L 029 - Continued
Part 2

Comments of

Grassland Water District
Grassland Resource Conservation District
and
The Grassland Conservation, Education and Legal Defense Fund

on the

Draft Bay Area to Central Valley
High-Speed Train
Program Environmental Impact Report/
Environmental Impact Statement

SCH Number: 2005112051

VOLUME 2

APPENDICES

October 26, 2007

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BY:

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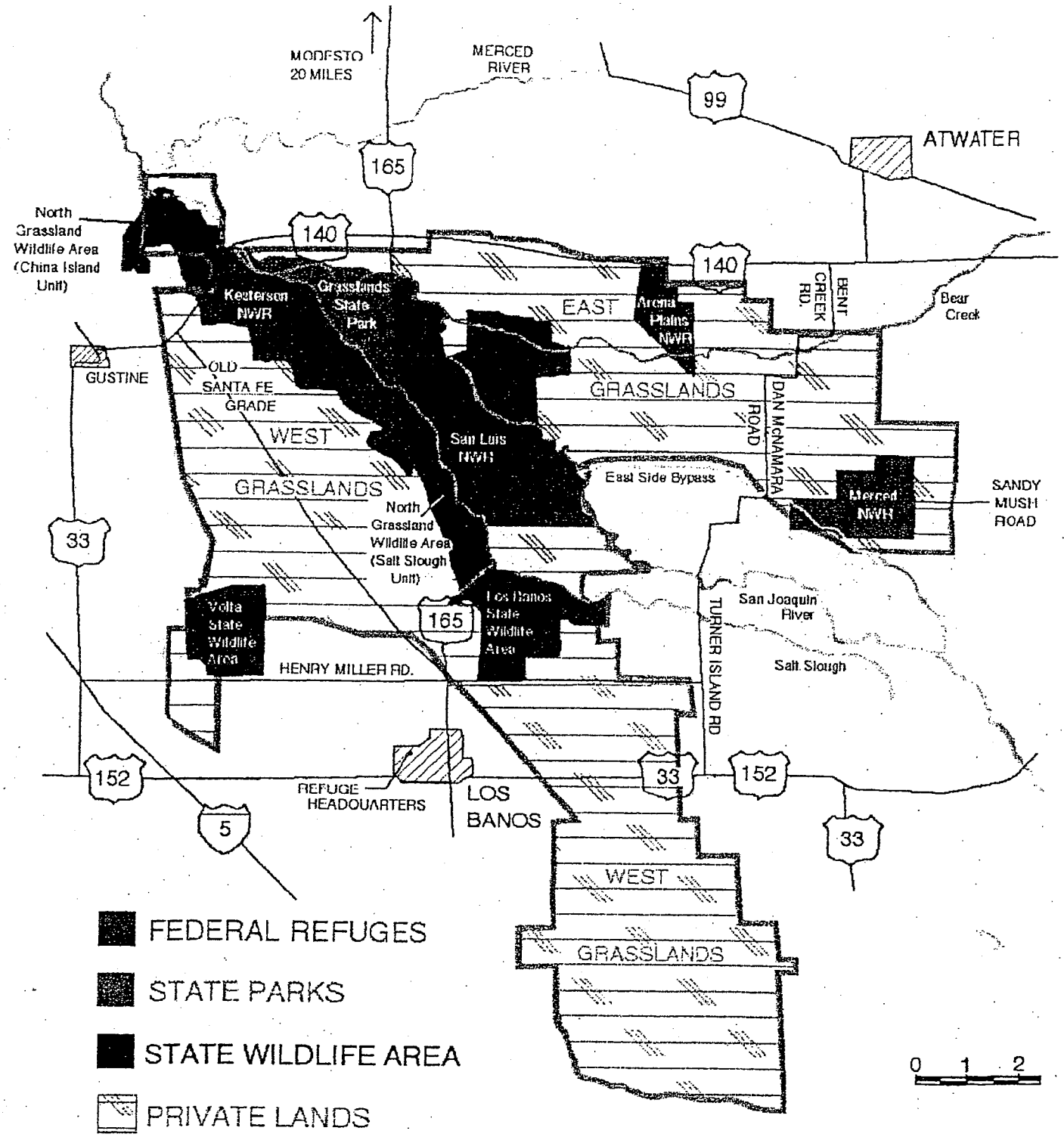
EXHIBIT 1

Map of Federal, State and Privately Owned Lands in GEA

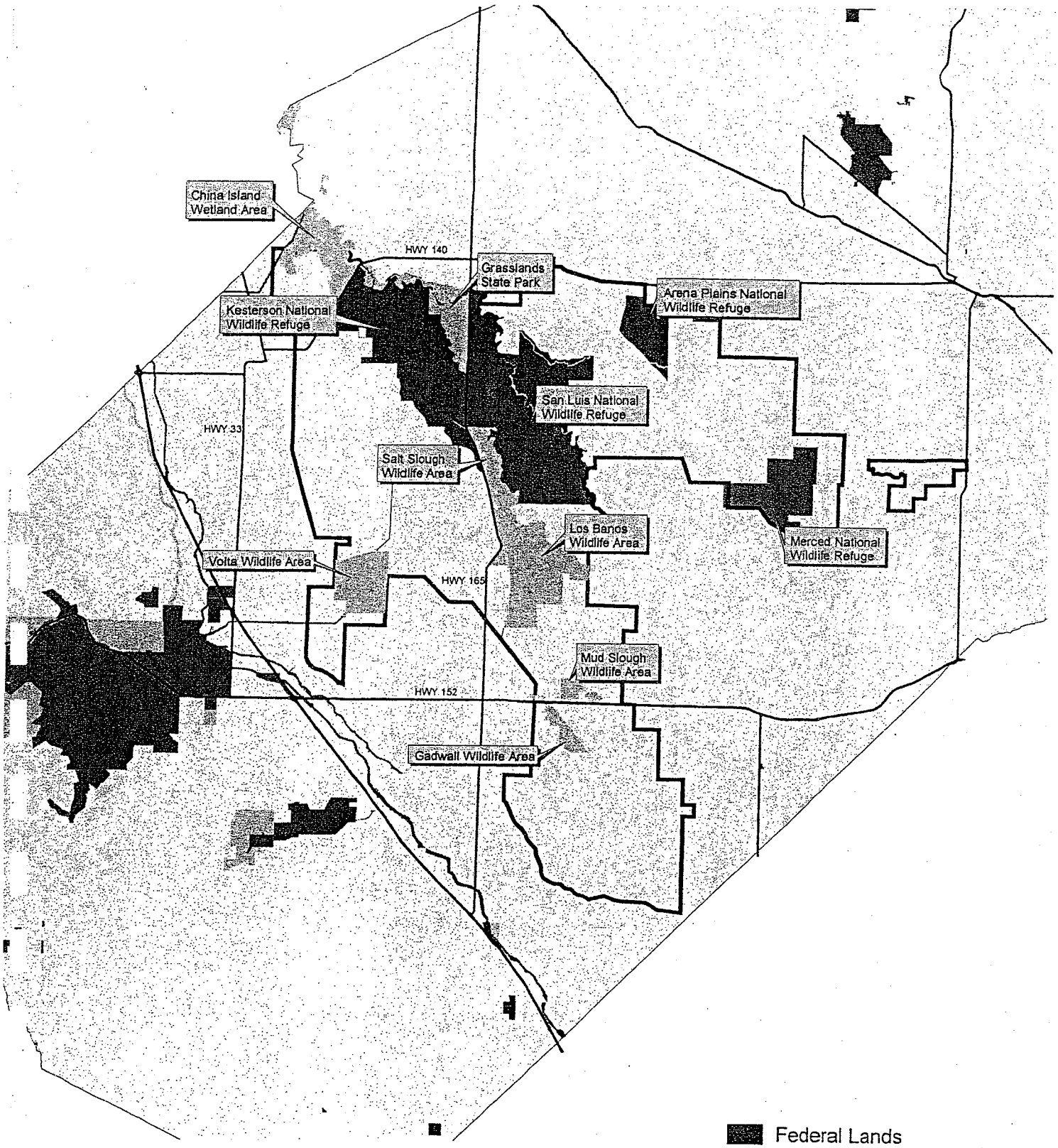


3. Federal, State and private owned lands in the Grasslands area.

EXHIBIT 2

Map of GEA and Public Lands

Figure 2
Grassland Ecological Area and Public Lands



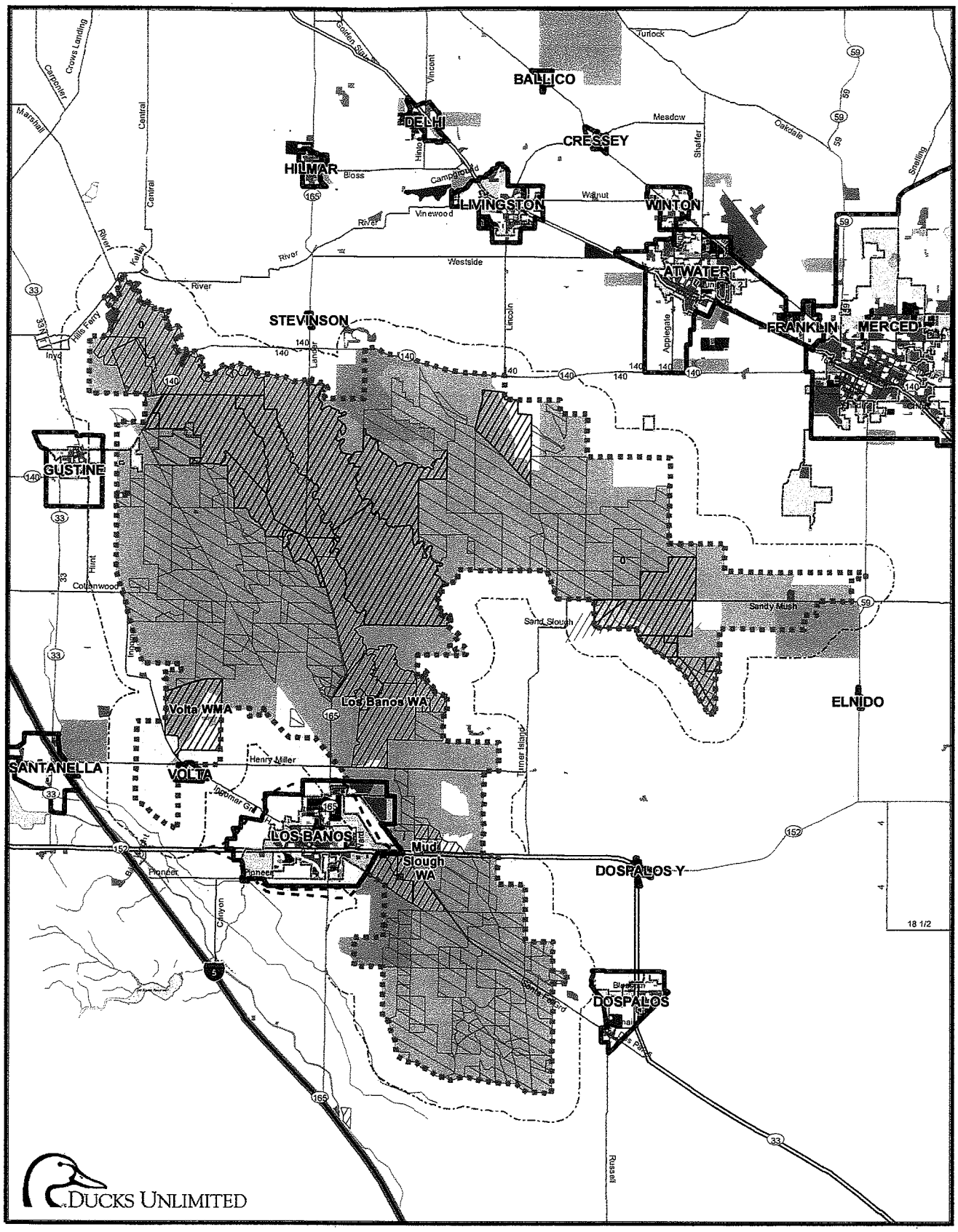
Federal Lands
State Lands
Grassland Ecological Area

N
0 1 2 3 4 5 Miles

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

EXHIBIT 3

Ducks Unlimited, Map of Grasslands Ecological Area Boundary, Federal and State Lands, and Federal and State Easements (2005)



The Grasslands Ecological Area & Surrounding Communities

Population Growth 1990-2000

- 0 - 10
- 11 - 50
- 51 - 100
- 101 - 200
- 201 - 764

- Sphere of Influence
- City Limit
- Urban or Built-up
- River, Creek or Canal
- Water body

Data Sources: U.S. Census, Merced CAG, Central Valley Joint Venture

Grassland Ecological Area

- Boundary
- 1 Mile Buffer

Protection Status

- Federal Lands
- State Ownership
- Easements

EXHIBIT 4

Dr. Karen Weissman Comments

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August 27, 2004
TRA File: LGWD

Mr. Thomas Enslow
Adams Broadwell Joseph & Cardozo
651 Gateway Boulevard, Suite 900
South San Francisco, CA 94080

RE: California High-Speed Train Program EIR/EIS

Dear Mr. Enslow:

I have reviewed the subject EIR/EIS on the proposed high speed rail project, specifically in regard to the biological impacts to the Grassland Ecological Area (GEA) and Grassland Water District (GWD) of Merced County. L029-82

I. Introduction - The Draft EIR/S Fails to Analyze Its Impact on the Grassland Ecological Area (GEA)

Draft EIR/S contains no mention of the unique resources of the GEA or GWD.

The Draft EIR/S fails to mention or analyze the project impact specifically on the Grassland Ecological Area (GEA). In its discussion of the environmental setting, the Draft EIR/S mentions in general terms the number of acres of wetland in the Merced County area and lists plant and animal species of concern based on the California Natural Diversity Data Base (CNDDB) that are within the pre-defined impact zone of 1/4 mile on either side of the track or a train station. L029-83

Importance of the GEA

The Draft EIR/S has vastly underestimated the project impacts in Merced County because it fails to recognize the special importance of the Grassland Ecological Area (GEA) and Grassland Water District (GWD). The Draft EIR/S does not even mention the existence of the GEA or GWD.

The GEA includes a total area of 179,474 acres, which encompasses two federal wildlife refuges, three state wildlife areas and privately owned wetlands, including duck clubs. The Grassland Water District supplies water to the 5 public refuges and 159 duck clubs in on 51,537 acres within the greater GEA area. This 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. L029-84

The GEA is of considerable importance because it preserves a variety of habitats important to the maintenance of biodiversity on a local, regional, national and international scale. It has been estimated that 30 percent of the Central Valley migratory population of waterfowl use this area for winter foraging. (U.S. Bureau of Reclamation, Final NEPA EA, Refuge Water Supply Long-Term Water Supply Agreements (January 2002).) The GEA is a major wintering ground for migratory waterfowl and shorebirds of the Pacific Flyway and the Western Hemisphere Shorebird Reserve Network has designated the GEA as one of only 22 international shorebird reserves in the world. (Fredrickson, Leigh H. and Laubhan, Murray K, Land Use Impacts and Habitat Preservation in the Grasslands of Western Merced County, CA (February 1995), p.3.) L029-84 cont'd

In addition to providing critical biological habitat, the Grassland wetlands provide substantial direct economic contributions to the local and regional economies. The GEA receives over 300,000 user visits per year for hunting, fishing and non-consumptive wildlife recreation. (Id. at p. 14). Recreational and other activities related to habitat values within the GEA contributes $41 million per year to the Merced County economy, and accounts for approximately 800 jobs. (Id. at p. 21.)

The GEA also includes a large and growing portfolio of federal, state and private conservation easements. (Grasslands Water District, Land Use and Economics Study: Grasslands Ecological Area (July 2001), pp. 11-12.) Through 1998, conservation easements had been acquired on over 64,000 acres at a total cost of over $28 million. (Id.)

The omission of the GEA as a major zone of biological concern is a major flaw in the Draft EIR/S since it results in the incomplete assessment and an underestimation of the direct and indirect impacts of the high-speed rail project on this key resource area. The entire assessment of biological impacts to the Merced County area in the EIR/S is limited to just the following paragraphs:

> "The southern route across the Pacheco Pass, which follows SR-152, would impact approximately 100,000 more linear ft (30,480 m) of jurisdictional waters than the northern tunnel option (Diablo Range direct). The HST segment using the northern tunnel under Henry Coe option would involve the fewest wetland impacts. (Page 3.15-22)"

L029-85

> "Segments that would be placed at grade (cut and fill) would require fencing the HST alignment for the safety of humans, as well as protection from train-wildlife collisions, and would have the potential to interfere with wildlife movement. Placement of overpasses, underpasses, and tunnels along these alignments could provide for movement of wide-ranging and migratory species. The proposed HST Alternative would potentially impact a relatively small percentage of wetlands compared to the Modal Alternative (from approximately 2.8% for the Bay Area to Merced segment with the Oakland to San Jose East plus tunnel under Henry Coe State Park. (P. 3-15-22)."

