Terrell Watt, AICP
Terrell Watt Planning Consultants
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EXPERIENCE

1989 - **TERRELL WATT PLANNING CONSULTANTS**
Planning Consulting Firm Owner

1981-1989 **SHUTE, MIHALY & WEINBERGER**
Planning Expert/Paralegal

PROFESSIONAL MEMBERSHIPS AND BOARDS

American Institute of Certified Planners (AICP)
American Planning Association (APA)
Board Member of the Conservation Biology Institute www.consbio.org
Board Member of the Planning and Conservation League

AWARDS

California State Association of Counties Distinguished Service Award, 2005

EDUCATION

USC GRADUATE SCHOOL OF URBAN AND REGIONAL PLANNING
Masters degree in City and Regional Planning

STANFORD UNIVERSITY
Bachelor's degree in Urban Studies

Since 1989, Terrell Watt, AICP, has owned Terrell Watt Planning Consultants. Ms. Watt's firm specializes in planning and implementation efforts focused on regionally-significant projects that promote resource conservation and sustainable development patterns. Prior to forming her own consulting group, she was the staff planning expert with the environmental and land use law firm Shute, Mihaly & Weinberger. She is an expert in general and specific planning, open space and agricultural land conservation and

environmental compliance. Her skills also include facilitation, public outreach, and negotiation.

Terrell works with a wide variety of clients throughout California including non-profit organizations, government agencies and foundations. Her recent projects include:

- Contract Project Manager for the Marin Countywide Plan update and EIR currently schedule for Board of Supervisors action in 2007.

- Facilitator for the Los Angeles Housing Infill Potential Methodology study, funded by an Environmental Justice Grant from Caltrans and jointly sponsored by the City of Los Angeles, County of Los Angeles and Environment Now. The Study Toolbox can be obtained at www.solimar.org

- Planner and meeting facilitator for the Santa Clara County Parks Strategic Plan. http://www.parkhere.org/SCC/docs/Parks%20and%20Recreation.%20Department%20of%20(DEP)/attachments/346915strategicplanfinal.pdf

- Consultant to the Institute of Local Self Government for the development of A Local Official's Guide to Funding Open Space Acquisition. Terry was responsible for meeting preparation and facilitation of advisory group meetings and calls. Report available at www.ilg.org.

- Project coordinator and meeting facilitator for the Silicon Valley Conservation Council for a successful Proposition 218 Funding Measure for the Santa Clara County Open Space Authority.

- Consultant to the Planning and Conservation League led coalition of community and environmental groups on California High Speed Rail (HSR). Co-facilitated calls with coalition members to develop comments on the HSR DEIR.[1]

- Workshop planner and facilitator to develop the Monterey County Community Plan. Prepared materials for 7 workshops including 2 in Spanish. Community Plan can be found at www.landwatch.org.

[1] Other recent EIR/S comment letters are available on request and include Comments on the MND for the proposed Ortega Highway Widening Project, Sonoma County General Plan DEIR, Placer County Martis Valley Community Plan DEIR/FEIR and numerous other letters.

Michael D. White, Ph.D.—Curriculum Vitae

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SUMMARY

Dr. White is a Senior Ecologist with over 20 years of experience conducting ecological research, developing species and habitat conservation programs, and conducting impact assessment studies throughout the Southwestern U.S. and the Pacific Rim. His project experience includes conservation assessments and multiple species conservation planning, lake management and water quality assessments, riparian and stream assessments and restoration, aquatic invertebrate ecology, ecological risk assessments, environmental impact analyses, resource management plans, and environmental regulatory compliance. Dr. White is trained as a limnologist, and his technical expertise includes the ecology of aquatic and riparian habitats, water resources management, and use of GIS for environmental analyses. His research interests are exploring the interrelationships of hydrological and biological characteristics and how they are influenced by land use and water management practices.

Dr. White's recent projects have involved conducting landscape-scale conservation assessments, developing water quality management strategies, conducting wildlife corridor assessments and habitat linkage planning studies, and developing habitat management plans for conserved land. These projects involve coordination with local governmental agencies (e.g., City of San Diego, San Diego Association of Governments), state and federal wildlife and land management agencies (i.e., California Department of Fish and Game, U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service), local academic and research institutions (San Diego State University, San Diego Natural History Museum, U.S. Geological Survey, San Diego Supercomputer Center) and non-governmental organizations (e.g., The Nature Conservancy, The Trust for Public Land, Pronatura, Sierra Watch, Southwest Wetlands Interpretive Association, Endangered Habitats League, Back Country Land Trust). Dr. White serves on the Scientific Advisory Panel of the Southern California Wetlands Recovery Project, the County of San Diego's Biological Advisory Panel, and the Technical Advisory Committee of the San Diego Tracking Team, a volunteer organization that conducts wildlife tracking studies and promotes environmental awareness in San Diego County.

Dr. White is a board member of the non-profit Conservation Biology Institute and manages the Institute's San Diego region. He is an Adjunct Associate Professor in the Biology Department and a Faculty Associate at the Center for Inland Waters at San Diego State University. Dr. White regularly lectures on a variety of subjects, including habitat conservation and land management planning, experimental design and statistical analysis, limnology and aquatic ecology, and ecological risk assessment.

EDUCATION

Ph.D. Ecology, San Diego State University and University of California, Davis, 1991. Dissertation: Horizontal distribution of pelagic zooplankton in relation to predation gradients.
B.A. Ecology, Behavior and Evolution, University of California, San Diego, 1982.

PERSONAL

Born July 20, 1960, Los Angeles, California (citizen of U.S.A.).
Married.

PROFESSIONAL ORGANIZATIONS AND AFFILIATIONS

Adjunct Professor, San Diego State University
Faculty Associate, Center for Inland Waters, San Diego State University
Society for Conservation Biology
Ecological Society of America
Societas Internationalis Limnologiae
Southwest Association of Naturalists
Arizona Riparian Council
California Native Grassland Association

Dr. White holds an Endangered Species Act 10(a)(1)(A) Scientific Collecting Permit (#TE027425-0) for the following species listed under the Act:

- Conservancy fairy shrimp (*Branchinecta conservatio*)
- Longhorn fairy shrimp (*Branchinecta longiantenna*)
- Riverside fairy shrimp (*Streptocephalus woottoni*)
- San Diego fairy shrimp (*Branchinecta sandeigonensis*)
- Vernal pool fairy shrimp (*Branhinecta lynchi*)
- Vernal pool tadpole shrimp (*Lepidurus packardi*)

EMPLOYMENT HISTORY

July 1999 – present. Senior Ecologist and San Diego Director of the Conservation Biology Institute, San Diego, California. Providing administrative and fiscal oversight of

a four-person operation with a budget of approximately $500K/yr. Responsibilities include marketing and proposal preparation, oversight of office contracts, staff timekeeping and project tracking, accounts payable, accounts receivable, and project management and technical studies.

September 1991 – present. Adjunct Professor, San Diego State University, San Diego California.

July 1998 – July 1999. Senior Technical Specialist. Ogden Environmental and Energy Services Co., Inc., San Diego, California. Responsibilities included providing technical oversight of the Lower Colorado River Multiple Species Conservation Program project and senior technical support of project staff.

January 1997 – June 1998. Manager, Aquatic Sciences Group. Ogden Environmental and Energy Services Co., Inc., San Diego, California. Managed a group of nine professional aquatic scientists with revenues of approximately $2M/year. Responsibilities included administration, marketing and proposal preparation, strategic planning, annual budgeting and performance tracking, timekeeping oversight, personnel supervision (including direct supervision of four professional biologists), project management, and project technical support.

January 1994 – December 1996. Deputy Manager, Biological Resources Group, Ogden Environmental and Energy Services Co., Inc., San Diego, California. Deputy manager for a group of 23 professional biologists. Responsibilities included, marketing and proposal preparation, strategic planning, annual budgeting, group health and safety program oversight, personnel supervision (including direct supervision of five professional biologists), project management, and project technical support.

September 1989 – July 1994. Senior Ecologist, Ogden Environmental and Energy Services Co., Inc., San Diego, California. Responsibilities included marketing and proposal preparation, project management, project technical support, and direct supervision of three professional biologists.

September 1983 – December 1990. Graduate Assistant, San Diego State University, San Diego, California.

July 1984 – June 1985. Graduate Assistant, UC Davis Tahoe Research Group, Lake Tahoe City and Davis, California.

SELECTED PROJECT EXPERIENCE

REGIONAL HABITAT CONSERVATION PLANNING, MONITORING, RESTORATION AND MANAGEMENT

Tejon Ranch Reserve Design. CBI, working with the South Coast Wildlands Project, is developing a science-based reserve design for the 270,000-acre Tejon Ranch. The reserve design uses a series of conservation planning principles and the results of previous CBI studies conducted for the Ranch to design and justify a reserve that captures regional conservation objectives, such as habitat representation goals, protection of intact watersheds, rare and endangered species protection and recovery, and maintenance of intact core reserve areas. The reserve design is undergoing review by a peer review group of academics, resource agency staff, and local experts. The final reserve design will be provided to stakeholders with an interest in significant conservation on Tejon Ranch for use in negotiations with the landowner.

Environmental Monitoring Program for the Ramona Grasslands – The County of San Diego Department of Parks and Recreation. CBI is overseeing a monitoring program for the Ramona grasslands in central San Diego County. The Ramona Grasslands are a regionally important conservation area, supporting a variety of target resources, including vernal pools and rare vernal pool species, Stephens' kangaroo rat, wintering and breeding raptors, riparian habitats and arroyo southwestern toads, and native grasslands. The Ramona Grasslands are currently grazed by cattle, which maintain habitat suitability for some species but adversely affect other natural resources. The monitoring program is intended to provide information to land managers to inform adaptive management of the Grasslands and to track the efficacy of management actions. Monitoring activities include, grassland, vernal pool, and riparian botany; stream channel geomorphology and water quality; and avian, small mammal, amphibian, and fairy shrimp surveys.

Hydrologic and Hydraulic Assessment of Santa Maria Creek – The Nature Conservancy. CBI is collaborating with researchers from San Diego State University's Department of Geography to conduct an analysis of the historic, current, and future hydrologic and hydraulic regime, and the associated changes in channel geomorphology and riparian vegetation, of Santa Maria Creek, Ramona, San Diego County. The analysis is looking at how changes in land uses in the watershed has affected runoff quantity, stream discharge and stage, and channel geomorphology and riparian vegetation distribution. Historic land uses were quantified from California Department of Water Resources land use maps and historic channel geomorphology and riparian vegetation distribution from historic aerial photography. Future land use was projected from County of San Diego General Plan information. This information is being incorporated into management planning for the Ramona Grasslands Open Space Preserve, which is traversed by Santa Maria Creek.

Exhibit A - continued

El Monte Valley Restoration Project – Endangered Habitats Conservancy. Lead scientist directing restoration planning for approximately 450 acres of the San Diego River and its floodplain in the El Monte Valley, Lakeside, California. The riverine functions and values of the site are compromised by a lack of surface-water hydrology due to the El Capitan dam upstream of the site, lowered groundwater elevations from groundwater withdrawals, and significant invasion of the river channel by exotic species. The project entails coordinating the design of the restoration project with a groundwater recharge project proposed for the Valley by the Helix Water District.

Conservation Assessment of Ranch Guejito. CBI prepared a conservation assessment for the 20,000-acre Rancho Guejito in northern San Diego County, one of the most important conservation targets in the region. The assessment documents the conservation significance of Rancho Guejito from both a natural and cultural resources perspective. The assessment evaluated the resources of Rancho Guejito within a Southern California regional context, and assessed its potential contribution to conservation of landscape-scale processes, protecting intact watershed basins, under-protected vegetation associations, and key sensitive species, as well as prehistoric and historic cultural resources. The assessment is being used by conservation organizations to justify and develop strategies for conservation of the property.

Las Californias Binational Conservation Initiative – San Diego Foundation and Resources Legacy Fund Foundation. In partnership with the Mexican non-governmental organization, *Pronatura*, and The Nature Conservancy, CBI is designing a conservation reserve system for a 2.5 million-acre area of southern California and northern Baja California. The study area extends from the Sweetwater River watershed in California to the Rio Guadalupe watershed in Baja California. The project is making use of the reserve selection algorithm, *SPOT*, to select a reserve portfolio. The project has required extensive manipulation and merging of various U.S. and Mexican digital datasets (e.g., land cover, roads, digital elevation models, etc.) and cross-walking of different vegetation classification systems.

Central Sierra Nevada Science Assessment – The Trust for Public Land. Ownership in the Central Sierra Nevada is characterized by a "checkerboard" pattern of public and private land, which potentially complicates management of the landscape for conservation, recreational, and timber harvest values. CBI is conducting a science assessment of the Central Sierra to identify high resource value areas, threats to these resources, and spatially explicit management strategies that could be implemented by TPL and their partners to improve resource values. CBI is working with TPL and their conservation partners for the project, Sierra Nevada Forest Protection Campaign and California Wilderness Coalition. As part of the assessment, CBI has assembled and will work with a Scientific Advisory Panel, comprised of academics and resource agency staff with relevant experience in the Sierra Nevada.

Tejon Ranch Conservation Assessments – Environment Now and Resources Legacy Fund Foundation. Principal investigator for assessments that characterized the conservation value of the 270,000-acre Tejon Ranch, California. The Conservation Significance Project was conducted in partnership with the South Coast Wildlands Project and California Wilderness Coalition. The Conservation Significance Project made use of available data, museum records, and expert opinion and assessed the biogeographic importance of the Tejon Ranch, its core habitat and natural community representation values, roadlessness, terrestrial and watershed integrity, importance as a habitat linkage, and habitat for rare and endangered species. CBI also conducted an additional Conservation Assessment Project that predicted the distribution of a set of conservation values across Tejon Ranch. Conservation values included threatened, endangered and endemic species distributions, roadless areas analysis, watershed integrity analysis, habitat diversity and regionally under-protected vegetation communities. As part of the Conservation Assessment Project, CBI conducted a remote sensing analysis to update information on roads, land cover, and vegetation community distributions.

Framework Management Plan for the Ramona Grasslands – The Nature Conservancy. CBI is developing a framework management plan for the Ramona grasslands in central San Diego County. The Ramona Grasslands are a regionally important conservation area, supporting a variety of target resources, including vernal pools and rare vernal pool species, Stephens' kangaroo rat, wintering and breeding raptors, riparian habitats and arroyo southwestern toads, and native grasslands. The Ramona Grasslands are currently grazed by cattle, which maintain habitat suitability for some species but adversely affect other natural resources. The intent of the framework management plan is to lay out a scientific basis for implementing management activities, describe experimental manipulations to increase our understanding of the dynamics of the system, and to develop a biological monitoring program to assess changes in resource states.

South Coast Missing Linkages Project – South Coast Wildlands Project. Working on a project in partnership with the South Coast Wildlands Project, The Nature Conservancy, and Pronatura to conduct planning studies on five important habitat linkages in the U.S.-Mexico border region. The Conservation Biology Institute is taking the lead on two of the five linkages. One is linking National Forest land in the Laguna Mountains with important habitats in Baja California through the Campo Valley area of San Diego County. The other is linking habitats in the Jacumba Mountains with those in the Sierra Juarez in Baja California. The project will result in a detailed comprehensive report describing threats and conservation opportunities for each of the five linkages described above. The report will also evaluate the likely biological impacts of losing ecoregional connectivity in these areas.

Habitat Management Planning for the Lake Hodges/San Pasqual Valley MSCP Preserve Area – City of San Diego. Project manager for the development of a habitat

management plan for the over 9,000-acres Lake Hodges/San Pasqual Valley MSCP Preserve Area. Coordinated a team of specialists associated with CBI, local biologists, the U.S. Geological Survey, and San Diego State University to conduct baseline surveys and map the distributions of key resources, including vegetation communities, rare plants, Hermes Copper butterfly, herpetofauna (including arroyo southwestern toad), and breeding riparian birds (including least Bell's vireo and southwestern willow flycatcher). The management plan addressed issues such as control of adjacent land use impacts, fire management, recreational access, fencing, exotic species control, monitoring, and research.

Monitoring Program for the Santa Margarita River – The Nature Conservancy. Developed a program to monitor future potential changes on the Santa Margarita River associated with modification of base flows resulting from a water rights settlement on the river. Base flow augmentation resulting from the settlement has been designed to mimic natural discharge patterns historically observed in the river. The monitoring plan was structured around geomorphically distinct reaches of the river that are anticipated to respond similarly to river hydrology. Elements considered in the monitoring plan include biological resources (riparian and coastal stream communities), water quality, discharge, and channel geomorphics. The objective of the monitoring program is to quantify conditions prior to the modification of base flows and to track changes following base flow augmentation.

Multiple Species Conservation Program – City of San Diego Clean Water Program. Participated in development of a conservation and management plan for federally listed species and key candidate species and their habitats in a 900-square-mile area in San Diego County. Coordinated the development of a GIS-based habitat evaluation model, prepared hydrologic management guidelines for the preserve system, and assisted with development of the species and habitat monitoring program for the preserve system.

Regional Conservation Planning and Constraints Analyses for Eastern San Diego Mountains – The Nature Conservancy. Worked with The Nature Conservancy and a team of regional scientific experts to prioritize conservation opportunities for a 400,000-acre area in San Diego County that includes the headwaters of five major watersheds. The study involved development and review of a spatial and non-spatial database for the area, identification of regionally important resources and landscape connections, and a gap analysis to identify regionally important resources that were in private ownership and zoned for development or agriculture. CBI identified and evaluated the potential effects of land uses and other stressors, including those that may affect downstream portions of the watersheds. CBI and a team of scientists conducted biological surveys of selected properties. As a result of the studies, CBI prepared a conservation strategy report that identifies conservation priorities, research needs, land use constraints, potentially compatible land uses and appropriate locations, restoration opportunities, and habitat management goals.

Exhibit A - continued

MSCP Monitoring Program Coordination – California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS) and City of San Diego. Working with the City of San Diego and other San Diego County jurisdictions, USFWS, and CDFG to implement the Subregional Biological Monitoring Program for the San Diego MSCP. As part of this effort, CBI is compiling an inventory of existing monitoring efforts in western San Diego County, developing a strategic framework of the roles and responsibilities of the monitoring partners, refining biological monitoring protocols, developing structures and protocols for managing large biological databases, formulating a strategy for developing a centralized database repository, and developing a web site to disseminate MSCP-related information to the public.

Regional Biological Monitoring Plan for the Multiple Habitats Conservation Program – San Diego Association of Governments. Developing a regional biological monitoring plan for the North Coastal San Diego County Multiple Habitats Conservation Program (MHCP). The plan is being developed in coordination with the California Department of Fish and Game and the U.S. Fish and Wildlife Service and the seven North San Diego County cities participating in the MHCP. The MHCP biological monitoring program is intended to provide a systematic data collection effort to gauge the progress and success of the habitat preserve system. The plan addresses regional monitoring objectives and describes specific monitoring approaches for riparian communities, uplands, vernal pools, coastal lagoons, and wildlife movement corridors within the preserve system.

Habitat Management Planning for the Marron Valley Preserve Area – City of San Diego. Project manager for the development of a habitat management plan for the 2,600-acre Marron Valley MSCP Preserve Area. Coordinated a team of biologists associated with CBI, the U.S. Geological Survey, and the San Diego Natural History Museum to conduct baseline surveys and map the distributions of key resources, including vegetation communities, rare plants, Quino checkerspot butterflies, herpetofauna (including arroyo southwestern toad), and breeding riparian birds (including least Bell's vireo and southwestern willow flycatcher). Dr. White conducted surveys for the endangered San Diego fairy shrimp in vernal pools on the property. The management plan addressed issues such as cattle grazing, fire management, access, fencing, exotic species control, monitoring, and research.

Wildlife Corridor Monitoring Study – City of Poway and City of San Diego. The study evaluated the use of designated wildlife corridors by target mammal species, including mountain lions, bobcats, coyotes, mule deer. Field monitoring was conducted in the Los Penasquitos, Carmel Valley, Carmel Mountain/Del Mar Mesa, and eastern Poway areas by a graduate student and by a local volunteer organization using different methodologies over several seasons. CBI analyzed the data generated to assess the functionality of the wildlife corridors and to compare the methods.

Lower Colorado River Multi-Species Conservation Program – National Fish and Wildlife Foundation. Served as a technical consultant to the plan development team for the Lower Colorado River Multiple Species Conservation Program (LCR MSCP). The LCR MSCP plan is being prepared for a consortium of federal and state agencies (California, Nevada, and Arizona), water and hydropower interests, and Native American Tribal governments. The LCR MSCP was initiated to optimize opportunities for current and future water and power development in the lower Colorado River basin, while working towards conservation of listed and selected unlisted species and their habitats in compliance with both the federal and California Endangered Species Acts. The result of the plan will be the issuance of incidental take authorizations under Sections 7 and 10(a)(1)(B) of the Endangered Species Act, and Section 2835 of the California Natural Communities Conservation Program Act for those species deemed to be adequately addressed by the plan, through a combination of conservation, management, restoration, and operational measures.

Responsibilities include providing overall technical oversight for the project team. Current efforts involve the development of a conservation strategy for the program and alternatives for evaluation under the California Environmental Quality Act and National Environmental Policy Act. The conservation strategy will involve a strong riparian habitat restoration component, which involves integrating the requirements of riparian species with the hydrologic and hydraulic conditions on the river in light of future water management scenarios (e.g., intrastate water transfers to achieve compliance with California's 4.4 Plan, offstream storage and interstate transfer rules). Implementation of the conservation strategy will have to consider large-scale water management activities and water accounting practices dictated by the large body of legislation and court decrees collectively known as the Law of the River.

TECHNICAL STUDIES

Fairy Shrimp Survey Protocol Analysis – Western Riverside County Regional Conservation Authority. Dr. White performed an analysis of Endangered Species Act section 10(a)(1)(A) fairy shrimp survey data to assess the adequacy of a single survey, as opposed to multiple surveys, in detecting fairy shrimp in vernal pools. The analysis used the survey data to determine the conditional probability of detecting shrimp in the second survey period if shrimp either were or were not collected in the first survey period.

The Influence of Watershed Urbanization on the Hydrology and Biology of Los Peñasquitos Creek – The San Diego Foundation Blasker Rose-Miah Fund. Dr. White was awarded a research grant to study the effects of urbanization in the Los Peñasquitos Creek watershed. The Los Peñasquitos Creek watershed is a small coastal watershed in San Diego, California that contains significant areas of conserved natural habitats, but has experience rapid urban growth. The study examined how patterns of land use change in the Los Peñasquitos Creek watershed have affected downstream hydrology of the creek, channel geomorphology, and associated riparian vegetation

communities. The research showed that urbanization of the watershed has resulted in significant increases in discharge, annual runoff, flood peaks, and dry-season flows. These hydrologic changes have driven changes in the distribution and composition of riparian habitats associated with Los Peñasquitos Creek.

Source Water Protection Guidelines – The City of San Diego Water Department. Providing technical assistance to City of San Diego Water Department staff for a project to develop development guidelines intended to ensure protect of the quality of San Diego source water supply reservoirs. The project is being conducted by a consulting firm, Brown and Caldwell, and Dr. White is serving as a technical advisor directly to the City.

Guajome Lake Water Quality Assessment Project – County of San Diego. Project manager for a water quality study at Guajome Lake in northern San Diego County funded under the U.S. Environmental Protection Agency's (USEPA) Clean Lakes Program. The focus of the project was to characterize water quality in the lake through field sampling and chemical analysis of soil, sediment, stream flow, and lake water to identify pollution problems in the lake and its watershed. The project included preparation of a Quality Assurance Project Plan (QAPP), assessing historic uses of agricultural chemicals in the watershed, estimating sediment and chemical constituent loadings to the lake with watershed modeling techniques, developing and assessing pollution control measures, and developing pollution control and water quality monitoring programs for the lake.

San Diego River Live Stream Discharge Studies – City of San Diego. Biology task manager for analysis of potential effects of live stream discharge of reclaimed water to the San Diego River. Objectives of the study were to determine the feasibility of a live stream discharge program in light of the potential effects to wetlands (including habitat for the endangered least Bell's vireo), aquatic fauna, water quality, and public health. Responsibilities included an assessment of the effects of varying quantities of live stream discharge on fisheries habitat, riparian and salt marsh wetlands, wetland-associated terrestrial species, and disease vectors. Completion of this task required interpretation of the QUAL2E water quality model output and hydraulic modeling output.

Salton Sea Water Quality Management Project – Salton Sea Authority. Project manager for a program funded under a USEPA Clean Lakes Grant, which summarized and presented environmental and economic analyses of salinity and surface elevation management alternatives at the Salton Sea. Contracted with the Salton Sea Authority, a Joint Powers Authority comprised of the counties of Imperial and Riverside, the Imperial Irrigation District, and the Coachella Valley Water District. The purpose of the project was to identify, summarize, and evaluate alternatives for managing the salinity and elevation of the Salton Sea. The project entailed interaction with the USEPA, U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Fish and Wildlife Service, California Department of Fish and Game, Regional Water Quality Control Board, California Environmental Protection Agency, and local citizens groups to identify and summarize their concerns.

Exhibit A - continued

Olivenhain Reservoir Limnological Assessment – Olivenhain Water District. Project manager and technical lead for the assessment of anticipated limnological conditions of a planned reservoir in San Diego County. The assessment projected anticipated thermal stratification and dynamics of nutrients, dissolved oxygen, and other water quality constituents. Recommended design features to better manage water quality in the reservoir, including a multi-port outlet tower to allow selective withdrawals, artificial circulation/hypolimnetic aeration, and a separate inlet structure for aqueduct inflows.

Fairy Shrimp Survey and Assessments – Twentynine Palms Marine Corps Air Ground Combat Center. Task manager overseeing field surveys of anostracans (primarily fairly shrimp) in desert playas and impact assessments of base operations on these resources. Field surveys involved collecting samples of sediments containing anostracan eggs that were reared in controlled conditions in the laboratory. The impact assessment primarily evaluated the effects of vehicle traffic (e.g., tanks and armored personel carriers) to desert playa habitats.

Fairy Shrimp Surveys – Rancho del Rey, City of Chula Vista. Performed field surveys of remnant vernal pools on Otay Mesa to characterize the fairy shrimp fauna on a proposed development site.

Fisheries Survey – Newhall Land and Farming. Conducted a field survey of native fishes in the Santa Clara River, Los Angeles County, California, as part of an emergency road crossing project. The purpose of the survey was to document the species present in the study area and to relocate fish potentially impacted by construction operations to areas outside of the impact zone as conditioned in the California Department of Fish and Game Streambed Alteration Agreement for the project. Species of particular interest were threespined stickleback (*Gasterosteus aculeatus*), arroyo chub (*Gila orcutti*), and Santa Ana sucker (*Catostomus santaanae*).

Impacts of Threadfin Shad on Largemouth Bass – San Diego State University. Participated in a project to examine the impacts of threadfin shad introductions on aquatic biota in southern California reservoirs. Sampled fish and plankton, conducted physical and chemical analyses, and conducted echosounding in six lakes in San Diego County. Identified zooplankton and provided statistical review.

Impacts of Opossum Shrimp on Zooplankton – Tahoe Research Group. Participated in a project assessing the impacts of opossum shrimp (*Mysis relicta*) introductions on Lake Tahoe zooplankton. Installed experimental enclosures with scuba, sampled and counted zooplankton, and analyzed data. Performed a variety of routine limnological analyses such as collection of temperature, oxygen, and nutrient profiles. Conducted short-term opossum shrimp feeding experiments.

ENVIRONMENTAL IMPACT ANALYSIS AND REGULATORY COMPLIANCE

Martis Valley Community Plan – Sierra Watch and Mountain Area Protection Foundation. Conducted a review and provided comments on the Environmental Impact Report prepared of for the update to the Martis Valley Community Plan on behalf of Sierra Watch and Mountain Area Protection Foundation. The Community Plan Update proposed alternatives that would change development patterns in the Martis Valley Community Planning Area, Placer County, California. These impacts would have potentially significant impacts to high value terrestrial and aquatic resources, including forests, shrub communities, meadows, and stream systems. To assist with critiquing the biological resources analyses in the EIR, CBI developed a natural resources conservation vision for the Martis Valley and identified how the proposed developments authorized under the proposed Community Plan would adversely affect these resources. Participated in landowner negotiations over development designs and provided litigation support.

Evaluation of the Cabo San Quintín Development Project and Environmental Impact Study – *pro esteros* and Endangered Habitats League. Conducted an evaluation of the proposed Cabo San Quintín development plan and associated Mexican environmental impact study (Manifestación de Impacto Ambiental) for the Punto Mazo peninsula, San Quintín, Baja California, Mexico. The evaluation discussed inadequacies and inconsistencies of the environmental analysis, and presented an independent analysis of key project features and their potential impacts. Key points discussed in the evaluation included the inadequate consideration of Mexican endangered species laws, state land use regulations, potable and irrigation water supply issues, waste water treatment and potential nutrient loading, potential effects of marina dredging on the Bahía San Quintín, potential impacts to endemic species and sensitive habitats, and potential socioeconomic impacts associated with the increased regional infrastructure and services needs that would result from implementing the project.

Wetlands Permitting, Mission Valley West Light Rail Transit – Metropolitan Transit Development Board. Project manager responsible for coordinating wetlands and endangered species permitting for the Mission Valley West Light Rail Transit project. Conducted a Section 404(b)(1) alternatives analysis, selected potential riparian mitigation sites, acted as permitting agency liaison, coordinated development of a wetlands mitigation plan, conducted U.S. Army Corps of Engineers 404 and California Department of Fish and Game Streambed Alteration Agreement permitting, and coordinated Section 7 consultation for the endangered least Bell's vireo.

Wetlands Permitting and Mitigation Plan, East Mission Gorge Sewer Interceptor Force Main and Pump Station – City of San Diego Water Utilities Department. Prepared a detailed wetlands mitigation plan for impacts associated with the construction of a sewage pump station and force main. The wetlands mitigation plan was developed in consultation with the U.S. Fish and Wildlife Service, California Department of Fish and Game, and City of San Diego. The mitigation plan was required for the U.S. Army

Corps of Engineers' Section 404 and California Department of Fish and Game 1601 permitting process. Also conducted the biological resources impact analysis for the California Environmental Quality Act (CEQA) compliance.

CONSERVATION OUTREACH, TRAINING, AND EDUCATION

San Dieguito River Watershed Information System – San Dieguito River Valley Conservancy. Directed the development of a Geographic Information System (GIS) based information system that will assist the Conservancy and the San Dieguito River Valley Joint Powers Authority (JPA) with planning, land acquisition and conservation, and community outreach. The project was funded by the San Diego Foundation. The GIS tool combines available regional data layers such as land use, land ownership, biological resources information, topography, water resources information, and political boundaries, into a user-friendly mapping and analysis tool. The tool allows staff at the Conservancy and JPA to combine various data layers for environmental analyses, to track resource and land status in the watershed, and to create maps and displays for outreach purposes.

Conservation Resource Center Feasibility Study – San Dieguito River Valley Conservancy. CBI prepared a study evaluating the feasibility and desirability of establishing a establishing a resource support service for conservation groups in San Diego County. The first phase of the study included an exploratory workshop and discussions with individuals from the San Diego conservation community about alternative strategies for sharing resources. CBI conducted research on other organizational models across the country and evaluated the local availability of technical services. We prepared a report summarizing the results of our study and that provided recommendations on a structure and strategy for developing a resource center.

Aquatic Ecology Training Program – Campo Environmental Protection Agency. Conducted training of tribal members working for the Campo Band of Mission Indians Environmental Protection Agency (Campo EPA) in aquatic and riparian resource ecology, inventory, and restoration. The program was funded under Section 106 of the Clean Water Act. The ultimate goal of the program was to provide tribal members sufficient training to allow for an efficient and effective transition of delegation of authority over water resources matters to the Campo Band. Conducted training in riparian ecology, aquatic invertebrate ecology, Rapid Bioassessment Protocols, and stream and riparian restoration techniques.

Lake Ecology Display – City of San Diego. Developed an educational display for "Lake Day" sponsored by the City of San Diego Recreational Lakes Program and held at Lake Morena, San Diego County, California. The display included a presentation of physical dynamics of lake (thermal stratification and turnover), oxygen dynamics, microscope viewing of zooplankton, and a listing of local fish species. Questions from the public were entertained.

ECOLOGICAL RISK ASSESSMENTS

Ecological Risk Assessment, U.S. Naval Activities (NAVACTS), Guam – U.S. Navy. Coordinated investigations in support of ecological risk assessments for terrestrial and freshwater habitats at four sites at NAVACTS Guam. Field studies included mapping and characterization of vegetation and wildlife habitat, floral and faunal inventories, collection of soils and sediments for toxicity tests and chemical analyses, and analysis of resident biota for contaminant bioaccumulation. This information was compared to data from offsite reference areas. These data were used to develop preliminary ecological risk assessments evaluating the potential risk that the chemicals onsite posed to aquatic and terrestrial communities. Of special concern was the potential for adverse impacts to the endangered Mariana common moorhen, which utilizes freshwater marshes in the area. Chemicals of concern for these sites included metals, pesticides, polychlorinated biphenyls (PCBs), dioxins, petroleum hydrocarbons, and polynuclear aromatic hydrocarbons (PAHs).

Ecological Risk Assessment, Old WESTPAC Site, NAVACTS, Guam – U.S. Navy. Coordinated field studies at NAVACTS, Guam to sample soils and freshwater sediments for chemical analyses and toxicity tests. Collected aquatic and terrestrial organisms for tissue analyses to determine bioaccumulation of chemicals found onsite. These data were used to develop a preliminary ecological risk assessment evaluating the potential risk that the chemicals onsite posed to aquatic and terrestrial communities. Of particular concern were wetlands supporting the endangered Mariana common moorhen. Chemicals of concern included metals, pesticides, PCBs, petroleum hydrocarbons, and PAHs.

Ecological Risk Assessment RCRA Facilities Investigation – Rocketdyne Division, Boeing North American. Task manager overseeing the development of ecological risk assessments at 36 sites at the 2,500-acre Santa Susana Field Laboratory (SSFL) for the Rocketdyne Division of Boeing North American. Supervised biologists conducting extensive field surveys of the SSFL that involved vegetation community mapping, rare plant surveys, and wildlife species inventories. Coordinated with the California Department of Toxic Substances Control (DTSC) on development of a series of "white papers" describing the approach and methodologies that will ultimately be employed to conduct the risk assessments for the SSFL. The white papers dealt with issues such as determining background concentrations, selecting contaminants of concern, proposed conceptual site models, calculation of exposure point concentrations, development of exposure model parameters, and risk-based decision criteria.

PUBLICATIONS AND PRESENTATIONS

PUBLICATIONS AND REPORTS

White M.D. and K.A. Greer. 2006. The effects of watershed urbanization on stream hydrologic characteristics and riparian vegetation of Los Peñasquitos Creek, California. *Landscape and Urban Planning* 74(2):125-138.

White, M.D., J.A. Stallcup, K. Comer, M.A. Vargas, J.M. Beltran-Abaunza, F. Ochoa, and S. Morrison. In press. Designing and establishing conservation areas in the Baja California-Southern California border region. In: *Border Institute VI, Transboundary Ecosystem Management*, Southwest Center for Environmental Research and Policy.

Strittholt, J.R., N.L. Stauss, and M.D. White. 2000. Importance of Bureau of Land Management Roadless Areas in the Western U.S.A. Prepared for the National Bureau of Land Management Wilderness Campaign by the Conservation Biology Institute. March.

White, M.D. 1999. The Lower Colorado River Multi-Species Conservation Program. *Arizona Riparian Council Newsletter* 12(1). January.

White, M.D. 1998. Horizontal distribution of pelagic zooplankton in relation to predation gradients. *Ecography* 21:44-62.

Hurlbert, S.H. and M.D. White. 1994. Experiments with invertebrate zooplanktivores: Quality of statistical analysis. *Bulletin of Marine Science* 53(2):128-153.

White, M.D. 1993. Morphological characteristics of threespined sticklebacks (*Gasterosteus aculeatus*) from the Sweetwater River, San Diego County, California. *Proceedings of the Western Association of Fish and Wildlife Agencies 73rd Annual Conference*. Pages 219-224. July.

PRESENTATIONS

White, M.D. 2006. Applying landscape ecology to wetland and watershed management in Southern California. Presented at the Southern California Wetlands Recovery Project Symposium 2006, Santa Barbara, CA. March.

White, M.D., J.A. Stallcup, K. Comer, M.A. Vargas, J.M. Beltran-Abaunza, F. Ochoa, and S. Morrison. 2004. Designing and establishing conservation areas in the Baja California-Southern California border region. Presented at Border Institute VI, Transboundary Ecosystem Management, organized by the Southwest Center for Environmental Research and Policy. April.

White, M.D. and K.A. Greer. 2003. The effects and conservation implications of watershed urbanization in a Southern California stream system. Presented at the Society for Conservation Biology Annual Meeting, Duluth, Minnesota. July.

White, M.D. 2003. The influence of human land use modifications on Southern California stream hydrology. Presented at the Western Division of the American Fisheries Society Annual Meeting, San Diego, CA. April.

Stallcup, J.A. and M.D. White. 2002. Wildlife corridor monitoring for the Multiple Species Conservation Program. Presented at the MSCP Annual Workshop. San Diego, CA. October.

White, M.D. 2002. A review of the ecological effects of roads with examples from Southern California. Presented to the National Research Council Committee on the Ecological Impacts of Road Density. Newport Beach, California. June.

White, M.D. and J.A. Stallcup. 2000. The Lower Colorado River – Conservation planning in a degraded riverine ecosystem. Presented at the Society for Conservation Biology Annual Meeting, Missoula, Montana. June.

White, M.D. 1998. Moderator for a panel discussion on salinity and surface elevation management options for the Salton Sea. Salton Sea Symposium II. La Quinta, California. January.

White, M.D. 1995. Managing salinity and surface elevation at the Salton Sea, California. Presented at the American Society of Civil Engineers Annual Convention 95, San Diego, California. October.

White, M.D. 1993. Morphological characteristics of threespined sticklebacks (*Gasterosteus aculeatus*) from the Sweetwater River, San Diego County, California. Presented at the American Fisheries Society Western Division Annual Conference, Sacramento, California. July.

White, M.D. 1991. Horizontal distribution of zooplankton in relation to predation gradients. Presented at the Zooplankton Ecology Symposium, Lawrence University, Appleton, Wisconsin. August.

Hurlbert, S.H. and M.D. White. 1991. Quality of statistical analyses in studies on the effects of invertebrate zooplanktivores. Presented at the Zooplankton Ecology Symposium, Lawrence University, Appleton, Wisconsin. August.

White, M.D., T. Morrison, G. Orlob, H. Chang ,and C. Nordby. 1991. An environmental assessment of the potential effects of live stream discharge of reclaimed water to the

San Diego River. Presented at the Symposium on Water Supply and Water Reuse: 1991 and beyond. American Water Resources Association, San Diego, California. June.

White, M.D. 1989. The role of vertebrate and invertebrate predation gradients in producing horizontal heterogeneity of zooplankton populations. Symposium on Intrazooplankton Predation, University of Sao Paulo, Sao Carlos, Brasil. June.

Hurlbert, S.H. and M.D. White. 1989. A review of the experimental intrazooplankton predation literature with emphasis on experimental design and analysis. Symposium on Intrazooplankton Predation, University of Sao Paulo, Sao Carlos, Brasil. June.

White, M.D. 1989. Evidence for diel horizontal migrations of an invertebrate predator, *Mesocyclops edax*. Southern California Academy of Sciences Annual Meeting, Thousand Oaks, California. May.

White, M.D. 1988. Predation-induced horizontal zooplankton gradients. Ecology Supplement 69(2) pg. 340. Ecological Society of America Annual Meeting, Davis, California. August.

INVITED LECTURES AND TEACHING

March 2006. Guest lecturer Watershed Analyses, Geography Department, San Diego State University. Topic: Habitat Management in the Ramona Grasslands, San Diego County.

July 2004. Guest lecturer in the joint Masters in Public Administration Program at San Diego State University and Universidad Autónoma de Baja California. Topics: the San Diego Multiple Species Conservation Program and Transboundary conservation planning.

January 2004. The Binational Expedition to the Sierra la Giganta, Baja California Sur: a limnologist's perspective. Presented to the San Diego State University Ecology and Evolutionary Biology Program Seminar Series.

September 2003. Presentation to Antelope Valley Chapter of the Sierra Club. Topic: Conservation significance of Tejon Ranch.

March 2001. Guest lecturer in Ecology of the Colorado River Delta, San Diego State University. Topics: Colorado River law, river operations, and the Multiple Species Conservation Program.

Fall Semester 2000. Instructor - Environmental Policy and Regulation (Biology 538) – San Diego State University. Curriculum covered aquatic and wetland ecology,

jurisdictional wetland determinations, Clean Water Act, CWA section 404 permitting, California Fish and Game Code, California Regional Water Quality Control Plans, California Environmental Quality Act, National Environmental Policy Act, Fish and Wildlife Coordination Act, Federal Endangered Species Act, California Endangered Species Act, Habitat Conservation Plans, local governmental ordinances and regulations, and included presentations by environmental non-governmental organizations.

November 2000. Guest lecturer in Conservation Ecology, San Diego State University Department of Biology. Topic: Conservation planning in practice.

January 2000. Invited speaker at the Strategic Planning Education Seminar of the Coalition for the Sonoran Desert Protection Plan. Topic: Use of science in habitat conservation planning.

October 1999. Guest lecturer for the San Diego State University Department of Biology Graduate Student Seminar Series. Topic: Habitat Conservation Planning on the Lower Colorado River.

March 1999. Guest lecturer in Ecology of the Colorado River Delta, San Diego State University Department of Biology. Topic: Lower Colorado River Multi-Species Conservation Program.

February 1997. Guest lecturer in Topics in Toxicology, San Diego State University Graduate School of Public Health. Topic: Ecological Risk Assessment.

March 1996. Guest lecturer in Topics in Toxicology, San Diego State University Graduate School of Public Health. Topic: Ecological Risk Assessment.

April 1995. Reviewed manuscripts for the "Ecological Risk Assessment" conference Society of Environmental Toxicology and Chemistry (SETAC) Special Publication.

March 1995. Guest lecturer in Topics in Toxicology, San Diego State University Graduate School of Public Health. Topic: Ecological Risk Assessment.

April 1994. Guest lecturer in Topics in Toxicology, San Diego State University Graduate School of Public Health. Topic: Ecological Risk Assessment.
Spring Semester 1992. Environmental Assessment (Environmental Studies 105) – University of San Diego. Curriculum covered general ecological principals, regional ecology, California Environmental Quality Act/National Environmental Policy Act, Clean Water Act, Rivers and Harbors Act, Endangered Species Act, local government ordinances and policies, and biological impact assessment issues and methodologies.

February 1990. Guest lecturer in Experimental Design, San Diego State University Department of Biology. Topic: Data Transformations.

April 1988. Guest lecturer in Experimental Design at San Diego State University. Topic: Split-plot and Repeated Measures Designs.

March 1988. Guest lecturer in Limnology, San Diego State University. Topic: Physical Limnology.

April 1986. Guest lecturer in Limnology, San Diego State University. Topic: Benthic Ecology.

Exhibit B

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Date: September 21, 2007

To: Terry Watt

From: Michael White

RE: **Bay Area to Central Valley High Speed Train (HST) Program EIR/EIS**

The following comments are focused on my review of the Biological Resources and Wetlands section of the referenced document. In general, the discussion of the Regulatory Requirements and Methods of Evaluation is misleading and does not meet the intent or standards for CEQA significance determinations, the description in the Affected Environment lacks crucial information necessary to allow a complete assessment of impacts, and thus the Environmental Consequences of the project are not fully assessed and are under-represented. Furthermore, a lack of information and analysis raises the question of bias in the document. Because two of the major alignment alternatives – Altamont Pass and Pacheco Pass differ with respect to many of the resources that were not adequately described or assessed, the conclusions regarding the relative impacts of these two alternatives are potentially misleading.

An overarching problem with the analysis is that there is no real synthesis or interpretation of the biological resources information available for the project alignments. The document essentially presents raw data on biological resources and impacts (numbers of species, acres of wetlands, etc.) but these data are never meaningfully discussed or interpreted. The purpose of the EIR/EIS is to present technical information in a meaningful and understandable way, so that the public and decision-makers can be adequately informed and do not have to synthesize and interpret raw data themselves. For example, the EIR/EIS should discuss the quality and regional importance of the biological resources in the various alignment segments and describe the nature and magnitude of the impacts to these resources, rather than just list the resources present and impacted. This information is readily available from the data sources listed in the EIR/EIS, but requires a biologist to interpret and discuss the data rather than pushing a button on the computer to create lists of resources and acreages from a GIS data base. Other specific issues and examples are discussed further below.

The discussion in the EIR/EIS on the Regulatory Requirements and Methods of Evaluation seems to ignore a central purpose of CEQA: to disclose when projects may have significant effects on the environment. Significant effects are defined as substantial, or potentially substantial, adverse change in any of the physical conditions with the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic and aesthetic significance. The significance criteria defined for the HST evaluation are largely focused on sensitive resources (e.g., special status species and their habitats) or those protected by specific regulations or policies (e.g., wetlands, HCP or NCCP plans). This does not meet the CEQA's requirement to disclose <u>any</u> of the potential impacts to the flora and fauna of California, not just potential impacts to those with regulatory status. The analysis must assess the potential impacts of the project alternatives within a broader biological context – where are existing biological resources, regardless of their regulatory status, likely to be significantly affected by the project and what are the nature and magnitude of those impacts? The document's significance criteria should be expanded to include impacts that would degrade high quality and intact habitats, functional watersheds and wetland systems, regional functions of existing conserved natural areas, etc. – i.e., should assess impacts to high priority conservation targets for public agencies and conservation organizations in California.

The discussion of the Affected Environment is presented in a piecemeal fashion and does not describe the overall resource values within the project area. The Affected Environment discussion is critical to the analysis of impacts and to allow the nature of the impacts to be placed into their appropriate biological context. The document lists the species, habitats, water resources, wildlife corridors, and management plans that are present in each HST corridor. However, there is no context provided or interpretation of this information that allows the quality, integrity, value, or importance of these resources to be assessed. The document should answer questions such as: How much potential special status species habitat is present? Are the communities and habitats in small, fragmented patches or part of a larger intact area? Are the existing communities and habitats degraded by urban edge effects or other stressors? Do unique soils exist that may support unique assemblages of plants and animals? Are portions of the HST corridor in protected status or targeted for protection by public agencies or private conservation organizations? Only by characterizing biological resources with respect to these and other issues, rather than merely presenting a list of species and habitats with no context or interpretation, can the impacts to biological resources be meaningfully assessed.

The information used to describe wildlife corridors in the Affected Environment section is taken out of context and does not provide a true description of areas important for wildlife movement and habitat connectivity in the study area. In fact, restricting the focus to "wildlife corridors" rather than assessing habitat connectivity more generally, misses an important biological value that can be significantly degraded by the project. The Missing Linkages report (California Wilderness Coalition 2000) discusses linkages and corridors *identified by participants* at the conference in 2000. These were high priority corridors and linkages, which themselves have varying levels of existing

functionality not discussed by the EIR/EIS. However, that an area was not identified by the Missing Linkages project does not imply that habitat connectivity is not an issue. On the contrary, landscape scale habitat connectivity through an area such as the Diablo Range is relatively secure in comparison to more urbanized areas such as the Altamont Hills, which may explain why it was not identified in the Missing Linkages report. The Missing Linkages report is one source of information, but regardless of what it reported, the HST EIR/EIS must characterize the true biological values and ecosystem functions of land that may be affected by the project. This was not done adequately for habitat connectivity and well as other landscape functions and values, such as watershed processes, ecosystem integrity, fire regimes, etc.

Fundamental to national wetlands policies is the protection of wetland "functions and values," not just wetland acreage. Wetlands are listed by Cowardin class in the Affected Environment discussion; however, no characterization of their functions or values is provided. Without this information, the wetland impact acreages presented in the Environmental Consequences section cannot be meaningfully interpreted, alternatives cannot be meaningfully compared, and the potential to adequately mitigate for lost functions and values as a result of the project cannot be assessed.

The EIR/EIS does not provide a discussion of the status and regional contributions of conservation areas (i.e., public and private lands protected and managed for natural resources values) in the study area. Substantial investments of public and private funds have been made to acquire and manage lands to protect natural resources, and they support essential regional natural resources functions. The EIR/EIS must assess the potential for the project to degrade and reduce the quality of these areas from a biological resources standpoint. To do this adequately, the EIR/EIS must assess the conservation contributions and regional natural resources functions of these protected areas in the Affected Environment section.

Figures 3.15-1 to 3.15-3 do not adequately characterize the biological resources in the various alignments, and thus, give a false impression as to the magnitudes of their impacts. The figures do not depict the distribution of habitats and rely solely on sensitive species, wetlands, and wildlife corridors to visually depict environmental consequences of the project. At a minimum, figures showing the distribution of vegetation communities, urban, agricultural land, and other infrastructure such as roads should be provided. In addition, it should also be clarified that the special status species information reported was not collected for this project and does not provide a comprehensive description of special status species distributions across all parts of the study area.

The Environmental Consequences section of the EIR/EIS is fundamentally flawed in that alternatives are not evaluated at an equal level of detail. For example, the EIR/EIS states at 3.1.5.A: "It was not possible as part of this study to identify or quantify impacts on biological resources that would occur as a result of transportation improvements in the No Project Alternative. For existing transportation facilities to be improved, impacts on

biological resources have previously been addressed, and only small additional or increased impacts are expected from the future transportation improvements in the No Project Alternative. In some cases, widening of existing corridors or similar improvements could results in additional impacts on biological resources." If impacts of transportation improvements associated with the No Project Alternative have "previously been addressed," then a summary of these impacts should be available for inclusion in the HST EIR/EIS. Furthermore, impacts due to widening existing transportation corridors as part of the No Project Alternative could be assessed in the same way that impacts for HST alignment alternatives were assessed – by making assumptions regarding direct and indirect impact buffers around the existing transportation corridors. Not presenting information that is readily available not only demonstrates a significant bias in the analysis of impacts, it leads one to wonder what other information may not be adequately disclosed in the EIR/EIS.

The presentation of potential impacts of the project in the Environmental Consequences section of the EIR/EIS is inadequate and misleading. The analysis of impacts is presented as a list of impact acreages and potentially affected species, without any interpretation of the significance of the these impacts. In the case of special status species, the analysis relies on available species data, which does not include areas that have not been surveyed in the past, and thus is a potentially misleading assessment of impact to special status species. The analysis must interpret the numbers and lists presented in the document so that the public and decision-makers can understand the implications of these numbers and lists and be adequately informed. Furthermore, the summary tables presenting biological resources impacts (e.g., Table 3.15-1 and Summary Table S.5-1) only list numbers of special status species potentially affected, wildlife corridors identified by the Missing Linkages Project, linear feet of non-wetland waters, acres of wetlands, and presence/absence of anadromous fish. The acreages of impact to terrestrial vegetation communities, particularly those considered sensitive by governmental agencies and non-governmental organizations, should also be listed in these or other summary tables. Furthermore, the length of each alignment segment appears to vary substantially, thus the potential for impacts varies considerably. It is virtually impossible from the presentation of biological impacts for the average reader to assess the overall magnitude of impacts to major alignment alternatives. The impacts across segments for major alternatives should totaled and presented to provide a comparable assessment of impacts.

