in six regions of California and in Jackson County, Oregon. Actual credit purchase amount is \$106.7 million over 20 years (see **Table 7**).

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analysis are the full cost of purchasing conservation bank credits, the default conservation strategy. This assumption makes the economic analysis more likely to overestimate than underestimate actual costs related to section 7.

APPENDIX G: SECTION 7 CONSULTATION ACTIVITY AND COSTS

CATEGORIES OF ECONOMIC IMPACTS ASSOCIATED WITH SECTION 7 IMPLEMENTATION

147. The following section provides an overview of the categories of economic impacts that are likely to arise because of the implementation of section 7 in the area proposed as critical habitat for vernal pool species. All dollar values are expressed in undiscounted terms. When these values appear in **Chapters II, IV, V, and VI** in the final economic analysis (FEA), a 12 percent discount rate applies to the opportunity cost of investment decisions in the private development market, a seven percent discount rate applies to public investment decisions, and a three percent discount rate applies to changes in consumer surplus in new housing markets.

TECHNICAL ASSISTANCE

148. Frequently, the service responds to requests for technical assistance from Federal agencies, private landowners, and developers who have questions regarding whether specific activities will constitute adverse modification of critical habitat and/or require consultation under section 7. For the purposes of this analysis, technical assistance costs represent the estimated economic costs of informational conversations between landowners or developers and the Service regarding the designation of critical habitat for vernal pool species. Our analysis assumes that this type of assistance is provided in instances where a Federal nexus does not exist or, in the case of a Federal agencies, where there is ultimately no need for a section 7 consultation. The most common type of technical assistance is conversations between municipal or private property owners and the Service regarding lands designated as critical habitat or lands adjacent to critical habitat.

SECTION 7 CONSULTATIONS

149. Section 7(a)(2) f the Federal Endangered Species Act (Act) requires Federal agencies, in consultation with and with the assistance of the Service, to insure that any action authorized, funded, or carried out by such agency in not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. If a Federal agency determines that a proposed action "may affect" listed species or designated critical habitat, section 7 consultation is required. Consultations are conducted by Service personnel and personnel at the Federal agency responsible for the activity under

consideration (referred to as the Action agency). Where a third party is involved, such as a private developer seeking a permit to fill wetlands under section 404 of CWA, the Action agency may ask the third party to provide information or to otherwise participate in the consultation process.

150. During a consultation, the Service, the Action agency, and the land owner applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, the region where critical habitat has been proposed, and the land owner.
151. Consultations are conducted in a stepwise process. First, if the Action agency determines that a proposed action “may affect” listed species or designated critical habitat, the agency typically requests the initiation of an informal consultation with the Service. Informal consultation is designed to identify and resolve potential concerns at an early stage in the planning process. No further consultation is required if the Action agency finds, with the Service’s written concurrence, that the proposed action “may affect, but it not likely to adversely affect” listed species or critical habitat.
152. The consultation becomes formal if the Action agency determines that the proposed action is likely to adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. Formal consultations determine whether a proposed agency action is “likely” to jeopardize the continued existence of a species (jeopardy) or destroy or adversely modify critical habitat (adverse modification). Formal consultation imposes higher costs on participants than does a consultation that ends at the informal stage.
153. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants. In addition to the administrative costs discussed above, for most formal consultations, the Action agency is typically required to prepare a biological assessment document that outlines the potential effects of the proposed action on any listed species and/or designated critical habitat. The process of preparing and reviewing the biological assessment can also represent a significant cost to the applicant, the Action agency, and the Service, depending on the scope and complexity of the proposed action and the biological issues at hand.