The foregoing is an extremely cursory and incomplete assessment of the project's potential effects on the sensitive biological resources of the GEA. A complete assessment must include <u>construction</u>, <u>operations</u>, and <u>induced growth</u> impacts on wildlife species, notably the

many species of resident and migratory waterfowl, as well as other sensitive mammalian wildlife such as the federally endangered San Joaquin kit fox, as well as badger, and tule elk. L029-85 cont'd

II. Construction impacts of the HST on the GEA must be addressed in the EIR/S (truck traffic, equipment storage and laydown areas, noise of pile-driving and other heavy equipment operation , disruption of water supply deliveries) L029-86

The Draft EIR/S needs to consider construction impacts on the wetlands complex including the impacts of truck and other vehicular traffic, equipment storage and laydown areas, blasting, and pile-driving, as well as temporary disruption of water supply deliveries.

Impacts of vehicular traffic include collisions with animals, noise and dust. The Draft EIR/S should consider the amount of time the project will be under construction within the GEA and estimate the likely number of animals that could be killed in collisions with construction vehicles. This is an impact that is largely unmitigatable. The impact is exacerbated because the construction vehicles must travel on roads in the wetlands that normally receive very little traffic of any kind. L029-87

Equipment storage and laydown areas may be located in sensitive habitat areas containing rare plants, mammal dens or bird's nests. These areas will destroy habitat and disrupt the activities of animals using the habitat. L029-88

Noise

Noise sources include blasting, pile driving, and trucks traveling, loading and unloading, motors, compressors etc. or other heavy equipment that will operate out in the open for construction of the rail bed and support structures for the train. These noise sources will impact wildlife in the vicinity of the construction zones for a considerable period of time as construction progresses.

Noise impact on wildlife is an area of active study at present. For example, noise disturbances displace waterfowl from feeding grounds, cause desertion of nests, increase energetic costs associated with flight, and lower productivity of nesting or brooding waterfowl, among other impacts. (Human Disturbances of Waterfowl: Causes, Effects, and Management, URL:http://www.nwrc.usgs.gov/wdb/pub/wmh/13_2_15.pdf.) (e.g. Carl E. Korschgen, U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center, (1992). L029-89

Direct physiological effects of noise on wildlife, if present, are difficult to measure in the field; telemetric measurement of physiological variables such as heart rate has met with more success technically than as an indicator of health and survival. Behavioral effects that might decrease chances surviving and reproducing include retreat from favorable habitat near noise sources and reduction of time spent feeding with resulting energy depletion. Serious effects such as decreased reproductive success have been documented in some studies and documented to be lacking in other studies on other species. Decreased responsiveness after repeated noises is frequently observed and usually attributed to habituation. Vehicle noise can interfere with animal communication essential for reproduction. (Ronald P. Larkin, Center for Wildlife and Plant Ecology, USACERL Technical Report 96/21, January 1996)

In a comprehensive 1998 report (U. S. Department of Transportation, Federal Railroad Administration, December 1998, *High-Speed Ground Transportation Noise and Vibration*

Impact Assessment (URL: http://www.fra.dot.gov/downloads/RRDev/nvman.pdf), the following was the government's assessment of noise impacts on animals: L029-89 cont'd

> "A wide range of studies have been conducted concerning noise effects on animals. For humans, annoyance is considered to be the primary environmental noise effect; thresholds for annoyance in terms of sound exposure have been determined by surveys as described in Section A.3. However, for animals, the effects are not easily determined. Usually the studies require introduction of a specific noise event like an aircraft overflight and a subsequent observation of animal response. Observations of response to noise range from no reaction or mild responses such as slight changes in body position to extreme responses such as panic and attempts to escape. Long-term effects that might change behavior tend to be affected by factors other than short term noise exposure, such as weather, predation, disease and other disturbances to animal populations. Conclusions from research conducted to date provide only preliminary indications of the appropriate descriptor, rough estimates of threshold levels for observed animal disturbance, and habituation characteristics of only a few species. Long-term effects continue to be a matter of speculation."

Moreover, most of the noise events used in prior studies are related to aircraft overflights. Consequently, any criteria adopted for effects on animals by high-speed rail noise must be considered interim until further specific research results are known.

The FRA report gives is the following synopsis of noise impacts observed in the literature:

Species	Noise Source	Sound Level (dB)	Behavioral Response
Reindeer	Sonic booms	Not stated	Startle
Caribou	Aircraft	Not stated	panic running
Pronghorn antelope	helicopter	77 dBA	Running
Domestic chicken		100 dB	Blood composition
		115 dB	interrupt brooding
Quail		80 dB	accelerated hatching
seabirds (general)	Sonic boom	Not stated	startle, flush from nest
California condor	Blasting, drilling	Not stated	Flush from nest
Raptors	Sonic booms	Not stated	Alarm

Project construction will cross the wetlands complex where the noise environment is usually exceptionally quiet (except for gunshots in the duck clubs). The Draft EIR/S must describe as fully as possible what are the expected construction noise and vibration impacts to wildlife species.

Water Flow and Water Quality

The DEIR/S does not acknowledge the potential construction impact on water flow and water quality. The GEA wetlands are a complex of natural and man made channels which move L029-90

water through the wetlands, establishing the waterfowl habitat and supporting nearly all the GEA ecological functions. The HST would probably be constructed on an earthen berm through most of the GEA, elevated above the flood level, in the same manner as rail road lines of the 19th century (see the Santa Fe Grade as an example). The berm would need to be wide enough for two tracks. L029-90 cont'd

Construction of the berm would entail tremendous wetland fill and the importation of possibly a million cubic yards of fill, depending on the actual route taken. It is unlikely that the earth for the berm could be excavated from along the route due to soil weigh bearing limitations. The berm would need to be keyed in to the substrate, meaning that the organic top layer would be removed and drainage ditches and water pumps would be installed to allow engineered placement of fill. Even where trestle construction crossed water channels, there would be disturbance from clearing and pile driving.

All that construction will alter the present water flow patterns, introduce sediment and create stagnant sections of the wetlands producing essentially permanent water quality degradation. Water quality impacts on wildlife range from altered growth of feed to increased risk of avian botulism.

The Grassland Water District has spent much time and money managing the application of water in the Grasslands. Historically, water quality problems in the Grasslands have had tremendous impact on wildlife (e.g. the Kesterson Wildlife Refuge). Imposition of a hydraulic barrier across the GEA will materially impact the south-to-north water management in the GEA which is essential to maintaining water quality. The EIR/S needs to take in to account the phenomenal complexity of the hydrology of the Grasslands.

III. Operations Impacts of the HST Must be Addressed in the EIR/S

L029-91

Operations impacts that need to be explicitly addressed include train noise and vibration, shock wave, train collisions with large animals, and interruption of habitat connectivity.

Noise and Vibration

The Draft EIR/S noise analysis compares the various routes for noise sensitivity and compares the HST alternative with the other alternatives. However, the Draft EIR/S never actually states anything about what the actual noise exposure will be in decibels, at varying distances from the track. I find this extraordinary.

The DEIR offers no quantitative analysis of actual impact. Indeed, the DEIR never actually tells the reader how much noise the trains produce. Information relevant to assessment of high-speed train noise on wildlife contained in the EIR is includes:

L029-92

> " Similarly, "quiet suburban" and "rural" or "natural open-space" areas are grouped as areas where ambient noise levels are less than 55 dBA Ldn." (DEIR p. 3.4-4)
>
> "While high-speed trains have some similar noise and vibration characteristics to conventional trains, they also have several unique features resulting from the reduced size and weight, the electrical power, and the higher speed of travel. The proposed HST would be a steel-wheel, steel-rail electrically-powered train operating in an exclusive

right-of-way. Because there would be no roadway grade crossings, the annoying sounds of the train horn and warning bells would be eliminated. The use of electrical power cars would eliminate the engine rumble associated with diesel-powered locomotives." (DEIR p. 3.4-9)

L029-92 cont'd

"For the proposed HST system higher operating speeds of 150 to 220 mph (241 to 354 kph) would be planned for the less constrained areas, in terms of alignment (i.e., flat and straight)." (DEIR p. 3.4-9)

"In the speed range from 60 mph to about 150 mph (98 kph to 241 kph), mechanical noise
resulting from wheel/rail interactions and structural vibrations dominate the noise emission from trains." (DEIR p. 3.4-9)

"Noise from HST also depends on the type and configuration of its track structure. Typical noise levels are expressed for HST at grade on ballast and tie track, the most commonly found track system. For trains on elevated structure, HST noise is increased, partially due to the loss of sound absorption by the ground and partially due to extra sound radiation from the bridge structure. Moreover, the sound from trains on elevated structures spreads about twice as far as it does from at-grade operations of the same train, due to raising the sound source higher above ground." (DEIR p. 3.4-10)

"Vibration of the ground caused by the pass-by of the HST is similar to that caused by conventional steel wheel/steel rail trains. However, vibration levels associated with the HST are relatively lower than conventional passenger and freight trains." (DEIR p. 3.4-10)

An indicative measure of actual noise exposure can be found in the Federal Railroad Administration (FRA) assessment: an electric locomotive train passby (2 engines, 10 passenger coaches) at a maximum speed of 150 mph in a flat area with no shielding will produce an Lmax sound level of 99 dBA at 50 feet from the train. That study also rated as "severe impact" any case where the project noise exceeded 60 dBA where the ambient noise level was near 50 or 55 dBA Ldn, as would be the case in the study area, according to the EIR criterion below. The FRA report also stated as a threshold for significant noise impacts on wild birds and mammals a sound level of 100 dB SEL – definitely the same range as the sound level of the train passbys. The SEL is a measure of all sound energy during an event expressed as the equivalent sound level with a duration of one second.

Figure 2.6-1 of the EIR shows that the trains will be operating at speeds in excess of 200 mph in the Stockton to Bakersfield and Merced to Gilroy segments so the noise impact would actually be greater than that estimated in the sample case analyzed in the FRA report. The sound energy radiated from a source is proportional to its power input. As a rough rule, the power input increases as the square of velocity, so a train at 200 mph will need 1.8 times the power as a train at 150 mph. Sound is measured on the logarithmic decibel scale; the logarithm of the power ratio is 2.5 dB, meaning that the Lmax noise from the train at 200 mph is expected to be around 101.5 dB.

Even at high speed, the train will take three to four seconds to pass a point receptor. This means the SEL at 50 feet distance is probably around 105 to 110 dB. With 3 dB drop-off per

doubling distance for a line source, the high speed train will likely exceed the FRA significance threshold for wild birds and mammals out to a distance of 500 feet. L029-92 cont'd

Train frequency determines the overall impact of the project. The EIR (Summary p. S-4) states that there would be 86 weekday intercity trains envisioned by the project by 2020. A chart in Appendix E to a technical report on operations that lays out the proposed schedule of trains for the Pacheco route, 134 total daily trains will pass through Los Banos (not all stopping). This is an average of a train every 11 minutes, but as much as a train every 5 minutes during the busy portion of the business day.

The high frequency means that startle effects will be frequent and that the overall sound level will rise substantially. It is difficult to estimate the impact of this project due to the absence of quantitative information in the DEIR A rough calculation based on the FRA data shows that a 200 mph train every 5 minutes would produce an average sound level (Leq) of 75 dB at 500 feet from the line. That is more noise that is produced by most busy freeways.

There is a high probability of significant impacts to wildlife. The EIR must evaluate the actual likely impacts of the train noise and vibration on the sensitive wildlife species who will be exposed to these noise levels on a daily basis.

Shock Wave

High speed trains will produce a significant shock wave each time they pass. The shock wave can be felt at varying distances from the train, depending upon its speed. The shock wave has been likened to the impact of a supersonic plane breaking the sound barrier. Howe M. S. "The compression wave produced by a high-speed train entering a tunnel." *Proceedings: Mathematical, Physical & Engineering Sciences* 1 June 1998, vol. 454, no. 1974, pp. 1523-1534(12) URL: http://www.ingenta.com/isis/searching/ExpandTOC/ingenta ?issue=pubinfobike://rsl/rpa/1998/00000454/00001974&index=2 It can produce a startle response in wildlife or if birds are flying within the immediate area of the train passes can possibly interrupt their flight. The EIR/S should quantify the shock wave that emanates from the train moving at over 200 mph, and determine all of its potential effects on wildlife. L029-93

Collisions with trains (large animals)

Animals that may be crossing the tracks in the GEA can be hit by one of some 100 plus trains per day. Although a likely mitigation for the project will be subterranean tunnels to allow wildlife passage (EIR/S p. 3.15-31) there may still be substantial numbers of wildlife who attempt to cross the track at grade level and may be hit by trains. Species at risk include San Joaquin kit fox, tule elk and bobcat. The EIR/S should estimate the mortality to each wildlife species that is vulnerable to train collisions and the effect of this mortality on the respective populations. For special status species such as the San Joaquin kit fox the EIR/S should also discuss whether these train impacts are substantial enough to cause further decline in the status of the species, or will interfere with the recovery of the species. L029-94

Interruption of Habitat Connectivity

The EIR/S states (p. 3.15-) "Segments that would be placed at grade (cut and fill) would require fencing the HST alignment for the safety of humans, as well as protection from train-wildlife collisions, and would have the potential to interfere with wildlife movement." On p. L029-95

3.15-31 the EIR/S mentions that construction of wildlife underpasses, bridges, and/or large culverts, could be considered to facilitate known provide these wildlife movement corridors. The EIR/S should provide evidence for the success of this type of mitigation in a wetland environment like the GEA and provide more detail on the number and location of such structures to facilitate wildlife movement across the railroad right-of-way. L029-95 cont'd

The EIR/S incorrectly limits the zone of impact to 0.25 miles away on either side of the tracks in rural areas and 0.5 miles away in sensitive areas (p. 3.15-4). In reality, large mammalian species such as San Joaquin kit fox, elk and bobcat have individual territories that may cover tens or hundreds of miles. So while an animal will only be impacted if it comes in contact with the train corridor, in a population sense the zone of impact is much larger since it encompasses the entire habitat of the animals which are killed or otherwise impacted by the train.

IV. Induced Growth Effects of the HST on the GEA Must be Fully and Correctly Assessed in the EIR/S

The Draft EIR/S stated "For Merced County, analysis results suggest that about 88 percent of population and employment growth experienced with the HST Alternative would have occurred anyway under the No-Project Alternative". (P. 4-23 of the Cambridge Systematics Economic Growth Effects report). I believe this is an underestimate of the growth inducing effects of the proposed project, and their impacts on the wetlands complex, for several reasons: L029-96

1. Induced growth is related to the station at Los Banos and commute trips to Bay Area and Sacramento. If the existence of the train line effectively shortens commute times between the Merced County area and the urban employment centers in the San Francisco Bay Area and the Sacramento area then more people will perceive of these areas as a bedroom community option, especially if the cost of housing there is substantially lower than closer in to the big cities, as it has been historically. The effect can be greater than assumed in the EIR/S – in other words, the assumption that only 12% more growth will result from the HST alternative than from the No Project Alternative is probably false. L029-97

2. As stated above, the EIR/S assumption was that impacts were limited to a zone 1/4 mile on either side of tracks or the station in rural areas and .5 miles on either side in sensitive areas. This is not a valid assumption. Induced growth can take place virtually anywhere in Merced County and is not related to the corridor around the train tracks, although it is likely to occur near the train station location. L029-98

The EIR provides no information to analyze the likely future pattern of growth. It is a numerical, tabular population analysis rather than a map-based analysis. There is no way to independently determine where the excess growth will go.

In the absence of strict land use controls by the local cities and the County, developers will build housing throughout the greater Los Banos area including in areas east of the Santa Fe Grade that will degrade the value of the wetlands. People will be willing to buy housing throughout this area and will not consider a local commute between Santa Nella where the proposed train station is, and their home housing tracts to be onerous, since it will be a short commute compared to the long-distance commute afforded by the train. L029-99

3. Impacts of urban encroachment on the wetlands complex of the GEA have been documented in numerous studies including the 1995 Land Planning and Guidance Study (for example the supporting study by Reed F. Noss, "Translating Conservation Principles to Landscape Design for the Grassland Water District"). Impacts include fragmentation of the North Grasslands from the South Grasslands and a reduction in habitat value of the entire interior of the wetlands complex. L029-100

4. The "Los Banos" station is shown as being in the vicinity of Santa Nella, a rural center about 6 miles north of Los Banos that is adjacent to the Los Banos wildlife area. The sprawl growth that will occur around this station will have detrimental effects on this wildlife area. Adverse effects of urban development near wetlands that were reported by Reed Noss in his supporting study to the 1995 *Land Planning Guidance Study* include:

> Edge effects where predators, competitors and parasites of sensitive wildlife species may thrive in the disturbed habitat in and adjacent to various types of urban development. Noss reported that remnant wetlands are especially susceptible to exotic species invasion in fragmented landscapes. For example, crows and ravens are highly destructive predators on bird eggs and small mammals. These birds have become serious pests in many areas since their populations have surged in response to thee huge amount of food in solid waste in urban areas, as well as agricultural waste at dairies and feedlots. Deleterious edge effects commonly extend 50 to 200 meters into a habitat from an edge, and in some cases much farther. L029-101
>
> Impacts of urban development adjacent to wetlands include (1) physical disruption, such as mowing and digging (2) chemical disruption including the introduction of fertilizers and toxic chemicals in drainage water (3) introduction of non-native species of both plants and animals (4) noise disruption and (5) visual disruption caused by removal of trees and shrubs around the wetlands.