While the acreage of impacts to terrestrial vegetation communities is presented in the text for each alignment segment, there are several problems with this presentation. First, many communities listed as impacted under each segment are not presented under the heading "Sensitive Vegetation Communities" and should be. For example, grasslands are not considered sensitive communities in the EIR/EIS; however, large expanses of grasslands in California are increasingly rare and those that support special status species, such as San Joaquin kit fox, are certainly considered sensitive by the California Resources Agency and the U.S. Fish and Wildlife Service. The southern alignment alternatives (e.g., Pacheco Pass, Henry Miller UPRR, Henry Miller, BNSF, and GEA

North) would each adversely affect thousands of acres of grasslands, which is never specifically discussed except for presenting a single acreage number buried in a long list of other acreages for each alignment segment.

The impact analysis does include a indirect impact buffer zone, but it does not acknowledge or provide any discussion of indirect or cumulative impacts that may occur as a result of the project outside of this zone. For example, construction of the HST can be expected to induce residential growth in the vicinity of the alignment. This residential growth is likely to produce impacts to biological resources outside of the assumed indirect impact corridor for the HST project. Furthermore, these growth-inducing impacts would have different magnitudes of effect in different parts of the study area, such as the relatively undeveloped areas along the Pacheco Pass corridor versus the relatively more developed Altamont Pass corridor. Growth inducing effects on biological resources requires a much more thorough analysis.

The discussion of impacts to Special Management Areas is completely inadequate. There is no assessment of the nature or magnitude of impacts to these areas. Public parks and other conserved lands serve as the back bone of functional biological open space. These areas are refugia for flora and fauna in the face of ongoing land uses changes that degrade habitat quality. When parks and private conservation areas are part of a larger system of relatively unfragmented open space, they serve as core areas managed for natural resources values within larger landscapes. Thus, indirect impacts, including growth inducing impacts, to Special Management Areas can be quite significant and merit special attention. Given the resources that have been invested in these areas and their importance to maintaining regional biological functions in light of ongoing land use and climate changes, impact to these special management area are potentially very significant impacts that merit much more evaluation and discussion in the EIR/EIS.

The mitigation measures presented in the Mitigation Strategies and CEQA Significance Conclusions provide no meaningful assurance that impacts from any project alignment would be fully mitigated. The current discussion in the EIR/EIS relies on a formulaic presentation of mitigation considerations but presents no concrete information on which to assess whether potential impacts can be adequately mitigated. While selection of specific mitigation measures may not be appropriate at this time, at a minimum, an assessment of the availability of adequate mitigation land and the ability to mitigate particular impacts (e.g., landscape scale fragmentation impacts) must be realistically assessed.

Selections from Deutsche Bahn (German National Railways) timetables of a high-speed train departing Berlin, which splits at Hamm; and return trains from Koblenz and Köln/Bonn Airport which join at Hamm before proceeding to Berlin.

For example, examine the schedule for ICE 546/556 departing Berlin at 2:40 PM (14:40 in 24-hr notation). 546, the front unit, departing platform areas A-D on Track 13 at Berlin runs to Köln/BonnAirport while 556, platform areas D-G runs to Koblenz. After a 4 minute stop at Hamm, the Airport module leaves two minutes ahead of the Koblenz module.

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Fahrtinformationen

ICE 556

Halt	Ankunft	Abfahrt	Fahrt
Berlin Ostbahnhof		14:40	ICE 556
Berlin Hbf		14:51	
Berlin-Spandau		15:05	
Hannover Hbf	16:28	16:31	
Bielefeld Hbf	17:20	17:22	
Hamm(Westf)	17:48	17:54	
Hagen Hbf	18:22	18:24	
Wuppertal Hbf	18:39	18:41	
Köln Hbf	19:09	19:12	
Bonn Hbf	19:32	19:37	
Koblenz Hbf	20:11		

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Hilfe

Fahrtinformationen

ICE 546

Halt	Ankunft	Abfahrt	Fahrt
Berlin Ostbahnhof		14:40	ICE 546
Berlin Hbf		14:51	
Berlin-Spandau		15:05	
Hannover Hbf	16:28	16:31	
Bielefeld Hbf	17:20	17:22	
Hamm(Westf)	17:48	17:52	
Dortmund Hbf	18:09	18:12	
Bochum Hbf	18:23	18:25	
Essen Hbf	18:34	18:36	
Duisburg Hbf	18:47	18:49	
Düsseldorf Hbf	19:00	19:02	
Köln/Bonn Flughafen	19:43		

Exhibit C - page 2

14:35		S S7	**Potsdam Hbf** Berlin Hbf (S-Bahn) 14:35 - Berlin Bellevue 14:37 Berlin Zoologischer Garten 14:41 - Berlin-Charlottenburg 14:46 - [illegible] 14:49 - Berlin Wannsee 15:01 - Potsdam Hbf 15:15 not every day, 25., 26. Oct	
14:38		S S5	**Berlin Westkreuz** Berlin Hbf (S-Bahn) 14:38 - Berlin Bellevue 14:40 Berlin-Tiergarten 14:42 - Berlin Zoologischer Garten 14:44 - Berlin Savignyplatz 14:46 - Berlin-Charlottenburg 14:48 - Berlin Westkreuz 14:51 daily	16 Berlin Hbf (S-Bahn)
14:38		S S7	**Ahrensfelde** Berlin Hbf (S-Bahn) 14:38 - Berlin Friedrichstr 14:40 Berlin Alexanderplatz 14:44 - Berlin Ostbahnhof 14:49 - Berlin Ostkreuz 14:53 - Berlin-Lichtenberg 14:58 - Ahrensfelde 15:14 daily	15 Berlin Hbf (S-Bahn)
14:39		ICE 546	**Köln/Bonn Flughafen** Berlin Hbf 14:39 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Dortmund Hbf 18:09 - Bochum Hbf 18:23 - Essen Hbf 18:34 - Duisburg Hbf 18:47 - Düsseldorf Hbf 19:00 - Köln/Bonn Flughafen 19:43 not every day, 30. Oct until 11. Nov 2007	13 A - D
14:39		IC 2444	**Münster(Westf)Hbf** Berlin Hbf 14:39 - Stendal 15:32 - Wolfsburg 16:03 - Hannover Hbf 16:37 - Minden(Westf) 17:10 - Bad Oeynhausen 17:20 - Bünde(Westf) 17:33 - Osnabrück Hbf 17:57 - Münster(Westf)Hbf 18:24 daily, not 30. Oct until 11. Nov 2007	13
14:39		ICE 556	**Koblenz Hbf** Berlin Hbf 14:39 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Hagen Hbf 18:22 - Wuppertal Hbf 18:39 - Köln Hbf 19:09 - Bonn Hbf 19:32 - Koblenz Hbf 20:11 not every day, 30. Oct until 11. Nov 2007 (Berlin Hbf - Köln Hbf) not every day, 30. Oct until 11. Nov 2007 Mo - Fr, Su (Köln Hbf - Bonn Hbf) not every day, 30. Oct until 9. Nov 2007 Mo - Fr (Bonn Hbf - Koblenz Hbf)	13 D - G
14:40		S S9	**Berlin-Spandau** Berlin Hbf (S-Bahn) 14:40 - Berlin Bellevue 14:42 Berlin Zoologischer Garten 14:46 - Berlin Savignyplatz 14:48 - Berlin-Charlottenburg 14:51 - Berlin Westkreuz 14:53 - Berlin-Spandau 15:07 daily	16 Berlin Hbf (S-Bahn)
14:40		IC 2454	**Düsseldorf Hbf** Berlin Hbf (tief) 14:40 - Berlin Südkreuz 14:44 - Lutherstadt Wittenberg 15:19 - Bitterfeld 15:36 - Halle(Saale)Hbf 15:56 - Weißenfels 16:24 - Naumburg(Saale)Hbf 16:33 - Weimar 16:58 - Erfurt Hbf 17:16 - Gotha 17:41 - Eisenach 17:57 - Bebra 18:21 - Kassel-Wilhelmshöhe 18:58 - Warburg(Westf) 19:32 - Altenbeken 19:54 - Paderborn Hbf 20:08 - Lippstadt 20:25 - Soest 20:36 - Hamm(Westf) 20:52 - Dortmund Hbf 21:15 - Bochum Hbf 21:29 - Essen Hbf 21:39 - Duisburg Hbf 21:53 - Düsseldorf Flughafen 22:04 - Düsseldorf Hbf 22:11 daily, not 27., 28. Oct (Berlin Hbf (tief) - Dortmund Hbf) Su, not 28. Oct (Dortmund Hbf - Düsseldorf Hbf)	3 Berlin Hbf (tief)
14:40		IC 2454	**Düsseldorf Hbf** Berlin Hbf (tief) 14:40 - Berlin Südkreuz 14:44 - Lutherstadt Wittenberg 15:19 - Bitterfeld 15:36 - Halle(Saale)Hbf 15:56 - Weißenfels 16:24 - Naumburg(Saale)Hbf 16:33 - Weimar 16:58 - Erfurt Hbf 17:16 - Gotha 17:41 - Eisenach 17:57 - Bebra 18:21 - Kassel-Wilhelmshöhe 18:58 - Warburg(Westf) 19:32 - Altenbeken 19:54 - Paderborn Hbf 20:08 - Lippstadt 20:25 - Soest 20:36 - Hamm(Westf) 20:52 - Dortmund Hbf 21:15 - Essen Hbf 21:39 - Duisburg Hbf 21:53 - Düsseldorf Flughafen 22:04 - Düsseldorf Hbf 22:11 not every day, 28. Oct	3 Berlin Hbf (tief)
14:40		IC 2454	**Dortmund Hbf** Berlin Hbf (tief) 14:40 - Berlin Südkreuz 14:44 - Lutherstadt Wittenberg 15:19 - Bitterfeld 15:36 - Halle(Saale)Hbf 15:56 - Weißenfels 16:30 - Naumburg(Saale)Hbf 16:39 - Weimar 17:04 - Erfurt Hbf 17:20 - Gotha 17:46 - Eisenach 18:01 - Bebra 18:25 - Kassel-Wilhelmshöhe 19:02 - Warburg(Westf) 19:35 - Altenbeken 19:57 - Paderborn Hbf 20:10 - Lippstadt 20:27 - Soest 20:38 - Hamm(Westf) 20:53 - Dortmund Hbf 21:15 not every day, 27. Oct	3 Berlin Hbf (tief)
14:41		S S9	**Berlin-Schönefeld Flughafen** Berlin Hbf (S-Bahn) 14:41 - Berlin Friedrichstr 14:43 Berlin Alexanderplatz 14:47 - Berlin Ostbahnhof 14:52 - Berlin Warschauer Straße 14:54 - Berlin Treptower Park 14:58 - Berlin-Schönefeld Flughafen 15:21 daily	15 Berlin Hbf (S-Bahn)
14:41		RE 33110	**Rostock Hbf** Berlin Hbf (tief) 14:41 - Berlin Gesundbrunnen 14:45 - Oranienburg 15:06 Gransee 15:27 - Neustrelitz Hbf 15:55 - Waren(Müritz) 16:24 - Güstrow 17:00 - Rostock Hbf 17:24 daily, not 3., 4. Nov	6 Berlin Hbf (tief)
14:41		RE 33110	**Schwaan** Berlin Hbf (tief) 14:41 - Berlin Gesundbrunnen 14:45 - Oranienburg 15:06 Gransee 15:27 - Neustrelitz Hbf 15:55 - Waren(Müritz) 16:24 - Güstrow 17:00 - Schwaan 17:13 not every day, 3., 4. Nov	6 Berlin Hbf (tief)
14:42		RE 38213	**Ludwigsfelde** Berlin Hbf (tief) 14:42 - Berlin Potsdamer Platz 14:44 - Berlin Südkreuz 14:48 Berlin-Lichterfelde Ost 14:53 - Teltow 14:57 - Großbeeren 15:04 - Birkengrund 15:08 - Ludwigsfelde 15:10 daily	1 Berlin Hbf (tief)
14:43		RE 38078	**Brandenburg Hbf** Berlin Hbf 14:43 - Berlin Zoologischer Garten 14:47 - Berlin Wannsee 14:59 Potsdam Hbf 15:07 - Potsdam Charlottenhof 15:10 - Potsdam Park Sanssouci 15:13 - Werder(Havel) 15:19 - Brandenburg Hbf 15:37 daily	14
14:44		RE 38019	**Eisenhüttenstadt** Berlin Hbf 14:44 - Berlin Friedrichstr 14:46 - Berlin Alexanderplatz 14:49 Berlin Ostbahnhof 14:53 - Erkner 15:13 - Fürstenwalde(Spree) 15:26 - Frankfurt(Oder) 15:57 - Eisenhüttenstadt 16:14 daily (Berlin Hbf - Berlin Ostbahnhof) daily (Berlin Ostbahnhof - Frankfurt(Oder)) daily (Frankfurt(Oder) - Eisenhüttenstadt)	11
14:45		S S5	**Strausberg Nord** Berlin Hbf (S-Bahn) 14:45 - Berlin Friedrichstr 14:47 Berlin Alexanderplatz 14:51 - Berlin Ostbahnhof 14:56 - Berlin Ostkreuz 15:01 - Berlin-Lichtenberg 15:05 - Strausberg Nord 15:49 daily	15 Berlin Hbf (S-Bahn)
14:45		S S7	**Potsdam Hbf** Berlin Hbf (S-Bahn) 14:45 - Berlin Bellevue 14:47 Berlin Zoologischer Garten 14:51 - Berlin-Charlottenburg 14:56 - Berlin Westkreuz 14:58 - Berlin Wannsee 15:11 - Potsdam Hbf 15:25 daily	16 Berlin Hbf (S-Bahn)
14:46		EC 371	**Praha hl.n.** Berlin Hbf (tief) 14:46 - Berlin Südkreuz 14:51 - Dresden-Neustadt 16:44 - Dresden Hbf 16:52 - Bad Schandau 17:36 - Decin hl.n. 17:57 - Usti nad Labem hl.n. 18:15 - Praha-Holesovice 19:21 - Praha hl.n. 19:34 daily, not 24. Nov until 7. Dec 2007	2 Berlin Hbf (tief)
14:46		EC 371	**Praha hl.n.** Berlin Hbf (tief) 14:46 - Berlin Südkreuz 14:51 - Dresden-Neustadt 16:44 - Dresden Hbf 17:06 - Bad Schandau 17:36 - Decin hl.n. 17:57 - Usti nad Labem hl.n. 18:15 - Praha-Holesovice 19:21 - Praha hl.n. 19:34 not every day, 24. Nov until 7. Dec 2007 (Berlin Hbf (tief) - Dresden-Neustadt) not every day, 25. Nov until 7. Dec 2007 (Dresden-Neustadt - Praha hl.n.)	2 Berlin Hbf (tief)
14:48		S S5	**Berlin-Charlottenburg** Berlin Hbf (S-Bahn) 14:48 - Berlin Bellevue 14:50 - Berlin-Tiergarten 14:52 - Berlin Zoologischer Garten 14:54 - Berlin Savignyplatz 14:56 - Berlin-Charlottenburg 14:58 Fr	16 Berlin Hbf (S-Bahn)

Exhibit C - page 3

14:48		S S7	**Ahrensfelde** Berlin Hbf (S-Bahn) 14:48 - Berlin Friedrichstr 14:50 ⊙ Berlin Alexanderplatz 14:54 - Berlin Ostbahnhof 14:59 - Ber Berlin-Lichtenberg 15:08 - Ahrensfelde 15:24 daily	
14:50		S S75	**Berlin-Spandau** Berlin Hbf (S-Bahn) 14:50 - Berlin Bellevue 14:52 ⊙ Berlin Zoologischer Garten 14:56 - Berlin Savignyplatz 14:58 - Berlin-Charlottenburg 15:01 - Berlin Westkreuz 15:03 - Berlin-Spandau 15:17 daily	16 Berlin Hbf (S-Bahn)
14:51		ICE 546	**Köln/Bonn Flughafen** Berlin Hbf 14:51 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Dortmund Hbf 18:09 - Essen Hbf 18:34 - Duisburg Hbf 18:47 - Düsseldorf Hbf 19:00 - Köln/Bonn Flughafen 19:43 not every day, 26. Oct	13 A - D
14:51		ICE 546	**Köln/Bonn Flughafen** Berlin Hbf 14:51 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Dortmund Hbf 18:09 - Bochum Hbf 18:23 - Essen Hbf 18:34 - Duisburg Hbf 18:47 - Düsseldorf Hbf 19:00 - Köln/Bonn Flughafen 19:43 daily, 26. Oct until 11. Nov 2007 Mo; not 5. Nov; also 27., 28. Oct	13 A - D
14:51		ICE 556	**Koblenz Hbf** Berlin Hbf 14:51 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Hagen Hbf 18:22 - Wuppertal Hbf 18:39 - Köln Hbf 19:09 - Bonn Hbf 19:32 - Koblenz Hbf 20:11 daily, not 30. Oct until 11. Nov 2007 (Berlin Hbf - Köln Hbf) Mo - Fr, Su, not 30. Oct until 11. Nov 2007 (Köln Hbf - Bonn Hbf) Mo - Fr, not 30. Oct until 9. Nov 2007 (Bonn Hbf - Koblenz Hbf)	13 D - G
14:52		S S75	**Berlin-Wartenberg** Berlin Hbf (S-Bahn) 14:52 - Berlin Friedrichstr 14:54 ⊙ Berlin Alexanderplatz 14:58 - Berlin Ostbahnhof 15:03 - Berlin Ostkreuz 15:08 - Berlin-Lichtenberg 15:13 - Berlin-Wartenberg 15:29 daily	15 Berlin Hbf (S-Bahn)
14:55		RE 38172	**Rathenow** Berlin Hbf 14:55 - Berlin Zoologischer Garten 15:00 - Berlin-Spandau 15:08 ⊙ Berlin-Staaken 15:13 - Dallgow-Döberitz 15:17 - Elstal 15:21 - Wustermark 15:24 - Rathenow 15:50 Mo - Th, Sa	14
14:55		RE 38172	**Rathenow** Berlin Hbf 14:55 - Berlin Zoologischer Garten 15:00 - Berlin-Spandau 15:08 ⊙ Berlin-Staaken 15:13 - Dallgow-Döberitz 15:17 - Elstal 15:21 - Wustermark 15:24 - Rathenow 15:55 Fr, Su	14
14:55		S S5	**Hoppegarten(Mark)** Berlin Hbf (S-Bahn) 14:55 - Berlin Friedrichstr 14:57 ⊙ Berlin Alexanderplatz 15:01 - Berlin Ostbahnhof 15:06 - Berlin Ostkreuz 15:11 - Berlin-Lichtenberg 15:15 - Hoppegarten(Mark) 15:34 Fr, also 25. Oct	- Berlin Hbf (S-Bahn)
14:55		S S7	**Potsdam Hbf** Berlin Hbf (S-Bahn) 14:55 - Berlin Bellevue 14:57 ⊙ Berlin Zoologischer Garten 15:01 - Berlin-Charlottenburg 15:06 - Berlin Westkreuz 15:08 - Berlin Wannsee 15:21 - Potsdam Hbf 15:35 daily, not 25., 26. Oct	16 Berlin Hbf (S-Bahn)
14:55		S S7	**Potsdam Hbf** Berlin Hbf (S-Bahn) 14:55 - Berlin Bellevue 14:57 ⊙ Berlin Zoologischer Garten 15:01 - Berlin-Charlottenburg 15:06 - Berlin Westkreuz 15:09 - Berlin Wannsee 15:21 - Potsdam Hbf 15:35 not every day, 25., 26. Oct	16 Berlin Hbf (S-Bahn)
14:57		ICE 1513	**München Hbf** Berlin Hbf (tief) 14:57 - Berlin Südkreuz 15:01 - Leipzig Hbf 16:05 - Naumburg(Saale)Hbf 16:49 - Jena Paradies 17:17 - Saalfeld(Saale) 17:44 - Bamberg 18:47 - Nürnberg Hbf 19:25 - Ingolstadt Hbf 19:59 - München Hbf 20:39 daily, not 27. Oct	1 Berlin Hbf (tief)
14:57		ICE 1513	**München Hbf** Berlin Hbf (tief) 14:57 - Berlin Südkreuz 15:01 - Leipzig Hbf 16:05 - Naumburg(Saale)Hbf 16:59 - Jena Paradies 17:23 - Saalfeld(Saale) 17:49 - Bamberg 18:50 - Nürnberg Hbf 19:25 - Ingolstadt Hbf 19:59 - München Hbf 20:39 not every day, 27. Oct	1 Berlin Hbf (tief)
14:58		S S5	**Berlin Westkreuz** Berlin Hbf (S-Bahn) 14:58 - Berlin Bellevue 15:00 ⊙ Berlin-Tiergarten 15:02 - Berlin Zoologischer Garten 15:04 - Berlin Savignyplatz 15:06 - Berlin-Charlottenburg 15:08 - Berlin Westkreuz 15:11 daily	16 Berlin Hbf (S-Bahn)
14:58		S S7	**Ahrensfelde** Berlin Hbf (S-Bahn) 14:58 - Berlin Friedrichstr 15:00 ⊙ Berlin Alexanderplatz 15:04 - Berlin Ostbahnhof 15:09 - Berlin Ostkreuz 15:13 - Berlin-Lichtenberg 15:18 - Ahrensfelde 15:34 daily	15 Berlin Hbf (S-Bahn)
	more		All stops shown up to this sign ⊙, behind only the most important are shown. **Following stations are included in this station schedule:** - Berlin Hbf (S-Bahn) - Berlin Hbf (tief)	

All information is issued without liability.

Software/Data: HAFAS 5.22.DB.R4.70.v_e [5.22.DB.R4.70.q_e/disabled]

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Das **Dauer-Spezial.**

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Fahrtinformationen

ICE 845

Halt	Ankunft	Abfahrt	Fahrt
Köln/Bonn Flughafen		7:11	ICE 845
Düsseldorf Hbf	7:53	7:55	
Duisburg Hbf	8:07	8:10	
Essen Hbf	8:22	8:24	
Bochum Hbf	8:34	8:36	
Dortmund Hbf	8:46	8:49	
Hamm(Westf)	9:07	9:11	
Bielefeld Hbf	9:35	9:37	
Hannover Hbf	10:28	10:31	
Wolfsburg	11:03	11:05	
Berlin-Spandau	11:56		
Berlin Hbf	12:10		
Berlin Ostbahnhof	12:20		

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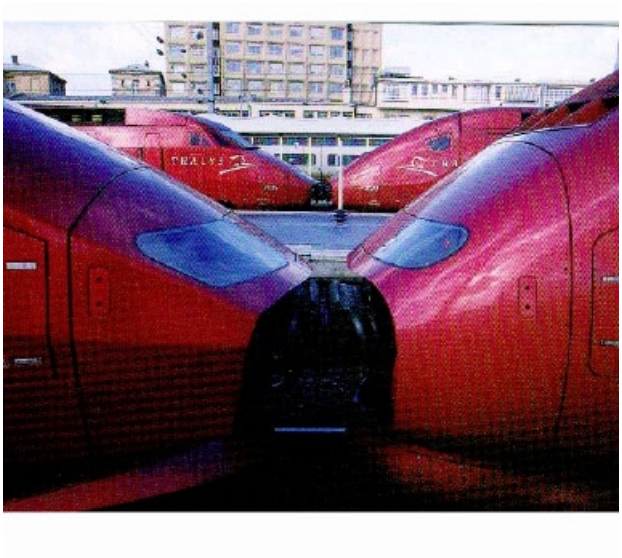
Fahrtinformationen

ICE 855

Halt	Ankunft	Abfahrt	Fahrt
Köln Hbf		7:49	ICE 855
Wuppertal Hbf	8:15	8:17	
Hagen Hbf	8:33	8:35	
Hamm(Westf)	9:02	9:11	
Bielefeld Hbf	9:35	9:37	
Hannover Hbf	10:28	10:31	
Wolfsburg	11:03	11:05	
Berlin-Spandau	11:56		
Berlin Hbf	12:10		
Berlin Ostbahnhof	12:20		

Thalys runs a high speed

Paris-Köln-Amsterdam network that splits at Brussels. At peak hours, double sets run Paris–Köln or Paris–Amsterdam. However, at off-peak hours, when a double set cannot be justified, mixed-destination trains join and divide in Brussels. Thus, midday trains 9333 and 9433 depart Paris Gare du Nord coupled at 12:55pm, with one module running as 9333 to Amsterdam and the other as 9444 to Köln. Likewise, trains 9345 and 9445 leave Paris at 3:55pm and split in Brussels. This arrangement maintains frequencies on both branches despite a split in the route.



Mit der Deutschen Bahn zu den Mumienausstellungen.
Bequem und schnell im ICE/ EC/IC vom 30.09. bis 24.03.08
nach Mannheim und vom 06.10.07 bis 24.03.08 nach Stuttgart.

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Fahrtinformationen

THA 9333

Halt	Ankunft	Abfahrt	Fahrt
Paris Nord		12:55	THA 9333
Bruxelles-Midi	14:17	14:25	
Antwerpen-Berchem	15:03	15:05	
Rotterdam Centraal	16:06	16:08	
Den Haag HS	16:26	16:28	
Schiphol (Airport)	16:49		
Amsterdam Centraal	17:06		

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Fahrtinformationen

THA 9433

Halt	Ankunft	Abfahrt	Fahrt
Paris Nord		12:55	THA 9433
Bruxelles-Midi	14:17	14:22	
Liege-Guillemins	15:08	15:10	
Aachen Süd(Gr)			
Aachen Hbf	15:58	16:06	
Köln Hbf	16:45		

Exhibit C - page 6

12:46		RER E	**Paris Blvd Haussmann/St-Lazare** Paris Magenta 12:46 - Paris Blvd Haussmann/St-Lazare 12:50 daily	
12:46		RER D	**Villiers-le-Bel-Gonesse** Paris Nord RER 12:46 - Stade de France St Denis 12:50 - St Denis 12:53 - Pierrefitte Stains 12:58 - Garges 13:00 - Villiers-le-Bel-Gonesse 13:04 Mo - Sa, not 1. Nov	Paris Nord RER
12:47		RER B	**Robinson** Paris Nord RER 12:47 - Paris Chatelet/Les Halles 12:50 - Paris St-Michel 12:52 - Paris Luxembourg 12:54 ⊙ Paris Port Royal 12:56 - Paris Denfert Rochereau 12:58 - Paris Cite Universitaire 13:00 - Gentilly 13:01 - Bourg la Reine Ratp 13:09 - Robinson 13:16 daily	Paris Nord RER
12:48		RER B	**Aeroport Paris-Charles de Gaulle RER** Paris Nord RER 12:48 - La Plaine-Stade de France 12:51 - La Courneuve Aubervilliers 12:54 - Le Bourget 12:58 ⊙ Aulnay sous Bois 13:05 - Sevran Beaudottes 13:09 - Villepinte 13:11 - Villepinte Parc des Expositions 13:14 - Roissy Aeroport Charles de Gaulle 13:19 - Aeroport Paris-Charles de Gaulle RER 13:22 daily	Paris Nord RER
12:49		RER E	**Chelles Gournay** Paris Magenta 12:49 - Noisy-le-Sec 12:56 - Bondy 12:59 - Le Raincy Villemomble Montferm 13:02 - Gagny 13:04 - Chenay Gagny 13:07 - Chelles Gournay 13:09 daily	Paris Magenta
12:51		RER D	**Melun** Paris Nord RER 12:51 - Paris Chatelet/Les Halles 12:54 - Paris Lyon Banlieue 12:58 - Maisons Alfort Alfor 13:05 ⊙ Villeneuve St George 13:11 - Montgeron Crosne 13:16 - Yerres 13:19 - Brunoy 13:22 - Boussy St Antoine 13:26 - Melun 13:47 Su, also 1. Nov	Paris Nord RER
12:51		RER D	**Corbeil Essonnes** Paris Nord RER 12:51 - Paris Chatelet/Les Halles 12:54 - Paris Lyon Banlieue 12:59 - Maisons Alfort Alfor 13:05 ⊙ Le Vert de Maisons 13:07 - Villeneuve St George 13:16 - Vigneux sur Seine 13:20 - Juvisy 13:24 - Viry Chatillon 13:27 - Corbeil Essonnes 13:43 Mo - Sa, not 1. Nov	Paris Nord RER
12:53		RER E	**Paris Blvd Haussmann/St-Lazare** Paris Magenta 12:53 - Paris Blvd Haussmann/St-Lazare 12:57 daily	Paris Magenta
12:53		RER E	**Tournan** Paris Magenta 12:53 - Noisy-le-Sec 12:59 - Val de Fontenay 13:05 - Villiers s Marne Plessis Trevi 13:12 ⊙ Les Yvris Noisy le Grand 13:16 - Emerainville Pontaul 13:20 - Roissy en Brie 13:23 - Ozoir la Ferriere 13:27 - Gretz-Armainvilliers 13:31 - Tournan 13:37 daily	Paris Magenta
12:53		RER B	**Remy les Chevreuse** Paris Nord RER 12:53 - Paris Chatelet/Les Halles 12:56 - Paris St-Michel 12:58 - Paris Luxembourg 13:00 ⊙ Paris Port Royal 13:02 - Paris Denfert Rochereau 13:04 - Paris Cite Universitaire 13:06 - Bourg la Reine Ratp 13:11 - Antony Ratp 13:15 - Remy les Chevreuse 13:43 daily	Paris Nord RER
12:54		RER B	**Mitry Claye** Paris Nord RER 12:54 - La Plaine-Stade de France 12:58 - Le Bourget 13:02 - Aulnay sous Bois 13:07 - Sevran Livry 13:11 - Vert Galant 13:14 - Villeparisis 13:17 - Mitry Claye 13:22 daily	Paris Nord RER
12:55		THA 9333	**Amsterdam Centraal** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Antwerpen-Berchem 15:03 - Rotterdam Centraal 16:06 - Den Haag HS 16:26 - Schiphol (Airport) 16:49 - Amsterdam Centraal 17:06 daily, not 27., 28. Oct	
12:55		THA 9333	**Amsterdam Centraal** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Antwerpen-Berchem 15:03 - Rotterdam Centraal 16:06 - Den Haag HS 16:26 - Amsterdam Centraal 17:09 not every day, 27., 28. Oct	
12:55		THA 9433	**Köln Hbf** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Liege-Guillemins 15:08 - Aachen Hbf 15:58 - Köln Hbf 16:48 not every day, 10., 17. Nov	
12:55		THA 9433	**Köln Hbf** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Liege-Guillemins 15:08 - Aachen Hbf 15:58 - Köln Hbf 16:51 not every day, 27. Oct	
12:55		THA 9433	**Köln Hbf** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Liege-Guillemins 15:08 - Aachen Hbf 15:58 - Köln Hbf 16:45 daily, not 27. Oct, 10., 17. Nov	
12:55		R 25069	**Sarcelles St Brice** Paris Nord Banlieue 12:55 - St Denis 13:00 - Epinay Villetaneuse 13:04 - Deuil Montmagny 13:08 - Groslay 13:10 - Sarcelles St Brice 13:14 Sa	Paris Nord Banlieue
12:55		R 25271	**Montsoult Maffliers** Paris Nord Banlieue 12:55 - St Denis 13:00 - Epinay Villetaneuse 13:04 - Deuil Montmagny 13:08 ⊙ Groslay 13:10 - Sarcelles St Brice 13:13 - Ecouen Ezanville 13:17 - Domont 13:20 - Bouffemont Moisselle 13:23 - Montsoult Maffliers 13:26 Mo - Fr, not 1. Nov	Paris Nord Banlieue
12:56		RER E	**Villiers s Marne Plessis Trevi** Paris Magenta 12:56 - Pantin 13:00 - Noisy-le-Sec 13:04 - Rosny Bois Perrier 13:08 - Rosny sous Bois 13:10 - Val de Fontenay 13:13 - Nogent le Perreux 13:16 - Les Boullereaux Champigny 13:20 - Villiers s Marne Plessis Trevi 13:24 daily	Paris Magenta
12:56		RER B	**Massy Palaiseau Ratp** Paris Nord RER 12:56 - Paris Chatelet/Les Halles 12:59 - Paris St-Michel 13:01 - Paris Luxembourg 13:03 ⊙ Paris Port Royal 13:05 - Paris Denfert Rochereau 13:07 - Paris Cite Universitaire 13:09 - Bourg la Reine Ratp 13:18 - Antony Ratp 13:23 - Massy Palaiseau Ratp 13:32 daily	Paris Nord RER
12:58		TGV 7043	**Lille Flandres** Paris Nord 12:58 - Lille Flandres 14:00 daily	
12:58		RER D	**Orry-la-Ville-Coye** Paris Nord RER 12:58 - Stade de France St Denis 13:02 - Garges 13:09 - Villiers-le-Bel-Gonesse 13:12 ⊙ Goussainville 13:17 - Les Noues 13:19 - Louvres 13:22 - Survilliers Fosses 13:28 - La Borne Blanche 13:31 - Orry-la-Ville-Coye 13:34 Mo - Sa, not 1. Nov	Paris Nord RER

Fahrtinformationen

THA 9456

Halt	Ankunft	Abfahrt	Fahrt
Köln Hbf		17:14	THA 9456
Aachen Hbf	17:52	18:02	
Aachen Süd(Gr)			
Liege-Guillemins	18:50	18:52	
Bruxelles-Midi	19:38	19:43	
Paris Nord	21:05		

Fahrtinformationen

THA 9356

Halt	Ankunft	Abfahrt	Fahrt
Amsterdam Centraal		16:56	THA 9356
Schiphol (Airport)		17:13	
Den Haag HS	17:34	17:36	
Rotterdam Centraal	17:53	17:56	
Antwerpen-Berchem	18:55	18:57	
Bruxelles-Midi	19:35	19:43	
Paris Nord	21:05		

Similarly, the French tend to use splitting trains on their extensively-branched TGV network at the beginning and end of the day when loads are lighter.
For example, weekday trains 6751 and 6781 leave Paris Gare de Lyon together at 7:14am and split at Dijon, with 6751 proceeding straight to Besançon and 6781 turning south to Chalon-sur-Saône.

Coupled TGV trainset

Another example is between Paris Montparnasse station and Brest/Quimper.

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Fahrtinformationen

TGV 8603

Halt	Ankunft	Abfahrt	Fahrt
Paris Montparnasse		7:05	TGV 8603
Rennes	9:08	9:11	
St-Brieuc	9:57	10:00	
Guingamp	10:15	10:17	
Morlaix	10:48	10:50	
Brest(F)	11:23		

Verkehrstage: fährt 3. Sep bis 2. Nov 2007 Mo - Fr; nicht 1. Nov

Zum besonders günstigen Festpreis von 39,- EUR (2.Kl.) und 59,- EUR (1.Kl.).

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Fahrtinformationen

TGV 8705

Halt	Ankunft	Abfahrt	Fahrt
Paris Montparnasse		7:05	TGV 8705
Rennes	9:08	9:14	
Vannes	10:11	10:14	
Auray	10:24	10:27	
Lorient	10:44	10:46	
Quimper	11:22		

Verkehrstage: fährt 27. Aug bis 7. Dez 2007 Mo - Fr; nicht 1. Nov

Bern, Zürich, Basel, Interlaken, Chur.

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Fahrtinformationen

TGV 8634

Halt	Ankunft	Abfahrt	Fahrt
Brest(F)		11:34	TGV 8634
Morlaix	12:04	12:06	
Plouaret	12:32	12:34	
Guingamp	12:47	12:49	
St-Brieuc	13:05	13:12	
Rennes	14:00	14:05	
Paris Montparnasse	16:10		

Verkehrstage: fährt 31. Aug bis 2. Nov 2007 Mo - Fr; nicht 1. Nov

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Fahrtinformationen

TGV 8730

Halt	Ankunft	Abfahrt	Fahrt
Quimper		11:44	TGV 8730
Lorient	12:16	12:19	
Auray	12:37	12:39	
Vannes	12:51	12:54	
Redon	13:19	13:21	
Rennes	13:57	14:05	
Paris Montparnasse	16:10		

Verkehrstage: fährt 7. Sep bis 3. Nov 2007 Mo - Sa

California High Speed Rail
Bay Area - Central Valley

Exhibit D - Population and Distance for the Two Alignments

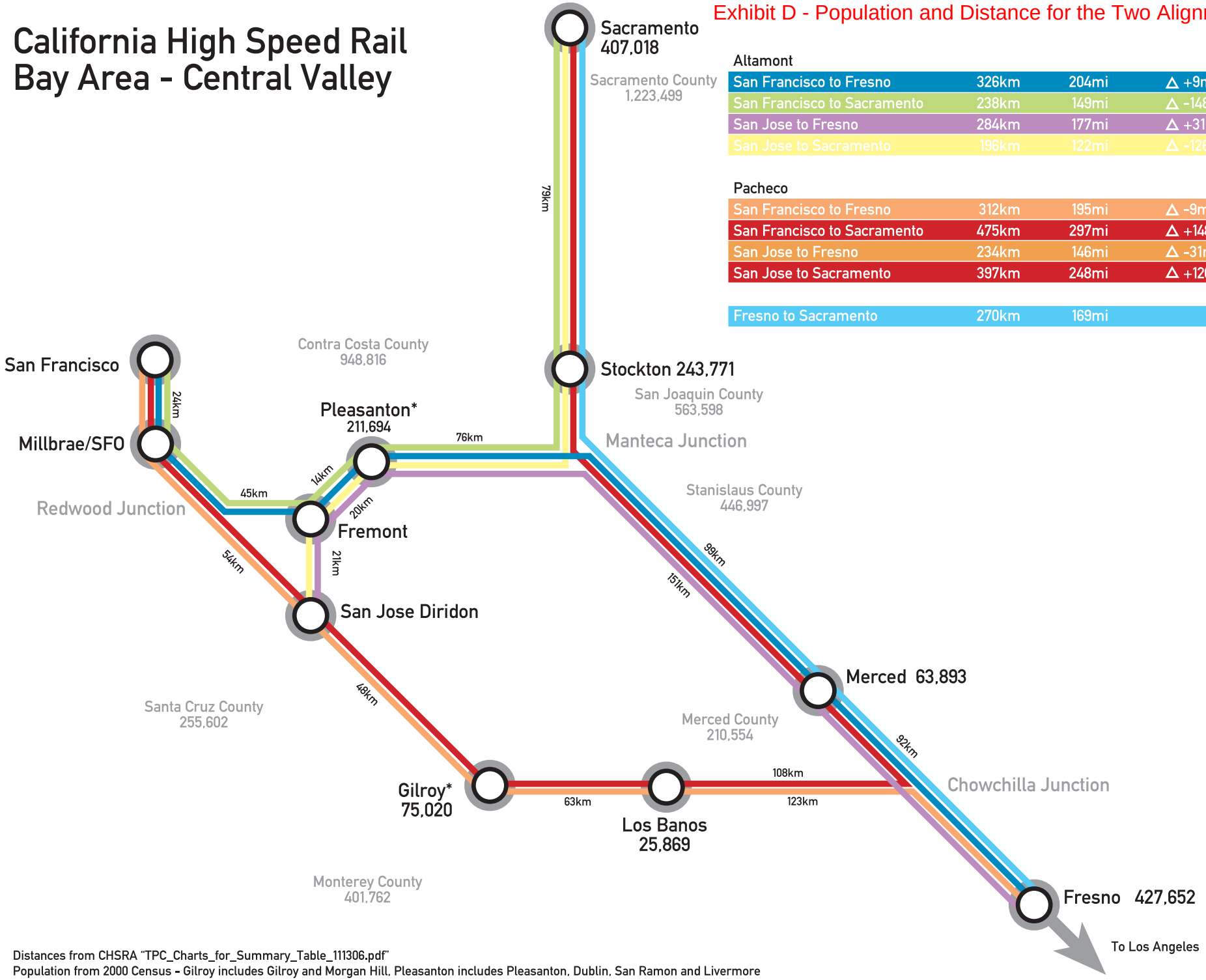
Altamont

San Francisco to Fresno	326km	204mi	Δ +9mi
San Francisco to Sacramento	238km	149mi	Δ -148mi
San Jose to Fresno	284km	177mi	Δ +31mi
San Jose to Sacramento	196km	122mi	Δ -126mi

Pacheco

San Francisco to Fresno	312km	195mi	Δ -9mi
San Francisco to Sacramento	475km	297mi	Δ +148mi
San Jose to Fresno	234km	146mi	Δ -31mi
San Jose to Sacramento	397km	248mi	Δ +126mi

Fresno to Sacramento	270km	169mi



Distances from CHSRA "TPC_Charts_for_Summary_Table_111306.pdf"
Population from 2000 Census - Gilroy includes Gilroy and Morgan Hill, Pleasanton includes Pleasanton, Dublin, San Ramon and Livermore

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May 11, 2007

Yuba County Board of Supervisors
915 8th Street, Suite 109
Marysville, CA 95901

RE: Yuba Highlands Environmental Impact Report

Dear Chairman Stocker and Members of the Board of Supervisors:

We have only recently had the opportunity to review the Environmental Impact Report (EIR) for the Yuba Highlands project, which we understand the Board of Supervisors will be considering on May 15, 2007. We are submitting these comments because the EIR completely ignores impacts from greenhouse gas emissions and improperly defers analysis and mitigation of significant effects on other natural resources in violation of the California Environmental Quality Act (CEQA). We urge the Board to reject the EIR until these deficiencies are corrected.

The Attorney General of the State of California submits these comments pursuant to his independent power and duty to protect the natural resources of the State from pollution, impairment, or destruction in furtherance of the public interest. (*See* Cal. Const., art. V., § 13; Cal. Gov. Code, §§ 12511, 12600-12612; *D'Amico v. Board of Medical Examiners*, 11 Cal.3d 1, 14-15 (1974).) These comments are made on behalf of the Attorney General and not on behalf of any other California agency or office.

Introduction

The Yuba Highlands project is a particularly egregious example of sprawl. It is proposed for a very rural area with no public transit and no existing infrastructure, and would be adjacent to Beale Air Force Base and the State's Spenceville Wildlife and Recreation Area. The main employers, in the Lincoln-Roseville area, are almost 50 miles away on existing roads; if the developer obtains approval to improve the gravel roads that run through the Spenceville Wildlife Area, the distance would be 30 miles, still a considerable commute. The Sacramento Area Council of Governments, which specializes in modeling travel behavior resulting from land uses, estimates that developing Yuba Highlands will result in 25,000 automobile trips per day throughout the county. Many of these trips will be lengthy commute trips, yet the EIR fails to quantify the impacts of or propose any significant mitigation for the resulting greenhouse gas emissions. In addition, the EIR fails to identify or adequately mitigate (1) air quality impacts on

the Nevada City area, which is non-attainment for ozone; (2) impacts on the Spenceville Wildlife Area and endangered and threatened species; and (3) impacts of supplying water to the development. For all these reasons the EIR fails to comply with CEQA.

The Attorney General recognizes that much of Yuba County's undeveloped land is either in a flood plain or supporting agriculture, and that this project avoids the problems of flooding and destroying farmland. Our point here is that the EIR, as written, is inadequate as a matter of law, and should not be certified unless the project's impacts are adequately mitigated, as required by CEQA.

The EIR fails to adequately analyze or mitigate impacts on air quality

The EIR, criticized by several commentators for severely underestimating travel trips and impacts, itself projects that the development will result in 1870 commute trips per day, to and from the major employment center in the Lincoln-Roseville area. In spite of the tremendous number of vehicle trips that the project will generate, the EIR fails to adequately analyze the emissions from the project and their impacts.

Greenhouse Gas Emissions

Under CEQA, Public Resources Code § 21000, et seq., the EIR must consider the Yuba Highlands project's global warming impacts. The project could result in significant increases in emissions of greenhouse gases that cause global warming, and any increase in such emissions will make it more difficult for the state to achieve the greenhouse gas reductions required by Assembly Bill 32. The EIR must evaluate the global warming impacts of the project and discuss feasible alternatives and mitigation measures to avoid or reduce those impacts.

The Intergovernmental Panel on Climate Change of the United Nations recently published its finding that overwhelming evidence establishes that global warming is occurring and is caused by human activity. ("Climate Change 2007: The Physical Science Basis, Summary For Policymakers" (Fourth Assessment Report of the IPCC, February 2007).) The California Climate Change Center has reported on the impacts global warming is expected to cause in the state, including substantial loss of snow-pack, a substantially increased risk of large wildfires, and reductions in the quality and quantity of agricultural products. (Amy Lynd Luers, Daniel R. Cayan et. al, *Our Changing Climate: Assessing the Risks to California* (July 2006) at pp. 2, 10.)

On June 1, 2005, Governor Schwarzenegger issued Executive Order S-3-05. The Order recognized California's vulnerability to global warming and the need to implement mitigation measures to limit the impacts to the State. The Order also set greenhouse gas emission reduction targets for California. A year later the Governor signed AB 32, the California Global Warming

Solutions Act of 2006, codified at Health and Safety Code section 38500, et seq. AB 32 recognizes the serious threats global warming poses to California and requires California to reduce its greenhouse gas emissions to 1990 levels by 2020. (Cal. Health & Saf. Code, §§ 38501, 38550.) The legislation also encourages entities to voluntarily reduce greenhouse gas emissions prior to 2012 by offering credits for early voluntary reductions. (*Id.*, §§ 38562(b)(3), 38563.)

CEQA requires that all aspects of potential environmental damage from a project be examined, disclosed, and mitigated to the extent feasible. It requires the governmental decision-maker to make a reasonable effort to gather information, identify mitigation opportunities, and adopt mitigation measures where feasible. The CEQA Guidelines provide that "[a]n EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. . . . '[C]umulatively considerable' means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (CEQA Guidelines, § 15130(a).) Although a project may only contribute a minor amount to a large problem, agencies are still required to analyze whether the project's contribution is considered significant in light of the nature of the larger problem. (*Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 718.) Thus, where a project's direct and indirect greenhouse gas-related effects, considered in the context of the existing and projected cumulative effects, may interfere with California's ability to achieve the greenhouse gas reduction requirements of the California Global Warming Solutions Act, the project's global warming-related impacts should be considered cumulatively significant.

Accordingly, the EIR must describe the existing level of greenhouse gas emissions in the county, and the estimated increased greenhouse gas emissions associated with the Yuba Highlands project. The EIR must then evaluate feasible alternatives and adopt mitigation measures that would avoid or reduce the development's greenhouse gas emissions. The existing EIR does none of these things. Instead, the EIR requires the developer to submit an "emissions reduction plan" prior to groundbreaking. There are several major problems with this plan. First, it only requires a reduction in "emissions," without designating the types of emissions that need to be reduced. The offsite mitigation strategies, for example, are specifically targeted at reductions in NOx and particulates. There is no requirement that CO2 and other greenhouse gases be reduced. Second, many of the measures are beyond the control of the developer to implement, such as telecommute programs, alternative work schedules, and employees working at a satellite work center. Third, other measures, such as promoting bicycle trips within the development, are good ideas but will have only a minor impact on reducing the project's emissions. Fourth, the measures are too vague. The plan, for example, requires the developer to develop a "transit services plan" but the does not contain standards or specific mitigation measures.

The EIR does include some energy-efficiency features that would reduce greenhouse gas emissions to a small degree. The measures include requirements such as planting trees, installing Energy Star roofing materials, installing energy efficient appliances, and prohibiting gas powered landscape maintenance equipment within the development. While a good start, the measures are insufficient to offset even a fraction of the greenhouse gas emissions the project will generate.

While no state agency has issued guidelines for carrying out AB 32, the absence of specific guidelines does not excuse CEQA compliance. In determining specific mitigation actions for the EIR, the County could look to a number of communities that are beginning to formulate strategies to reduce greenhouse gas emissions. There are a growing number of resources available to help guide Yuba County in calculating and mitigating the emissions. The Attorney General's Office would be happy to identify some of those resources if the County is interested.

Other Air Quality Impacts

Nevada County, two miles downwind of the project, has not attained the federal ozone standard. According to the Northern Sierra Air Quality Management District, the Yuba Highlands project will increase locally emitted ozone precursors by 18 percent. This is significant for Nevada County because its nonattainment results from pollution being transported from upwind areas. If Nevada County fails to attain the federal ozone standard by the target date of 2014, it is subject to serious federal sanctions under the Clean Air Act, including the cutoff of highway funds and the imposition of stricter standards for stationary sources.

The EIR proposes that before ground can be broken, the Feather River Air Quality Management District must approve an "emissions reductions plan." While the requirements of the plan sound good in theory, they are neither practical nor legally adequate under CEQA, as discussed above.

The EIR fails to adequately analyze or mitigate impacts on biological resources

Yuba Highlands is adjacent to the Spenceville Wildlife and Recreation Area (Spenceville) managed by the Department of Fish and Game. Spenceville is a 11,000- acre blue oak woodland, home to over 230 fish and wildlife species, including species listed as threatened or endangered. As suggested by its name, Spenceville serves two purposes, protection of wildlife

and human recreation; there are a number of hiking trails and even limited hunting is permitted. The recreational use of the area is light, however, and regulated by DFG.

The proposed development will potentially affect Spenceville in a number of ways. First, there will be only a 450-foot buffer separating houses from the wildlife area; second, the development will be constructed in the middle of two separate parts of the wildlife area; and third, the project proposes to "improve" the narrow gravel roads that traverse the wildlife area to serve as the main commuter routes into the Lincoln-Roseville area. The EIR fails to adequately analyze or mitigate the impacts that are likely to result from siting a large development adjacent to the wildlife area (increased human use of the area, lighting, noise, domestic pets), fragmenting the wildlife area (interruption of wildlife mobility), and developing the roads through the wildlife area (species mortality and displacement from road construction and vastly increased traffic). In addition, the EIR fails to meaningfully address the impacts the development will have on habitat or species on the development site. The surveys of on-site species were conducted during the wrong time of the year, resulting in an inadequate baseline of species that may be affected. The EIR improperly defers most of these analyses to future project-specific EIR's.

The EIR defers evaluating significant mitigation on the ground that the EIR is "only" a Program EIR and that mitigation will be required at later stages. It is appropriate to use a Program EIR to consider broad environmental issues at an early stage of the planning process (CEQA Guidelines, § 15168). The use of a Program EIR, however, does not excuse an agency from identifying and mitigating significant environmental impacts a project is expected to cause. (*Stanislaus Natural Heritage Project v. County of Stanislaus* (1996) 48 Cal.App.4th 182, 199.) An agency is permitted to defer analysis of certain details of long-term projects to the future, but it must consider all reasonably foreseeable consequences of approving a project. (*Laurel Heights Improvement Assn v. Regents of University of California* (1988) 47 Cal.3d 376, 399.)