ESTIMATION OF THE NUMBER OF CONSULTATIONS ASSOCIATED WITH PRIVATE LAND DEVELOPMENT

154. Estimates of section 7 consultation activity for private land development projects rely on historical consultation data provided by the Sacramento Fish and Wildlife Office (SFWO). For consultations taking place between 1995 and 2001 and requiring compensation, SFWO data show that the average land development project size is approximately 300 acres. On a county by county basis, this size factor was combined with projections of the land area of overlap between the likely path of urban growth and proposed critical habitat shown in **Table 3a**. Organized by county, **Table 5** shows that 158 development projects will require a formal consultation and biological assessment in the next 20 years.
155. SFWO's 1995–2001 consultation history also indicates that, for every formal consultation initiated for listed vernal pool species, the Service conducts 2.5 technical assistance efforts and 3.0 informal consultations. Using these ratios, **Table 5** also shows the number of technical assistance efforts and informal consultations associated with section 7 activities across the 37 counties. Thus, in addition to the 158 formal consultations associated with private land development under section 7, therefore, the Service will complete 394 technical assistance efforts and 473 informal consultations.

ESTIMATED COSTS OF CONSULTATIONS AND TECHNICAL ASSISTANCE

156. Estimates of the cost of individual consultations and technical assistance were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort for consultations of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.
157. Estimates take into consideration the level of effort of the Service, the Action agency, and the applicant during informal consultations, consultations that proceed to the formal stage, and technical assistance, as well as the varying complexity of consultations. Costs associated with consultations include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings and preparing letters, and the development of a biological opinion.
158. Cost estimates for technical assistance are based on analysis of past technical assistance efforts provided by a field office in southern California. Technical assistance costs represent the

estimated economic costs of informational conversations, letters, and meetings between third parties or an agency and the Service regarding the designation of critical habitat for the vernal pool species.

159. Per-effort costs associated with formal consultations, informal consultations, and technical assistance calls are presented in **Table G-1**. The low and the high scenarios represent a reasonable range of costs for each type of interaction.⁶² For example, when the Service participates in technical assistance with a third party regarding a particular activity, the cost of the Service's effort is expected to be approximately \$260 to \$680. The cost of the third party's effort is expected to be approximately \$600 to \$1,500.⁶³
160. **Table G-3** and **G-4** display the estimates of total consultation costs associated with activities affecting the proposed critical habitat for vernal pool species. The cost estimates were calculated by multiplying the number of expected consultations or technical assistance calls (as described in **Chapters II and IV** and summarized in **Table G-2**) by the per effort cost of these actions. Based on this analysis, the upper-bound, undiscounted total administrative cost of consultations and technical assistance attributable to critical habitat designation for the vernal pool species is estimated to range from \$8.5 to \$18.5 million. Aside from biological assessment costs, the Service will incur costs ranging from \$2.3 million to \$5.8 million (undiscounted), and costs for other Federal agencies will range from \$3.5 to \$7.5 million (undiscounted). Aside from biological assessment costs, costs to the local governments in California and Oregon, private landowners, and private companies are estimated between \$2.7 million and \$5.1 million (undiscounted).
161. The cost of biological assessments may be borne by the Service when it consults on its own activities (e.g., management activities in national wildlife refuges), by the Action agency when there is no third party, and by the project applicant (a private company or landowner in most cases) in all other cases. **Table G-4** estimates that these groups will spend from \$1.5 to \$2.1 million (undiscounted) on biological assessments as a result of section 7 requirements.

⁶²One public comment suggested that the consultation cost for transportation projects appeared to be too high. However, the unit costs used in this analysis have been estimated with a national survey of work effort specific to each type of consultation activity. For a specific jurisdiction, these costs may appear high or low.

⁶³One public comment stated that the species survey costs paid by landowners who require Federal action for projects on their private land were not included in the analysis. These survey costs, however, are part of the a cost estimated for each Biological Assessment, and are correctly attributed to third parties. See **Table G-4** for details.

Table G-1
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Consultation and Technical Assistance Unit Costs [1]

Category	Technical Assistance		Informal Consultations		Formal Consultations	
	<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>
USFWS	\$260	\$680	\$1,000	\$3,100	\$3,100	\$6,100
Action Agency	\$0	\$0	\$1,300	\$3,900	\$3,900	\$6,500
Third Party	\$600	\$1,500	\$1,200	\$2,900	\$2,900	\$4,100
Biological Assessment	\$0	\$0	\$0	\$4,000	\$4,000	\$5,600

"Unit_Costs"

[1] A low to high cost range is specified for each action.

