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Draft Economic Analysis of Critical Habitat Designation for the Buena Vista Lake Shrew

Prepared for:

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

Prepared by:

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A Division of ENTRIX, Inc.
Vancouver, Washington**

October 18, 2004

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This report addresses the potential economic effects associated with the proposed designation of critical habitat for the Buena Vista Lake shrew (*Sorex ornatus relictus*, hereafter “BVLS”). The BVLS is one of nine subspecies of ornate shrew. The species is insectivorous and is about the size of a mouse. Coloration varies from black or brown to grey, and the BVLS have long pointed snouts. The BVLS inhabits riparian woodland. The purpose of this report is to quantify the economic costs of the critical habitat designation (CHD), as well as protective activities that aid conservation of the species within the specific areas designated as critical habitat. Economic costs are measured here in terms of the impacts of the listing and the CHD on the efficient use of society’s resources, as well as how those costs are distributed across segments of society. This analysis is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation (avoided costs) outweigh the biological benefits of including those areas in a final designation.

The BVLS was proposed for listing by the Service as endangered under the Endangered Species Act of 1973 (the Act) on June 1, 2000.¹ Several organizations in Kern County filed a lawsuit following the listing of the BVLS by the Service. The Service entered into a consent decree for settlement and was required to make final listing decisions for several species, including the BVLS, by March 1, 2002. The final rule listing the BVLS as endangered was published in the March 6, 2002, edition of the Federal Register with an effective date of April 5, 2002.² The final rule incorporated information regarding species distribution, status, and threats obtained after publication of the proposed rule. The proposed rule designating critical habitat was published August 19, 2004.³

DESIGNATED CRITICAL HABITAT

The Service has proposed five critical habitat units (CHUs) for the BVLS, all in Kern County, California, covering a total of 4,649 acres. These include Kern Lake Preserve, Kern Fan Water Recharge, Goose Lake, Coles Levee, and Kern National Wildlife Refuge. The largest CHU is in the Kern Fan Recharge area at 2,682 acres, and the smallest is in the Kern Lake Preserve at 90 acres (see Map 1 in the Map Attachment).

The Service reports that the preferred habitat for the BVLS are areas in and adjacent to riparian and wetland edge areas which have vegetation that provides cover, which in turn offers moist soils that

¹ U.S. Fish and Wildlife Service, June 1, 2000, “Proposed Endangered Status for the Buena Vista Lake Shrew, Proposed Rule,” *Federal Register*, Vol. 65, No. 106, pp. 35033-35040.

² U.S. Fish and Wildlife Service, March 6, 2002, “Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule,” *Federal Register*, Vol. 67, No. 44, pp. 10101-10113.

³ U.S. Fish and Wildlife Service, August 19, 2004, “Proposed Designation of Critical Habitat for the Buena Vista Lake Shrew, Proposed Rule,” *Federal Register*, Vol. 69, No. 160, pp. 51417-51442.

support a variety of prey.⁴ The Service has determined that the BVLS requires three primary constituent elements (PCEs):

- Riparian or wetland communities supporting a complex vegetative structure with a thick cover of leaf litter or dense mats of low-lying vegetation;
- Suitable moisture supplied by a shallow water table, irrigation, or proximity to permanent or semi-permanent water; and
- A consistent and diverse supply of prey.⁵

The five proposed CHUs are considered by the Service to be essential to the conservation of the BVLS because all are reported to contain wetland and/or riparian habitat and are located within the historical range of the BVLS.⁶ Most locations supporting the BVLS are on private land and are reported to be susceptible to variations in water supplies that maintain current habitat.⁷

KEY FINDINGS

RETROSPECTIVE COSTS

Retrospective effects include those that have occurred since the time that the BVLS was listed as endangered but prior to designation of critical habitat. Few retrospective costs have been incurred since the listing of the BVLS in April 2002. None of the proposed critical habitat areas are included in active or completed habitat conservation plans (HCPs). The Kern Fan Recharge CHU is adjacent to the Kern Water Bank, which is covered by the operative Kern Water Bank HCP. That HCP was completed prior to the listing of the BVLS and has not been updated to include the BVLS. A formal section 7 consultation is underway for the proposed Goose Lake CHU. At the Kern National Wildlife Refuge (KNWR), a Comprehensive Conservation Plan (CCP) was in development for several years prior to the listing of the BVLS and was completed in September 2004. In none of the areas around the proposed CHUs, however, has the listing of the BVLS had evident effect on historical land use patterns. As such, retrospective costs include only certain administrative costs associated with the ongoing preparation of a Comprehensive Conservation Plan at the KNWR CHU and the ongoing section 7 consultation related to HCP preparation at the Goose Lake proposed CHU.

⁴ Ibid., p. 51421.

⁵ Ibid., p. 51422.

⁶ Ibid., p. 51421.

⁷ Ibid., p. 51422.

PROSPECTIVE COSTS

Prospective effects include costs associated with BVLS conservation activities anticipated through 2024. This prospective analysis attempts to forecast the costs of conservation activities likely to occur within the proposed designation. This forecast is difficult to develop, as no section 7 consultations have been completed since the listing in 2002. In addition, no identifiable changes in economic activities resulting from BVLS conservation efforts have taken place since the listing. The proposed rule, however, does outline potential threats related to certain economic activities, including primarily agricultural practices and water management. In addition, parties involved in litigation related to the listing of the species expressed concern about how the listing could affect a number of sectors within the regional economy.

Therefore, the prospective costs presented herein reflect, where data permit, ranges representing the reasonably foreseeable future. The primary prospective costs that are likely to be incurred because of BVLS conservation activities relate to agriculture, operation and maintenance of groundwater recharge projects and resultant effects on water supplies, and water requirements for habitat. In addition, other potential impact categories are identified and discussed qualitatively. An important goal of the report is to provide a reasonable basis for comment on whether the quantified effects are appropriately captured, and whether other economic activities may also be burdened by BVLS conservation efforts.

EFFECTS ON AGRICULTURE

There is no cultivated farmland within the boundaries of the proposed designation. In addition, it is uncertain whether farmers with cropland adjacent or proximate to critical habitat may be required to alter their farming practices as a result of BVLS conservation requirements. One possible outcome is that these farmers would implement certain protective measures to avoid incidental take of the species and mitigate potential effects of their pesticide use practices. Specifically, the scenario developed in this report considers that farmers would establish buffer zones along the affected margins of their fields. These buffer zones were assumed to be 45 feet wide. Based on site visits, land use maps, and Kern County cropping data, it was determined that three of the proposed CHUs (Kern Lake, Kern Fan Water Recharge, and Goose Lake) have adjacent cropland. When aggregated for the three proposed CHUs, these buffers would remove from production the equivalent of 15.9 acres of field crops, 6.3 acres of vegetables, 2.7 acres of permanent crops, and 6.4 acres of hay, or a total of 31.3 acres. The annual loss from foregone crop production, measured as gross revenue less variable costs and rent, would be \$14,800.⁸ The annual costs for establishing buffer zones and the annual cultural costs associated with the zones would be \$14,400 for the five CHUs. The total annual costs attributable to the buffer zones,

⁸ Gross revenues (measured as the product of yield per acre and price per unit of crop) less variable costs less rent (or rent equivalent) is a measure of the income which landowners would forego by removing land from production. When agricultural land is removed from production, the owner loses the crop revenue which would have been forthcoming from the land had it remained in production. Once the land is removed from production, however, such typical operating costs as seed, fertilizer, and chemicals need not be incurred for that land. In addition, the owner loses the rent or rent equivalent from the land. Thus, the efficiency loss when land is taken out of production is measured as gross revenue less variable costs and rent.

including the annual loss from foregone crop production, would be \$29,265. The largest effect would be \$13,100 for the Kern Fan Water Recharge CHU, with \$11,000 for the Goose Lake CHU, and \$5,200 for the Kern Lake CHU.

OTHER PROJECT MODIFICATION EFFECTS

Goose Lake CHU

A formal section 7 consultation was begun at the Goose Lake CHU in 2002.⁹ A draft biological opinion (BO) has been issued. Annual prospective costs for the Goose Lake CHU, including issuance of a final BO and monitoring, all attributable to the BVLS, include \$400 to the Service and \$1,525 to non-Federal parties. In addition, the proposed Goose Lake CHU includes about one-half mile of canal and adjacent maintenance roads on both side of the canal. The Semitropic Water Storage District (SWSD) estimates that there is increased diligence and maintenance expense. Thus, annual SWSD costs attributable specifically to the BVLS would be \$1,250.

Kern Fan Water Recharge CHU

The Kern Fan Water Recharge CHU is moist an average of two months per year across all water year types. In some years, particularly dry years, there may be no water recharged.¹⁰ While the Service has indicated that the presence of open water does not appear to be necessary for the survival of the BVLS, it also indicates that the availability of water contributes to improved vegetation structure and diversity. Those improve cover availability, and the presence of water attracts potential prey species for the BVLS.¹¹ Because the BVLS currently lives in this CHU as it is currently operated, it is uncertain whether supplemental water would be required to conserve the species. Therefore, this report provides a cost range that is bounded with and without supplemental water for the Kern Fan Water Recharge CHU. If supplemental water is pumped ten months of the year from groundwater for 2,682 acres (10,996 acre-foot), the annual cost is estimated to be \$481,058. This amounts to a present value of \$7.2 million when using a three percent discount rate, and \$5.1 million when using a seven percent rate.

Kern National Wildlife Refuge CHU

The Service noted in the final rule listing the BVLS as endangered that the KNWR has been managed primarily for waterfowl and that it received at that time some water from Poso Creek as well as through purchases from willing sellers via the Goose Lake canal. The Service also noted that adequate water to

⁹ Personal communication with Waring Laurendine, Quad Knopf, Inc., October 7, 2004.

¹⁰ Personal communication with Robert Kunde, Wheeler Ridge-Maricopa Water Storage District, July 1, 2004.

¹¹ U.S. Fish and Wildlife Service, August 19, 2004, "Proposed Designation of Critical Habitat for the Buena Vista Lake Shrew, Proposed Rule," *Federal Register*, Vol. 69, No. 160, p. 51421.

meet the needs of all KNWR wildlife has not always been available, and that without full deliveries of water to the Refuge the continued existence of the BVLS is not assured. Since 2000, the U.S. Bureau of Reclamation has attempted to provide KNWR with a more reliable and consistent water supply in order to maintain wetland habitat for waterfowl and other wildlife, including the BVLS.¹²

The Service has indicated that KNWR would need about 3.5 acre-feet (AF) per acre for optimal management of habitat.¹³ For this analysis, therefore, it is assumed that the 387 acres in the KNWR proposed CHU would require a total of 1,355 AF of supplemental water per year. The annual cost associated with providing this supplemental water, based on the water's value, is \$283,200. This amounts to a present value of \$4.2 million when using a three percent discount rate, and \$3.0 million when using a seven percent rate.

Coles Levee CHU

The Coles Levee CHU is in an area surrounded by oil and gas wells; oil, gas, and water pipelines; and related infrastructure. Although no wells are located within the CHU, access roads and pipelines cross it. Past practices indicate that as long as access roads have been developed for these facilities and that the roads would not be considered critical habitat, the designation of habitat would have no impact on the operation of those facilities. In addition, it is difficult with available information to assess whether impacts from BVLS conservation efforts will be engendered in the future. For example, to the extent that these operations expand into critical habitat, it is unclear how or whether these expansions would be constrained. There are currently no wells in critical habitat, and no plans to add new pipelines.

A multi-species HCP for the area, completed prior to the listing of the BVLS, expired several years ago. Currently, the new owners and operators are considering development of a new HCP or updating the previous HCP. Should a new HCP be developed, the cost is expected to be approximately \$750,000 based on other completed HCPs and industry contacts. Assuming the permit will extend 20 years and cover eight Federally listed species, annual cost would be \$37,500, of which a pro rata share of \$4,688 could be assumed allocable to the BVLS.

Kern Lake Preserve CHU

Moisture for BVLS habitat in the Kern Lake Preserve CHU presently comes from precipitation and agricultural runoff from the New Rim ditch. The Service reported in 2002 that absent a dependable water supply to maintain wetlands in the Kern Lake Preserve, the continued existence of the BVLS was unlikely. However, because the BVLS currently lives in this CHU as it is currently operated, it is uncertain whether supplemental water would be required to conserve the species. Therefore, this report

¹² U.S. Fish and Wildlife Service, March 6, 2002, "Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule," *Federal Register*, Vol. 67, No. 44, p. 10106.

¹³ Personal communication with Service Manager, Kern National Wildlife Refuge, June 8, 2004.

provides a cost range that is bounded with and without supplemental water for the Kern Lake Preserve CHU. If the estimated 20 acre-feet¹⁴ of supplemental water were purchased from willing sellers, the annual cost is estimated to be \$4,180.

DISTRIBUTIONAL EFFECTS

Based on the quantified impact figures, the distributional (secondary and regional) effects of BVLS conservation efforts are likely to be limited. For example, the annual value of agricultural production, both crop and livestock, at the farm gate in Kern County exceeds \$2.4 billion. In contrast, the annual loss of \$50,000 of gross crop value from land dedicated to buffer zones for the BVLS would be less than 0.003 percent of total agricultural output and would likely have effects too small to measure on such entities as farm labor, suppliers of such purchased inputs as seed and chemicals, and financial institutions. Moreover, establishment and maintenance of the buffer zones are likely to require various types of inputs, including labor, trees, chemicals, and custom services, the purchases of which may partially offset the direct and indirect reduction in crop output.

Similarly, the distributional effects on non-agricultural entities are apt to be minimal. The expected cost of pumping groundwater for habitat wetting at the Kern River Fan Recharge CHU is attributable to the BVLS as a cost that would not otherwise be incurred. Regionally, however, the impacts of these outlays are expected to be minimal. Most of the outlays for pumping groundwater would circulate among sectors in the local economy.

FEDERAL AND NON-FEDERAL COSTS ATTRIBUTABLE TO THE BVLS

RETROSPECTIVE COSTS

Table ES-1 shows the estimated retrospective costs at the Federal and non-Federal levels of BVLS conservation measures, by CHU. “Non-Federal” includes private entities, State, water districts, and local and regional governments. These include Federal agency costs for section 7 consultations, research and monitoring of sites, a conservation plan, and a biological opinion; and non-Federal costs for a biological assessment and for an ongoing HCP.

¹⁴ U.S. Fish and Wildlife Service, March 6, 2002, “Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule,” *Federal Register*, Vol. 67, No. 44, p. 10106.

Table ES-1
Total Retrospective Federal and Non-Federal Costs
Attributable to the BVLS, by CHU (2004 \$)

CHU	Federal	Non-Federal	Total
Kern Lake	\$3,540	\$3,214	\$6,754
Kern Fan Water Recharge	\$3,540	\$3,214	\$6,754
Goose Lake	\$24,000	\$58,214	\$72,214
Kern NWR	\$16,545	\$3,214	\$19,759
Coles Levee	\$3,540	\$3,214	\$6,754
Total	\$51,165	\$71,071	\$122,237

Note: Numbers may not sum due to rounding.

PROSPECTIVE COSTS

Table ES-2 shows the estimated average annual and present value of prospective costs at the Federal and non-Federal levels BVLS conservation measures, by CHU. These costs include effects on agricultural producers on three CHUs, biological monitoring, HCP development, and supplemental water purchases. The ranges shown for Kern Lake, Coles Levee, and Kern Fan Water Recharge CHUs reflect totals with and without supplemental water. Both the KNWR and Goose Lake CHUs are assumed to require supplemental water, and thus are not shown as a range. Present values shown are calculated at three and seven percent discount rates. Total prospective costs range from \$6.7 to \$14.2 million under a three percent discount rate, and \$4.8 to \$10.1 million under a seven percent rate.

The largest effects are expected to be for the Kern Fan Water Recharge CHU, followed by the KNWR CHU. The large range of costs for the Kern Fan Water Recharge CHU is a reflection of the “with” and “without” supplemental water scenarios.

Table ES-2
Annual and Total Prospective Federal and Non-Federal Costs
Attributable to the BVLS, by CHU

CHU	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Kern National Wildlife Refuge	\$19,760	\$4,213,598	\$3,000,437	\$283,220
Goose Lake	\$82,214	\$1,839,234	\$1,309,690	\$123,625
Kern Lake	\$6,754	\$130,210- \$192,398	\$92,720- \$137,003	\$8,752- \$12,932
Coles Levee	\$6,754	\$297,981- \$570,675	\$212,188- \$406,368	\$20,029- \$38,358
Kern Fan Water Recharge	\$6,754	\$247,551- \$7,404,479	\$176,277- \$5,272,612	\$16,639- \$497,697
TOTAL	\$122,237	\$6,728,574- \$14,220,384	\$4,791,311- \$10,126,110	\$452,266- \$955,833

Note: Numbers may not sum due to rounding.

Table ES-3 shows the estimated retrospective and annual and present value of prospective costs at the Federal and private levels, by category of impact. Present values shown are calculated at three and seven percent discount rates. The largest private impacts are expected to be for agriculture. The largest Federal impacts are for surface water purchases for the KNWR CHU.

Table ES-3
Annual and Total Prospective Federal and Non-Federal Costs
Attributable to the BVLS, by Category of Impact

Category of Impact	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Non-Federal:				
Agriculture	\$0	\$435,396	\$310,039	\$29,265
Goose Lake BO	\$55,000	\$22,688	\$16,156	\$1,525
Goose Lake Canal Maint.	\$0	\$18,597	\$13,243	\$1,250
Coles Levee HCP	\$0	\$291,018	\$207,230	\$19,561
Kern Valley Floor HCP	\$16,071	\$1,860	\$1,324	\$125
Total Non-Federal	\$71,071	\$769,559	\$547,991	\$51,726
Federal Agencies:				
Consultations	\$51,165	\$117,711	\$83,820	\$7,912
Supplemental Water	\$0	\$5,841,304- \$13,333,114	\$4,159,500- \$9,494,299	\$392,627- \$896,195
Total Federal	\$51,165	\$5,847,092- \$13,450,825	\$4,163,621- \$9,578,119	\$393,016- \$904,107
TOTAL	\$122,237	\$6,728,574- \$14,220,384	\$4,791,311- \$10,126,110	\$452,266- \$955,833

Note: Numbers may not sum due to rounding.

CAVEATS AND ASSUMPTIONS

The assumptions presented here include only those which apply in general to all areas included in the analysis. These general caveats describe factors that introduce uncertainty into the results of this analysis. The Service therefore solicits from the public further information on any of the issues presented in the discussions and tables of caveats. Additionally, information pertaining to the following questions is requested:

- Are data available to develop more accurate estimates of the number of future consultations, project modifications, and costs for the activities related to private lands?
- Are data available on additional land use practices, or current or planned activities in proposed critical habitat areas, that are not specifically or adequately addressed in this analysis?

- Are data available on additional co-extensive impacts (such as additional regulatory burdens from State or local laws triggered by the designation of critical habitat) that are not specifically or adequately addressed in this analysis?
- Are there water district canals that would be affected by incremental costs incurred for vegetation control as a result of conservation activities for the BVLS, and if so, what are the length of the affected area and the nature of those costs?
- Are there data available that help to determine whether there are effects on upstream water users in the Kern River, above the Kern Fan Water Recharge CHU?

This report addresses the economic effects of activities associated with the listing and designation of critical habitat for the Buena Vista Lake shrew (*Sorex ornatus relictus*, hereafter “BVLS”). The analysis attempts to quantify the economic effects of the designation of critical habitat, as well as the economic effects of the protective measures taken as a result of the listing of the BVLS or other Federal, State, and local laws that also afford protection to habitat in the areas proposed for designation. Because all BVLS-related species and habitat protection efforts likely contribute to the efficacy of the proposed BVLS critical habitat designation (CHD), the impacts of these actions may be considered relevant for understanding the full impact of proposed CHD. Costs are examined that (a) have been incurred since the date the species was listed as endangered (retrospective costs), and (b) are forecast to occur after the designation is finalized (prospective costs).