Here, the EIR fails to assess the reasonably foreseeable impacts of the project and improperly defers assessing reasonably foreseeable impacts on the Spenceville Wildlife Area and the area's biological resources. For example, the EIR has mapped out residential, commercial, and open space areas, and has determined the number of houses for each neighborhood, but has based these decisions on incomplete biological surveys done at the wrong time of the year. The EIR states that some additional surveys will be done in the future. But without knowing whether sensitive habitat or species exist on site, the Board is not able to make an informed decision about the appropriate location of areas to be developed. Also, all assessment and mitigation of impacts of widening the roads through the Spenceville Wildlife Area has been deferred until the roads are constructed. The Board cannot make a reasoned judgment whether to approve the paving of the roads unless the EIR discloses the impacts of that decision. And if the roads through Spenceville are not improved, commuters will have to travel even farther to the Lincoln-Roseville area, resulting in more greenhouse gas emissions and other pollutants. The Board thus

needs to know what the impacts are of improving and not improving the roads.

The EIR fails to adequately analyze and mitigate impacts from supplying water to the project

The EIR maintains that the project is entitled to groundwater from the Yuba Goldfields well field, near the Yuba River. Even if Yuba Highlands can secure this water supply, which is uncertain, the EIR fails to discuss any impacts from using the groundwater. There are indications that the well field is hydraulically connected to the Yuba River. If the two are connected, pumping groundwater will draw down the river. The EIR acknowledges that it is unknown whether using groundwater will affect the Yuba River but assures the Board and the public that those impacts will be studied later, in an EIR on the well field. The California Supreme Court has specifically forbidden EIR's from deferring this type of analysis. It recently held that an EIR must address the reasonably foreseeable impacts of supplying water to a project and cannot put off the analysis to a future EIR, which is exactly what the EIR proposes to do here. (*Vineyard Area Citizens v. City of Rancho Cordova* (2007) 40 Cal.4th 412; *Stanislaus Natural Heritage Project v. County of Stanislaus*, *supra*, 48 Cal.App.4th 182.)

Thank you for the opportunity to submit these comments. We respectfully request the Board to refuse to certify the EIR until it has been re-drafted to eliminate the deficiencies described above and then recirculated for public comment.

Sincerely,

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March 30, 2006

VIA OVERNIGHT MAIL AND U.S. MAIL

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RE: Orange County Transportation Authority 2006 Long-Range Transportation Plan Draft Program Environmental Impact Report

Dear Mr. Campbell:

The Attorney General of the State of California submits the following comments regarding the Orange County Transportation Authority ("OCTA") 2006 Long-Range Transportation Plan ("Plan") Draft Program Environmental Impact Report ("DPEIR"). The Attorney General provides these comments pursuant to his independent power and duty to protect the natural resources of the State from pollution, impairment, or destruction in furtherance of the public interest. (*See* Cal. Const., art. V, § 13; Cal. Gov. Code, §§ 12511, 12600-12; *D'Amico v. Board of Medical Examiners*, 11 Cal.3d 1, 14-15 (1974).) These comments are made on behalf of the Attorney General and not on behalf of any other California agency or office. While these comments focus on some of the primary issues raised by the Draft PEIR, they are not an exhaustive discussion of all issues.

I. Introduction

The Plan is described as being OCTA's "blueprint" for maintaining and improving Orange County's transportation network, including freeways, roadways and bus and rail systems through 2030. The Plan focuses much of its attention and planned spending on freeways and roadways, with a much smaller emphasis on public transit. Consequently, the Plan forecasts huge increases (approximately 45%) in vehicle miles traveled ("VMT") per day in the coming years. The environmental analysis in the DPEIR fails to adequately analyze air quality impacts and contains no analysis at all of the impact of the Plan on climate change, both in violation of the California Environmental Quality Act ("CEQA"), Pub. Resources Code §§ 21000, et seq. Orange County is one of the most populous counties in the State, in one of the worst air quality

regions in the country. The environmental and public health concerns raised by the projected increases in vehicular travel under the proposed plan deserve, and CEQA requires, serious and thorough environmental analysis.

II. The DPEIR Should Discuss The Plan's Impact On Climate Change.

Despite the Plan's heavy reliance on vehicular travel and improvements to freeways, roads and streets, and the acknowledged increase in vehicle travel that the Plan will encourage, the DPEIR never analyzes one of the most important environmental impacts of vehicle emissions--greenhouse gases and resulting climate change

Climate change results from the accumulation in the atmosphere of "greenhouse gases" produced by the burning of fossil fuels for energy. Because greenhouse gases (primarily, carbon dioxide("CO_2"), methane and nitrous oxide) persist and mix in the atmosphere, emissions anywhere in the world impact the climate everywhere. The impacts on climate change from greenhouse gas emissions have been extensively studied and documented. (*See* Oreskes, Naomi, *The Scientific Consensus on Climate Change*, 306 Science 1686 (Dec. 3, 2004) [review of 928 peer reviewed scientific papers concerning climate change published between 1993 and 2003, noting the scientific consensus on the reality of anthropogenic climate change]; J. Hansen, *et al.*, *Earth's Energy Imbalance: Confirmation and Implications,* Sciencexpress (April 28, 2004) (available at http://pubs.giss.nasa.gov/abstracts/2005/HansenNazarenkoR.html) [NASA and Department of Energy scientists state that emission of CO_2 and other heat-trapping gases have warmed the oceans and are leading to energy imbalance that is causing, and will continue to cause, significant warming, increasing the urgency of reducing CO_2 emissions].)

In California, the state government has acknowledged the true environmental impacts of greenhouse gas emissions on climate change. Governor Schwarzenegger, in his Executive Order S-3-05 issued on June 1, 2005, recognized the significance of the impacts of climate change on the State of California, noting that "California is particularly vulnerable to the impacts of climate change." The Order goes on to itemize a litany of the direct impacts that climate change and the increased temperatures resulting from the increased presence of greenhouse gases in the atmosphere, will have on the state:

- "[I]ncreased temperatures threaten to greatly reduce the Sierra snowpack, one of the State's primary sources of water;"
- "[I]ncreased temperatures also threaten to further exacerbate California's air quality problems and adversely impact human health by increasing heat stress and related deaths;"

- "[R]ising sea levels threaten California's 1,100 miles of valuable coastal real estate and natural habitats;" and

- "[T]he combined effects of an increase in temperatures and diminished water supply and quality threaten to alter micro-climates within the state, affect the abundance and distribution of pests and pathogens, and result in variations in crop quality and yield."
  Executive Order S-3-05, June 1, 2005.

The California legislature, also recognized all of these severe impacts resulting from climate change, as well as a "projected doubling of catastrophic wildfires due to faster and more intense burning associated with drying vegetation." (Stats. 2002, ch, 200, Section 1, subd. (c)(4), enacting Health & Saf. Code § 43018.5) In the particular realm of vehicular travel and emissions from cars and truck, the California legislature went on to recognize that "passenger vehicles and light-duty trucks are responsible for *40 percent of the total greenhouse gas pollution in the state.*" (*Ibid.*, subd. (e)(emphasis added).)

Despite the increasing attention that governments, climate scientists, environmentalists, and other members of the public are rightfully directing to the issue of climate change, OCTA does not even mention the issue in its long term transportation plan, which is meant to cover the next quarter century. The DPEIR never once mentions carbon dioxide, climate change or global warming, and mentions greenhouse gases only by passing reference, when discussing other emissions, without explaining either the importance, or the projected impacts, of greenhouse gases.

Under CEQA, an environmental impact report must identify and focus on the "significant environmental effects" of a proposed project. (Pub. Res. Code § 21100(b)(1); Cal. Code Regs., Title 14, §§ 15126(a), 15126.2(a), 15143.) "'Significant effect on the environment' means a substantial, or potentially substantial, adverse change in the environment." (Pub. Res. Code § 21068). CEQA also provides that the CEQA guidelines "shall" specify certain criteria that *require* a finding that a project may have a significant effect on the environment:

> "(1) A proposed project has the potential to degrade the quality of the environment, curtail the range of the environment, or to achieve short-term, to the disadvantage of long-term, environmental goals.
>
> (2) The possible effects of a project are individually limited but cumulatively considerable. As used in this paragraph, "cumulatively considerable" means that

> the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.
>
> (3) The environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly."
> (Pub. Res. Code § 21083(b).)

In other words, if these criteria are present with regard to a project's impacts on the environment, they must be considered in an EIR. The Plan under consideration in this DPEIR, with its projected 45% increase in vehicular miles traveled by the year 2030, when considered in light of the severe impacts cars and trucks have on the level of greenhouse gas emissions in this state, clearly "has the potential to degrade the environment." (*See ibid.*, subd. (b)(1).) Moreover, the cumulative effects of this project on greenhouse gas emissions, when taken in consideration with the impacts statewide of increased population and vehicular travel over the next quarter century, are undeniable. (*See ibid.*, subd. (b)(2).) When considering the impacts of climate change on California, it is impossible to ignore that the impacts of this project will have either direct or indirect effects on human beings. (*See ibid.*, subd. (b)(3).) Given the scope of the Plan (both in years, and geographically), the projected increase in vehicle travel it calls for, and the fact that it covers one of the most heavily populated regions in the State, there is no question that the impacts of this Plan on greenhouse gas emissions and climate change may, and likely will, have significant cumulative environmental impacts for California. These impacts should have been considered and analyzed in the DPEIR.

There *could* be such analysis in the DPEIR; the data is obtainable. Carbon dioxide emissions from cars can be quantified. The California Air Resources Board has information that could be applied to the projected increase in VMT. The impacts could be assessed as to their cumulative impact on climate change, assuming (as is highly probable in this Plan) that there would be a considerable impact from the increase in CO_2 resulting from the increased VMT. (*See* Cal. Code Regs., title 14, § 15130(a) ["an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable.] *See also* Cal. Code Regs., title 14, § 15065(a)(3) ["'Cumulatively considerable' means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probably future projects."].)

Moreover, the Plan could include mitigation for these impacts. The Governor has recognized, "mitigation efforts will be necessary to reduce greenhouse gas emissions and adaptation efforts will be necessary to prepare Californians for the consequences of global warming." (Executive Order S-3-05, June 1, 2005.) Increased public transportation, increased

support of alternative fuels and technologies, the purchase of carbon offsets (or mitigation "credits"), installation of electric vehicle charging stations, and other affirmative steps to reduce the transportation impacts of CO_2 could be considered as potential mitigation projects. These are real, achievable and available mitigation measures that could be considered when OCTA recognizes its obligations to analyze greenhouse gas emissions and their impact on climate change as part of its long term transportation planning.

III. The DPEIR Does Not Adequately Discuss The Plan's Impact On Air Quality.

The DPEIR's discussion of air quality fails to address potentially serious impacts on Orange County and the South Coast air basin. In the DPEIR chapter on air quality the drafters concluded that there would be no significant unavoidable adverse long-term air quality impacts from the Plan (see DPEIR, 4.1-17 through 4.1-20), that the plan would have a neutral effect on air quality (see id.), and that the only potentially significant impacts relate solely to regional and local short term impacts from the construction of individual projects (e.g., construction of individual road widening, or lane building projects anticipated under the Plan). (*See id.* at 4.1-21 through 4.1-23)[1]. The DPEIR bases these optimistic conclusions on a comparison of the future, year 2030, emissions under the Plan to the emissions budgets of the federally mandated, local Air Quality Management Plan (AQMP), prepared by the South Coast Air Quality Management District (SCAQMD) and projected for 2030. The DPEIR finds that the Plan's emissions are within the projected emissions for the AQMP in 2030, and thus there are no significant impacts. The fundamental basis on which all of the DPEIR's assumptions rests, however, is that by the year 2030, "better fuels" and "improved emission controls" will result in overall emission reductions from vehicles. (See DPEIR at 4.1-18.) There are a number of things wrong with this analysis.

First, the comparison fails to analyze all phases of this 24-year project. The CEQA Guidelines require that an EIR consider "all phases of a project when evaluating its impact on the environment." (Cal. Code Regs., title 14, §15126.) The huge emission reductions anticipated in the Plan by the year 2030 as an anticipated result of "better fuels" and "improved emission controls" will surely take some time. The DPEIR must look at the all phases of the 24-year project time frame, not just 2030, to discern if the project will have significant impacts on health and air quality. The DPEIR contains no analysis of whether the impacts on air quality in the "in between" years, before all of the "better fuels" and "improved emission controls" have been implemented, will be significant; there is no way to discern, from the information available in the DPEIR what the emissions during those years will be.

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1. These impacts, according to the DPEIR, would be addressed through mitigation measures, but the mitigation measures include no monitoring requirements.

Second, there is no detailed comparison of the project with the emissions budgets of the AQMP. The DPEIR states that "[c]umulative impacts were assessed by comparing projected vehicle emissions in 2030 to the emission budgets established in the local AQMP." (DPEIR at 4.1-16.) Nowhere in the document, however, is a detailed comparison shown to the public, nor is there any indication of how the project emission budgets compare year by year with the AQMP emission budgets. This failing is linked to the failure to consider "all phases" of the project, but displays as well the fundamental lack of detailed information in this DPEIR. The conclusory statement that "the impacts were assessed," without any backup, is not sufficient disclosure for the public to make its own evaluation, and, in fact, this lack of information precludes the informed decision making and public participation required by CEQA. (*See* Pub. Res. Code § 21061; Cal Code Regs, title 14, § 15121(a) [an EIR is an informational document which will inform public agency decision-makers and the public generally].) The purpose of an EIR, inter alia, is to provide public agencies and the public in general with detailed information about the effect of the proposed project on the environment. (Pub. Resources Code § 21061; *Laurel Heights Improvement Association v. Regents of the University of California* (1988) 47 Cal.3d 376, 391.) An EIR should, when viewed as a whole, provide a reasonable, good faith analysis of known environmental impacts. (*Al Larson Boat Shop, Inc. v. Board of Harbor Commissioners* (1993) 18 Cal.App.4th 729, 749.)

Third, the air quality appendix does not contain any actual useful emissions data or modeling to allow the public to evaluate the accuracy or appropriateness of the model. Appendix B, Air Quality, contains only summary tables of the results of some computer modeling performed by OCTA for criteria pollutant emissions. The tables may represent various alternative scenarios (perhaps for the proposed Plan and for some plan alternatives; it is not clear), but there are no explanations of the assumptions and data (or "inputs") that went into the modeling program that produced these results. There is no explanation of what the various summaries (or "outputs") represent. Without an explanation of the data inputs for the modeling done to support the DPEIR, or an explanation of what the summaries show, it is impossible for the public or the public agency decision makers to make informed decisions. (*See* Pub. Res. Code § 21061.)

Fourth, the toxics analysis is inadequate. In its discussion of impacts on hydrology and water quality, the DPEIR acknowledges that there will be "new roadways in undeveloped areas" under the Plan. (DPEIR at 4.7-11.) In its discussion of toxic air contaminants, however, there is no discussion of the impacts of those "new roadways in undeveloped areas" which will expose new populations to both criteria and toxic pollutants. There should be a risk assessment in order to draw valid conclusions about public health, and such an assessment should be done for each phase of the project (just as with the overall air quality assessment). The DPEIR recognizes that diesel emissions are a known carcinogen, but limits its analysis of cancer risk from the project to

construction emissions and to the expected situation in 2030. The DPEIR does not consider the cancer risks resulting from the operation of current and new roadways, expanded freeways, etc. In Health & Safety Code Section 39606(b), the Legislature recognized the special susceptibility of children and infants to air pollution, and the DPEIR itself recognizes that there are particularly sensitive receptors (DPEIR at 4.1-16), yet the DPEIR makes no effort to evaluate the project's effects on them.[2]

Fifth, where the DPEIR does provide some mitigation for the few significant air quality impacts it does recognize (related to construction), the document makes no assignments, not even tentatively, of responsibility for enforcing them through mitigation monitoring. The DPEIR recognizes only two categories of potentially significant impacts on air quality: Short-term (construction) regional impacts (from a number of construction-related activities and materials) and short-term localized impacts (from construction vehicles which are sources of carcinogenic pollutants and diesel exhaust). (*See* DPEIR at 4.1-21 through 4.1-23.) With regard to the construction impacts, the DPEIR acknowledges that "a large number of the projects in the [Plan] would involve extensive construction or reconstruction" and that it is "very likely" that some of the projects would be under construction at the same time. (DPEIR at 4.1-21.) Notwithstanding the acknowledged significant air quality impacts the construction activities are expected to produce, there are no monitoring requirements for the list of mitigation measures that the DPEIR says "should be considered" when EIR's are prepared for the individual projects. Likewise, there are no monitoring requirements incorporated in the mitigation measures to address the emissions from construction equipment. Moreover, Chapter 7, Mitigation Monitoring and Reporting Program, does not indicate any monitoring actions, or responsible implementation agencies for the proposed mitigation measures. (DPEIR at 7-1 through 7-34.)

OCTA is required to "provide that measures to mitigate or avoid significant effects on the environment are fully enforceable through permit conditions, agreements or other measures." (Pub. Res. Code § 21081.6(b).) The DPEIR should disclose and discuss such mitigation monitoring measures, or at least make tentative assignments of responsibility for enforcing them, so that the public can take these proposed measures into account.[3]

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2. In addition to these failures to address toxic air contaminants, in the chapter on Hazardous Materials, the DPEIR does not examine the indirect effects of the 45 % increase in VMT, such as increased cancer risk from benzene and other petrochemical toxic emissions released from gas stations, increased refinery emission, and the like.

3. In addition, the Plan should contemplate, discuss and disclose whether funding for the mitigation measures it will require is or will be available.

Finally, given the inadequacies and lack of detail in the air quality impacts analysis it is not appropriate for all future projects contemplated under this Plan to be able to "tier" off of a document as deficient as this DPEIR.[4] The DPEIR states "[t]he lead agencies for individual projects may use this PEIR as the basis of their regional and cumulative analysis." (DPEIR at 2-13.) The deficient analysis of the air quality impacts would make any meaningful project-level analysis of regional and cumulative of air quality impacts for an individual project nearly impossible. For example, it is possible that a project-level EIR could be prepared next year for a project such as a lane-addition to a freeway. Based on "tiering" from this DPEIR, the planners of such a project would have only the conclusory statements regarding air quality impacts in the year 2030 from this DPEIR upon which to base cumulative and regional impacts analyses in their EIR, whereas the new hypothetical freeway lane might be operational in 2009. There would be no analysis of the cumulative and regional impacts of that project for years 2009 through 2029. While this example pertains only to the air quality analysis, the other failings of the DPEIR discussed below also contribute to the inappropriateness of allowing future project level EIR's to "tier" off of this deficient CEQA document.

IV. The DPEIR Contains Many Other Inadequacies.

In addition to the failure of the DPEIR to adequately address air quality, and to address greenhouse gas emissions impacts at all, the DPEIR is inadequate in a number of other areas.

A. The DPEIR Does Not Contain An Adequate Description of the Project

Chapter 2 of the DPEIR, is titled "Project Description" and it does contain a list of the projects that the Plan envisions. The description, however, is lacking. The list of projects contemplated under the plan includes one-line, bullet-point descriptions of various freeway and interchange improvements, lane additions and ramp construction projects that will make up the improvements to freeways under the Plan. (There are also one-line, bullet-point descriptions of the other planned projects.) Despite the fact that the primary focus of projects and spending under the Plan is on freeway construction projects, however, the Project Description does not contain any maps or visual drawings of the Plan's contemplated improvements. It is very difficult to ascertain what the impacts on the ground will be from the brief descriptions of the planned projects. Guidelines indicating areas of disturbance, or footprints, for planned projects

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4. "'Tiering' or 'tier' means the coverage of general matters and environmental effects in an [EIR] prepared for a policy, plan, program or ordinance followed by narrower or site-specific [EIRs] which incorporate by reference the discussion in any prior EIR . . ." (Pub. Res. Code §§ 21068.5.)

should be included. From the descriptions in the DPEIR, an understanding of the true impact of the Plan is not possible.

The public should be able to understand from the DPEIR what implementation of the Plan will mean to their communities and their surroundings in physical terms. "Only through an accurate view of the project may affected outsiders and public decision-makers balance the proposal's benefit against its environmental cost, consider mitigation measures, assess the advantage of terminating the proposal (i.e., the "no project" alternative) and weigh other alternatives in the balance. An accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." *County of Inyo v. City of Los Angeles*, (1977) 71 Cal.App.3d 185, 192-193.

B. The DPEIR Does Not Contain An Adequate Analysis of Alternatives.

The alternatives considered in the DPEIR consist entirely of plans that envision varying degrees of funding, as opposed to plans that envision alternative mixes of various transportation improvements or projects. The four alternatives to the Proposed Plan are:

(i) the No Project (Baseline) Alternative, which "includes projects and programs that have secured funding, have been assessed for their environmental impacts, and have been approved to be implemented" (a small sub-set of the projects in the Proposed Plan) (DPEIR at 5-4,);

(ii) the Constrained Alternative, which is "a set of projects and services that can be completed within the County's traditional revenue sources for transportation improvements" (a sub-set, larger than the No Project Alternative sub-set, of the same projects that are included in the Proposed Plan) (DPEIR at 5-11, 5-17);

(iii) the Balanced II Alternative, which "includes all of the projects from the Proposed Plan with the exception of the High Occupancy Toll (HOT) projects proposed along [SR 91, including the direct connectors between SR-241 and the SR-91 toll lanes" (DPEIR at 5-29); and

(iv) the "Unconstrained" Alternative, which "includes projects and services that could be implemented . . . if funding was not an issue." (DPEIR at 5-43.)

It is clear from the alternatives considered that the planners looked only at alternative levels of funding that would allow variable numbers of projects off a master-list of desired projects, and not at alternatives designed to provide alternative levels of environmental impact,

or a different master-list of projects. For example, nowhere does the DPEIR consider a potential alternative that changes the balance of spending to focus more on improvements to mass transit services rather than on improvements to freeways and roadways. The decision to focus so much attention on freeway upgrades was pre-determined by the planners' view that the only solution to increased congestion is to build more freeways. The planners exhibit this view when they explain that "the projections for 2030 indicate that vehicle miles will increase faster than population and employment, mostly due to longer trips or commutes. In short, freeway capacity must grow to meet future freeway travel demand." (DPEIR at 2-5) This conclusion ignores the obvious alternative viewpoint: some of the increased travel demand might be more properly diverted to mass transit solutions, as opposed to simply concluding that increased freeway capacity is the only solution. Based on a review of the Plan "objectives" to increase mobility, protect transportation resources and enhance the quality of life (see DPEIR at 2-3), other types of alternatives – alternatives that examine variable mixes of modes of transportation as opposed to just variable mixes of dollars – that still met the objectives of planners could have been considered.

Given that the impacts on the environment from the proposed Plan are projected to be significant, such alternatives should have been considered. One of the purposes of the discussion of alternatives in an EIR is to diminish or avoid adverse environmental effects. (*See Laurel Heights Improvement Ass'n v. Regents of Univ. of Cal.* (1988) 47 Cal.3d 376, 403 [discussion of only three alternatives, where planners claimed they had already ruled out other alternatives as infeasible, was inadequate]; Pub. Res. Code § 21002 [EIR should consider alternatives which would substantially lessen the significant environmental effects].)

C. The DPEIR Does Not Contain Adequate Discussion of Biological Resource Impacts.

The DPEIR does not quantify the biological resource impacts that it recognizes will be more significant under the proposed Plan than under the No Project alternative. (See DPEIR at 5-6 through 5-7.) Additional detail on the magnitude of direct impacts of the project must be provided for the Proposed Project and all project alternatives. All of the proposed alternatives and the proposed Plan contain lists of the projects they include. The Program EIR should make an attempt to quantify the impacts. Instead, the DPEIR puts off the analysis of the biological resource impacts of all the projects until the EIR for the individual project is prepared. (*See* DPEIR at 4.2-22.) It is impossible to analyze the difference between alternatives on this subject, when the impacts have not been described.

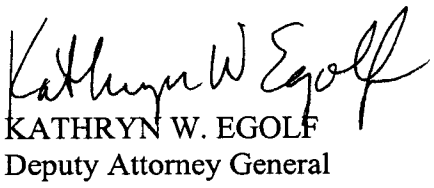
D. The Plan And DPEIR Should Include Plans For Improving Air Quality And Reducing Greenhouse Gas Emissions In Its Discussion Of "Environmental Programs."

The only "environmental program" contemplated under the Plan is a program for augmenting urban runoff treatment and mitigation to create a "coordinated high-quality urban runoff program." (DPEIR at 2-11.) As discussed in detail above, the impacts of the Plan on greenhouse gas emissions and the cumulative impacts of those emissions on climate change, warrant close examination in this DPEIR. Likewise, a plan like this one which places so much of its emphasis for transportation planning and spending on automobile and truck travel versus mass transit will likely result in greater emissions of criteria pollutants and toxic air contaminants than would an alternative that focuses on improving mass transit and *reducing* vehicular miles traveled. Given these considerations, the state of air quality in the South Coast air basin and the severe impacts climate change can inflict on the citizens of Orange County, it would be a responsible and reasonable planning measure to include some "environmental program" aimed at reducing the air quality and climate impacts of the proposed Plan. As mentioned in above, there are some easily implemented steps that might be considered, such as the purchase of mitigation credits. There are also programs that might encourage greater use of alternative technologies and fuels (e.g., electric and hybrid vehicles) or that might add incentives for increased use of public transit (enhanced employer managed discount programs that reward use of transit when compared with parking costs) that could be explored. This long term plan is an opportunity for OCTA to take a truly "visionary" role in shaping the transportation *and* environmental landscape of Orange County for the next quarter century. We hope that the opportunity will not be missed.

V. Conclusion

If you or your staff have questions regarding these comments, please contact me at 213-897-0628.

Sincerely,



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For BILL LOCKYER
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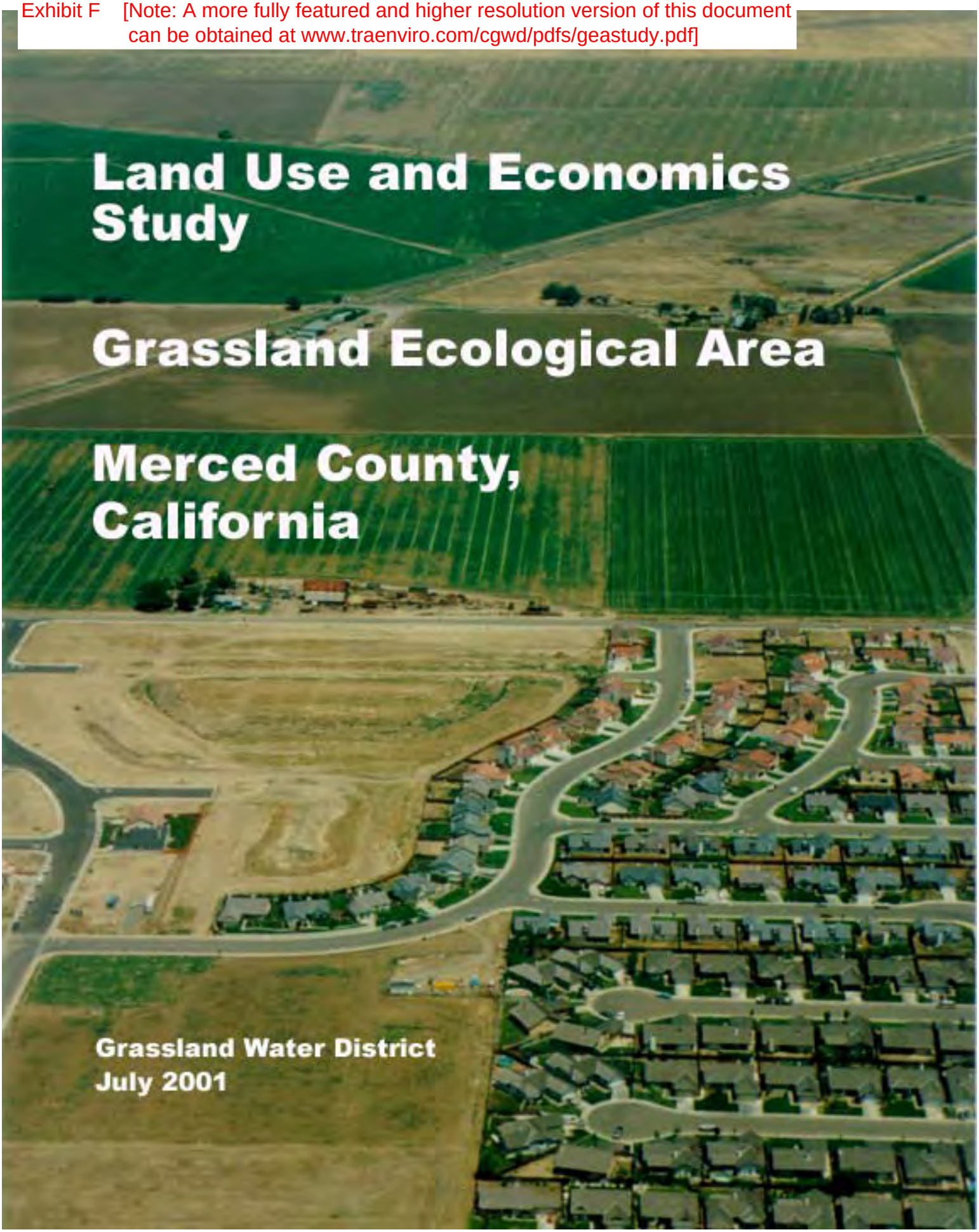
Exhibit F [Note: A more fully featured and higher resolution version of this document can be obtained at www.traenviro.com/cgwd/pdfs/geastudy.pdf]



Land Use and Economics Study

Grassland Ecological Area

Merced County, California

Grassland Water District
July 2001

LAND USE AND ECONOMICS STUDY

GRASSLAND ECOLOGICAL AREA
MERCED COUNTY, CALIFORNIA

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LAND USE AND ECONOMICS STUDY
GRASSLAND ECOLOGICAL AREA/
MERCED COUNTY, CALIFORNIA

Economics of Merced County Wetlands and the Impact of Urban Growth

SUMMARY

Wetlands and wildlife habitat have more economic value than most people realize. These lands contribute to the local and regional economy through direct expenditures by public and private entities for habitat management and enhancement and by the money spent for recreation of all types in the resource areas. These areas are worthy of protection for more than just their ecological values. Protection from encroachment of non-compatible uses is most important when the wetlands are embedded in a rapidly growing region such as the Central Valley of California.

This Land Use and Economics Study, jointly funded by the Grassland Water District, the Packard Foundation and the Great Valley Center, may be the first of its kind to provide a comprehensive picture of the economic values of wetlands in the County, and their impact on the local economy. These non-urban land uses produce a net economic benefit to the local economy whereas urban development, particularly sprawl type residential development, produces a net economic loss to local government. The reason is that it costs local government more to provide public infrastructure (water supply, sewer, roads, storm drains, schools) and services (police, fire, mosquito abatement, other local services) than the revenue a city and/or county receive from the residential development. Wildlife habitat and agriculture contribute to the local economy but require very little in the way of urban services.

The wildlife habitat resource areas of Merced County include the Grassland Ecological Area (GEA) of about 178,000 acres which includes two federal wildlife refuges, three state wildlife areas and a large number of private duck clubs. In addition, wildlife habitat resource areas in the County include another 23,000 acres of state wildlife areas and 33,400 acres of state parks and recreation areas.

Waterfowl are central to private recreation in the Grasslands.

The typical total annual value of habitat maintenance and land acquisitions in the Grasslands is $16.4 million and the value of expenditures related to recreation in the Grasslands is about $11.4 million per year. With a multiplier of 1.41 to account for induced jobs and spending by other providing services to the wetlands users and managers, the total $27.7 million spent on the wetlands contributes $41 million per year to the local economy, and accounts for about 800 jobs. In Merced County as a whole, habitat management and wildlife-associated recreation contributes $53.4 million to the county's economy and accounts for about 1100 jobs.

The productive economy of the wetlands is threatened by burgeoning population growth. There is an inevitable conflict between urban growth and protection of open space and

agricultural values. Growth introduces more roads, motor vehicles, houses, noise, urban pets, pests, vandalism, litter and the like into the pristine wetland environment. California Department of Finance projections show a growth in the total Merced County population from 198,000 to about 620,000 people by the year 2040. The number of urban acres is expected to increase from about 50,000 to as many as 94,000 to accommodate this population growth as well as the associated commercial and industrial development within the cities. The Merced Case Study looked at two growth scenarios: conventional or "sprawl" growth at a density of 5.5 persons per acre (2.2 dwelling units (DU) per gross acre)[1] and a more compact scenario of 10.7 persons per gross acre (4.3 DU per gross acre) and 10% of the residential and job growth as infill rather than annexation of lands around cities.

Water supply is a key part of the infrastructure needed to maintain habitat value in the wetlands.

The economic impact on the wetlands of this explosive growth is difficult to predict. The amount of urban land in a two-mile band around the wetlands complex is expected to increase by a factor of 3 to 6 by 2040, depending upon whether growth is compact or conventional. Broadly, if non-compatible urban development encroaches on the wetlands so as to reduce its utilization by wildlife, then recreational usage could be expected to decline, and public funds for habitat management may be more difficult to obtain. The impact will depend on how closely this growth encroaches on the boundaries of the refuges, or whether it, as in the case of Los Banos, divides the North from the South Grasslands.

The cities of Merced, Los Banos, Gustine and Dos Palos have planning spheres of influence affecting the GEA. Growth in unincorporated areas of the county such as Volta could also adversely affect the wildlife refuge areas. Because of its size and location, Los Banos presents the greatest challenge; the city boundary and its sphere include the GEA and its two-mile band. The current Los Banos General Plan restricts growth on the eastern end of the city to protect the wetlands, and the city has the opportunity to place important lands in open space and recreation uses.

This study also addresses growth in Merced County in relation to impact on the agricultural economy. The analysis of agricultural impact of sprawl vs. compact growth follows the same methodology as the 1995 American Farmland Trust study: *Alternatives for Future Urban Growth in California's Central Valley: The Bottom Line for Agriculture and Taxpayers.*

Agriculture is generally compatible as a buffer to the wetlands.

The total value of agricultural production in Merced County in 1998 was $1.45 billion

[1] Gross acreage includes streets, public facilities, commercial and industrial land uses.

($2.11 billion with the economic multiplier applied) from 966,200 acres of field crops, 57,400 acres of vegetable and seed crops and 115,900 acres of fruit and nut crops. Within the GEA the approximately 50,000 acres of agricultural lands and 128,700 acres of range and wetlands had an economic value in 1998 of $114 million ($160 million with the economic multiplier effect). Thus the GEA accounts for 5.3% of the total agricultural production in the County.

Two tables summarize the economic impact of the various land uses and growth types in this study. Table S1 gives the economic picture today of the economic impact of land uses on local government. In Table S-1 net revenue is the *difference* between the total cost of local government to provide services and infrastructure to the various land uses and the revenue that each land use type produces. The revenue/cost ratio is total revenue *divided by* total cost. Net revenue per acre is the net revenue divided by the total number of acres of that land use category. It can be seen from Table S-1 that agriculture and wetlands have a highly positive revenue to cost ratio. That is, for example, agriculture produces $3.42 of revenue to local government for every dollar it costs to serve agriculture. Wetlands produce $1.70 of revenue for every dollar of cost – less than agriculture because their productivity and market value is less, but they demand very little in the way of urban services. In addition, these two land uses produce a modest net revenue per acre.

Table S-1: Economic Impact on Local Government – Existing Revenue vs. Cost by Land Use

	Agriculture	Wetlands	Cities Only	All Urban	County
Revenue ($1000's)	$12,194	$272	$86,125	$279,874	$206,215
Cost ($1000's)	$3,562	$160	$84,274	$289,442	$208,890
Net Revenue	$8,632	$112	$1,851	($9,568)	($2,675)
Revenue/Cost Ratio	3.42	1.70	1.02	0.97	0.99
Area (ac)	1,162,000	129,000	22,875	50,130	1,162,000
Population			125,232	198,522	198,522
Net Revenue per capita			$14.78	($48.20)	($13.47)
Net Revenue per acre	$7.43	$0.87	$80.92	($190.86)	($2.30)

Source: Appendix 2 Summary Table C, Tables 4E, 4F.

In contrast, all types of urban development are a "break even" proposition or are negative. Considering the cities only (city population and city-provided urban services) the revenue/cost ratio is very slightly positive. Also, within the cities only there appears to be a net revenue per acre of about $81. However, this is misleading because the cities populations also utilize many services provided only by the County such as District Attorney, assessor, courts and judicial services, elections etc. Looking at the entire County urban population, there is already a large net deficit in the cost per acre to provide services to its urban population – the County and cities spend $190.86 more per acre to serve their urban population than they get back in revenue. It is more expensive and inefficient to serve this far flung scattered population compared to the more concentrated population in cities.

In Table S2 net revenue per urban acre is the net revenue divided by the total number of acres that are urban under each scenario. When one now considers the effect of the two growth scenarios on local government economics, Table S2 depicts the following: at present there is a small net deficit to local governments (cities and County together) to provide infrastructure and urban services to the urban population. This impact is negative (a deficit) whether one considers the cost per capita (population) or the cost per urban acre.

Table S2: Economic Impact on Local Government
– Effect of Growth to 2040 on Revenue vs. Cost

	Existing	2040 "Sprawl"	2040 "Compact"
Revenue ($1000's)	$292,340	$942,360	$943,272
Cost ($1000's)	$293,164	$1,005,015	$943,988
Net Revenue	($824)	($62,655)	($716)
Revenue/Cost Ratio	1.00	0.94	1.00
Urban Area (ac)	50,130	144,325	97,228
Population	198,522	620,457	620,457
Net Revenue per capita	($4.15)	($100.98)	($1.15)
Net Revenue per urban acre	($16.44)	($434.12)	($7.36)

Source: Appendix 2 Summary Table D, Tables 4E, 4F.

Under the sprawl growth scenario for year 2040, the present $16.44 deficit per acre grows to $434.12. With the same population accommodated with compact growth, the deficit shrinks to $7.36 per acre. The sprawl scenario shows that continued growth at the current average density per gross urbanized acre is so inefficient that unless revenues (fees and taxes) are raised substantially, local governments will fall farther behind in their ability to provide capital improvements and services.

The improvement (from -$16.44 per acre to -$7.36 per acre) under the compact growth scenario shows that marked effect that even a modest effort at making growth more compact would have in reducing the costs of infrastructure (e.g. roads, sewer, water, storm drainage). Even with the tripling in population under either growth scenario, serving the new population at increased compact densities is so much more efficient than serving the present population that the overall cost to serve each person or each dwelling unit (or acre) drops. Note that even under the compact scenario as depicted in this study, the net impact of the growth on local government is still negative (a net loss).

Sprawl growth would also consume twice as much land over the 44 year period. The difference in net revenue between the sprawl and compact scenarios is also related to: (1) the saving of 47,000 acres of farm land under the compact compared to sprawl scenario and (2) the fact that this land remaining in production continues to produce revenues for the County of some $115 million per year.

Compact growth makes more than economic sense: keeping more of the land surrounding the wetlands complex in some kind of agricultural use helps to preserve both the economic viability of agriculture in the County and its value in protecting the wetlands from the effects of urban encroachment. Preserving wetlands as a land use includes guarantee of an adequate supply of inexpensive water of sufficient quality, protection of a one to two mile buffer around the "core" area with only compatible uses (agriculture, open space uses), more land in permanent protection in easement or fee, and continuation of seasonal land use diversification. Protection would also be enhanced by a greater level of public expenditure for wetlands, including in lieu fees paid to local governments for their loss of property taxes. Private landowners could also make greater use of other federal sources of money such as the USDA Wetland Reserve and Conservation Reserve Program or endangered species funds.

Expenditures for water delivery and improvements are a major part of public and private investments in the wetlands.

This analysis has confirmed that for Merced County, agriculture has a net positive economic impact on local government and generates over $2 billion per year in county economic productivity. Likewise, in contrast to the common view of wetlands as an economic "wasteland" suitable only as habitat for ducks, this study shows that wetlands too have a net positive economic impact on local governments and represent important public and private investment and local economic activity.

The substantial economic values of non-urban uses emphasize the importance of their long-term protection in future land use planning decisions. This study focuses on Merced County, California, but its results are clearly applicable to most of California's Central Valley and to other regions where the balance of urban, agricultural, and natural resource land uses is undergoing rapid change. Regional planning often considers the quality of life contribution of agricultural and natural open space; this study shows that planning also needs to provide for the integrity and long term viability of agriculture and natural resources as components of our economy.

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LAND USE AND ECONOMICS STUDY
GRASSLAND ECOLOGICAL AREA/
MERCED COUNTY, CALIFORNIA

Economics of Merced County Wetlands and the Impact of Urban Growth

I. Purpose

The purpose of the Land Use and Economic Study of Merced County is five-fold:

- Provide specific tools for local government and citizens to use in directing the course of future local land use planning
- Estimate current economic values of wetland habitat and agriculture in Merced County as contributors to the local economy
- Show that wetlands and agriculture have substantial demonstrable direct economic value to the local economy and deserve to be better protected in future land use planning decisions
- Offer a model for other Central Valley counties to use for protecting their open space and agricultural resource areas from urban encroachment
- Reinforce other studies which have shown the positive economic impact of compact growth compared to sprawl growth

II. Report Organization

The main text describes the study methodology, results, conclusions and recommendations. The main text contains tables listed as "Text Table 1 through "n" and refers to Figures 1 through 8 which are included in Appendix 1. Appendix 1 also includes the tables relating to wetland expenditures and recreational use and expenditures in Merced County. Appendix 2 is the analysis of population, land use, existing costs and revenues to local government (cities, counties) in Merced County, and the fiscal analysis of two growth scenarios to the year 2040: conventional "sprawl" growth vs. compact growth. Appendix 2 is intended to be a *self-standing document*, but portions of the analysis are also included in the analysis in the main text of the report.

III. Background of the Current Study

A. Existing Land Use and Resources of Merced County

Merced County, located in the central portion of the Great Valley of California, encompasses 1.262 million acres. (See Figure 1) The 1998 land use distribution in Merced County is as follows:

Text Table 1

Distribution of Land Uses in Merced County (1996) (See Also Figure 1)

Land Use	***Acres***
Agriculture	1,162,008
Grassland Ecological Area (GEA)	179,464*
Developed area – incorporated	22,875
Developed area – unincorporated	27,255

* Includes 49,799 acres of agriculture out of the 1,162,00

The total value of **agricultural production** in Merced County in 1998 was $1.45 billion ($2.11 billion with the economic multiplier applied) from 966,200 acres of field crops, 57,400 acres of vegetable and seed crops and 115,900 acres of fruit and nut crops. Within the GEA the approximately 50,000 acres of agricultural lands and 128,700 acres of range and wetlands had an economic value in 1998 of $90.8 million ($126 million with the economic multiplier effect). Thus the GEA accounts for 6% of the total agricultural production in the County. (See also Appendix 2, Table 2A).

About 46% (22,875 acres) of the urbanized area (50,069 acres) of Merced County is in its six cities. (See Figure 1 and Appendix 2, Table 1). The remainder is scattered throughout the rural areas around the cities, and in rural communities such as Volta and Santa Nella. There is a higher density of development near the boundaries of cities. For this study we have defined a two-mile ring or "doughnut" around each city as a way of project where a major portion of the growth in the next 40 years is likely to go. Merced, the county seat and largest city accounts for about half of the urbanized area in cities. The remaining cities, in decreasing order of size and population are: Los Banos, Atwater, Livingston, Dos Palos and Gustine. Merced, Atwater and Livingston are in the Highway 99 transportation corridor, Gustine is on the I-5 corridor and Los Banos is on S.R. 152.

B. Grassland Ecological Area (GEA)

The **Grassland Ecological Area (GEA)** is the largest wetland complex in California. The GEA boundary is a non-jurisdictional boundary established by the U.S. Fish and Wildlife Service for the purpose of designating an area in which public easements for wetland conservation were to be purchased. Its land use distribution, as shown in Appendix 2, Table 5 includes the following land uses: wetlands/rangeland -- 128,674 acres, agriculture 49,799 acres, urban development 771 acres, and other miscellaneous 220 acres. About 110,000 acres are privately owned by about 160 hunting clubs. Approximately 51,000 acres are in public ownership in federal wildlife refuge, state wildlife areas and state park (see Figure 4 and Text Tables 2 and 3 below). The area of year-round and seasonal wetlands, riparian corridors and native grasslands provides habitat for more than 550 species of plants and animals, including 47 species that have been federally listed as threatened, endangered or sensitive (GWD, 1997). Over a million waterfowl regularly are found in the GEA during the winter months. (See Figure 3). **For the purpose of this study we have termed the GEA the "focus area", and the County as a whole the "study area".**

1. Federal Refuges

The **San Luis National Wildlife Refuge** comprises 26,074 acres of permanent and seasonal marshes, wooded sloughs and grasslands. This refuge includes the Kesterson, Freitas, Blue Goose, West and East Bear Creek Units and the San Luis Unit (see Figure 2). Migratory waterfowl feed and rest on the seasonal marshes which are flooded in fall, winter and spring. The sloughs and channels of the San Joaquin River provide songbird and wading bird habitat, while the uplands include remnant native grasslands which are habitat for raptors.

The **Merced National Wildlife Refuge** comprises 7,034 acres of marshes, uplands and farmed fields planted with small grain and corn and pasture grasslands. Collectively, these lands provide an abundance of food for waterfowl, cranes and shorebirds..

2. State Wildlife Areas

California State wildlife areas and their acreages are listed below. (See Figure 2). State wildlife areas that are part of the GEA are shown in *italics.*

Text Table 2
State Wildlife Areas

State Wildlife Area Name	***Acreage***
North Grasslands Wildlife Area (WA)*	6,335
Volta Wildlife Area	3,000
Los Banos WA	6,130
Upper and Lower Cottonwood Creek WA	6,000
San Luis Reservoir WA	900
O'Neill Forebay WA	700
Total acres in State Wildlife Areas	23,065

* Includes Gadwall, Salt Slough and China Island wildlife areas (a small portion of the latter is in Stanislaus County)

North Grasslands Wildlife Area* - This Wildlife Area is composed of 6,335 acres of permanent and seasonal marshes, riparian corridors, shrublands, and grasslands. The area provides habitat for almost 200 species of birds and many species of mammals, reptiles, amphibians, and fish.

Volta Wildlife Area - This Wildlife Area is composed of 3,300 acres of permanent and seasonal marshes, shrublands, and grasslands. Most of the 2,800 acres of emergent marsh are open for hunting in season, bird watching and fishing. The area provides habitat for almost 150 species of birds and many species of mammals, reptiles, amphibians, and fish, including the state-threatened Giant Garter Snake.

Los Banos Wildlife Area - This Wildlife Area is composed of 6,130 acres of permanent and seasonal marshes, riparian corridors, shrublands, and grasslands. The wildlife area includes the

Los Banos and Mud Slough units. The area provides habitat for almost 200 species of birds and many species of mammals, reptiles, amphibians, and fish.

Upper and Lower Cottonwood Creek WA – Upper Cottonwood Creek is a 4,000 acre wildlife area, located on the coastal mountains of western Merced County. The area is steep and rugged with deep gullies and canyon hillsides. The area contains grasslands, with some oak trees and scrub vegetation. Elevations range from a high of 2,001 feet to 600 feet at the low point. Lower Cottonwood Creek WA (2000 acres) has different topography The hills are grass covered with very few trees or brush clusters and are much more gentle and rolling than the upper unit. Elevation varies from a low of 300 feet to a high of 1,078 feet.

San Luis Reservoir Wildlife Area – This Wildlife Area is a 1,083 acre blue oak woodland in the foothills of western Merced County. The area is fairly steep with east facing hillsides. Elevations range from 600 feet to 1,490 feet. The majority of the landscape is annual grassland savannah with scattered blue oaks and interior live oaks. Sycamore riparian areas line the creeks leading into the reservoir. Lush corridors of California bay and poison oak are found along the southern border.

O'Neill Forebay WA – When this 700 acre area was established over twenty years ago, thousands of cottonwood and willow trees were planted, as well as wild rose and blackberry bushes. They have grown into maturity, providing habitat, food and cover for many species of upland and non-game wildlife. In addition to the shrubs and trees, cereal grains are planted each year to benefit upland game. Discing is also done yearly to enhance turkey mullein which is a favorite with dove.

3. State Parks and Recreation Areas

The State Parks and Recreation Areas in Merced County are as listed below.

Text Table 3
State Park and Recreation Area Acreages

State Park or Recreation Area	***Acres***
San Luis Reservoir (including Los Banos Creek)	23,551*
Grasslands State Park (in GEA)	*2,826*
Pacheco State Park	6,880*
McConnell State Recreation Area	74
George J. Hatfield SRA	46.5
Total acres in State Parks and Recreation Areas	33,378

* Only a portion of these areas is in Merced County. The total acreage of State Parks and Recreation Areas in Merced County is about 2/3 of the 33,378 (22,263 acres)

C. 1995 Land Planning Guidance Study

The 1995 *Land Planning Guidance Study* prepared for the Grassland Water District addressed both immediate, critical threats and long-term threats to habitat in the wetland ecosystems of the Grasslands Management Area. The immediate threats would be brought about through the urban expansion of the City of Los Banos, especially in the easterly direction. The longer term threats were related to the ultimate expansion of Los Banos and the other cities in Merced County that would bring urban development to within one mile or closer of the boundary of the resource conservation area.

The study addressed the concept of a buffer or band of appropriate land uses around the GEA. It examined the effect of a range of buffer widths in protecting the interior of the resource area from encroachment. The recommended actions to avoid fragmentation and impacts to the wildlife corridor area between the North and South Grasslands included:

- Restriction of land uses incompatible with habitat to an area geographically west of the Santa Fe Grade
- A minimum 200-foot wide buffer strip of agricultural land separating any waterways from the nearest road or urbanization
- An impenetrable barrier over several tens of feet close to habitat

Compact Growth Alternative

The study specifically requested the City of Los Banos to consider a compact growth alternative to its conventional General Plan. The new General Plan proposed to designate as urban a total of over 10,000 acres for urban development, of which only about 2,100 acres were actually developed in 1992. The study showed that there was enough vacant land within the existing city limit of Los Banos to accommodate 45 years of growth at historic rates and more than double the 1992 population There was also appropriately zoned vacant land within the existing city limit sufficient to accommodate an additional 8 million square feet of commercial and industrial development.