Table G-2
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Consultation and Technical Assistance Counts by Activity

Consultation Nexus		Consultation Descriptions					
Project Owner/Activity	Action Agency	Technical Assistance	Informal Consultations	Informals with 3rd Party [1]	Formal Consultations	Formals with 3rd Party [1]	Biological Assessments [2]
Department of Defense							
Base operations and training	DOD		52		31		31
Facilities construction	DOD				1		1
Base closure and re-use	DOD, BLM		40		41		41
State and Local Governments							
Runway extensions	FAA				4	4	4
Construction of high speed rail systems	FRRA				1	1	1
Construction of transit maintenance facilities	FTA				1	1	1
Construction and maintenance of state highways [3]	FHWA		400	400	9	18	9
Disaster response	FEMA				6	6	6
Public and Private Entities							
Discharge to US waters	EPA	8	3	1	3	1	3
Characterization and cleanup of contaminated sites	EPA	12			10	4	10
Public and Private Utilities; Energy Companies							
Operation of hydroelectric facilities	FERC	18	10				
Authorization to establish an interconnection	WAPA		4	4	5	5	5
Oil pipeline conversion	FERC	2	1				
Western Area Power Administration							
Maintenance of power lines	WAPA		4		4		4
Bureau of Reclamation							
Maintenance of water facility ROW	BOR		4				
Power plant construction	BOR				1		1
Water supply and delivery contracts	BOR		30		40		40
Native American Governments							
Fire protection	BIA				12	6	12
Casino construction	BIA				1	1	1
Private Landowners							
Land development	ACOE	394	473	473	158	158	158
Agricultural conversion	ACOE						
Fish and Wildlife Service							
National Wildlife Refuge operations	FWS				1		1
National Wildlife Refuge mosquito/weed control	FWS				10		10
Habitat Conservation Program [4]	FWS		11				
Forest Service							
Forestry research	USFS				2		2
Forest management	USFS		25		29		29
TOTAL		434	1,057	878	370	205	370

"Descriptions"

Sources: EPS interviews with action agencies, FWS consultation history databases.

[2] The costs of a biological assessment are borne by either the action agency or the third party. It is assumed that each reported biological assessment is a "Level 3" assessment, due to the presence of both plant and crustacean species and large land areas.

[1] The number reported in this column reflects the number of third parties participating across all consultations (for example, if there are three formal consultations and one third party, one third party is assumed to participate in ONE consultation of the three).

[3] Two third parties are assumed for each formal consultation: Caltrans, the state transportation agency, and the local government.

[4] These "consultations" are internal administrative reviews of one previous HCP and twenty ongoing HCPs. As internal consultations, the Action Agency also refers to the Service (Section 10 Branch).

Table G-3
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Consultation and Technical Assistance Cost by Activity and Party