Another key impact of urban development is the interruption of water deliveries for wildlife uses and the competition for the water supply that supports the wetland habitat.

In fact, a station anywhere in the vicinity of Los Banos will contribute incrementally to excessive and sprawl growth in the Los Banos area that will impact the GEA, as described below. L029-102

<u>Conflict of Urban Growth and Buffer to Protect the Wetlands</u>

The 1995 *Land Planning Guidance Study* prepared for the Grassland Water District recommended a buffer zone of 2 miles around the entire perimeter of the GEA to protect the interior from the effects of urban encroachment. The train corridor within the GEA habitat areas, and the induced development that is likely to occur closer than two miles from the boundary of the GEA will degrade the quality of the habitat in the wildlife refuge. L029-103

The 2001 *Land Use and Economic Study* published by the Grassland Water District contains information relevant to the issue of encroachment of urban development on the 2-mile wide buffer zone that was recommended to protect the interior of the wetlands complex. Only

land uses compatible with wildlife uses, such as agriculture, were recommended to occur inside the buffer zone. L029-103 cont'd

According to the 2001 study, if growth occurs according to the sprawl growth scenario, which is the conventional mode of growth in California, the added population of 421,934 by the year 2040 will require a total of 94,127 new acres of urbanized land. 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". 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 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% (from 12,341 to 75,973 acres) under the low-density sprawl scenario.

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 or Santa Nella 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. However, the policy protection afforded by General Plans is far from permanent as General Plans are re-written on a 5 or 10-year cycle.

In summary, the Draft EIR/S failed to mention the identity or the special values of the GEA or GWD, or to discuss their importance as a wetland and wildlife resource of local, regional and national scale importance. As a result of this omission, the Draft EIR/S also failed to address the construction, operations and induced growth impacts on the proposed high-speed rail project on this highly valuable and vulnerable resource area. The Draft EIR/S must be greatly expanded and re-circulated to include all of these issues. L029-104

The DEIR/S failure to acknowledge the values and unique importance of the Grassland Ecological Area has artificially raised the attractiveness of the southern (Pacheco Pass) alternative for the HST project compared to the other alternatives. If the impacts on the GEA are fully described, it will become clear that a more northerly alternative, possibly even the summarily rejected Altamont Pass alternative, may be environmentally superior to the Pacheco Pass alternative.

Thank you for the opportunity to provide these comments.

Sincerely yours,

Karen G. Weissman

Karen G. Weissman, Ph.D.
Principal

Other references:

K.M. Manci, D.N. Gladwin, R. Villella, and M.G. Cavendish. "Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis." U.S. Fish and Wildlife Service National Ecology ResearchCenter, Ft. Collins, CO., Report NERC-88/29, 1988.
P. Dufour, "Effects of Noise on Wildlife and Other Animals: Review of Research Since 1971." US Environmental Protection Agency, Report 550/9-80100, July 1980.
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F. Bradley, C. Book, and A.E. Bowles. "Effects of Low-Altitude Aircraft Overflights on Domestic Turkey Poults," Report No. HSD-TR-90-034, US Air Force Systems Command, Noise and Sonic Boom Impact Technology Program, June 1990.
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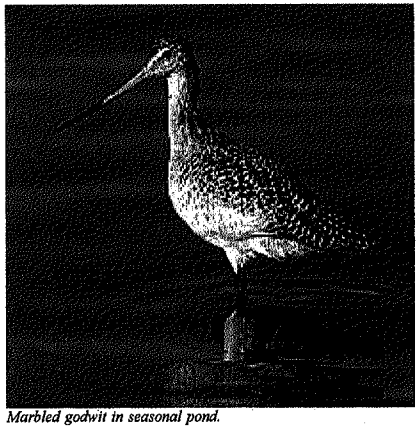
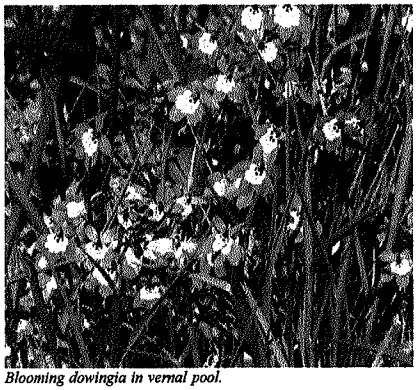
EXHIBIT 5

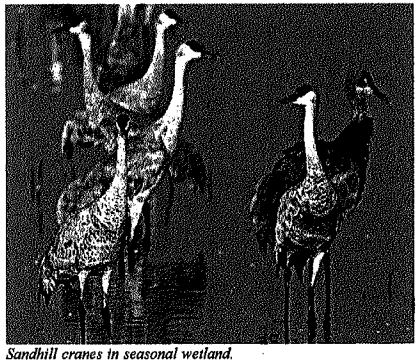
U.S. Fish & Wildlife Service, Grasslands Wildlife Management Area Proposed Expansion



Marbled godwit in seasonal pond.



Blooming dowingia in vernal pool.



Sandhill cranes in seasonal wetland.

For More Information . . .

Visit the San Luis NWR Complex website for the Grasslands WMA at http://sanluis.fws.gov/GWMA.htm or contact:

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Project Leader
San Luis NWR Complex
P.O. Box 2176
Los Banos, CA 93635
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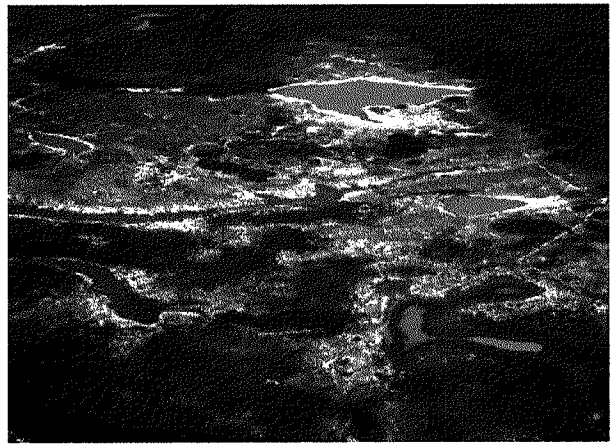
U.S. Fish and Wildlife Service

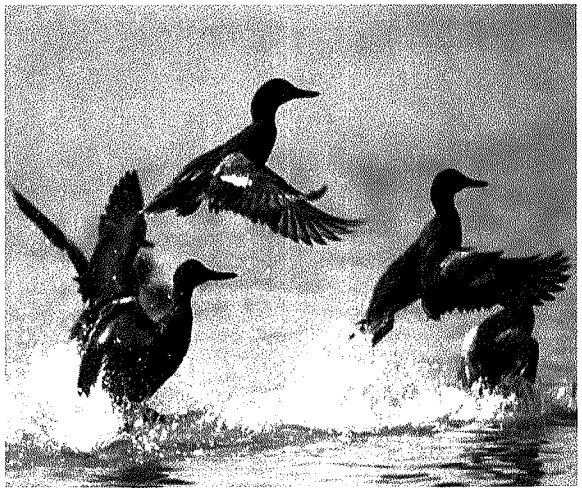
Grasslands Wildlife Management Area

Proposed Expansion

What is the Grasslands?

The Grasslands area is California's version of the Midwest prairies. The Grasslands, spanning the San Joaquin Valley in Merced County, comprise the most significant concentration of California's seasonal wetlands.





Why is the Grasslands Habitat Unique?

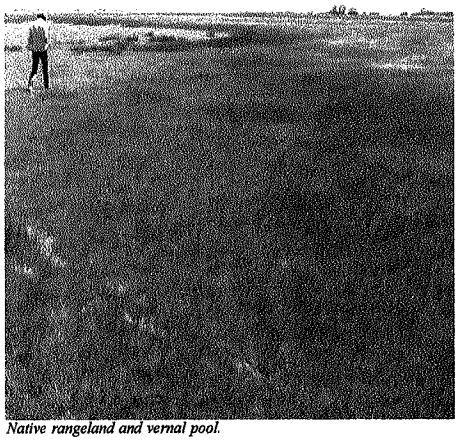
This area is recognized internationally for its importance to migratory waterfowl and shorebirds of North America's Pacific Flyway. Seasonally flooded wetlands and vernal pools attract large flocks of wintering waterfowl and shorebirds. From September through April during the wet season, a host of migratory birds use the Grasslands including:

- 500,000 to 1,000,000 waterfowl;
- More than 100,000 shorebirds;
- More than 30,000 sandhill cranes;
- and other migratory bird species.

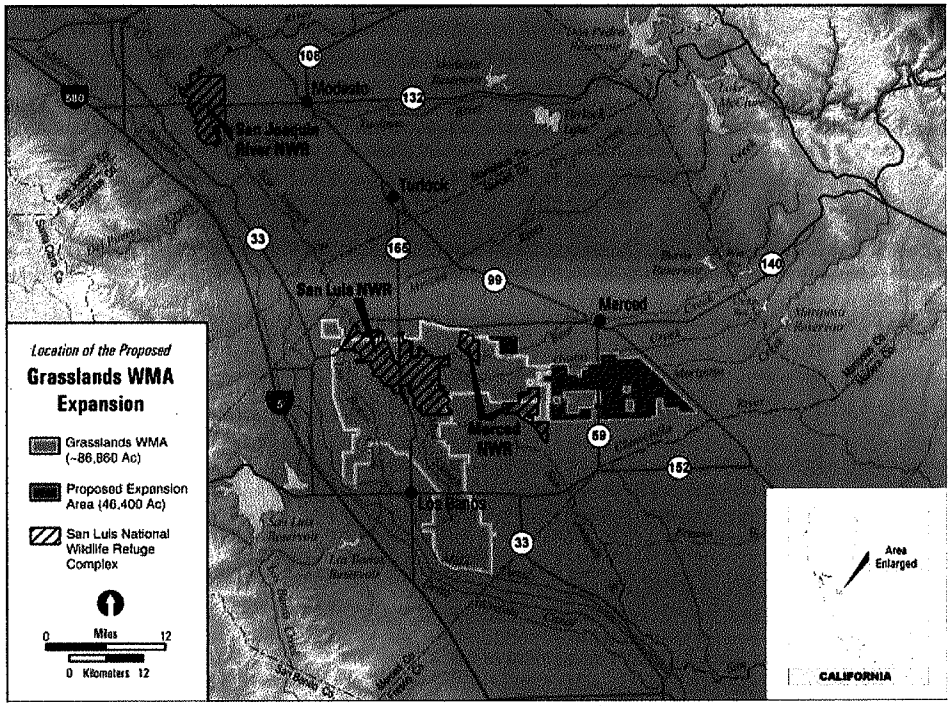
These wildlife concentrations attract both hunters and bird watchers to the area.

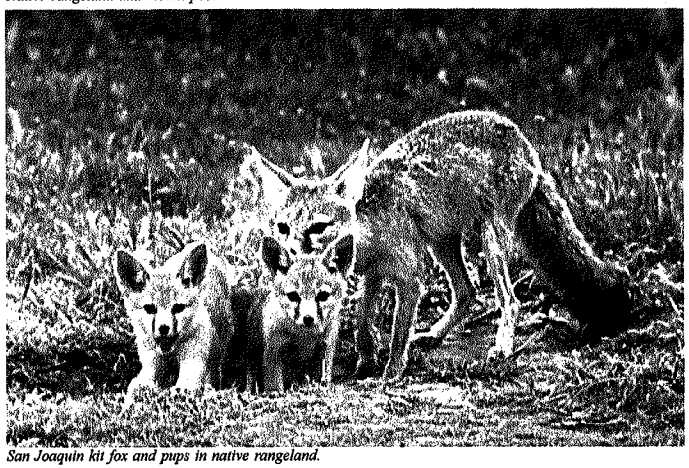
How Much of the Grasslands is Protected as Part of the WMA?

The Grasslands WMA currently includes more than 82,000 acres permanently protected under conservation agreements purchased with Duck Stamp funds. Through these collaborative partnerships between the Service and local landowners, the wildlife values of the Grasslands are maintained while the land remains in private ownership.

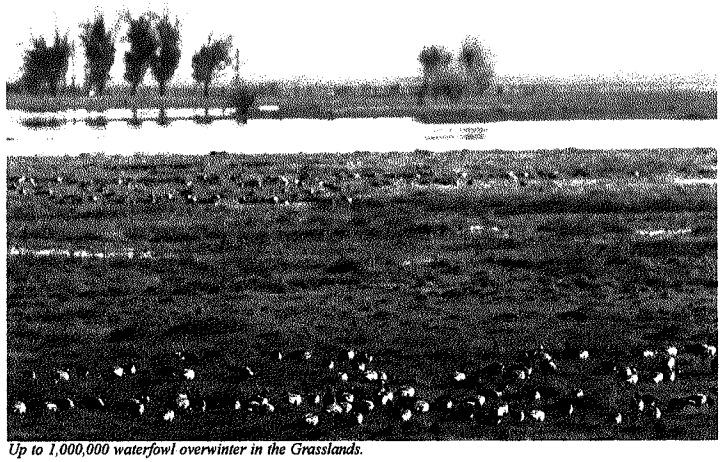


Native rangeland and vernal pool.





San Joaquin kit fox and pups in native rangeland.



Up to 1,000,000 waterfowl overwinter in the Grasslands.

Why Expand the Grasslands WMA?

Disappearing habitats

The San Joaquin Valley is the fastest-growing region in California. The Grasslands habitat is imperiled by subdivision into ranchettes, development, road building, and conversion of unplowed rangelands to incompatible agricultural uses such as row crops, orchards, and vineyards.

Since 1987, an average of 3,000 acres of Merced County grasslands have been converted annually to agricultural uses incompatible with wildlife. Approximately 66 percent of the Grasslands-area vernal pools have been destroyed; other habitats exist as small, scattered fragments no longer providing the habitat connections needed by many wildlife species to thrive.

Protecting a core and a corridor

By acquiring conservation easements on a network of strategically located private properties, the Grasslands WMA expansion would:

- Protect a larger core reserve area of significant wetland habitat for wildlife concentrations of national significance;
- Conserve the largest intact vernal pool habitat in the world; and
- Provide a cross-valley wildlife corridor essential to recovery of Central Valley's threatened and endangered species.

Benefits for wildlife and community

Easements maintain wildlife friendly agriculture, the local rural lifestyle, and a sense of place. Private ownership is retained through the easement program, and the land remains on local tax rolls. Easements do not increase refuge O&M costs or require additional staff to manage.

Long-term Partnerships are Key to Conservation

The Grasslands area exemplifies the best of conservation partnerships among landowners, agencies, and conservation groups interested in wetland and natural resource protection. For several decades, these groups have worked together to protect, restore, and enhance the natural resources of the Grasslands. These conservation partners include the following:

Fish and Wildlife Service
Bureau of Reclamation
Natural Resources Conservation Service
Grassland Water District
California Department of Fish and Game
California Department of Parks and Recreation
California Waterfowl Association
Ducks Unlimited
Hundreds of private landowners
Approximately 100 waterfowl hunting clubs

EXHIBIT 6

C.V. of Dr. Karen Weissman

Who We Are
What We Do
Areas of Expertise
Experience
EIR/EIS
Biological Assessment
GIS/Mapping
Conservation Planning
Featured Projects
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Search

Thomas Reid Associates
Environmental Consultants

Karen G. Weissman, Ph.D.

weissman@traenviro.com

Dr. Weissman has been a Principal of Thomas Reid Associates since she completed her doctorate in late 1972 and Vice-President of the firm since 1982. Her areas of expertise include ecology, population biology, demography, land use, land use economics, governmental planning and policies and regional environmental issues. Dr. Weissman provides public representation of many of her cases in the EIR process. She has provided expert witness testimony in administrative law proceedings.

Dr. Weissman plays a key role in conceptualizing, planning, contracting and executing projects. She has served as client liaison for technical information transfer and review on numerous cases, and she has expert familiarity with the methods of data collection and analysis from diverse sources, including governmental agencies, universities, public service organizations, public and private interest groups, and private industry and commerce. Dr. Weissman has primary responsibility for administering subcontracts and assuring the delivery of acceptable work products by subcontractors. Dr. Weissman also reviews work of TRA staff for CEQA adequacy and overall quality control.