D. 1995 American Farmland Trust (AFT) economics study

The AFT study was titled *Alternatives for Future Urban Growth in California's Central Valley: The Bottom Line for Agriculture and Taxpayers.*[1] The purpose of the study was to compare the land use and economic impacts of two alternative growth scenarios for the Central Valley of California: conventional "sprawl" growth versus compact growth. The study looked at eleven counties from Kern in the south to Sacramento and Sutter in the north. The two scenarios assumed the same amount of growth would occur between 1995 and 2040 – the study's planning horizon -- a tripling of the 1995 population. The difference was in the distribution of the growth: 3 units per acre which approximates the existing average urban density of the Valley versus 6 units to the acre, which was "intended to represent a relatively conservative, realistically achievable goal for new development in the valley". In addition, the compact scenario assumed that 10 percent of the new population would be accommodated as urban infill.

[1] David Strong of Strong Associates, who prepared the economic analysis of urban growth and its effect on agriculture and wetlands for this study, was a principal author on the 1995 AFT study.

The study defined a "Zone of Conflict" around urbanizing areas within which "urbanization can be assumed to alter agricultural investment, crop patterns and ownership, slowly changing in anticipation of further urbanization." In the zone of conflict agriculture would not have a long term future and its economic value would be diminished. The zone of conflict was defined to extend only out to one-third of a mile from the agriculture/urban boundary or interface.

The study found the following differences between the sprawl and compact growth scenarios:

Text Table 4
Results of American Farmland Trust 1995 Study

	Lower Density "Sprawl"		***Compact Growth***	
	11 County	*Merced Co.*	*11 County*	*Merced Co.*
Acres of Farmland Lost				
Prime and Important	613,669	38,858	265,937	16,090
Other	421,808	16,540	208,433	8,657
Total	1,035,477	55,398	474,370	24,747
Zone of Conflict Around Urban Areas				
Acres	2,537,490	112,610	1,585,870	92,876
Dollar value of productivity lost	$2,537,490	$112,610	$1,575,870	$92,876
Reduction of Agricultural Sales (1993 dollars)	$5,266,000,000	$267,000,000	$2,448,000,000	$145,000,000
Net revenue (cost) to local government providing urban services	($985,000,000)	($39,000,000)	$217,000,000	$18,000,000

The study showed that sprawl growth would have a far greater impact on the loss of agricultural lands and productivity. In addition, the study showed that in each of the eleven counties, sprawl growth would cause a substantial net loss to local government in that the cost to provide urban services was far in excess of the additional revenue the growth would produce.

E. Study Methodology

1. Estimate the current economic values accruing to the wetlands of Merced County

Unlike other studies of wetland economics[2] this study looks only at actual expenditures related to wetlands and other public open space (state parks and recreation areas). Prior studies attributed an economic value to a whole host of other functions that wetlands have that are not usually expressed in direct economic terms – for example, toxics filtration, flood protection, erosion and sediment control, endangered species habitat and people's willingness to pay to preserve wildlife habitat. In terms of assessing the overall scope of the values wetlands have, these are valid methods of valuing wetlands. The values attributed to wetlands in these studies are mostly "avoided" costs – that is, the cost of a removing pollutants from water in an industrial water treatment plant, the cost of building a flood control dam, or the costs of repairing flood damage, the cost of dredging shipping channels clogged with silt etc. (See Allen et al. (1992), Loomis et al. (1990)).

The avoided cost methodology has merit if one wants to assign a comprehensive or "global" value to wetlands. However, the key point is that if costs, such as federal government expenditures are avoided somewhere, such as in Merced County, then the funds they represent may be available to be spent elsewhere, for example to build a flood control dam in another state, and not in Merced County. The avoided costs are not likely to show up directly stimulating the economy of Merced County. Therefore, in this study we purposely limit the values attributable to wetlands to *actual expenditures* "on the books" that show up in for example, the California Department of Fish and Game budget or the State Board of Equalization records for sales taxes. We are trying to encompass **all actual expenditures** on wetlands, as listed below. The total thus represents a *lower limit* on the value of wetlands, without considering any avoided costs. This methodology also provides a baseline comparable to other traditional economic analyses.

This case study looks at economic activity for agriculture and wetlands which can be traced to real budgets of agencies or the private sector. Economic activity for agriculture includes direct sales (agricultural product value) and jobs. Economic activity for wetlands includes two categories of expenditures: expenditures related to land, and expenditures related to recreational use. The number of jobs supported by these expenditures is estimated.

Expenditures related to land:

- infrastructure
- operation and maintenance
- consulting
- equipment mobilization
- levee repair
- canal cleaning
- water control structure, pipe and pump replacement
- flooding and irrigation
- vegetation management (mowing, herbicide spraying, discing, seeding, irrigation)

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[2] For example, Allen et, al. "The Value of California Wetlands – An Analysis of their Economic Benefits", a 1992 study prepared by the Campaign to Save California Wetlands

- land acquisition (purchase of conservation easements)
- wages of employees related to land management
- landowner expenditures

Expenditures related to recreation:

- transportation
- food
- supplies (equipment/auxiliary/retail)
- services

For each category of expenditures there is an economic multiplier which shows the effect of spending the money – that is the expenditure of funds generates demand for more goods and services in the community or the region where the money is spent. For example, if a hunter or fisherman purchases supplies from a local supermarket, the employees of that supermarket are supported and they in turn have more money to spend locally on their own purchases. The estimates of the number of jobs directly supported by the expenditures and the economic multiplier effect (sales and jobs) uses the widely accepted economic model for agriculture and open space developed by Dr. Charles Goldman of the UC Cooperative Agricultural Extension Service.[3]

The expenditures are broken down into the categories as shown in Appendix 2 Table 5C – Wetland Sales and Jobs – 1998.

This study compiles economic information on all of the components of wetlands and agriculture. The study looks at expenditures, revenues and contributions of taxes or other fees to the government of Merced County and its cities. Tax revenues include property taxes for private property and in lieu taxes paid by public agencies (California Department of Fish and Game and the US Fish and Wildlife Service) to the County. The study considers the sources of revenue to the entities which spend money for habitat management including public and private investment and water wheeling and delivery charges.

2. Provide an estimate of the economic value of agriculture in Merced County

This study uses geographic data base information from the Merced County Data Services to delineate the extent of each type of agriculture now practiced in Merced County and assigns values to the agricultural production based on current data from the County Agricultural

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[3]George Goldman uses the IMPLAN system for creating regional input-output models. IMPLAN (IMpact of PLANning) is a system for IBM compatible computers of algorithms and data which allows the user to construct, with no additional data requirements, Leontief input-output models for any county (parish, borough, township), region or state in the United States. There are 521 sectors in the U.S. model, closely corresponding to the sectors in the Department of Commerce input-output model for the United States, and roughly corresponding to 3 or 4 digit level SIC code. The 1996 model for the state of California has 516 of these 528 sectors.

IMPLAN was originally started in the late 1970's by economists in the Fort Collins office of the U.S. Forest Service to meet the economic impact requirements of the Forest Service plans. It was originally on the Forest Service computer in Fort Collins and was accessible only by modem. In the mid-1980s, a version for IBM compatible personal computers was designed. The IMPLAN system was turned over to the University of Minnesota to run and in 1993 IMPLAN was privatized. It is now run by the Minnesota IMPLAN Group (MIG) in Minneapolis and this group is now responsible for the data requirements of the system. MIG has a WEB page supplying information.

Commissioner's office. See Appendix 2, Tables 2 and 5B for detail on calculation of agricultural productivity values.

3. Compare the economic impacts of two growth scenarios on wildlands and agriculture: compact urban growth vs. sprawl growth

In a manner similar to the 1995 AFT study, this study compares the impact of sprawl growth and compact growth on the local economy in terms of:

1. Loss of agricultural land (acres)
2. Loss of agricultural revenue
3. Increased urbanization in a two-mile zone of conflict around the GEA
4. Increased urbanization in a two-mile zone around existing cities and its impact on agriculture

The study compares the economic impacts of the growth anticipated between the test year (1998) and the year 2040. The end year was picked to be the same as that in the 1995 AFT study.

4. Suggest concrete measures that can be used to more permanently protect agriculture and open space resources.

The study provides lists of concrete suggestions to enhance the long-term or permanent protection of agricultural lands and wetlands areas, as well as numerous strategies from other studies to encourage compact growth through infill and more efficient land use in built-up areas (Appendix 3)

IV. Wetlands Resources Economic Values

A. Description of geographic area and resources for which economic data apply

The geographic areas to which the economic values apply are shown in Figures 1 through 3 and are listed in Text Tables 2 and 3 and the tables in Appendices 1 and 2. These areas include the federal wildlife refuges, state wildlife areas, state recreation areas, state parks, and private duck clubs and other wetlands. Figure 4 of Appendix 1 shows land status in the GEA by management entity and corresponds to Summary Table 1 of Appendix 1.

B. Expenditures for wildlife management, habitat enhancement and restoration (federal, state and private)

Expenditures for are generally reported for the period 1990 through 1999, or some portion thereof. Not all entities reported data for the entire period so there are gaps. The overall organization of the data presented in Appendix 1 is:

<u>Expenditures for Habitat Management and Acquisition, Agency Operations and Management</u> (one summary table and 12 supporting tables). The **summary table (Summary Table S-1)** shows all expenditures for habitat management by all agencies and sponsors for the years each entity reported. The table shows the acreage to which these expenditures applied and the annual

cost per acre per year for public and for all (public and private) expenditures. The data in the summary table are derived from each of the supporting tables.

Expenditures for Recreational Use (two Summary Tables and three supporting tables). The Summary Tables (**Summary Table R-1** is a summary of the users to public and private wetlands in the GEA and the rest of Merced County. **Summary Table R-2** is a summary of expenditures for hunting/fishing and wildlife watching in the GEA and all of Merced County (for the year 1996/97).

Entities which spend money in the GEA include the following:

Text Table 5
Merced County Wetlands Land Management and Expenditure Categories

Entity	***Lands Managed***	***Categories of Expenditures***
PRIVATE		
Private landowners and duck clubs	Miscellaneous throughout GEA (see Figures 2 and 3, Appendix 1)	Mowing, discing, irrigation, spraying weeds, plant watergrass, grazing, burning
Ducks Unlimited	Private duck clubs Public lands (through partnership agreements)	Habitat enhancement Habitat restoration water conveyance infrastructure flood relief monitoring and evaluation
California Waterfowl Association	Private lands	Habitat enhancement programs, advisory programs and direct habitat services Water conveyance infrastructure
PUBLIC/PRIVATE PARTNERSHIP		
USFWS Partners for Wildlife Program	Private ranches, duck clubs	Habitat enhancement Habitat restoration Water conveyance and drainage structures Silt removal Levees and other flood control structures Administration and engineering
PUBLIC		
USFWS	Federal refuges Private lands through partnerships	Habitat enhancement Habitat restoration

Entity	***Lands Managed***	***Categories of Expenditures***
Natural Resources Conservation Service		Agricultural Conservation Program Waterbank program Wetland reserve program Permanent easements 30-year easements
CDFG	State wildlife areas	Habitat restoration (Presley program), endangered species, research
California Wildlife Conservation Board	State Wildlife Areas Private lands (Partners for Wildlife)	Public access, water conveyance system, soil samples, planning, wetland restoration, educational center, administration and engineering
CWCB Inland Wetlands Conservation Program		Easement acquisitions Restoration projects Administration and engineering
Grassland Water District (GWD)	Public and private lands in the GEA	Water conveyance system installation and repair Water delivery Levee repair Silt removal Vegetation management Consulting, administration and engineering Education

Source: GWD and agencies listed in table.

C. Conservation Easements (NRCS-FWS, CDFG)

A conservation easement is the transfer of a partial interest in a property from a private landowner to the government or a private non-profit entity such as a land trust. The conservation easement restricts the landowner's right to use the property so that it cannot be developed. The landowner is still permitted certain other uses, such as grazing, which are compatible with the biological or open space values the purchaser of the easement is seeking to protect. The donation (as opposed to sale) of a conservation easement can have tax benefits to the donor (e.g. the difference in value between the fair market value of the land and the value diminished by the easement is considered a charitable donation). In addition, property taxes are reduced according to the reduction in fair market value. Conservation easements are granted in perpetuity, so that the conservation easement transfers with the property each time it is sold.

The entities which have purchased conservation easements in the GEA include the NRCS, the California Wildlife Conservation Board, California Department of Fish and Game, Ducks Unlimited, and the US Fish and Wildlife Service. Supporting Table S12 of Appendix 1 shows the years, acreages and fees paid by these various entities to acquire conservation easements over portions of the GEA. In all, a total of about 64,000 acres have been acquired at a

total cost of $28 million. The average annual expenditure on such easements has been about $2.2 million since 1990.

D. Water conveyance facilities (GWD, local canal companies)

The GWD supplies irrigation water from the U.S. Bureau of Reclamation to a portion of the public and private lands within the 178,000 acres of the GEA. The GWD encompasses about 51,000 acres within the GEA (see Figure 2 of Appendix 1). Depending on the area, the water supplies permanent wetlands, or seasonal (summer or winter) flooded areas. Areas supplied include 5 public refuges and wildlife areas and 159 private duck clubs. The GWD currently maintains 160 structures for water delivery including concrete weirs, metal box weirs, concrete pipe and gates. The GWD has an annual budget of about $1.5 million which includes about $250,000 to $360,000 for structure repair and replacement (capital expenditures), silt removal and channel repair, aquatic weed control and herbicide application. The remaining budget is mainly for staff salaries and related expenses, legal, engineering and professional services related to administration, operations, and depreciation.

Revenue for the GWD comes primarily from three sources: (1) sale of water (2) standby charges applied to owners within the District and (3) conveyance charges. The GWD has a cooperative agreement with the U.S. Bureau of Reclamation (Bu Rec) to transport Central Valley Project Improvement Act (CVPIA) water to the refuges. In addition the Central California Irrigation District (CCID), San Luis Canal Company (SLCC) also transport water to public and private wetlands within the GEA through cooperative agreements with the Bu Rec.

Charges and annual revenues for the three entities providing water to the GEA area as follows:

Text Table 6
Annual Revenues for Water Transported by Public Agencies – Merced Co.

Entity	***Annual Water Supplied (After 2002) (Acre-feet)***	***Charges per Acre-foot***	***Total Revenues***
GWD	35,810	$13.75	$492,388
CCID	163,630	$4.59 - $12.75/acre-foot	$927,327
SLCC	14,000	$14.09	$197,260
Total Water Deliveries	213,440		$1,616,975

Source: Don Marciochi, Grassland Water District.

E. Land valuation, in lieu fees and property taxes

Government agencies are exempt from ordinary taxation. The agencies which have purchased land in fee or conservation easement in the GEA or elsewhere in Merced County may contribute to local government (county and city) revenue through the payment of in-lieu fees or other revenue sharing payments. For example, since 1935 the USFWS has made revenue sharing payments to counties for refuge land under its administration. The most recent revision (1978) of the original Act of Congress that created this revenue sharing provides that (1) Congress is authorized to appropriate funds to make up any shortfall in the revenue sharing fund (2) all lands administered solely or primarily by the USFWS (not just refuges) qualify for revenue sharing (3) payments to units of local government can be used for any governmental purpose. The minimum payment is 75 cents per acre for all purchased and donated land, with no minimum for public domain land. Public domain land pays 25% of net income. Purchased land pays the greatest of 3/4 of 1% of fair market value, 25% of net receipts or 75 cents per acre. FWS areas are reappraised by the Service at least once every five years. For example, in 1998 the FWS paid $92,684 to Merced County on an appraised value of $1.985 million for the San Luis and Merced National Wildlife Refuges (see Summary Table S2).

The California Department of Fish and Game has paid in lieu fees of over $50,000 per year to the County since 1995 for lands in the state wildlife areas.

F. Visitor usage and expenditures (hunting, fishing, non-consumptive recreation) – Data Sources and Methodology

The methodology used to estimate visitor usage and expenditures in the public lands and wetlands of Merced County was to (1) obtain records of actual visitor usage at each of the federal, state and private facilities for the entire county for as many years as possible between 1990 and 1999 and (2) use the US Fish and Wildlife *1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation* to calculate the expenditures related to this visitor usage.

Private duck club usage was estimated from a questionnaire that the GWD mailed to 1362 members of duck clubs in May 1998. From this mailing, 495 forms were returned by June 30, 1998. This questionnaire asked the number of days the member hunted waterfowl during the 1997-98 season in ranges from 0 to 41 or more days. From the data were tallied the total number of user days (28,465) and divided by the number of members (1,362) to give the mean number of user days per member (20.9).

Usage figures for the federal refuges and state wildlife areas were obtained directly from the respective agencies (see Tables Support R1 through Support R3 in Appendix 2, and Figures 6 and 7).

The user figures were converted into expenditures by assuming that expenditures in Merced County were proportional to the number of users (visitor-days) compared to visitor days for fishing, hunting and wildlife-associated recreation throughout California as reported in the National Survey. Wildlife-associated recreation includes bird and other wildlife watching, hiking, dog trials and nature photography. In our analysis, we have termed this "non-consumptive" recreation.

The National Survey is aggregated at a state by state level and does not discriminate visitor use at a smaller subdivision of the states (e.g. counties). However, we used the reasonable
assumption that the usage in Merced County is the proportion of total state usage as reported by the federal, state, and private facilities for Merced County. These facilities have data for usage but not expenditures. However, using the assumption that expenditures are in proportion to user days, we were able to estimate the expenditures for these recreational activities in the County (see Table R2).

Expenditures in the national survey were reported as "trip related" "equipment" and "other". Trip-related expenses include food, lodging and transportation costs. Equipment includes sporting goods equipment, clothing and other supplies related to the sport or activity being pursued. Based on the responses to the GWD questionnaire of duck club members showing that only 11% of the members who hunted in Merced County also lived in Merced County, we attributed 100% of the trip-related expenditures were spent in Merced County but only 15% of the equipment expenditures. In other words, duck club members who live out of the County are assumed to buy their hunting supplies in the county where they live.

The analysis shows that there are over 300,000 visits per year in the GEA for hunting, fishing and non-consumptive wildlife recreation, and almost 550,000 in all of Merced County. The greatest proportion of usage is for non-consumptive recreation (64% of user-days in the GEA and 78% in Merced County as a whole). The expenditure per trip is greatest for hunting ($115) and least for non-consumptive recreation ($37). Based on these usage figures, typical annual expenditures for wildlife-related recreation are about $11.4 million in the GEA and $17.5 million in all of Merced County.

V. Agricultural Resources Economic Values

A. Description and mapping of agricultural resources

The footnote to Table 2B of Appendix 2 estimates the percentage of land around each city in the various crop types, based on interviews with Agricultural Commissioner and Cooperative Extension staff and review of the GIS LU 90 data. Crop types vary substantially from city to city. For example, northeast Los Banos has an estimated 80% of its farmland in low-value hay pasture use, jointly in seasonal wetlands. Atwater and Livingston, on the other hand, both have 55% of their adjoining farmlands in high-value nut production.

B. Current economic values

Text Table 7
Acreage and Value of Agricultural Crops in Merced County (1998)

Crop Type	***Harvested Acreage***	***Total Value of Crops[a]***	***Value per Acre***
Grain, seed, truck and row crops	295,756	$323,583,000; *$479,982,516*	$1,094 *$1,622*
Fruit and nut crops	115,881	$220,815,000; *$329,267,557*	$1,906 *$2,841*
Dairy, other and non-range livestock, poultry, fish farms	19,433	$768,715,000; *$1,094,204,267*	$39,557 *$56,306*
Hay pasture and range	730,938	$136,641,000; *$210,310,895*	$187 *$288*
Total in County	1,162,008	$1,449,754,000	$1,248 *$1,819*
In GEA[b]	88,401	$86,273,530 *$119,738,516*	$976 *$1,354*
In 2 mile band around GEA[c]	157,620	$237,482,090 *$329,336,571*	$1,507 *$2,089*

Sources: Merced County Department of Agriculture. *1999 Annual Report of Agriculture, Merced County* Appendix 2, Table 2A, 5A.

[a] Direct sales value is shown in regular type. Total value with economic multiplier applied is shown in *italic* type.

[b] Does not include value of the wetlands, which is calculated separately.

[c] See column 5 of Table 5A of Appendix 2 (139,659 "as" +17,961 range land/wetlands)

Table 2A of Appendix 2 provides detail on the existing agricultural sales and jobs county-wide. As reported in the County Agricultural Commissioner's report, of the county's 1,162,000 acres of farmland, nearly one-half (568,000 acres) are in range fed cattle production. Other major crop types include: hay pasture 162,900 acres; feed grains 129,900 acres; nuts 83,800; cotton 68,800 acres; vegetables 44,700; food grains 36,500; and fruits 32,000 acres. Minor amounts of acreage are also in dairy; poultry, sheep, pigs and other animal products; sugar, greenhouse, and other miscellaneous crops.

The values of these types of agricultural production, however, vary widely. For example, the huge acreage of range land produces an average value of only $96 per acre, while the value of the county's 5,684 acres of dairies averages $92,700 per acre, and poultry (2,680 acres) is a close second at an average of $87,600 per acre. In all, county-wide agriculture currently yields direct annual sales of almost $1,450 million, an average of $1,248 per agricultural acre.

When indirect economic activity is added (using the multipliers specific to each crop types as shown in the footnote), total agriculture-related sales are estimated at $2,114 million annually. The sales multipliers are from the Cooperative Extension Input-Output study of Merced County generated by George Goldman specifically for this analysis based on calculations of indirect economic activity generated by each crop type.

The number of direct farm jobs is estimated at almost 14,000; when indirect jobs are added to this, the current farm-related jobs in the county total 27,300. These direct and indirect job estimates are also from the Cooperative Extension Input-Output study, specific to each crop type.

It must be noted that the distribution of crop types and value is not equal throughout the county. Indeed, the areas close to the cities - the flat, higher quality soils areas of the county - produce the higher value crops. The footnote to Table 2B estimates the percentage of land around each city in the various crop types, based on interviews with Agricultural Commissioner and Cooperative Extension staff and review of the GIS LU 90 data.

C. Growth and Land Use Change Scenarios

1. Current General Plans (County, cities)

The third section of Table 1A of Appendix 2 estimates the currently urbanized acres of each city and the unincorporated area. The data for the cities are from the Merced County (MDSS) GIS file LU 90.dbf updated by current city zoned land use information. These data are more accurate than the 1990 GIS data, since a great deal of land in the current city boundaries has been developed since 1990. Generalized Merced County land uses were shown in Figure 1 of Appendix 1.

For the unincorporated area, the Merced County Data Services (MDSS) GIS LU 90.dbf identified 8,182 acres as residentially developed with 19,865 units. These represent urban or suburban pockets in the unincorporated area, mostly adjoining or near the cities. For purposes of this analysis, Strong Associates has also identified smaller developed rural lots (1.5 to 10 acre parcels) as a residential land use. Based on Strong Associates' "Analysis of Rural Parcels in the Central Valley," May 1999 (prepared for American Farmland Trust), we estimate an additional 9,667 acres in this use, accommodating 2,188 dwelling units. It is appropriate to count these

smaller rural lots as part of the County's current low density housing mix; very few of them are in commercial farming.

These estimates of urbanized land use provide the gross density per acre ratios, which are then used in Table 1 of Appendix 2 for projecting the impact of the low density (current average density) growth scenario.

2. Current demographics

Table 1 of Appendix 2 shows the baseline (year 1996) population for Merced County, each of its six cities and the unincorporated area. The 1996 population was 198,522 of which 125, 232 (63%) was in the six cities. Half of the city population is in the City of Merced. The population per gross acre was 4.0 for the county as a whole. Population density in the unincorporated area was 2.7 per gross acre, which includes rural residential lots of less than 10 acres. (This is calculated in the footnote to DS Table 1A.). City densities varied from a low of 4.7 per gross acre (Livingston) to a high of 6.7 per gross acre (Atwater). Overall, these densities are typical of areas that are experiencing sprawl or suburban growth. The total developed area in the county was 50,130 acres of which 15,533 (slightly less than half) was in cities. This shows the effect of the less intense and more inefficient use of the land in the unincorporated areas.

3. Additional population growth and land use conversion under current General Plans

Table 1 of Appendix 2 describes the impacts of projected population growth to the year 2040 on Merced County, including each of the six incorporated cities and the unincorporated area. Overall, the population is expected to triple from the 1996 total of almost 200,000 to over 600,000. The cities of Merced, Los Banos, and Livingston are all expected to grow by more than 400%, while Atwater and the unincorporated area are projected to just over double.

The new population (added between 1996 and 2040) totals 422,000. The major share of that is expected to be in Merced, with 187,500 new residents. The unincorporated area will account for 82,200 new residents. The other cities follow with: Los Banos, 63,600 new residents; Livingston, 38,000; Atwater, 31,000; Gustine, 10,700; and Dos Palos 9,000.

Along with the projected new population, we have estimated new jobs, totaling almost 161,400 county-wide. These jobs are proportional to population for each city, based on the ratios from the 1990 census as noted in Table 1A of Appendix 2.

4. Additional population growth and land use conversion to year 2040 (per AFT report)

This report specifically compares the impact of two growth scenarios: (1) conventional or "sprawl" growth and (2) compact growth. These scenarios are essentially the same as were defined in the 1995 American Farmland Trust study for all of the Central Valley of California.

- **Conventional or "sprawl" growth** is relatively low density and represents **the current average density per gross urbanized acre**.

- **Compact growth** assumes the potential to accommodate **10% of new residents in urban infill areas** and the remaining 90% at **densities not quite double the current average**. For this type of densification of growth to become a reality would require substantial changes in the General Plans and zoning districts of the area's cities and a reduction of the amount of growth that could occur in the unincorporated area.

Note that the study assumes that the growth will occur according to California Department of Finance projections. The study deliberately does not include a *reduced growth scenario* because the intent of the study is to show how the physical and financial impact of growth that is predicted to occur can be reduced by concentrating that growth more efficiently.

D. Economic Model

1. Inputs to the model (demographics, public service and infrastructure revenues and costs, local expenditures for goods and services)

The model is an input-output model (see Footnote 3) which includes information on:

- population (Appendix 2 Table 1, 1A, 1B)
- housing units (Appendix 2 Table 1, 1A)
- jobs (Appendix 2 Table 1, 1A, 2)
- acres of developed land (residential, commercial, industrial, other) (Appendix 2 Table 1, 1A, 2
- agricultural sales (Appendix 2 Table 2A, 2B,
- multiplier showing the effect of additional spending induced by direct sales (Appendix 2 Table 2B)
- annual city revenues (taxes, benefit assessments, licenses and permit fees, fines and forfeitures, use of money and intergovernmental funds transfers, fees for services and other revenues) (Appendix 2 Table 3A, 3C)
- annual city costs (general government, public safety, transportation, community development, enterprise, culture and leisure, public utilities, and other costs) (Appendix 2 Table 3B)
- city annualized capital costs for public infrastructure (sewer mains, roads, storm drains, fire stations) (Appendix 2 Table 3D)annual county revenues (taxes, special benefit assessments, license and permit fees and franchises, fines, forfeitures, penalties, use of money, state and federal subventions, service fees, bond sales and other miscellaneous revenues) (Appendix 2 Table 4, 4A, 4C)annual county costs (general government, public protection, public roads, health care, public assistance, education, recreation and debt service). (Appendix 2 Table 4, 4B, 4C)

The model assigns the expenditures for wetlands and wildlife habitat into standard economic categories to which multipliers, developed by the Cooperative Extension Input-Output Study (George Goldman) can be applied. These are divided into:

- land expenditures (structures, maintenance, acquisition (easement and fee), wages and salaries of public employees, and expenditures by private landowners (duck clubs) (See Table Appendix 2, Table 5C)
- recreation expenditures by users of the wetlands complex (transportation, equipment, food, retail and services). (See Table Appendix 2 Table 5C)

2. Economic Analysis using Model Outputs (See Appendix 2 Summary Tables and all other Appendix 2 Tables)

a. Present Day – Economic value of wetlands uses vs. public costs (Summary Tables, Appendix 2 Tables 4F, 5)

The economic value of the GEA wetlands complex, including land management, acquisition, and recreational use, as shown in Appendix 2 Tables 5 and 5C, is about $27.7 million annually and accounts for about 600 jobs. With multipliers applied, this value jumps up to $40.9 million and 800 jobs. The comparable figures for all of Merced County are $36.5 million of direct expenditures (753 jobs) and $53.4 million (1100 jobs) with multipliers applied. For the GEA wetlands, this works out to an average of about $318 per acre of stimulation to the local economy. In contrast, the cost to local governments to serve this vast wetlands complex is low – only about $160,000 per year in County administrative costs and sheriff's patrol, or about $1.24 per acre (Appendix 2 Table 4F).

b. Present Day — Economic value of agriculture vs. cost of services by local government (Summary Tables, Table 4E)

The present day value of agriculture in Merced County as a whole on about 1.16 million acres is about $2.1 billion with multipliers applied and supplies over 27,000 jobs. (Summary Tables of Appendix 2). Within the 179,464 acres of the GEA, the agriculture accounts for almost $120 million in annual sales (with multipliers applied) and about 2500 jobs (Summary Tables, Table 5 of Appendix 2). The average value per acre of economic stimulation provided by agriculture is $1,819 ($2,113 billion/1.162 million acres), whereas the cost to local government (county) to provide services to agriculture is only about $3.6 million per year (Appendix 2 Table 4E) or $3.07 per acre. These services comprise the agricultural commissioner's office, the cooperative extension service, county administrative cost and sheriff's patrol.

c. Economic value of urbanization vs. cost of services by local government (Table 1, 1A of Appendix 2)

Under the growth scenarios to the year 2040 projected by the State of California Department of Finance, the existing revenues to the cities of $86.1 million per year will increase under either the low or compact density scenario to about $229 million per year. The revenues are slightly higher under the compact scenario because the property tax revenue for infill is greater than for annexation. The existing costs to the cities of about $84.3 million to provide

services yields a net positive revenue to the cities of about $1.85 million (Summary Tables of Appendix 2).

Overall, sprawl growth would consume twice as much land over the 44 year period and result in a large net annual loss to cities in the costs to serve new development vs. the revenue produced. The Summary Tables shows a net revenue *loss* to the cities of $53.6 million annually or a loss of $158 per capita to serve 94,195 acres of conventional sprawl growth (-$569/acre). In contrast, compact growth, even under the conservative case study scenario, would have a net revenue benefit to the cities of $6.3 million per year on 47,097 acres or $19 per capita (+$134/acre). This is a total net difference of $703 per acre between the conventional and compact growth scenarios. This striking difference is due to two factors: (1) the saving of 47,000 acres of farm land under the compact compared to sprawl scenario and the fact that this land remaining in production continues to produce revenues for the County of some $115 million per year and (2) the relatively lower cost to local government to provide infrastructure (roads, sewer, water, storm drainage) to more compact development.

E. Target year scenarios

1. Land use conversion (loss of wetland and agricultural acreage) (Summary Tables of Appendix 2)

a. Conventional growth

If growth occurs according to the sprawl growth scenario, the added population of 421,934 by the year 2040 will require a total of 94,127 new acres of urbanized land. (See Summary Tables of Appendix 2). The population estimates are assigned to each city are based on California Department of Finance projections . See the discussion in Appendix 2 Section 1.

b. Compact growth

Under the compact scenario, the new population would only require 47,063 acres of new urbanization, of which about 32,000 acres are in cities and 15,000 are in the unincorporated county.

2. Economic impacts – conventional vs. compact growth scenarios

3. Wetlands (loss of acreage, revenue, total economic effect)

a. GEA — Wetland, Rangeland and Agriculture

The impact on the wetlands from the two growth scenarios is shown in Appendix 2 Tables 4F and 5 and the Summary Tables of Appendix 2. Appendix 2 Table 4F shows an existing revenues to local governments from the wetlands and recreational uses of about $273,000 per year or about $2.11 per acre. This revenue comes from property taxes on the assessed value of private lands, in lieu fees paid to local governments by the federal and state governments. The only local government costs to serve these areas are the costs to county government to provide sheriff patrol and related administrative cost. The costs to serve these areas now is about $160,000 per year or about $1.24 per acre. This is a net benefit to local government of about $113,000 per year or about 87 cents per acre per year.

Under the conventional growth scenario the 94,195 acres of additional urbanization by the year 2040 will include 7,810 acres of rangeland and wetlands, and 1,953 acres of agricultural lands **within the GEA** based on discussions with the City of Los Banos about where the growth will occur. Under the compact growth scenario about 3,900 acres of the wetlands area and 976 agriculture acres would be lost to urbanization. (Appendix 2 Summary Tables and Table 5). These values are, respectively, 6 and 3% of the existing range and wetland area in the GEA (total 128,893 acres). Including agricultural land, the increase in urbanized land in the GEA would be 4881 acres under the compact scenario and 9,763 under the sprawl scenario.

Note that most of the acreage affected is combined range/wetlands, converting an estimated 20% of the GEA total in this land use under the low density scenario. These lands are dual use, and their conversion will thus result in a loss of farm sales as well as wetlands economic activity, as discussed below.

The conversion of agricultural and range lands will result in loss of farm-related economic activity. Currently, the GEA generates an estimated $119.7 million in direct and indirect annual farm sales and supports 2,487 total farm-related jobs. By 2040 with low density development, on the basis of the acreage of farmland lost there would be a loss of $11.8 million (10%) in total direct and indirect agricultural sales and a loss of 243 farm-related jobs. Compact development would reduce those losses to $5.9 million in total annual agricultural sales and 122 jobs.

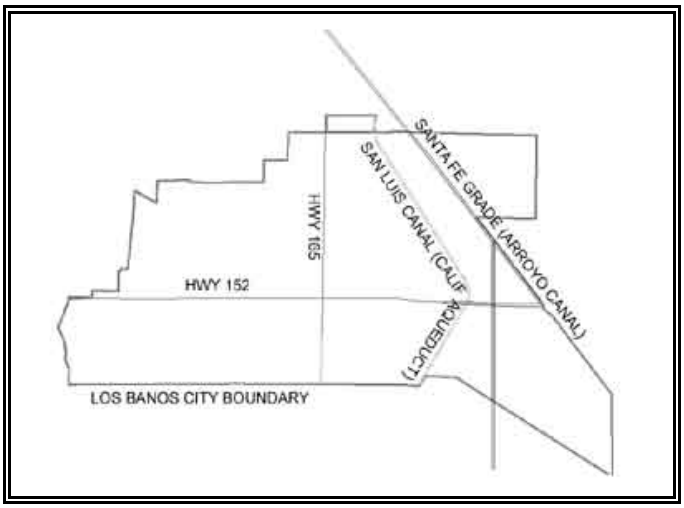
The potential urbanization of wetlands would also reduce the economic benefits of recreation and government and private investment in these areas. Current direct and indirect benefits from the wetlands are estimated at $40.9 million in annual sales and 798 jobs. Using a direct proportional extrapolation from the acreage lost with urban conversion by 2040 shows that under low density development, wetland-related sales would drop by $2.5 million (10%) annually and jobs by 85. Under compact density, sales would be reduced by an estimated $1.2 million (5%) annually and jobs by 42. Combined, the conversion of farmlands and wetlands within the GEA would result in direct and indirect annual sales losses of $14.3 million under low density development compared to $7.1 million with compact development.

b. Band Around the GEA

Recall that we had defined a two-mile band of land around the core area of the GEA in the earlier land planning guidance study. In the long term, it is essential that this band contain only resource beneficial or resource neutral uses to protect the integrity of the interior of the refuge complex as a whole. The growth of the City of Los Banos directly to the east is a particular threat to both the band and the GEA interior, and can isolate the North from the South Grasslands. Thus, urbanization in the band is almost of equal importance to urbanization within the GEA complex in its potential adverse effects on the wetlands complex.

The net loss to the focus area band from with the urbanization of another 5000 to 7000 total acres under the compact scenario and 10,000 to 14,000 under the sprawl scenario increases the total urban land within the band from the current 1.4% to as much as 10% (see Text Table 8, below).

The 1995 "*Grassland Water District Land Planning Guidance Study*" studied the effectiveness of a one-mile and a two-mile band of only compatible (agriculture, open space) uses around the wetlands. The study showed that the two mile buffer was substantially more effective in protecting the core, or interior of the refuge. Using the model of a two-mile buffer, we attempted to estimate where growth would occur in relation to the buffer – specifically, within a corresponding two mile ring or "doughnut" around existing city boundaries. Text Table 8 summarizes this analysis. Text Table 8 shows that within the 160,000-acre area that corresponds to a two-mile band around the GEA, the present 2187 acres of urban land (1.4% of total area) could grow to as much as 9300 acres(5% urban) under the compact scenario and as much as 16,400 acres (10% urban) under the low-density "sprawl" scenario. Correspondingly, of the 167,600 acres that form a two-mile ring around the six cities, the percentage of land that is urban is expected to grow from the present 7% up to as much as 45% under the low-density scenario. The intersection of the growth zone around cities with the two-mile band around the GEA (and in the case of Los Banos, the GEA interior as well), corresponds to a potential "zone of conflict" — see Figure 8.



Los Banos boundaries delimiting "Zones of Conflict"

Of the six cities in Merced County, Los Banos, Gustine and Dos Palos have city spheres that include a portion of the two-mile GEA band. Growth in unincorporated areas such as Volta could also have adverse consequences on the wildlife refuge areas. Los Banos presents the greatest problem with lands within both its current city boundary and its sphere that are either directly within the GEA area or its two-mile band. The current Los Banos General Plan prohibits growth east of the Santa Fe Grade and discourages non-compatible uses east of the San Luis Canal, both of which are intended to slow down encroachment on the nearby wetlands complex (see Figure 8 of Appendix 1). However, General Plans are re-written on a 5 or 10-year cycle. Land use restrictions, such as conservation easements, that are more permanently preventive of growth in the east/north direction are needed to prevent encroachment and fragmentation of the wetlands complex in the long term.

Text Table 8
Effect of City and Non-city Growth on GEA Two-mile Band (1996-2040)

	Year 1996 (Acres)	***Year 2040 (Acres)***		***Comment***
		Sprawl Growth	*Compact Growth*	
GEA				
Within 2-mile band around GEA	160,359	160,359	160,359	
City land within 2-mile band				
Non-urban	31,678	20,503	26,866	
Urban	1550	12,726[a] 8,548 (Appendix 2 Table 2B)[b]	6363[b] 4,274 Appendix 2 Table 2B	20% of 63,632 acres of city growth is in GEA band (sprawl) 20% of 31,816 acres (compact)[8]
Total	33,230	33,230	33,230	
Unincorporated urban land in band	638	1,528 (Appendix 2 Table 2)[c]	764[c]	5% of 30,563 acres of growth in the unincorporated County is in the GEA band[c] (sprawl) 5% of 15,281 acres (compact)
Total urban land in band	2187	12,263 - 16,441	7225 - 9314	6-7 fold increase (sprawl) 3-4 fold increase (compact)
Percent of Band that is Urban Land	1.4%	8 - 10%	4 - 5%	
CITIES				
Acres within 2-mile radius of city limits	167,606	167,606	167,606	
Urban lands	12,341 (7%)	75,973 = 12,341+63,632 (45%)	44,157 (=12,341+31,816 (26%) see Appendix 2 Table 1)	

See Figure 8 of Appendix 1

[a] The 20% is the ratio of total city land in GEA band to total land in band 33,229/160,359

[b] Based on interviews with the cities, the only cities where growth is projected to occur in the direction of the GEA and band are Los Banos if it grows to the northeast and Gustine.

[c] These values are calculated as 5% of the total amount of growth calculated for the unincorporated area in Appendix 2 Table 2B (30,563 acres for sprawl growth) and (15,281 acres for compact growth).

4. Agriculture (loss of revenue, costs vs. revenues, total economic effect)

Based on these percentages, Text Table 9 below projects the acreage and value of the agricultural land around the six cities where the projected urban growth will occur.

Text Table 9
Effect of Sprawl Vs. Compact Growth on Agriculture

Scenario	***Sprawl Growth***			***Compact Growth***		
	Total	*In Cities*	*Unincorp*	*Total*	*In Cities*	*Unincorp*
Urban Acres 1996 [a]	50,130	22,875	27,255	50,130	22,875	27,255
Urban Acres 2040 [a]	144,325	86,507	57,818	97,227	54,691	42,537
New Urban Acres 2040 [a]	94,195	63,632	30,563	47,097	31,816	15,281
Loss of Ag Acreage	86,385 (7.4%)			43,192 (3.7%)		
Loss of Wetlands [b]	9,763			4,881		
Loss of Ag Income [c]	$229.2 million			$114.6 million.		
Loss of Ag Jobs [d]	2,709			1,355		
Net Annual Revenue/ Cost in 2040	($53.63 million net loss)			$6.3 million net gain		

[a] Summary Tables, Appendix 2
[b] Table 5, Appendix 2
[c] Agricultural income includes direct and indirect annual sales of agricultural products, and personal income
[d] Table 2B, Appendix 2

5. Urban lands (costs vs. revenues, total economic effect)

These effects are fully described in **Appendix 2** and are summarized below in Text Tables 10, 11 and 12.

Text Table 10
Effect of Sprawl Vs. Compact Growth in City and County Revenues

Scenario	***Sprawl Growth***			***Compact Growth***		
	Total	*In Cities*	*Unincorp*	*Total*	*In Cities*	*Unincorp*
Urban Acres 1998	50,130	22,875	27,255	35,734	22,875	12,859
Urban Acres 2040	144,325	86,507	57,818	81,968	54,691	42,537
New Urban Acres 2040	94,195	63,632	30,563	47,097	31,816	15,281
Net Annual Revenue/ Cost in 2040 (Cities)	($51.8 million) loss			$8.2 million		
Net Annual Revenue/cost in 2040 (County)	($10.9 million) loss			($8.9 million) loss		

Source: Appendix 2, Summary Table B

City Fiscal Impacts

Population and employment growth in the county's cities will increase both revenues and costs to the city governments, under any development scenario. Table 3 of Appendix 2 estimates the total new revenues and new costs anticipated due to population growth between 1996 and 2040 for each city.

Under the low density scenario, all of the cities would produce less new revenue than the new costs involved. For the cities combined, the estimated net annual shortfall is $53.6 million. This net shortfall is 23% of the $229 million of new revenues generated. On a per capita basis, the average city resident would produce a $158 net annual shortfall.

The compact density scenario, on the other hand, generates small net revenue surpluses for almost all of the cities (the exception being Livingston), with the combined total net annual surplus of $8.2 million, about 2.5% over the revenues. The average city resident would generate a $19 net annual surplus. Some of the revenues and costs are the same or minimally affected by density, while others vary considerably: Revenues and costs estimated on an average per resident or per employee basis increase in direct proportion to the increase in population, regardless of density.

Property tax revenues vary somewhat due to differences in tax share distribution. The compact scenario yields almost $1.0 million more in annual revenues due to the cities receiving a higher share of property tax in infill areas than in new annexations. The biggest differences between the scenarios are the costs that are based on the acreage affected and capital improvements required. The low density option requires an estimated $73.3 million in acre-

related costs and $55.9 million in annualized capital costs, compared to $36.6 million and $33.5 million respectively for the compact scenario.

Capital costs of new services are calculated on an annualized basis in Table 3D of Appendix 2, based on a Strong Associates case study. (We have assumed the costs will be the same for these new capital improvements in all of the cities.) As shown, at current average densities, internal acre-related capital costs include: sewer systems, at $1,400 per acre; roads and storm drains, at $5,000 per acre; and fire station, at $500 per acre. These total $703/acre on an annualized basis (financed over 20 years at 8% interest). Spine infrastructure for sewer mains and arterial roads are an additional $2.24 million per mile in one-time costs, which converts to $1,726 per acre, or to $176/acre on an annualized basis. Although most of these costs relate to acreage, we have assumed that the compact density would cost slightly more (an added 20%) per new acre served, since quantity of development per acre will be almost doubled.

The low density scenario would involve an estimated $55.9 million annually to cover these capital improvements. The compact density alternative would cost an estimated $33.5 million.

County Fiscal Impacts

The County's revenues and costs are affected by growth both within the cities and in the unincorporated area. Most of the County's revenues and costs will be nearly the same under the two alternative scenarios, as shown in Table 4 of Appendix 2.

Average revenues from new residents are estimated at $359.9 million annually, and from jobs, $32.5 million - the same under both scenarios. Property taxes are almost the same under both scenarios - $28.4 million annually from the low density option vs. $28.0 million from the compact approach - with the difference due to a lower county share from infill development.

The County will lose net revenue from conversion of farmlands and wetlands. For the low density option, these lost revenues are estimated at $786,000 and $6,800, whereas for the compact scenario, the losses would be $393,000 and $3,400 annually (see Tables 4E and 4F of Appendix 2).

Average costs to serve residents, at $404.0 million, and for job-related services, at $21.2 million, are the same for both scenarios. Road cost is the significant difference between the two scenarios in impact on County government (see discussion below). With estimated road costs of $133 per urbanized acre, the low density approach would increase costs by almost $4.1 million annually, whereas the compact density alternative would cost $2.0 million. (See Table 4B of Appendix 2).

In all, the growth generated by the low density approach will produce estimated revenues of $421.1 million, exceeded by costs of $429.3 million, yielding a net annual deficit of $8.2 million. Under the compact density option, revenues are almost identical, at $421 million, while costs are estimated at $427.3 million, reducing the county's net annual deficit to $6.2 million. (See Summary Tables of Appendix 2). Together with existing development, total revenues to the County in 2040 under the low density scenario will be $607.8 million, exceeded by costs of $638 million for a net annual deficit of $10.9 million. Under the compact scenario, the revenues

would be the same as under low density, but the costs would be about $636 million, reducing the annual deficit to $8.9 million.

VI. Conclusions and Recommended Strategies to be implemented by local government and stakeholders (et al)

A. Comparison of economic effect of growth scenarios

The full economic impact of this explosive growth on the wetlands is difficult to predict. Broadly, if non-compatible urban development encroaches on the wetlands so as to reduce its utilization by wildlife, then recreational usage could be expected to decline, and public funds for habitat management may be more difficult to obtain. The impact will depend on how closely this growth encroaches on the boundaries of the refuges, or whether it, as in the case of Los Banos, divides the North from the South Grasslands.

The total economic effects of this change are difficult to quantify. In the earlier discussion, it was estimated that on the basis of acreage alone, loss direct sales and total revenues due to urban development would reduce the economic values within the GEA by about 10% in 2040 compared to 1996. While the total urbanized land within the GEA in 2040 would only be 5652 - 10,534 acres[5] (3 to 6 percent of the total acreage), there could effects in addition to the direct loss of productivity on urbanized lands. Effects on the *remaining* lands include threshold effects related to fragmentation of habitat, increased number of roads, domestic pets, pollution and illegal hunting. In addition, the increase in intensity of land uses in the band from the present 1.4% to as much as 8 to 10% may begin to affect the integrity of the wetlands complex by direct incursions, introduction of more exotic species, effects on water quality or more subtle effects. As reported in the 1995 Land Planning Guidance Study, many studies of conservation biology have shown that many wildlife refuges lose a number of their key species over time if they are not large enough or are not protected from outside effects by a large enough buffer. These effects are seen even in refuges of hundreds of thousands or even millions of acres. On the level of watersheds, at least one study (E. Strecker, pers. comm.) showed that biodiversity in streams drops sharply when as little as 5% of its area is impervious surface.

If the increase in urban land, however modest, results in decreased utilization by wildlife, then this will negatively impact the amount of valid public recreational use of these lands that are dependent upon healthy wildlife populations. In particular, if growth of Los Banos toward the east were to fragment and isolate the North from the South Grasslands, this could have a profound effect on the movement of waterfowl between different parts of the refuges they now utilize on a daily basis (Grassland Land Planning Guidance Study, 1995, Fleshkes, J. 1992). In addition, there may be more public pressure to decrease the levels of public expenditure in the wetlands at both the state and federal level. This is in direct contradiction to the other economic indicators from this study which show that if anything, the levels of public expenditure in the wetlands should increase. If the level of expenditure declines, then this may create a positive feedback loop in which the resources are negatively impacted further and more incentive is created for further urban development at the expense of wildlife habitat.

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[5]10,534 acres urbanized = 771 existing urban + 9,763 new urban (sprawl growth). 5,632 acres urbanized = 771 existing urban + 4,881 new urban (compact growth).

B. Economic Implications for Planning

Table 11 summarizes the economic impact of the various land uses and growth types.

Text Table 11
Economic Impact of Land Use Types on Local Government
Existing Revenue vs. Cost by Land Use

	Agriculture	*Wetlands*	*Cities Only*	*All Urban*	*County*	*Co Urban*	*All Merced*
Revenue ($1000's)	$12,194	$272	$86,125	$279,874	$206,215	193749	$292,340
Cost ($1000's)	$3,562	$160	$84,274	$289,442	$208,890	205168	$293,164
Net Revenue	$8,632	$112	$1,851	($9,568)	($2,675)	($11,419)	($824)
Revenue/Cost Ratio	3.42	1.70	1.02	0.97	0.99	0.94	1.00
Area (ac)	1,162,000	129,000	22,875	50,130	1,162,000	27255	1,184,875
Population			125,232	198,522	198,522	73290	323,754
Net Revenue per capita			$14.78	($48.20)	($13.47)	($155.81)	($2.55)
Net Revenue per acre	$7.43	$0.87	$80.92	($190.86)	($2.30)	($418.97)	($0.70)

Source: Appendix 2 Summary Table B, Tables 4E, 4F.

Text Table 11 gives the economic picture today of the economic impact of land uses on local government. In Text Table 11 net revenue is the *difference* between the total cost of local government to provide services and infrastructure to the various land uses and the revenue that each land use type produces. The revenue/cost ratio is total revenue *divided by* total cost. Net revenue per acre is the net revenue divided by the total number of acres of that land use category. It can be seen from Text Table 11 that agriculture and wetlands have a highly positive revenue to cost ratio. That is, for example, agriculture produces $3.42 of revenue to local government for every dollar it costs to serve agriculture. Wetlands produce $1.70 of revenue for every dollar of cost – less than agriculture because their productivity and market value is less, but they demand very little in the way of urban services. In addition, these two land uses produce a modest net revenue per acre. The economic value of agriculture is also much higher than for wetlands in terms of stimulation of the local economy ($317/acre for wetlands, $1,819 average for agriculture) because of the much higher value of agricultural commodities in the marketplace.

In contrast, all types of urban development are a "break even" proposition or are negative. Considering the cities only (city population and city-provided urban services) the revenue/cost ratio is very slightly positive. Also, within the cities only there appears to be a net revenue per acre of about $81. However, this is misleading because the cities populations also utilize many services provided only by the County such as District Attorney, assessor, courts and judicial services, elections etc. Looking at the entire County urban population, there is already a large net deficit in the cost per acre to provide services to its urban population – the County and cities spend $190.86 more per acre to serve their urban population than they get back in revenue. This amount grows to $418.97 per acre looking only at the County serving the unincorporated population – since that illustrates that it is the most expensive and inefficient to serve this far flung scattered population compared to the more concentrated population in cities.