This information is intended to assist the Secretary in determining whether the benefits (avoided costs) of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.¹⁵ 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).¹⁶ This report also complies with direction from the U.S. 10th Circuit Court of Appeals that “co-extensive” effects should be included in the economic analysis to inform decision-makers regarding which areas to designate as critical habitat.¹⁷

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

¹⁵ 16 U.S.C. §1533(b)(2).

¹⁶ Executive Order 12866, September 30, 1993, “Regulatory Planning and Review;” Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use;” 5. U.S.C. §§601 *et seq.*; and Pub. Law No. 104-121.

¹⁷ In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass’n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

1.1 APPROACH TO ESTIMATING ECONOMIC EFFECTS

This economic analysis considers both the economic efficiency and distributional effects that may result from species and habitat protection (hereinafter referred to as “conservation activities”). Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities on private lands are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of conservation activities.

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

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

1.1.1 EFFICIENCY EFFECTS

At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 “Regulatory Planning and Review,” Federal agencies measure changes in economic efficiency in order to discern the implications on a societal level of a regulatory action. For regulations specific to the conservation of the BVLS and its habitat, efficiency effects represent the opportunity cost of resources used, or benefits foregone, by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surplus in affected markets.¹⁸

¹⁸ For additional information on the definition of “surplus” and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., 1990, *A Guide to Benefit-Cost Analysis* (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc.; and U.S. Environmental Protection Agency, September 2000, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

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

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

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

1.1.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

Measurements of changes in economic efficiency focus on the net impact of conservation activities, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.¹⁹ This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; 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.

¹⁹ U.S. Office of Management and Budget, September 17, 2003, "Circular A-4," <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

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

This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, may be affected by future BVLS conservation activities.²⁰ In addition, in response to Executive Order 13211 “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” this analysis considers the impacts of conservation activities on the energy industry and its customers.²¹ While small business impacts are discussed, significant impacts on the energy sector are not expected. See Appendix A for an analysis of impacts to small businesses and the energy industry.

1.1.2.2 Regional Economic Effects

Regional economic impact analysis includes various approaches to estimate the potential localized and distributive impacts of proposed conservation activities. Regional economic impact analysis is often based on input-output analysis, which enables the quantification of linkages among sectors of the economy and the tracing of effects on additional sectors resulting from a direct change to one sector. Regional economic impact analysis is discussed more fully in Section 2.2.3.

1.2 SCOPE OF THE ANALYSIS

This analysis attempts to quantify the economic effects of the designation of critical habitat, as well as any protective measures taken as a result of the listing or other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation. Habitat protection efforts undertaken to meet the requirements of other Federal, State, or local agencies can assist the Service in achieving its goals as set out in the Act. In certain cases, other government entities may work cooperatively with the Service to address natural resource management issues, thereby expediting the regulatory process for project proponents. Because conservation activities affording protection to the BVLS likely contribute to the efficacy of the CHD efforts, the impacts of these actions are considered relevant for understanding the full impact of CHD.

The following items are included in the economic analysis:

- Consistent with recent court rulings, the analysis includes impacts that occur co-extensively with the listing resulting from sections 4, 7, 9, or 10 of the Act. Enforcement actions taken in response to violations of the Act, however, are not included.
- The analysis considers conservation and protection activities for the BVLS. No distinction is made between impacts that occur due to listing and those that result from CHD.

²⁰ 5 U.S.C. § 601 *et seq.*

²¹ Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use.”

- Both retrospective and prospective costs are considered. Retrospective costs include those that have accrued since the time that the BVLS was listed as endangered but prior to designation of critical habitat. Prospective effects include likely future costs associated with BVLS conservation activities from the present to the year 2024.
- The geographic scope of the analysis reflects the five distinct areas inhabited by the BVLS that are currently designated as proposed critical habitat units (CHU): Kern Lake Preserve, Kern Fan Water Recharge, Goose Lake, Coles Levee, and Kern National Wildlife Refuge. The five areas are all located within Kern County, California.
- The geographic unit of analysis is the area defined by each CHU.
- The localized economic efficiency effects reflect the area specifically identified as critical habitat. However, activities occurring in adjacent land or beyond of the boundaries of each CHU with the potential to affect critical habitat, such as adjacent farm land, are also considered when appropriate. Thus, all relevant costs in adjacent areas may be included.
- This analysis utilizes a “with” and “without” framework, and emphasizes those effects that are determined to be attributable to BVLS conservation activities. Impacts that would have occurred without the BVLS listing and CHD are evaluated on a case-by-case basis to determine if they should be assigned, in part, to conservation activities for the BVLS.
- The period of analysis and discounting is guided by the availability of information concerning the start date and duration of the activity. Each potential cost component is examined over the time period that is appropriate for that specific activity or investment. Some of these are costs that are incurred one time only, while others are recurring. These costs are presented both as net present values and annualized costs, using three and seven percent discount rates.

1.2.1 SECTIONS OF THE ACT RELEVANT TO ECONOMIC ANALYSIS

The analysis begins by estimating retrospective costs incurred from the time that the BVLS was listed as endangered. It focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. It then looks at activities likely to occur in the foreseeable future, and quantifies the effects that sections 4, 7, 9, and 10 of the Act may have on those activities.

Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as the CHD. Pursuant to this section, the Secretary is required to determine if a species warrants listing as endangered or threatened “solely on the basis of the best scientific and commercial data available.”²² Under section 4(d) of the Act, the Service may write regulations to provide for the conservation of

²² 16 U.S.C. § 1533.

threatened species. The implementation of these regulations may have economic impacts on resource managers, landowners, and other relevant parties. However, there is no 4(d) rule in place for the BVLS, and thus 4(d) issues are not relevant to this analysis.

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

- Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action they authorize, fund, or carry out will not likely jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and CHD.
- Section 9 defines the actions that are prohibited by the Act, and in particular, prohibits the “take” of a listed species. The term “take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”²³ “Harm” in this passage is defined as “an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”²⁴ The economic impacts associated with this section manifest themselves in sections 7 and 10, though these impacts do not directly flow from or depend on the designation of critical habitat.
- Section 10 of the Act, in part, allows non-Federal entities (e.g., a landowner or local government) to develop and implement a habitat conservation plan (HCP) for the species in order to meet the conditions for issuance of an incidental take permit in connection with development and management of a property.²⁵ The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. These economic impacts do not directly flow from or depend on the designation of critical habitat; however, designation of critical habitat may influence the conservation measures provided under the conservation plans. Federal agencies do not develop HCPs, but instead obtain permission for incidental take through the section 7 consultation process.

²³ 16 U.S.C. § 1532.

²⁴ U.S. Fish and Wildlife Service, February 2004, “ESA Basics,” http://endangered.fws.gov/pubs/esa_basics.pdf.

²⁵ Ibid.

1.2.2 OTHER RELEVANT PROTECTION EFFORTS

The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction.²⁶ In addition, under certain circumstances, the CHD may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws.

1.2.3 ADDITIONAL ANALYTIC CONSIDERATIONS

Previous economic impact analyses prepared to support critical habitat decisions have considered other types of economic impacts related to conservation activities associated with CHD, including time delay, regulatory uncertainty, and stigma impacts. This analysis considers these types of economic impacts and has determined that the CHD for the BVLS is unlikely to have economic impacts of this nature.

1.2.4 BENEFITS

The published economics literature has documented that real social welfare benefits can result from conservation and recovery of endangered and threatened species. Such benefits have also been ascribed to preservation of open space and biodiversity, both of which can be associated with species conservation, but which are not the purpose of critical habitat. 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.

In Executive Order 12866, OMB directs Federal agencies to provide an assessment of costs and benefits of proposed regulatory actions.²⁷ In its guidance for implementing Executive Order 12866, however, OMB acknowledges that often, it may not be feasible to monetize, or even quantify, the benefits of environmental regulations.²⁸ Where benefits cannot be quantified, OMB directs agencies to describe the benefits of a proposed regulation qualitatively. *Given the limitations associated with estimating the benefits of critical habitat designation for the BVLS, the Service believes that the benefits of the proposed*

²⁶ For example, the Sikes Act Improvement Act (Sikes Act) of 1997 requires Department of Defense (DoD) military installations to develop Integrated Natural Resources Management Plans (INRMPs) that provide for the conservation, protection, and management of wildlife resources (16 U.S.C. 670a - 670o). These plans must integrate natural resource management with the other activities, such as training exercises, taking place at the facility.

²⁷ Executive Order 12866, September 30, 1993, "Regulatory Planning and Review."

²⁸ U.S. Office of Management and Budget, February 3, 2003, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," *Federal Register*, Vol. 68, No. 22, p. 5492; and U.S. Office of Management and Budget, March 22, 2000, "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*.

rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

1.3 ANALYTIC TIME FRAME

The analysis examines activities taking place both within and adjacent to the CHD, and considers activities that have occurred since the listing (2002) and prior to designation (2004), as well as activities anticipated to occur after designation. The analysis 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. The analysis estimates economic impacts to activities through 2024 (20 years from the year of final CHD). The analysis time frame is further discussed in Section 2.3, “Project Life, Period of Analysis, and Discount Rate.”

1.4 INFORMATION SOURCES

The analysis contained in this report is based on information collected from a wide range of sources. Numerous individuals were consulted within the Action agencies, including the Service and Federal Highway Administration. Many other individuals with local, State, and special districts were also contacted. Special districts included water agencies and districts: Kern County Water Agency, Wheeler Ridge-Maricopa Water Storage District, Semitropic Water Storage District, and Buena Vista Water Storage District. Kern County offices contacted include the Planning Department, Agricultural Commissioner, and Farm Advisor. California State agencies contacted included Department of Transportation (Caltrans), Department of Fish and Game (DFG), Department of Pesticide Regulation (DPR), and Water Resources Control Board. Legal counsel for the City of Bakersfield, Kern County Water Agency, and the Kern Water Bank Authority were also contacted.

Publicly available data from the U.S. Census Bureau, U.S. Department of Commerce, and California Employment Development Department were used to characterize the regional economy. Other publicly available documents consulted include Federal Register notices related to listing and CHD rules for the BVLS and the Service’s 1998 recovery plan for upland species of the San Joaquin Valley, which includes the BVLS. A full list of information sources is provided in the reference section at the end of this report.

1.5 BACKGROUND OF THE BVLS LISTING²⁹

The BVLS was included as a Category 2 candidate species in the September 18, 1985, Notice of Review.³⁰ The BVLS was proposed for listing by the Service as endangered under the Act on June 1,

²⁹ Details may be found in the final rule listing the BVLS as endangered: U.S. Fish and Wildlife Service, March 6, 2002, “Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule,” *Federal Register*, Vol. 67, No. 44, pp. 10101-10113.

2000.³¹ The final rule was delayed because insufficient funds were appropriated for listing action for the species in Fiscal Year 2001.

Several organizations in Kern County filed a lawsuit following the listing of the BVLS by the Service. The suit alleged that the listing violated several provisions of the Act, National Environmental Policy Act, Administrative Procedures Act, and Regulatory Flexibility Act.³² The plaintiffs allege that the listing could have serious impacts on delivering irrigation water, maintaining canals and reservoirs, growing crops, using pest control materials, harvesting, grazing, flood control, mosquito control, and groundwater recharge.

The Service entered into a consent decree for settlement of listing litigation with several parties on October 2, 2001. Under that decree, the Service was required to make final listing decisions for several species previously proposed for listing, including the BVLS, and to publish a final listing determination for the species by March 1, 2002. The final rule was published in the March 6, 2002, edition of the Federal Register with an effective date of April 5, 2002.³³ The final rule incorporated information regarding species distribution, status, and threats obtained after publication of the proposed rule. The proposed rule designating critical habitat was published August 19, 2004.³⁴

The recovery plan for the BVLS was included in a multi-species plan for upland species in the San Joaquin Valley of California.³⁵ Details on the recovery plan are included in Section 4.2.3 of this report.

1.6 BACKGROUND OF THE BVLS CRITICAL HABITAT DESIGNATION

The final rule to list the BVLS as endangered was published on March 6, 2002, and became effective April 5, 2002.³⁶ At the time, the listing of the BVLS was completed without designation of critical

³⁰ U.S. Fish and Wildlife Service, September 18, 1985, "Review of Vertebrate Wildlife, Notice of Review," *Federal Register*, Vol. 50, No. 181, pp. 37958-37967. Category 2 species were those for which the Service had information which indicated that a threatened or endangered classification might be appropriate, but for which sufficient data on biological vulnerability and threats were not available at that time to support such a listing.

³¹ U.S. Fish and Wildlife Service, June 1, 2000, "Proposed Endangered Status for the Buena Vista Lake Shrew, Proposed Rule," *Federal Register*, Vol. 65, No. 106, pp. 35033-35040.

³² California Farm Bureau Federation, April 10, 2002, "Listing of shrew prompts farm groups to file suit," *Ag Alert*, Sacramento.

³³ U.S. Fish and Wildlife Service, March 6, 2002, "Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule," *Federal Register*, Vol. 67, No. 44, pp. 10101-10113.

³⁴ U.S. Fish and Wildlife Service, August 19, 2004, "Proposed Designation of Critical Habitat for the Buena Vista Lake Shrew, Proposed Rule," *Federal Register*, Vol. 69, No. 160, pp. 51417-51442.

³⁵ U.S. Fish and Wildlife Service, 1998, "Recovery Plan for Upland Species of the San Joaquin Valley, California," Portland, Oregon.

habitat because the budget of the Service was limited.³⁷ The Service noted in the March 2002 final rule that it would prepare a CHD when available resources and priorities allowed it to do so. On January 12, 2004, the United States District Court for the Eastern District of California issued a Memorandum Opinion and Order which required the Service to publish a proposed CHD by July 12, 2004, with a final rule by January 12, 2005.

By Section 3(5)(a)(i) of the Act and regulations at 50 CFR 424.12, the Service is required to base CHD on the best scientific and commercial data available. Further, the Service is to consider physical and biological features, “primary constituent elements” (PCEs), essential to species conservation and which may require special management considerations and protection. Regarding the BVLS, the Service has determined that there are three PCEs, but that not all may be present in suitable habitat.³⁸ The first is riparian or wetland communities which support complex vegetative structures having a thick cover of leaf matter or dense mats of low-lying vegetation. The second is suitable moisture from a shallow water table, irrigation, or proximity to permanent or semi-permanent water. The third is a reliable, varied supply of prey.³⁹ The Service notes that all of the proposed CHUs contain extant occurrences of the BVLS and all contain the PCEs.⁴⁰

1.7 DESCRIPTION OF THE SPECIES AND HABITAT⁴¹

The BVLS is one of nine subspecies of ornate shrew. Of these, eight are reported to occur in California. The BVLS had been found commonly in Kern County, but by 2002 was known in only four locations. The species is insectivorous and is about the size of a mouse. Coloration varies from black or brown to grey, and the mammals have long pointed snouts. They are active virtually any time at night or during the day.

³⁶ U.S. Fish and Wildlife Service, March 6, 2002, “Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule,” *Federal Register*, Vol. 67, No. 44, p. 10101.

³⁷ *Ibid.*, pp. 10111.

³⁸ Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, October 6, 2004.

³⁹ U.S. Fish and Wildlife Service, August 19, 2004, “Proposed Designation of Critical Habitat for the Buena Vista Lake Shrew, Proposed Rule,” *Federal Register*, Vol. 69, No. 160, p. 51422.

⁴⁰ *Ibid.*

⁴¹ Information on the BVLS and its habitat is taken from U.S. Fish and Wildlife Service, March 6, 2002, “Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule,” *Federal Register*, Vol. 67, No. 44, pp. 10101-10113, and Williams, Daniel F., and Adam C. Harpster, October 29, 2001, “Status of the Buena Vista Lake Shrew (*Sorex ornatus relictus*),” Endangered Species Recovery Program, Department of Biological Sciences, California State University, Stanislaus, submitted to U.S. Bureau of Reclamation, Fresno.

The BVLS was initially described by Grinnell in 1932. He asserted that the BVLS formerly occurred in wetlands around Buena Vista Lake and likely throughout the Tulare Basin. In particular, the animals were believed to have been located throughout the margins of Kern, Buena Vista, Goose, and Tulare lakes. The draining and cultivating of these lakes are believed to have resulted in the reduction of available habitat for the species.

Shrews primarily are insectivorous mammals. They have high metabolic rates because they are small and lose heat quickly from their body surface areas. They eat a variety of aquatic and terrestrial insects as well as spiders, centipedes, slugs, snails, and earthworms. There is scant knowledge available regarding their reproduction or longevity. For the BVLS, the breeding season typically begins in February or March and culminates with the onset of dry weather in May or June. Like other long-tailed shrews, the BVLS is believed to be capable of giving birth to two litters of four to six young per year.

Geographical distinctions among North American shrews are reported to be primarily in the darkness or paleness of their coat; their size, external and cranial; length of tail; shape of the skull; and in characteristics of their teeth. On the basis of recent taxonomy studies, the Service concluded that populations of ornate shrew sub-species are genetically diverse.

BVLS have been found more commonly in moist than in dry habitats, and it is generally concluded that they prefer moist habitat with diverse aquatic and terrestrial insect prey. BVLS noted at the Kern National Wildlife Refuge (KNWR) were commonly found associated with dense riparian areas which provide food, moisture, and cover. However, because of the scarcity of the BVLS, little is known about their home range size, breeding territory size, and population densities.

At the time of the proposed rule to list the BVLS in June 2000, the only known surviving population of the species was found on the 83 acre Kern Lake Preserve, south of Bakersfield. Since June 2000, several other BVLS have been trapped, primarily at the KNWR. Two were trapped by staff from the University of California, Los Angeles, at KNWR in 1998. In 1999, staff from the Endangered Species Recovery Program (ESRP) at California State University Stanislaus captured five BVLS within ½ mile from where captures were made the year before. The seven were around a marsh of approximately 800 acres with emergent vegetation and a covering of willow and cottonwood trees. The area remains moist longer than most other marshes on the KNWR.⁴² In addition, ESRP staff found nine BVLS at Coles Levee and five in the water recharge area along the Kern River Fan.

The Service has enumerated several factors believed to be most responsible for the decline of the BVLS. The first is the loss and fragmentation of available habitat over time because of the drainage of land for agricultural production and because of urban and energy development in the San Joaquin Valley. Second is uncertainty of water availability and delivery to habitat areas. With diversion of water for irrigation and other purposes, less water remained for riparian habitat. Reliable water supplies are thus considered

⁴² Prior to the 1998 and 1999 surveys, KNWR staff reported occurrences of BVLS three other times.

critical for the maintenance of habitat desirable for the BVLS. Third is the possibility of disease and associated threats. Because of the small BVLS population and its limited geographical distribution, the species is believed vulnerable to epidemic diseases and other threats. The significance of these threats, however, is not known. In addition, while many predators are reported to find shrews unpalatable, others are known to prey on the animals. Similar to the disease threat, however, the overall impact of predation on the number and densities of BVLS is unknown.

The Service reports other potential threats to the BVLS include selenium toxicity; exposure to agricultural pesticides; loss or alteration of elements essential for breeding, feeding, and sheltering; introduction of poisons or predators into the limited geographic environment of the BVLS; and catastrophic random events such as floods, droughts, or disease. BVLS could be injured or killed or their reproduction reduced by exposure to pesticides through drift or direct spraying of crops, canals, and roadsides where they live.

Selenium toxicity is believed to be a serious threat to BVLS throughout the Tulare Basin. The soils on the west side of the San Joaquin Valley have naturally-elevated levels of the element, which often accumulates in the shallow groundwater characteristic for many parts of this area. Because of increased amounts of imported water and little or no exported drain water, groundwater has increasingly accumulated near the surface, the depths to groundwater on the west side have fallen, and selenium concentrations have increased. As surface vegetation absorbs selenium, the element may become part of the BVLS food chain by becoming concentrated in the insects which feed on the vegetation or which reside in the soils that concentrate these salts.