Undiscounted

Consultation Nexus		Consultation Costs								
		Action Agency	Fish and Wildlife Service		Action Agency		Third Party		Total	
			Low	High	Low	High	Low	High	Low	High
Department of Defense										
Base operations and training	DOD	\$148,100	\$350,300	\$312,500	\$577,900	-	-	\$460,600	\$928,200	
Facilities construction	DOD	\$3,100	\$6,100	\$7,900	\$12,100	-	-	\$11,000	\$18,200	
Base closure and re-use	DOD, BLM	\$167,100	\$374,100	\$375,900	\$652,100	-	-	\$543,000	\$1,026,200	
State and Local Governments										
Runway extensions	FAA	\$12,400	\$24,400	\$15,600	\$26,000	\$27,600	\$38,800	\$55,600	\$89,200	
Construction of high speed rail systems	FRRRA	\$3,100	\$6,100	\$3,900	\$6,500	\$6,900	\$9,700	\$13,900	\$22,300	
Construction of transit maintenance facilities	FTA	\$3,100	\$6,100	\$3,900	\$6,500	\$6,900	\$9,700	\$13,900	\$22,300	
Construction and maintenance of state highways	FHWA	\$427,900	\$1,294,900	\$555,100	\$1,618,500	\$568,200	\$1,284,200	\$1,551,200	\$4,197,600	
Disaster response	FEMA	\$18,600	\$36,600	\$23,400	\$39,000	\$41,400	\$58,200	\$83,400	\$133,800	
Public and Private Entities										
Discharge to US waters	EPA	\$14,380	\$33,040	\$23,600	\$42,400	\$12,900	\$24,600	\$50,880	\$100,040	
Characterization and cleanup of contaminated sites	EPA	\$34,120	\$69,160	\$63,000	\$98,600	\$34,800	\$56,800	\$131,920	\$224,560	
Public and Private Utilities; Energy Companies										
Operation of hydroelectric facilities	FERC	\$14,680	\$43,240	\$13,000	\$39,000	\$10,800	\$27,000	\$38,480	\$109,240	
Authorization to establish an interconnection	WAPA	\$19,500	\$42,900	\$24,700	\$48,100	\$39,300	\$60,100	\$83,500	\$151,100	
Oil pipeline conversion	FERC	\$1,520	\$4,460	\$1,300	\$3,900	\$1,200	\$3,000	\$4,020	\$11,360	
Western Area Power Administration										
Maintenance of power lines	WAPA	\$16,400	\$36,800	\$36,800	\$64,000	-	-	\$53,200	\$100,800	
Bureau of Reclamation										
Maintenance of water facility ROW	BOR	\$4,000	\$12,400	\$5,200	\$15,600	-	-	\$9,200	\$28,000	
Power plant construction	BOR	\$3,100	\$6,100	\$7,900	\$12,100	-	-	\$11,000	\$18,200	
Water supply and delivery contracts	BOR	\$154,000	\$337,000	\$355,000	\$601,000	-	-	\$509,000	\$938,000	
Native American Governments										
Fire protection	BIA	\$37,200	\$73,200	\$70,800	\$111,600	\$41,400	\$58,200	\$149,400	\$243,000	
Casino construction	BIA	\$3,100	\$6,100	\$3,900	\$6,500	\$6,900	\$9,700	\$13,900	\$22,300	
Private Landowners										
Land development	ACOE	\$1,065,032	\$2,698,080	\$1,230,703	\$2,871,641	\$1,893,390	\$3,494,882	\$4,189,125	\$9,064,603	
Agricultural conversion	ACOE	-	-	-	-	-	-	-	-	
Fish and Wildlife Service										
National Wildlife Refuge operations	FWS	\$3,100	\$6,100	\$7,900	\$12,100	-	-	\$11,000	\$18,200	
National Wildlife Refuge mosquito/weed control	FWS	\$31,000	\$61,000	\$79,000	\$121,000	-	-	\$110,000	\$182,000	
Habitat Conservation Program	FWS	\$11,000	\$34,100	\$14,300	\$42,900	-	-	\$25,300	\$77,000	
Forest Service										
Forestry research	USFS	\$6,200	\$12,200	\$15,800	\$24,200	-	-	\$22,000	\$36,400	
Forest management	USFS	\$114,900	\$254,400	\$261,600	\$448,400	-	-	\$376,500	\$702,800	
TOTAL		\$2,316,632	\$5,828,880	\$3,512,703	\$7,501,641	\$2,691,690	\$5,134,882	\$8,521,025	\$18,465,403	

"Cost Totals"

Table G-4
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Consultation Costs and Technical Assistance Costs by Activity and Action