Text Table 12
Economic Impact of Land Use Types on Local Government – Effect of Growth to 2040 on Revenue vs. Cost by Land Use

	Existing	*2040 Sprawl*	*2040 Compact*
Revenue ($1000's)	$292,340	$942,360	$943,272
Cost ($1000's)	$293,164	$1,005,015	$943,988
Net Revenue	($824)	($62,655)	($716)
Revenue/Cost Ratio	1.00	0.94	1.00
Urban Area (ac)	50,130	144,325	97,228
Population	198,522	620,457	620,457
Net Revenue per	($4.15)	($100.98)	($1.15)
Net Revenue per	($16.44)	($434.12)	($7.36)

Source: Appendix 2 Summary Table B Table, Tables 4E, 4F.

In Text Table 12 net revenue per urban acre is the net revenue divided by the total number of acres that are urban under each scenario. When one now considers the effect of the two growth scenarios on local government economics, Text Table 12 depicts the following: at present there is a net deficit to local governments (city and County together) to provide urban services to the urban population. This impact is negative (a deficit) whether one considers the cost per capita (population) or the cost per acre. When one compares the exist deficit per acre ($16.44) with the comparable value in the year 2040 this value ($-16.44) grows to -$434.12 under the sprawl growth scenario but shrinks to -$7.36 per acre under the compact growth scenario. The sprawl scenario shows that continued growth at the current average density per

gross urbanized acre is so inefficient that unless revenues (fees and taxes) are raised substantially, local governments will fall farther behind in their ability to provide capital improvements and services.

The improvement (from -$16.44 per acre to -$7.36 per acre) under the compact growth scenario shows that marked effect that even a modest effort at making growth more compact would have in reducing the costs of infrastructure (e.g. roads, sewer, water, storm drainage). Even with the tripling in population under either growth scenario, serving the new population at increased compact densities is so much more efficient than serving the present population that the overall cost to serve each person or each dwelling unit (or acre) drops. Note that even under the compact scenario as depicted in this study, the net impact of the growth on local government is still negative (a net loss).

Sprawl growth would also consume twice as much land over the 44 year period. The difference in net revenue between the sprawl and compact scenarios is also related to: (1) the saving of 47,000 acres of farm land under the compact compared to sprawl scenario and (2) the fact that this land remaining in production continues to produce revenues for the County of some $115 million per year.

The key point is that agriculture and wetlands are compatible uses to each other. Agriculture of all types is a productive use within the wetlands complex and especially in the two-mile band we have defined around the wetlands to protect the core area from the effects of urban encroachment.

About 8% of all of the County's agriculture takes place within the GEA and another 14% within the two mile band. Within the GEA portion about 44% of the 88,401 acres of non-wetlands is grazing land and within the band only 11% of the 160,359 acres is grazing land and the rest is higher value agriculture. Considering the difference in total economic values and in net revenue to local government ($7.43 for agriculture vs. $0.87 per acre for wetlands), buffer lands should be kept in agriculture and lands within the wetlands complex which are purchased for conservation easement should be allowed to continue as agriculture if that agriculture is compatible with wetland use (e.g. small grain crops), to preserve their economic productivity unless this is completely incompatible with wildlife utilization.

The overall impact over time, beyond 2040 will depend on many factors, including whether growth has become more compact by that time, and whether the intense growth pressures on the Central Valley continue. This analysis has confirmed that for Merced County, agriculture, in contrast to the bulk of urban growth, has a net positive economic impact on local government and generates over $2 billion per year in county economic productivity. Likewise, in contrast to the common view of wetlands as a "wasteland" suitable only as habitat for ducks, this study shows that wetlands too have a net positive economic impact on local governments and represent substantial public and private expenditures and local economic activity. These substantial economic values of non-urban uses emphasize the importance of their long-term protection in future land use planning decisions.

C. Strategies to protect wetland uses and infrastructure

The following are a preliminary (rather than an exhaustive) list of suggested means to better protect wetland uses and their infrastructure.

- Adequate supply of water of sufficient quality at affordable price (should not be shorted in State or federal water plans, or re-allocated for urban uses at a higher price)
- Protection of one to two mile band around the "core" area with only compatible uses (agriculture, open space uses) inside the band
- Permanent protection of more lands through progressive public purchase by fee or conservation easement. Concentrate purchase on lands with low agricultural value or allow continuation of agriculture if not entirely incompatible with wildlife usage.
- Continuation of seasonal land use diversification (e.g. flooded for duck clubs in fall, winter; agriculture in summer)
- General Plan policies (e.g. City of Los Banos) and case-by-case local land use planning decisions should be directed away from any further encroachment on the GEA.
- Increase level of public expenditure for wetlands, including the rate of in lieu fees paid to local government. Currently, the level of in lieu fees paid by federal and state agencies to Merced County is extremely low in comparison to the property taxes paid by either agriculture or development (see Table Text-12 below)

Text Table 13
Revenue per Acre from Property and In-lieu Property Taxes

Entity	*Type of Revenue*	*Total Revenue*	*Acres*	*Revenue per Acre*
Cities – developed	property tax	$5,164,699	22,875	$225.78
County– developed	property tax	$19,069,090	27,255	$699.65
County – Ag	property tax (1% of A.V.)	$38,260,680	1,162,008	$32.93
County+cities – developed	property tax	$24,233,789	50,130	$483.42
GWD – private wetland	property tax (1% of A.V.)	$232,416	38,602	$6.02
Federal/State	in lieu	$146,897	56,177	$2.61

Source: Appendix 2, Tables 3A and 4A.

Private landowner partnerships to make use of other federal sources of money such as endangered species funds, USDA Wetland Reserve and Conservation Reserve Programs

D. Strategies to protect agriculture

The means to protect agriculture in the potential zone of conflict between the wetlands buffer and the cities as they grow include:

- the use of tax incentives (e.g. Farmland Security Zone super Williamson Act)),
- creation of easements through cash sales, donation, or a combination
- funding for easement purchase through local bond issues, sales tax etc.
- changes in the federal inheritance tax law
- greater use of the right-to-farm laws
- education of Realtors on right-to-farm,
- County and city general plan language
- Urban boundary or urban limit lines
- requirements for the Board of Supervisors or City Councils to make findings before allowing conversion of agricultural areas to non-agricultural uses.
- Assurance of a reliable source of adequate water at affordable cost to agriculture

VII. Reference

A. Persons and Organizations Consulted

American Farmland Trust
- Erik Vink, Policy Director, Davis Field Office

California State Parks Department
- Joe Hardcastle, District Head
- Dave Gould, Chief Ranger, Four Rivers District
- Jean Leavitt, Administrative Chief

California Department of Fish and Game
- John Beam, Los Banos Wildlife Area Manager
- Joyce Bigham
- Leslie Howard, North Grasslands Wildlife Area Manager
- Dave Smith

California Wildlife Conservation Board
- Jim Sorro

Central Valley Habitat Joint Venture
- Ruth Ostroff
- Mike Eichholz

Ducks Unlimited
- Fritz Reid, Director of Conservation Planning
- Jim Gleason, Director of Development

Grassland Water District
- Dean Kwasny, Biologist
- Don Marciochi, General Manager
- Dave Widell

Great Valley Center
- Carol Whiteside, Executive Director

City of Los Banos
- Lynn Azevedo, Planning Director

Merced County
- Robert Smith, Director of Planning
- Robert King, Planner

Merced Data Special Services (MDSS)

U.S. Fish and Wildlife Service
- San Luis National Wildlife Refuge
  - Mike Chouinard

Sue Lackey

Strecker, Eric. Water quality consultant, Seattle, WA.

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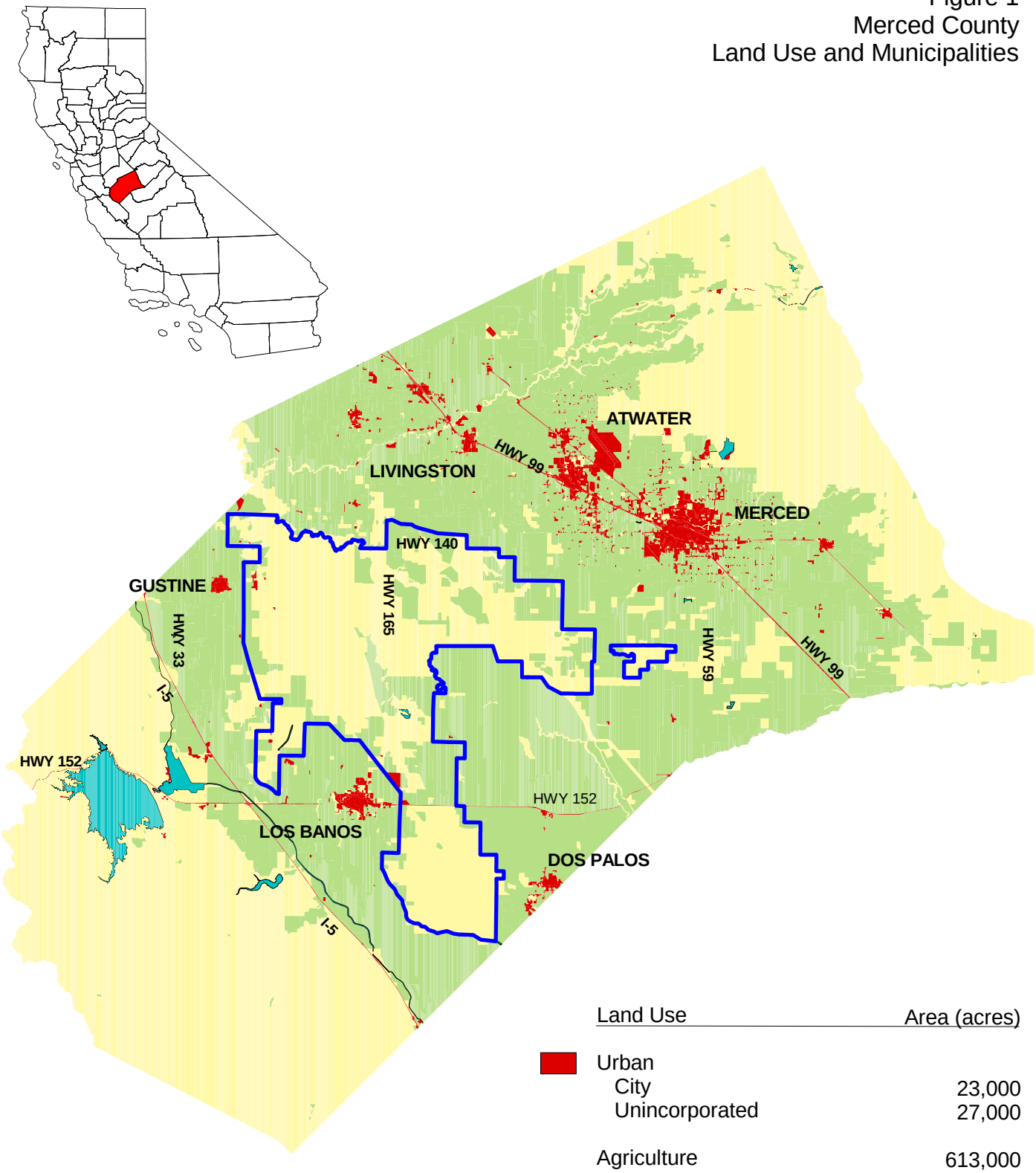
APPENDIX 1

MAIN TEXT FIGURES

Figure 1
Merced County
Land Use and Municipalities



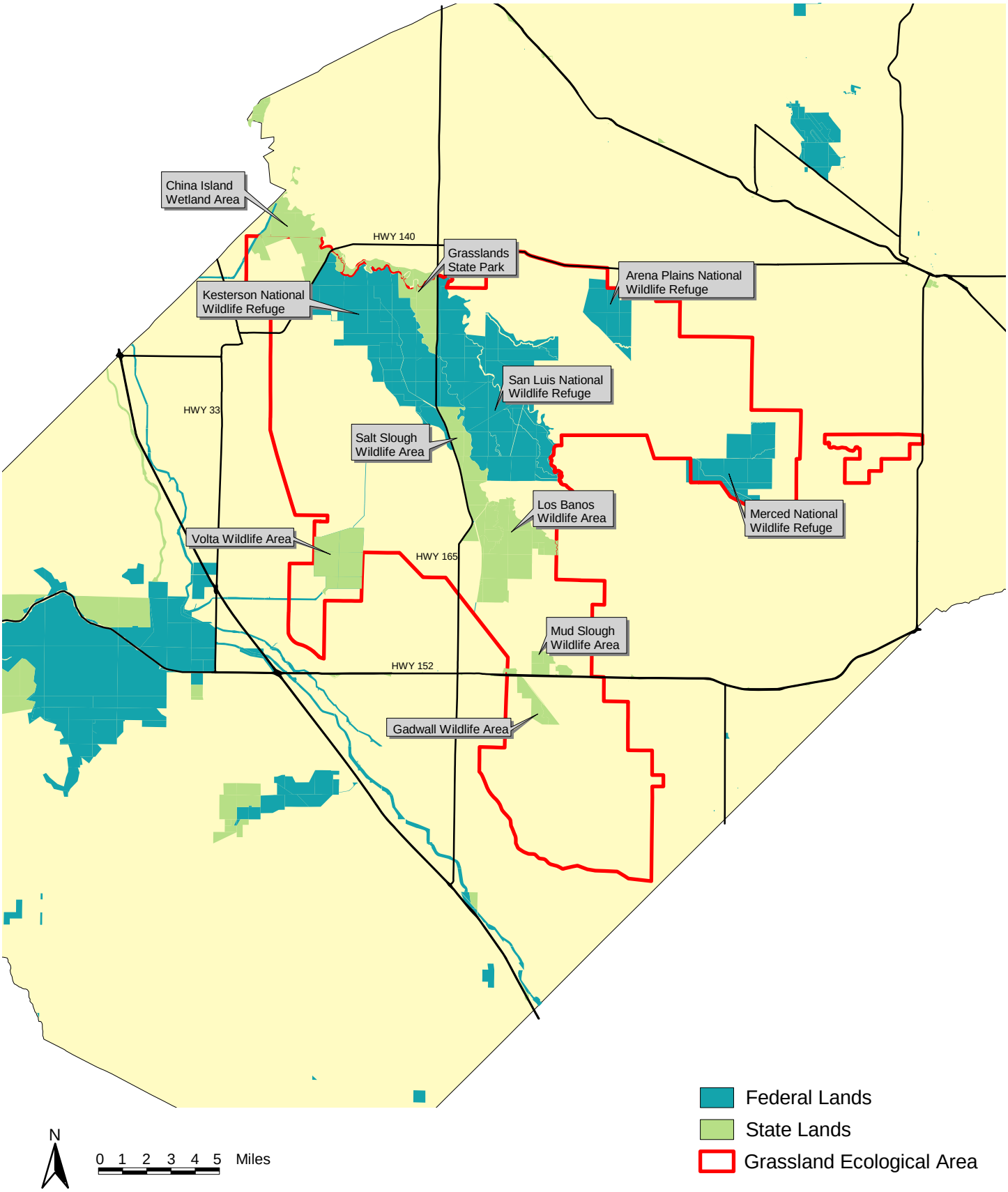
Land Use	Area (acres)
Urban	
City	23,000
Unincorporated	27,000
Agriculture	613,000
Rangeland and Other	588,000
Water	16,000
All Merced County	1,267,000
Grassland Ecological Area	

N

0 1 2 3 4 5 Miles

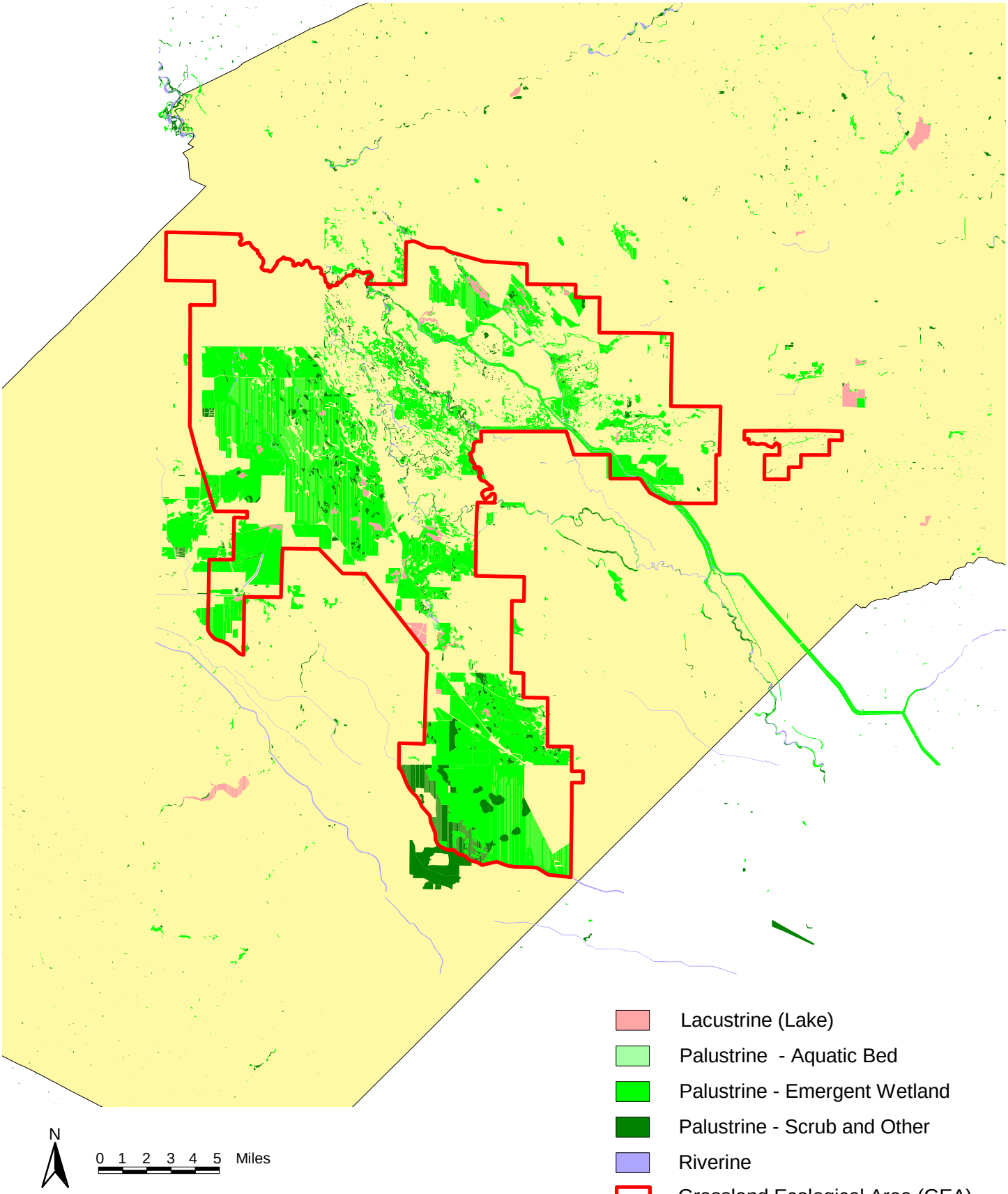
Source: MDSS, 1999
Map: Thomas Reid Associates, 6/20/01

Figure 2
Grassland Ecological Area and Public Lands



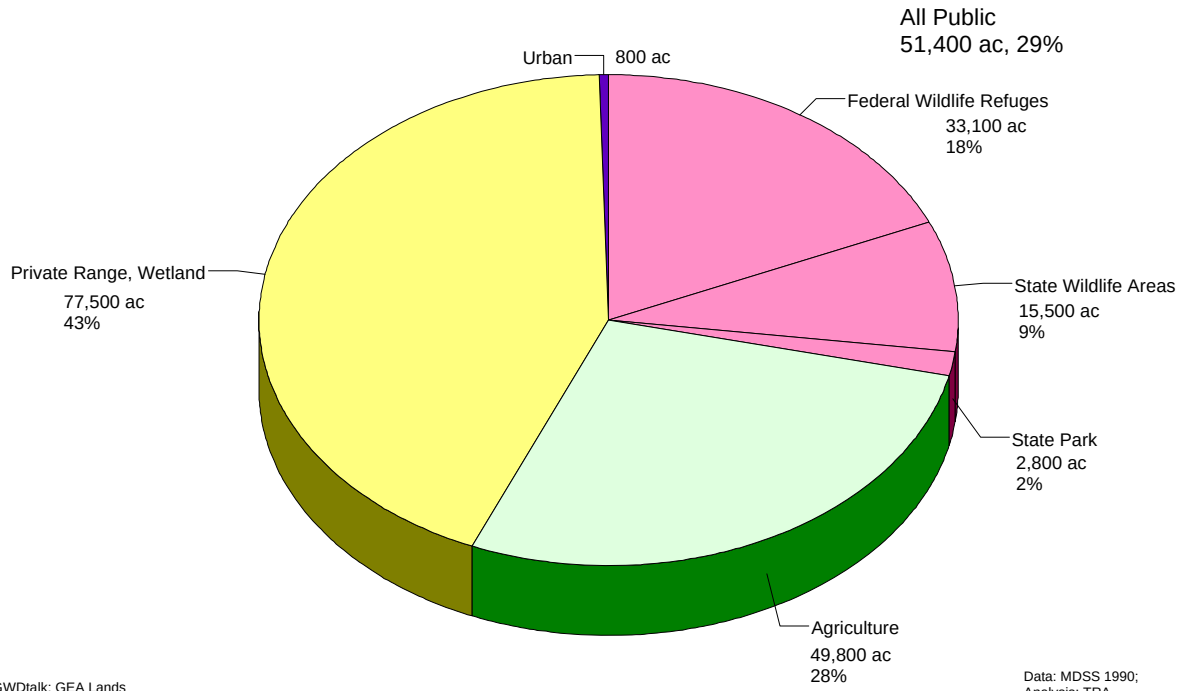
Source: MDSS
Map: Thomas Reid Associates, 6/20/01

Figure 3
Grassland Ecological Area and Wetlands



Source: National Wetlands Inventory
Map: Thomas Reid Associates, 7/6/00

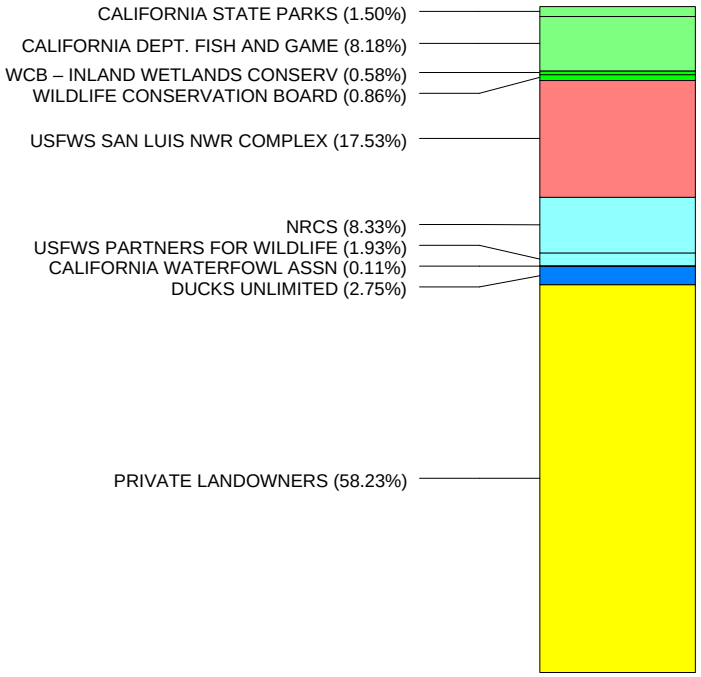
Figure 4 - Land Status in Grassland Ecological Area



CGWDtalk; GEA Lands
05/09/00

Data: MDSS 1990;
Analysis: TRA

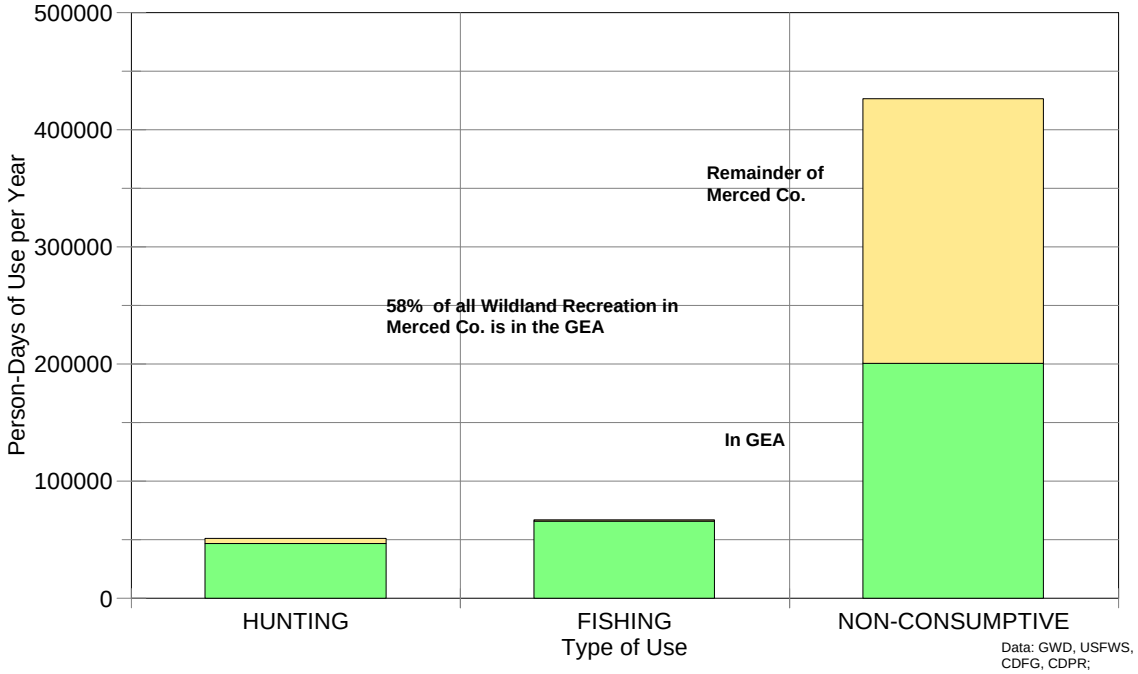
Figure 5 Participation in Land Management in Grassland Ecological Area



CGWDtalk; Mgmt Lands
05/09/00

Data: GWD, USFWS,
CDFG, others;
Analysis: TRA

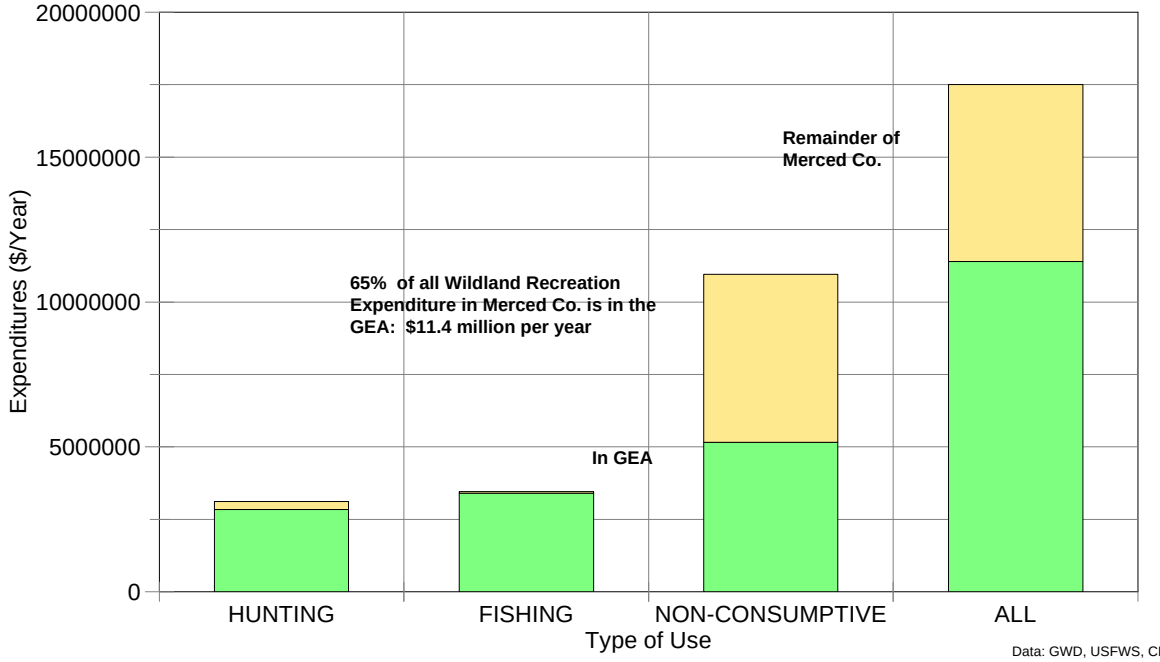
Figure 6
Recreation Use in GEA and Merced Co.



Data: GWD, USFWS, CDFG, CDPR;
Analysis: TRA

CGWDtalk; Rec Use
05/09/00

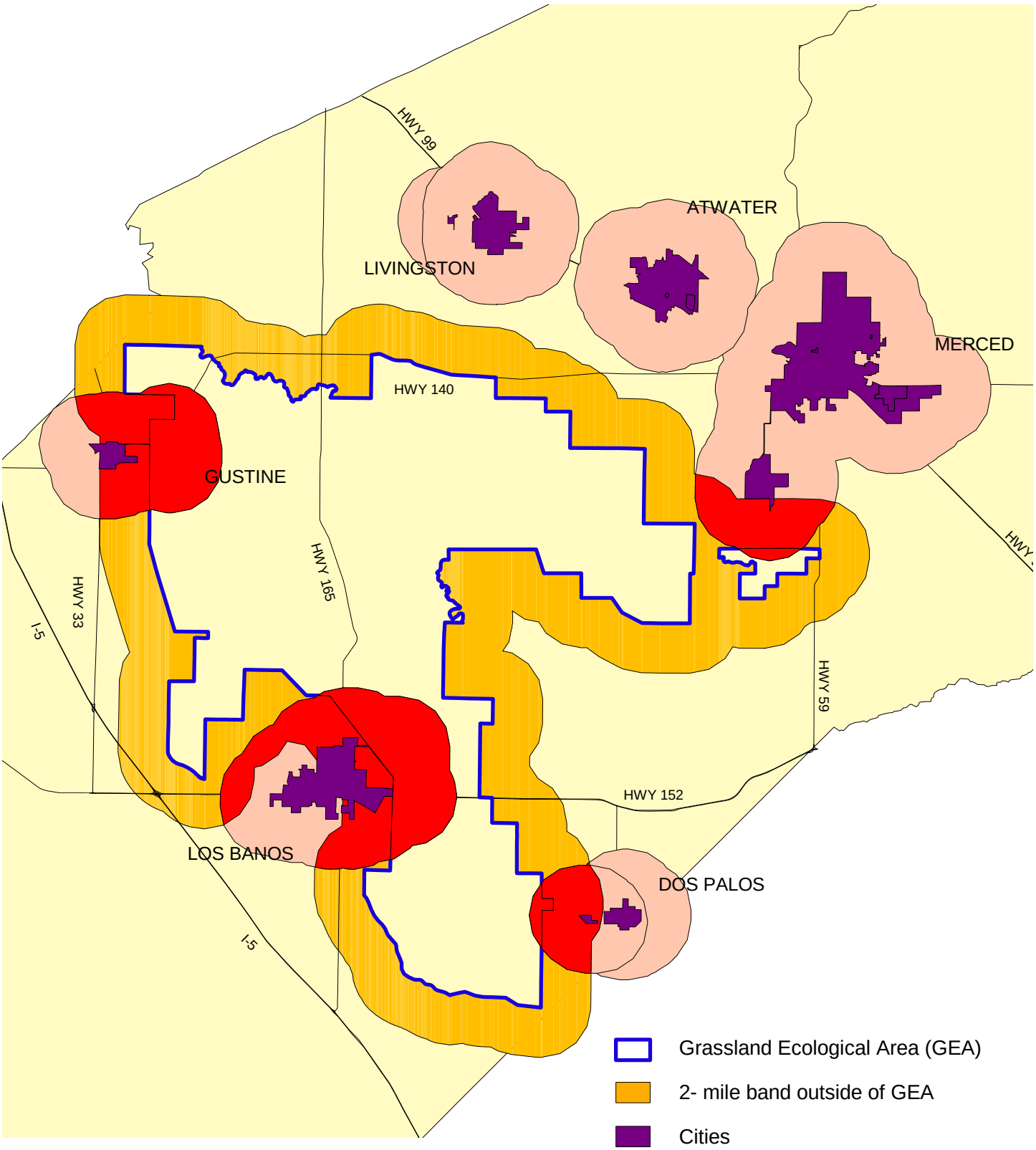
Figure 7
Recreation Value in GEA and Merced Co.



Data: GWD, USFWS, CDFG, CDPR;
Analysis: TRA

CGWDtalk; Rec Val
05/09/00

Figure 8
Cities and the Grassland Ecological Area
Zones of Conflict 2040



N

0 1 2 3 4 5 Miles

Source: Toby Goldman
Map: Thomas Reid Associates, 6/20/01

APPENDIX 1

TABLES

SUMMARY TABLE S-1: ALL EXPENDITURES FOR HABITAT MANAGEMENT IN THE GEA AND MERCED COUNTY – 1990-99
ALL EXPENDITURES FOR HABITAT MANAGEMENT – 1990 - 1999
ALL AGENCIES AND SPONSORS

ACRES												ALL MERCED	GEA
PROGRAM SPONSOR	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**TOTAL ACRES**	**AVG/YR**	**ONLY**
Private Landowners	110000	110000	110000	110000	110000	110000	110000	110000	110000	110000	1100000	110000	110000
NRCS					20372	19913	14174	8492	15771		78722	15744	15744
WILDLIFE CONSERVATION BOARD	5595		1198	340	697	483	2213	280	2160		12966	1621	1621
WCB – INLAND WETLANDS CONSERV	1101	1101	1101	1101	1101	1101	1101	1101	1101		9909	1101	1101
CAL FISH AND GAME	23065	23065	23065	23065	23065	23065	23065	23065	23065	23065	230650	23065	15454
CALIFORNIA STATE PARKS	33378	33378	33378	33378	33378	33378	33378	33378	33378	33378	333780	33378	2837
DUCKS UNLIMITED					2235	6786	20997	10200	6540		46758	5195	5195
USFWS PARTNERS FOR WILDLIFE	1294	4303	1749	276	10089	7149	2499	3496	1992		32847	3650	3650
USFWS SAN LUIS NWR COMPLEX	33108	33108	33108	33108	33108	33108	33108	33108	33108	33108	331080	33108	33108
CALIFORNIA WATERFOWL ASSN				203	203	203	203	203	203		1218	203	203
TOTAL ACRES	207541	204955	203599	201471	234248	235186	240738	223323	227318	199551	2177930	227065	188913

EXPENDITURES												ALL COUNTY	GEA ONLY
PROGRAM SPONSOR	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**TOTALS**	**AVG/YR**	
Private Landowners	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$43,252,000	$4,325,200	$4,325,200
GWD	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,434,353	$1,537,605	$14,971,958	$1,497,196	$1,497,196
NRCS					$240,562	$218,277	$166,278	$416,847	$78,232		$1,120,196	$140,025	$140,025
WILDLIFE CONSERVATION BOARD	$6,275,000		$1,220,000	$776,845	$1,550,000	$1,033,000	$119,668	$40,386	$429,020		$11,443,919	$1,271,547	$1,271,547
WCB – INLAND WETLANDS CONSERV	$94,222	$94,222	$94,222	$94,222	$94,222	$94,222	$94,222	$94,222	$94,222		$847,998	$84,800	$84,800
CAL FISH AND GAME	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$30,000,000	$3,000,000	$2,010,000
CALIFORNIA STATE PARKS	$1,818,626	$1,561,666	$1,791,779	$1,736,411	$1,948,999	$1,803,604	$1,782,720	$1,725,242	$1,969,156	$1,570,645	$17,708,848	$1,770,885	$150,525
DUCKS UNLIMITED					$461,835	$2,373,770	$1,883,355	$258,661	$5,389,612		$10,367,233	$1,151,915	$1,151,915
USFWS PARTNERS FOR WILDLIFE	$157,535	$222,681	$160,315	$88,245	$253,199	$192,250	$135,351	$1,097,163	$205,545		$2,512,284	$279,143	$279,143
USFWS SAN LUIS NWR COMPLEX	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$2,403,281	$2,691,569	$2,822,974	$3,327,770	$5,530,023	$31,775,617	$3,177,562	$3,177,562
CALIFORNIA WATERFOWL ASSN				$31,866	$31,866	$31,866	$31,866	$31,866	$31,866		$191,196	$31,866	$31,866
TOTAL EXPENDITURES	$20,170,583	$13,703,769	$15,091,516	$14,552,789	$16,405,883	$16,975,470	$15,730,229	$15,312,561	$20,284,976	$15,963,473	$164,191,249	$16,730,139	$14,119,779
EXPENDITURE PER ACRE PER YEAR	$97	$67	$74	$72	$70	$72	$65	$69	$89	$80		$74	$75
PUBLIC EXPENDITURE PER ACRE PER YE	$162	$99	$115	$112	$97	$101	$87	$97	$136	$130		$106	$124

DRAFT 5/08/00

SUPPORTING TABLE S1
USFWS EXPENDITURES FOR WETLAND ENHANCEMENT AND RESTORATION 1996-98
US FISH AND WILDLIFE SERVICE COST SHARE

NAME	WETLAND ACRES RESTORED	WETLAND ACRES ENHANCED	TOTAL ACRES	RIPARIAN MILES RESTORED	TOTAL COST	FWS COST	COOPERATORS
Bee Ess Land and Cattle	0	700	700	0	$31,651	$5,000	WCB
Eighty Gun Club	0	80	80	0	$4,000	$2,000	
Hewitson Ranch	285	0	285	0	$25,800	$12,000	DU,NRCS
Modesto Properties	0	600	600		$37,000	$12,000	DU?
Oh So Hi	0	118	118		$3,500	$1,750	
Salinas Land and Cattle	0	200	200		$15,000	$7,500	
Stevens Creek Quarry	84	0	84		$2,400	$1,200	
Underwood	0	152	152		$6,000	$3,000	DU
Webfoot	0	280	280		$10,000	$5,000	
1996 TOTAL	369	2130	2499	0	$135,351	$49,450	
Gustine Land and Cattle	0	2211	2211		$12,012	$6,000	
La Canada	0	127	127		$11,620	$5,000	
Modesto Properties	47	500	547		$25,775	$10,000	DU,NRCS
New McNamara	0	173	173		$38,978	$0	DU
Ramacclotti-Wooten	0	138	138		$60,898	$10,000	DU,NRCS
San Felipe Ranch	0	0	0	5	$902,880	$25,000	DU,NRCS,WCB
Vogt, Chet	0	300	300		$45,000	$5,000	
1997 TOTAL	47	3449	3496		$1,097,163	$61,000	
240 Gun Club	0	240	240		$14,200	$7,100	DU
Castle Duck Club	0	712	712		$116,545	$10,000	WCB, NRCS
Gables Land and Cattle	0	197	197		$12,525	$4,700	NRCS
Gallo, Michael	75	0	75		$19,150	$4,800	NRCS
Giovanotto Duck Club	0	47	47		$20,000	$7,500	NRCS
Salinas Land and Cattle	0	675	675		$20,500	$10,250	
Wooten Gun Club	0	46	46		$2,625	$1,100	NRCS
1998 TOTAL	75	1917	1992		$205,545	$45,450	

SUPPORTING TABLE S2
NRCS EXPEIDITURES FOR HABITAT RESTORATION AND EASEMENT ACQUISITIONS 1994 - 98

YEAR	PARTICIPANTS	ACRES	RESTOR	ACQUIS	PAYMENTS
1994					
AG CONSERVATION PROGRAM	9	459	$22,285		$22,285
WATERBANK PROGRAM	43	19913	$218,277		$218,277
1994 TOTALS	52	20372	$240,562		$240,562
1995					
AG CONSERVATION PROGRAM	0	0	$0		$0
WATERBANK PROGRAM	43	19913	$218,277		$218,277
1995 TOTALS	43	19913	$218,277		$218,277
1996					
AG CONSERVATION PROGRAM	8	734	$22,967		$22,967
WATERBANK PROGRAM	33	13440	$143,311		$143,311
HABITAT SUBTOTAL	41	14174	$166,278	$0	$166,278
WETLAND RESERVE PROGRAM					
Permanent Easements	1	149	$51,304	$298,160	$349,464
30-Year Easements	0	0			$0
EASEMENT SUBTOTAL	1	149	$51,304	$298,160	$349,464
1997					
AG CONSERVATION PROGRAM					
WATERBANK PROGRAM	26	7922			$92,600
Restoration Agreements	3	570	$416,847		$416,847
HABITAT SUBTOTAL	29	8492	$416,847	$0	$509,447
WETLAND RESERVE PROGRAM					
Permanent Easements	0	0			$0
30-Year Easements	1	593	$85,000	$800,280	$885,280
1997 EASEMENT SUBTOTAL	1	593	85000	800280	885280
1998					
AG CONSERVATION PROGRAM					
WATERBANK PROGRAM	23	6576			$77,443
CONSERVATION RESERVE PROGRAM	7	5340	$78,232		$101,565
WILDLIFE HABITAT INCENTIVE PROGRAI	11	3855			$81,339
HABITAT SUBTOTAL	41	15771	$78,232	$0	$260,347
WETLAND RESERVE PROGRAM					
Permanent Easements	1	178	$75,000	$267,750	$101,565
30-Year Easements	0	0			$0
1998 TOTALS	1	178	$75,000	$267,750	$101,565

SUPPORTING TABLE S3
CWCB EXPENDITURES FOR WETLAND RESTORATION AND ACQUISITIONS 1990 - 1998
CALIFORNIA WILDLIFE CONSERVATION BOARD
INLAND WETLANDS CONSERVATION PROGRAM
1990 to 1998

PROJECT	ACRES	COST
Acquisitions		
Los Banos Wildlife (Reserve Gun Club)	171	$278,000
Mud Slough Wetlands (Hwy 152)	780	$570,000
Mud Slough Wildlife Area (Neves and Lo Bue)	258	$661,000
TOTAL ACQUISITIONS	1209	$1,509,000
Restoration Projects		
Mud Slough Wetland Restoration	780	$30,000
Los Banos Wildlife Area (Field 62)	302	$312,000
Stillbow Water Delivery System	2000	$8,000
N. Grassland Wildlife Area (China Island Unit)	535	$291,000
San Joaquin Valley Wetland Restoration	285	$47,000
Mud Slough North Drainage	2800	$34,000
Grassland Envir. Education Center	15	$27,000
Wetland Enhancement Bee Ess	700	$23,000
Wetland Enhancement (Modesto Properties)	1283	$76,000
TOTAL RESTORATION PROJECTS	8700	$848,000
GRAND TOTAL	9909	$2,357,000
PER YEAR AVERAGE	1101	$261,889

SUPPORTING TABLE S4
CDFG EXPENDITURES FOR ALL ACTIVITIES 1999-2000

Habitat Conservation and Planning	$160,000
Inland and Anadromous Fisheries Management	$600,000
Wildlife Management	$160,000
Wildlife Refuge Management	$1,120,000
Hatchery Programs	$240,000
Law Enforcement	$370,000
Administration	$350,000
Subtotal	$3,000,000

CALIFORNIA DEPARTMENT OF FISH AND GAME
CALIFORNIA WATERFOWL HABITAT PROGRAM (Presley Program)

	NO. PROPERTIES	ANN. AV.	ACRES	ANN. AV.
1993 through 1996	17	4.25	5619	1405
1997 through 1998	9	4.5	1828	914
TOTAL	26		7447	

YEAR	PAYMENT
1994	$112,380
1995	$112,380
1996	$112,380
1997	$107,844
1998	$148,940
TOTAL	$593,924

EASEMENT	Klamath	248	$372,000

SUPPORTING TABLE S5
DUCKS UNLIMITED EXPENDITURES FOR HABITAT ENHANCEMENT 1994-1999
DUCKS UNLIMITED

YEAR	PROJECT	ACRES	COST
1994	Underwood	1093	$10,500
	Salt Slough I	686	$246,560
	Salt Slough II	336	$149,775
	Salt Slough Pipeline I	120	$55,000
	1994 TOTALS	2235	$461,835
1995	Mud Slough	395	$1,450,100
	Greenhouse	3650	$57,500
	Greenhouse	1900	$15,135
	China Island I	636	$291,644
	Los Banos WA Road 62	205	$46,283
	1995 TOTALS	6786	$2,373,770
1996	Rooney Ranch	100	$8,500
	Modesto Property	500	$32,045
	Baron	600	$23,000
	Mesquite?	220	$4,000
	South City	179	$8,000
	Red Fern	100	$9,000
	Santa Fe L&C	106	$10,600
	Ramogni	216	$25,400
	Haywire	180	$13,000
	Triple D	90	$9,800
	Underwood	246	$10,000
	China Island III	250	$83,836
	Gadwall Unit	470	$95,264
	Boundary Drain	500	$142,305
	Salt Slough Pipeline II	175	$122,416
	San Luis NWR-- Kesterson Unit	306	$224,174
	San Luis NWR-- Nevada Unit	350	$20,000
	San Luis NWR-- Sousa	256	$80,000
	San Luis NWR-- Mariposa	400	$185,000
	San Luis NWR-- East Kesterson	407	$187,000
	Gadwall Ditch Extension	1718	$163,190
	Los Banos Creek Rehabilitation	6267	$216,991
	Eagle Ditch Enhancement	3021	$72,360
	Big Water Delivery Ditch	306	$66,167
	Fremont Drain	1024	$3,478
	Big Water Drain	1658	$15,678
	Upper Gadwall	740	$12,256
	Brillo Ditch	612	$9,895
	Monitoring and Evaluation		$30,000
	1996 TOTALS	20997	$1,883,355
YEAR	PROJECT	ACRES	COST
1997	Monitoring and Evaluation		$30,000
	Underwood	3780	$10,000
	New Windmere?	640	$49,476
	San Joaquin Wedland Farms	246	$38,500
	Ramagiotti Wooden	620	$62,550
	Deer Park	230	$3,000
	Hollow Tree	457	$10,000
	Wheel Berry	72	$15,135
	Hollister	4000	$10,000
	Mendota	155	$30,000
	1997 TOTALS	10200	$258,661
1998	Monitoring and Evaluation		$30,000
	Hollister?	35	$7,000
	Fresher Farms?	150	$17,500
	Ducks Home	266	$10,000
	Modesto Properties	935	$46,242
	South City	179	$10,915
	240 Club	1600	$16,200
	Santa Cruz		
	Santa Fe Sierra	100	$7,345
	San Luis NWR – Flood Relief	1850	$2,765,000
	Merced NWR	1000	$1,500,000
	Los Banos WA Road 62		$151,770
	San Felipe Ranch	425	$827,640
	1998 TOTALS	6540	$5,389,612
1999	Rooney Ranch	100	$20,750
	Lower Borgess	40	$16,000
	Gallo	360	$56,500
	Pioneer	153	$3,700
	South City	75	$4,000
	Frasher Farms	150	$19,000
	Mar	220	$22,500
	Halfback	119	$15,000
	Riverfield	342	$8,250
	Redfern	192	$3,800
	The Duck Club	167	$3,750
	Oh So Hi	188	$5,000
	Six Spot	55	$4,500
	North Anchor Marsh	30	$7,000
	Mesquite	200	$4,000
	Fremont Pond	73	$25,500
	Castle Duck Club – Ph. 2		$36,884
	Exeter Land and Cattle Ph. 2		$5,875
	1999 TOTALS	2464	$262,009
	GRAND TOTAL	49222	$10,629,242

SUPPORTING TABLE S6
USFWS PARTNERS FOR WILDLIFE EXPENDITURES FOR HABITAT ENHANCEMENT 1990 - 98
USFWS PARTNERS FOR WILDLIFE PROGRAM

CLUB	ACRES	COST
B" AND "D" GUSTINE	198	$4,900
SIMPLE TEN CLUB	166	$5,915
EXETER DEVELOPMENT CLUB	0	$10,600
SAN JOAQUIN WETLAND FARMS	600	$33,100
FOUR "S" LAND AND CATTLE	150	$32,000
MESQUITE GUN CLUB	45	$7,000
GUSTINE LAND AND CATTLE	19	$14,500
COACHES GUN CLUB	43	$20,020
KLAMATH LAND AND CATTLE	73	$29,500
1990 TOTALS	1294	$157,535
GUSTINE GUN CLUB	500	$5,479
HOLLISTER LAND AND CATTLE	1000	$15,400
DEER PARK	24	$7,300
UNDERWOOD SOUTH	50	$8,000
ABINANTE CLUB	30	$15,000
SAN JOAQUIN WETLAND FARMS	12	$15,200
CLEAR LAKE LAND AND CATTLE	60	$12,000
DOUBLE "D" DUCK CLUB	56	$7,500
REEDLEY GUN CLUB	56	$7,500
SANTA FE SIERRA	75	$39,000
STILLBOW RANCH ET AL	2000	$20,000
SAND LAKE	51	$12,000
E.T.N. INC.	14	$11,502
KLAMATH LAND AND CATTLE	250	$4,800
FOUR "S" LAND AND CATTLE	125	$42,000
1991 TOTALS	4303	$222,681
GUSTINE LAND AND CATTLE	220	$3,588
HOLLISTER GUN CLUB	72	$9,600
BARBARA DUCK CLUB	70	$5,000
REEVES LAKE	13	$17,000
UNDERWOOD NORTH	20	$6,000
SIMPLE TEN CLUB	15	$5,000
EXETER	115	$10,000
RAMOGNI LAND COMPANY	42	$8,032
PIEDMONT	73	$5,500
FLYWAY CLUB	26	$17,800
SAND LAKE	30	$16,000
GABLES GUN CLUB	445	$7,000
COACHES GUN CLUB	43	$10,000
GATOS GUN CLUB	15	$6,000
$"D" AND "B"	60	$5,000
BARDIN RANCH	245	$12,710
SNOWBIRD RANCH	120	$12,000
FOUR "S" LAND AND CATTLE	125	$4,085
1992 TOTALS	1749	$160,315
MAR LAND AND CATTLE	0	$0
SUNSET	0	$6,522
FLYWAY RANCH	0	$8,250
SAND LAKE DEVELOPMENT	0	$9,945
FRASHER FARMS	0	$5,000
COACHES GUN CLUB	0	$10,261
ABC LAND AND CATTLE	30	$12,508
BARBARA DUCK CLUB	0	$13,761
ROBERT FLYNN	160	$12,319
WHEEL-BERRY	86	$9,679
1993 TOTALS	276	$88,245