An additional potential source of selenium concentrations is the concentrated animal feeding operations and resultant liquid and solid manure throughout the Tulare Basin, in particular dairies, beef cattle, swine, and poultry operations. The number of dairy cows in both Tulare and Kern counties has increased sharply in the last decade.

Agricultural pesticides are a potential threat to the BVLS. In addition to injuring or killing the BVLS themselves, pesticides may also kill the many types of prey which constitute the food supply of the BVLS. Further, the chemicals may bioaccumulate as the BVLS feed on insects which have ingested the pesticides themselves. Certain types of pesticides have been found to adversely affect behavior and motor activity in some types of shrews. Depression of behavior and motor activities could result in increased vulnerability of the animals to predation and starvation.

1.8 PROPOSED CRITICAL HABITAT DESIGNATION

The Service has proposed five CHUs for the BVLS.⁴³ The five CHUs cover a total of 4,649 acres, and are shown in Map 1 (see Map Attachment). All proposed CHUs are located in Kern County, California,

⁴³ U.S. Fish and Wildlife Service, August 19, 2004, "Proposed Designation of Critical Habitat for the Buena Vista Lake Shrew, Proposed Rule," *Federal Register*, Vol. 69, No. 160, pp. 51417-51442.

and BVLS have been found within all. The Service selected areas for CHD that are within the historical range of the BVLS and which exhibit desirable factors indicated by occurrences of the BVLS, known riparian habitat, and availability of adequate water for required moisture. The Service examined, by field visit or aerial photography, all remaining areas of riparian habitat within the historical range of the BVLS. The five units are:

The Kern National Wildlife Refuge (KNWR) CHU in northwestern Kern County includes 387 acres in three separate units of 274 acres, 66 acres, and 47 acres. KNWR is an important location for migratory birds. Ten extant occurrences of the BVLS have been recorded in two locations, one with standing water from September 1 through approximately April 15 and which is dry for about three months in the summer. The second area has standing water from mid-August through June or early July and is dry for only a brief time during the summer.

In 1985, the Service completed a Master Plan for KNWR. Preparation of the Master Plan included a section 7 consultation and ultimate issuance of a Biological Opinion (BO).⁴⁴ The Plan did not include the BVLS. Subsequently, KNWR completed a draft Comprehensive Conservation Plan (CCP) for the refuge in June 2004, an update of the Master Plan.⁴⁵ A final copy of the document was completed in September 2004.

The Goose Lake CHU of 1,277 acres is about 10 miles south of KNWR in the historic lake bed of Goose Lake. The Goose Lake area includes a total of about 8,000 acres nearly equally divided between former marshes and wetlands, and upland communities. In January 2004, five BVLS were captured in the CHU. Semitropic Water Storage District (SWSD), which receives State Water Project (SWP) from SWP contractor Kern County Water Agency, owns and manages the Goose Lake area as a groundwater recharge basin. In wet years or years in which water is otherwise abundant, water is transferred from the California Aqueduct and recharges an aquifer used to irrigate cropland. A formal section 7 consultation is underway at this CHU.

The Kern Fan Water Recharge CHU includes 2,682 acres in which have been found two extant occurrences of the BVLS. This CHU is within the 2,800 acre Kern Fan Water Recharge Area owned by the City of Bakersfield. The Kern Water Bank is contiguous to the CHU and includes 19,900 acres owned by the Kern Water Bank Authority. The CHU is adjacent to, but not included within, the Kern Water Bank HCP/Natural Community Conservation Plan (NCCP) permit area. Parts of the area flood occasionally and provide pockets of wetland communities.

The Coles Levee CHU includes 214 acres owned by Aera Energy, and serves as a mitigation bank to compensate for the take of habitats for listed upland species. There are many oil and natural gas wells in

⁴⁴ Personal communication with Service Manager, Kern National Wildlife Refuge, October 7, 2004.

⁴⁵ U.S. Fish and Wildlife Service, June 2004, "Kern and Pixley National Wildlife Refuges: Draft Comprehensive Conservation Plan and Environmental Assessment," Sacramento and Delano.

the area, which is also traversed by pipelines carrying those products as well as water. There is a road to each well, but not to several parts of the pipelines.⁴⁶

The area was established as a mitigation bank in 1992, in an agreement between Atlantic Richfield Company (ARCO) and DFG. An HCP was in place for the Coles Levee Ecological Preserve Area, but expired when ARCO sold the property to Aera Energy and is no longer operative. The current owner is reported to be considering preparation of a new HCP covering multiple species.⁴⁷ Based on discussions with consultants who have completed similar types of plans, the range of expected costs is from \$500,000 to \$1,000,000. Alternatively, the previous HCP could be amended to include a management plan specifically for the BVLS at a cost of about \$50,000.⁴⁸ Either would include actions specific to preservation of the BVLS, and the affected land could be removed from critical habitat. It is unknown whether the operators of the wells and pipelines will agree to either.⁴⁹ However, with the designation of CH for the BVLS, the risk of a take of the species has risen, and it is reasonable to assume that the operators of wells and pipelines in the area will pursue either a new HCP (for an estimated \$750,000) or a management plan for the shrew (for an estimated \$50,000) which would amend the existing HCP.

The Kern Lake CHU is comprised of about 90 acres of privately owned land, and located approximately 16 miles south of Bakersfield, between California State Highway 99 and Interstate 5. It was leased to and managed for the owner, J.G. Boswell Corporation, by The Nature Conservancy (TNC) from 1986-1995.⁵⁰ During the lease period, water was supplied to the Kern Preserve by the owner only during years of high runoff, when excess water was available at the end of the growing season, and after commercial crop irrigation needs were met. The Service reported in 2002 that absent a dependable water supply to maintain wetlands in the Kern Preserve, the continued existence of the BVLS was unlikely. Moreover, the lack of a guaranteed water supply was reported to be a key reason for the refusal of TNC to renew the lease with the landowner.⁵¹ The potential cost of a water supply to maintain adequate moisture in the Kern Lake CHU is discussed in a later section of this report.

⁴⁶ Personal communication with Waring Laurendine, Quad Knopf, October 15, 2004. Access to parts of some pipelines is available on utility corridors in the area. However, roads do not provide access to other parts.

⁴⁷ Personal communication with Jim Jones, Quad Knopf, Inc., June 21, 2004.

⁴⁸ Personal communication with Waring Laurendine, Quad Knopf, October 15, 2004.

⁴⁹ Personal communication with Waring Laurendine, Quad Knopf, October 15, 2004.

⁵⁰ U.S. Fish and Wildlife Service, March 6, 2002, "Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule," *Federal Register*, Vol. 67, No. 44, p. 10106.

⁵¹ Ibid.

1.8.1 LAND INCLUDED AND EXCLUDED IN THE PROPOSED UNITS

The Service notes that in determining boundaries for the proposed CHUs, efforts were made to exclude all developed areas, such as towns, housing developments, roads, and other lands not likely to contain PCEs for the conservation of the BVLS. The Service has selected areas which have the physical and biological features vital to species conservation and which may require special management considerations or protection. In doing so, the Service used identified PCEs or principal biological elements essential to the conservation of the species, together with data on occurrence, geographic distribution, GIS data layers, vegetation, topography, watersheds, current land uses, conservation principles, and scientific information on the biology and ecology of the species.

The Service also notes that the proposed CHUs may not include all of the area occupied by the BVLS which may eventually be determined to be vital for the conservation of the species. It notes that CHDs do not imply that areas outside the designated areas are unimportant to the BVLS. Thus, areas outside the CHUs are subject to conservation actions which may be implemented under Section 7(a)(1) of the Act, as well as to the regulatory protections under the Section 7(a)(2) jeopardy standard and the Section 9 take prohibition.

1.9 ORGANIZATION OF THE REPORT

The remainder of this report is divided into six sections. Section 2.0 describes the framework for the economic analysis, considering efficiency and distributional as well as retrospective and prospective effects among Federal and non-Federal entities. Section 3.0 presents a socioeconomic profile of the area, including a geographic description, demographics, and economic activity. Section 4.0 contains a discussion of the regulatory environment which applies in the area, considering other Federal and State listed species, HCPs, and the recovery plan for the BVLS. A detailed review of the economic effects on agriculture of conservation activities for the BVLS is presented in Section 5.0. This is followed by Section 6.0, which presents a similar analysis of economic effects on non-agricultural sectors or activities, including road maintenance and transportation, groundwater recharge projects, mosquito abatement, and Federal agencies. A summary and analysis of the economic effects in Section 7.0 completes the report.

Two appendices are included with this report. Appendix A addresses the economic effects of BVLS conservation activities on small entities and the nation's energy supply. Appendix B includes a list of the acronyms used in the report. A Map Attachment is also provided and contains the two maps referenced in the text of the report.

1.9.1 CATEGORIES OF COSTS DELINEATED

Subsections that address specific categories of economic efficiency effects are organized in this report by the types of costs that are incurred. These types include:

- **Section 7 Consultation Costs:** These are costs incurred by Federal agencies and the Service in consultation, and preparation of biological assessments and biological opinions. Consultation costs for agencies include both retrospective and prospective costs.
- **Non-Section 7 Project Modification Costs:** These are costs incurred by private entities associated with project modifications that are necessary to avoid incidental take of listed species. Both retrospective and prospective costs are addressed.
- **Retrospective Costs:** These are costs incurred by private entities (in addition to project modification costs) between the time of the BVLS listing and the CHD, and include the economic effects on private entities caused by restrictions to behavior or actions.
- **Prospective or Forecasted Costs:** These costs include future or anticipated economic effects on private entities (in addition to project modification costs) that would result from the listing or conservation activities associated with BVLS.

These types of economic effects are discussed in detail in Section 2.2. In addition to these efficiency effects, some distributional and secondary effects may also be associated with the costs identified above, particularly where there are costs borne by private sector. These are also discussed in Section 2.2.

This section describes the framework for analyzing the economic impact of conservation actions taken to protect BVLS and its habitat.⁵² This section first describes the general analytic approach to estimating economic costs of a CHD, as well as protective measures taken as a result of the species' listing or Federal, State, and local laws that aid habitat conservation in the areas designated, including a discussion of efficiency and distributional effects, as well as retrospective and prospective effects. Methods used to evaluate each of the different general categories of economic effects, such as Federal and private efficiency effects, as well as distributional effects, are also described. The time frame and discount rate used in the analysis are described, as well as general caveats and assumptions that apply to all categories examined.

Several conceptual issues were important for the design and implementation of this study. The first issue relates to the relevance of the collection of different types of information for the economic analysis. The proposed CHUs for BVLS in Kern County of the San Joaquin Valley encompass a variety of land use, ownership, and economic activities. As a result, the degree of available information, specific recovery actions, and associated economic impacts vary substantially across the units. While all known or potential impacts are explored and discussed, the analysis of some impacts is necessarily more qualitative than quantitative.

A second issue is the relatively scant knowledge about the optimum habitat for the BVLS. It is believed that the species was found previously in wetlands around Buena Vista Lake and throughout the Tulare Basin, including the margins of Kern, Buena Vista, Goose, and Tulare lakes.⁵³ It is believed that because of the widespread cultivation of Tulare Basin land, the frequency of BVLS appearances has been reduced to five locations along a 70-mile stretch of the west Tulare Basin. Overall, the BVLS appears to prefer moist habitat with many types of insect prey. However, because few BVLS have been found, little is known about their population density, home range size, and breeding territory size.

A third conceptual issue important for this analysis is uncertainty about the volume, source(s), and cost(s) of water which may be required to provide adequate moisture for the CHUs. Adequate moisture is essential for ample food supplies and for breeding. A 1990 publication by the U.S. Bureau of Reclamation stated that wetlands in the San Joaquin Valley area require 10 AF per acre per year.⁵⁴ It has

⁵² Much of the general framework discussion represents guidance from the Service and incorporates language employed in prior economic analyses of CHD.

⁵³ Grinnell, 1932, 1933; Hall 1981; Williams and Kilburn 1984; Williams 1986; Service 1998.

⁵⁴ U.S. Bureau of Reclamation and California Resources Agency, September 1990, "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley, Final Report of the San Joaquin Valley Drainage Program," Sacramento, p. 158.

been estimated that 25,000 acre-feet (AF) of water would be needed annually for optimal coverage of 7,100 acres of wetlands in the KNWR, equivalent to about 3.5 AF per acre per year.⁵⁵ The Service has stated that habitat for the BVLS generally requires a reliable water source to maintain a moist environment for between eight and ten months per year, but that the volume of water required to support the BVLS is unknown.⁵⁶ The economic analysis includes a discussion of impacts potentially related to maintenance of moist habitat for the BVLS, and quantifies these impacts where water supplementation is reasonably foreseeable.

2.1 RETROSPECTIVE AND PROSPECTIVE EFFECTS

The economic analysis includes both retrospective and prospective effects. Retrospective effects include those that have occurred since the time that the BVLS was listed as endangered but prior to designation of critical habitat. This retrospective analysis begins with the April 2002 rule listing the BVLS as endangered.⁵⁷ Prospective impacts include likely future costs associated with BVLS conservation activities through 2024. This prospective analysis attempts to forecast the costs of conservation activities likely to be within the proposed designation.

For each of the proposed CHUs, it is assumed that, regardless of other costs such as those for section 7 consultations, the Federal government has used one person-week of time to review maps, visit sites, and analyze other data to identify the location of essential habitat for the BVLS. It is estimated that the cost for that person-week, including benefits and incidental expenses, is \$3,540.⁵⁸ These costs, assumed invariant among the CHUs, are included in the summary tables in Section 7.0 and in the discussion of effects on Federal agencies in Section 6.5.

Prospectively, it is assumed that annual monitoring by the Service for the BVLS will require an average of five person-days for each CHU other than KNWR. It is assumed that the cost would be at the same daily rate as that referenced above, \$708. Costs presented relate as closely as possible to CHD for the BVLS. In some cases, other costs, those associated more directly with the recovery plan for the BVLS, are presented as well.

⁵⁵ Personal communication with Service Manager, Kern National Wildlife Refuge, June 8, 2004.

⁵⁶ Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, May 21, 2004.

⁵⁷ U.S. Fish and Wildlife Service, March 6, 2002, "Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule," *Federal Register*, Vol. 67, No. 44, p. 10106.

⁵⁸ Based on an estimated \$708 per day for a Federal biologist. Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, June 30, 2004.

2.2 GENERAL CATEGORIES OF ECONOMIC EFFECTS

2.2.1 FEDERAL

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

2.2.1.1 Section 7 Consultations, Technical Assistance, and Project Modifications

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

To date, no formal or informal section 7 consultations have been completed for any of the proposed CHUs for the BVLS. A section 7 consultation for the BVLS has been underway since 2002 for the Goose Lake CHU because surveys there revealed occurrences of the BVLS. A draft of the resulting BO was prepared in June 2004, and a revised draft was completed in September 2004.⁵⁹ The retrospective and prospective Federal government and private sector costs of the consultation are discussed in Section 6.0 of this report.

2.2.2 PRIVATE

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

⁵⁹ Personal communication with Wes Roadhamel, Quad Knopf, Inc., October 7, 2004.

This section identifies and briefly discusses some of the categories of economic activity that may occur in or near the proposed CHUs. These include, for example:⁶⁰

- Flood channel maintenance on rivers, creeks, and streams;
- Operation and maintenance of groundwater recharge projects;
- Maintenance and operation of irrigation canals by water districts;
- Crop and livestock production on cultivated lands adjacent or proximate to proposed CHUs;
- Mosquito abatement; and
- Oil and gas production and other energy-related activities.

In addition, some re-allocation of water from current uses may be required to keep the CHUs moist for the BVLS. The Service has indicated that habitat for the BVLS requires a reliable source of water to maintain a moist environment for eight to ten months per year.⁶¹ The Service also notes that the BVLS lives in some CHUs as they are currently operated and that supplemental water is not required.⁶² The optimal management of habitat at KNWR requires 3.5 AF per acre of habitat annually.⁶³ Efforts are underway for a wetland enhancement project on the Goose Lake CHU. For this analysis, therefore, it is assumed that supplemental water is *required* for the KNWR and Goose Lake CHUs, but that supplemental water is not necessary for the other three CHUs.

Specific concerns have also been raised with respect to the effect of designating the Kern Fan Water Recharge CHU. These include the effects on:⁶⁴

- City of Bakersfield recharge operations;

⁶⁰ Based on U.S. Fish and Wildlife Service, March 6, 2002, “Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule,” *Federal Register*, Vol. 67, No. 44, pp. 10101-10113; and personal communication with Robert Kunde, Wheeler Ridge-Maricopa Water Storage District, June 2004, including information provided by Kern County Farm Bureau to Kern County Board of Supervisors.

⁶¹ Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, May 21, 2004.

⁶² Internal Service communication, September 23, 2004.

⁶³ Personal communication with Service Manager, Kern National Wildlife Refuge, June 8, 2004.

⁶⁴ Personal communication with Robert Thornton, Nossaman, Gunther & Know, attorney retained by the City of Bakersfield, California, October 7, 2004; and David Sunding, Charles River Associates, October 15, 2004.

- Management or reoperation, if required by the Service, of Lake Isabella, which is upstream of the Kern Fan Water Recharge CHU on the Kern River;
- Changes in diversions upstream on the Kern River; and
- Recharge operations of other entities.

Each category of effect is analyzed in Sections 5.0 and 6.0 of this report. Effects are quantified as permitted by available data. Other effects are discussed and analyzed qualitatively due to the lack of available data.

2.2.3 SECONDARY AND REGIONAL EFFECTS

Regional economic impact analysis can provide an assessment of the potential localized effects of conservation activities. Specifically, regional economic impact analyses produce a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a fundamental change in a particular economic sector's output. Regional economic impacts are commonly measured using regional input/output models, such as those created using IMPLAN modeling software and databases. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., agricultural production) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to agricultural producers). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy. These additional impacts are referred to as "secondary effects."

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

Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

2.2.4 EFFECTS ON SMALL ENTITIES

This analysis considers how small entities, including small businesses, organizations, and governments, might be affected by future BVLS conservation activities. The analysis follows guidelines appropriate for the Regulatory Flexibility Act (RFA).⁶⁵ Those activities involving small entities are identified, affected small entities described, and potential effects estimated, depending on the availability of data. This analysis is included in Appendix A of this report.

2.2.5 EFFECTS ON ENERGY SUPPLY

In adherence with Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” the analysis considers the future impacts of conservation activities on the energy industry and its customers.⁶⁶ This involves analyzing impacts associated with changes in existing or proposed energy generating facilities as a result of the CHD. If the designation results in a reduction of more than 500 megawatts of installed capacity, the potential electricity price impacts are also considered. This analysis is also included in Appendix A of this report.

2.3 PROJECT LIFE, PERIOD OF ANALYSIS, AND DISCOUNT RATE

The period of analysis and discounting is guided by the availability of information concerning the start date and duration of the activity. Each potential cost component has a time period that is appropriate for that specific activity or investment. The time period used is therefore discussed in each section describing the effects of individual types of activities.

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

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

⁶⁵ Regulatory Flexibility Act, Public Law No. 96-354, 94 Stat. 1164 (codified at 5 U.S.C., Section 601, *et seq.*).

⁶⁶ Executive Order 13211, May 18, 2001, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use.”

2.4 CAVEATS AND ASSUMPTIONS

The assumptions presented here include only those which apply in general to all areas included in the analysis. These general caveats describe factors that introduce uncertainty into the results of this analysis. The Service therefore solicits from the public further information on any of the issues presented in the discussions and tables of caveats. Additionally, information pertaining to the following questions is requested:

- Are data available to develop more accurate estimates of the number of future consultations, project modifications, and costs for the activities related to private lands?
- Are data available on additional land use practices, or current or planned activities in proposed critical habitat areas, that are not specifically or adequately addressed in this analysis?
- Are data available on additional co-extensive impacts (such as additional regulatory burdens from State or local laws triggered by the designation of critical habitat) that are not specifically or adequately addressed in this analysis?
- Are there water district canals that would be affected by incremental costs incurred for vegetation control as a result of conservation activities for the BVLS, and if so, what is the length of the affected area and the nature of those costs?