Current case work includes several EIRs and the Merced County Expanded Case Study which explores the economic relationships between agriculture, wetlands, and urban growth. Past work includes the Pacifica Police Station EIR, Stonebridge Subdivision EIR, Mount Washington Cellars and Resort Village EIR, the Brisbane General Plan EIR, the Pacifica Wastewater Management Plan EIR, and the Grassland Water District Land Planning Guidance Study. Dr. Weissman was also Project Manager and Principal Investigator for the Claratina/Coffee and North Beyer Park Reorganization, Gilroy Hot Springs Resort, Gilton Solid Waste Transfer Station, and Outdoor Resorts Recreational Vehicle Park EIRs. She has also been Principal Investigator for numerous other TRA studies including the Farm Labor Housing Project EIR and Devers-Serrano Transmission Line EIS/EIR.

Dr. Weissman's expertise encompasses up-to-date knowledge of the requirements of CEQA and other environmental statutes, regulations, and case law as they pertain to environmental documents. She is frequently hired by private and public clients to provide detailed, formal technical review of numerous EIR's prepared by others, including industrial projects, "new towns," other mixed-use developments, high-voltage electrical transmission lines, sewage sludge disposal, and solid waste/hazardous waste transfer facilities. To date, Dr. Weissman has reviewed more than 100 environmental documents prepared by others. In year 2000 she worked for the Morgan Hill School District doing technical review and advising the District on the CEQA adequacy of an EIR prepared by another consultant on a proposed, controversial new high school.

Dr. Weissman has participated in the firm's many endangered species conservation planning studies. Prior to her lead role in the Merced County Expanded Case Study she was a Principal Investigator for the Grasslands Land Planning Guidance Study (1995), Natomas Basin Habitat Conservation Plan (1994-97), and the Southern San Joaquin Valley Habitat Preservation Study (1986-89) and was principal author of the Coachella Valley Fringe Toed Lizard Habitat Conservation Plan and EIS/EIR (1984-1985) and the Carrizo Plain Land Acquisition Study (1985). She provided expertise in theoretical ecology for the Biological Study for Endangered Species and Habitat Conservation Plan for San Bruno Mountain. In early 1999 she prepared the Mitigation Monitoring and Reporting Program (MMRP) for the Headwaters Forest HCP/Sustained Yield Plan (SYP). The MMRP is the essential link for the regulatory agencies to track the applicant's (Pacific Lumber's) compliance with the HCP.

A biologist by training, Dr. Weissman has done biological reconnaissance and impact assessment of projects ranging from oil and gas pipelines, transmission lines, marine terminals for oil and liquid natural gas, port expansion, landfill expansion and residential subdivisions. She has worked closely with wildlife agencies in the study of impacts on rare or endangered species in California and other parts of the western region.

Educational Background and Honors

A.B. Zoology, University of California, Los Angeles, *magna cum laude*, with Highest Departmental Honors, elected to Phi Beta Kappa
Ph.D. Biology, Stanford University, Stanford, CA
National Science Foundation Graduate fellowship

«*TRA Staff*

Updated 7/17/01

EXHIBIT 7

Don Marciochi Letter (August 30, 2004)

Grassland Water District

22759 S. Mercey Springs Road
Los Banos, CA 93635
Telephone (209) 826-5188
Fax (209) 826-4984

August 30, 2004

Mr. Thomas Enslow
Adams Broadwell Joseph & Cardozo
651 Gateway Boulevard, Suite 900
South San Francisco, CA 94080

RE: Potential Impact of High-Speed Train Project on GWD Canals and Waterways

Dear Mr. Enslow:

Pursuant to your request, I have reviewed the proposed High Speed Train project for its potential impact on the canals and waterways of the Grassland Water District (GWD).

I am the General Manager of the Grassland Water District and have been the General Manager for approximately 21 years. I have personal knowledge and professional experience concerning the canals and waterways of this area and concerning the maintenance and protection of the wetlands for wildlife habitat.

It is my understanding that the High Speed Train project proposes an alignment over Pacheco Pass that would run just north of and parallel to Henry Miller Avenue as it passes through the Grassland Water District. This route would cut across the southern part of the Los Banos Wildlife Management Area, the oldest WMA in the state (1929) and would sever the important wildlife corridor connecting the North and South grasslands. I am concerned that this route placement would result in significant fragmentation impacts on the wetland habitat and wildlife in this area.

This route would also bisect several important waterways essential to the management of critically important wetlands and wildlife habitat. The Santa Fe and San Luis Canals convey water to more than 31,000 acres of public and privately-owned wetlands. Mud Slough South (a natural channel) and the Porter-Blake Bypass serve as drainage facilities

for thousands of acres of additional wetlands thus making possible the timely release of water, a crucial element in the management of seasonal habitat. Rail facilities must be designed and constructed so as to not impede the flow of water in these channels as well as allow for ongoing operation and maintenance activities.

Finally, I am concerned that the placement of the High Speed Train Route may impede the access of our members to their hunting clubs. Access to these clubs should be considered prior to any final decision being made as to this route.

Thank you for the opportunity to comment on this matter.

Sincerely,

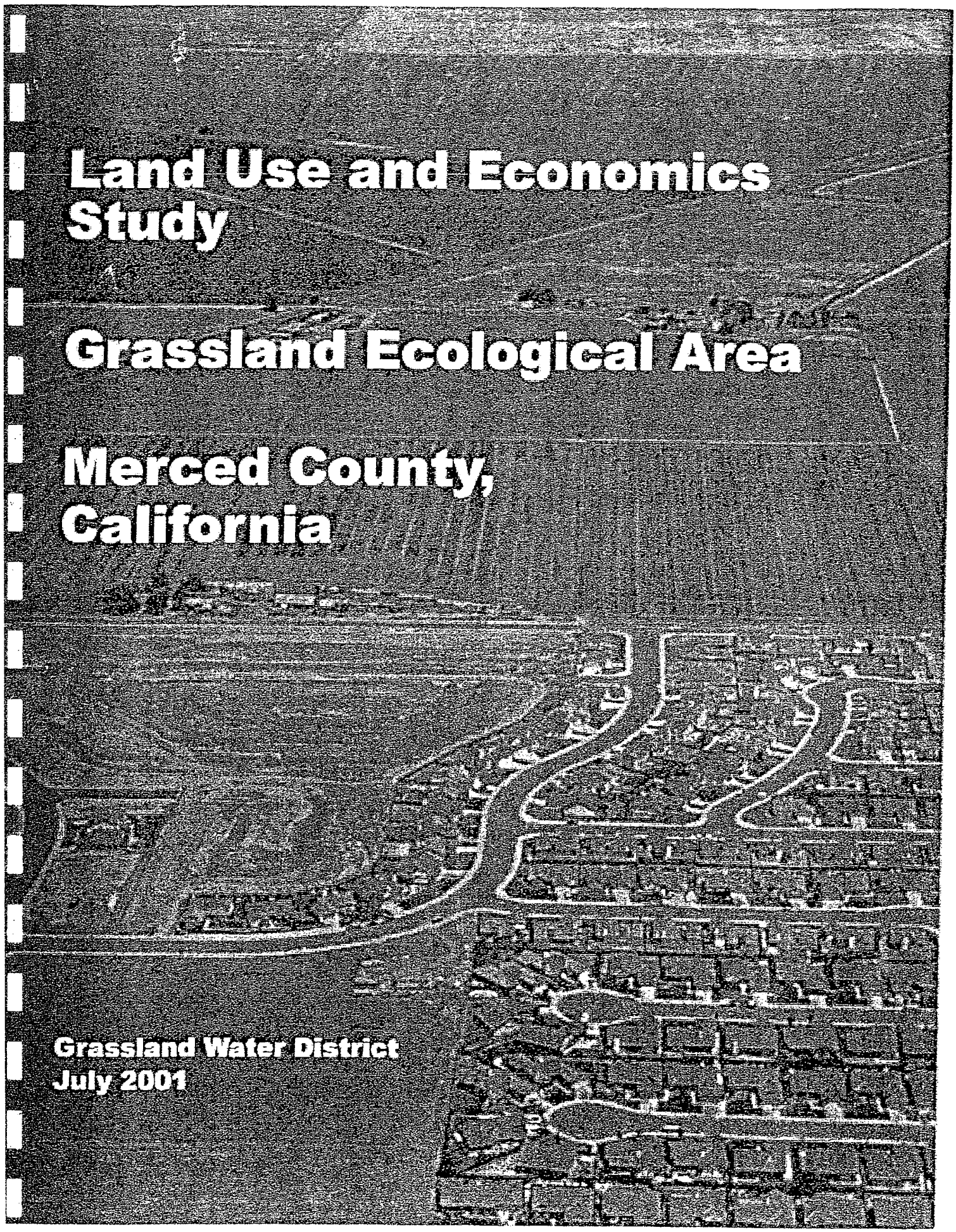
Don Marciochi

EXHIBIT 8

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

Report prepared for:

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Report prepared by:

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David Strong (Economics Supporting Study)
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Strong Associates
240 41st Street
Oakland, CA 94611
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ACKNOWLEDGEMENT

Thomas Reid Associates and Strong Associates are grateful to the three entities who jointly provided funding for the study: The Grassland Water District, Great Valley Center and the Packard Foundation. Without their commitment to the level of support needed, this comprehensive a study would not have been possible.

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.

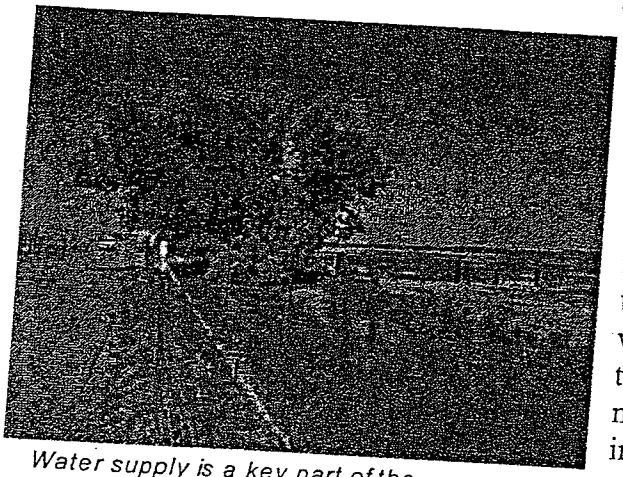
The wildlife habitat resource areas of Merced County include the Grassland Ecological Area (GEA) of about 178,000 acres which includes two federal wildlife refuges, three state wildlife areas and a large number of private duck clubs. In addition, wildlife habitat resource areas in the County include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



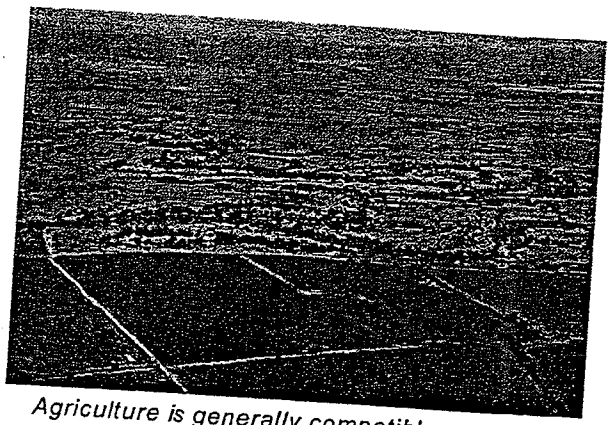
Water supply is a key part of the infrastructure needed to maintain habitat value in the wetlands.

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.*

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



Agriculture is generally compatible as a buffer to the wetlands.

[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)

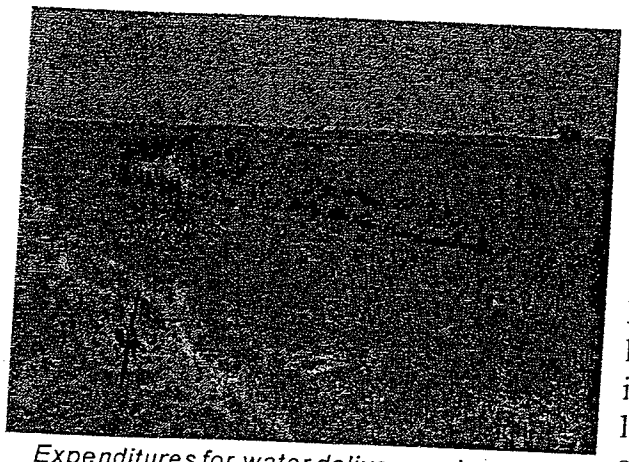
Source: Appendix 2 Summary Table D, Tables 4E, 4F.

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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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

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.

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[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:

Expenditures for Habitat Management and Acquisition, Agency Operations and Management (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.

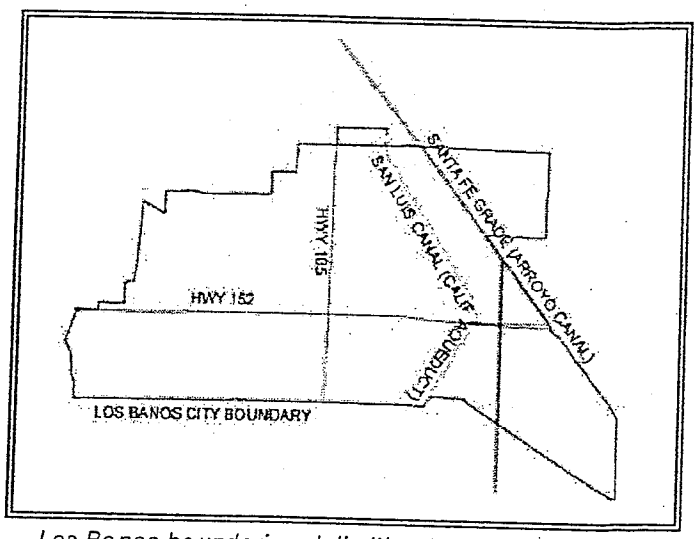
The potential urbanization of wetlands would also reduce the economic benefits of recreation and government and private investment in these areas. Current direct and indirect benefits from the wetlands are estimated at $40.9 million in annual sales and 798 jobs. Using a direct proportional extrapolation 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.

---

[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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U.S. Department of the Interior, U.S. Fish and Wildlife Service. 1997. "1996 National Survey of Fishing, Hunting and Wildlife Associated Recreation"

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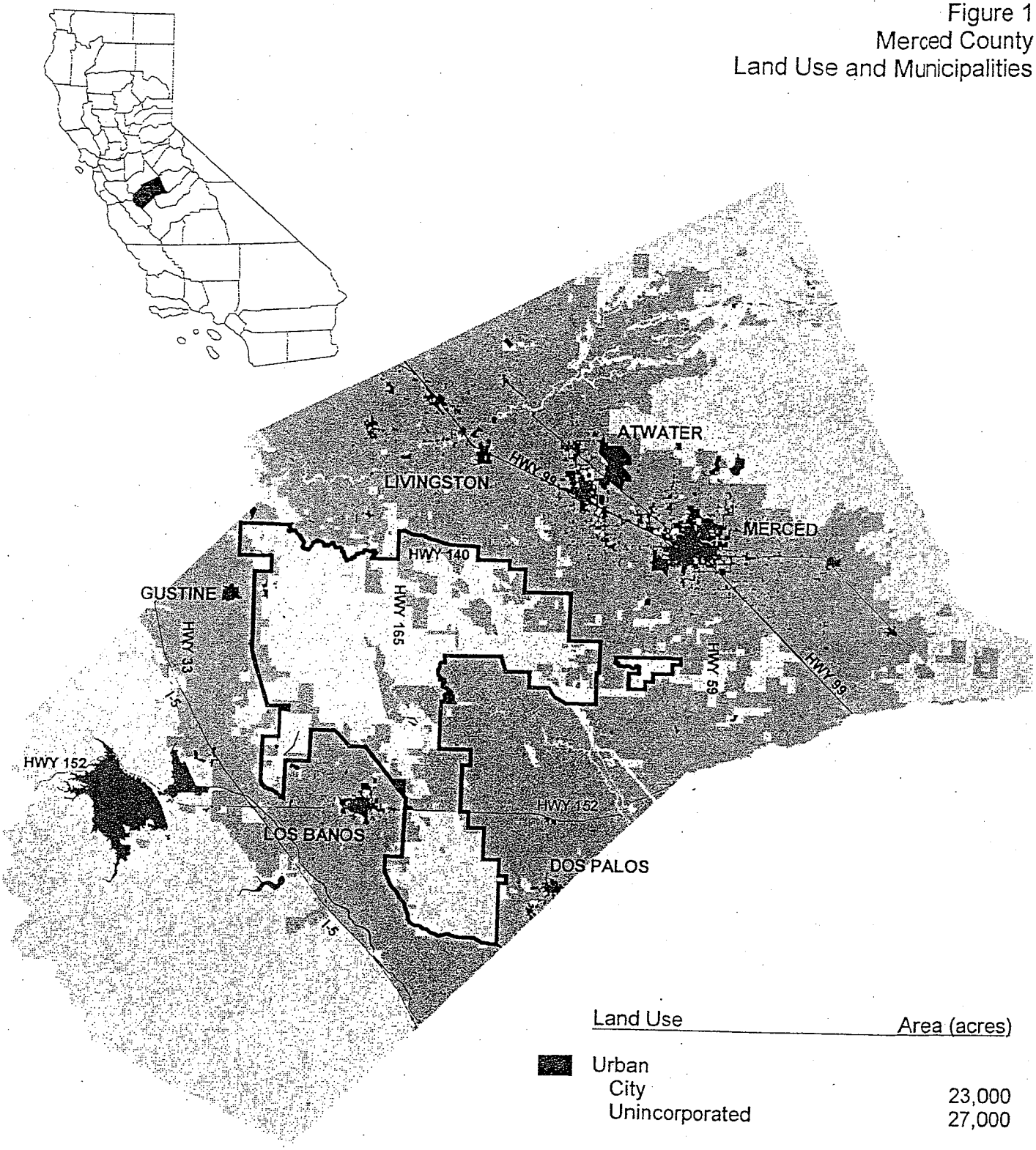
Madge Strong, editing
Toby Goldman (consultant) GIS