CLUB	ACRES	COST
BRIDGEPORT RESERVOIR	0	$6,000
MAGNESON	0	$2,750
MESQUITE DRAIN	0	$14,124
BRITTO DRAIN	0	$5,835
SANTA FE LAND AND CATTLE	0	$3,937
TRANQUILITY GUN CLUB	160	$5,000
PIEDMONT LAND DEVELOPMENT	20	$2,100
SUNSET	30	$5,300
STILLBOW RANCH	588	$12,462
ROONEY RANCH (CLEAR LAKE)	55	$9,985
ALMADEN	228	$9,700
SOUTH SAN FRANCISCO	50	$6,700
COON DUCK CLUB	55	$6,843
GALLO (BEAR CREEK)	400	$8,000
MODESTO PROPERTIES	1900	$22,025
SAN FELIPE RANCH	400	$25,000
WHEEL-BERRY	30	$5,142
MUD SLOUGH DRAIN PROJECT	5633	$80,893
SAN JOAQUIN WETLAND FARMS	220	$9,403
WINGSETTER (SASO)	320	$12,000
1994 TOTALS	10089	$253,199
SOUTH SAN FRANCISCO	20	$5,000
BARDIN	600	$27,000
GREENHOUSE RANCH	650	$66,250
EXETER DEVELOPMENT	0	$12,000
HOLLOW TREE DRAIN	5839	$48,000
SAN JOAQUIN WETLAND FARMS	40	$34,000
1995 TOTALS	7149	$192,250
EIGHTY GUN CLUB	80	$4,000
UNDERWOOD	152	$6,000
OH SO HI	118	$3,500
WEBFOOT	280	$10,000
HEWITSON RANCH	285	$25,800
SALINAS LAND AND CATTLE	200	$15,000
MODESTO PROPERTIES	600	$37,000
STEVENS CREEK QUARRY	84	$2,400
BEE ESS LAND AND CATTLE	700	$31,651
1996 TOTALS	2499	$135,351
Gustine Land and Cattle	2211	$12,012
La Canada	127	$11,620
Modesto Properties	547	$25,775
New McNamara	173	$38,978
Ramacclotti-Wooten	138	$60,898
San Felipe Ranch	0	$902,880
Vogt, Chet	300	$45,000
1997 TOTAL	3496	$1,097,163
240 Gun Club	240	$14,200
Castle Duck Club	712	$116,545
Gables Land and Cattle	197	$12,525
Gallo, Michael	75	$19,150
Giovanotto Duck Club	47	$20,000
Salinas Land and Cattle	675	$20,500
Wooten Gun Club	46	$2,625
1998 TOTAL	1992	$205,545
GRAND TOTAL	32847	$2,512,284

SUPPORTING TABLE S7
CWA EXPENDITURES FOR HABITAT ENHANCEMENT 1993-98
CALIFORNIA WATERFOWL ASSOCIATION

1993 THROUGH 1998

PROJECT	ACRES	COST
BEE ESS LAND AND CATTLE	100	$26,500
ELLWORTHY BROTHERS	325	$16,198
CASTLE DUCK CLUB	720	$135,000
UNDERWOOD GUN CLUB	40	$9,000
EXETER LAND AND CATTLE	32	$4,500
TOTALS	1217	$191,198
PER YEAR AVERAGE	203	$31,866

SUPPORTING TABLE S8
CALIFORNIA WILDLIFE CONSERVATION BOARD MERCED COUNTY PROJECTS
CAPITAL PROJECTS (PUBLIC ACCESS AND CONVEYANCE) 1965-1999

YEAR/PROJECT	ALLOCATION	ACREAGE	PURPOSE
1965			
Los Banos WLA Expansion	$46,506	208	
1969			
Canyon Road	$12,400		public access
Cottonwood Road	$11,800		public access
Mervel Road	$10,800		public access
1978			
Cottonwood Creek WLA	$722,000	6136	
1980			
Cottonwood Creek WLA – Dev. Planning	$23,500		soil samples
Los Banos WLA Water System Improvement	$45,200		conveyance system
1981			
Los Banos WLA Water System Improvement	$33,075		
1982			
Los Banos WLA Water Supply Agreement	$200,000		water supply
1984			
Cottonwood Creek WLA – – Water Supply	$0		conveyance system
1985			
1986			
Grassland Water Facility Improvement Project	$450,000		conveyance system
1987			
Los Banos – Exp 1	$1,725,000	1329	
Los Banos - Exp 2	$1,465,000	929	
Los Banos - Exp 3	$210,000	120	
1990			
North Grassland WLA-- Salt Slough/China Islanc	$6,275,000	5595	
1992			
Los Banos - Exp 4	$278,000	171	
Mud Slough Wetlands	$570,000	779	
Wetland CEP-Klamath Land/Cattle	$372,000	248	
1992 TOTAL	$1,220,000	1198	
1993			
Mud Slough Wetlands Restoration	$30,000		conveyance system
Stillbow Water Delivery System	$8,000		conveyance system
West Hilmar WLA	$690,000	340	
Los Banos WLA PA (Parking Lot)	$48,845		public access
	$776,845	340	
PRE-1993 TOTAL ALL YEARS	$13,227,126	17053	
1994			
Mud Slough WLA	$1,200,000	395	
Los Banos WLA Wetland Restoration	$350,000	302	
1994 TOTAL	$1,550,000	697	
1995			
Mud Slough North Drainage Project	$34,000		conveyance system
Mud Slough Exp 1	$661,000	258	
North Grassland WLA – China Is. Unit	$291,000	225	
San Joaquin Valley Wetland Restoration	$47,000		
1995 TOTAL	$1,033,000	483	
1996			
Grassland Educational Center – WR	$27,000	230	
Wetland Enhancement – Bee Ess Property	$23,051	700	
Wetland Enhancement – Modesto Property	$69,617	1283	
1996 TOTAL	$119,668	2213	
1997			
Wetland Habitat Restoration (Elworthy)	$40,386	280	
1998			
Owens Creek Habitat Restoration	$150,000		
Wetland Habitat Restoration and Enhancement (Santa Cruz Land and Cattle)	$65,000	1440	
Enhancement/Restoration (Castle Land and Cattle)	$62,250	720	
Los Banos WLA PA	$151,770		
1998 TOTAL	$429,020	2160	
1999			
East Grasslands Wetlands	$15,000	41	
Mud Slough-- Exp 2	$1,300,000	724	
1999 TOTAL	$1,315,000	765	
GRAND TOTAL	$17,714,200	22453	

SUPPORTING TABLE S9
GWD BUDGETS FOR CAPITAL EXPENDITURES AND MAINTENANCE; WATER DELIVERY CHARGES BY AGENCY

	1996	
Capital Expenditures		
Structures		
Silt Removal/Channel Repair		
SUBTOTAL	$269,360	
Maintenance Cost		
Aquatic Weed Control	$13,000	
Levee Road Maintenance	$70,000	
Herbicide Application	$10,000	
SUBTOTAL	$93,000	
TOTAL ANNUAL CAPITAL EXPENDITURE	$362,360	For total GWD budget see O&M page
Water Delivery Charges		
CCID (163630 acf @ 5.67/acf)	$927,327	
GWD (35810 acf @ 13.75/acf)	$492,388	
SLCC for CVPIA water (14000 acf @14.09/acf)	$197,260	
SLCC (36,480 acf @ 13.02/acf)	$474,979	
	$2,091,954	

SUPPORTING TABLE S10
IN LIEU FEES PAID TO MERCED COUNTY BY STATE AND FEDERAL AGENCIES

STATE OF CALIFORNIA
CALIFORNIA DEPARTMENT OF FISH AND GAME

YEAR	IN LIEU FEE AMOUNT
94thru 95	$36,702
95 thru 96	$51,922
96 thru 97	$54,213
97 thru 98	$54,213
98 thru 99	$54,213

FEDERAL GOVERNMENT

US FISH AND WILDLIFE SERVICE	SAN LUIS NWR	MERCED NWR	
ACRES	26,074	7,034	
APPRAISED VALUE	$1,620,000	$365,000	$1,985,000
1998 TAXES PAID TO MERCED CO.	$75,641	$17,043	$92,684
IN LIEU FEES PER ACRE	$2.90	$2.42	

TOTAL (STATE PLUS FEDERAL)	$146,897

SUPPORTING TABLE S11
STATE, FEDERAL AND GWD O&M BUDGETS

CAL STATE PARKS

	SALARIES AND BENEFITS	O&E PROJECTS	CONTRACTS AGREEMENTS	TOTAL
FY 99/00				$1,570,645
FY 98/99	$931,462	$1,037,964		$1,969,426
FY 97/98				$1,725,242
FY 96/97				$1,782,720
FY 95/96				$1,803,604
FY 94/95				$1,948,999
FY 93/94				$1,736,411
FY 92/93				$1,791,779
FY 91/92				$1,561,666
FY 90/91				$1,818,626

FEDERAL: SAN LUIS NWR COMPLEX

FY 1999	$1,438,429	$1,773,404	$2,318,190	$5,530,023

GWD

FY1998	$1,297,506	$240,099		$1,537,605
FY1999	$1,104,932	$329,421		$1,434,353

SUPPORTING TABLE S12
TOTAL ACRES AND COSTS OF CONSERVATION EASEMENTS – ALL ENTITIES
CONSERVATION EASEMENT AQUISITIONS

	PRE-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	TOTALS
ACRES											
NRCS								149	593	178	
WILDLIFE CONSERVATION BOARD		134	134	134	134	134	134	134	134	134	1209
WCB – INLAND WETLANDS CONSERV											
CAL FISH AND GAME											248
DUCKS UNLIMITED							130				
USFWS	28018.82	4527.6	5352.4	692.64	1955	3952.46	8189.67	5335.72	3791.14	875.94	62691.39
CALIFORNIA WATERFOWL ASSN											
TOTAL ACRES	28018.82	4661.6	5486.4	826.64	2089	4086.46	8453.67	5618.72	4518.14	1187.94	64148.39
COST											
NRCS								$51,304	$85,000	$75,000	
WILDLIFE CONSERVATION BOARD											
WCB – INLAND WETLANDS CONSERV		$167,667	$167,667	$167,667	$167,667	$167,667	$167,667	$167,667	$167,667	$167,667	$1,509,000
CAL FISH AND GAME											$372,000
DUCKS UNLIMITED							$310,000				
USFWS	$8,588,181	$1,688,280	$1,736,200	$430,421	$660,822	$2,377,540	$3,957,392	$3,395,803	$2,653,798	$633,370	$26,121,807
CALIFORNIA WATERFOWL ASSN											
TOTAL COST	$8,588,181	$1,855,947	$1,903,867	$598,088	$828,489	$2,545,207	$4,435,059	$3,614,774	$2,906,465	$876,037	$28,002,807
										9 yr AV	$2,157,181

RECREATION: SUMMARY TABLE R-1 (rev. 3/20/00)
SUMMARY OF USERS TO PUBLIC AND PRIVATE WETLANDS IN THE GEA AND REST OF MERCED CO. 1994-1998

	Analysis Year				
	1994//5	1995//6	1996//7	1997//8	1998//9
HUNTING					
In GEA					
Federal NWR	3809	5420	5798	7846	8510
State Refuges		12411	12378	10950	
Private			*28465*	28465	
Subtotal			46641	47261	
In All Merced Co.					
Federal NWR	3809	5420	5798	7846	8510
State Refuges		17376	16660	15070	
Private			28465	28465	
Subtotal			50923	51381	
FISHING					
In GEA					
Federal NWR	4964	32085	52027	54700	65640
State Refuges		12888	14022	10924	
Private					
Subtotal			66049	65624	
In All Merced Co.					
Federal NWR	4964	32085	52027	54700	65640
State Refuges		14784	15129	11501	
Private					
Subtotal			67156	66201	
NON-CONSUMPTIVE					
In GEA					
Federal NWR	29343	146725	184782	181158	184782
State Refuges		11514	15984	9031	
Private					
Subtotal			200766	190189	
In All Merced Co.					
Federal NWR				181158	
State Refuges		15222	22131	13407	
State Parks			404472	377008	499806
Private					
Subtotal			426603	571573	

SUMMARY TABLE R-2 (rev. 3/20/00)
EXPENDITURES FOR HUNTING/FISHING AND WILDLIFE WATCHING IN THE GEA AND ALL OF MERCED CO. – 1996/97
BASED ON FEDERAL SURVEY OF HUNTING/FISHING AND WILDLIFE WATCHING 1996

		HUNTING	FISHING	NON-CONSUMPTIVE	TOTAL
IN GEA		46641	66049	200,766	313,456
IN ALL MERCED CO.		50923	67,156	426,603	544,682
CALIF		7,452,000	35,815,000	77,467,000	120,734,000
GEA % of CA		0.63%	0.18%	0.26%	0.26%
Merced % of CA		0.68%	0.19%	0.55%	0.45%
EXPENDITURES					
CALIFORNIA					
TRIP		$277,060,000	$1,454,325,000	$1,579,434,000	$3,310,819,000
EQUIP		$471,380,000	$1,746,979,000	$1,040,355,000	$3,258,714,000
OTHER		$106,518,000	$123,055,000	$254,561,000	$484,134,000
TOTAL		$854,958,000	$3,324,359,000	$2,874,350,000	$7,053,667,000
Average Expenditure					
TRIP		$37	$41	$20	$27
EQUIP		$63	$49	$13	$27
OTHER		$14	$3	$3	$4
TOTAL		$115	$93	$37	$58
	% in Area				
IN GEA					
TRIP	100%	$1,734,100	$2,682,000	$4,093,300	$8,509,400
EQUIP	15%	$442,500	$483,300	$404,400	$1,330,200
OTHER	100%	$666,700	$226,900	$659,700	$1,553,300
TOTAL		$2,843,300	$3,392,200	$5,157,400	$11,392,900
IN ALL MERCED CO.	% in Co.				
TRIP	100%	$1,893,300	$2,727,000	$8,697,800	$13,318,100
EQUIP	15%	$483,200	$491,400	$859,400	$1,834,000
OTHER	100%	$727,900	$230,700	$1,401,800	$2,360,400
TOTAL		$3,104,400	$3,449,100	$10,959,000	$17,512,500

ASSUMPTIONS AND METHODS:
Tables referred to by number are from the USFWS 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation
Non-Consumptive days estimated from Number of Calif Participants times 13 days national average days per participant.

5,959,000	13	77,467,000

California expenses for hunting from Table 55: 100% of trip and "other" assumed spent in Merced Co.; 15% of equipment expenses
California trip expenses for fishing from Table 60; Cal. equipment expenses for wildlife watching from Table 48
Participation in wildlife watching activities away from home from Table 37.

RECREATION: SUPPORTING TABLE R1 (rev. 3/20/00)
USERS OF STATE REFUGES IN MERCED COUNTY 1994-1999
VISITS TO WETLANDS REFUGE AREAS IN MERCED COUNTY (1994 - 1999)

STATE RECREATIONAL AREAS

1997 to 1998	**Los Banos WA**	**North Grassl WA**	**Volta**	**GEA Subtotal**	**O'Neill Forebay WA**	**Little Panoche Reservoir WA**	**San Luis Reservoir**	**Cottonwood Creek**	**Merced Co. Total**
Hunting									
Waterfowl	3849	2224	2224	8297	138	81	18	50	8584
Other game birds	1169	27	27	1223	1169	0	92	165	2649
Mammals	1260	85	85	1430	175	366	509	1357	3837
Total Hunting	6278	2336	2336	10950	1482	447	619	1572	15070
Fishing	8364	1280	1280	10924	34	539	4	0	11501
Non-Hunting Uses	8611	210	210	9031	1315	2121	322	618	13407
TOTALS - 1997/8	23253	3826	3826	30905	2831	3107	945	2190	39978

1996 to 1997	**Los Banos WA**		**Volta**	**GEA Subtotal**	**O'Neill Forebay WA**	**Little Panoche Reservoir WA**	**San Luis Reservoir**	**Cottonwood Creek**	**Merced Co. Total**
Hunting									
Waterfowl	4811	2347	2347	9505	115	81	0	12	9713
Other game birds	2079	7	7	2093	1132	55	373	475	4128
Mammals	700	40	40	780	180	215	469	1175	2819
Total Hunting	7590	2394	2394	12378	1427	351	842	1662	16660
Fishing	10272	1875	1875	14022	44	1060	3	0	15129
Non-Hunting Uses	15568	208	208	15984	3360	1716	367	704	22131
TOTALS 1996/7	41020	6871	6871	54762	4831	3127	1212	2366	66298

1995 to 1996	**Los Banos WA**		**Volta**	**GEA Subtotal**	**O'Neill Forebay WA**	**Little Panoche Reservoir WA**	**San Luis Reservoir**	**Cottonwood Creek**	**Merced Co. Total**
Hunting									
Waterfowl	4424	3002	3002	10428	132	93	0	96	10749
Other game birds	695	26	26	747	1190	220	410	550	3117
Mammals	1036	100	100	1236	171	717	278	1108	3510
Total Hunting	6155	3128	3128	12411	1493	1030	688	1754	17376
Fishing	10268	1310	1310	12888	13	1845	20	18	14784
Non-Hunting Uses	11076	219	219	11514	1436	1426	274	572	15222
TOTALS 1995/6	27499	4657	4657	36813	2942	4301	982	2344	47382

Sources: California Department of Fish and Game, California State Parks

RECREATION: SUPPORTING TABLE R2
STATE PARK ATTENDANCE RECORDS

	MCC0NNELL SRA	HATFIELD SRA	SAN LUIS RESERVOIR SRA	GVG SRA	PACHECO SP	TOTAL
1996 TO 1997	15434	4873	380458	1225	2482	**404472**
1997 TO 1998	18145	5345	348256	1750	3512	377008
1998 TO 1999	14449	5765	472592	2128	4872	499806
	48028	15983	1201306	5103	10866	1281286
3-YEAR AVERAGE	16009	5328	400435	1701	3622	427095

RECREATION: SUPPORTING TABLE R3
USERS IN FEDERAL WILDLIFE REFUGES (GEA) 1996-1998

	SAN LUIS NWR	MERCED NWR	FEDERAL TOTAL
1998 TO 1999			
Hunting			
Waterfowl	7842	668	8510
Other game birds	0	0	0
Mammals	0	0	0
Total Hunting	7842	668	8510
Fishing	65640	0	65640
Non-Hunting Uses	92992	91790	184782
TOTALS 1998/99	166474	92458	258932
1997 TO 1998			
Hunting			
Waterfowl	6736	1110	7846
Other game birds	0	0	0
Mammals	0	0	0
Total Hunting	6736	1110	7846
Fishing	54700	0	54700
Non-Hunting Uses	91168	89990	181158
TOTALS 1997/8	152604	91100	243704
1996 TO 1997			
Hunting			
Waterfowl	5305	493	5798
Other game birds	0	0	0
Mammals	0	0	0
Total Hunting	5305	493	5798
Fishing	52027	0	52027
Non-Hunting Uses	92017	86989	179006
TOTALS 1996/7	149349	87482	236831
1995 TO 1996			
Hunting			
Waterfowl	5067	353	5420
Other game birds	0	0	0
Mammals	0	0	0
Total Hunting	5067	353	5420
Fishing	32085	0	32085
Non-Hunting Uses	71171	75554	146725
TOTAL 1995/6	108323	75907	184230
1994 TO 1995			
Hunting			
Waterfowl	3429	180	3609
Other game birds	200	0	200
Mammals	0	0	0
Total Hunting	3629	180	3809
Fishing	4964	0	4964
Non-Hunting Uses	17642	11701	29343
TOTALS 1994/5	26235	11881	38116

Source: U.S. Fish and Wildlife Service

APPENDIX 2: ECONOMICS SUPPORTING STUDY

EXECUTIVE SUMMARY

This presents a one-page summary of Strong Associates' analysis of the economic impact of growth to the year 2040 in Merced County.

Demographics: Merced County's population is projected to grow by **422,000** from 1996 to 2040. Most of this (340,000) will occur within and in annexations to the cities.

- At low densities (averaging 4.5 residents per acre), **94,195 new acres** would be urbanized by 2040.
- At compact densities (9.0 residents per acre), **47,097 new acres** would accommodate the same growth.

Agriculture Impact: Currently, the County's farmlands produce total annual sales of $2.1 billion and support 27,300 jobs. With conversion to urban use by 2040:

- The low density scenario would result in an estimated **$229.2 million (11%) loss** in total annual sales and reduction of 3,300 jobs (12%).
- The compact scenario would halve that impact, with a **$114.6 million (5%) loss** in total annual sales and reduction of 1,660 farm-related jobs (6%).

Grasslands Ecological Area Impact: The 179,500-acre GEA generates total annual sales of $160.6 million and 3,286 jobs. With potential urban growth by 2040:

- The low density scenario would reduce total sales by an estimated **$14.3 million** (9%) annually and jobs by 328.
- Under the compact alternative, total annual sales would decrease by **$7.1 million** and jobs by 164.

Cities Fiscal: For the six cities combined, new growth from 1996-2040:

- Under the low density approach would result in a **shortfall of $53.6 million**, or $158 shortfall per capita, annually.
- Under the compact alternative would yield a **surplus of $6.3 million**, or $19 surplus per capita, annually.
- Thus the low density approach costs the cities ***$60 million more per year*** than the same growth at more compact density.

County Fiscal:

- Under the low density approach, new growth produces an estimated **$8.2 million deficit**, or $19 per new resident, annually.
- The compact alternative produces a **$6.2 million deficit**, or $15 per new resident.

INTRODUCTION

This report presents Strong Associates' economic analysis of the impact of growth to the year 2040 in Merced County. The recap table summarizes the overall findings, briefly discussed below.

Following this overview, the sections of the report provide the detailed findings and supporting documentation for the five series of tables:

- Table 1 series covers demographic impacts (population, jobs, and acres affected);
- Table 2 series shows the impact on private sector agricultural economy;
- Table 3 series pertains to the fiscal impact (revenues and costs) on the cities;
- Table 4 series is the fiscal impact on the County; and
- Table 5 series is the impact on the 179,500-acre Grasslands Ecological Area (GEA).

Note that all dollars are in constant current value, not adjusted for inflation.

Demographics: The population of Merced County is projected to more than triple from the existing 198,500 to 620,500 by 2040, an increase of 422,000.

- Most of this growth (340,000) will occur within and in annexations to the cities.
- About 82,000 new residents are projected in the unincorporated area.

The population growth by city is illustrated in Figure 1.1. As shown, the cities of Livingston, Los Banos and Merced are projected to be the fastest growing in the County.

Job growth closely parallels population growth. The County's existing 75,900 jobs will also more than triple to a total of 237,300 in 2040, an addition of 161,400 new jobs.

Currently, the County's population and businesses occupy 50,130 developed acres, an average of 3.96 residents per acre.

- Using a low density scenario for new growth, 94,195 new acres would be urbanized by 2040, almost tripling the total developed acreage, with an average of 4.48 residents per new acre developed.
- Under an alternative compact option, the same population could be accommodated on 47,097 new acres, at an average of 8.96 people per new acre.

Figure 1.2 illustrates the impact of the two scenarios on acres urbanized for each of the cities and unincorporated area.

Agriculture (Private Sector) Impact: Currently, the County has 1,162,000 acres of farmland producing total (direct and indirect) annual sales of $2.1 billion and supporting 27,300 farm-related jobs. With conversion of farmland to urban use by 2040:

- The low density scenario would result in an estimated $229.2 million (11%) loss in total annual sales and reduction of 3,300 jobs (12%).
- The compact scenario would halve that impact, with a $114.6 million (5%) loss in total annual sales and reduction of 1,660 farm-related jobs (6%).

Figure 2 graphically compares the total agricultural sales lost annually due to city and unincorporated area urbanization under the two scenarios.

Grasslands Ecological Area Impact: The GEA, comprising 179,500 acres, currently generates total annual sales of $160.6 million (from farming, land maintenance, recreation uses, and related economic activities) and 3,286 direct and indirect jobs. With fairly small amounts of farm and wetland acreage potentially affected by urban growth by 2040, we estimate:

- Under the low density scenario, total annual sales would drop by $14.3 million (9%) and jobs by 328.
- Under the compact alternative, in contrast, total annual sales would decrease by $7.1 million and jobs by 164.

Cities Fiscal Impact: The County's six cities combined currently average a balanced budget, with $86.1 million in annual revenues slightly exceeding $84.3 million in annual costs. For new growth from 1996 to 2040:

- Under the low density approach, combined new revenues of $228.9 million annually would be outstripped by estimated costs of $282.6 million – a $53.6 million annual shortfall.
- Under the compact alternative, new revenues of $229.9 million exceed estimated costs of $223.6 million, yielding an annual surplus of $6.3 million.
- Thus the low density approach costs the cities *$60 million more per year* than the same growth at more compact density.

On a per capita basis:

- Under the low density approach, combined cities' revenues averaging $674 per capita are exceeded by $832 costs, for a $158 annual loss per new resident.
- Under the compact alternative, however, revenues of $677 per capita exceed costs of $658, yielding a small annual surplus of $19 per new resident.

The revenues are nearly the same for both scenarios (with a slight difference due to the cities' greater tax share from infill development), while the costs are substantially higher for low density due to acre-related and capital improvement costs.

County Fiscal Impact: The County's 1996-97 budget shows slightly less revenues ($206.2 million) than costs ($208.9 million), for a $2.7 million shortfall. The new growth in both cities and unincorporated area will increase the deficit, but with less adverse impact from the compact density scenario, primarily due to lower projected road costs.

- Under the low density approach, the estimated annual deficit would increase by $8.2 million, or $19 per new resident.
- Under the compact alternative, $6.2 million would be added to the County's annual deficit, or $15 per new resident.

Figure 3 illustrates the difference in impact from the two scenarios on net annual revenues/costs per capita for all the cities as well as the County.

I. DEMOGRAPHICS

Results:

Table 1 describes the impacts of projected population growth to the year 2040 on Merced County, including each of the six incorporated cities and the unincorporated area. Overall, the population is expected to triple from the 1996 total of almost 200,000 to over 600,000. The cities of Merced, Los Banos, and Livingston are all expected to grow by more than 400%, while Atwater and the unincorporated area are projected to just over double.

The new population (added between 1996 and 2040) totals 422,000. The major share of that is expected to be in Merced, with 187,500 new residents. The unincorporated area will account for 82,200 new residents. The other cities follow with: Los Banos, 63,600 new residents; Livingston, 38,000; Atwater, 31,000; Gustine, 10,700; and Dos Palos 9,000.

Along with the projected new population, we have estimated new jobs, totaling almost 161,400 county-wide. These jobs are proportional to population for each city, based on the ratios from the 1990 census as noted in Table 1A below.

Currently, the density per gross urbanized acre averages 4.0 residents per acre county-wide. For this cities, the average is 5.5 persons per acre, with the ratio varying from a low of 4.7 and 4.8 persons per acre in Los Banos and Livingston to a high of 6.7 persons per acre in Atwater. Merced, Dos Palos, and Gustine are all close the average of 5.5. For the unincorporated area of the County, we estimate an average of 2.7 persons per gross urbanized acre, which includes rural residential lots of less than 10 acres. (This is calculated in the footnote to Table 1A.)

Most importantly for this analysis, Table 1 projects the amount of land needed to accommodate the new residents. For ease of comparison, we have used two scenarios:

- Low density represents the current average density per gross urbanized acre. At these densities, the new population by year 2040 will require a total of 94,195 new acres of urbanized land.
- Compact density, in contrast, assumes the potential to accommodate 10% of new residents in urban infill areas and the remaining 90% at densities not quite double the current average. At these more compact densities, the new population would only require 47,097 acres of new urbanization.

Supporting Methodology:

The supporting information for Table 1 is presented in Tables 1A and 1B. Table 1A shows how the demographic baseline data was calculated. The first section is directly from the 1990 Census, showing population, jobs, housing units, and the ratios of population to housing and jobs. The second section of Table 1A begins with the

updated 1996 population figures from the State Department of Finance. From these, the census data ratios are applied to estimate the 1996 jobs and housing units. These 1996 figures are the baseline for projecting the land use and fiscal impacts in the rest of this report.

Finally, the third section of Table 1A estimates the currently urbanized acres of each city and the unincorporated area. The data for the cities is from the Merced County GIS file LU 90.dbf updated by current city zoned land use information. These data are more accurate than the 1990 GIS data, since a great deal of land in the current city boundaries has been developed since 1990.

For the unincorporated area, the GIS LU 90.dbf identified 8,182 acres as residentially developed with 19,865 units. These represent urban or suburban pockets in the unincorporated area, mostly adjoining or near the cities. For purposes of this analysis, Strong Associates has also identified smaller developed rural lots (1.5 to 10 acre parcels) as a residential land use. Based on Strong Associates' "Analysis of Rural Parcels in the Central Valley," May 1999 (prepared for American Farmland Trust), we estimate an additional 9,667 acres in this use, accommodating 2,188 dwelling units. It is appropriate to count these smaller rural lots as part of the County's current low density housing mix; very few of them are in commercial farming.

These estimates of urbanized land use provide the gross density per acre ratios which are then used in Table 1 for projecting the impact of the low density (current average density) growth scenario.

Table 1B shows two alternative methodologies for projecting population growth in the County. Both begin with the projection to year 2020 from the Merced County Association of Governments' "1998 Regional Transportation Plan". The first method takes the average growth rate from 1995-2025 and continues it to 2040 (an average growth of 16% per five-year period). This method represents a high-end potential growth. If this growth rate were to continue, the overall County population in 2040 would be quadruple the 1995 level.

The second method - the one used in this report - uses the State Department of Finance projections of population in the year 2040. The overall growth rate between 2025 (using the COG 1998 Regional Plan estimate for that year) and 2040 would be 9% per five-year period, yielding a 2040 population of 620,000, a little over triple the 1995 population.

II. AGRICULTURAL IMPACT

Results:

As a result of the projected urban growth, productive farmland will be reduced by an equal number of acres. (It is assumed that the agricultural land around cities - level, well-irrigated, accessible land - cannot be replaced with comparable agricultural use elsewhere in the county, so each acre of urbanization is essentially lost from farm use.) Table 2 shows the amount of farmland that would be urbanized:

- For the low density scenario (at current average densities), 63,632 acres would be annexed into the cities, and 30,563 acres of the unincorporated area would be urbanized, for a total of 94,195 acres.
- For the compact density scenario, the amount of farmland lost to urbanization would be one-half of that: 31,816 acres annexed to cities and 15,281 acres in the unincorporated area, for a total of 47,097 acres.

The value of the agricultural economy on these lands is also shown in Table 2.

- At low densities, 94,195 acres converted to urbanization would reduce direct annual farmgate sales by $156.4 million and total (direct and indirect) farm-related sales by *$229.2 million*. (The indirect multiplier is explained in Table 2A.)
- At compact densities, on the other hand, the direct annual sales of the 47,097 acres lost to farming would drop to $78.2 million, and the total direct and indirect sales lost are estimated at *$114.6 million* annually.

The number of farm-related jobs affected by projected urban growth is estimated as follows:

- For low density growth, 1,846 direct farm jobs would be lost, and a total of 3,314 direct and indirect jobs would be lost.
- For compact growth, 923 direct farm jobs and a total of 1,657 direct and indirect jobs would be lost.

Supporting Methodology:

Table 2A provides detail on the existing agricultural sales and jobs county-wide. As reported in the County Agricultural Commissioner's report, of the county's 1,162,000 acres of farmland, nearly one-half (568,000 acres) are in range fed cattle production. Other major crop types include: hay pasture 162,900 acres; feed grains 129,900 acres; nuts 83,800; cotton 68,800 acres; vegetables 44,700; food grains 36,500; and fruits 32,000 acres. Minor amounts of acreage are also in dairy; poultry, sheep, pigs and other animal products; sugar, greenhouse, and other miscellaneous crops.

The values of these types of agricultural production, however, vary widely. For example, the huge acreage of range land produces an average value of only $96 per acre, while the value of the county's 5,684 acres of dairies averages $92,700 per acre, and poultry (2,680 acres) is a close second at an average of $87,600 per acre.

In all, county-wide agriculture currently yields direct annual sales of almost $1,450 million, an average of $1,248 per agricultural acre.

When indirect economic activity is added (using the multipliers specific to each crop types as shown in the footnote), total agriculture-related sales are estimated at $2,114 million annually. The sales multipliers are from the Cooperative Extension Input-Output study of Merced County generated by George Goldman specifically for this analysis, based on calculations of indirect economic activity generated by each crop type.

The number of direct farm jobs is estimated at almost 14,000; when indirect jobs are added to this, the current farm-related jobs in the county total 27,300. These direct and indirect job estimates are also from the Cooperative Extension Input-Output study, specific to each crop type.

It must be noted that the distribution of crop types and value is not equal throughout the county. Indeed, the areas close the cities - the flat, higher quality soils areas of the county - produce the higher value crops. The footnote to Table 2B estimates the percentage of land around each city in the various crop types, based on interviews with Agricultural Commissioner and Cooperative Extension staff and review of the GIS LU 90 data. Crop types vary substantially from city to city. For example, northeast Los Banos has an estimated 80% of its farmland in low-value hay pasture, jointly in seasonal wetlands use. Atwater and Livingston, on the other hand, both have 55% of their adjoining farmlands in high-value nut production.

Based on these percentages, Table 2B estimates the acreage and value of the agricultural land around the six cities where the projected urban growth will occur. The first section shows acreage converted to urbanization by 2040. Note that all detailed figures are for the low density approach, with the total for the compact scenario (at one-half of the low density) shown on the last line.

The second section shows direct sales lost, using the average direct sales per acre for each crop type projected to be converted to urban use. As shown:

- In the low density approach, annual direct sales would drop by $156.4 million.
- In the compact scenario, $78.2 million in annual direct sales would be lost.

The third section calculates the *total* direct and indirect sales lost, using the Input-Output multipliers for each crop type (shown and discussed in Table 2A).

- The low density approach reduces total annual sales by $229.2 million.
- The compact alternative halves that impact, with total annual sales reduced by $114.6 million.

The fourth and fifth sections of Table 2B (on the second page) show the projections of direct and indirect jobs lost due to urbanization, again using the Input-Output multipliers relevant to the crop types affected. Total farm-related jobs lost are estimated at 3,314 for low density versus 1,657 for the compact alternative.

III. CITY FISCAL IMPACT

Results:

Population and employment growth in the county's cities will increase both revenues and costs to the city governments, under any development scenario. Table 3 estimates the total new revenues and new costs anticipated due to population growth between 1996 and 2040 for each city.

- Under the low density scenario, new revenues are less than the new costs involved for all of the cities. For the cities combined, the estimated net annual shortfall is $53.6 million. On a per capita basis, the average new city resident would produce a $158 net annual shortfall.
- The compact density scenario, on the other hand, generates small net revenue surpluses for almost all of the cities (the exception being Livingston), with the combined total net annual surplus of $6.3 million. The average new city resident would generate a $19 net annual surplus.

Some of the revenues and costs are the same or minimally affected by density, while others vary considerably:

- Revenues and costs estimated on an average per resident or per employee basis increase in direct proportion to the growth in population, regardless of density.
- Property tax revenues vary somewhat due to differences in tax share distribution. The compact scenario yields almost $1.0 million more in annual revenues due to the cities receiving a higher share of property tax in infill areas than in new annexations.
- The biggest differences between the scenarios are the costs that are based on the acreage affected and capital improvements required. The low density option requires an estimated $73.3 million in acre-related costs and $55.9 million in annualized capital costs, compared to $36.6 million and $33.5 million respectively for the compact scenario.

These estimates are discussed in more detail in the supporting section below.

Supporting Methodology:

Table 3A presents detailed data on the cities' revenues from the California State Controller's Cities Annual Report for Fiscal Year 1996-97. The last column is our allocation of each line item to its primary revenue source, i.e. residents, jobs, both residents and jobs, property taxes, or enterprise accounts. On page 3 of the table, these allocations are subtotaled; then revenues that derive from both residents and jobs are allocated at the ratio of residents to job population equivalents. (Each job is considered to equal 2/3 the impact of one resident. The ratio of population-to-job equivalents is calculated for each city in Table 1B above. The average for all cities is about 80% residential to 20% jobs.)

Finally on page 3 of Table 3A, the average revenues generated per resident and per job are calculated based on the 1996 population and estimated jobs. These factors are applied to the new population and jobs to project average revenues (excluding property

tax) in Table 3. These are the same under both scenarios, with new city residents generating $159.4 million and jobs generating $57.1 million in revenues.

Table 3B follows the same methodology and source document for city costs as Table 3A did for revenues. Page 2 shows the totals by allocation and calculates the average costs per resident and per job, again based on the 1996 baseline. When these factors are applied to growth in Table 3, we project average costs of $127.6 million for residents and $25.8 million for jobs - the same for both scenarios.

An allocation factor is added for acre-related costs, which include fire protection, streets and street lighting, and an estimated half the ongoing costs of solid waste, sewer, and water services. (The other half of those items is split to residents and jobs. This is based on the assumption that some service costs relate to people served while some is due to expansiveness of the system.) As itemized in Table 3B, these costs currently total $26.7 million annually for the cities combined, coming to an average of $1,169 per city acre. (Note that these costs vary from city to city, with a low of $749 per acre in Livingston to a high of $1,768 per acre in Gustine). These per acre factors are used to project the costs shown in Table 3.

- The low density scenario, adding 63,632 acres to the cities, would generate new acre-related costs of $73.3 million annually.
- In contrast, the compact density option, with only 31,816 new acres, would cost $36.6 million for annual acre-related services.

Table 3C evaluates property taxes as a case study item. The average household value for each city is estimated based on regional real estate values, cross-checked with city property tax revenues. We also estimate that job-related property value will average 25% of per resident value. Note that this analysis assumes that the average property values of new development will be the same under either density. Price of housing is primarily a function of new residents' ability to pay and size of unit, rather than lot size. If all housing within the region is at higher density, relative values should remain constant.

All property is taxed at 1% of assessed value, but the city share of this revenue varies. According to information from LAFCo, the city share of property tax ranges from 14.5% to 18.5% for infill (that is within existing city boundaries); for new annexations, however, the city tax share ranges from 9.0 to 9.7%. (With new annexations, the County retains its full share, while the cities receive only the Fire District share of the property tax.)

Based on these values and tax rates, property taxes differ slightly under the two scenarios. The low density approach generates an estimated $12.4 million in annual property tax, while the compact plan would produce over $13.3 million. This is due to the infill development yielding a higher share of taxes to the cities than newly annexed areas.

Capital costs of new services are calculated on an annualized basis in Table 3D, based on a Strong Associates case study. The two types of capital costs, as detailed in the footnote of Table 3D, are:

- Internal area costs, including sewer mains (at $1,400/acre), roads/storm drains (at $5,000/acre), and fair share of fire station costs ($500/acre assuming a $2.5 million station serves 5,000 acres). These total $6,900 per acre, or an annualized cost of $703 per acre (financed for 20 years at 8% interest).
- Spine infrastructure costs, consisting of sewer mains and spine roads into new urban areas, estimated at $2,244,000 per mile, or $1,726 per acre (one mile per 1,300 acres), for an annualized cost of $176 per acre.
- The combined $879 annualized cost per acre is used to project capital costs of low density development.
- For compact density, we have added 20% to the average cost to allow for larger pipes and greater usage levels, coming to $1,054 per acre.

Note that we have used the same average costs for new capital improvements for all of the cities. For the cities combined, these capital costs to serve new development to the year 2040 are estimated as follows:

- The low density scenario would cost $55.9 million annually for capital improvements.
- The compact density alternative would cost $33.5 million.

IV. COUNTY FISCAL IMPACT

Results:

The County's revenues and costs are affected by growth both within the cities and in the unincorporated area. Most of the County's revenues and costs will be nearly the same under the two alternative scenarios. As shown in Table 4, on the revenue side:

- Average revenues from new residents are estimated at $359.1 million annually, and from jobs, $32.5 million - the same under both scenarios.
- Property taxes are almost the same under both scenarios - $30.3 million annually from the low density option vs. $29.9 million from the compact approach - with the difference due to a lower county share from infill development.
- The County will lose net revenue from conversion of farmlands and wetlands. For the low density option, these lost revenues are estimated at $786,000 and $6,800, whereas for the compact scenario, the losses would be $393,000 and $3,400 annually.

On the cost side:

- Average costs to serve residents, at $404.0 million, and for job-related services, at $21.2 million, are the same for both scenarios.
- Road cost is the significant difference between the two scenarios in impact on County government (see discussion below). With estimated added road costs of $133 per new unincorporated urbanized acre, the low density approach would

increase costs by almost $4.1 million annually, whereas the compact density alternative would cost $2.0 million.

Comparing total new annual revenues and costs under the two alternatives:

- The low density approach has estimated revenues of $421.1 million, exceeded by costs of $429.3 million, yielding a net annual deficit of $8.2 million (or $19 per capita).
- Under the compact density option, revenues are almost identical, at $421.0 million, while costs are estimated at $427.3 million, reducing the net annual deficit to $6.2 million (or $15 per capita).

Supporting Methodology:

Table 4A details the existing County revenues and Table 4B details the costs, with data for both drawn from the California State Controller's Counties Annual Report for Fiscal Year 1996-97. In both tables, we have allocated revenues and costs to:

- Residents and jobs (depending on the nature of the item and using the resident-to-job equivalent ratio where the item relates to both);
- Unincorporated area only; and
- Case studies, which include property tax, agriculture and wetland-related items.

In Table 4C, the total of average revenues and costs (excluding case study items) are calculated on a per resident and per job basis, using the 1996 baseline data (from Table 1A). These factors are then used to project average revenues and costs from the new population. These added revenues and costs are the same for both scenarios.

Table 4D shows the estimated County property tax revenues. The County's shares of property tax per resident and job are from Table 3C above. We have assumed the average value for future unincorporated area development will be the same as the all-cities average value. Based on these values:

- The low density approach yields projected new property tax revenues of $30.3 million annually.
- The compact scenario yields slightly less, at $29.9 million annually.

Tables 4E and 4F present the case studies of agricultural and wetlands area impact on the County fiscal picture. The compact scenario benefits the County in maintaining more land in farming and wetlands, since both of these land uses produce more revenue than they cost in services.

- Under the low density approach, the County would lose annual net revenues of $786,000 from converted farmland and $6,800 from converted wetlands.
- Under the compact plan, the estimated lost annual net revenues would be $393,000 and $3,400 respectively.

While significant, these impacts are small compared to the large fiscal impacts of urbanization.

In Table 4E, note that we have subtracted wetland acres from total farmlands converted to urbanization, so that the fiscal analysis does not double-count those lost revenues. (For private sector analysis, however, mixed use acres affect both farm and wetlands economic activity.) Also note that the farmlands slated for urbanization are generally more valuable per acre than the county-wide average. Thus while the low density scenario would convert 7.4% of existing farm acres, it results in a loss of 9.1% of farm assessed value. Similarly the compact option would convert 3.7% of acres but 4.6% of value. These same percentages of value lost are applied to all other revenues and costs for farmlands, on the conservative assumption that higher value crops require somewhat more County services.

In Table 4F, potential wetland acres lost to urbanization are based on the Los Banos northeastward growth plus a proportionate share of unincorporated area growth. The wetlands are estimated at an average assessed value of $600 per acre. Other wetlands-related revenues and costs are estimated from the budget and interviews.

V. GRASSLANDS ECOLOGICAL AREA IMPACTS

Results:

The Grasslands Ecological Area (GEA) encompasses the Grasslands Water District and surrounding area. As summarized in Table 5, the area totals 179,500 acres, of which 90,100 acres are wetlands, 38,600 are combined range and wetlands, 49,800 are currently agricultural, and less than 800 are in urban development. (Details are discussed in reference to Table 5A below.)

Los Banos northeastward development is the major potential for conversion of wetlands and farms to urbanization. (The other cities close to the Grasslands Ecological Area are directing their growth away from the GEA and thus will have virtually no impact.) Assuming one-half of the population growth of Los Banos occurs in this direction, Table 5 projects that by 2040:

- Under the low density approach, almost 9,800 acres would urbanize, with most of that (6,600 acres) in Los Banos annexation and the balance in the surrounding unincorporated area. (The unincorporated area impact is based on the county-wide ratio of city-to-unincorporated area development.)
- Under the compact density alternative, 4,900 acres would be converted, 3,300 of that annexed to Los Banos and the balance in the unincorporated area.

Note that most of the acreage affected is combined range/wetlands, converting an estimated 20% of the GEA total in this land use under the low density scenario. These lands are dual use, and their conversion will thus result in a loss of farm sales as well as wetlands economic activity, as discussed below.

The conversion of agricultural and range lands will result in loss of farm-related economic activity. Currently, the GEA generates an estimated $119.7 million in direct and indirect annual farm sales and supports 2,487 total farm-related jobs. By 2040:

- With low density development, there would be a loss of $11.8 million (10%) in total direct and indirect agricultural sales and a loss of 243 farm-related jobs.
- Compact development would reduce those losses to $5.9 million in total annual agricultural sales and 122 jobs.

The potential urbanization of wetlands would also reduce the economic benefits of recreation and government and private investment in these areas. Current direct and indirect benefits from the wetlands are estimated at $40.9 million in annual sales and 798 jobs. With urban conversion by 2040:

- Under low density development, wetland-related sales would drop by $2.5 million (10%) annually and jobs by 85.
- Under compact density, sales would be reduced by an estimated $1.2 million (5%) annually and jobs by 42.

Combined, the conversion of farmlands and wetlands within the GEA would result in direct and indirect annual sales losses of $14.3 million under low density development compared to $7.1 million with compact development.

Supporting Methodology:

A detailed description of existing Grasslands Ecological Area (GEA) land uses is shown in Table 5A, along with a comparison to the County at large and the two-mile buffer area around the GEA. All of this data is from the GIS LU90 maps. Note that the 179,500-acre GEA comprises over 14% of the total County. Within the GEA:

- 90,000 acres (50% of the total) is exclusively wetlands, with approximately 20,000 acres of that in State and federal ownership;
- Dual-use range and wetlands comprise another 38,600 acres, or 22% of the total (based on interviews with GWD staff);
- Other agricultural use is predominantly grain, seed, truck and row crops, accounting for 50,000 acres, or 27% of the total acreage; and
- There is a very low ratio of urbanized area (0.4%).

The two-mile buffer area encompasses another 160,400 acres, or almost 13% of the County area. Of this, 127,100 acres are unincorporated area with little urbanization (0.5%). The portion of buffer area within city boundaries is 33,200 acres, with almost 5% of that urbanized. In all of the buffer area, most of the farmland is in grain, seed, truck and row crops. It should be noted that the analysis of GEA impacts above does not include the buffer area. These impacts, however, are included in the County-wide analysis.

Table 5B provides details on the existing GEA agricultural uses and economic activity. As shown, the 88,400 acres of farm and rangeland produce annual direct sales of $86.3 million, or an average of $976 per acre. There is a wide range of sales value depending

on crop type, with rangelands at only $50 per acre (based on the county-wide average), up to the very high value dairy and poultry uses. The large acreage of grain, seed, truck and row crops average $990 in annual sales per acre.

Using the multipliers for indirect economic activity for each type of agricultural use (from the Input-Output study for Merced County developed by George Goldman, Coop Extension), the total direct and indirect annual sales are estimated at $119.7 million. In addition, farming in the GEA generates an estimated 2,487 direct and indirect jobs.

In our analysis of the impacts of urbanization on the GEA, we have used the GIS map identification of actual acreage of range/wetlands affected and have assumed that the balance of farmlands affected will be a mix of the crop types represented throughout the GEA.

Table 5C compares the wetlands-related economic activity county-wide and within the GEA. Overall, it is estimated that wetlands generate $53.4 million in total (direct and indirect) sales county-wide, with almost $40.9 million of that occurring in the GEA.

The three main categories of economic activities from wetlands are:

- Land maintenance, consisting of Grasslands Water District (GWD) and State and federal government costs. Annual *direct* costs of such wetlands maintenance are estimated at $11.0 million County-wide, of which $8.4 million is in the GEA (see Table 5C footnote #2).
- Other land expenditures, including GWD costs for structures and wages, State and federal land acquisition costs, and private landowners' land expenses. These come to an estimated $8.0 million in direct sales annually for the GEA, which is 100% of the county-wide cost.
- Recreation expenditures, including transportation, equipment, food, retail, and services for hunting, fishing, and non-consumptive use of the wetlands. These generate estimated *direct* sales of $17.5 million County-wide, of which $11.4 million is from the GEA.

The *total* (direct plus indirect) sales and jobs generated from these three categories of wetlands economic activity are estimated as follows:

- County-wide, land maintenance of $15.9 million, other land costs of $12.4 million, and recreation expenditures of $25.2 million come to a total of $53.4 million in annual sales and generate an estimated 1,092 wetlands-related jobs.
- From the GEA only, land maintenance of $12.1 million, other land costs of $12.4 million, and recreation expenditures of $16.4 million total $40.9 million in annual sales and generate 798 related jobs.

Note that these totals are based on the type of economic activity (maintenance, banking, personal income, retail, etc.) and the Input-Output multipliers (shown in Table 5C footnote #1).