3.0

SOCIOECONOMIC PROFILE OF THE CRITICAL HABITAT AREA

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

3.1 GEOGRAPHIC DESCRIPTION OF THE REGION

Kern County occupies 8,162 square miles, including 8,141 square miles of land and 20.5 square miles of water.⁶⁷ It is bordered by Tulare and Kings counties on the north, San Bernardino County to the east, San Luis Obispo County to the west, and Ventura and Los Angeles counties to the south. Kern County is approximately 135 miles by 60 miles and is the third largest county in California. There are 11 incorporated cities in the county, of which Bakersfield is the largest and serves as the county seat. The next three largest cities in population are Delano, Ridgecrest, and Wasco.

A large portion of Kern County is devoted to production agriculture, and nearly all commercially-farmed land is irrigated. Much of the valley floor is primarily field crops, pasture, vineyards, and grain and hay crops, while deciduous fruits, nuts, and grapes are grown in the north, northwest, and west parts of the county. Irrigation is essential because annual precipitation averages only 6.49 inches.⁶⁸ Normal maximum temperature during July is 98.5 degrees.

3.2 POPULATION CHARACTERISTICS AND DEMOGRAPHICS

All of the proposed CHUs for the BVLS are within Kern County. Table 1 presents the population size, change in population from 1990 to 2000, per capita income, and poverty rates for the Kern County and the State of California as a whole.

The estimated population of Kern County in 2003 was 713,087, or about two percent of California's total population. Kern County is one of the larger counties in the State, ranking 13th in terms of population among California's 58 counties. Kern County population grew by nearly 22 percent between 1990 and

⁶⁷ California Department of Finance, December 2003, *California Statistical Abstract 2003*, p. 2.

⁶⁸ *Ibid.*, p. 7.

2000, while the State population grew 14 percent over the same time period. The per capita income for Kern County is \$21,021, while the State average is \$32,655. The poverty rate for a region is the percentage of people who are estimated to live below the poverty level, which is based on national levels set for minimum income requirements for various sizes of households. The poverty rate for Kern County is 18.6 percent, while that for the State is 12.7 percent.

Table 1
Socioeconomic Profile of Kern County

	Kern County	California State
Population (2003)	713,087	35,484,453
Percent of State Population (2003)	2.0%	100.0%
Change in Population (1990-2000)	+21.7%	+13.8%
Per Capita Income (2001)	\$21,021	\$32,655
Poverty Rate (2000)	18.6%	12.7%

Sources:

2003 population estimates: U.S. Census Bureau, "Annual Population Estimates 2000-2003," downloaded from <http://eire.census.gov/popest/data/counties/CO-EST2003-01.php>, June 3, 2004.

2000 poverty estimates: U.S. Census Bureau, "Small Area Income and Poverty Estimates," downloaded from <http://www.census.gov/hhes/www/saipe/estimatetoc.html>, May 12, 2004.

1990-2000 population change: U.S. Census Bureau, "Ranking Tables for Counties," downloaded from <http://www.census.gov/population/www/cen2000/phc-t4.html>, May 12, 2004.

2001 per capita income: U.S. Department of Commerce, May 2003, Bureau of Economic Analysis, *Regional Economic Information System 1969-2001*, CD-ROM.

3.3 EMPLOYMENT

Employment is a key economic indicator, as patterns of growth and decline in a region's employment are largely driven by economic cycles and local economic activity. Current employment figures can be examined to provide a "snapshot" of a region's economy, highlighting key industries. Recent employment data for Kern County are presented in Table 2. Employment is given for each industry group in terms of the number of jobs, which includes both full-time and part-time jobs, and as a percentage of the total jobs for each county.

Kern County's economy has traditionally been associated with oil production and agricultural industries, but in recent years, the county economy has become increasingly diversified.⁶⁹ Approximately six percent of the jobs in the county are in agricultural production, while another eight percent of county employment is in forestry, hunting, fishing, and related industries, which includes agricultural services.

⁶⁹ California Employment Development Department, Labor Market Information Division, 2003, *County Snapshots: Kern County*, <http://www.calmis.cahwnet.gov/file/cosnaps/kernSnap.pdf>.

Table 2
2001 Employment in Kern County
(Number of Jobs and Percentage of Total Jobs)

		Kern
Total Employment		316,778
Goods Producing:	Agricultural Production (Farm)	19,676 (6.2%)
	Forestry, Hunting, Fishing, and Related Activities ^{a/}	26,712 (8.4%)
	Mining	9,592 (3.0%)
	Construction	18,569 (5.9%)
	Manufacturing	11,377 (3.6%)
Service Providing:	Trade, Transport, and Utilities ^{b/}	51,310 (16.2%)
	Leisure and Hospitality ^{c/}	21,634 (6.8%)
	Financial Activities ^{d/}	17,869 (5.6%)
	Information	3,271 (1.0%)
	Professional and Business Services ^{e/}	35,043 (11.1%)
	Educational and Health Services ^{f/}	26,274 (8.3%)
	Other Services	16,494 (5.2%)
	Government	58,957 (18.6%)

a/ Also includes Agricultural Services

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

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

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

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

f/ Includes Education Services and Health Care and Social Assistance

Source: U.S. Department of Commerce, Bureau of Economic Analysis, May 2003, *Regional Economic Information System 1969-2001*, CD-ROM.

Mining employment, which includes jobs related to petroleum production, represents three percent of total county employment. Significant employers in the county include government, with nearly 19 percent of county jobs, and trade, transportation, and utilities, with over 16 percent of total jobs.

Earnings represent the sum of three components of personal income: wage and salary disbursements, other labor income (includes employer contribution to pension and profit-sharing, health and life insurance, and other non-cash compensation), and proprietors' income. Earnings reflect the amount of income that is derived directly from work and work-related factors. Earnings can be used as a proxy for the income that is generated within a geographical area by industry sectors, and can be used to identify the significant income-producing industries of a region or to show trends in industry growth or decline. Earnings from employment in Kern County are presented in Table 3, broken out by industry group as employment was in the previous table.

3.4 ECONOMIC ACTIVITY

While agriculture and energy remain important, new industries, such as light manufacturing and food processing, have broadened the economic base of the county. Kern County is an attractive area for company re-locations due to its central location, easily accessible transportation, low labor costs, and affordable housing costs. The median selling price of a home in Bakersfield in January 2003 was \$138,980, far less than the median for all of California, \$336,740.⁷⁰

⁷⁰ Ibid.

Table 3
2001 Earnings from Employment in Kern County
(Millions of Dollars and Percentage of Total Earnings)

		Kern
Total Employment		\$10,196.9
Goods Producing:	Agricultural Production (Farm)	\$347.2 (3.4%)
	Forestry, Hunting, Fishing, and Related Activities ^{a/}	\$437.3 (4.3%)
	Mining	\$595.4 (5.8%)
	Construction	\$731.0 (7.2%)
	Manufacturing	\$464.6 (4.6%)
Service Providing:	Trade, Transport, and Utilities ^{b/}	\$1,619.6 (15.9%)
	Leisure and Hospitality ^{c/}	\$336.6 (3.3%)
	Financial Activities ^{d/}	\$382.7 (3.8%)
	Information	\$145.4 (1.4%)
	Professional and Business Services ^{e/}	\$1,077.1 (10.6%)
	Educational and Health Services ^{f/}	\$823.1 (8.1%)
	Other Services	\$331.9 (3.3%)
	Government	\$2,905.0 (28.5%)

a/ Also includes Agricultural Services

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

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

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

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

f/ Includes Education Services and Health Care and Social Assistance

Source: U.S. Department of Commerce, Bureau of Economic Analysis, May 2003, *Regional Economic Information System 1969-2001*, CD-ROM.

4.1 OTHER ESA LISTED SPECIES

Within California, there are currently 83 Federally-listed endangered and 40 Federally-listed threatened species, as well as one species proposed for Federal endangered status, and one species proposed for Federal delisting. The 1998 recovery plan for the upland species of the San Joaquin Valley published by the Service covers 34 species of plants and animals in the San Joaquin Valley, including 11 listed species and 23 candidates or species of concern.⁷¹ The 11 listed species cover five endangered plants, one threatened plant, and five endangered animals. Based upon maps in the 1998 recovery plan, several of the plant and animal species both listed and of concern are distributed throughout areas for which critical habitat has been proposed for the BVLS. However, there are no other riparian dependent species found within the range of the BVLS.⁷² Species included in the recovery plan and which, from maps in the plan, appear to be located in similar areas as the BVLS critical habitat, include:

1. Hoover's woolly-star (*Eriastrum hooveri*);
2. San Joaquin woolly-threads (*Lembertia congdonii*);
3. Bakersfield smallscale (*Atriplex tularensis*);
4. Lost Hills saltbush (*Atriplex vallicola*);
5. Munz's tidy-tips (*Layia munzii*);
6. Oil neststraw (*Stylocline citroleum*);
7. Giant kangaroo rat (*Dipodomys ingens*);
8. Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*);
9. Blunt-nosed leopard lizard (*Gambelia sila*);
10. San Joaquin kit fox (*Vulpes macrotis mutica*);

⁷¹ U.S. Fish and Wildlife Service, 1998, "Recovery Plan for Upland Species of the San Joaquin Valley, California," Portland, Oregon.

⁷² Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, May 21, 2004.

11. San Joaquin antelope squirrel (*Ammospermophilus nelsoni*); and

12. Short-nosed kangaroo rat (*Dipodomys nitratooides brevinasus*).

State-listed species in California are classified as endangered or threatened, as are State candidate species. Currently there are 79 animals listed by the State of California as either endangered or threatened, including 47 endangered and 32 threatened. There is some overlap between State and Federal listings, as 54 species are currently listed by both, while 31 are State listed only and 69 are Federal listed only.⁷³ The BVLS is Federally listed only.

4.2 FEDERAL AND CALIFORNIA STATE STATUTES AND REGULATIONS

4.2.1 HABITAT CONSERVATION PLANS

There are currently nine HCPs approved or in development in various parts of the eight-county San Joaquin Valley. Of these nine HCPs, only one, the Kern Valley Floor HCP, includes the BVLS and proposed CHUs.⁷⁴ A second, the Kern Water Bank Authority HCP, covers areas around the Kern Fan Water Recharge CHU, but does not include the BVLS. It covers 19,900 acres in southwestern Kern County, and was completed in 1997, prior to the listing of the BVLS. Finally, the Coles Levee HCP, which covers one CHU, has expired and was not renewed by the new owner when the property was sold several years ago.

Specific conservation documents or measures have not been specified for other proposed CHUs. The Comprehensive Conservation Plan (CCP) for the entire KNWR has been completed, with an internal Service cost estimated at slightly more than \$182,000.⁷⁵ The KNWR CCP covers goals, operating practices, and other activities related to the many unlisted fish, amphibians, reptiles, birds, and mammals species in the Refuge as well as the 11 Federally-listed species, including the San Joaquin kit fox, Tipton kangaroo rate, blunt-nosed leopard lizard, and BVLS. For purposes of this study, it is assumed that the cost of the Plan is distributed equally among the 11 Federally-listed species, and thus that \$16,545 of costs are attributable to the BVLS.

⁷³ California Department of Fish and Game, Habitat Conservation Branch, August 2004, "State and Federally Listed Endangered and Threatened Animals of California," <http://www.dfg.ca.gov/whdab/pdfs/TEAnimals.pdf>

⁷⁴ Cylinder, Paul, Kenneth Bogdan, and David Zippin, 2004, "Understanding the Habitat Conservation Planning Process in California: A Guidebook for Project and Regional Conservation Planning," published by Institute for Local Self Government, Sacramento.

⁷⁵ Personal communication with Service Manager, Kern National Wildlife Refuge, June 30, and August 7, 2004.

The most extensive HCP in Kern County to date is the Kern Valley Floor HCP, which has been in development for more than ten years and is believed to be within a year of completion.⁷⁶ It encompasses about 3,100 square miles (nearly two million acres) in Kern County. The HCP will cover 28 State and Federal listed species, including the BVLS.⁷⁷

Estimated non-Federal costs to date for the Kern Valley Floor HCP are \$450,000 and estimated non-Federal costs to complete the HCP are \$70,000.⁷⁸ Although the HCP was begun well before the listing, for the purposes of this analysis the HCP costs will be attributed in part to the BVLS.

4.2.2 CALIFORNIA ENDANGERED SPECIES ACT

The California Endangered Species Act (CESA)⁷⁹ is generally comparable to the Act and is directed by DFG. CESA prohibits the “taking” of listed species except as otherwise provided in State law. CESA applies take provisions both to species that are listed and that are candidates for listing by the State of California, whereas the Act applies take provisions only to species listed by the Federal government. The BVLS is not listed as threatened or endangered by the State of California.⁸⁰ It is, however, a mammalian species of special concern in California.⁸¹ Analogous to the Act, a State lead agency for a project or activity is required to consult with DFG to assure that any such project or action it undertakes will not jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of essential habitat.

CESA was amended in 1991 to include the Natural Community Conservation Planning Act (NCCPA).⁸² Provisions in the NCCPA establish a framework for voluntary cooperation among DFG, landowners, and others in establishing plans which provide for coordinated activities to protect species both listed and candidates for listing. The objective of the NCCPA is to concurrently allow reasonable development on affected land while preserving species and their habitats.

⁷⁶ Personal communication with Ted James, Kern County Planning Department, June 28, 2004.

⁷⁷ Patricia Fisher (contact), Office of the Secretary, July 11, 2003, “Secretary Norton Announces 70 Million in Grants to Support Land Acquisition and Conservation Planning for Endangered Species,” <http://www.libertymatters.org>.

⁷⁸ Personal communication with Ted James, Kern County Planning Department, June 28, 2004.

⁷⁹ California Fish and Game Code §§ 2050, *et seq.*

⁸⁰ California Department of Fish and Game, Habitat Conservation Branch, August 2004, “State and Federally Listed Endangered and Threatened Animals of California,” <http://www.dfg.ca.gov/whdab/pdfs/TEAnimals.pdf>.

⁸¹ California Department of Fish and Game, Habitat Conservation Branch, “California’s Plants and Animals,” <http://www.dfg.ca.gov/hcpb>.

⁸² California Fish and Game Code §§2800-2840.

4.2.3 CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

CEQA is a California State statute requiring State and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. CEQA regulations require a lead agency to prepare an Environmental Impact Report (EIR) if the proposed project may produce certain types of impacts, including when:

“[t]he 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.”⁸³

State law instructs the lead agency (typically a county or city community development or planning department) 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.

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.

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 “mitigated 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.

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. Some of these classifications are listed here:

- Certain alterations of existing facilities;

⁸³ California Natural Resources Code §15065(a). Categories of “environmental impact” evaluated in the context of CEQA review and/or EIR preparation typically include geological, air quality, water quality, noise, light/glare, land use planning, population, housing, transportation/circulation, public service, utility system, energy, human health, aesthetic, recreational, and cultural resource impacts.

- Replacement or reconstruction of existing structures;
- Smaller development projects such as restaurants smaller than 2,500 square feet;
- Certain projects involving landscaping or temporary trenching;
- Lot line adjustments;
- Experimental management or research;
- Habitat restoration;
- Certain safety inspections and mortgage lending; and
- Signs and small parking lots.

Many of these types of minor projects are eligible for a categorical exemption from the provisions of CEQA altogether, and compliance costs are usually limited to completion of the paperwork required by the lead agency.

4.2.4 ELEMENTS OF THE RECOVERY PLAN

The recovery plan for the BVLS was included in a multi-species plan for upland species in the San Joaquin Valley of California.⁸⁴ The plan included three general criteria for the long-term conservation of the BVLS:

1. Secure and protect at least three disjoint occupied sites with, collectively, at least 4,940 acres of occupied habitat;
2. Approve and implement a management plan for recovery areas that includes survival of the BVLS as an objective; and
3. Monitor the recovery areas to demonstrate the continued presence of the BVLS at known occupied sites.

The total area of the five proposed CHUs is 4,649 acres, quite close to the minimum acreage stipulated in the first point above.

⁸⁴ U.S. Fish and Wildlife Service, 1998, "Recovery Plan for Upland Species of the San Joaquin Valley, California," Portland, Oregon.

The recovery plan pointed out that the systematic status of the species was uncertain because few specimens had been available, to that date, for comparison. It also indicated that a DNA analysis of the species was underway and that the BVLS is a distinct evolutionary unit of ornate shrew. It also noted that the BVLS was formerly found in wetlands around Buena Vista Lake and presumably throughout the Tulare Basin. At the time of the recovery plan, nothing specifically was known about the reproduction and mating characteristics, population numbers, home range, or territoriality of the species. However, the recovery plan noted that the establishment of habitat which can support expansion and introduction efforts is critical to conservation of the BVLS.

The conservation strategy discussed in the recovery plan includes several specific recommendations for the preservation of the BVLS. Among others, it recommends that the Kern Lake location should be preserved in perpetuity and that greater efforts should be made to locate the species in other locations within the Tulare Basin. It recommends several areas which are included among the proposed CHUs, including Goose Lake Slough, Kern River west of Bakersfield, and the Goose Lake bed. The plan emphasizes that the establishment of habitat which can support expansion and introduction efforts is critical to the conservation of the BVLS.

5.1 DESCRIPTION OF AGRICULTURE IN THE REGION

Kern County is home to one of the most productive, diversified agricultural sectors in the world and is regularly among the top three to five agricultural counties in the United States in terms of value of output. In 2003, Kern County farmers produced crops and livestock products worth nearly \$2.5 billion at the farm gate (see Table 4). Fruit and nut crops accounted for nearly a third of the harvested acreage and 45 percent of the value. Vegetables were 11 percent of acreage and 20 percent of value. Field crops were 56 percent of acreage and 16 percent of value. Livestock and poultry and their products contributed 14 percent of value. Agriculture also directly supported 30,900 jobs (see Table 5).

Table 4
Kern County Value of Agricultural Production, 2003

Commodity Group	Harvested Acres	Total Value
Fruit and Nut Crops	275,808	\$1,115,963,000
Field Crops and Rangeland	487,455*	\$386,928,000
Vegetable Crops	96,976	\$502,360,000
Nursery Crops	3,959	\$100,702,000
Industrial and Wood Crops	n/a	\$7,717,000
Seed Crops	2,028	\$9,024,000
<i>Subtotal (Crops)</i>	<i>866,226</i>	<i>\$2,122,694,000</i>
Livestock and Poultry	n/a	\$81,240,000
Livestock and Poultry Products	n/a	\$256,764,000
Apiary Products	n/a	\$17,018,000
<i>Subtotal (Livestock)</i>	<i>n/a</i>	<i>\$355,022,000</i>
Total (Crop and Livestock)	866,226	\$2,477,716,000

* Acreage figure does not include rangeland (1,974,000 acres).

Source: Kern County Agricultural Commissioner, *Kern County Crop Report – 2003*, available from website: http://www.co.kern.ca.us/kernag/crop00_09/crop03/contnts.htm.

Agriculture contributed a further \$1.8 billion in output and 27,600 jobs to the Kern County economy in 2003 through indirect and induced impacts.⁸⁵ Thus, the total economic impacts on Kern County of the agricultural and related sectors in 2003 were over \$4.2 billion of output and 58,500 jobs (see Table 5). This represents about 15 percent of total output for all industries in Kern County, and nearly one-fifth of the county's total employment.⁸⁶

Table 5
Regional Economic Benefits of Agricultural Production in Kern County

Industry	Output (\$millions)		Income (\$millions)		Employment (jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	\$2,478	\$2,869	\$736	\$904	30,900	45,150
Mining	\$0	\$87	\$0	\$15	0	350
Construction	\$0	\$49	\$0	\$29	0	500
Manufacturing	\$0	\$166	\$0	\$13	0	300
Transportation and Public Utilities	\$0	\$161	\$0	\$41	0	1,000
Trade	\$0	\$315	\$0	\$137	0	4,700
Finance, Insurance, and Real Estate	\$0	\$275	\$0	\$45	0	1,400
Services	\$0	\$280	\$0	\$146	0	4,900
Government	\$0	\$24	\$0	\$9	0	150
Other*	\$0	\$2	\$0	\$1	0	50
Total	\$2,478	\$4,227	\$736	\$1,341	30,900	58,500

* "Other" consists primarily of domestic services (such as cleaning and maid services).