APPENDIX 1

MAIN TEXT FIGURES

Figure 1
Merced County
Land Use and Municipalities



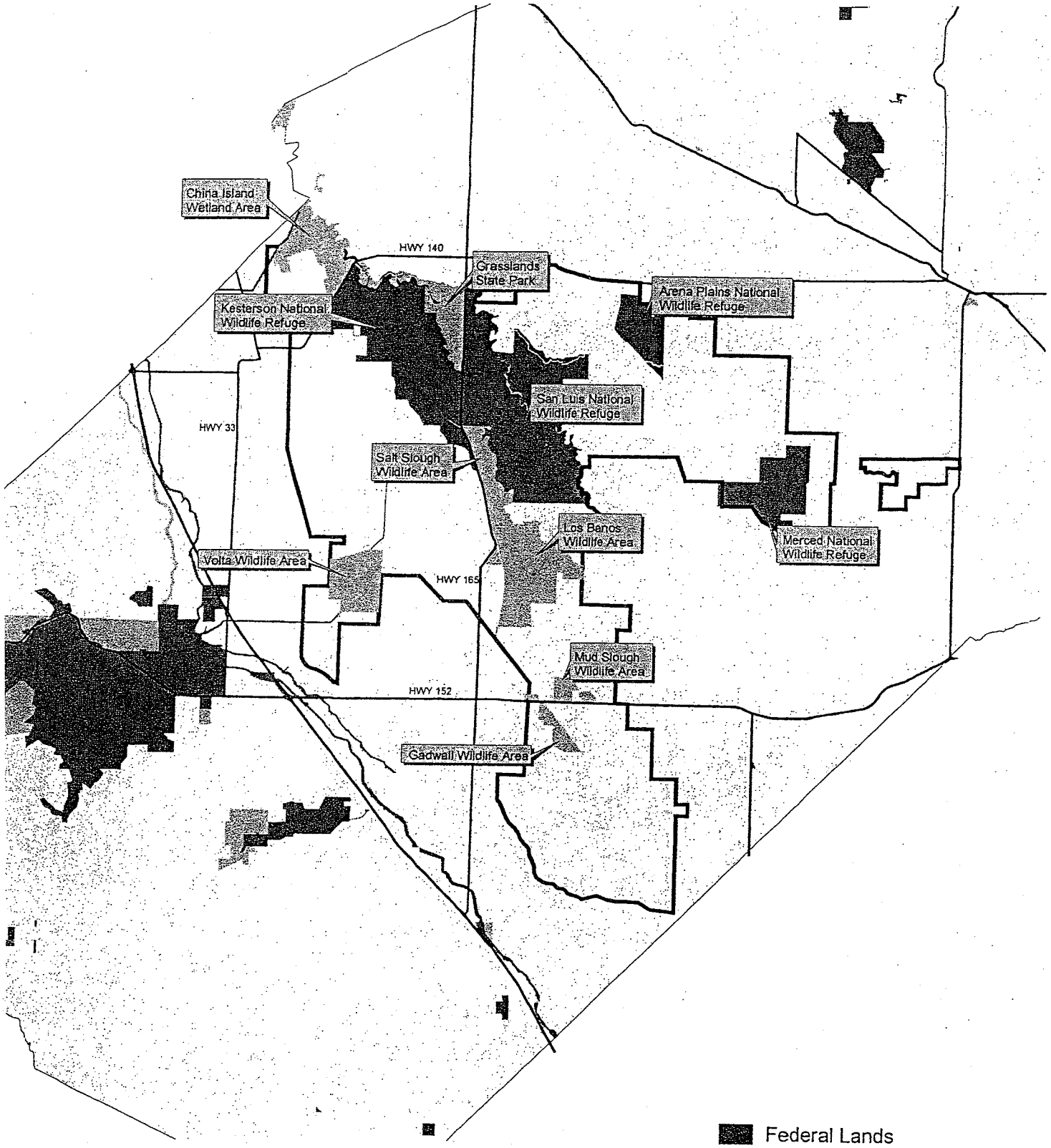
Land Use	Area (acres)
Urban	
City	23,000
Unincorporated	27,000
Agriculture	613,000
Rangeland and Other	588,000
Water	16,000
All Merced County	1,267,000
Grassland Ecological Area	

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

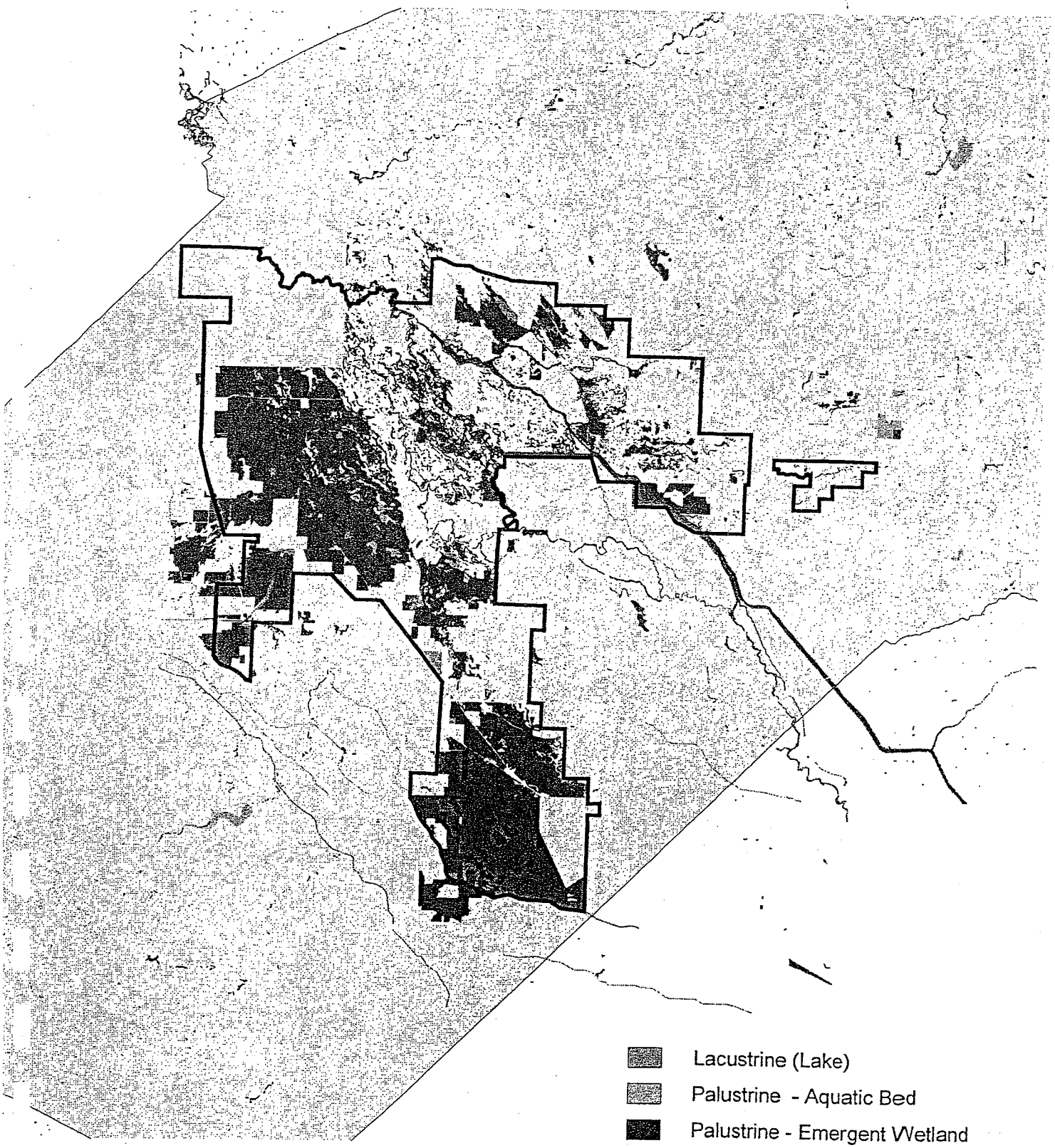


Federal Lands
State Lands
Grassland Ecological Area

N
0 1 2 3 4 5 Miles

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

Figure 3
Grassland Ecological Area and Wetlands



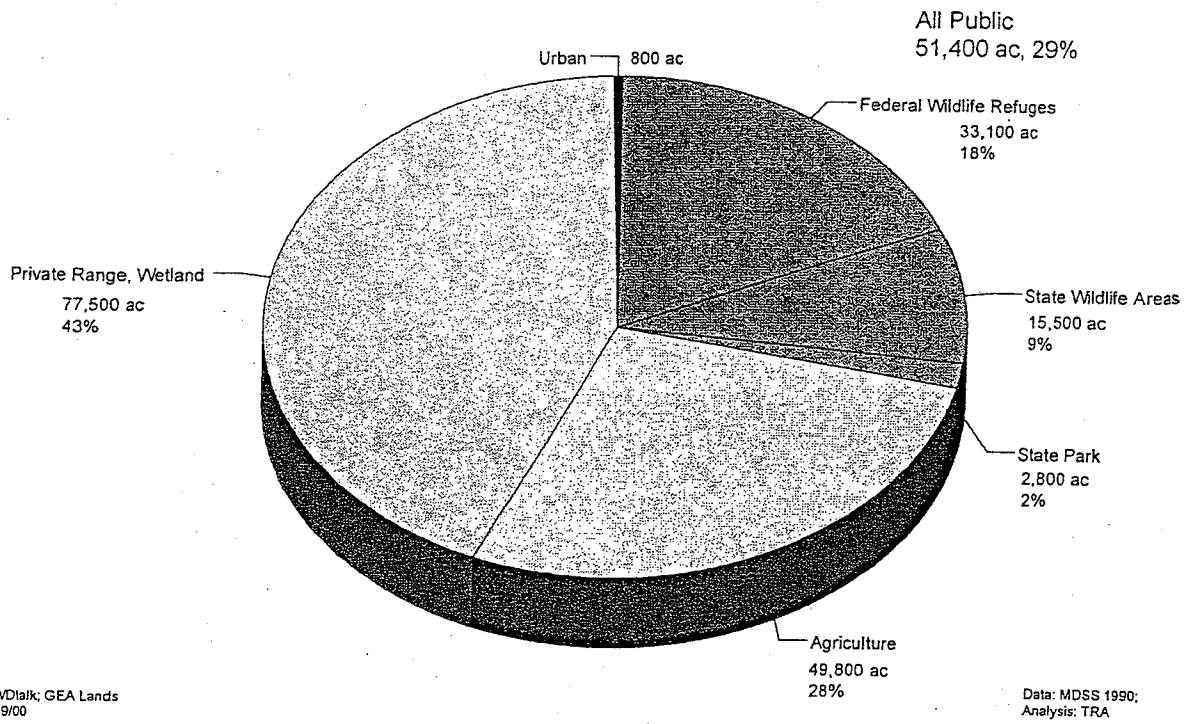
Lacustrine (Lake)
Palustrine - Aquatic Bed
Palustrine - Emergent Wetland
Palustrine - Scrub and Other
Riverine
Grassland Ecological Area (GEA)

N

0 1 2 3 4 5 Miles

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

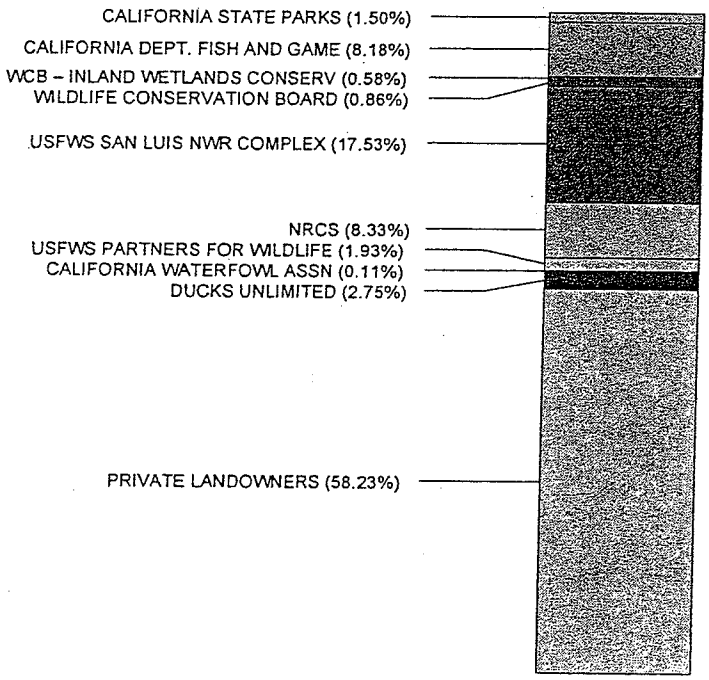
Figure 4 - Land Status in Grassland Ecological Area



CGWDtalk; GEA Lands
05/09/00

Data: MDSS 1990;
Analysis: TRA

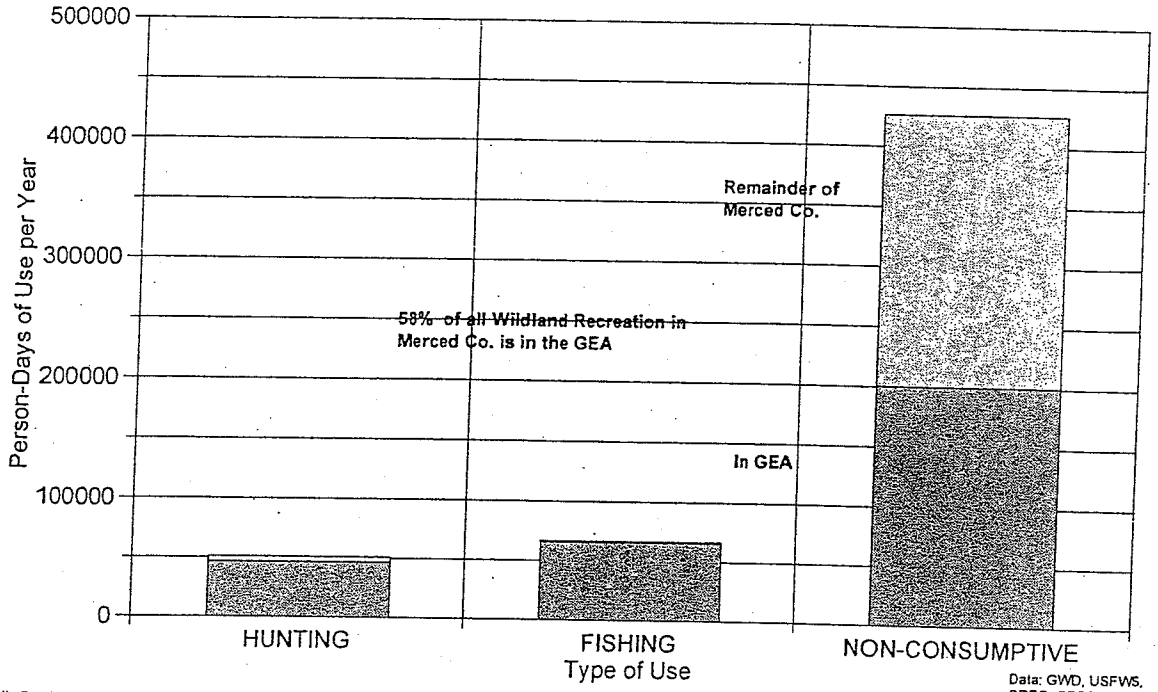
Figure 5 Participation in Land Management in Grassland Ecological Area



CGWDtalk; Mgmt Lands
05/09/00

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

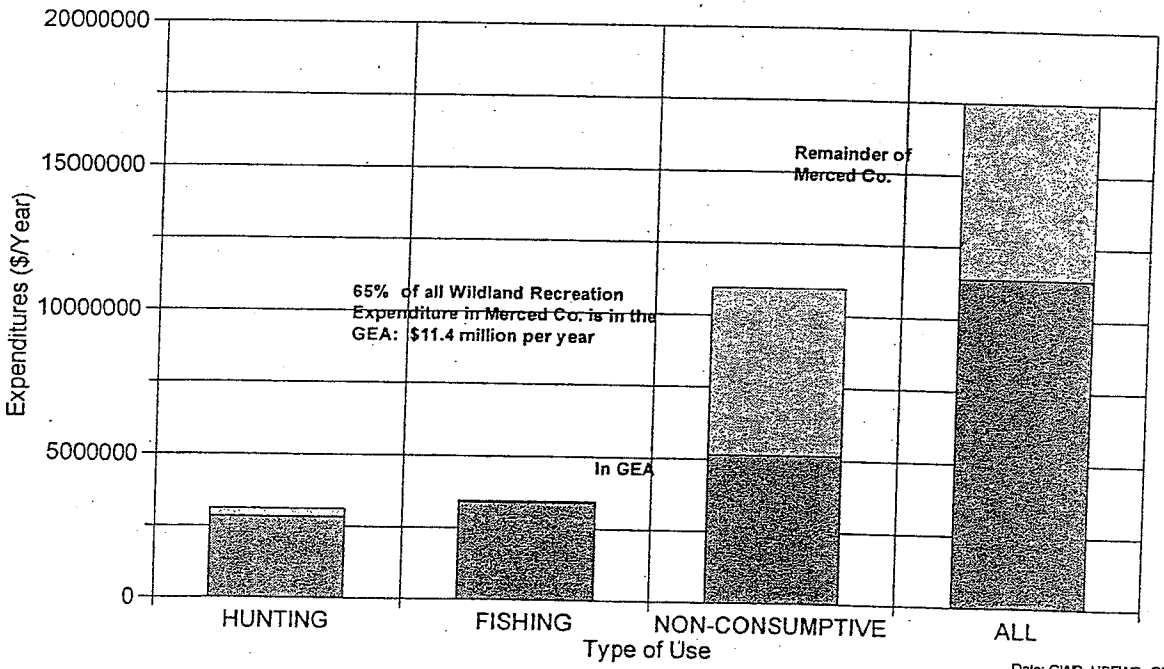
Figure 6
Recreation Use in GEA and Merced Co.