Undiscounted

Consultation Nexus		Consultation Costs									
Project Owner/Activity	Action Agency	Technical Assistance		Informal Consultations		Formal Consultations		Biological Assessments		Total	
		Low	High	Low	High	Low	High	Low	High	Low	High
Department of Defense											
Base operations and training	DOD	-	-	\$119,600	\$364,000	\$217,000	\$390,600	\$124,000	\$173,600	\$460,600	\$928,200
Facilities construction	DOD	-	-	-	-	\$7,000	\$12,600	\$4,000	\$5,600	\$11,000	\$18,200
Base closure and re-use	DOD	-	-	\$92,000	\$280,000	\$287,000	\$516,600	\$164,000	\$229,600	\$543,000	\$1,026,200
State and Local Governments											
Runway extensions	FAA	-	-	-	-	\$39,600	\$66,800	\$16,000	\$22,400	\$55,600	\$89,200
Construction of high speed rail systems	FRRRA	-	-	-	-	\$9,900	\$16,700	\$4,000	\$5,600	\$13,900	\$22,300
Construction of transit maintenance facilities	FTA	-	-	-	-	\$9,900	\$16,700	\$4,000	\$5,600	\$13,900	\$22,300
Construction and maintenance of state highways [3]	FHWA	-	-	\$1,400,000	\$3,960,000	\$115,200	\$187,200	\$36,000	\$50,400	\$1,551,200	\$4,197,600
Disaster response	FEMA	-	-	-	-	\$59,400	\$100,200	\$24,000	\$33,600	\$83,400	\$133,800
Public and Private Entities											
Discharge to US waters	EPA	\$6,880	\$17,440	\$8,100	\$23,900	\$23,900	\$41,900	\$12,000	\$16,800	\$50,880	\$100,040
Characterization and cleanup of contaminated sites	EPA	\$10,320	\$26,160	-	-	\$81,600	\$142,400	\$40,000	\$56,000	\$131,920	\$224,560
Public and Private Utilities; Energy Companies											
Operation of hydroelectric facilities	FERC	\$15,480	\$39,240	\$23,000	\$70,000	-	-	-	-	\$38,480	\$109,240
Authorization to establish an interconnection	WAPA	-	-	\$14,000	\$39,600	\$49,500	\$83,500	\$20,000	\$28,000	\$83,500	\$151,100
Oil pipeline conversion	FERC	\$1,720	\$4,360	\$2,300	\$7,000	-	-	-	-	\$4,020	\$11,360
Western Area Power Administration											
Maintenance of power lines	WAPA	-	-	\$9,200	\$28,000	\$28,000	\$50,400	\$16,000	\$22,400	\$53,200	\$100,800
Bureau of Reclamation											
Maintenance of water facility ROW	BOR	-	-	\$9,200	\$28,000	-	-	-	-	\$9,200	\$28,000
Power plant construction	BOR	-	-	-	-	\$7,000	\$12,600	\$4,000	\$5,600	\$11,000	\$18,200
Water supply and delivery contracts	BOR	-	-	\$69,000	\$210,000	\$280,000	\$504,000	\$160,000	\$224,000	\$509,000	\$938,000
Native American Governments											
Fire protection	BIA	-	-	-	-	\$101,400	\$175,800	\$48,000	\$67,200	\$149,400	\$243,000
Casino construction	BIA	-	-	-	-	\$9,900	\$16,700	\$4,000	\$5,600	\$13,900	\$22,300
Private Landowners											
Land development	ACOE	\$339,232	\$859,914	\$1,656,716	\$4,686,139	\$1,562,046	\$2,634,967	\$631,130	\$883,582	\$4,189,125	\$9,064,603
Agricultural conversion	ACOE	-	-	-	-	-	-	-	-	-	-
Fish and Wildlife Service											
National Wildlife Refuge operations	FWS	-	-	-	-	\$7,000	\$12,600	\$4,000	\$5,600	\$11,000	\$18,200
National Wildlife Refuge mosquito/weed control	FWS	-	-	-	-	\$70,000	\$126,000	\$40,000	\$56,000	\$110,000	\$182,000
Habitat Conservation Program [4]	FWS	-	-	\$25,300	\$77,000	-	-	-	-	\$25,300	\$77,000
Forest Service											
Forestry research	USFS	-	-	-	-	\$14,000	\$25,200	\$8,000	\$11,200	\$22,000	\$36,400
Forest management	USFS	-	-	\$57,500	\$175,000	\$203,000	\$365,400	\$116,000	\$162,400	\$376,500	\$702,800
TOTAL		\$373,632	\$947,114	\$3,485,916	\$9,948,639	\$3,182,346	\$5,498,867	\$1,479,130	\$2,070,782	\$8,521,025	\$18,465,403