Note: Numbers may not sum due to rounding.

Source: Input-Output model for the Kern County economy developed using IMPLAN software and databases from MIG, Inc., with modifications and interpretation by NEA.

In 2002, nearly 812,000 acres of Kern County farmland were irrigated.⁸⁷ The average size of the 2,147 farms in the county that year was 1,272 acres, but the median size was 167 acres, with the majority of farms (57 percent) smaller than 180 acres. Virtually all cropland harvested in Kern County is irrigated because of limited precipitation and high temperatures during the growing seasons for most crops. In

⁸⁵ Additional output calculated as \$4.3 billion (from Table 5) less \$2.5 billion; and additional employment calculated as 58,500 (from Table 5) less 30,900.

⁸⁶ Employment data and output comparison based on input-output model for the Kern County economy developed by NEA using IMPLAN software and databases from MIG, Inc.

⁸⁷ U.S. Department of Agriculture, 2004, *2002 Census of Agriculture – County Data, California*, Washington, D.C.

2002, over 789,000 acres of harvested cropland and 22,000 acres of pasture were irrigated. Sources of water in the county include SWP, Central Valley Project (CVP), Kern River, other local streams, and groundwater. Several water agencies serve the area, shown in Map 2 (see Map Attachment). Generally, farms in the eastern areas of the county have access to groundwater as well as surface water. Those on the west side usually have access to surface water only, other than their access to groundwater through the Kern Water Bank.

As shown in Table 4, the acreage and value of crops vary considerably by type. For example, fruit and nut crops accounted in that year for 32 percent of total crop acreage, but 45 percent of total agricultural (both crop and livestock) value. Field crops accounted for 56 percent of total crop acreage, but 16 percent of total agricultural value. The production of each crop requires multiple inputs, including seed, fertilizers and chemicals, labor, machinery, water, and finance. Annual water use depends on the type of crop, with wheat and other grains requiring about 1.5 AF per acre, cotton about 2.5 AF per acre, fruits and nuts from 3.0 to 4.5 AF per acre, and alfalfa about 4.5 AF per acre.⁸⁸ If an average of 3.0 AF per acre is assumed as a representative irrigation rate for all irrigated harvested cropland of 789,000 acres, then it can be reasonably estimated that irrigation water use in Kern County exceeds 2.3 million AF per year.

Each proposed CHU location was visited in June 2004 to identify current land uses in the area. It was found that a variety of crops are grown on land adjacent or proximate to some of the proposed CHUs. Field, hay, and grain crops were found to the north, east, and west of the Kern Lake Preserve CHU. Nursery and berry crops were found to the north and south, and field crops to the south of the Kern Fan Water Recharge CHU. Deciduous fruits and nuts were found to the northwest, north, and southeast of the Goose Lake CHU. Field crops and grain and hay crops were found to the north and east of the Goose Lake CHU.

5.2 RETROSPECTIVE COSTS

To date, the impacts on Kern County agriculture of the listing of the BVLS have been minimal. Federal or State permits are not required for most farm operation activities undertaken in Kern County, as elsewhere, such as disking, preparation, pruning and thinning, and harvesting. The use of pesticides, however, does require a permit from the County Agricultural Commissioner, which implements regulations of the U.S. EPA and California DPR. Users who comply with restrictions on pesticide labels or from the Agricultural Commissioner would not be in danger of violating ESA regulations relative to incidental take due to pesticides; these procedures have not varied with announced changes in the

⁸⁸ University of California Cooperative Extension Service, Davis, production budgets for various crops, various years: 1999, "Sample Costs to Produce Wheat, San Joaquin Valley, Double Cropped;" 2003, "Sample Costs to Establish an Almond Orchard and Produce Almonds, San Joaquin Valley South, Micro-Sprinkler Irrigation;" 1998, "Sample Costs to Establish a Vineyard and Produce Table Grapes, San Joaquin Valley, Thompson Seedless Variety;" 2004, Sample Costs to Establish and Produce Pistachios, San Joaquin Valley, Low-Volume Irrigation;" and 2003, "Sample Costs to Establish and Produce Alfalfa, San Joaquin Valley, 300 Acre Planting."

regulations, implementing the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), published August 5, 2004.⁸⁹ In addition, discussions with staff at Wheeler Ridge-Maricopa Water Storage District and University of California Cooperative Extension Service indicate that few, if any, farmers have made adjustments to their operations as a result of the listing of the BVLS.⁹⁰

5.3 PROSPECTIVE OR FUTURE COSTS

Three of the proposed CHUs, Goose Lake, Kern Fan Water Recharge, and Kern Lake, are adjacent to cropland. The map of the KNWR CHU provided by the Service shows that parts of that CHU are within a mile of cropland.⁹¹ Another map provided by the Service showed that parts of the Coles Levee CHU are within three miles of cropland. Crops most commonly grown on areas adjacent or proximate to the CHUs are field, grain and hay, nursery crops, and fruit and nut orchards. Field and grain and hay crops make up most of the acreage.⁹²

The primary agricultural issues related to the BVLS are the possibilities of incidental take by pesticide application or drift, and runoff of contaminated surface water from cropland or dairies. In its final rule listing the BVLS, the Service stated that the species is exposed to wide-scale use of pesticides throughout its range.⁹³ It noted that the BVLS could be exposed to lethal and sublethal doses of pesticides from both drift and direct spraying of crops, canals, ditch banks, wetland or riparian edges, and roadsides where the species exists. However, farmers who control field run-off and use best management practices (BMPs) with pesticides, including following label directions, are not likely to face further restrictions on those products because the BVLS exist on the CHUs under current practices.

The U.S. EPA, through the California DPR, has issued interim guidelines on pesticide use for all counties in California.⁹⁴ Information in the guidelines is noted as being similar to what the U.S. EPA expects to distribute when the Endangered Species Protection Program is in effect. The guidelines note that until

⁸⁹ U.S. Fish and Wildlife Service and NOAA Fisheries, August 5, 2004, "Joint Counterpart Endangered Species Act Section 7 Consultation Regulations," *Federal Register*, Vol. 69, No. 150, p. 47732-47762, and personal communication with California Department of Pesticide Regulation, August 17, 2004.

⁹⁰ Personal communication with Robert Kunde, Wheeler Ridge-Maricopa Water Storage District, June 28, 2004; and personal communication with Blake Sanden, University of California Cooperative Extension Service, October 8, 2004.

⁹¹ Based upon NEA analysis of GIS maps.

⁹² Based upon NEA site visits and NEA analysis of California Department of Water Resources GIS coverages of land use.

⁹³ U.S. Fish and Wildlife Service, March 6, 2002, "Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule," *Federal Register*, Vol. 67, No. 44, pp. 10110.

⁹⁴ See, for example, U.S. Environmental Protection Agency, March 2000, "Protecting Endangered Species: Interim Measures for Use of Pesticides in Kern County," Pesticides and Toxic Substances (H-7506C).

that time, compliance with pesticide label requirements would satisfy all legal requirements relative to pesticides and endangered species protection. The guidelines were issued to ensure that the use of pesticides registered by U.S. EPA will not harm threatened or endangered species or their critical habitat. At the time they were issued, the final listing for the BVLS had not been completed, and the species was not included in the guidelines. The guidelines, when finalized, will include any pesticide restrictions specific to the BVLS.⁹⁵

The interim guidelines include tables of pesticide active ingredients and maps that show the areas of the subject county for which restrictions apply. The restrictions are grouped according to such criteria as type of pesticide (herbicide, insecticide, fungicide, or rodenticide); type of species (aquatic animal, dicotyledonous plant, monocotyledonous plant, insect, carnivorous or granivorous birds, and specific terrestrial species such as the kit fox and kangaroo rats), and active ingredients in the products. Maps in the publication for Kern County indicate that all of the BVLS CHUs are within the areas for which the guidelines apply.⁹⁶ The Kern County guidelines do not include the BVLS, but do include the Valley Elderberry Longhorn Beetle, Blunt-nosed Leopard Lizard, San Joaquin Kit Fox, Tipton Kangaroo Rat, Vernal Pool Fairy Shrimp, San Joaquin Adobe Sunburst, Giant Kangaroo Rat, Western Snowy Plover, and Desert Tortoise. It is unclear whether the BVLS will be subject to similar restrictions as other species included when revised guidelines are issued.

The interim guidelines list restrictions on terrestrial species only for rodenticides. Insecticide, herbicide, and fungicide restrictions relative to terrestrial species are not included. The Service has given its approval only for the rodenticide restrictions.⁹⁷ Until a section 7 consultation is completed, the final form of the restrictions, including the approval of the Service, is unknown. However, assuming the restrictions for insecticides applied to the BVLS, the impacts on farming for some types of products could increase because the BVLS feeds on insects. For example, applications of some sprayable or dust formulations, when air currents are moving toward habitat, are not to be made within 40 yards of habitat with ground application or 200 yards with aerial application. The Guidelines point out that the County Agricultural Commissioner may reduce or waive such buffer zones if there is an adequate hedgerow, windbreak, riparian corridor, or other physical barrier which substantially reduces the likelihood of drift.

For this analysis, it is assumed that a 15-yard buffer would provide ample area for placing a hedgerow or some other physical barrier to reduce or eliminate drift. If a turning area of 20 feet is assumed for farm equipment,⁹⁸ an additional 25 feet would be adequate for the development of a buffer strip.

⁹⁵ Personal communication with Rich Marovich, California Department of Pesticide Regulation, October 11, 2004.

⁹⁶ U.S. Environmental Protection Agency, March 2000, "Protecting Endangered Species: Interim Measures for Use of Pesticides in Kern County," Sacramento.

⁹⁷ Personal communication with Rich Marovich, California Department of Pesticide Regulation, June 24, 2004.

⁹⁸ Personal communication with Joe Grant, University of California Cooperative Extension Service, August 19, 2004.

BVLS may migrate from critical habitat onto farmland. If that occurred and a farmer “takes” a BVLS incidental to his or her farming operations, assuming no HCP or other agreement is in place for the farmland, the farmer would be in violation of section 9 of the Act. Given the implications of such a violation, it is assumed for this analysis that farmers with land adjacent to the proposed CHUs (i.e., Goose Lake, Kern Fan Water Recharge, and Kern Lake) would need to implement measures to minimize the probability of incidental take. Conversations with local farm advisors and staff in irrigation districts suggest that farmers have not changed their operations because of the listing of the BVLS. However, it may be the case that the proximity of designated critical habitat to farmers’ cultivated fields would result in additional prudence to reduce the possibility of incidental take. It is assumed that they do so by idling part of their land adjacent to the critical habitat to serve as a buffer zone.

The final rule listing the BVLS reported that selenium toxicity is a serious threat to the continued existence and recovery of the species.⁹⁹ Selenium is present at elevated concentrations in western San Joaquin Valley soils and has been concentrated in shallow groundwater as a result of leaching due to irrigation. The Service reports that the element may enter the BVLS food chain by becoming concentrated in insects that forage on vegetation or reside in soils which concentrate the salts. The buffer zones discussed above are not in response to the potential hazard to the BVLS from selenium, however.

The Service also reported in the final rule listing the BVLS that liquid and solid manure from dairies, beef cattle, swine, and poultry operations in the Tulare Basin are an additional potential source of selenium exposure, and that the potential of additional exposure to toxic levels of the element appears to be increasing.¹⁰⁰ It reports that selenium, which may be used as a supplement in livestock feed, can accumulate by land applications of manure and that a form of the element is easily transported to aquatic ecosystems where it can bioaccumulate to toxic levels. The Service states that the BVLS and its prey could be exposed to potentially toxic levels of the element from the application of manure around the aquatic and moist habitats that support them.¹⁰¹

In subsequent discussions, the Service has indicated that, regarding dairies and BVLS, the focus of conservation activities is on reducing surface runoff, reducing selenium concentration, and implementing BMPs.¹⁰² The implications for individual dairy operations are likely to be minor. Dairy wastewater and manure handling are under regulations of the U.S. EPA and the State and Regional Water Quality Control Boards. One of the requirements of these regulations is that discharges of wastewater to disposal fields are not to result in surface runoff from those fields and are to be managed to minimize percolation to

⁹⁹ U.S. Fish and Wildlife Service, March 6, 2002, “Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule,” *Federal Register*, Vol. 67, No. 44, pp. 10107-10108.

¹⁰⁰ *Ibid.*, pp. 10109-10110.

¹⁰¹ *Ibid.*, p. 10109.

¹⁰² Personal communication with Service personnel, June 2004.

groundwater.¹⁰³ Application of wastewater to cropland is to be “at a reasonable rate,” meaning that the quantities of nutrients in the animal wastes are not to exceed the nutrient requirements of the crops on which the wastes are applied. The Service has indicated that dairies operated according to BMPs have allowed the BVLS to exist in the locations where they have been found. Consequently, for this analysis, it is assumed that dairy operations are not affected by conservation activities for the BVLS. None of the proposed CHUs are adjacent to dairies. In addition, assuming dairies are currently in compliance with regulations on runoff containment and manure spreading, no additional restrictions should be required because of the BVLS.

5.3.1 DEVELOPMENT AND COST OF BUFFER ZONES

5.3.1.1 Foregone Crop Production

For this analysis, it is assumed that a buffer zone of 45 feet is established between cultivated cropland and designated critical habitat. Assuming machinery turnaround area of 20 feet,¹⁰⁴ an additional 25 feet is assumed to be included in the buffer to allow for the establishment and maintenance of suitable vegetation and for any maintenance activities required on the ground.

An estimate of the linear feet of cropland adjacent to proposed CHUs was developed using GIS analysis on preliminary maps of the proposed CHUs provided by the Service and land use maps from the U.S. Department of Agriculture, Natural Resources Conservation Service. The number of feet of cropland adjacent to proposed CHUS was multiplied by 45 feet, the assumed buffer, to develop estimates of the number of square feet of each affected crop type. The number of square feet for each crop was then divided by 43,560 to calculate the number of affected acres. The results are shown in Table 6. For example, there are estimated to be 7,097 linear feet of field crops adjacent to the Kern Lake CHU. Multiplying this figure by 45 feet, the assumed crop buffer size, yields 319,365 square feet, or 7.3 acres, of affected crop land that could otherwise be used to grow field crops.

As cropland is set aside for the establishment of buffer zones, the stream of income that would have been produced by that land will be lost. The farm-level impact of this loss is expressed as gross margin (i.e., gross revenue less variable costs of production less rent).¹⁰⁵

¹⁰³ California Regional Water Control Board, Central Valley Region, undated, “Dairy Waste Management for Protection of Water Quality,” Fact Sheet No. 2 for Dairies, http://www.swrcb.ca.gov/~rwqcb5/available_documents/dairies/factsheet2.pdf.

¹⁰⁴ Personal communication with Joe Grant, University of California Cooperative Extension Service, August 19, 2004.

¹⁰⁵ Gross margin is calculated as gross value of production less variable costs. Fixed costs such as interest and taxes must be paid regardless of the use of the land and thus are excluded from the figures. Rent is deducted from gross margin because the establishment of the buffer zones will remove that land from production.

Table 6
Estimation of Idled Acreage for Buffer Adjacent to Critical Habitat, by Crop and CHU

Measure and CHU	Field Crops	Vegetables	Fruits/Nuts	Hay/Grain	Total
Linear Feet					
Kern Lake	7,097				7,097
Kern Fan	1,812	6,079			7,891
Goose Lake	6,480		2,638	6,200	15,318
Total	15,389	6,079	2,638	6,200	30,306
Square Feet					
Kern Lake	319,365				
Kern Fan	81,540	273,555			355,095
Goose Lake	291,600		118,710	279,000	689,310
Total	692,505	273,555	118,710	279,000	1,363,770
Acres					
Kern Lake	7.3				7.3
Kern Fan	1.9	6.3			8.2
Goose Lake	6.7		2.7	6.4	15.8
Total	15.9	6.3	2.7	6.4	31.3

Note: Totals shown may differ from sums because of rounding.

Table 7 shows, by type of crop, the number of acres of buffer zone likely to be required; per acre gross production value, variable costs, rent, and gross margin less rent, and total foregone gross margin less rent. Representative crops include cotton, processing tomatoes, almonds, and alfalfa for field, vegetable, permanent, and hay crops, respectively. For example, 15.9 acres of field crops would be idled (as shown above), each at a gross margin less rent of \$247. Total foregone margin less rent of the idled field crops would therefore be \$3,927 per year. Values for all crops, calculated similarly are estimated at \$1,803 for the Kern Lake CHU, \$9,314 for the Kern Fan Water Recharge CHU, and \$3,707 for the Goose Lake CHU. Total annual foregone gross margin less rent for all CHUs is estimated to be \$14,824.

Table 7
Acres and Annual Gross Value, Variable Costs, Rent, and Foregone Gross Margin Less Rent of Crop Production Foregone, by Crop Type and CHU

CHU/Crop Type	Acres	Per Acre				Total Gross Margin Less Rent
		Gross Value	Variable Costs	Rent	Gross Margin Less Rent	
Kern Lake						
Field Crops	7.3	\$1,102	\$730	\$125	\$247	\$1,803
Subtotal	7.3	\$1,102	\$730	\$125	\$247	\$1,803
Kern Fan						
Field Crops	1.9	\$1,102	\$730	\$125	\$247	\$469
Vegetables	6.3	\$3,146	\$1,617	\$125	\$1,404	\$8,845
Subtotal	8.2					\$9,314
Goose Lake						
Field Crops	6.7	\$1,102	\$730	\$125	\$247	\$1,655
Permanent	2.7	\$2,969	\$2,168	\$342	\$459	\$1,239
Hay/Grain	6.4	\$771	\$519	\$125	\$127	\$813
Subtotal	15.8					\$3,707
Total (All Units)	31.3					\$14,824

Note: Totals shown may differ from sums because of rounding.

Sources for gross values, variable costs, and rent:

Field crops: Gross value from Kern County Agricultural Commissioner, 2004, "Annual Crop Report," average of upland/acala and pima cotton. Variable costs and rent from University of California Cooperative Extension, 2003, "Sample Costs to Produce Cotton, Acala Variety, 40-Inch Row, San Joaquin Valley," Davis.

Vegetables: Gross value from Kern County Agricultural Commissioner, 2004, "Annual Crop Report," figures for potatoes. Variable costs from University of California Cooperative Extension, 2002, "Sample Costs to Produce Processing Tomatoes," Davis. Rent assumed equal to that for cotton, since vegetables and cotton are often grown in rotation.

Permanent crops: Gross value from Kern County Agricultural Commissioner, 2004, "Annual Crop Report," figures for almonds. Variable costs from University of California Cooperative Extension Service, 2003, "Sample Costs to Establish an Almond Orchard and Produce Almonds, San Joaquin Valley South, Micro-Sprinkler Irrigation," Davis. Rent based on land value and interest rate from University of California, Ibid., annualized for 30-years assumed orchard life.

Hay: Gross value from Kern County Agricultural Commissioner, 2004, "Annual Crop Report," figures for alfalfa. Variable costs from University of California Cooperative Extension Service, 2003, "Sample Costs to Establish and Produce Alfalfa," Davis. Rent assumed equal to that for cotton, since alfalfa and cotton are often grown in rotation.