CGWDtalk; Rec Use
05/09/00

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

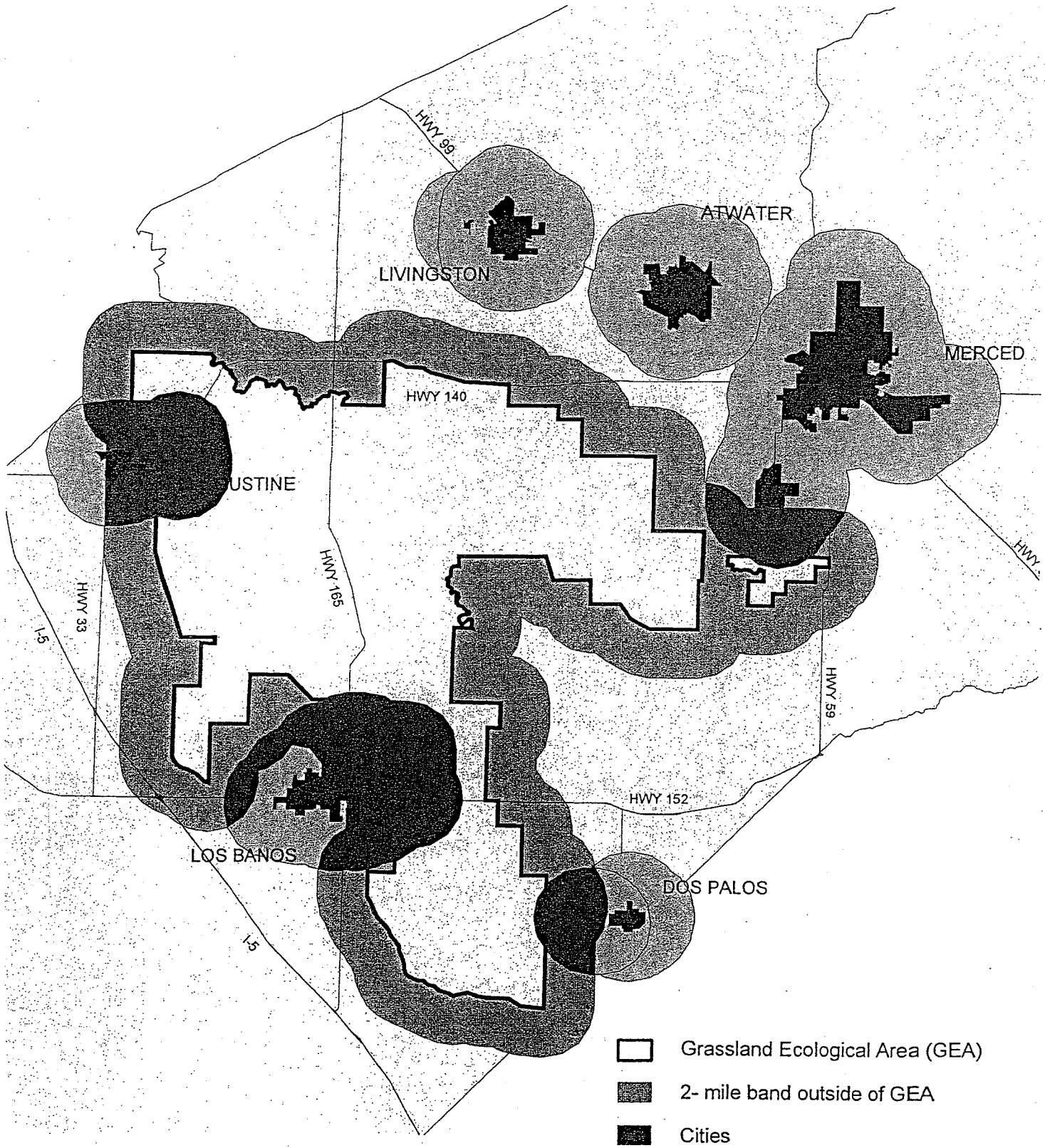
Figure 7
Recreation Value in GEA and Merced Co.



CGWDtalk; Rec Val
05/09/00

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

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



Grassland Ecological Area (GEA)
2- mile band outside of GEA
Cities
2-mile potential city expansion zone
Zone of conflict

N
0 1 2 3 4 5 Miles

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

APPENDIX 1

TABLES

SUMMARY TABLE 3-1: 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

PROGRAM SPONSOR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	TOTAL ACRES	ALL MERCED AVG/YR	GEA 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

PROGRAM SPONSOR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	TOTALS	ALL COUNTY AVG/YR	GEA ONLY
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	$168,278	$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

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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
ighty 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?
h So Hi	0	118	118		$3,500	$1,750	
alinas Land and Cattle	0	200	200		$15,000	$7,500	
Stevens Creek Quarry	84	0	84		$2,400	$1,200	
nderwood	0	152	152		$6,000	$3,000	DU
lebfoot	0	280	280		$10,000	$5,000	
1996 TOTAL	369	2130	2499	0	$135,351	$49,450	
ustine 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
ew McNamara	0	173	173		$38,978	$0	DU
amacclotti-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	
97 TOTAL	47	3449	3496		$1,097,163	$61,000	
240 Gun Club	0	240	240		$14,200	$7,100	DU
(istle Duck Club	0	712	712		$116,545	$10,000	WCB, NRCS
(ibles 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
S linas 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
HOLUSTER 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
Ramacciotti-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 Islan	$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 B-1 (rev. 2/20/00)

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

	MCCONNELL 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
L ;ERS IN FEDERAL WILDLIFE REFUGES (GEA) 1996-1998

	SAN LUIS NWR	MERCED NWR	FEDERAL TOTAL
1: 8 TO 1999			
H ıting			
Waterfowl	7842	668	8510
^ther game birds	0	0	0
ammals	0	0	0
Total Hunting	7842	668	8510
Fishing	65640	0	65640
N -Hunting Uses	92992	91790	184782
TO TALS 1998/99	166474	92458	258932
9 7 TO 1998			
ıting			
Waterfowl	6736	1110	7846
(her game birds	0	0	0
ammals	0	0	0
otal Hunting	6736	1110	7846
is ing	54700	0	54700
c -Hunting Uses	91168	89990	181158
OTALS 1997/8	152604	91100	243704
9 TO 1997			
unting			
Waterfowl	5305	493	5798
C ıer game birds	0	0	0
Mammals	0	0	0
otal Hunting	5305	493	5798
sl ıg	52027	0	52027
or Hunting Uses	92017	86989	179006
OTALS 1996/7	149349	87482	236831
9 TO 1996			
ınting			
Waterfowl	5067	353	5420
O er game birds	0	0	0
Mammals	0	0	0
tal Hunting	5067	353	5420
sh ıg	32085	0	32085
on Hunting Uses	71171	75554	146725
OTAL 1995/6	108323	75907	184230
9 TO 1995			
nting			
Waterfowl	3429	180	3609
Ot er game birds	200	0	200
Mammals	0	0	0
tal Hunting	3629	180	3809
h g	4964	0	4964
n Hunting Uses	17642	11701	29343
TALS 1994/5	26235	11881	38116

ır e: 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

	Existing	Change from 1996 to 2040				Total 2040	
		< 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 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 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 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	All Cities	Unincorp Area (1)	Total 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

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 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5a Los Banos NE (1)	5b Los Banos SW (1)	6 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

By Crop Type and City (1)

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5a Los Banos NE	5b Los Banos SW	6 Merced	All Cities	Unincorp.	Total County
Acres Urbanized										
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%

By Crop Type and City

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5a Los Banos NE	5b Los Banos SW	6 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

By Crop Type and City

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5a Los Banos NE	5b Los Banos SW	6 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 6 - CITY FISCAL IMPACTS: 2040
($000 97 dollars)

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 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)

TA___A CO... - 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.

TA 3B - L... IL OF ...STING ... 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								
Planning	$179,421	$15,882	$9,698	$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 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 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.

	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities
For City Infill							
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 Low	Cost/Ac Compact (+20%)
Sewer Main	40	$35	$1,400		
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	- - - - -	- - - - - - >
		Resident	Jobs	Unincorp only	Case Study
Taxes					
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	
Property Tax Share	$20,403,282
Agriculture Share	$19,540,621
Wetlands Share	$715,764
Unincorporated Only - Total	$146,897
Resident Share	$3,374,374
Job Share	$2,687,243
	$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	
Agriculture Share	$7,349,430
Wetlands Share	$3,562,487
Roads Share (acre related)	$160,000
Unincorporated Only - Total	$3,626,943
Resident Share	$3,162,004
Job Share	$2,518,118
	$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				
Net Per Acre		**$8,631,481**	**$786,023**	**$393,012**
Percent Reduction of Net Revenue		$7.43	$9.10	$9.10
			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				
Per Acre		**$112,297**	**$6,805**	**$3,402**
Percent Reduction of Net Revenue		$0.87	$0.87	$0.87
			6.1%	3.0%

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

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

(2) Strong Associates - based on interviews.

GRASSLANDS ECOLOGICAL AREA (GEA) IMPACTS

	Existing	Lost to Urbanization: 2040					
		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).

	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										
Wetlands - only (1)	**603,162**	**47.6%**	**38,602**	**21.5%**	**17,961**	**11.2%**	**2,513**	**7.6%**	**15,448**	**12.2%**
Other			90,072	50.2%						
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 3B - GLA - AG SALES & JOBS: 1998

Agricultural Uses	Acres	Av. Sales/ac	Direct Sales	Total Sales (1)	Direct Jobs (1)	Total Jobs (1)
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

... & JOBS: 1998 - COUNTY & GEA

COUNTY-WIDE	GEA/Co Ratio	Dir/Tot Ratio	Direct Sales	Total Sales (1)	irect Jobs (1)	Total Jobs (1)
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)

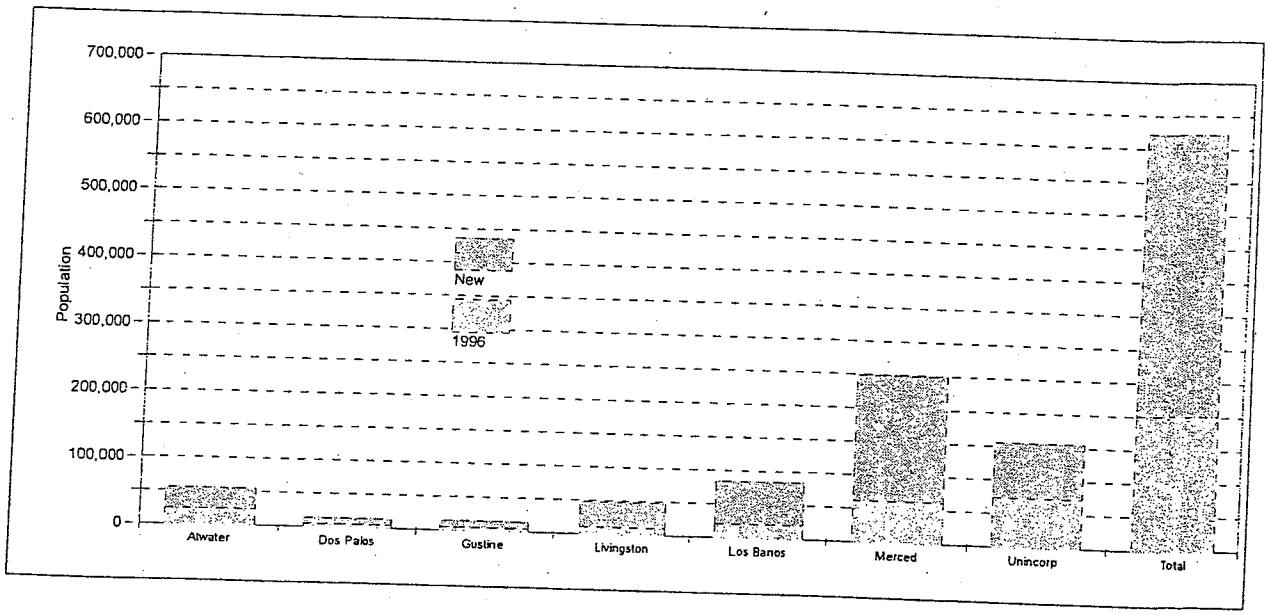
(5) Land Acquisition total of $2,157,000 is allocated to banking (40%) and personal income (60%)

WETLANDS SALES & JOBS: 1990 COUNTY & GEA

COUNTY-WIDE	GEA/Co Ratio	Dir/Tot Ratio	Direct Sales	Total Sales (1)	irect Jobs (1)	Total Jobs (1)
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**

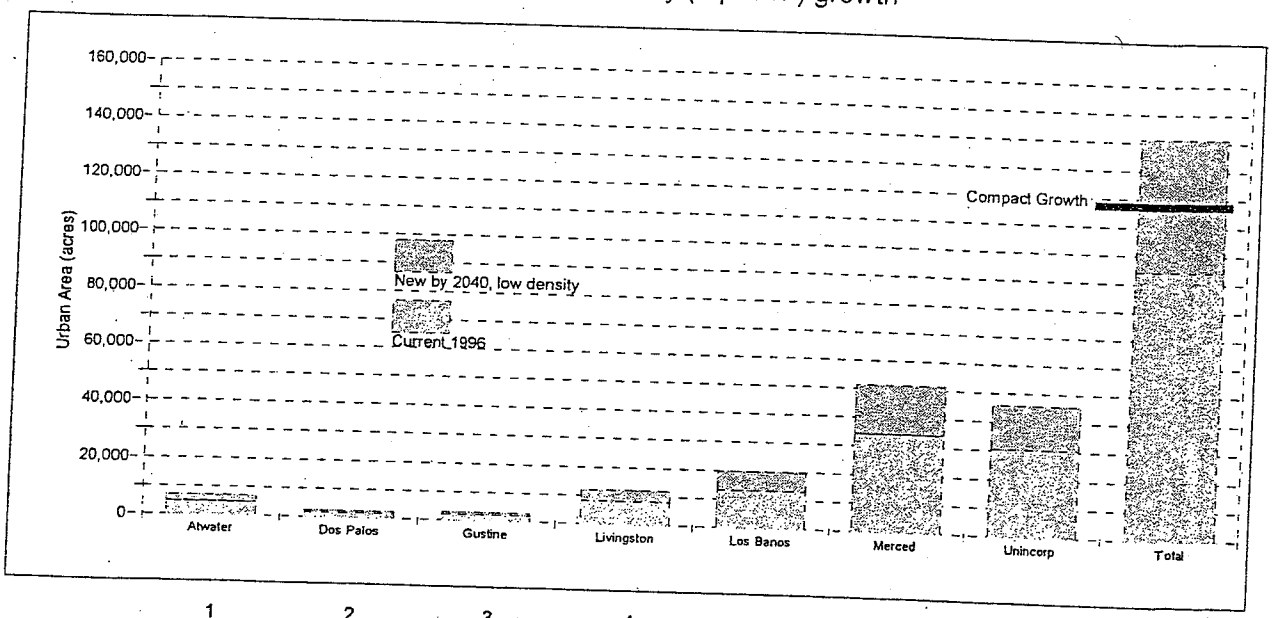
GEA ONLY		ST.& Fed	GWD (4)				
Land Maintenance Costs (2)		$8,297,383	$91,168	**$8,388,551**	**$12,096,954**	142	**202**
Other Land Costs (3)							
Structures			$198,192	$198,192	$274,267	2	3
Land Acquisition (Banking) (5)		$862,800		$862,800	$1,261,388	12	18
Land Acquisition (Income) (5)		$1,294,200		$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**