"Totals"

APPENDIX H: USE OF A SINGLE DISCOUNT RATE

162. This appendix calculates the summary results of this analysis using a single discount rate in place of a differentiated discount rate that is applied to private sector, public sector and consumer regulatory impacts. Assuming the same per unit impacts from the Executive Summary section, a single discount rate of 7 percent was applied to the 20 years of total regulatory impacts. This alternative discounting exercise results in increased impacts from affected activities in the private sector, previously discounted at 12 percent, and decreased impacts from consumer surplus losses discount rates, previously discounted at 3 percent. Impacts from public sector activities remain unchanged because the previous discount rate is unchanged at 7 percent.
163. As shown in **Tables H-1** and **H-2**, the uniform discount rate analysis yields the following results:
- Total 20-year impacts from the designation are estimated at \$1.4 billion, nearly unchanged from the differentiated discount rate approach used in the Executive Summary;
 - Annual impacts associated with the designation, excluding time-delay costs that occur only in the first year, are estimated at \$55 million, also unchanged from the approach used in the Executive Summary section; and
 - Total 20-year administrative costs, project modification costs, and consumer surplus losses for private land development activities that are attributable only to critical habitat designation (excluding section 7 impacts attributable to the listing of the plants and crustaceans) are estimated at \$214 million, a \$19 million increase over the method used in the Executive Summary.

Table H-1
U.S. Fish and Wildlife Service
Vernal Pool Species Critical Habitat Designation Final Economic Analysis
Total Section 7 and Indirect Costs by Affected Party and Activity [1]