5.3.1.2 Establishment and Ongoing Costs

In addition to foregone crop production, there are costs associated with the development of the buffer zones. The farm advisor for Kern County noted that many permanent crop and vegetable crop growers use pomegranate trees to keep people out of their fields.¹⁰⁶ The trees have very thick, thorny foliage and are very effective for that purpose. The trees would also likely serve as effective buffers to contain pesticides because they have a large amount of leaf surface. Trees with an average height of five to seven feet sell for approximately \$10 apiece. A supplier of the trees recommends spacing of 10 feet by 10 feet when the trees are used for hedgerows.¹⁰⁷

The costs for establishing the buffer zones are shown in Table 8. The number of trees required for each CHU is found by dividing the linear feet of cropland in the buffer for that CHU by 10 feet, the assumed spacing between trees. Thus, for example, the Kern Fan Water Recharge CHU, with 7,891 linear feet of buffer, would require 790 trees, including one at each end. The cost of the trees is the product of the number of trees and \$10, the estimated unit price.¹⁰⁸ The cost of land preparation is found by dividing the square feet per acre by the total space required per tree, which provides an estimate of the number of trees required per acre, then using a land preparation charge of \$899 per acre.¹⁰⁹ Using the recommended 10 feet by 10 feet spacing, each tree requires 100 square feet. For an acre (43,560 square feet), 436 trees would be required. Land preparation costs are thus estimated to be \$2.06 per tree. Thus, for example, land preparation costs for the 790 trees required for the Kern Fan unit would be (at \$2.06 per tree) \$1,627.

¹⁰⁶ Personal communication with Martin Viveros, Kern County Farm Advisor, June 28, 2004.

¹⁰⁷ Personal communication with L.E. Cooke Nursery, Visalia, June 28, and August 11, 2004.

¹⁰⁸ Average delivered price, based on personal communication with Martin Viveros, Kern County Farm Advisor, June 28, 2004.

¹⁰⁹ Land preparation includes such activities as chiseling, disking, floating, irrigating, and raking. Because a current crop production budget for pomegranates was not available, the figure shown is based on an average of such charges for other permanent crops grown in Kern County, including oranges, almonds, and pistachios. University of California Cooperative Extension, 2002, "Sample Costs to Establish an Orange Orchard and Produce Oranges, San Joaquin Valley-South, Low Volume Irrigation," OR-VS-02; University of California Cooperative Extension, 2003, "Sample Costs to Establish an Almond Orchard and Produce Almonds, San Joaquin Valley South, Flood Irrigation," AM-VS-03-1; University of California Cooperative Extension, 2003, "Sample Costs to Establish an Almond Orchard and Produce Almonds, San Joaquin Valley South, Micro-Sprinkler Irrigation," AM-VS-03-2; and University of California Cooperative Extension, 2004, "Sample Costs to Establish and Produce Pistachios, San Joaquin Valley, Low-Volume Irrigation," PI-SJ-04. Figures from the 2002 and 2003 budgets were indexed to 2004 using the U.S. Department of Agriculture Index of Farm Prices Paid, <http://www.usda.gov/nass/graphics/data/paid.txt>.

**Table 8
Establishment Costs for Buffer Zones, by CHU**

CHU	Linear Feet of Cropland	Number of Trees Required	One-Time Tree Cost	One-Time Land Preparation Cost
Kern Lake	7,097	711	\$7,110	\$1,465
Kern Fan	7,891	790	\$7,900	\$1,627
Goose Lake	15,318	1,533	\$15,330	\$3,158
Total	30,306	3,034	\$30,340	\$6,250

The annual cost equivalents for the establishment costs and recurring annual costs for cultural operations are shown in Table 9. The annual amortized costs for the one time expenses of the trees and land preparation are found by assuming a 30 year life for the trees and an interest rate of 6.23 percent.¹¹⁰ It is reported as the USDA’s ten-year average of California’s agricultural sector long-run rate of return to production assets from current income. For example, the annual amortized cost of trees for the Goose Lake unit, \$1,141, is found by calculating the uniform annual payment over 30 years at 6.23 percent of a one-time payment of \$15,330, i.e., \$10 for each of 1,533 trees.

**Table 9
Annual Costs for Establishment of Buffer Zones, by CHU**

CHU	Amortized Tree Cost	Amortized Land Preparation Cost	Annual Cultural Cost	Total Annual Cost
Kern Lake	\$529	\$109	\$2,746	\$3,384
Kern Fan	\$588	\$121	\$3,051	\$3,760
Goose Lake	\$1,141	\$235	\$5,921	\$7,297
Total	\$2,258	\$465	\$11,718	\$14,441

Note: Totals shown may differ from sums because of rounding.

Other annual costs include such cultural activities as pruning, fertilizing, irrigating, and frost protection. Production budgets for oranges, almonds, and pistachios, noted previously, were used to estimate these costs, \$1,684 per acre. The annual cultural cost per tree in the buffer zone was found by dividing the per acre figure by 436, resulting in \$3.86 per tree. Thus, for example, the annual cultural costs for the Kern Lake CHU would be for 711 trees at \$3.86 per tree, or \$2,746.

¹¹⁰ Because a current or recent production budget for pomegranates was not available, the interest rate, used to amortize establishment cost to an annual cost, is taken from a 2004 production budget for the establishment of and production from a pistachio orchard. University of California Cooperative Extension, 2004, “Sample Costs to Establish and Produce Pistachios, San Joaquin Valley-South, Low Volume Irrigation,” PI-SJ-04.

5.4 SUMMARY OF DIRECT EFFECTS ON AGRICULTURE

This section summarizes the estimated direct economic effects on Kern County agriculture of conservation activities for the BVLS. The quantified effects include the following:

- Lost value of income stream from land used for buffers; and
- Cost of setting up buffers, including annual amortized costs of trees and labor for planting trees, pruning, thinning, and other cultural practices.

The total annual costs attributable to the buffer zones include the sum of value of foregone crop production, amortized tree and land preparation costs, and annual cultural costs. These figures are shown in Table 10, by CHU. The largest effect would be \$13,100 for the Kern Fan Water Recharge CHU, with \$11,000 for the Goose Lake CHU, and \$5,200 for the Kern Lake CHU. The annual total for the three CHUs combined is \$29,300.

Table 10
Total Annual Costs Attributable to Buffer Zones, by CHU

CHU	Foregone Crop Production	Amortized Establishment	Cultural	Total
Kern Lake	\$1,803	\$638	\$2,746	\$5,187
Kern Fan	\$9,314	\$709	\$3,051	\$13,074
Goose Lake	\$3,707	\$1,376	\$5,921	\$11,004
All Units	\$14,824	\$2,723	\$11,718	\$29,265

Note: Totals shown may differ from sums because of rounding.

Table 11 contains the estimated costs to agriculture due to BVLS conservation measures for the 20-year prospective period. The prospective annual costs for each CHU are the sum of those related to foregone gross margin less rent and to establishment costs for buffer zones. For example, the prospective annual cost of \$13,074 for the Kern Fan Water Recharge CHU is the sum of \$9,314 of foregone (gross margin less rent) attributable to agricultural production and \$3,760 of annualized establishment costs. The largest prospective total costs are for the Kern Fan Water Recharge CHU, \$194,512 at a three percent discount rate and \$138,509 at a seven percent rate.

Table 11
Summary of Costs to Agriculture, by CHU

CHU	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Kern Lake	\$0	\$77,172	\$54,953	\$5,187
Kern Fan	\$0	\$194,512	\$138,509	\$13,074
Goose Lake	\$0	\$163,712	\$116,577	\$11,004
All Units	\$0	\$435,396	\$310,039	\$29,265

Note: Totals shown may differ from sums because of rounding.

5.5 DISTRIBUTIONAL EFFECTS: SECONDARY AND REGIONAL IMPACTS

Based upon the quantified impact estimates provided above, the secondary and regional effects of the changes in agricultural activities are minimal. As shown, the development of buffer zones along agricultural fields adjacent to proposed CHUs would result in idling the equivalent of 31 acres of land, with 16 acres in field crops, six each in vegetables and hay/grain, and three in permanent crops, with an aggregate estimated annual gross margin less rent of about \$14,800 (see Table 7). Total annual gross value for these crops is approximately \$50,000, based on reports from the Kern County Agricultural Commissioner.¹¹¹ Total gross production value for all Kern County crops in 2003 was \$2.1 billion (see Table 4), and the foregone production value would therefore be 0.0024 percent of the total.¹¹² Relative to all of Kern County, with total irrigated crop land exceeding 800,000 acres annually, 0.003 percent of permanent crops may be affected. In addition, normal variation in total Kern County harvested cropland is 45,183 acres between years.¹¹³ That is, harvested cropland fluctuates by an average of 45,183 acres per year within the county. Thus, the effect of creating buffers with an equivalent cropland area of 31 acres would be small relative to total agricultural production in the area.

It is noted that idling any crop land may have third party impacts, in particular on farm labor and suppliers of farm inputs such as machinery, chemicals, and seed. However, it is likely that much or all of the labor displaced by the reduction in crop acreage would be used in preparation and maintenance of the buffer areas because trees require periodic maintenance, such as pruning, fertilizing, and weeding. Moreover, there would likely be some offsetting benefits to other affected third parties as trees are

¹¹¹ Calculated as the sum across proposed CHUs and crop types of the product of gross value per acre and the number of acres for each crop in Table 7.

¹¹² Data are only for crops in Table 4 and exclude livestock and apiary activities.

¹¹³ Based on crop reports from the Kern County Agricultural Commissioner for years 1985 through 2000. During that time, average cropland harvested was 838,731 acres, the standard deviation of acres harvested was 45,183, and the resultant coefficient of variation was (45,183)/(838,731), or 5.4 percent.

purchased and land is prepared to establish those zones. For example, the nurseries which sell the trees would benefit from the establishment of the buffer zones.

6.1 INTRODUCTION

6.1.1 FEDERAL CONSULTATIONS

The Service notes in the proposed CHD rule for the BVLS that Federal agencies already consult with the Service on activities in areas currently occupied by the BVLS.¹¹⁴ Agencies undertake these consultations to ensure that their activities do not jeopardize the continued existence of the BVLS. The proposed CHD rule reports that, in general, these activities may include, but are not limited to, the following:

1. Regulation of activities affecting U.S. waters by the U.S. Army Corps of Engineers under section 404 of the Clean Water Act;
2. Regulation of water flows, channelization, and similar activities;
3. Road construction, right-of-way designation, and regulation funded or permitted by the Federal Highway Administration;
4. Private landowners' voluntary conservation measures funded by the Natural Resources Conservation Service;
5. Regulation of airport improvement activities by the Federal Aviation Administration;
6. Licensing of construction of communication sites by the Federal Communications Commission; and
7. Funding of activities by the U.S. Environmental Protection Agency, Department of Energy, or any other Federal agency.

In the course of our investigation of economic effects, we found that only the second type of activity has been the subject of consultations between the Service and other Federal agencies relative specifically to the BVLS.¹¹⁵ These are discussed in sections 6.2 and 6.3 as they relate to conservation plans and potential need for supplemental water for CHUs.

¹¹⁴ U.S. Fish and Wildlife Service, August 19, 2004, "Proposed Designation of Critical Habitat for the Buena Vista Lake Shrew, Proposed Rule," *Federal Register*, Vol. 69, No. 160, p. 51426.

¹¹⁵ Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, October 6, 2004.

6.1.2 PRIVATE AND NON-FEDERAL EFFECTS

As noted earlier in section 2.2.2, various private and non-Federal entities have identified a number of potential effects of the BVLS listing and proposed CHD. These include maintenance and operation of irrigation canals, mosquito abatement, effects on oil and gas development, and flood control activities. The investigation and discussion associated with each of these categories of effects are presented in section 6.3.3 through 6.3.8.

In addition, representatives for the City of Bakersfield and water associations identified four categories of potential effects with respect to the Kern Fan Water Recharge CHU. The city owns the Kern Fan Water Recharge Area containing the proposed CHU, which is also adjacent to the Kern Water Bank. The Kern River flows through the CHU. The City raised concern over effects on their recharge operations, recharge operations of other entities, reservoir operation of Lake Isabella upstream on the Kern River, and changes in diversions by upstream water users on the Kern River.

We understand through discussions with persons knowledgeable about these concerns that they are in the very early stages of their own investigation. As such, the details associated with the concerns and the manner in which they could affect various entities have not yet been fully articulated.¹¹⁶ We are aware that the concern stems from anticipation of what the Service may require of the City or water users on the Kern River in terms of protection for the BVLS as a result of CHD. The Service has indicated that it does not anticipate requiring any new activities if operations continue as they have in the past.¹¹⁷ As such, we do not have sufficient information at this time to address the specific issues regarding the Kern Fan Recharge CHU, and have not developed costs. We seek public comment that will assist us in fully addressing these cost categories.

6.2 RETROSPECTIVE COSTS

The available information indicates that entities in Kern County that may be burdened by future conservation efforts for the BVLS have not been measurably affected to date by the listing of the species. Retrospective costs attributable to conservation activities for the BVLS are not measurable for such activities as irrigation canal and flood channel maintenance and mosquito abatement because the listing of the BVLS itself has not yet caused entities to operate differently.¹¹⁸

Retrospective costs can be estimated for the proposed KNWR and Goose Lake CHUs because of the ongoing conservation-related activities at those locations. Federal retrospective costs at the KNWR CHU are associated with preparation of the Comprehensive Conservation Plan (CCP) and Environmental

¹¹⁶ Personal communication with David Sunding, Charles River Associates, contractor to the City of Bakersfield, October 15, 2004.

¹¹⁷ Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, May 21, 2004.

¹¹⁸ Personal communication with Robert Kunde, Wheeler Ridge-Maricopa Water Storage District, June 28, 2004.

Assessment for that refuge. Retrospective Federal and private costs at the Goose Lake proposed CHU are associated with the formal section 7 consultation underway as part of the preparation of an HCP for the area. Both are discussed below or in Section 6.5.

6.2.1 GOOSE LAKE CHU

A project was initiated at Goose Lake in 2001 to convert land primarily in native vegetation and some previously-cultivated agricultural land to wetlands more favorable for waterfowl. The project proponent is Gooselake Holdings, in cooperation with Ducks Unlimited (DU) and SWSD. The project would include construction of spillways and other facilities for the enhancement of waterfowl habitat. The BVLS would be an indirect beneficiary of the project because the habitat created would benefit the BVLS.¹¹⁹ Surveys completed in late 2002 and 2003 revealed the presence of the BVLS.¹²⁰ A formal intra-Service section 7 consultation was initiated after the surveys were complete. The Service completed a draft BO for the Goose Lake area in September 2004.¹²¹ DU paid for survey work and coordination, and DU estimates total costs for that activity to date of \$35,000.¹²² SWSD estimates that its staff and miscellaneous costs to date have been \$10,000. Costs incurred by Gooselake Holdings for meetings and consultations were not available, but are estimated to be comparable to those of SWSD, \$10,000. SWSD estimates that its staff and miscellaneous costs to date have been \$10,000. Total non-Federal retrospective costs are thus estimated to be \$55,000. Federal government costs are shown in Section 6.5.

6.2.2 OTHER CHUS

Retrospective costs associated with the other CHUs relate to the Federal costs involved in researching and mapping the units. These costs are discussed in Section 6.5. The Service estimates that each unit required five days of a biologist's time, with each day costed at \$708.¹²³ Thus, Federal retrospective costs for each of the Kern Fan Water Recharge, Kern Lake, and Coles Levee CHUs are estimated to be \$3,540.

In addition, because the BVLS will be included in the Kern Valley Floor HCP, some of the costs of that Plan, both retrospectively and prospectively, may be allocated to the BVLS. Estimated non-Federal costs to date for the Kern Valley Floor HCP are \$450,000.¹²⁴ Because the Plan will cover 28 listed species for

¹¹⁹ Personal communication with Chris Hildebrandt, Ducks Unlimited, October 13, 2004.

¹²⁰ Personal communication with Chris Hildebrandt, Ducks Unlimited, October 11, 2004.

¹²¹ Personal communication with Chris Hildebrandt, Ducks Unlimited, June 29, 2004.

¹²² Personal communication with Chris Hildebrandt, Ducks Unlimited, October 13, 2004.

¹²³ Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, July 1, 2004.

¹²⁴ Personal communication with Ted James, Kern County Planning Department, June 28, 2004.

which there is no objective mechanism to allocate these costs, the BVLS share of the costs is estimated to be 1/28 of the total, or about \$16,100.

6.3 PROSPECTIVE COSTS

This section includes prospective costs, those likely future costs associated with the conservation activities associated with BVLS between 2004 and 2024. Prospective costs include estimated expenditures for the completion of the BO at Goose Lake and the expected completion of a new HCP at the Coles Levee CHU. In addition, they include impacts related to water requirements and surface water requirements in certain units. Other potential impact categories are discussed qualitatively.

6.3.1 GOOSE LAKE CHU

DU expects additional costs of \$3,000 to that organization from the time the draft BO was completed in June 2004 until the BO is finalized.¹²⁵ DU also expects costs of \$5,000 to \$10,000 for administrative and monitoring costs attributable specifically to the BVLS during construction of the enhanced waterfowl habitat, for which a midrange cost of \$7,500 is used in the analysis.¹²⁶ SWSD estimates a cost of \$10,000 of additional staff time during construction attributable specifically to the BVLS.

6.3.2 COLES LEVEE CHU

As discussed above, the HCP permit that was previously in place for the Coles Levee fields (and which did not include the BVLS) was not transferred when the fields were sold to a new owner; the HCP is no longer operative. From discussions with the Service and the consultants who prepared the previous HCP, there is some likelihood that either a new HCP or a management plan specifically for the BVLS, which would amend the existing HCP, will be developed for the fields. The costs for the HCP and management plan are assumed to be \$750,000 and \$50,000, respectively, as discussed in Section 1.8. Because there are eight Federally-listed species (including the BVLS) that would be covered by the new HCP, it is assumed that one-eighth of this cost would be attributable to the BVLS, i.e., \$93,750. Annual BVLS-related costs for HCP preparation are assigned 1/20 of this figure, or \$4,688, assuming a 20 year life for the HCP. If instead the existing HCP is amended with a management plan for the BVLS, then the annual cost would be 1/20 of the \$50,000 estimated cost, or \$2,500.

On an ongoing basis, some annual costs for the HCP (whether the old plan amended to include a management plan for the BVLS or a new plan) are relatively invariant with regard to the area covered, e.g., construction and maintenance of a database and education program and preparation of an annual report (estimated at \$25,000 by Quad Knopf). Other annual costs such as mammal surveys and trapping

¹²⁵ Personal communication with Chris Hildebrandt, Ducks Unlimited, June 29, 2004.

¹²⁶ Personal communication with Chris Hildebrandt, Ducks Unlimited, June 29, 2004.

and mapping are more closely related to the size of the area. Because the Coles Levee field covers 6,000 acres and an HCP in development in the Goose Lake area (outside the proposed critical habitat) covers 2,687 acres, it is assumed that the Coles Levee variable monitoring costs are a multiple of those for Goose Lake, i.e., $(6,000/2,687) = 2.23$. The total estimated monitoring costs for Coles Levee are thus assumed to be $\$25,000 + [2.23 * (\$67,144 - \$25,000)] = \$118,981$. Because eight Federally listed species would be covered by the HCP, the share of these annual monitoring costs attributable to the BVLS is \$14,873.

6.3.3 MAINTENANCE AND OPERATION OF IRRIGATION CANALS BY WATER DISTRICTS

Four of the five proposed CHUs are within or nearly adjacent to the service areas of water districts. The KNWR and Goose Lake CHUs are within the service area of SWSD, which receives SWP water through Kern County Water Agency (KCWA). The Coles Levee CHU is closest to West Kern and Henry Miller Water Districts, primarily to west and south, respectively, of the CHU. Both receive SWP water through KCWA. The Kern Lake CHU is within the service area of Kern Delta Water District, which also receives SWP water through KCWA.

Each district has a distribution system to convey water to its customers. The system must be capable of delivering water to farmers at the time and rate and for the required duration to meet crop water demands. The distribution system includes canals, some of which are unlined and which facilitate groundwater recharge. These canals annually require maintenance and repairs, which activities include, among others, control of vegetation in order to maintain efficient water delivery capacity. These activities are completed during the times of year when the canals are dry, i.e., prior to or after the irrigation season.