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



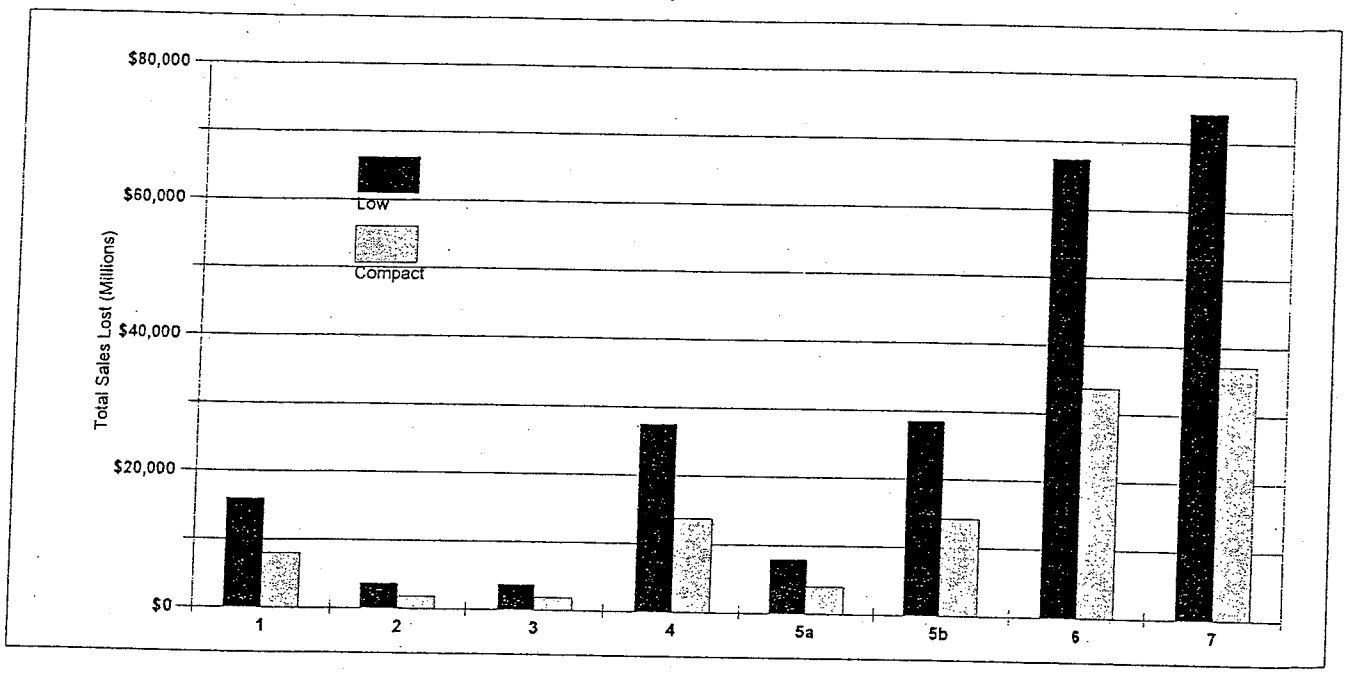
Population	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	7 Unincorp	Total
1996	23,672	4,430	4,216	10,508	20,694	61,712	73,290	198,522
New	31,046	8,965	10,683	37,963	63,567	187,526	82,184	421,934
2040	54,718	13,395	14,899	48,471	84,261	249,238	155,474	620,456
% Added	131%	202%	253%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

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



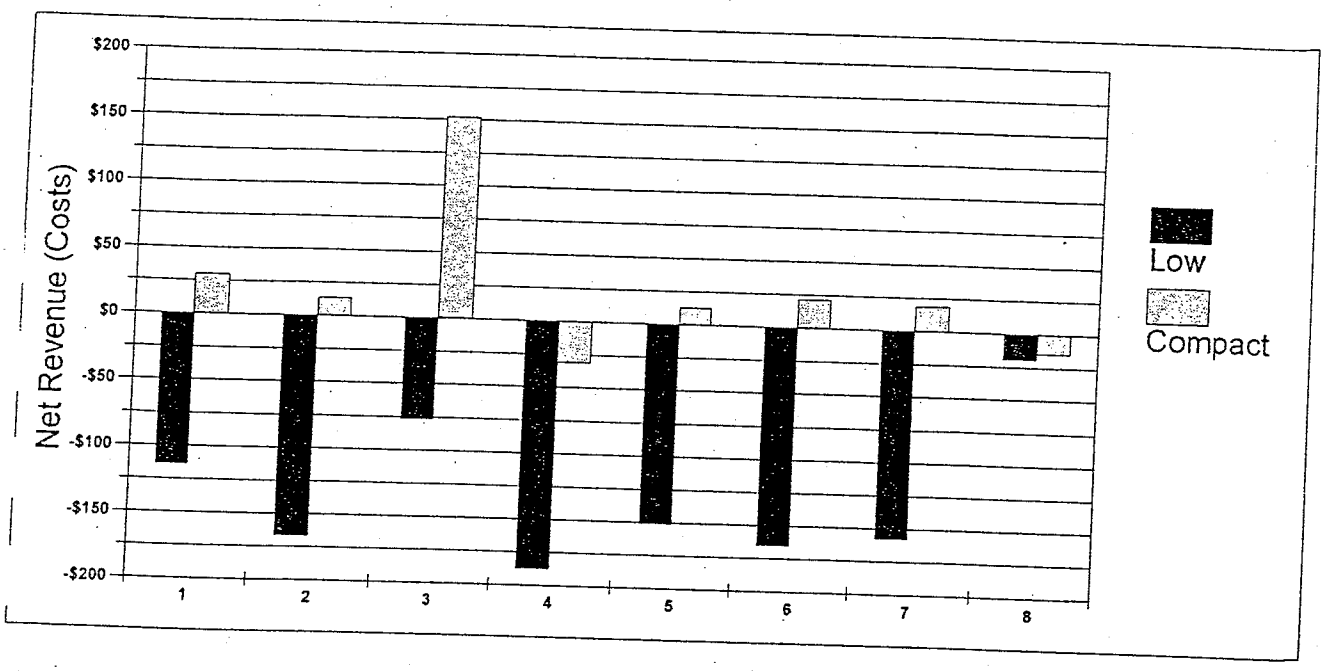
Acres	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	7 Unincorp	Total
Current 1996	3,540	780	771	2,222	4,294	11,267	27,255	50,130
New by 2040, low density	4,643	1,579	1,953	8,029	13,190	34,239	30,563	94,195
New by 2040, Compact	2,321	790	976	4,014	6,595	17,119	15,281	47,097

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
ɔw 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).

EXHIBIT 9

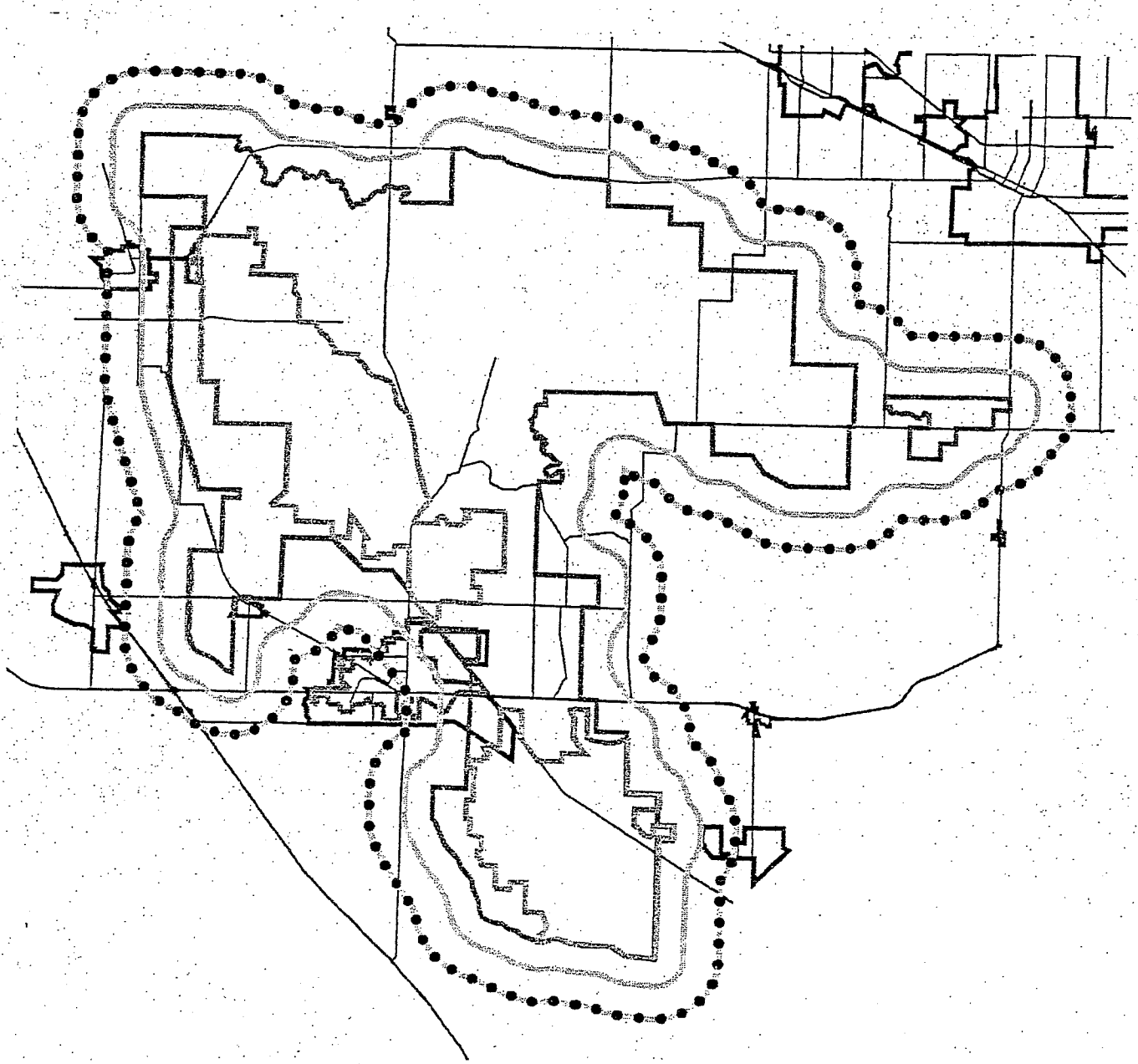
Thomas Reid Associates, Grassland Water District
Land Planning Guidance Study (January 23, 1995)

GRASSLAND WATER DISTRICT
LAND PLANNING GUIDANCE STUDY

January 23, 1995

Prepared for
Grassland Water District

Prepared by
Thomas Reid Associates



GRASSLAND WATER DISTRICT LAND PLANNING GUIDANCE STUDY

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GRASSLAND WATER DISTRICT LAND PLANNING GUIDANCE STUDY

Introduction

The wetland ecosystems of the Grasslands Management Area, known as the most valuable of the remaining wetlands in the Central Valley portion of the Pacific Flyway, are endangered by development and other human activities on surrounding and adjacent lands (Frederickson and Laubhan 1994). Like many semi-natural areas embedded in human-dominated landscapes, the Grasslands Management Area is threatened more by cumulative impacts that cross its boundaries and fragment its continuity than by outright destruction (Map 1, page 21).

The Planning Guidance Study identifies:

(1) Immediate, critical threats to wildlife habitat and steps needed to protect the habitat, and

(2) Long-term threats to habitat and programmatic mitigation that should be used to address these threats.

I. IMMEDIATE CRITICAL THREATS

The most immediate, critical threat to the integrity of the habitat is the urban expansion of the City of Los Banos to the east, which would effectively isolate the southern portion of the wildlife refuge from the northern portion (Map 2, page 22). An important first principle of conservation planning is to prevent the fragmentation of habitat. A second important principle is to maintain links between habitat patches for connectivity facilitating species dispersal and migration. The major area of connectivity between the north and south wetland habitats is also the area in which a number of pending and/or approved projects are being considered. Sound conservation planning would require that this area be maintained as a permanent wildlife corridor between two major habitat areas and that development plans be discontinued.

A. Biological Issues

The proposed Los Banos General Plan will have potentially adverse impacts on sensitive wildlife, including listed threatened species. Specifically:

- the proposed expansion of urban land uses at the eastern end of the city between the San Luis Canal and the Santa Fe Canal may affect waterfowl and shorebird utilization of both the north and south Grasslands by interfering with bird population movements in the corridor area between the two refuge areas. Any development to the east of the Santa Fe Canal will likely have an adverse effect on bird movements.

- road development along the San Luis, Santa Fe or other canals could result in take of a federally listed threatened species, the giant garter snake

- there are recent sightings of the San Joaquin kit fox, a federally listed endangered species, along Highway 152, reported by the California Department of Fish and Game.

Waterfowl and Shorebird Movements

Several studies, as summarized below, have recently documented the importance of this corridor to bird movements.

1) Fleskes data on pintail movements (Map 3, page 23):

A 3-year study (1991-94) of survival, habitat use, and movements of female northern pintail ducks wintering in the San Joaquin Valley was conducted by Joe Fleskes with the National Biological Service, California Pacific Science Center, Dixon, California. Each year, 120 to 180 female pintails were captured, radio-marked and released during August and September. Day and night locations of these ducks were determined by triangulation from truck-mounted directional antennae.

During the pre-hunting season, pintail distribution generally reflected and shifted according to the amount of available flooded habitat. For instance in 1991, early pintails were primarily concentrated on private wetlands in the South Grasslands and Volta Wildlife Area but moved to North Grassland clubs in early October as they became flooded. Day and nighttime locations during this period were often in the same or adjacent wetland.

During the hunting period, the pattern changed. Most pintails were located on National Wildlife Refuge and State Wildlife Area sanctuaries on hunting days (Wednesdays, Saturdays, Sundays) and flew to private wetlands in the evening. On non-hunting days, some pintails remained on private wetlands and some returned in the morning to sanctuaries. Most pintails present at Merced NWR during the day either remained there at night or flew to South Grassland duck clubs. In contrast, almost all pintails present at San Luis NWR and Los Banos WA flew to duck clubs in the evening. Most flew to North Grassland duck clubs, but flights to South Grassland clubs peaked during late November. There were three major morning and evening flight routes:

1) East-west between San Luis NWR/Los Banos WA and North Grassland duck clubs;
2) North-south movements between San Luis NWR/Los Banos WA/Merced NWR and South Grassland duck clubs;
3) Dispersal from Kesterson NWR to surrounding North Grassland duck clubs.

These data indicate the extreme importance of the corridor connection between the north and south grassland duck clubs in the daily movement of waterfowl through the GWMA. While many other species of ducks, geese, swans, raptorial, upland, shore and wading birds are found in the habitats of the GWMA, pintails are one of the dominant species among the waterfowl component.

There is no quantitative information as to the effect the imposition of urban use would have on current flight patterns, or what proportion of the ducks would selectively fly over wetland, agriculture or other open ground which could provide a landing place. Given the

extensive movements now occurring, it is likely that a major urban development east of Los Banos could disrupt the current movement pattern, and cause a diversion of many of the birds to avoid flying over the development.

2) Harvey and Stanley bird movement data re: Pajaro Vista site

Harvey and Stanley recorded movements of up to 6,000 shorebirds and waterfowl per hour in the north-south direction between the City of Los Banos wastewater ponds and the South Grasslands. Many of these were concentrated over the site of the Pajaro Vista project (see map). East of the Pajaro Vista site, bird movements were generally lower, ranging from 18 to 200 birds/hour.

Giant Garter Snake Impacts

The giant garter snake (*Thamnophis gigas*) was recently listed as threatened (1992) by both the state and federal governments (Map 4, page 24). The snake is a semi-aquatic species which uses canals as well as natural waterways for dispersal, feeding and escape from predators. The snakes crawl up on grassy banks and other sites above the water line for basking. If there is a traveled roadway within about 200 feet of a canal, the animals will use it as a basking site and major mortality from vehicular traffic is the result (Hansen and Brode, 1992)

Recent reconnaissance by George Hansen confirmed that viable garter snake habitat exists along both the San Luis and Santa Fe Canals. According to Hansen, there are potential supporting habitats (in the form of wetlands, grasslands, vegetated canals and drains) dispersed throughout the GWMA. North of Highway 152 these include the San Luis Canal, the Santa Fe Canal, and other existing vegetated canals and drains within USGS Los Banos topographic Map T 10S R 11E sections 16, 17 and 18, which presently run through agricultural lands, and other wetlands further north. South of Highway 152, natural or restored wetlands, irrigated pasture, drains and canals form a block of potential supporting habitat for giant garter snakes within the Los Banos USGS quad sections T 10S, R 11E 19, 20, 21 and 22 and extending further south.