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APPENDIX 2

SUPPORTING STUDY TABLES AND FIGURES

SUMMARY TABLE A - COMPARISON OF CITY AND COUNTY REVENUE EFFECTS BY LAND USE AND COMMON GROWTH SCENARIO

		Change from 1996 to 2040			
	Existing	< Low Density	>	< Compact Density	>
	Total in 1996	Amount	%	Amount	%
Demographics					
Population	198,522	421,934	213%	421,934	213%
Jobs	75,916	161,351	213%	161,351	213%
Developed Acres	50,130	94,195	188%	47,097	94%
Pop per Acre	4.0	4.5		9.0	
Agriculture Impact					
Total Annual Sales (000)	$2,113,765	($229,245)	-11%	($114,623)	-5%
Total Jobs	27,319	-3,314	-12%	-1,657	-6%
GEA Impact					
Total Annual Sales (000)	$160,605	($14,291)	-9%	($7,146)	-4%
Total Jobs	3,286	-331	-10%	-166	-5%
Cities Fiscal Impact					
Revenues (000)	$86,125	$228,937	266%	$229,892	267%
Costs (000)	($84,274)	($282,568)	335%	($223,574)	265%
Net Revenue/(Cost) (000)	$1,852	($53,631)		$6,318	
Per Capita net Rev/(Cost)	$15	($158)		$19	
County Fiscal Impact					
Revenues (000)	$206,215	$421,083	204%	$421,039	204%
Costs (000)	($208,890)	($429,284)	206%	($427,250)	205%
Net Revenue/(Cost) (000)	($2,675)	($8,201)		($6,211)	
-	($13)	($19)		($15)	

SUMMARY TABLE B - CHANGE IN REVENUE FOR ALTERNATE GROWTH SCENARIOS

		Change from 1996 to 2040				Total 2040	
	Existing	< Low Density		> < Compact Density		Low	Compact
Demographics (T1)	Total in 1996	Amount	%	Amount	%		
Population							
Cities	125,232	339,751	271%	339,751	271%	464,983	464,983
Unincorp. Area	73,290	82,184	112%	82,184	112%	155,474	155,474
Total	198,522	421,934	213%	421,934	213%	620,456	620,456
Jobs							
Cities	47,806	128,043	268%	128,043	268%	175,849	175,849
Unincorp. Area	28,111	33,308	118%	33,308	118%	61,419	61,419
Total	75,916	161,351	213%	161,351	213%	237,267	237,267
Developed Acres							
Cities	22,875	63,632	278%	31,816	139%	86,507	54,691
Unincorp. Area	27,255	30,563	112%	15,281	56%	57,818	42,537
Total	50,130	94,195	188%	47,097	94%	144,325	97,227
Average Pop/Acre	3.96	4.48		8.96		4.30	6.38
Agriculture Impact (T2)							
Ag. Acres	1,162,008	-94,195	-8%	-47,097	-4%	1,067,813	1,114,910
Direct Annual Sales (000)	$1,449,754	($156,390)	-11%	($78,195)	-5%	$1,293,364	$1,371,559
Total Annual Sales (000)	$2,113,765	($229,245)	-11%	($114,623)	-5%	$1,884,520	$1,999,143
Direct Jobs	13,971	-1,846	-13%	-923	-7%	12,125	13,048
Total Jobs	27,319	-3,314	-12%	-1,657	-6%	24,006	25,663
GEA Impact (T5)							
Ag/Wetland Acres	179,464	-9,763	-5%	-4,881	-3%	169,701	174,582
Direct Annual Sales (000)	$114,021	($10,021)	-9%	($5,011)	-4%	$104,000	$109,010
Total Annual Sales (000)	$160,605	($14,291)	-9%	($7,146)	-4%	$146,314	$153,459
Direct Jobs	1,865	-249	-13%	-124	-7%	1,617	1,741
Total Jobs	3,286	-331	-10%	-166	-5%	2,955	3,120
Cities Fiscal Impact (T3)							
Revenues (000)	$86,125	$228,937	266%	$229,892	267%	$315,062	$316,017
Costs (000)							
Average (Res + Jobs)	($57,540)	($153,399)	267%	($153,399)	267%	($210,939)	($210,939)
Acre-related	($26,734)	($73,261)	274%	($36,631)	137%	($99,995)	($63,365)
Capital/year	NA	($55,907)		($33,544)		$55,907	$33,544
Total Costs	($84,274)	($282,568)	335%	($223,574)	265%	($366,841)	($307,848)
Net Revenue/(Cost) (000)	$1,852	($53,631)		$6,318		($51,779)	$8,169
Per Capita							
Revenue	$688	$674	98%	$677	98%	$678	$680
Cost	($673)	($832)	124%	($658)	98%	($789)	($662)
Net Revenue/(Cost)	$15	($158)		$19		($111)	$18
County Fiscal Impact (T4)							
Revenues (000)							
Average + New prop tx	$185,958	$421,876	227%	$421,436	227%	$607,834	$607,394
Agriculture	$19,541	($786)	-4%	($393)	-2%	$18,755	$19,148
Wetlands	$716	($7)	-1%	($3)	0%	$709	$713
Total	$206,215	$421,083	204%	$421,039	204%	$627,298	$627,254
Costs (000)							
Average (Res + Jobs)	($205,263)	($425,217)	207%	($425,217)	207%	($630,480)	($630,480)
Acre-related	($3,627)	($4,067)	112%	($2,034)	56%	($7,694)	($5,661)
Total Costs	($208,890)	($429,284)	206%	($427,250)	205%	($638,174)	($636,140)
Net Revenue/(Cost) (000)	($2,675)	($8,201)		($6,211)		($10,876)	($8,886)
Per Capita							
Revenues	$1,039	$998	96%	$998	96%	$1,011	$1,011
Cost	($1,052)	($1,017)	97%	($1,013)	96%	($1,029)	($1,025)
Net Revenue/(Cost)	($13)	($19)		($15)		($18)	($14)

SUMMARY TABLE C – REVENUE VS. COST BY LAND USE

Revenue vs. Cost by Land Use

	Agriculture	Wetlands	Cities Only	All Urban	County
Revenue ($1000's)	$12,194	$272	$86,125	$86,125	$206,215
Cost ($1000's)	$3,562	$160	$84,274	$84,274	$208,890
Net Revenue	$8,632	$112	$1,851	$1,851	($2,675)
Revenue/Cost Ratio	3.42	1.70	1.02	1.02	0.99
Area (ac)	1,162,000	129,000	22,875	22,875	1,162,000
Population			125,232	125,232	198,522
Net Revenue per capita			$14.78	$14.78	($13.47)
Net Revenue per acre	$7.43	$0.87	$80.92	$80.92	($2.30)

SUMMARY TABLE D – REVENUE VS. COST BY GROWTH SCENARIO

	Existing	2040 Sprawl	2040 Compact
Revenue ($1000's)	$292,340	$942,360	$943,272
Cost ($1000's)	$293,164	$1,005,015	$943,988
Net Revenue	($824)	($62,655)	($716)
Revenue/Cost Ratio	1.00	0.94	1.00
Urban Area (ac)	50,130	144,325	97,228
Population	198,522	620,457	620,457
Net Revenue per capita	($4.15)	($100.98)	($1.15)
Net Revenue per urban acre	($16.44)	($434.12)	($7.36)

TABLE 1 - DEMOGRAPHIC IMPACTS
Population, Jobs and Acres: 1996 Vs. 2040

	1	2	3	4	5	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities	Unincorp	Total
1996 Baseline: Population, Jobs, & Acres									
Population (1)	23,672	4,430	4,216	10,508	20,694	61,712	125,232	73,290	198,522
Jobs (2)	10,086	1,473	1,583	3,886	7,821	22,956	47,806	28,111	75,916
Developed Land Area (3)									
Residential	2,673	447	612	1,119	2,855	7,828	15,533	17,849	33,382
Commercial/Industrial	364	227	117	538	1,439	2,705	5,390	1,423	6,813
Other	503	106	42	565	0	735	1,951	7,983	9,935
Total	3,540	780	771	2,222	4,294	11,267	22,875	27,255	50,130
Population per gross acre	6.7	5.7	5.5	4.7	4.8	5.5	5.5	2.7	4.0
2040 Projected Population, Jobs									
% diff: 1996 Vs 2040	231%	302%	353%	461%	407%	404%	371%	212%	313%
2040 - Population	54,718	13,395	14,899	48,471	84,261	249,238	464,983	155,474	620,456
2040 - Jobs	23,314	4,455	5,594	17,926	31,844	92,715	175,849	61,419	237,267
New Population, Jobs in 2040 (vs 1996)									
Population	31,046	8,965	10,683	37,963	63,567	187,526	339,751	82,184	421,934
Jobs	13,228	2,982	4,011	14,040	24,023	69,758	128,043	33,308	161,351
New Urbanized Acres in 2040									
Low Density									
Pop/ Acre (existing ratio	6.7	5.7	5.5	4.7	4.8	5.5	5.3	2.7	4.5
Acres Urbanized	**4,643**	**1,579**	**1,953**	**8,029**	**13,190**	**34,239**	**63,632**	**30,563**	**94,195**
Compact Density (4)									
Pop/ Acre	12.0	10.2	9.8	8.5	8.7	9.9	9.6	4.8	8.1
Acres Urbanized	**2,321**	**790**	**976**	**4,014**	**6,595**	**17,119**	**31,816**	**15,281**	**47,097**

(1) Population estimates are based on Department of Finance, Population Unit projections

(2) Jobs estimates are based on 1990 Census ratio of jobs-to-population as applied to 1996.

[3]See Table 1A for Acreage documentation

(4) Compact density assumes 10% of new residents & jobs will be in infill; 90% in new annexations but at higher average density as shown.

(4) Compact: Infill Vs. Annexatic	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities	Unincorp	Total
Population Infill 10%	3,105	897	1,068	3,796	6,357	18,753	33,975	8,218	42,193
Population Annex 90%	27,941	8,069	9,615	34,167	57,211	168,773	305,775	73,965	379,741
Jobs infill 10%	1,323	298	401	1,404	2,402	6,976	12,804	3,331	16,135
Jobs Annex 90%	11,905	2,684	3,610	12,636	21,621	62,783	115,238	29,978	145,216

TABLE 1A - DETAIL DEMOGRAPHIC DATA: 1990, 1996

	1	2	3	4	5	6		Unincorp	Total
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities	Area (1)	County
1990 Census Information (for appropriate ratios)									
Population	22,282	4,080	3,931	7,317	14,519	56,216	108,345	70,058	178,403
K-12 ADA	4,920	906	793	1,959	3,070	12,840	24,488	NA	
Employment	9,494	1,357	1,476	2,706	5,487	20,912	41,432	26,791	68,223
Occ Housing Units	7,189	1,363	1,523	1,654	4,772	18,282	34,783	22,491	57,274
Census Ratios									
Pop to HH Ratio	3.099	2.993	2.581	4.424	3.043	3.075	3.115	3.115	
K-12 to HH Ratio	0.684	0.665	0.521	1.184	0.643	0.702	0.704	NA	
Pop/Job Ratio	0.426	0.333	0.375	0.370	0.378	0.372	0.382	0.382	
Employee to HH Ratio	1.321	0.996	0.969	1.636	1.150	1.144	1.191	1.191	
Resid & Job split calculation									
Population	22,282	4,080	3,931	7,317	14,519	56,216	108,345	70,058	178,403
Job Pop Equiv (jobs x 2/3)	6,329	905	984	1,804	3,658	13,941	27,621	17,861	45,482
Total	28,611	4,985	4,915	9,121	18,177	70,157	135,966	87,919	223,885
Percentage Pop	77.9%	81.9%	80.0%	80.2%	79.9%	80.1%	79.7%	79.7%	79.7%
Percentage Jobs	22.1%	18.1%	20.0%	19.8%	20.1%	19.9%	20.3%	20.3%	20.3%
1996 Information (for base year and fiscal analysis) (1)									
Population	23,672	4,430	4,216	10,508	20,694	61,712	125,232	73,290	198,522
Increase % Population - 1990 to 1996	6.2%	8.6%	7.3%	43.6%	42.5%	9.8%	15.6%	4.6%	11.3%
K-12 Students	5,227	984	850	2,813	4,376	14,095	28,345	NA	
Dwelling Units	7,637	1,480	1,633	2,375	6,802	20,069	39,997	23,529	63,526
Jobs	10,086	1,473	1,583	3,886	7,821	22,956	47,806	28,027	75,833
Job Population Equiv (jobs x 2/3)	6,724	982	1,055	2,591	5,214	15,304	31,871	18,684	50,555
Pop as % of pop/job equiv total	77.9%	81.9%	80.0%	80.2%	79.9%	80.1%	79.7%	79.7%	79.7%
Jobs as % of pop/job equiv total	22.1%	18.1%	20.0%	19.8%	20.1%	19.9%	20.3%	20.3%	20.3%
Acres (2)									
Residential	2,673	447	612	1,119	2,855	7,828	15,533	17,849	33,382
Commercial/Industrial	364	227	117	538	1,439	2,705	5,390	1,423	6,813
Other	503	106	42	565	0	735	1,951	7,983	9,935
Total Acres	3,540	780	771	2,222	4,294	11,267	22,875	27,255	50,130
Population/Acre	6.7	5.7	5.5	4.7	4.8	5.5	5.5	2.7	4.0
Resid acres as % of Total	88.0%	66.3%	83.9%	67.5%	66.5%	74.3%	74.2%	65.5%	66.6%
Commercial acres as % of Total	12.0%	33.7%	16.1%	32.5%	33.5%	25.7%	25.8%	5.2%	13.6%

(1) Department of Finance for population, 1990 Census ratios for other data

(2) City land areas are from Merced County GIS file LU 90.dbf updated by current city zoned use data.
Unincorporated area is from GIS file LU 90.dbf with added Strong Assoc. estimate of developed rural parcels, as follows:

	Pop@2.5	Units	Acres
Unincorporated Total	73,290	29,316	1,179,857
Farms (over 10 acre parcel 1DU/160ac	18,156	7,263	1,162,008
Rural Residential (1.5 to 10 ac parcels)	5,470	2,188	9,667
Urban Residential	49,664	19,865	8,182
Residential Developed (less than 10 acres)	55,134	22,053	17,849

TABLE 1B - DETAIL OF POPULATION PROJECTIONS

Method # 1

Based on Average percentage Increase (years 2020 to 2040)

	1		2		3		4		5		6						
	Atwater	%	Dos Palos	%	Gustine	%	Livingston	%	Los Banos	%	Merced	%	All Cities	Unincorp.	%	Total	%
1990	22,282		4,196		3,931		7,317		14,519		56,216		108,461	69,942		178,403	
1995	23,915	7%	4,365	4%	4,135	5%	10,437	43%	20,123	39%	60,973	8%	123,948	77,524	11%	201,472	13%
2000	26,115	9%	5,655	30%	5,484	33%	13,888	33%	25,042	24%	84,994	39%	161,178	77,806	0%	238,984	19%
2005	29,083	11%	6,461	14%	6,265	14%	17,683	27%	30,522	22%	102,667	21%	192,681	86,860	12%	279,541	17%
2010	31,410	8%	7,382	14%	7,370	18%	21,956	24%	36,280	19%	120,254	17%	224,652	94,810	9%	319,462	14%
2015	37,239	19%	8,434	14%	8,669	18%	25,048	14%	41,389	14%	142,571	19%	263,350	110,180	16%	373,530	17%
2020	42,523	14%	9,635	14%	10,196	18%	28,140	12%	51,000	23%	162,797	14%	304,291	124,199	13%	428,490	15%
2025	47,388	11%	11,090	15%	11,979	17%	35,345	26%	62,993	24%	194,957	20%	363,751	136,811	10%	500,562	16%
2030	52,809	11%	12,764	15%	14,074	17%	44,395	26%	77,806	24%	233,469	20%	435,317	150,704	10%	586,021	16%
2035	58,851	11%	14,691	15%	16,536	17%	55,761	26%	96,103	24%	279,589	20%	521,530	166,008	10%	687,538	16%
2040	65,583	11%	16,908	15%	19,427	17%	70,038	26%	118,702	24%	334,821	20%	625,480	182,865	10%	808,345	16%
Average increase per 5 yr interval		11%		15%		17%		26%		24%		20%			10%		16%

Note: Growth Projections as follows:

1995 to 2020 based on "1998 Regional Transportation Plan" - Merced County Association of Governments

2025 to 2040 based on the average growth rate of "1998 Regional Transportation Plan"

Method # 2

Based on meeting Target 2040 Population

	1		2		3		4		5		6						
	Atwater	%	Dos Palos	%	Gustine	%	Livingston	%	Los Banos	%	Merced	%	All Cities	Unincorp.	% inc	Total	% inc
1990	22,282		4,196		3,931		7,317		14,519		56,216		108,461	69,942		178,403	
1995	23,915	7%	4,365	4%	4,135	5%	10,437	43%	20,123	39%	60,973	8%	123,948	77,524	11%	201,472	13%
2000	26,115	9%	5,655	30%	5,484	33%	13,888	33%	25,042	24%	84,994	39%	161,178	77,806	0%	238,984	19%
2005	29,083	11%	6,461	14%	6,265	14%	17,683	27%	30,522	22%	102,667	21%	192,681	86,860	12%	279,541	17%
2010	31,410	8%	7,382	14%	7,370	18%	21,956	24%	36,280	19%	120,254	17%	224,652	94,810	9%	319,462	14%
2015	37,239	19%	8,434	14%	8,669	18%	25,048	14%	41,389	14%	142,571	19%	263,350	110,180	16%	373,530	17%
2020	42,523	14%	9,635	14%	10,196	18%	28,140	12%	51,000	23%	162,797	14%	304,291	124,199	13%	428,490	15%
2025	45,290	7%	10,462	9%	11,210	10%	32,238	15%	57,821	13%	181,087	11%	338,108	131,372	6%	469,480	9%
2030	48,237	7%	11,361	9%	12,325	10%	36,932	15%	65,554	13%	201,433	11%	375,841	138,959	6%	514,801	9%
2035	51,375	7%	12,336	9%	13,551	10%	42,310	15%	74,321	13%	224,064	11%	417,958	146,985	6%	564,943	9%
2040	54,718	7%	13,395	9%	14,899	10%	48,471	15%	84,261	13%	249,238	11%	464,983	155,474	6%	620,456	9%
% to meet 2040		7%		9%		10%		15%		13%		11%			6%		9%

Note: Growth Projections as follows:

1995 to 2020 based on "1998 Regional Transportation Plan" - Merced County Association of Governments

2025 to 2040 based on Dept. of Finance population projection growth rate percentage.

TABLE 2 - PRIVATE SECTOR AGRICULTURE IMPACT:2040

Annual Acres, Sales & Jobs Lost

	1	2	3	4	5a	5b	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos NE (1)	Los Banos SW (1)	Merced	All Cities	Unincorp	Total
Acres Urbanized (2)										
Low Density	4,643	1,579	1,953	8,029	6,595	6,595	34,239	63,632	30,563	94,195
Compact Density	2,321	790	976	4,014	3,298	3,298	17,119	31,816	15,281	47,097
Direct Annual Sales Lost ($000)										
Low Density	$10,887	$2,447	$2,544	$18,710	$5,632	$19,291	$46,136	$105,647	$50,743	$156,390
Compact Density	$5,444	$1,224	$1,272	$9,355	$2,816	$9,646	$23,068	$52,824	$25,371	$78,195
Total Annual Sales Lost ($000)										
Low Density	$15,997	$3,684	$3,719	$27,500	$7,979	$28,553	$67,432	$154,864	$74,382	$229,245
Compact Density	$7,998	$1,842	$1,860	$13,750	$3,989	$14,276	$33,716	$77,432	$37,191	$114,623
Direct Jobs Lost (3)										
Low Density	102	29	30	164	123	190	609	1,247	599	1,846
Compact Density	51	14	15	82	61	95	305	623	299	923
Total Jobs Lost										
Low Density	206	55	54	343	164	385	1,032	2,239	1,075	3,314
Compact Density	103	28	27	171	82	192	516	1,119	538	1,657

(1) Los Banos growth area is divided into two areas: NE affects Grasslands WD(Focus Area) , SW does not affect the Focus Area
Strong Associates assumes a 50/50 split of growth for illustrative purposes.

(2) The ag impact is estimated based on total urbanized acres, which may slightly overlap with wetlands and vacant lands.

(3) Sales and jobs impact figures for the unincorporated area are assumed to be proportional to the city figures.

TABLE 2A - AGRICULTURAL SALES & JOBS: 1998

Sector Description	Acres	Dir. Sales/Acre	Direct Sales (1)	Total Sales (2)	Direct Jobs (2)	Total Jobs (2)
Dairy	5,684	$92,706	$526,908,000	$749,997,686	3,053	7,234
Poultry	2,680	$87,613	$234,820,000	$333,864,258	858	3,183
Range Fed Cattle	568,000	$96	$54,391,000	$94,357,888	759	1,369
Sheep, Lambs & Goats	3,374	$500	$1,687,000	$2,659,171	102	132
Hogs, Pigs & Swine	2,870	$500	$1,435,000	$2,018,507	15	24
Other Meat Animal Products	4,750	$500	$2,375,000	$3,708,054	32	53
Cotton	68,772	$884	$60,823,000	$88,564,249	396	961
Food Grains	36,545	$309	$11,297,000	$15,330,989	234	288
Feed Grains	129,911	$358	$46,567,000	$66,117,456	639	968
Hay Pasture	162,938	$505	$82,250,000	$115,953,007	3,169	3,734
Fruits	32,044	$2,829	$90,637,000	$135,126,987	1,001	1,987
Nuts	83,837	$1,553	$130,178,000	$194,140,570	1,337	2,659
Vegetables	44,704	$3,341	$149,371,000	$227,469,478	1,253	2,978
Sugar Crops	12,658	$1,199	$15,176,000	$20,205,827	250	338
Misc. Crops	1,952	$10,933	$21,342,000	$35,869,009	632	1,040
Greenhouse & Nursery	1,214	$15,657	$19,007,000	$26,425,508	224	348
Commercial Fishing	75	$19,867	$1,490,000	$1,956,591	18	25
Total All	1,162,008	$1,248	$1,449,754,000	$2,113,765,234	13,971	27,319

(1) Direct Sales from Ag Commissioner Crop/Livestock Report

(2) Input Output Multiplier for Sales, Income and Employment - Coop Extension, George Goldman

I-O #	Sector Description	Sales Multiplier	Direct Jobs Per $1M Sales	Total Jobs Per $1M Sales
1	Dairy	1.4234	5.7944	13.7293
2	Poultry	1.4218	3.6544	13.5536
4	Range Fed Cattle	1.7348	13.9602	25.1706
6	Sheep, Lambs & Goats	1.5763	60.2469	78.0057
7	Hogs, Pigs & Swine	1.4066	10.4100	16.6830
8	Other Meat Animal Products	1.5613	13.5223	22.2791
10	Cotton	1.4561	6.5051	15.7977
11	Food Grains	1.3571	20.7085	25.5081
12	Feed Grains	1.4198	13.7263	20.7857
13	Hay Pasture	1.4098	38.5283	45.3970
16	Fruits	1.4909	11.0463	21.9229
17	Nuts	1.4913	10.2696	20.4244
18	Vegetables	1.5228	8.3877	19.9357
19	Sugar Crops	1.3314	16.4511	22.2812
20	Misc. Crops	1.6807	29.5999	48.7288
23	Greenhouse & Nursery	1.3903	11.7964	18.2913
25	Commercial Fishing	1.3131	11.8341	16.7378

TABLE 2B - AGRICULTURAL IMPACT: 2040

By Crop Type and City (1)

	1	2	3	4	5a	5b	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Los Banos	Merced	All Cities	Unincorp.	Total County
Acres Urbanized					NE	SW				
1-8 Animal Products	93	0	20	161	66	132	342	813	391	1204
11 - Food Grains	464	316	781	803	0	0	10,272	12,636	6069	18705
12 - Feed Grains	0	0	0	803	989	0	0	1,792	861	2653
13 - Hay Pasture	464	474	488	0	5,276	1,649	13,695	22,047	10589	32636
16 - Fruits	464	0	0	803	0	1,979	0	3,246	1559	4805
17 - Nuts	2,553	0	195	4,416	0	660	3,424	11,248	5402	16650
18 - Vegetables	464	632	293	803	0	1,979	5,136	9,306	4470	13776
Other	139	158	176	241	264	198	1,370	2,545	1222	3767
Low Density Total	4,643	1,579	1,953	8,029	6,595	6,595	34,239	63,632	30563	94195
Compact Density	2,321	790	976	4,014	3,298	3,298	17,119	31,816	15,281	47,097
									48.03%	
Direct Sales Lost										
1-8 Animal Products	$3,680,167	$0	$773,885	$6,364,077	$2,613,892	$5,227,783	$13,570,111	$32,229,914	$15,480,135	$47,710,049
11 - Food Grains	$143,518	$97,636	$241,438	$248,185	$0	$0	$3,175,223	$3,906,000	$1,876,065	$5,782,065
12 - Feed Grains	$0	$0	$0	$287,788	$354,606	$0	$0	$642,393	$308,544	$950,937
13 - Hay Pasture	$234,361	$239,156	$246,413	$0	$2,663,333	$832,292	$6,913,394	$11,128,948	$5,345,271	$16,474,219
16 - Fruits	$1,313,199	$0	$0	$2,270,903	$0	$5,596,313	$0	$9,180,416	$4,409,384	$13,589,800
17 - Nuts	$3,964,938	$0	$303,188	$6,856,529	$0	$1,024,056	$5,316,424	$17,465,137	$8,388,563	$25,853,700
18 - Vegetables	$1,551,286	$2,110,695	$978,638	$2,682,623	$0	$6,610,939	$17,160,460	$31,094,641	$14,934,859	$46,029,500
Low Density Total	$10,887,470	$2,447,487	$2,543,563	$18,710,104	$5,631,830	$19,291,383	$46,135,611	$105,647,448	50742820.11	$156,390,268
Compact Density	$5,443,735	$1,223,743	$1,271,781	$9,355,052	$2,815,915	$9,645,692	$23,067,806	$52,823,724	$25,371,410	$78,195,134
Total Sales Lost										
1-8 Animal Products	$5,238,327	$0	$1,101,543	$9,058,588	$3,720,598	$7,441,195	$19,315,614	$45,875,867	$22,034,331	$67,910,197
11 - Food Grains	$194,766	$132,501	$327,652	$336,808	$0	$0	$4,309,047	$5,300,774	$2,545,979	$7,846,753
12 - Feed Grains	$0	$0	$0	$408,611	$503,481	$0	$0	$912,092	$438,081	$1,350,173
13 - Hay Pasture	$330,394	$337,153	$347,384	$0	$3,754,668	$1,173,334	$9,746,247	$15,689,179	$7,535,565	$23,224,744
16 - Fruits	$1,957,795	$0	$0	$3,385,596	$0	$8,343,314	$0	$13,686,705	$6,573,770	$20,260,475
17 - Nuts	$5,913,099	$0	$452,159	$10,225,464	$0	$1,527,223	$7,928,633	$26,046,579	$12,510,258	$38,556,837
18 - Vegetables	$2,362,374	$3,214,270	$1,490,317	$4,085,230	$0	$10,067,461	$26,132,790	$47,352,442	$22,743,535	$70,095,978
Low Density Total	$15,996,755	$3,683,923	$3,719,056	$27,500,298	$7,978,748	$28,552,528	$67,432,331	$154,863,639	$74,381,520	$229,245,158
Compact Density	$7,998,378	$1,841,962	$1,859,528	$13,750,149	$3,989,374	$14,276,264	$33,716,165	$77,431,819	$37,190,760	$114,622,579

(1) Percentage of Crop Mix in City Expansion Areas per Agricultural Commissioner, Cooperative Extension & GIS LU90.shp

	Atwater	Dos Palos	Gustine	Livingston	Los Banos-NE	Los Banos-SW	Merced	Unincorp (All Cities Aver.)
1-8 Animal Products	2.0%	0.0%	1.0%	2.0%	1.0%	2.0%	1.0%	1.3%
11 - Food Grains	10.0%	20.0%	40.0%	10.0%			30.0%	19.9%
12 - Feed Grains				10.0%	15.0%			2.8%
13 - Hay Pasture	10.0%	30.0%	25.0%		80.0%	25.0%	40.0%	34.6%
16 - Fruits	10.0%	0.0%		10.0%		30.0%		5.1%
17 - Nuts	55.0%	0.0%	10.0%	55.0%		10.0%	10.0%	17.7%
18 - Vegetables	10.0%	40.0%	15.0%	10.0%		30.0%	15.0%	14.6%
19 - Other open	3.0%	10.0%	9.0%	3.0%	4.0%	3.0%	4.0%	4.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 2B, CONT. - AGRICULTURAL IMPACT:2040

By Crop Type and City

	1	2	3	4	5a	5b	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Los Banos	Merced	All Cities	Unincorp.	Total County
Direct Jobs Lost					NE	SW				
1-8 Animal Products	21	0	4	37	15	30	79	187	90	276
11 - Food Grains	3	2	5	5	0	0	66	81	39	120
12 - Feed Grains	0	0	0	4	5	0	0	9	4	13
13 - Hay Pasture	9	9	9	0	103	32	266	429	206	635
16 - Fruits	15	0	0	25	0	62	0	101	49	150
17 - Nuts	41	0	3	70	0	11	55	179	86	266
18 - Vegetables	13	18	8	23	0	55	144	261	125	386
Total Low Density	102	29	30	164	123	190	609	1247	599	1,846
Total Compact Density	51	14	15	82	61	95	305	623	299	923
Total Jobs Lost										
1-8 Animal Products	51	0	11	87	36	72	186	442	213	655
11 - Food Grains	4	2	6	6	0	0	81	100	48	147
12 - Feed Grains	0	0	0	6	7	0	0	13	6	20
13 - Hay Pasture	11	11	11	0	121	38	314	505	243	748
16 - Fruits	29	0	0	50	0	123	0	201	97	298
17 - Nuts	81	0	6	140	0	21	109	357	171	528
18 - Vegetables	31	42	20	53	0	132	342	620	298	918
Total Low Density	206	55	54	343	164	385	1032	2239	1075	3314
Total Compact Density	103	28	27	171	82	192	516	1,119	538	1,657

Sources: Interviews with Ag commissioner and Coop Extension staff

GIS LU90 map for buffer areas

I-O Multipliers for Table 2A

TABLE 2B, CONT. - AGRICULTURAL IMPACT:2040
By Crop Type and City

	1	2	3	4	5a	5b	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos NE	Los Banos SW	Merced	All Cities	Unincorp.	Total County
Direct Jobs Lost										
1-8 Animal Products	21	0	4	37	15	30	79	187	90	276
11 - Food Grains	3	2	5	5	0	0	66	81	39	120
12 - Feed Grains	0	0	0	4	5	0	0	9	4	13
13 - Hay Pasture	9	9	9	0	103	32	266	429	206	635
16 - Fruits	15	0	0	25	0	62	0	101	49	150
17 - Nuts	41	0	3	70	0	11	55	179	86	266
18 - Vegetables	13	18	8	23	0	55	144	261	125	386
Total Low Density	102	29	30	164	123	190	609	1247	599	1,846
Total Compact Density	51	14	15	82	61	95	305	623	299	923
Total Jobs Lost										
1-8 Animal Products	51	0	11	87	36	72	186	442	213	655
11 - Food Grains	4	2	6	6	0	0	81	100	48	147
12 - Feed Grains	0	0	0	6	7	0	0	13	6	20
13 - Hay Pasture	11	11	11	0	121	38	314	505	243	748
16 - Fruits	29	0	0	50	0	123	0	201	97	298
17 - Nuts	81	0	6	140	0	21	109	357	171	528
18 - Vegetables	31	42	20	53	0	132	342	620	298	918
Total Low Density	206	55	54	343	164	385	1032	2239	1075	3314
Total Compact Density	103	28	27	171	82	192	516	1,119	538	1,657

Sources: Interviews with Ag commissioner and Coop Extension staff
GIS LU90 map for buffer areas
I-O Multipliers for Table 2A

TABLE 3 - CITY FISCAL IMPACTS: 2040

($000'97 dollars)	1	2	3	4	5	6		
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities	Per Capita
New Residents	31,046	8,965	10,683	37,963	63,567	187,526	339,751	
New Jobs	13,228	2,982	4,011	14,040	24,023	69,758	128,043	
Low Density: New Acres	4,643	1,579	1,953	8,029	13,190	34,239	63,632	
Revenues								
Average/Resident	$17,434	$3,172	$6,597	$14,144	$25,269	$92,824	$159,440	
Average/Job	$4,313	$1,462	$1,401	$5,179	$9,611	$35,144	$57,109	
Property Tax (1)	$858	$236	$407	$1,012	$2,675	$7,199	$12,388	
Total Rev.	**$22,605**	**$4,869**	**$8,406**	**$20,335**	**$37,555**	**$135,167**	**$228,937**	**$674**
Costs								
Average/Resident	($13,107)	($2,370)	($3,323)	($11,756)	($20,182)	($76,853)	($127,591)	
Average/Job	($3,405)	($511)	($735)	($2,626)	($4,154)	($14,377)	($25,809)	
Acre-Related	($5,554)	($2,093)	($3,453)	($6,014)	($11,245)	($44,902)	($73,261)	
Capital/year	($4,079)	($1,388)	($1,716)	($7,054)	($11,589)	($30,082)	($55,907)	
Total Cost	**($26,145)**	**($6,362)**	**($9,227)**	**($27,450)**	**($47,170)**	**($166,214)**	**($282,568)**	**($832)**
Net Revenue/(Cost)	**($3,540)**	**($1,493)**	**($820)**	**($7,115)**	**($9,615)**	**($31,047)**	**($53,631)**	**($158)**
Net as % of Revenue	-15.7%	-30.7%	-9.8%	-35.0%	-25.6%	-23.0%	-23.4%	
Compact: New Acres	2,321	790	976	4,014	6,595	17,119	31,816	
Revenues								
Average/Resident	$17,434	$3,172	$6,597	$14,144	$25,269	$92,824	$159,440	
Average/Job	$4,313	$1,462	$1,401	$5,179	$9,611	$35,144	$57,109	
Property Tax (1)	$915	$249	$438	$1,119	$2,838	$7,785	$13,344	
Total Rev	**$22,662**	**$4,882**	**$8,436**	**$20,442**	**$37,717**	**$135,753**	**$229,892**	**$677**
Costs								
Average/Resident	($13,107)	($2,370)	($3,323)	($11,756)	($20,182)	($76,853)	($127,591)	
Average/Job	($3,405)	($511)	($735)	($2,626)	($4,154)	($14,377)	($25,809)	
Acre-Related	($2,777)	($1,047)	($1,726)	($3,007)	($5,623)	($22,451)	($36,631)	
Capital/year	($2,447)	($833)	($1,029)	($4,232)	($6,953)	($18,049)	($33,544)	
Total Cost	**($21,737)**	**($4,760)**	**($6,814)**	**($21,621)**	**($36,912)**	**($131,730)**	**($223,574)**	**($658)**
Net Revenue/(Cost)	**$925**	**$122**	**$1,622**	**($1,180)**	**$805**	**$4,024**	**$6,318**	**$19**
Net as % of Revenue	4.1%	2.5%	19.2%	-5.8%	2.1%	3.0%	2.7%	

(1) See Table 3C for Property Tax detail

TABLE 3A - DETAIL OF EXISTING CITY REVENUES

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingstone	5 Los Banos	6 Merced	All Cities	Allocation
Taxes								
Secured and Unsecured Prop Tax	749,066	134,395	199,665	347,119	1,070,444	2,664,010	5,164,699	Prop. Tax CS (1)
Indebtedness Property Tax	0		50,500		0		50,500	Prop. Tax CS (1)
Property Tax - Prior Year	45	4,430	268	1,807	1,356	30,648	38,554	Prop. Tax CS (1)
Other Property Taxes				0		28,013	28,013	Prop. Tax CS (1)
Interest, Penalties /Delinquent								
Sales and Use Taxes	876,740	267,690	159,274	229,957	1,462,499	6,691,063	9,687,223	Jobs.67 (3)Res.33 (4)
Transportation Tax	344,390	90,117	54,629	201,526	32,527	546,605	1,269,794	Jobs.67 (3)Res.33 (4)
Transient Lodging Taxes	25,128		319	1,797	96,552	522,367	646,163	Res/Jobs (2)
Franchises	227,966	32,345	70,171	344,631	409,518	545,147	1,629,778	Res/Jobs (2)
Business License Taxes	82,199	17,428	17,606	33,236	69,758	788,073	1,008,300	Jobs (3)
Real Property Transfer Taxes	23,533			2,761	34,454	48,265	109,013	Res/Jobs (2)
Utility Users Tax	14,705		163,367				178,072	Res/Jobs (2)
Other Non-Property Taxes	0	48,258	13,693		180,925		242,876	Res/Jobs (2)
Benefit Assessments								
Fire		0		4,567			4,567	Res/Jobs (2)
Paramedics		0				0	0	Res/Jobs (2)
Lighting	84,787	0	96,767		182,175		363,729	Res/Jobs (2)
Other		0		215,144		458,297	673,441	Res/Jobs (2)
Licenses and Permits								
Construction Permits	244,227	33,892	35,609	32,959	303,307	337,604	987,598	Res/Jobs (2)
Other Licenses and Permits	27,536	3,550	2,661	12,009	15,513	5,005	66,274	Res/Jobs (2)
Fines and Forfeitures								
Vehicle Code Fines	24,553	7,108	4,629	23,716	32,753	306,787	399,546	Res/Jobs (2)
Other Fines, Forfeitures /Penalties	26,572	3,484	4,268	28,630	48,346	39,340	150,640	Res/Jobs (2)
Use of Money								
Investment Earnings	503,738	17,482	98,996	268,463	356,037	2,006,240	3,250,956	Res/Jobs (2)
Rents and Concessions	42,090	12,175		32,921	16,706	34,938	138,830	Res/Jobs (2)
Royalties								Res/Jobs (2)
Other				8,343		0	8,343	Res/Jobs (2)
Intergovernmental								
State Motor Vehicle In-Lieu Tax	904,307	171,665	165,569	406,500	788,129	2,398,933	4,835,103	Resid (4)
State Trailer Coach In-Lieu Tax	0			0	0	0	0	Resid (4)
State Cigarette Tax	0			0	0	0	0	Resid (4)
Homeowners Property Tax Relief	18,481	3,408	5,037	8,435	28,131	68,205	131,697	Prop. Tax CS (1)
State Gasoline Tax	412,478	81,157	74,968	186,548	352,968	1,062,065	2,170,184	Resid (4)
Other State Grants	235,620	55,495	339,242	89,123	568,563	1,841,132	3,129,175	Resid (4)
County Grants of State Gas Tax						0	0	Resid (4)
County Grants	0	405					405	Resid (4)
Federal Revenue Sharing								Resid (4)
Other Federal Grants	586,540		2,400	60,072	113,848	2,319,699	3,082,559	Resid (4)
Other Taxes in-Lieu	0	76,600		62,472			139,072	Resid (4)

TABLE 3A CONT. - DETAIL OF EXISTING CITY REVENUES

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingstone	5 Los Banos	6 Merced	All Cities	Allocation
Charges for Services								
Zoning Fees and Subdivision Fees	0	4,834		6,573	41,805	310,072	363,284	Res/Jobs (2)
Police Department Services	13,932	7,743	21,026	71,283	101,050	117,136	332,170	Res/Jobs (2)
Fire Department Services	0	180			26,977	107,883	135,040	Res/Jobs (2)
Plan Checking Fees	67,776	2,196	630		40,189	113,662	224,453	Res/Jobs (2)
Animal Shelter Fees and Charges	523	780	447			0	1,750	Resid (4)
Engineering Fees	415				30,321	334,421	365,157	Res/Jobs (2)
Street, Sidewalk and Curb Repairs		1,031	2,425	1,034	492	18,546	23,528	Resid (4)
Weed and Lot Cleaning		780	1,406	965	17,755	7,206	28,112	Resid (4)
Sewer Charges/Connect Fees *	2,299,979	415,420	893,289	1,003,693	1,454,797	5,372,724	11,439,902	Enterprise Res/Jobs (2)
Solid Waste Revenues *	1,240,160	256,694	529,930	583,054	1,215,641	4,120,045	7,945,524	Enterprise Res/Jobs (2)
First Aid and Ambulance Charges								Resid (4)
Library Fines and Fees								Resid (4)
Parking Facilities						6,433	6,433	Jobs (3)
Parks and Recreation Fees	71,855	13,167	34,307	63,416	450,934	390,509	1,024,188	Resid (4)
Golf Course Fees								Resid (4)
Water Charges/Connect Fees *	1,411,827	550,179	321,593	910,326	1,426,744	5,164,913	9,785,582	Enterprise Res/Jobs (2)
Electric Revenues								Res/Jobs (2)
Airport Revenues	0		34,052		153,330	155,086	342,468	Res/Jobs (2)
Cemetery Revenues								Resid (4)
Housing Revenues						526,792	526,792	Resid (4)
Transit Revenues	3,389					925	4,314	Res/Jobs (2)
Quasi-External Transactions	653,535		356	249,990	450,315	4,510,173	5,864,369	Res/Jobs (2)
Other Current Service Charges	292,887	16,148		0	430,534	411,188	1,150,757	Res/Jobs (2)
Other Revenues								
Sale of Real and Personal Property	5,708,564					145,066	5,853,630	Res/Jobs (2)
Contributions: Non-Govt Sources	2,810	5,000	8,000			47,043	62,853	Res/Jobs (2)
Other Sources of Revenues	108,487	50,079		204,158	0	232,876	595,600	Res/Jobs (2)
Other Sources								
Sale of Bonds					41,220	0	41,220	Res/Jobs (2)
Notes and Other		43,007			379,924		422,931	Res/Jobs (2)
Total Revenues	**$17,330,841**	**$2,428,324**	**$3,407,102**	**$5,697,232**	**$12,426,542**	**$44,835,141**	**$86,125,161**	

Source: Annual Report 1996/97 - Financial Transactions Concerning Cities
State of California, Office of the Controller

TABLE 3A CONT. - EXISTING CITY REVENUES
Totals and Per Resident & Job

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	All Cities
Revenue Totals - by Allocation							
Case Study (Property Tax)	$749,111	$138,825	$250,433	$348,926	$1,071,800	$2,722,671	$5,281,766
Res/Jobs (1)	$8,115,111	$290,889	$559,581	$1,516,380	$3,400,082	$10,857,726	$24,739,769
Resident Share	$6,319,905	$238,096	$447,551	$1,216,462	$2,715,838	$8,700,130	$19,720,938
Job Share	$1,795,206	$52,793	$112,030	$299,918	$684,244	$2,157,596	$5,018,831
Resident	$2,614,296	$519,156	$691,352	$1,012,519	$2,786,048	$10,953,312	$18,576,684
Jobs	$900,356	$257,159	$160,921	$322,330	$1,071,425	$5,643,744	$8,355,934
Enterprise (Sewer/water) (1)	$4,951,966	$1,222,293	$1,744,812	$2,497,073	$4,097,182	$14,657,682	$29,171,008
Resident Share	$4,359,006	$809,962	$1,464,695	$1,685,918	$2,724,139	$10,893,733	$21,656,294
Job Share	$592,960	$412,331	$280,117	$811,155	$1,373,043	$3,763,949	$7,514,714
Total Revenue	**$17,330,840**	**$2,428,322**	**$3,407,099**	**$5,697,228**	**$12,426,537**	**$44,835,135**	**$86,125,161**
Residents & Jobs Base							
Population (1996)	23,672	4,430	4,216	10,508	20,694	61,712	125,232
Jobs (1996 est.)	10,086	1,473	1,583	3,886	7,821	22,956	47,806
Average Rev per Resident (w/o Prop Tax)							
Resid. share of resid/job	$266.98	$53.75	$106.16	$115.77	$131.24	$140.98	$157.48
Resid. only	$110.44	$117.19	$163.98	$96.36	$134.63	$177.49	$148.34
Resid. share of enterprise	$184.14	$182.84	$347.41	$160.44	$131.64	$176.53	$172.93
Total per Resident	**$561.56**	**$353.77**	**$617.55**	**$372.56**	**$397.51**	**$495.00**	**$478.74**
Average Rev per Job (w/o Prop Tax)							
Job share of resid/job	$177.99	$35.83	$70.77	$77.18	$87.49	$93.99	$104.98
Job only	$89.27	$174.53	$101.66	$82.94	$137.00	$245.85	$174.79
Job share of enterprise	$58.79	$279.85	$176.95	$208.73	$175.57	$163.96	$157.19
Total per Job	**$326.04**	**$490.21**	**$349.38**	**$368.85**	**$400.06**	**$503.79**	**$436.96**

(1) Revenues/costs affecting both residents & jobs are allocated at the ratio of residents to job population equivalents from Table 1A. This ratio varies by city. The average for all cities is 79.7% res. to 20.3% jobs.

TABLE 3B - DETAIL OF EXISTING CITY COSTS

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	Total Cities	Allocation
General Government								
Legislative	$6,632	$7,163	$21,283	$85,478	$371,271	$174,809	$666,636	Res/Jobs (2)
Management and Support	$1,389,272	$124,758	$62,173	$605,050	$833,305	$2,659,532	$5,674,090	Res/Jobs (2)
Public Safety								
Police	$1,593,500	$578,728	$461,644	$1,515,593	$2,800,650	$9,658,337	$16,608,452	Res/Jobs (2)
Fire	$851,033	$65,932	$19,647	$39,229	$512,280	$5,692,179	$7,180,300	Acre (5)
Animal Regulation			$4,829		$66,909		$71,738	Resid (4)
Street Lighting	$55,130		$89,269	$41,800	$248,024	$0	$434,223	Acre (5)
Other			$46,654					Res/Jobs (2)
Transportation								
Street, Highways, & Storm Drains	$715,565	$333,030	$471,512	$237,986	$1,038,734	$1,816,202	$4,613,029	Acre (5)
Street Trees & Landscaping			$7,269	$17,216	$0	$278,296	$302,781	Acre (5)
Public Transit	$22,937				$32,527	$965,853	$1,021,317	Res/Jobs (2)
Airports	$0		$33,361		$224,537	$337,161	$595,059	Res/Jobs (2)
Other				$6,679				Res/Jobs (2)
Community Development			$9,698					
Planning	$179,421	$15,882		$64,979	$305,644	$303,805	$869,731	Res/Jobs (2)
Regulation Enforcement	$230,948	$28,993	$38,541	$52,526	$288,110	$1,931,025	$2,570,143	Res/Jobs (2)
Housing	$479,772					$2,615,232	$3,095,004	Resid (4)
Community Promotion		$105			$0	$302,370	$302,475	Res/Jobs (2)
Other				$14,512		$484,817	$499,329	Res/Jobs (2)
Enterprise								
Solid Waste	$1,130,189	$270,613	$259,119	$557,159	$854,930	$4,530,376	$7,602,386	Ac(5)0.5 & Res/job(2)0.5
Sewers	$2,923,953	$425,004	$838,522	$880,463	$1,364,290	$5,276,048	$11,708,280	Ac(5)0.5 & Res/job(2)0.5
Culture and Leisure								
Parks and Recreation	$374,647	$32,469	$100,349	$237,428	$1,137,416	$2,905,060	$4,787,369	Resid (4)
Community Center/Auditoriums	$0		$47,962			$693,987	$741,949	Resid (4)
Other				$69,821		$0	$69,821	Resid (4)
Public Utilities (Enterprise)								
Water	$1,172,027	$575,084	$452,068	$1,219,298	$1,504,310	$4,173,623	$9,096,410	Ac(5)0.5 & Res/job(2)0.5
Other Costs	$5,700,000							Res/Jobs (2)
Total Costs	**$16,825,026**	**$2,457,761**	**$2,963,900**	**$5,645,217**	**$11,582,937**	**$44,798,712**	**$84,273,553**	

TABLE 3B CONT. - EXISTING CITY COSTS
Totals and Per Resident, Job & Acre

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	Total Cities
Cost Totals - by Allocation							
Case Study	NA	NA	NA	NA	NA	NA	
Res/Jobs total (1)	$11,735,795	$1,390,980	$1,448,209	$3,673,277	$6,717,809	$23,807,733	$48,773,801
Residential share	$9,139,628	$1,138,531	$1,158,272	$2,946,756	$5,365,894	$19,076,771	$38,825,852
Jobs share	$2,596,166	$252,449	$289,936	$726,521	$1,351,915	$4,730,962	$9,947,949
Resident only	$854,419	$32,469	$153,140	$307,249	$1,204,325	$6,214,279	$8,765,881
Job only	$0	$0	$0	$0	$0	$0	$0
Acre-Related	$4,234,813	$1,034,313	$1,362,552	$1,664,691	$3,660,803	$14,776,701	$26,733,871
Total Cost	**$16,825,026**	**$2,457,761**	**$2,963,900**	**$5,645,217**	**$11,582,937**	**$44,798,712**	**$84,273,553**
Residents, Jobs & Acres: Base							
Population (1996)	23,672	4,430	4,216	10,508	20,694	61,712	125,232
Jobs (1996 est.)	10,086	1,473	1,583	3,886	7,821	22,956	47,806
Acres	3,540	780	771	2,222	4,294	11,267	22,875
Average Cost per Resident, Job & Acre							
Per Resident	$422.19	$264.33	$311.06	$309.67	$317.49	$409.82	$380.03
Per Job	$257.42	$171.53	$183.34	$187.03	$172.90	$206.10	$208.10
Per Acre	$1,196.27	$1,325.44	$1,768.21	$749.10	$852.54	$1,311.45	$1,168.71

(1) Revenues/costs affecting both residents & jobs are allocated at the ratio of residents to job population equivalents from Table 1A. This ratio varies by city. The average for all cities is 79.7% res. to 20.3% jobs.

Source: Annual Report 1996/97 - Financial Transactions Concerning Cities
State of California, Office of the Controller

TABLE 3C - PROPERTY TAX CASE STUDY

	1	2	3	4	5	6	
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities
Value Per: (1)							
Household	$ 80,000	$ 75,000	$ 100,000	$ 120,000	$ 130,000	120,000	
Resident	$ 25,811	$ 25,055	$ 38,743	$ 27,126	$ 42,727	39,025	
Job (@ 25% per resid value)	$ 6,453	$ 6,264	$ 9,686	$ 6,781	$ 10,682	9,756	
City Property Tax							
For City Infill							
City Rate for Infill	16.1%	15.1%	15.6%	18.5%	14.5%	16.3%	
Per Resident	$41.59	$37.78	$60.59	$50.13	$61.77	64	57
Per Job	$10.40	$9.45	$15.15	$12.53	$15.44	16	14
For Annexation Areas							
City Rate from County (2)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
City Rate from Fire	9.7%	9.7%	9.0%	9.0%	9.0%	9.0%	
Total	9.7%	9.7%	9.0%	9.0%	9.0%	9.0%	
Per Resident	$24.99	$24.25	$34.87	$24.41	$38.45	$35.12	$32.53
Per Job	$6.25	$6.06	$8.72	$6.10	$9.61	$8.78	$8.06
City Revenue Projections							
Population	31,046	8,965	10,683	37,963	63,567	187,526	
Jobs	13,228	2,982	4,011	14,040	24,023	69,758	
Low Density:							
Population Property Tax ($000)	$776	$217	$373	$927	$2,444	$6,586	
Jobs Property Tax ($000)	$83	$18	$35	$86	$231	$613	
Total ($000)	**$858**	**$236**	**$407**	**$1,012**	**$2,675**	**$7,199**	**$12,388**
Compact Density:							
Infill Resid. (10%)	$129	$34	$65	$190	$393	$1,195	
Infill Jobs (10%)	$14	$3	$6	$18	$37	$111	
Annex Residents (90%)	$698	$196	$335	$834	$2,200	$5,928	
Annex Jobs (90%)	$74	$16	$31	$77	$208	$551	
Total ($000)	**$915**	**$249**	**$438**	**$1,119**	**$2,838**	**$7,785**	**$13,344**

(1) Property value is based on regional real estate values and cross checked with City property tax revenue. Strong Associates

(2) Annexation Prop Tax Shift: Per Bill Nicholson, Merced Co. LAFCo Exec. Director, County will retain its full share of property tax in annexation areas; cities will receive the Fire District share.

NOTE: The following are the County property tax shares, used in Table 4D below.