In addition, the proposed CHU for Goose Lake includes about one-half mile of SWSD canal and adjacent maintenance roads on both side of the canal. Annual SWSD maintenance expense for its approximate 40 miles of canals is about \$200,000, thus \$5,000 per mile and \$2,500 for one-half mile.¹²⁷ For the one-half mile of canal which includes CH for the BVLS, SWSD estimates an increment of 50 percent annually for increased diligence and maintenance attributable specifically to the BVLS. Thus, annual SWSD costs for canal maintenance, attributable specifically to the BVLS, would be \$1,250.

There could potentially be an effect on the water districts operating the irrigation canals if the Service requires changes in canal operation because of conservation activities for the BVLS. However, no information exists indicating whether or how such changes might be implemented.

¹²⁷ Personal communication with Drew Hamilton, SWSD, October 15, 2004.

6.3.4 MOSQUITO ABATEMENT

The Kern County Farm Bureau has asserted that the listing of the BVLS may cause significant restriction or prohibitions on certain activities, including mosquito abatement,¹²⁸ cited as well in the lawsuit filed by the Kern County Farm Bureau, Kern County Water Agency, and other parties following listing of the BVLS.¹²⁹ Stated objectives of the mosquito abatement districts within Kern County vary, but generally include the elimination of mosquito-breeding places, source reduction, and abatement. Typical abatement products are “Teknar,” “Methoprene,” “Golden Bear 1111,” and “Temephos.” Teknar is a bacterial toxin, Bti or *Bacillus thuringiensis israelensis*, which infects and kills mosquito larvae and black flies. Methoprene is a juvenile growth hormone, and both it and Teknar are permitted for use anywhere other than in potable drinking water.¹³⁰ Golden Bear 1111 is a spray product which coats water surfaces with a light oil and which suffocates mosquito pupa. It remains in the water for up to about four hours before evaporating. Teknar and Methoprene have been used in critical habitat locations, including those for small mammals such as the kangaroo rat.¹³¹ The Kern County Agricultural Commissioner notes that Teknar, Methoprene, and Golden Bear 1111 are permitted around small mammals.¹³²

Temephos is an organophosphate insecticide. It was registered by the U.S. EPA in 1965 to control mosquito larvae. It helps prevent mosquitoes from developing resistance to bacterial larvicides.¹³³ It is applied directly to water, and the U.S. EPA reports that it is not expected to have a direct impact on terrestrial animals or birds. Typically it is used as a larvicide only for sudden increases in the adult mosquito population.¹³⁴ Currently in Kern County, it is used infrequently. When applied, it is primarily for treatment of sewage treatment ponds and street drains.¹³⁵ In California, no organophosphates are currently labeled for control of adult mosquitoes.¹³⁶

¹²⁸ Kunde, Robert, Chair, Kern County Farm Bureau Endangered Species Committee, March 14, 2002, “Impacts of Listing the Buena Vista Lake Shrew (BVLS) as Endangered,” Bakersfield.

¹²⁹ California Farm Bureau Federation, April 10, 2002, “Listing of shrew prompts farm groups to file suit,” *Ag Alert*, Sacramento.

¹³⁰ Personal communication with Donald Black, West Side Mosquito and Vector Control District, Kern County, June 18, 2004.

¹³¹ *Ibid.*, July 8, 2004.

¹³² Personal communication with Kern County Agricultural Commissioner, Pesticide Desk, July 8, 2004.

¹³³ U.S. EPA, “What is Temephos?” <http://www.epa.gov/pesticides/factsheets/larvicides4mosquitos.htm>.

¹³⁴ Personal communication with Richard Takahashi, Kern Mosquito and Vector Control, June 18, 2004.

¹³⁵ Personal communication with Donald Black, West Side Mosquito and Vector Control District, Kern County, June 29, 2004.

¹³⁶ *Ibid.*

Restrictions on pesticide use due to the BVLS could affect agricultural producers. However, since the time of the listing, there have been no pesticide restrictions attributed to the BVLS. Given the current state of regulations, producers who follow pesticide labels will not be further impacted, and there is no reasonably foreseeable chance for future restrictions. Thus, this category is presented and discussed qualitatively only.

6.3.5 WATER REQUIREMENTS AND SURFACE WATER PURCHASES FOR HABITAT

6.3.5.1 KNWR

Since 2000, the U.S. Bureau of Reclamation has attempted to provide KNWR with a more reliable and consistent water supply in order to maintain wetland habitat for waterfowl and other wildlife, including the BVLS.¹³⁷ The Service has indicated that KNWR would need about 3.5 AF per acre for optimal management of habitat.¹³⁸ For this analysis, therefore, it is assumed that the 387 acres of BVLS critical habitat in the KNWR CHU would require 1,355 AF of supplemental water per year. It is assumed that this water will be provided by the U.S. Bureau of Reclamation as part of its program of purchasing water for wildlife refuges.

The cost of such water depends on many factors. For reported Central and Southern California transactions in 2003, the average one-year lease price was \$206 per AF, with a range of \$65 to \$352 per AF. The average permanent sale price was \$1,332 per AF, with a range of \$1,000 to \$1,600 per AF.¹³⁹

Using the range of annual lease costs for surface water of \$65 to \$352 per AF, total annual surface water purchases for the 387 acres of BVLS critical habitat in KNWR, using 3.5 AF per acre, are estimated to range from about \$88,100 to \$477,000. At the midpoint of that range, \$209 per AF, total annual costs would be about \$283,200. At \$209 per AF, the midpoint of that range, total prospective costs are estimated at about \$4,213,200 and \$3,000,200 at three and seven percent discount rates, respectively (see Table 12).

¹³⁷ U.S. Fish and Wildlife Service, March 6, 2002, "Endangered Status for the Buena Vista Lake Shrew (*Sorex Ornatus Relictus*), Final Rule," *Federal Register*, Vol. 67, No. 44, p. 10106.

¹³⁸ Personal communication with Service Manager, Kern National Wildlife Refuge, June 8, 2004.

¹³⁹ Stratecon, February 2004, "Water Strategist," Claremont, CA.

Table 12
Estimated Annual Volume and Cost of Surface Water Required
for BVLS Habitat, KNWR CHU

Unit	Acres of Habitat	Total AF @ 3.5 AF/Acre	Annual Cost @ \$209/AF	Prospective (Total)	
				3%	7%
KNWR	387	1,355	\$283,195	\$4,213,226	\$3,000,172

6.3.5.2 Kern Fan Water Recharge Unit

The Kern Fan Water Recharge CHU is moist an average of two months per year across all water year types. In some years, particularly dry years, there may be no water recharged.¹⁴⁰ While the Service has indicated that the presence of open water does not appear to be necessary for the survival of the BVLS, it also indicates that the availability of water contributes to improved vegetation structure and diversity. Those improve cover availability, and the presence of water attracts potential prey species for the BVLS.¹⁴¹ Because the BVLS currently lives in this CHU as it is currently operated, it is uncertain whether supplemental water would be required to conserve the species. In this analysis, an estimate is made of the cost of providing supplemental water, should it be necessary.

Wheeler Ridge-Maricopa Water Storage District (WRMWS D), which has wells near the area, indicates that the costs for groundwater pumping in the area, including energy and operations and maintenance, average \$40 to \$45 per AF.¹⁴² WRMWS D also indicates that a well and pump cost approximately \$450,000 and that a pump used continuously requires repair approximately every five years and is not repairable beyond some point. In addition, the District estimates that well casings have an average life of 30 years, although some may last longer. Considering both wells and pumps, a 20 year combined life is reasonable.¹⁴³ Total costs, assuming \$42.50 per AF for energy, operations, and maintenance (the midpoint of the \$40 to \$45 range estimated by WRMS D), and between \$8 and \$12 per AF for capital costs, would be \$50.50 per AF and \$54.50 per AF. These conditions are believed to be comparable to those which would be applicable for the Kern River Fan CHU. Prospective groundwater pumping costs are estimated as the midpoint, \$52.50 per AF.

Assuming 3.5 AF per acre required for habitat management, a total of 9,405 AF would be required per year. At 10 AF per acre, 26,870 AF would be required. Because the CHUs are in different areas, the

¹⁴⁰ Personal communication with Robert Kunde, Wheeler Ridge-Maricopa Water Storage District, July 1, 2004.

¹⁴¹ U.S. Fish and Wildlife Service, August 19, 2004, "Proposed Designation of Critical Habitat for the Buena Vista Lake Shrew, Proposed Rule," *Federal Register*, Vol. 69, No. 160, p. 51421.

¹⁴² Robert Kunde, Wheeler Ridge-Maricopa Water Storage District, June 18, 2004, personal communication.

¹⁴³ Well and pump cost and expected life from Robert Kunde, Wheeler Ridge-Maricopa Water Storage District, July 1, 2004, personal communication. Interest rate based on discount rate used in this analysis.

evapotranspiration (ET) of habitat in each is unknown. As an indication of the range, a recent publication shows estimated annual Kern County ET rates of 29.1 inches for miscellaneous field crops and 58.4 inches for grass.¹⁴⁴ The midpoint is 43 inches, or approximately 3.5 AF per acre, which is consistent with the lower number of the range estimated above. Thus, for this analysis, it is assumed that average evapotranspiration of habitat in the CHUs is 3.5 AF per acre. It is also assumed that irrigation efficiency averages 85 percent and that required water thus averages 4.1 AF per acre.¹⁴⁵ For 2,682 acres of habitat in the Kern Fan Water Recharge CHU, a total of 10,996 AF would be required per year. Assuming uniform monthly water requirements throughout the year and pumping for 10 of the 12 months, 9,163 AF of groundwater would need to be pumped to keep the habitat moist.

The cost of pumped groundwater for the Kern Fan Water Recharge CHU is shown in Table 13, based on an estimated average pumping cost of \$52.50 per AF.¹⁴⁶ Assuming this activity would be attributable solely to conservation measures for the Buena Vista Lake shrew, the annual cost is estimated at about \$481,000. The present value of those costs over 20 years would range from about \$7,157,000 to \$5,096,000 at three percent and seven percent interest rates, respectively.

Table 13
Estimated Annual Volume and Cost of Groundwater Pumped
for BVLS Habitat, Kern Fan Water Recharge Unit

Acres	2,682
Application Rate (AF per Acre per Year)	4.1
Total Water Required (AF per Year)	10,996
Groundwater Required (AF per Year) ^{a/}	9,163
Cost per AF	\$52.50
Total Annual Cost	\$481,058

a/ Assuming pumping is required for 10 months per year for 2,682 acres of designated critical habitat, and assuming surface water in recharge area two months per year.

¹⁴⁴ Irrigation Training and Research Center, California Polytechnic State University, 2003, “California Crop and Soil Evapotranspiration for Water Balances and Irrigation Scheduling/Design,” ITRC Report 03-001, San Luis Obispo.

¹⁴⁵ Based on representative crop production budgets and evapotranspiration estimates for alfalfa and irrigated pasture in the Central Valley of California. See University of California Cooperative Extension Service: 2003, “Sample Costs to Establish and Produce Alfalfa, San Joaquin Valley, 300 Acre Planting;” and Irrigation Training and Research Center, California Polytechnic State University, 2003, “California Crop and Soil Evapotranspiration for Water Balances and Irrigation Scheduling/Design,” ITRC Report 03-001, San Luis Obispo.

¹⁴⁶ Midpoint of \$50.50 per AF and \$54.50 per AF.

6.3.5.3 Purchase of Surface Water For Other CHUs

The purchase of water for the Buena Vista Lake shrew may affect federal agencies, particularly the U.S. Bureau of Reclamation, which frequently purchases and transfers water to refuges. The cost of such water depends on many factors. For reported Central and Southern California transactions in 2003, the average one-year lease price was \$209 per AF, with a range of \$65 to \$352 per AF. The average permanent sale price was \$1,332 per AF, with a range of \$1,000 to \$1,600 per AF.¹⁴⁷

The total area in all proposed CHUs is 4,649 acres. The Kern Fan Water Recharge CHU includes 2,682 acres, and the remaining CHUs include a total of 1,968 acres.¹⁴⁸ On the basis of an average application rate of 3.5 AF per acre per year in KNWR and 4.1 AF per acre per year in the Goose Lake, Coles Levee, and Kern Lake CHUs, a total of 7,488 AF of surface water would be required to keep habitat moist year round in those four CHUs (see

¹⁴⁷ Stratecon, February 2004, "Water Strategist," Claremont, CA.

¹⁴⁸ FR 69 51423, Table 1. Figures in Table 1 of that publication for KNWR and other individual units are as shown and sum to 4,650, although sum shown in table is 4,649.

Table 14).¹⁴⁹

The water requirement and cost for KNWR, 1,355 AF and about \$283,200 per year, are attributable exclusively to the BVLS. The water requirement and cost for the Kern Lake CHU, 20 AF and \$4,180 per year, are also attributable exclusively to the BVLS.¹⁵⁰ Based on the number of Federally-listed species in the Goose Lake and Coles Levee CHUs, it is assumed that one-tenth of the annual costs for these CHUs would be attributable to the Buena Vista Lake shrew, i.e., approximately \$109,200 and \$18,300, respectively, also at \$209 per AF. Total prospective surface water costs are estimated at about \$415,400 annually, or \$6,176,000 and \$4,398,000 at three and seven percent discount rates, respectively.

¹⁴⁹ Application rate for KNWR based on information provided by the Service Manager of KNWR. Application rates for other proposed CHUs as discussed previously.

¹⁵⁰ The quantity of 20 AF per year is taken from FR 67 10106.

Table 14
Estimated Annual Volume and Cost of Surface Water Required
for BVLS Habitat, KNWR, Goose Lake, Coles Levee, and Kern Lake CHUs

Unit	Acres of Habitat	Total Acre-Feet ^{a/}	Annual Cost @ \$209/AF	Prospective (Total)	
				3%	7%
KNWR	387	1,355	\$283,195	\$4,213,226	\$3,000,172
Goose Lake	1,277	5,236	\$109,171	\$1,624,183	\$1,156,555
Coles Levee	214	877	\$18,285	\$272,041	\$193,716
Kern Lake	90	20	\$4,180	\$62,188	\$44,283
All Units	1,968	7,488	\$415,137	\$6,176,186	\$4,397,964

a/ Assumes 3.5 AF per acre at KNWR and 4.1 AF per acre at other CHUs shown.

6.3.6 POTENTIAL EFFECTS ON OIL AND GAS DEVELOPMENT

Kern County is the largest producer in California of oil and natural gas. In 2002, the latest year for which data are available, Kern County produced 198.8 million barrels of oil and 209.4 trillion cubic feet of natural gas, representing 77 percent and 43 percent, respectively, of total California production that year.¹⁵¹ Energy production in Kern County is regulated by agencies at the county, State, and Federal levels. Land use and zoning are directed principally by the county, while the California Department of Oil, Gas, and Geothermal Resources (DOGGR) regulates drilling of all new wells and, as a lead agency for CEQA, requires that the applicant have a biological survey done.¹⁵² The results are provided to the Service. DOGGR also oversees testing wells for leakage or contamination of areas around wells and procedures for abandoning wells.

Two of the proposed CHUs are adjacent to or within areas of oil and gas exploration. Oil fields are located to the north, northwest, and northeast of the Kern River Fan Recharge CHU. The Coles Levee CHU is surrounded by oil fields, oil tanks, and related infrastructure. Wells proximate to the Kern River Fan Recharge CHU are in the “Kern River Field.” Production in 2002 from that field included 38.7 million barrels of oil and 585,000 cubic feet of natural gas.¹⁵³ The Coles Levee area is divided into two separate fields, Coles Levee North and Coles Levee South. The North field is the larger producer of oil

¹⁵¹ California Division of Oil, Gas, and Geothermal Resources, 2003, “2002 Annual Report of the State Oil and Gas Supervisor,” Publication PR06, Sacramento. Total state oil production was 257.6 million barrels and total state natural gas production was 485.3 trillion cubic feet.

¹⁵² Personal communication with Linda Campion, California Division of Oil, Gas, and Geothermal Resources, June 29, 2004.

¹⁵³ California Division of Oil, Gas, and Geothermal Resources, 2003, “2002 Annual Report of the State Oil and Gas Supervisor,” Publication PR06, Sacramento.

and the South field is the larger producer of natural gas. In 2002, production from the two fields included 256,761 barrels of oil and over 2.1 billion cubic feet of natural gas.

Access roads have been developed for the facilities in Coles Levee, and the roads are not considered to be critical habitat, and current operations have not been affected by the listing. In addition, it is difficult with available information to assess whether impacts from BVLS conservation efforts will be engendered in the future. For example, to the extent that these operations expand into critical habitat, it is unclear how or whether these expansions would be constrained. There are currently no wells in critical habitat, and no plans to add new pipelines.¹⁵⁴ We have not been able to confirm a requirement for increased maintenance around existing pipelines attributable to the BVLS. However, for purposes of this analysis, we apply increased diligence and maintenance attributable to the BVLS costs of \$2,000 per year along the four mile length of the Coles Levee CHU. This estimate is comparable to the cost of canal maintenance suggested by SWSD.

A multi-species HCP for the area, completed prior to the listing of the BVLS, expired several years ago. Currently, the new owners and operators are considering development of a new HCP or updating the previous HCP. Should a new HCP be developed, cost is expected to be approximately \$750,000 based on other completed HCPs and industry contacts. Assuming the permit will extend 20 years and cover eight Federally listed species, annual cost would be \$37,500, of which a pro rata share of \$4,688 could be assumed allocable to the BVLS.

6.3.7 EFFECTS ON RECREATIONAL VISITATION

Conservation efforts for the BVLS are not expected to have measurable impacts on recreation in Kern County. Waterfowl hunters in the KNWR use areas that are not included in the CHU, and it is not expected that non-consumptive wildlife activities will either increase or decrease because of conservation activities for the BVLS.¹⁵⁵

6.3.8 FLOOD RISKS

Flood channels are kept free of vegetation in order to provide maximum carrying capacity for flood water. No recommended or required changes to current flood control operations in any of the CHUs have been identified. However, several of the proposed CHUs include or are proximate to irrigation canals, e.g., Goose Lake, Kern Fan Water Recharge, and Kern Lake. To the extent that all canals in the area would convey water during flood events, there is a potential for a change in risk if canals operation change because of conservation activities for the BVLS. However, no information exists indicating whether or how such changes might be implemented.

¹⁵⁴ Personal communication with Mark Poe, AERA, June 29, 2004.

¹⁵⁵ Personal communication with Service Manager, Kern National Wildlife Refuge, June 29, 2004.

6.3.9 OTHER PROSPECTIVE COSTS

The prospective non-Federal costs of the Kern Valley Floor HCP, through completion of the Plan, are estimated to be \$70,000.¹⁵⁶ Because the Plan will cover 28 listed species for which there is no objective mechanism to allocate these costs, the BVLS share of the costs is estimated to be 1/28 of the total, or \$2,500. The annual costs attributable to the BVLS are 1/20 of this amount, or \$125.

6.4 DISTRIBUTIONAL EFFECTS: SECONDARY AND REGIONAL IMPACTS

The quantifiable secondary and regional impacts related to conservation activities for the BVLS are minimal. The principal effects will be on the agricultural sector and have been described and summarized in Section 5.0 of this report. The resultant impacts on Kern County agricultural or total output are likely to be immeasurable. Similarly, the secondary impacts of the non-agricultural impacts discussed above are likely to be minimal. However, as noted previously in this report, several potential impacts of conservation activities for the BVLS could not be quantified.

6.5 EFFECTS ON FEDERAL AGENCIES

This section summarizes the effects on Federal agencies of the BVLS conservation activities. The principal potential effects are the section 7 consultations and forthcoming BO for the Goose Lake area and purchases of surface water for KNWR.

6.5.1 GOOSE LAKE BO

The ongoing consultations for the Goose Lake area are part of a formal section 7 consultation. Meetings, initially informal but more recently formal, began about four years ago. A draft BO has been prepared, and the final report is expected later in the fall of 2004. Costs to the private sector of the consultation process have been described previously. The Service estimates that its costs to date for the consultations (retrospective costs), attributable specifically to the BVLS, have been \$24,000.¹⁵⁷ For prospective costs, it is assumed that an additional ten Federal person-days will be required to complete the consultations and ultimately to issue the BO and incidental take permit, or \$7,080.¹⁵⁸ The annual cost for each of the 20 years of the recovery period is \$354. The annual cost for each of the ten covered species is estimated to be \$35. Annual monitoring costs are estimated on the basis of five person-days, each at \$708, i.e., \$3,540. Costs attributable to the BVLS are assumed to be one-tenth of this amount or \$354 per year.