Affected Party/Activity	Action Agency	Administrative Costs [2]		Project Modification Costs [3]	Consumer Surplus Losses and Other Costs [4]	TOTAL COST	
		Low	High			Low	High
Department of Defense							
Base operations and training	DOD	\$261,059	\$526,085	\$1,331,932	-	\$1,592,991	\$1,858,017
Facilities construction	DOD	\$6,235	\$10,315	-	-	\$6,235	\$10,315
Base closure and re-use	DOD	\$307,761	\$581,629	\$283,390	-	\$591,151	\$865,019
State and Local Governments							
Runway extensions	FAA	\$31,513	\$50,557	\$1,054,210	-	\$1,085,723	\$1,104,767
Construction of high speed rail systems	FRRRA	\$7,878	\$12,639	-	-	\$7,878	\$12,639
Construction of transit maintenance facilities	FTA	\$7,878	\$12,639	-	-	\$7,878	\$12,639
Construction and maintenance of state highways	FHWA	\$879,189	\$2,379,115	\$433,020	-	\$1,312,209	\$2,812,134
Disaster response	FEMA	\$47,269	\$75,835	-	-	\$47,269	\$75,835
Public and Private Entities							
Discharge to US waters	EPA	\$28,838	\$56,701	-	-	\$28,838	\$56,701
Characterization and cleanup of contaminated sites	EPA	\$74,770	\$127,276	-	-	\$74,770	\$127,276
Public and Private Utilities; Energy Companies							
Operation of hydroelectric facilities	FERC	\$21,810	\$61,915	-	-	\$21,810	\$61,915
Authorization to establish an interconnection	WAPA	\$47,326	\$85,640	-	-	\$47,326	\$85,640
Oil pipeline conversion	FERC	\$2,278	\$6,439	-	-	\$2,278	\$6,439
Western Area Power Administration							
Maintenance of power lines	WAPA	\$30,153	\$57,131	-	-	\$30,153	\$57,131
Bureau of Reclamation							
Maintenance of water facility ROW	BOR	\$5,214	\$15,870	-	-	\$5,214	\$15,870
Power plant construction	BOR	\$6,235	\$10,315	-	-	\$6,235	\$10,315
Water supply and delivery contracts	BOR	\$288,491	\$531,639	-	-	\$288,491	\$531,639
Native American Governments							
Fire protection	BIA	\$84,677	\$137,727	\$230,113	-	\$314,789	\$367,840
Casino construction	BIA	\$7,878	\$12,639	\$487,431	-	\$495,309	\$500,070
Private Landowners							
Land development	ACOE	\$2,374,311	\$5,137,633	\$770,901,385	\$118,674,907	\$891,950,603	\$894,713,925
Agricultural conversion	ACOE	-	-	-	-	-	-
Consumers							
Land development	ACOE	-	-	-	\$544,279,581	\$544,279,581	\$544,279,581
Fish and Wildlife Service							
National Wildlife Refuge operations	FWS	\$6,235	\$10,315	-	-	\$6,235	\$10,315
National Wildlife Refuge mosquito/weed control	FWS	\$62,346	\$103,154	-	-	\$62,346	\$103,154
Habitat Conservation Program	FWS	\$14,340	\$43,642	-	-	\$14,340	\$43,642
Forest Service							
Forestry research	USFS	\$12,469	\$20,631	-	-	\$12,469	\$20,631
Forest management	USFS	\$213,393	\$398,333	\$144,529	-	\$357,921	\$542,862
20 YEAR TOTAL		\$4,829,544	\$10,465,817	\$774,866,009	\$662,954,488	\$1,442,650,041	\$1,448,286,314
ANNUALIZED TOTAL [5]		\$426,100	\$923,300	\$68,356,900	\$54,868,100	\$123,651,100	\$124,148,300

"All_Sect_7"

- [1] Assumes an annual discount rate of 7% for all costs/losses.
[2] Administrative costs include technical assistance, informal consultations, formal consultations, and biological assessments.
[3] Some activities of federal agencies have zero projection modification costs.
[4] Other category includes costs related to project time delays, regulatory uncertainty, and CEQA.
[5] Excludes first year time delay effects. All other impacts occur over a 20 year period. Values are rounded to nearest hundreded dollars.

Table H-2
U.S. Fish and Wildlife Service
Vernal Pools Species Critical Habitat Designation Final Economic Analysis
Portion of Private Land Development Costs and Consumer Surplus Losses Attributable to Critical Habitat [1] [2]