For City Infill	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities
County Rate in City	13.6%	14.2%	13.2%	12.2%	15.0%	16.0%	
Per Resident	$35.14	$35.57	$50.99	$33.15	$64.29	$62.36	$53.75
Per Job	$8.79	$8.89	$12.75	$8.29	$16.07	$15.59	$13.31
For Annexation Areas							
County Rate in City (2)	18.8%	18.8%	18.3%	18.3%	18.3%	18.3%	
Per Resident	$48.45	$47.03	$71.02	$49.72	$78.32	$71.53	$65.58
Per Job	$12.11	$11.76	$17.75	$12.43	$19.58	$17.88	$16.31

TABLE 3D - CITY ANNUALIZED CAPITAL COSTS
($000'97 dollars)

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	All Cities
Low Density							
Number of Acres	4,643	1,579	1,953	8,029	13,190	34,239	63,632
Annualized Capital Cost							
For new area @$879/ac (1)	**$4,079**	**$1,388**	**$1,716**	**$7,054**	**$11,589**	**$30,082**	**$55,907**
Compact Density							
Number of Acres	2,321	790	976	4,014	6,595	17,119	31,816
Annualized Capital Cost							
For new area @$1,054/ac (1)	**$2,447**	**$833**	**$1,029**	**$4,232**	**$6,953**	**$18,049**	**$33,544**

Source: Strong Associates Case Study (assumes the same costs for all cities)

(1) Capital costs include internal area and spine infrastructure as follows:

Internal Area Capital Costs	Ft/Ac	Cost/Ft	Cost/Ac	Cost/Ac	Cost/Ac
Sewer Main	40	$35	$1,400	Low	Compact (+20%)
Roads/Storm	40	$125	$5,000		
	Ac served	Station Cost			
Fire Station	5,000	$2,500,000	$500		
Total Internal per acre			$6,900		
Per acre annualized @ 20yr/8%				$703	$843
Spine Infrastructure Capital Costs	Ft/mile	Cost/Ft	Cost/Mile		
Sewer Main	5,280	$75	$396,000		
Spine Roads/Storm	5,280	$350	$1,848,000		
Total per mile			$2,244,000		
Total Spine per Acre (1Mi. per 1,300Ac)			$1,726		
Per acre annualized @ 20yr/8%				$176	$211
Total Capital cost per acre				$879	$1,054

TABLE 4 - COUNTY FISCAL IMPACTS: 2040

	< Acres Urbanized >		< - Per Res/Job/Ac - >		City area	Unincorp	Total	Per Capita
	City area	Unincorp	City area	Unincorp				
New Population					339,751	82,184	421,934	
New Jobs					128,043	33,308	161,351	
Low Density								
Revenues								
Av/Resident			$843.96	$880.63	$286,735,854	$72,373,150	$359,109,004	
Av/Job			$196.17	$220.62	$25,118,593	$7,348,433	$32,467,026	
Property Tax					$24,367,382	$5,932,421	$30,299,803	
Subtotal Above					$336,221,829	$85,654,005	$421,875,834	
Agriculture	58,356	28,029	$9.10	$9.10	($530,988)	($255,035)	($786,023)	
GEA (range/wetlands)	5,276	2,534	$0.87	$0.87	($4,597)	($2,208)	($6,805)	
Total	63,632	30,563			$335,686,244	$85,396,762	$421,083,006	$998
Costs								
Av/Resident			$950.78	$985.14	$323,027,151	$80,962,166	$403,989,317	
Av/Job			$126.83	$149.74	$16,239,738	$4,987,484	$21,227,222	
Subtotal Above					$339,266,889	$85,949,650	$425,216,539	
Roads (per Acre)		30,563		$133.07		$4,067,073	$4,067,073	
Total					$339,266,889	$90,016,723	$429,283,612	$1,017
Net Revenue/(Cost)					($3,580,645)	($4,619,962)	($8,200,607)	($19)
Net as a % of Revenues					-1.07%	-5.41%	-1.95%	
Compact Density								
Revenues								
Av/Resident			$843.96	$880.63	$286,735,854	$72,373,150	$359,109,004	
Av/Job			$196.17	$220.62	$25,118,593	$7,348,433	$32,467,026	
Property Tax					$23,927,385	$5,932,421	$29,859,807	
Subtotal Above					$335,781,833	$85,654,005	$421,435,837	
Agriculture	29,178	14,014	$9.10	$9.10	($265,494)	($127,518)	($393,012)	
GEA (range/wetlands)	2,638	1,267	$0.87	$0.87	($2,298)	($1,104)	($3,402)	
Total	31,816	15,281			$335,514,040	$85,525,383	$421,039,423	$998
Costs								
Av/Resident			$950.78	$985.14	$323,027,151	$80,962,166	$403,989,317	
Av/Job			$126.83	$149.74	$16,239,738	$4,987,484	$21,227,222	
Subtotal Above					$339,266,889	$85,949,650	$425,216,539	
Roads		15,281		$133.07		$2,033,537	$2,033,537	
Total					$339,266,889	$87,983,186	$427,250,076	$1,013
Net Revenue/(Cost)					($3,752,849)	($2,457,803)	($6,210,652)	($15)
Net as a % of Revenues					-1.12%	-2.87%	-1.48%	

Existing City and County Demographic Information

	County Wide	-	Unincorp
Estimated Population	198,522	125,232	73,290
Estimated Jobs	75,916	47,806	28,111

TABLE 4A - DETAIL OF EXISTING COUNTY REVENUES

	Total	< - - - - - - - - - - Allocation	- - - - -	- - - - - - >
Taxes		Resident	Jobs	Unincorp only	Case Study
Property Taxes	$19,069,090				$19,069,090
Other Taxes					
Sales and Use Taxes	$3,088,839		$3,088,839		
Transportation Tax (non-transit)	$941,747	$750,433	$191,314		
Property Transfer	$288,343	$229,767	$58,576		
Transient Lodging	$287,036	$228,725	$58,311		
Subtotal Other Taxes	$4,605,965	$1,208,924	$3,397,041		
Total Taxes	**$23,675,055**	**$1,208,924**	**$3,397,041**		**$19,069,090**
Special Benefit Assessments					
Capital Outlay	$558,684	$445,188	$113,496		
Total Special Benefit Assmts	$558,684	$445,188	$113,496		
Licenses, Permits & Franchises					
Animal Licenses	$113,318	$113,318			
Business Licenses	$0	$0	$0		
Construction Permits	$735,500	$586,084	$149,416		
Road Privileges & Permits	$47,988	$38,239	$9,749		
Zoning Permits	$33,552	$26,736	$6,816		
Franchises	$977,576	$778,983	$198,593		
Other	$223,592	$178,170	$45,422		
Total Licenses & Permits	**$2,131,526**	**$1,721,530**	**$409,996**		
Fines, Forfeitures & Penalties					
Vehicle Code Fines	$238,066	$189,703	$48,363		
Superior Court Fines	$4,743	$3,779	$964		
Municipal Court	$1,300,147	$1,036,024	$264,123		
Forfeitures and Penalties	$284,309	$226,552	$57,757		
Total Fines, Forfeitures & Penalties	$1,827,265	$1,456,059	$371,206		
Revenue From Use of Money & Property					
Interest	$4,228,408	$3,369,414	$858,994		
Rents and Concessions	$1,096,657	$873,873	$222,784		
Total Revenues From Use of Money & Property	**$5,325,065**	**$4,243,287**	**$1,081,778**		
State & Federal & Other					
State					
Highway Uses Tax	$3,826,103	$3,826,103			
Motor Vehicle In-lieu Tax	$13,497,494	$8,066,625	$2,056,495	$3,374,374	
Highway Property Rentals	$1,545	$1,231	$314		
Other State In-Lieu Taxes	$9,506	$7,575	$1,931		
Public Assistance Administration	$14,574,715	$14,574,715			
Public Assistance Programs	$37,281,559	$37,281,559			
Aid for Mental Health	$6,541,611	$6,541,611			
Alcohol and Drug Abuse	$1,568,367	$1,568,367			
Other Aid for Health	$3,968,482	$3,968,482			
Aid for Agriculture	$610,326				$610,326
Aid for Construction	$167,967	$133,845	$34,122		
Aid for Corrections	$152,322	$152,322			
Aid for County Fairs	$117,000	$93,232	$23,768		
Aid for Disaster	$7,619	$6,071	$1,548		
Homeowners Property Tax Relief	$471,531				$471,531
Public Safety	$6,967,278	$5,551,887	$1,415,391		
SP 90 Mandated Costs	$61,985	$49,393	$12,592		
Trial Court Funding	$2,830,377	$2,830,377			
Other	$5,609,451	$4,426,701	$1,128,537		$54,213
Subtotal State	$98,265,238	$89,080,096	$4,674,699	$3,374,374	$1,136,070

TABLE 4A - CONT. COUNTY REVENUES, CONTINUED

	Total	< - - - - - - - - - - Allocation		- - - - -	- - - - - - >
		Resident	Jobs	Unincorp only	Case Study
Federal					
Public Assistance Administration	$9,076,865	$9,076,865			
Public Assistance Programs	$37,873,238	$37,873,238			
Aid for Construction	$857,702	$683,461	$174,241		
In-Lieu Taxes	$118,933	$94,772	$24,161		
Other	$7,406,780	$5,828,250	$1,485,846		**$92,684**
Subtotal Federal	$55,333,518	$53,556,586	$1,684,248		**$92,684**
Other: In-Lieu Taxes	$0	$0	$0		
Other: Governmental Agencies	$54,670	$43,564	$11,106		
Total State, Federal and Other	**$153,653,426**	**$142,680,245**	**$6,370,053**	**$3,374,374**	**$1,228,754**
Charges for Current Services					
Assessments & Tax Collection Fees	$793,887	$632,610	$161,277		
Auditing and Accounting Fees	$11,236	$8,953	$2,283		
Communication Services	$176,597	$140,722	$35,875		
Election Services	$44,776	$44,776			
Legal Services	$66,971	$53,366	$13,605		
Planning and Engineering Services	$404,895	$322,641	$82,254		
Agricultural Services	$105,438				**$105,438**
Civil Process Services	$153,650	$122,436	$31,214		
Court Fees and Costs	$1,025,567	$817,225	$208,342		
Estate Fees	$60,248	$60,248			
Humane Services	$112,392	$112,392			
Law Enforcement Services	$99,347	$79,165	$20,182		
Recording Fees	$394,699	$314,517	$80,182		
Road and Street Services	$70,276	$56,000	$14,276		
Health Fees	$288,259	$288,259			
Mental Health Services	$793,867	$793,867			
California Children's Services	$4,988	$4,988			
Sanitation Services	$600,361	$478,399	$121,962		
Institutional Care and Services	$1,938,532	$1,938,532			
Library Services	$26,876	$21,416	$5,460		
Park and Recreation Fees	$193,430	$193,430			
Other	$4,689,886	$3,737,143	$952,743		
Total Charges for Current Services	**$12,056,178**	**$10,221,085**	**$1,729,655**		**$105,438**
Miscellaneous Revenue					
Miscellaneous	$3,238,055	$2,580,250	$657,805		
Total Miscellaneous Revenue	**$3,238,055**	**$2,580,250**	**$657,805**		
Other Financing Sources					
Sale of Fixed Assets	$106,194	$84,621	$21,573		
Proceeds From Sale of Bonds		$0	$0		
Other Long Term Debt Proceeds	$1,600,929	$1,275,703	$325,226		
Total Other Financing Sources	**$1,707,123**	**$1,360,324**	**$346,799**		
Grand Total Revenue Sources	**$204,172,377**	**$165,916,892**	**$14,477,829**	**$3,374,374**	**$20,403,282**
Total Transfers in	$2,042,721	$1,627,746	$414,975		
Total Revenue Sources and Transfers in	**$206,215,098**	**$167,544,638**	**$14,892,804**	**$3,374,374**	**$20,403,282**

Case Study Revenues - Total	$20,403,282
Property Tax Share	$19,540,621
Agriculture Share	$715,764
Wetlands Share	$146,897
Unincorporated Only - Total	$3,374,374
Resident Share	$2,687,243
Job Share	$687,131

Source: California State Controller: County Annual Report 1996-97

TABLE 4B - DETAIL OF EXISTING COUNTY COSTS

	Total	< - - - - - - - - - - - Allocation		- - - - -	- - - - - - >
General (Leg/Admin/Fin/Counsel etc.)		Resident	Jobs	Unincorp only	Case Study
Legislative and Administrative					
Board of Supervisors	$417,196	$332,443	$84,753		
Administrative Officer	$737,518	$587,692	$149,826		
Other	$868	$692	$176		
Subtotal Legislative & Admin.	$1,155,582	$920,827	$234,755	$0	$0
Finance					
Treasurer-Tax Collector	$1,968,625	$1,568,702	$399,923		
Assessor	$1,509,109	$1,202,536	$306,573		
Purchasing Agent	$439,948	$350,573	$89,375		
Other	$549,796	$438,106	$111,690		
Subtotal Finance	$4,467,478	$3,559,917	$907,561	$0	$0
Counsel					
County Counsel	$587,887	$468,459	$119,428		
'District Attorney	$94,300	$75,143	$19,157		
Other		$0	$0		
Subtotal Counsel	$682,187	$543,602	$138,585	$0	$0
Personnel	$648,040	$516,392	$131,648		
Elections	$355,921	$355,921			
Communications	$157,599	$125,583	$32,016		
Property Management	$1,382,906	$1,101,971	$280,935		
Jails	$3,751	$2,989	$762		
Courts	$89,163	$71,050	$18,113		
Other	$455,793	$363,199	$92,594		
Plant Acquisition	$548,707	$437,238	$111,469	$0	$0
Promotion	$1,304,375	$1,039,393	$264,982		
Other General	$2,035,531	$355,022	$90,509		$1,590,000
Total General	**$12,738,326**	**$8,955,867**	**$2,192,459**	**$0**	**$1,590,000**
Public Protection					
Judicial					
Court Appointed Counsel	$1,480,593	$1,480,593			
Other	$16,223,250	$12,927,524	$3,295,726		
Subtotal Judicial	$17,703,843	$14,408,117	$3,295,726		$0
Police Protection	$6,994,008	$2,519,648	$642,356	$3,162,004	$670,000
Detention and Correction					
Adult Detention	$8,651,972	$8,651,972			
Juvenile Detention	$1,221,580	$1,221,580			
Probation	$2,242,540	$2,242,540			
Subtotal Detention and Correction	$12,116,092	$12,116,092	$0		
Fire Protection	$6,700,544	$5,339,340	$1,361,204		
Flood Control - Soil & Water Conservation	$130,346	$103,866	$26,480		
Protective Inspection					
Agricultural Commissioner	$1,341,149				$1,341,149
Building Inspector	$466,648	$371,849	$94,799		
Sealer of Weights and Measures	$252,518	$201,219	$51,299		
Subtotal Protective Inspection	$2,060,315	$573,069	$146,097		$1,341,149
Other Protection					
LAFCo	$14,911	$11,882	$3,029		
Recorder	$348,181	$277,449	$70,732		
Coroner	$320,797	$320,797			
Emergency Services	$0	$0	$0		
Planning and Zoning	$774,693	$774,693			
Pound	$519,410	$519,410			
Other	$1,295,696	$1,032,478	$263,218		
Subtotal Other Protection	$3,273,688	$2,936,708	$336,980		
Total Public Protection	**$48,978,836**	**$37,996,840**	**$5,808,843**	**$3,162,004**	**$2,011,149**

TABLE 4B - CONT. COUNTY COSTS

	Total	< - - - - - - - - - - Allocation		- - - - -	- - - - - - >
		Resident	Jobs	Unincorp only	Case Study
Public Ways and Facilities					
Roads	$7,253,886	$2,890,136	$736,807		$3,626,943
Total Public Ways and Facilities	$7,253,886	$2,890,136	$736,807	$0	$3,626,943
Health					
Public Health	$14,581,745	$14,581,745			
Medical Care	$2,300,778	$2,300,778			
Mental Health	$8,943,321	$8,943,321			
Drug & Alcohol Abuse	$1,592,598	$1,592,598			
Total Health	**$27,418,442**	**$27,418,442**	$0	$0	$0
Public Assistance (Welfare/Soc/Relief etc.)					
Welfare					
Administration	$19,056,093	$19,056,093			
Aid Programs-Cash	$72,458,431	$72,458,431			
Subtotal Welfare	$91,514,524	$91,514,524	$0	$0	$0
Social Services					
Administration & Programs	$7,700,355	$7,700,355			
Other	$9,142	$9,142			
Subtotal Social Services	$7,709,497	$7,709,497	$0	$0	$0
General Relief					
Aid to Indigents	$451,217	$451,217			
Subtotal General Relief	$451,217	$451,217	$0	$0	$0
Care of Court Wards					
Veterans' Services	$47,512	$47,512			
J.T.P.A.	$5,688,915	$5,688,915			
Other	$827,835	$827,835			
Subtotal Other Public Assistance	$6,516,750	$6,516,750	$0	$0	$0
Total Public Assistance	**$106,239,500**	**$106,239,500**	$0	$0	$0
Education					
Library Services	$575,914	$575,914			
Agricultural Education	$121,338				$121,338
Total Education	**$697,252**	**$575,914**	**$0**	**$0**	**$121,338**
Recreation/Cultural Services					
Recreation Facilities	$1,178,959	$1,178,959			
Cultural Services	$1,902	$1,902			
Total Recreation & Culture	**$1,180,861**	**$1,180,861**	$0	$0	$0
Debt Service					
Retirement/ Long Term Debt	**$2,496,638**	**$1,989,450**	**$507,188**		
Interest of Long Term Debt	$1,578,362	$1,257,720	$320,642		
Interest of Short Term Notes & Warrants	$308,126	$245,531	$62,595		
Total Debt Service	$4,383,126	$3,492,701	$890,425	$0	$0
Total Financing Uses	**$208,890,229**	**$188,750,260**	**$9,628,535**	**$3,162,004**	**$7,349,430**
Total Transfers Out	$0	$0	$0		
Total Fin. Uses and Transfers Out	**$208,890,229**	**$188,750,260**	**$9,628,535**	**$3,162,004**	**$7,349,430**

Case Study Cost - Total	$7,349,430
Agriculture Share	$3,562,487
Wetlands Share	$160,000
Roads Share (acre related)	$3,626,943
Unincorporated Only - Total	$3,162,004
Resident Share	$2,518,118
Job Share	$643,886

Note: Total road costs are divided 50:50 to county-wide system and the case study portion allocated to developed areas in the unincorporated area. The per acre share is based on unincorp. developed areas (27,195) from Table 1.

TABLE 4C - COUNTY AVERAGE REVENUES & COSTS

Existing Average Revenues & Costs	County-wide	Unincorp Area	Total
Total Resident Revenues	$167,544,638	$2,687,243	$170,231,881
Total Job Revenues	$14,892,804	$687,131	$15,579,935
Total Resident Costs	$188,750,260	$2,518,118	$191,268,379
Total Job Costs	$9,628,535	$643,886	$10,272,420
Base Resident & Job Factors - 1996			
Resident Count	198,522	73,290	
Job Count	75,916	28,111	
Revenues/Resident	$843.96	$36.67	$880.63
Revenues/Job	$196.17	$24.44	$220.62
Costs/Resident	$950.78	$34.36	$985.14
Costs/Job	$126.83	$22.91	$149.74
New Resident & Job Impact - 2040			
Resident Count	421,934	82,184	
Job Count	161,351	33,308	
Average Revenues	County-wide	Unincorp Added	Total
New Residents	$356,095,664	$3,013,340	$359,109,004
New Jobs	$31,652,837	$814,189	$32,467,026
Total Revenue	$387,748,501	$3,827,529	$391,576,031
Average Costs			
New Residents	$401,165,624	$2,823,693	$403,989,317
New Jobs	$20,464,275	$762,948	$21,227,222
Total Cost	$421,629,899	$3,586,640	$425,216,539

TABLE 4D - COUNTY PROPERTY TAX: 2040 GROWTH

	City Infill	City Annex	Unincorp	Total
County Property Tax (1)				
Per Resid	$53.75	$65.58	$65.58	
Per Job	$13.31	$16.31	$16.31	
Low Density				
New Residents		339,751	82,184	421,934
New Jobs		128,043	33,308	161,351
New Property Taxes		**$24,367,382**	**$5,932,421**	**$30,299,803**
Compact Density (2)				
New Residents	33,975	305,775	82,184	421,934
New Jobs	12,804	115,238	33,308	161,351
New Property Taxes	**$1,996,742**	**$21,930,644**	**$5,932,421**	**$29,859,807**

(1) County property tax estimates are from Table 3C.
Unincorporated area new devt. revenue at cities annexation area average.
(2) Compact assumes 10% infill and 90% city annexations for city growth

TABLE 4E- AGRICULTURAL FISCAL IMPACT

		Existing	< 2040 Reduced Acres, Rev/Cost >	
		County Wide	Low Density	Compact
Agricultural Acreage (1)		1,162,008	86,385	43,192
		100.0%	7.4%	3.7%
Revenues				
Property Assessed Value ($000'96)	$3,826,068		$348,420	$174,210
Percent share of AV (2)	100.0%		9.1%	4.6%
Property Tax Rev @ 1%	$38,260,680		$3,484,199	$1,742,099
County Share @ 30%		$11,478,204	$1,045,260	$522,630
Other County Revenue				
Aid for Agriculture	$610,326		$55,579	$27,790
Agricultural Services	$105,438	$715,764	$9,602	$4,801
Total Ag Revenue		**$12,193,968**	**$1,110,440**	**$555,220**
Revenue per Acre		$10.49	$12.85	$12.85
Costs				
Agricultural Commissioner	$1,341,149		$122,131	$61,066
Agricultural Education (Coop Ext)	$121,338		$11,050	$5,525
County Administrative Cost (3)	$1,500,000		$136,597	$68,299
Sheriff Patrol (3)	$600,000		$54,639	$27,319
Total Ag Costs		**$3,562,487**	**$324,417**	**$162,208**
Cost per Acre		$3.07	$3.76	$3.76
Net Revenue/Cost		**$8,631,481**	**$786,023**	**$393,012**
Net Per Acre		$7.43	$9.10	$9.10
Percent Reduction of Net Revenue			9.1%	4.6%

(1) Ag acreage impact is based on total urbanized area minus estimated wetlands impact area.

(2) Percent share of A/V has been applied to all other ag revenues & costs

(3) Strong Associates - based on interviews.

TABLE 4F - WETLANDS AREA FISCAL IMPACT

			< 2040 Reduced Acres, Rev/Cost >	
		Existing	Low Density	Compact
GEA Wetlands Acreage		128,893	7,810	3,905
		100.0%	6.1%	3.0%
Revenues				
Property Assessed Value ($000'96) (1)	$66,000		$3,999	$2,000
Property Tax Revenue @ 1%	$660,000		$39,992	$19,996
County Share @ 19%		$125,400	$7,599	$3,799
Other County Revenue				
State - Fish & Game	$54,213			
Federal Wetlands	$92,684	$146,897	$8,901	$4,451
Total Wetlands Revenue		**$272,297**	**$16,500**	**$8,250**
Revenue per Acre		$2.11	$2.11	$2.11
Costs				
County Administrative Cost (2)	$90,000			
Sheriff Patrol (2)	$70,000	$160,000	$9,695	$4,848
Cost per Acre		$1.24	$1.24	$1.24
Net Revenue/Cost		**$112,297**	**$6,805**	**$3,402**
Per Acre		$0.87	$0.87	$0.87
Percent Reduction of Net Revenue			6.1%	3.0%

(1) GEA acreage impact estimated based on Los Banos NE for city; proportionate share for unincorp area.

	Private acres	Per Ac AV	Total AV
Assessed Value Calculation	110,000	$600.00	$66,000,000

(2) Strong Associates - based on interviews.

TABLE 5 - GRASSLANDS ECOLOGICAL AREA (GEA) IMPACTS

		< - - - - - - - - - - - Lost to Urbanization: 2040 - - - - - - - - - - >					
	Existing	2040: Low Density			2040: Compact Density		
		City	Unincorp (1)	Total	City	Unincorp (1)	Total
Focus Area Acreage by Land Use							
Urban development	771						
Agriculture	49,799	1,319	634	1,953	660	317	976
Range & Wetlands	38,602	5,276	2,534	7,810	2,638	1,267	3,905
Wetlands only	90,072						
Other	220						
Total	179,464	6,595	3,168	9,763	3,298	1,584	4,881
Agricultural Economic Impact							
Acres (Ag + Rangeland)	88,402	6,595	3,168	9,763	3,298	1,584	4,881
Direct Sales	$86,273,530	$5,631,830	$2,704,987	$8,336,817	$2,815,915	$1,352,493	$4,168,409
Total Sales	$119,738,516	$7,978,748	$3,832,219	**$11,810,966**	$3,989,374	$1,916,109	**$5,905,483**
Direct Jobs	1,257	123	59	182	61	29	91
Total Jobs	2,487	164	79	243	82	39	122
Wetlands Economic Impact							
Acres (Wetlands + Range)	128,674	5,276	2,534	7,810	2,638	1,267	3,905
Direct Sales	$27,747,283	$1,137,739	$546,460	$1,684,199	$568,869	$273,230	$842,099
Total Sales	$40,866,536	$1,675,676	$804,833	**$2,480,508**	$837,838	$402,416	**$1,240,254**
Direct Jobs	609	45	22	67	23	11	34
Total Jobs	798	60	29	88	30	14	44
Combined Economic Impact							
Direct Sales	$114,020,813	$6,769,569	$3,251,447	$10,021,016	$3,384,785	$1,625,723	$5,010,508
Total Sales	$160,605,052	$9,654,423	$4,637,052	**$14,291,475**	$4,827,212	$2,318,526	**$7,145,737**
Direct Jobs	1,865	168	81	249	84	40	124
Total Jobs	3,286	224	107	331	112	54	166

(1) Based on county-wide ratio of city-to-unincorporated are new growth (from Table 1).

TABLE 5A - GEA & BUFFER AREA LAND USE:1990

	Entire County	% share	Focus Area	% share	2-Mi Buffer around Focus Area	% share	City portion of Buffer Area	% share	Unincorp portion of Buffer Area	% share
Urban										
Residential	15,826	1.2%	24	0.0%	1,154	0.7%	1,069	3.2%	86	0.1%
Commercial/Industrial	3,679	0.3%	39	0.0%	463	0.3%	315	0.9%	149	0.1%
Right of Ways	6,335	0.5%	657	0.4%	436	0.3%	40	0.1%	396	0.3%
Public land	3,956	0.3%		0.0%	71	0.0%	64	0.2%	8	0.0%
Parks/sports/openspace	1,378	0.1%	51	0.0%	63	0.0%	63	0.2%		0.0%
Subtotal Urban	**31,174**	**2.5%**	**771**	**0.4%**	**2,187**	**1.4%**	**1,550**	**4.7%**	**638**	**0.5%**
Agriculture										
Dairy and Livestock	5,684	0.4%	318	0.2%	1,141	0.7%	201	0.6%	940	0.7%
Grain, Seed and Truck and Row Crops	442,074	34.9%	47,585	26.5%	123,860	77.2%	25,650	77.2%	98,210	77.3%
Improved Pasture / Grazing Operation	12,195	1.0%	352	0.2%	1,817	1.1%	467	1.4%	1,350	1.1%
Orchards, Vineyards and Tree Farms	137,620	10.9%	1,257	0.7%	7,714	4.8%	617	1.9%	7,097	5.6%
Other Agricultural Land Uses	1,247	0.1%	35	0.0%	255	0.2%	45	0.1%	210	0.2%
Poultry	2,680	0.2%	45	0.0%	729	0.5%	51	0.2%	678	0.5%
Rice Fields	10,987	0.9%	154	0.1%	3,539	2.2%	1,740	5.2%	1,799	1.4%
Fish Farms	852	0.1%	53	0.0%	605	0.4%	189	0.6%	416	0.3%
Subtotal Ag	**613,339**	**48.4%**	**49,799**	**27.7%**	**139,659**	**87.1%**	**28,960**	**87.2%**	**110,699**	**87.1%**
Range Land/Wetlands	**603,162**	**47.6%**	**38,602**	**21.5%**	**17,961**	**11.2%**	**2,513**	**7.6%**	**15,448**	**12.2%**
Wetlands - only (1)			90,072	50.2%						
Other										
Extractive	1,417	0.1%		0.0%		0.0%		0.0%		0.0%
Land In Transition	1,109	0.1%	13	0.0%	345	0.2%	207	0.6%	138	0.1%
Open Water	16,411	1.3%	207	0.1%	183	0.1%		0.0%	183	0.1%
Unknown	35	0.0%	0	0.0%	23	0.0%		0.0%	23	0.0%
Subtotal Other	**18,972**	**1.5%**	**220**	**0.1%**	**551**	**0.3%**	**207**	**0.6%**	**344**	**0.3%**
Total	**1,266,648**	100.0%	**179,464**	100.0%	**160,359**	100.0%	**33,230**	100.0%	**127,129**	100.0%
Percent share of County acres	100.0%		14.2%		12.7%		2.6%		10.0%	

Source: LU90.shp. This GIS file was developed in 1990 and is not consistent with Ag Commissioner acreage or with urban acreage uses persented elsewhere

(1) Based on interview with GWD

TABLE 5B - GEA - AG SALES & JOBS: 1998

	Acres	Av. Sales/ac	Direct Sales	Total Sales (1)	Direct Jobs (1)	Total Jobs (1)
Agricultural Uses						
Dairy & Livestock	318	$92,706	$29,517,513	$42,015,051	171	577
Grain, Seed, Truck & Row	47,585	$989	$47,049,367	$63,849,990	974	1,629
Pasture, Grazing	352	$192	$67,416	$116,954	1	3
Orchard, Vine & Tree	1,257	$1,906	$2,395,826	$3,571,839	26	78
Other Agricultural Uses	35	$1,491	$52,782	$88,710	2	4
Poultry	45	$87,613	$3,898,787	$5,543,249	14	75
Rice	154	$2,000	$308,800	$419,068	6	11
Fish Farms	53	$19,867	$1,052,933	$1,382,657	12	23
Subtotal	49,799	$1,694	$84,343,424	$116,987,517	1,207	2,400
Range Land/Wetlands (2)	38,602	$50	$1,930,106	$2,750,999	49	87
Total	**88,402**	$976	$86,273,530	**$119,738,516**	1,257	**2,487**

(1) Input Output Multipliers per Coop Extension, George Goldman, as follows:

	Direct Sales	Total Sales	Direct Jobs	Total Jobs
Dairy & Livestock	1.0000	1.4234	5.7944	13.7293
Grain, Seed, Truck & Row	1.0000	1.3571	20.7085	25.5081
Pasture, Grazing	1.0000	1.7348	13.9602	25.1706
Orchard, Vine & Tree	1.0000	1.4909	11.0463	21.9229
Other Agricultural Uses	1.0000	1.6807	29.5999	48.7288
Poultry	1.0000	1.4218	3.6544	13.5536
Rice	1.0000	1.3571	20.7085	25.5081
Fish Farms	1.0000	1.3131	11.8341	16.7378
Undeveloped & Range	1.0000	1.4253	25.5480	31.7132

(2) Based on interviews with GWD Staff

TABLE 5C - WETLANDS SALES & JOBS: 1998 - COUNTY & GEA

		GEA/Co Ratio	Dir/Tot Ratio	Direct Sales	Total Sales (1)	irect Jobs (1)	Total Jobs (1)
COUNTY-WIDE							
Land Maintenance Costs (2)		1.3112	1.4421	$10,998,911	$15,861,299	184	265
Other Land Costs		1.0000	1.5544	$7,965,832	$12,381,739	111	168
Recreation Expenditures (3)		1.5371	1.4384	$17,512,500	$25,190,435	458	659
Total				**$36,477,243**	**$53,433,473**	753	**1,092**
GEA ONLY		ST.& Fed	GWD (4)				
Land Maintenance Costs (2)		$8,297,383	$91,168	**$8,388,551**	**$12,096,954**	142	**202**
Other Land Costs (3)							
Structures			$198,192	$198,192	$274,267	2	3
Land Acquisition (Banking) (5)		$862,800		$862,800	$1,261,388	12	18
Land Acquisition (Income) (5)		$1,294,200		$1,294,200	$2,032,922	18	27
Wages/Other			$1,210,640	$1,210,640	$1,901,667	17	26
Landowners (110,000ac/$40per)				$4,400,000	$6,911,496	62	93
Subtotal Other Land Costs		$2,157,000	$1,408,832	**$7,965,832**	**$12,381,739**	111	**168**
Recreation Expenditures (3)	Hunting	Fishing	Non-Consum				
Transportation	$328,831	$333,081	$523,091	$1,185,004	$1,732,440	17	25
Equipment/Auxiliary	$1,400,654	$582,842	$1,192,671	$3,176,167	$4,494,887	109	128
Food	$390,937	$487,443	$735,169	$1,613,549	$2,433,887	51	62
Retail	$322,260	$1,863,267	$2,416,297	$4,601,825	$6,444,303	163	190
Services	$400,618	$125,566	$290,171	$816,355	$1,282,326	16	24
Subtotal Recreation	$2,843,300	$3,392,200	$5,157,400	**$11,392,900**	**$16,387,843**	356	**429**
Combined Total				**$27,747,283**	**$40,866,536**	609	**798**

TABLE 5C FOOTNOTES - WETLANDS SALES & JOBS 1998 - COUNTY & GEA

(1) Input Output Multipliers per Coop Extension, George Goldman, as follows:	Direct Sales	Sales Multiplier	Direct Jobs	Total Jobs
New Industrial and Commercial Buildings	1.0000	1.3838	10.2919	16.5350
Maintenance Repair, other Facilities	1.0000	1.4421	16.9025	24.0615
Transportation Services	1.0000	1.4620	14.0883	20.6996
General Merchandise Store	1.0000	1.4152	34.2205	40.3439
Food	1.0000	1.5084	31.7355	38.3278
Special Retail	1.0000	1.4004	35.3375	41.3769
Banking	1.0000	1.2920	6.6801	10.9123
Services	1.0000	1.4703	19.9968	29.2110
Personal Income	1.0000	1.5708	14.0563	21.2369

(2) Land Maintenance - Direct Costs per Thomas Reid Associates

	County Wide	% in GEA	GEA
Grasslands Water Dist.	$91,168	100.0%	$91,168
Other State & Federal			
NRCS	$140,025	100.0%	$140,025
Wildlife Conservation Board	$1,271,547	100.0%	$1,271,547
WCB	$84,800	100.0%	$84,800
California Fish & Game	$3,000,000	67.0%	$2,010,000
California State Parks	$1,770,885	8.5%	$150,525
Ducks Unlimited	$1,151,915	100.0%	$1,151,915
USFWS Partners for Wildlife	$279,143	100.0%	$279,143
USFWS San Luis NWR Complex	$3,177,562	100.0%	$3,177,562
California Waterfowl Assn.	$31,866	100.0%	$31,866
Subtotal Other St /Fed.	$10,907,743		$8,297,383
Total Maintenance	**$10,998,911**		**$8,388,551**

(3) Recreation & other land costs are from Thomas Reid & Assoc.

(4) GWD (Grassland Water Dist.) Annual Budget - $1,500,000 ($91,168 is Maintenance;$1,408,832 is other land costs)

(5) Land Acquisition total of $2,157,000 is allocated to banking (40%) and personal income (60%)

TABLE 5C - WETLANDS SALES & JOBS: 1998 - COUNTY & GEA

		GEA/Co Ratio	Dir/Tot Ratio	Direct Sales	Total Sales (1)	irect Jobs (1)	Total Jobs (1)
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Total				**$36,477,243**	**$53,433,473**	753	**1,092**
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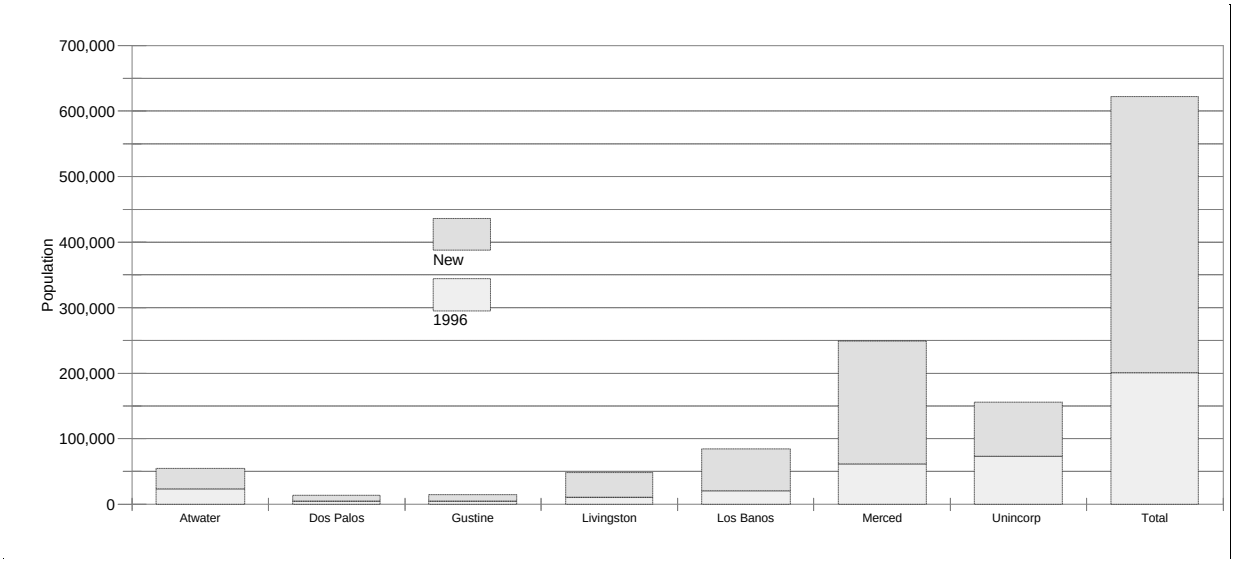
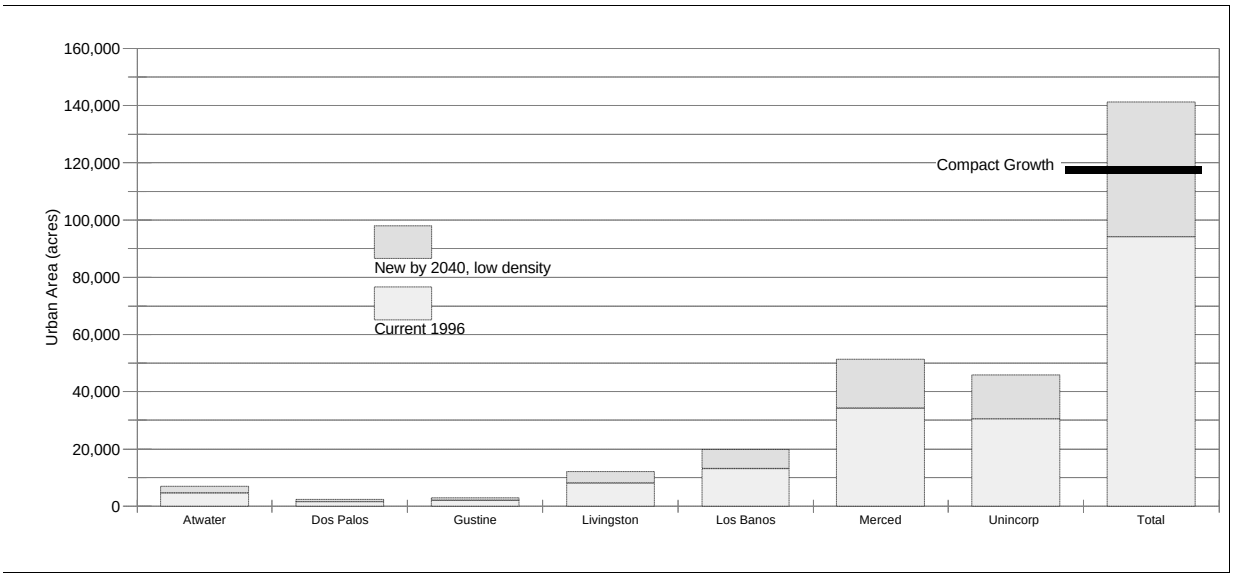
Equipment/Auxiliary	$1,400,654	$582,842	$1,192,671	$3,176,167	$4,494,887	109	128
Food	$390,937	$487,443	$735,169	$1,613,549	$2,433,887	51	62
Retail	$322,260	$1,863,267	$2,416,297	$4,601,825	$6,444,303	163	190
Services	$400,618	$125,566	$290,171	$816,355	$1,282,326	16	24
Subtotal Recreation	$2,843,300	$3,392,200	$5,157,400	**$11,392,900**	**$16,387,843**	356	**429**
Combined Total				**$27,747,283**	**$40,866,536**	609	**798**

Figure 1.1 - Population Growth in Merced County: 1996 to 2040



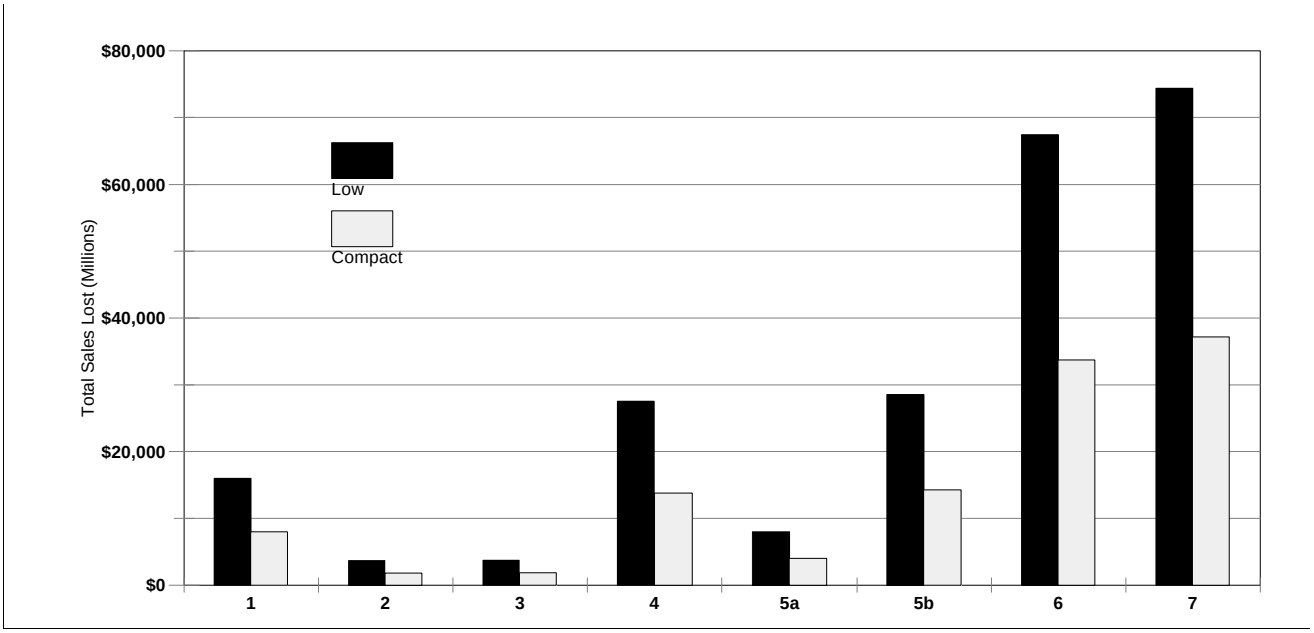
	1	2	3	4	5	6	7	
Population	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	Unincorp	Total
1996	23,672	4,430	4,216	10,508	20,694	61,712	73,290	198,522
New	31,046	8,965	10,683	37,963	63,567	187,526	82,184	421,934
2040	54,718	13,395	14,899	48,471	84,261	249,238	155,474	620,456
% Added	131%	202%	253%	361%	307%	304%	112%	213%

Figure 1.2 - Acres Urbanized: 1996 to 2040, Low density ("sprawl") growth



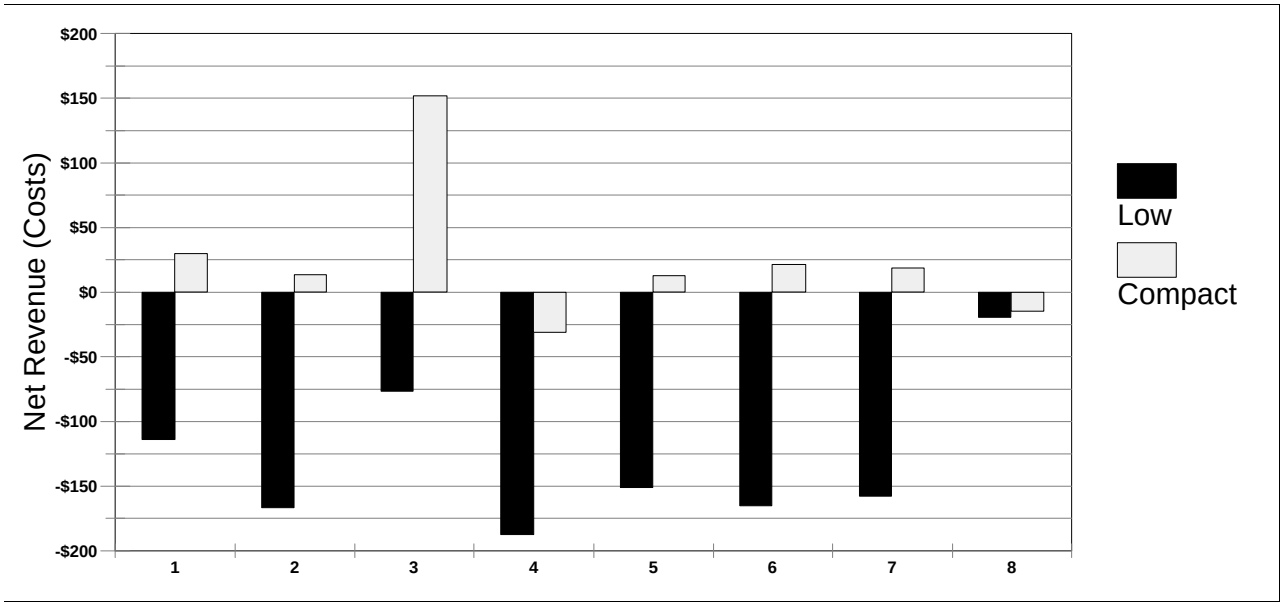
	1	2	3	4	5	6	7	
Acres	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	Unincorp	Total
Current 1996	3,540	780	771	2,222	4,294	11,267	27,255	50,130
New by 2040, low density	4,643	1,579	1,953	8,029	13,190	34,239	30,563	94,195
New by 2040, Compact	2,321	790	976	4,014	6,595	17,119	15,281	47,097

Figure 2 - Ag Sales Lost, Low Vs. Compact Density: 2040



	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5a Los Banos NE (1)	5b Los Banos SW (1)	6 Merced	7 Unincorp	Total
Annual Sales Lost									
Low Density ($000'97)									
Direct	$10,887	$2,447	$2,544	$18,710	$5,632	$19,291	$46,136	$50,743	$156,390
Indirect	$5,109	$1,236	$1,175	$8,790	$2,347	$9,261	$21,297	$23,639	$72,855
Total	$15,997	$3,684	$3,719	$27,500	$7,979	$28,553	$67,432	$74,382	$229,245
Compact Density ($000'97)									
Direct	$5,444	$1,224	$1,272	$9,355	$2,816	$9,646	$23,068	$25,371	$78,195
Indirect	$2,555	$618	$588	$4,395	$1,173	$4,631	$10,648	$11,819	$36,427
Total	$7,998	$1,842	$1,860	$13,750	$3,989	$14,276	$33,716	$37,191	$114,623
Total Value/Acre	$3,446	$2,333	$1,905	$3,425	$1,210	$4,329	$1,969	$2,434	$2,434

Figure 3 - Net Fiscal Balance per Capita, Low Vs. Compact: 2040



	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	7 Total Cities	8 County Gov.
New Population	31,046	8,965	10,683	37,963	63,567	187,526	339,751	339,751
Low Density ($000'97)								
Revenues	$22,605	$4,869	$8,406	$20,335	$37,555	$135,167	228,937	$421,083
Costs	$26,145	$6,362	$9,227	$27,450	$47,170	$166,214	282,568	-$429,284
Net Annual	-$3,540	-$1,493	-$820	-$7,115	-$9,615	-$31,047	-53,631	-$8,201
Per Capita Net	-$114	-$167	-$77	-$187	-$151	-$166	-$158	-$19
Compact ($000 '97)								
Revenues	$22,662	$4,882	$8,436	$20,442	$37,717	$135,753	229,892	$421,039
Costs	$21,737	$4,760	$6,814	$21,621	$36,912	$131,730	223,574	-$427,250
Net Annual	$925	$122	$1,622	-$1,180	$805	$4,024	6,318	-$6,211
Per Capita Net	$30	$14	$152	-$31	$13	$21	$19	-$15

APPENDIX 3 — Strategies to Encourage Compact Growth

1. Commercial, Industrial, Institutional[1]

- Policies and standards that encourage construction of multi-story buildings in commercial centers
- Minimize land devoted to parking (multi-story structures)
- Shared use of parking facilities with different peak demand hours
- Enhancement of pedestrian access to parking and employment
- Financial incentives such as tax exempt bond financing or density bonuses to encourage infill, redevelopment and re-use of prior development sites (including blighted sites)
- Promote infill development and discourage expansion of growth into open lands
- Concentrate growth in areas with existing infrastructure in preference to building new infrastructure
- Change zoning, if necessary to permit uses that serve employees of industrial and office developments, such as restaurants and other retail shops (to reduce automobile trips for these services)

2. Residential Development

- Encourage nodes of higher density housing (village centers) served by a full range of urban services (within walking or short transit distance from residences)
- Provide incentives for commercial development that serves residences in village centers such as reduced parking requirements and increased allowable floor area ratios.
- Transit and pedestrian-oriented guidelines for specific plans
- Overlay zones that facilitate compact growth
- Revise local street standards to be narrower and more pedestrian-friendly
- Exclude motor vehicles from village centers
- Promote infill development and discourage expansion of growth into open lands
- Re-designate vacant land for higher density or mixed use where appropriate
- Create housing near employment centers to allow for non-vehicular "commuting" or realistic public transit
- Design housing to be affordable to household incomes of the population working in local employment centers

3. Downtown Redevelopment

- Create mixed-use zone districts that encourage residential, commercial and office use on the same site
- Promote downtown or village centers to centralize activities
- Improve transportation and public transit access to downtown from all areas of a city
- Promote infill development and revitalization/redevelopment of run-down or non-functioning neighborhoods
- Create activity centers that give each area a sense of identity

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[1] Sources of Information: Growth Alternatives Alliance. A Landscape of Choice (1998). Association of Bay Area Governments. Jobs/Housing Balance for Traffic Mitigation. (1985). The Local Government Commission. Land Use Strategies for More Livable Places (1992). Center for Land Recycling. Land Recycling and the Creation of Sustainable Communities. (1998).