¹⁵⁶ Personal communication with Ted James, Kern County Planning Department, June 28, 2004.

¹⁵⁷ Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, July 2, 2004.

¹⁵⁸ Based on an assumed daily rate of \$708, including benefits and incidental expenses, for a Federal biologist. Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, June 30, 2004.

6.5.2 OTHER FEDERAL COSTS

Retrospective costs associated with the Kern Fan Water Recharge, Kern Lake, and Coles Levee CHUs relate to the Federal costs involved in researching and mapping the units. The Service estimates that each unit required five days of a biologist's time, with each day costing an average of \$708.¹⁵⁹ Thus, Federal retrospective costs for each of the Kern Fan Water Recharge, Kern Lake, and Coles Levee CHUs are estimated to be \$3,540. These costs are assumed to be attributable solely to the BVLS.

¹⁵⁹ Personal communication with Service Biologist, Sacramento Fish and Wildlife Office, July 1, 2004.

7.1 SUMMARY AND DISCUSSION OF FINDINGS

7.1.1 GENERAL

This economic analysis of conservation activities for the BVLS examined the impacts on agricultural production, groundwater pumping, surface water purchases, operation of irrigation canals, mosquito abatement, oil and gas production, and Federal agencies. The goal was to estimate impacts attributable to conservation efforts for the BVLS. Some of the anticipated impacts could be addressed quantitatively, while others could only be analyzed qualitatively because of limited or unavailable data, or an unreasonable level of speculation and assumptions that would be required for quantification.

Table 15 summarizes the types of impacts considered and whether for this report they are analyzed quantitatively or qualitatively.

Table 15
Types of Impacts Considered Quantitatively or Qualitatively

Type of Impact	Type of Analysis	
	Quantitative	Qualitative
Agricultural Production	X	X
Goose Lake Modification	X	
Groundwater Recharge	X	
Irrigation Canal Operation		X
Mosquito Abatement		X
Habitat Water Requirements	X	
Oil and Gas Production	X	X

7.1.2 SUMMARY OF QUANTIFIED IMPACTS

Table 16 summarizes the economic impacts due to BVLS conservation activities in critical habitat for each activity or sector included in this analysis. Retrospective costs total \$122,237, including \$51,165 to Federal agencies and \$71,071 to non-Federal entities. Total annual prospective costs are \$452,000 to \$956,000, with all but \$51,726 applied to Federal entities. Total prospective costs range from \$6.7 to \$14.2 million at a three percent discount rate, including \$770,000 to non-Federal entities. The total prospective costs at seven percent discount rate range from \$4.8 to \$10.1 million, including \$548,000 to non-Federal entities.

The single largest Federal cost component is estimated to be for supplemental water purchases. They are assumed to be required for the KNWR and Goose Lake CHUs, but may or may not be necessary for the remaining three CHUs. The single largest non-Federal component is estimated to be for foregone crop production and establishment costs for buffer zones adjacent to proposed critical habitat.

Table 16
Total Retrospective Costs and Total and Annual Prospective Costs
at 3 and 7 Percent Discount Rates, by Category of Impact

Category of Impact	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Non-Federal:				
Agriculture	\$0	\$435,396	\$310,039	\$29,265
Goose Lake BO	\$55,000	\$22,688	\$16,156	\$1,525
Goose Lake Canal Maint.	\$0	\$18,597	\$13,243	\$1,250
Coles Levee HCP	\$0	\$291,018	\$207,230	\$19,561
Kern Valley Floor HCP	\$16,071	\$1,860	\$1,324	\$125
Total Non-Federal	\$71,071	\$769,559	\$547,991	\$51,726
Federal Agencies:				
Consultations	\$51,165	\$117,711	\$83,820	\$7,912
Supplemental Water	\$0	\$5,841,304- \$13,333,114	\$4,159,500- \$9,494,299	\$392,627- \$896,195
Total Federal	\$51,165	\$5,847,092- \$13,450,825	\$4,163,621- \$9,578,119	\$393,016- \$904,107
TOTAL	\$122,237	\$6,728,574- \$14,220,384	\$4,791,311- \$10,126,110	\$452,266- \$955,833

Note: Numbers may not sum due to rounding.

Table 17 shows the estimated average annual and present value of prospective costs at the Federal and non-Federal levels BVLS conservation measures, by CHU. These costs include effects on agricultural producers on three CHUs, biological monitoring, HCP development, and supplemental water purchases. The ranges shown for Kern Lake, Coles Levee, and Kern Fan Water Recharge CHUs reflect totals with and without supplemental water. Both the KNWR and Goose Lake CHUs are assumed to require supplemental water, and thus are not shown as a range. Present values shown are calculated at three and seven percent discount rates. Total prospective costs range from \$6.7 to \$14.2 million under a three percent discount rate, and \$4.8 to \$10.1 million under a seven percent rate.

The largest effects are expected to be for the Kern Fan Water Recharge CHU, followed by the KNWR CHU. The large range of costs for the Kern Fan Water Recharge CHU is reflective of the “with” and “without” supplemental water scenarios.

Table 17
Annual and Total Prospective Federal and Non-Federal Costs
Attributable to the BVLS, by CHU

CHU	Retrospective (Total)	Prospective (Total)		Prospective (Annual)
		3%	7%	
Kern National Wildlife Refuge	\$19,760	\$4,213,598	\$3,000,437	\$283,220
Goose Lake	\$82,214	\$1,839,234	\$1,309,690	\$123,625
Kern Lake	\$6,754	\$130,210- \$192,398	\$92,720- \$137,003	\$8,752- \$12,932
Coles Levee	\$6,754	\$297,981- \$570,675	\$212,188- \$406,368	\$20,029- \$38,358
Kern Fan Water Recharge	\$6,754	\$247,551- \$7,404,479	\$176,277- \$5,272,612	\$16,639- \$497,697
TOTAL	\$122,237	\$6,728,574- \$14,220,384	\$4,791,311- \$10,126,110	\$452,266- \$955,833

7.2 DISCUSSION OF RESULTS

Among non-Federal parties, the largest prospective costs are likely to be on agricultural producers. An annual cost of \$29,265 is anticipated, which reflects foregone crop production in buffer areas, plus the cost associated with planting and maintaining buffer zones. Total prospective costs are \$435,396 using a three percent discount rate and \$310,039 using a seven percent discount rate.

Among Federal costs, the largest prospective expenditure will be that expected for surface water. At an average of \$209 per AF for purchased surface water, annual Federal expenditures for water would be \$283,000 for the KNWR CHU, but if required for the Kern Fan Water Recharge CHU would be an additional \$485,000.

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APPENDIX A: ECONOMIC EFFECTS TO SMALL ENTITIES AND ENERGY

This appendix contains an examination of the extent to which the analytic results presented in the main report reflect impacts to small entities. The analysis of the effect on small entities is conducted pursuant to the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. The appendix also contains an analysis of the effects of the rulemaking on energy markets, as required by Executive Order No. 13211.

POTENTIAL EFFECTS ON SMALL ENTITIES

Under the RFA (as amended by SBREFA), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities. However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.¹⁶⁰ SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. Accordingly, the following represents a screening level analysis of the potential effects of habitat conservation activities for the BVLS on small entities.

Small entities include small businesses, small governments, or small organizations, as defined by the U.S. Small Business Administration (SBA). Size standards for small businesses are established for different types of economic activity or industry within the North American Industry Classification System (NAICS), and are commonly expressed in terms of the number of employees or annual revenues. These size standards were most recently published by the SBA in “Table of Small Business Size Standards Matched to North American Industry Classification System Codes,” effective January 28, 2004.¹⁶¹ Small organizations are defined as “any non-profit enterprise ... which is independently owned and operated and not dominant in its field.”¹⁶² These may include organizations such as irrigation districts, water associations, public utilities, or agricultural co-ops. A small government is defined as any government serving populations of 50,000 or less, and might include county, city, town, or school district governments.

¹⁶⁰ Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for “significant impact” *and* a threshold for a “substantial number of small entities.” See 5 U.S.C. § 605(b).

¹⁶¹ This table and other information on size standards are available from <http://www.sba.gov/size>.

¹⁶² Regulatory Flexibility Act, 5 U.S.C. § 601 *et seq.*

This analysis is intended to facilitate determination of whether the BVLS CHD potentially affects a “substantial number” of small entities in counties and/or supporting critical habitat areas. It is also intended to quantify, to the extent possible, the probable number of small entities that are likely to experience a “significant effect.”

In the sections that follow, a screening process is used to identify and describe the small entities that would be subject to this analysis. This is followed by a determination of the economic effects on the small entities.

DEFINITION OF SMALL ENTITIES

The SBA defines three types of small entities: small business, small organization, and small governmental organization. Within the category of small business, the SBA has developed size standards that vary depending upon the business type. For most industries, the size standard is based upon annual revenue for the business. The revenue standard varies from \$750,000 for most of agriculture to \$28.5 million for general and heavy construction. The size standard is based on number of employees for two industry types: manufacturing (500 employees) and wholesale trade (100 employees). The SBA publishes a table of current small business size standards on their website (www.sba.gov/size).¹⁶³ The SBA definition of “small government organization” includes governments of cities or counties with a population of fewer than 50,000 persons.

IDENTIFICATION OF ACTIVITIES THAT MAY INVOLVE SMALL ENTITIES

The analysis in the main report determined that costs related to conservation activities for the BVLS would be incurred for activities affecting agricultural enterprises, irrigation water districts, and Federal agencies. This section considers the extent to which the costs presented in the main report reflect impacts to small entities.

Agriculture

There is no agricultural activity at present within any of the CHUs. It is assumed that following the designation of critical habitat for the BVLS, farmers with cropland adjacent to any of the CHUs would establish buffer zones along the boundary of their fields in order to minimize or avoid an incidental take. There is a cost to farmers in terms of foregone crop production in the buffer zone, plus a cost of establishing and maintaining the buffer. Many farmers would fall below the SBA small business revenue threshold, and therefore be considered small entities.

¹⁶³ U.S. Small Business Administration, January 28, 2004, “Table of Small Business Size Standards Matched to North American Industry Classification System Codes,” [http:// www.sba.gov/size/indextableofsize.html](http://www.sba.gov/size/indextableofsize.html).

Water Districts

A project was initiated at Goose Lake in 2001 to convert land primarily in native vegetation and some previously cultivated agricultural land to wetlands more favorable for waterfowl. The project proponent is Goose Lake Holdings, in cooperation with Ducks Unlimited (DU) and Semitropic Water Storage District (SWSD). SWSD is in the process of completing an HCP to include the BVLS. In addition to SWSD, three other water districts (West Kern, Henry Miller, and Kern Delta) in the vicinity of BVLS CHUs may be affected by changes to irrigation canal operation and maintenance schedules in order to avoid an incidental take of the BVLS; this may or may not result in incremental costs to the districts. No attempt was made to quantify these effects. Water purchases may be necessary to provide adequate moisture for ample food and breeding in some or all of the CHUs; however, this could be beneficial for the water districts.

For this analysis, only effects on SWSD are considered. The NAICS code for water districts is 221310, "Water Supply and Irrigation Systems." Although the water district is not-for-profit, the SBA revenue threshold of \$6 million was considered. Annual revenues for SWSD are greater than the threshold, so effects on the SWSD were not considered further.

ESTIMATED NUMBER OF POTENTIALLY AFFECTED SMALL ENTITIES

Information on farms in Kern County, California, is available from the U.S. Department of Agriculture "2002 Census of Agriculture," and specific data on farms and sales are presented in Table A-1. Although the SBA threshold for the agricultural businesses of concern is \$750,000, the Census of Agriculture provides information on farms with sales above and below \$500,000. Therefore, the number of small farms by SBA standards is understated in this table. In addition, the average sales per small farm is understated (lower than actual) because it does not include those farms with annual sales of \$500,000 to \$750,000. As shown in Table A-1, small farms predominate in number (77 percent of all farms in Kern County have revenues less than \$500,000), but overall revenues for these farms are small (six percent of all sales).

Specific farm size data are not available by commodity group. For the four commodity groups considered in this analysis, the average sales per farm indicate that more than half of the cotton and "other crops and hay" farms would be considered small farms by SBA standards.

Table A-1
Market Value of Agricultural Products Sold, by Farm Size and
Select Commodity Groups, Kern County, California, 2002

Farm Type	No. of Farms	Annual Sales	Average Sales/Farm
All Farms	2,147	\$2,058,705,000	\$958,875
Farms with sales less than \$500,000	1,660	\$130,296,000	\$78,492
Farms with sales \$500,000 or more	487	\$1,928,409,000	\$3,959,772
By Commodity Group:			
Cotton	223	\$135,224,000	\$606,386
Vegetables, melons, potatoes, and sweet potatoes	194	\$333,134,000	\$1,717,186
Fruits, tree nuts, and berries	812	\$1,081,149,000	\$1,331,464
Other crops and hay	362	\$83,645,000	\$231,064

Source: U.S. Department of Agriculture, 2004, *2002 Census of Agriculture – County Data, California*, National Agricultural Statistics Service, <http://www.nass.usda.gov/census/census02/volume1/ca/index2.htm>.

In the case of the BVLS, as demonstrated in Section 5.0 of the main report, 31.3 acres of agricultural land would be affected, which represents 0.004 percent of harvested acres (see Table 4 of the main report). Table A-2 provides details on the acreage distribution by commodity type, CHU, and expected cost as foregone revenue and buffer zone costs, per acre and in total. Assuming that each affected crop type within a CHU represents one farm, the effects on each of those farms ranges from \$1,577 to \$12,518 per year.

It is not known whether the specific farms adjacent to the CHUs and included in Table A-2 would meet the small business threshold. For the purposes of this analysis, it is assumed that *all* of the farms in Table A-2 are small entities, and that each crop type and CHU represents a separate farm. When the total costs are compared to the average sales per farm for all farms with annual sales of less than \$500,000, they would account for 2.0 to 15.9 percent of annual revenues. Since the SBA revenue threshold for small farms is \$750,000 per year, these percentages actually represent an overstatement of the potential effect on these farms. It should also be noted that for tree nuts and vegetables, the effects shown in Table A-2 are likely to be overstated, since the average sales per small farm for those commodity groups are likely to be greater than for all farms (which include lower valued commodities such as field crops and hay), as indicated by the average sales per farm reported in Table A-1.

Table A-2
Effects in Terms of Foregone Revenue and Buffer Zone Costs,
and Share of Small Farm Revenue, by Crop Type and CHU

CHU/Crop Type	Acres	Per Acre		Total Cost	Share of Small Farm Revenue ^{b/}
		Foregone Revenue ^{a/}	Buffer Zone Costs		
Kern Lake					
Field Crops	7.3	\$372	\$463	\$6,096	7.8%
SubTotal	7.3			\$6,096	
Kern Fan					
Field Crops	1.9	\$372	\$458	\$1,577	2.0%
Vegetables	6.3	\$1,529	\$458	\$12,518	15.9%
SubTotal	8.2			\$14,095	
Goose Lake					
Field Crops	6.7	\$372	\$462	\$5,585	7.1%
Tree Nuts	2.7	\$801	\$462	\$3,409	4.3%
Hay/Grain	6.4	\$252	\$462	\$4,567	5.8%
SubTotal	15.8			\$13,561	
Total (All Units)	31.3			\$33,752	

a/ Based upon *Kern County Agricultural Commissioners Report for 2003* and University of California Cooperative Extension enterprise budgets.

b/ From Table A-1, average sales for farms with sales less than \$500,000 per year in Kern County, or \$78,492. The SBA revenue threshold for small farms is \$750,000 per year, so this average represents an underestimate for *all* small farms in Kern County.

ESTIMATED EFFECTS ON SMALL ENTITIES

Table A-3 provides a summary of the effects on small farms and the proportion of small farms that would be affected by BVLS conservation activities. As noted in Table A-2, the effects as a percent of small business (farm) sales range from 2.0 to 15.9 percent depending upon commodity group. Based upon the number of affected farms, the proportion of all businesses in the commodity group affected is 0.12 to 1.35 percent. The proportion would be lower if not all of the affected businesses in the commodity group are considered small.

**Table A-3
Summary of Effects on Small Businesses of BVLS Conservation Activities**

	Commodity Group			
	Field Crops (incl. Cotton)	Vegetables	Fruits and Tree Nuts	Other Crops and Hay
Effects as a Percent of Small Business Sales ^{a/}	2.0 - 7.8%	15.9%	4.3%	5.8%
Number of Affected Farms ^{a/}	3	1	1	1
Number of Farms in Affected Commodity Group ^{b/}	223	194	812	362
Proportion of Businesses Affected ^{c/}	1.35%	0.52%	0.12%	0.28%

a/ From Table A-2, assuming *all* affected farms are small businesses.

b/ From Table A-1.

c/ Determined by dividing “Number of Affected Farms” by “Number of Farms by Commodity Group” in Table A-1.

CAVEATS

The estimated effects on small businesses provided above contain several important assumptions that are likely to overstate the actual effects. These include:

- The SBA revenue threshold for small businesses engaged in farming is \$750,000 annually. For this analysis, the threshold is assumed to be \$500,000 based on data available. As a result, the average revenue per small farm (\$78,492) is understated, and the effect of costs as a percent of annual revenue is similarly overstated.
- Data are not available on the average revenue per small farm by commodity group, so the average for all small farms was applied to each commodity group. This likely overstates the effect on vegetable and fruit and tree nut farms, which are likely to have higher revenue than the average for all small farms.
- All of the affected farms are assumed to be small, which may overstate the proportion of small businesses affected.
- Parsing farms by crop types within the CHUs may overstate the actual number of farms that are affected, since a single farm may produce more than one crop type.

POTENTIAL EFFECTS ON ENERGY SUPPLY

Executive Order No. 13211, “Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001, requires Federal agencies to submit a “Statement of Energy

Effects” for all “significant energy actions” in order to present consideration of the impacts of a regulation on the supply, distribution, and use of energy.¹⁶⁴ Significant adverse effects are defined in the EO by the OMB according to the following criteria:

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

The CHD is expected to have minimal impacts on the energy industry. There is a very small likelihood of energy-related impacts occurring in any CHU of the size established by the criteria. Regulatory cost evidence does not exist to suggest that any project modifications were part of section 7 consultations.

¹⁶⁴ Daniels, Mitchell E., July 13, 2001, “Memorandum for Heads of Executive Departments and Agencies, and Independent Regulatory Agencies,” M-01-27, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>.

**APPENDIX B:
LIST OF ACRONYMS**

BMP	Best Management Practice
BO	Biological Opinion
BVLS	Buena Vista Lake Shrew
CCP	Comprehensive Conservation Plan
CESA	California Endangered Species Act
CHD	Critical Habitat Designation
CHU	Critical Habitat Unit
CVP	Central Valley Project
DFG	California Department of Fish and Game
DOGGR	California Department of Oil, Gas, and Geothermal Resources
DPR	California Department of Pesticide Regulation
DPS	Distinct Population Segment
DU	Ducks Unlimited
ESA	Endangered Species Act of 1973
ESRP	Endangered Species Recovery Program
EIR	Environmental Impact Report
HCP	Habitat Conservation Plan
KCWA	Kern County Water Agency
KNWR	Kern National Wildlife Refuge
KWB	Kern Water Bank
KWBA	Kern Water Bank Authority
NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEA	Northwest Economic Associates

OMB	Office of Management and Budget
PCE	Primary Constituent Element
RFA	Regulatory Flexibility Act
SBREFA	Small Business Regulatory Enforcement Fairness Act
SWP	State Water Project
SWSD	Semitropic Water Storage District
TNC	The Nature Conservancy
USBR	U.S. Bureau of Reclamation