ID	Region or County	Total Costs Attributable to Critical Habitat	Total Costs Attributable to Section 7			
			Administration Costs		Land Value and Consumer Surplus Losses	Total [3]
			<i>Low</i>	<i>High</i>		
San Francisco Bay Area						
1	Alameda	\$73,669,500	\$74,362	\$160,909	\$81,737,407	\$81,855,000
2	Contra Costa	\$2,700	\$0	\$57	\$3,004	\$3,000
3	Napa	\$0	\$11,562	\$24,995	\$3,296,788	\$3,315,100
4	Solano	\$140,689,100	\$260,492	\$563,719	\$319,335,875	\$319,748,000
	Subtotal	\$214,361,300	\$346,416	\$749,680	\$404,373,074	\$404,921,100
San Joaquin Valley Region						
5	Fresno	\$0	\$77,989	\$168,787	\$4,977,857	\$5,101,200
6	Kings	\$0	\$57	\$113	\$2,380	\$2,500
7	Madera	\$0	\$614,673	\$1,330,062	\$32,135,109	\$33,107,500
8	Merced	\$0	\$181,653	\$393,062	\$123,502,954	\$123,790,300
9	San Joaquin	\$0	\$0	\$0	\$0	\$0
10	Stanislaus	\$0	\$0	\$0	\$0	\$0
11	Tulare	\$0	\$9,805	\$21,198	\$579,646	\$595,100
	Subtotal	\$0	\$884,176	\$1,913,222	\$161,197,946	\$162,596,600
Mountain Region						
12	Lassen	\$0	\$0	\$0	\$0	\$0
13	Modoc	\$0	\$0	\$0	\$0	\$0
14	Plumas	\$0	\$24,372	\$52,711	\$1,404,480	\$1,443,000
15	Siskiyou	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$24,372	\$52,711	\$1,404,480	\$1,443,000
Upper Sacramento Valley Region						
16	Butte	\$0	\$150,820	\$326,408	\$86,393,049	\$86,631,700
17	Colusa	\$0	\$52,087	\$112,732	\$4,124,570	\$4,207,000
18	Glenn	\$0	\$0	\$0	\$0	\$0
19	Shasta	\$0	\$99,016	\$214,186	\$7,839,244	\$7,995,800
20	Tehama	\$0	\$4,988	\$10,769	\$1,106,184	\$1,114,100
	Subtotal	\$0	\$306,911	\$664,096	\$99,463,047	\$99,948,600
Sacramento Valley Region						
21	Placer	\$0	\$285,940	\$618,697	\$39,331,115	\$39,783,400
22	Sacramento	\$0	\$215,943	\$467,253	\$586,079,163	\$586,420,800
23	Yolo	\$0	\$0	\$0	\$0	\$0
24	Yuba	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$501,883	\$1,085,950	\$625,410,278	\$626,204,200
Northern Coast Region						
25	Lake	\$0	\$0	\$0	\$0	\$0
26	Mendocino	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$0	\$0	\$0	\$0
Central Coast Region						
27	Monterey	\$0	\$33,213	\$71,868	\$7,561,182	\$7,613,700
28	San Luis Obispo	\$0	\$64,840	\$140,335	\$9,472,477	\$9,575,100
29	San Benito	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$98,053	\$212,202	\$17,033,659	\$17,188,800

Table H-2
U.S. Fish and Wildlife Service
Vernal Pools Species Critical Habitat Designation Final Economic Analysis
Portion of Private Land Development Costs and Consumer Surplus Losses Attributable to Critical Habitat [1] [2]

ID	Region or County	Total Costs Attributable to Critical Habitat	Total Costs Attributable to Section 7			
			Administration Costs		Land Value and Consumer Surplus Losses	Total [3]
			<i>Low</i>	<i>High</i>		
	Sierra Nevada Foothills Region					
30	Amador	\$0	\$0	\$0	\$0	\$0
31	Calaveras	\$0	\$0	\$0	\$0	\$0
32	Mariposa	\$0	\$0	\$0	\$0	\$0
33	Tuolumne	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$0	\$0	\$0	\$0
	Jackson County, Oregon					
34	Jackson	\$0	\$51,747	\$111,939	\$4,732,271	\$4,814,100
	Southern California					
35	Riverside	\$0	\$173,831	\$376,172	\$1,566,183	\$1,841,200
36	Santa Barbara	\$0	\$0	\$0	\$0	\$0
37	Ventura	\$0	\$0	\$0	\$0	\$0
	Subtotal	\$0	\$173,831	\$376,172	\$1,566,183	\$1,841,200
TOTAL [4]		\$214,361,300	\$1,752,300	\$3,791,600	\$1,315,180,900	\$1,317,952,900
37 COUNTY AREA ANNUALIZED COST [4]		\$18,910,500	\$154,600	\$334,500	\$116,022,200	\$116,266,800

"CH_Portion"

Source: Table 16

[1] Assumes an annual discount rate of 7% for all costs/losses.

[2] Outside of land development activities, there is not likely to be additional cost attributable solely to critical habitat designation.

[3] Reflects the average of the low and high range of consultation costs. Does not include indirect cost effects (time delay, uncertainty, and CEQA).

[4] Costs for Private Land Development only. Totals/Annualized Costs may not equal the sum of the county costs due to rounding.

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