Urban development such as the low-density and medium-density residential development to the west of the San Luis Canal will also adversely affect the giant garter snake population. The snake can be impacted by human disturbance, domestic pets (especially cats) and water pollution in runoff. The GGS is particularly sensitive to the effects of oil and grease which destroy the insulating properties of its skin and scales. Human disturbance includes collecting and killing the animals, trampling vegetation, littering and dumping, and killing the prey base (e.g with chemicals). Garter snakes are hunted by house cats.

San Joaquin Kit Fox Impacts

Impacts to the San Joaquin kit fox from continued urban growth include increased road kill mortality, loss of foraging habitat and denning sites. In addition, CDFG have documented young kit fox being attacked by bands of domestic dogs.

B. The Buffer Concept

With respect to the GWMA, there are two scales on which a buffer needs to be considered: (1) a buffer on the east side of the City of Los Banos which will protect the resources in the corridor between the North and South Grasslands and (2) the buffer around the entire Grasslands Wildlife Management Area which will effectively insulate the GWMA in the long-term from future encroachment of urbanization or other non-wildlife-compatible uses. This latter buffer concept is further discussed below under Means to Address Long Term Threats.

1. What is a "Buffer"? The applicable dictionary definition of buffer is simply "something that serves as a protective barrier." When this definition is applied to land use planning and conservation biology, the concept must be expanded to encompass a range of conditions and meanings. The purpose of a buffer is to protect a species and/or community of concern within a protected area from adverse effects that are caused by non-compatible land uses adjacent to or near the reserve.

To adequately protect a species or community of concern from adverse effects one needs to consider the behavior of the species of concern with respect to the outside environment, and separately, the effect of the outside environment on the species of concern within the reserved area. The combination of these two distinct sets of effects independently contribute to what constitutes an effective buffer.

For example, with respect to the giant garter snake (GGS), the life habits of the garter snake determine the need for a buffer in the following manner. The GGS is one of the federally listed endangered species which occurs in the study area, the species is dependent on water channels (e.g. canals) for short-term escape from predators and for dispersal. The species will crawl up a grassy bank next to a canal to bask as part of its thermoregulation. Giant garter snakes have been observed numerous times to crawl as far as 200 feet laterally from a canal, but rarely, if ever more than 300 feet (G. Hansen, pers. comm.). If there is a road within the 200 feet, this will preferentially attract the garter snakes as a basking site, and if the road is more than very lightly travelled, then the probability of the snakes being killed by vehicular traffic is high. Therefore, from the point of view of snake behavior, to be effective a buffer must not contain a public road within 200 to 300 feet of the nearest garter snake habitat (e.g. the canal).

From the point of view of incursions into the habitat from the outside, if there is urbanization close to habitat, or access to habitat areas, then the snake can be adversely impacted by human disturbance, domestic pets (especially cats) and water pollution in runoff. The GGS is particularly sensitive to the effects of oil and grease which destroy the insulating properties of its skin and scales. Human disturbance includes collecting and killing the animals, trampling vegetation, littering and dumping, and killing the prey base (e.g with chemicals).

For these impacts, the type of barrier between land uses may be more important than the mere width of the buffer per se. For example, a residential subdivision can be separated from a wetland or canal by intervening agricultural land of different widths. If there were 200 feet of beet or alfalfa fields separating the subdivision from the nearest habitat, this might distract or discourage humans crossing to the habitat, since they would be trespassing over a farmer's field, which could be posted. If the width of the field were doubled, it would act as a greater deterrent to humans since there would be a greater distance of

agricultural land to cross, and the habitat would be more distant in the view, and therefore less "attractive."

On the other hand, neither 200 nor 400 feet of agricultural land would act as much of a deterrent to cats, except that with a greater distance to cross, a cat could become distracted or decide to turn back before it encountered the habitat. However, once a cat had learned that a hunting ground existed, they would likely deliberately seek the area out irrespective of the relative distance, since house cats, both domestic and feral, have been recorded to travel many miles.

In both cases, a relatively impenetrable barrier between the habitat (canal) and the subdivision, even if only a few feet wide, could be more effective in preventing incursion of impact sources than would several hundred feet of agricultural land. For example, a strip of chicken wire between the ground and one foot off the ground, with blackberry bramble (*Rubus ursinus*) growing on top of it, could be extremely effective in preventing both humans and cats from reaching the canal, even if the blackberry bushes were only ten or twenty feet thick.

Regardless of the separation between a subdivision and habitat, water pollution in runoff from the subdivision could be prevented from reaching the habitat, if all of the runoff flowed to a drainage system which trapped and removed the oil and grease before any of the water could flow offsite.

C. Recommended Actions to Avoid Fragmentation and Impacts to "Corridor" Area

1. Overall Recommendation

The overall recommendation with respect to buffers is to use a combination of buffering techniques on different scales:

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

2. Specific Land Use Changes Recommended for Los Banos General Plan

a. Legal Requirement for an HCP

The proposed Los Banos General Plan, or projects contemplated thereunder, are subject to federal and state permits under the respective Endangered Species Acts, and require Habitat Conservation Plans. Pursuant to the federal and state Endangered Species Acts, actions which could result in a take of listed species are subject to permits. Federal actions such as highway or water delivery system improvements involving federal funding come under Section 7 of the federal ESA, and require a consultation between the involved federal agency and the USFWS. In order for the action to proceed, the USFWS must issue a Non-Jeopardy Biological Opinion stating that the project will avoid take of the listed species

or that adequate mitigation has been incorporated into the project so that the project will not adversely affect the survival or recovery of the species in the wild.

For local agency and private actions, activities in listed species habitat are subject to Sections 9 and 10 of the ESA. Take of the species is prohibited under Section 9 unless a permit is granted under Section 10(a). The permit is granted only if the proposed action incorporates a Habitat Conservation Plan (HCP) which fully mitigates the expected impacts of the project. The relevant permit on the state level is the 2081 permit.

Actions under the proposed Los Banos General Plan which could result in a take of listed species include the proposed 152 bypass and its interchanges, residential, commercial and industrial development adjacent to 152 in the eastern portion of the city, and the residential and industrial development areas designated to the east and immediately west of the San Luis Canal. Development of the college site south of the proposed bypass would be growth-inducing to the immediate area, and would thus result in both direct and indirect loss of habitat and increase in local traffic. Overall growth, and the development particularly in the eastern portion of the city would cause increased traffic levels on the existing Pacheco Boulevard, on the extension of Pioneer Road to the east, along the proposed 152 bypass, and the proposed road along the Santa Fe Canal would introduce or increase vehicular traffic along each of these transportation corridors. This traffic would in turn result in road kill mortality to both San Joaquin kit fox and giant garter snake. As mentioned above, other sources of impact include direct habitat loss, hunting, collection, predation by domestic animals, and water pollution in runoff.

The City of Los Banos may either have to prepare a citywide HCP which addresses and mitigates all potential impacts to listed species, or the General Plan must include the condition that any project within the known or suspected habitat of a listed species must obtain a 10(a) permit subject to an HCP prior to approval.

The preparation of an HCP, and USFWS processing of an 10(a) permit application are difficult, expensive and time-consuming processes which will significantly delay the implementation of projects under the new General Plan.

b. Avoidance of an HCP

In order for the City of Los Banos to avoid the need for endangered species take permits, we are proposing an alternative to the General Plan which is designed to avoid *a priori*, the majority of impacts to listed species in the area east of the city. In addition, these proposed changes would offer a major land use transitional area that would permanently buffer the threatened or endangered species, waterfowl and shorebirds in the wetlands east of the Santa Fe grade from the effects of future urban growth in Los Banos. The changes we are proposing are described below and shown on the attached map (Figure 1).

The alternative General Plan configuration we show would constitute an environmentally superior alternative under CEQA. We suggest that either the General Plan be revised to incorporate these changes as part of the Proposed Project, or that this alternative be studied in detail in the Draft EIR as part of the environmentally superior alternative.

In identifying what these changes should be, we define three categories of impact of land use on birds and other wildlife: resource beneficial, resource neutral and resource negative.

Resource beneficial means that land uses in the area should directly benefit the species of interest by providing food, shelter and other habitat requirements, and should minimize or eliminate all sources of adverse impacts to the species. Resource beneficial land uses include natural wetlands, uplands, managed duck clubs, irrigated pasture and some types of cultivated agriculture, such as rice.

Resource neutral means land uses that may or may not provide a direct benefit to the species of interest, but do not create adverse impacts to the species, and act to buffer the resource beneficial areas from the effects of urban uses. Resource neutral land uses are primarily cultivated agriculture.

Resource negative uses are uses which have little or no habitat value to the wetland-dependent species of interest, and result in adverse impacts to the species. Resource negative uses encompass most urban uses, including residential, commercial and industrial, as well as developed parks, bicycle trails, and golf courses.

In general, as shown on the attached map (Map 5 & 6, pages 25 & 26), we are recommending that all uses east of the Santa Fe Grade should be resource beneficial; between the Santa Fe Grade and the San Luis Canal, all uses should be resource neutral, with an additional buffer of at least 200 to 300 feet to the west of the San Luis Canal, specifically for the giant garter snake.

The specific changes we are proposing for the Los Banos General Plan are as follows:

a. The area proposed to be zoned I industrial between San Luis Canal and Santa Fe Grade (Map 6, page 23) should be rezoned to agriculture (AG). This would have the effect of protecting giant garter snake habitat in the Santa Fe canal, and buffering the lands east of the Santa Fe Grade from the nearest urban uses in Los Banos.

b. A 200 to 300-foot additional buffer strip of agriculture should be provided on the west side of the San Luis Canal, within the area proposed to be zoned LD. The area immediately adjacent to the canal should be planted with impenetrable hedgerow vegetation (e.g. blackberries) to reduce human and domestic animal access to the canal habitat and the GGS.

c. There is ample land south of the Highway 152 bypass and west of the corridor area that could be rezoned I to compensate for the loss of the I acreage east of the San Luis Canal, without any loss in I zoned area. This would have the effect of leaving a resource neutral use between the San Luis and Santa Fe Canals.

d. Frwy 152 bypass in the east part of Los Banos should be moved 200 feet to the west to move this away from the San Luis Canal to reduce impacts to the GGS.

e. To reduce road impacts to the GGS and kit fox, the proposed freeway interchange at the Pioneer Road extension should either be eliminated or re-designed to serve only the area west of the Highway 152 bypass.

f. All development east of the Santa Fe Grade should be eliminated to protect the contiguity of the north and south Grasslands. The area should be designated for permanent resource-beneficial open space uses.

g. No new roads should be built or improved adjacent to the Santa Fe Grade or other canals to protect habitat for the Giant Garter Snake. The proposed major roadway along this canal should be eliminated.

i. To reduce road impacts to the kit fox and preserve the resource neutrality of this zone, the proposed major roadway that would be an eastward extension of Pioneer Road into the Ag zoned area is growth-inducing, and should be eliminated.

j. The College site currently designated south of Highway 152 and the proposed bypass should be moved to outside the sensitive corridor area east of Los Banos. One option that could be explored is a land swap that could be negotiated with the California Department of Fish and Game.

k. The stormwater flow from the City of Los Banos which is discharged into the San Luis Canal must be treated or pre-treated by source control to prevent heavy metals, oil and grease from entering the canal.

c. Consider "Compact Growth Alternative"

The City of Los Banos needs to consider compact growth instead of expansive growth. The proposed new General Plan defines several growth zones around the city larger than the existing City Limit, including the Urban Limit Line, the Sphere of Interest and the Urban Influence Boundary Line. These areas are much larger than the existing city, and the NOP acknowledges (p. 5) that for example, the "Sphere of Interest is significantly larger than the current City Limits, and contains more land than the City is projected to need over the next 20 years."

The area that has been designated for urban uses in the new General Plan within the Planning Area Boundary but outside the existing City Limit is one and one half times as large as the area within the existing City Limit (new urban designated area 8,000 acres; existing city limit, 5,036 acres).

The projection of the land area needed for growth to the year 2020 shown on p. 6 of the NOP is based on the "calculated" growth projection, which is supposed to be the average of the last 5 and 10 year average growth, according to Valley Planning Consultants, and incorporates the 1993 "mini building boom" where the city experienced 10% growth in one year. This analysis shows that the City would need an additional 6,079 acres of land to accommodate the growth as shown on the table. Based on the acreages listed in Table 2 (p. 6) of the NOP, the 3,405 acres of low-density, 343 acres of medium density and 190 acres of high density-designated acreages would accommodate 23,305 new dwelling units (65,720 more persons), or 162 years of growth at the historic rate that prevailed between 1980 and 1992. The "calculated" growth area shown in Table 2 requires 6,079 acres, which is *2,000 acres less* than the area designated as urban in the new General Plan. Thus, even the inflated calculated growth projections do not seem to warrant the 8,000 acres proposed to be designated urban in the new General Plan.

On the other hand, we have done an independent analysis of the amount of growth that could be accommodated on vacant lands within the existing City Limit of Los Banos, based on the demographic data from Urban Research Associates, compiled for the City of Los Banos, and the existing General Plan, as shown on the attached pages copied from referenced documents. This analysis, shown in our Table 1, illustrates that about 6,600 residential units and over 8 million square feet each of commercial and industrial development could be built on vacant land within the existing city limit, without any expansion of the city into neighboring areas.

The demographic data in the attached Table 1 "Housing Trends in Los Banos and Neighboring Cities", from Urban Research Associates, showed that between April 1980 and January 1992 the number of housing units increased from 3,944 to 5,657, an annualized increase of 1,749 units in 12 years, or 146 units per year. At this rate, the remaining vacant land within the existing city limit could accommodate growth in Los Banos over the next 45 years, or well beyond both the 20 year stated planning horizon for the General Plan, and the 2020 planning horizon used for the projections in the NOP.

The rate of growth of Los Banos will be tied to the overall condition of the California economy. Indications are that the growth rate over the 1980 to 1992 period encompasses both faster and slower economic times and would be more indicative of a long-range trend than the calculated value used in the NOP. It therefore appears that the major expansion of land area as contemplated in the new General Plan may not be needed for the foreseeable future, and certainly not within the time frame the new General Plan is supposed to address.

A compact growth alternative would stipulate that infill on vacant lands within the existing City Limits, already designated for each type of use take place before there is outward expansion of the city urbanized area. The compact growth alternative would have other advantages as well. The provision of infrastructure to outlying areas is inefficient and extremely expensive. The compact growth alternative, which would eliminate the need to extend water, sewer, fire, police services and schools to outlying areas, would be far less expensive than the proposed General Plan.

d. Mitigation for stormwater discharges

Stormwater discharges can adversely affect the San Luis Canal and wildlife habitat. The City of Los Banos has a contract with the GWD to discharge urban stormwater to the San Luis Canal, which is used to supply Central Valley project water to the wetland habitat north of Hwy 152. Stormwater from the entire east side of the city is currently discharged to the San Luis Canal. The city is required to monitor both the quality and quantity of runoff in the San Luis Canal. It has been shown that during peak runoff periods the runoff can exceed the contractual limits. In addition, while the city is small and there are few industrial sources, pollutant loading is low and there is high enough dilution. However, with the contemplated growth in urban uses, pollution of the San Luis Canal by oil and grease, heavy metals, and toxics could become a problem.

Urban pollution, as mentioned, can adversely affect giant garter snake using this canal, as well as wildlife for which the canal is used to supply water. Therefore, the Master Storm Drain Plan, as part of the General Plan, should include mitigation for the impacts of

pollution giant garter snake and on birds. Mitigation includes pre-treatment, heavy metals catch basins, filters for oil and grease removal, and best management practices.

e. Mitigation for Wastewater Treatment Ponds

The present and future wastewater disposal system for the City of Los Banos can have adverse impacts on wildlife. The present City of Los Banos, with a population of just over 16,000 persons and little industrial development currently utilizes a wastewater treatment plant that provides only primary treatment (grit removal and solids settling), followed by aeration in large oxidation ponds. The ponds are located in the northeast portion of the city, to the east of the Santa Fe Canal (Santa Fe Grade). Because of the preponderance of residential flow in the overall wastewater stream, there has not been a problem with toxics or heavy metals. However, the few industrial sources entering the wastewater are not required to pretreat their wastewater, and have contributed a high biochemical oxygen demand (BOD) to the waste stream (M. Teague, pers. comm.)

Large numbers of waterfowl and shorebirds have been observed on the ponds, which they use for resting and feeding. At present there is a concern on the part of the GWD and other resource agencies that the high concentrations of birds using these ponds is increasing the incidence of avian cholera. According to the USFWS field office in Los Banos, bird use of the Los Banos sewer ponds has been correlated with outbreaks of avian cholera among the local waterfowl populations. Mortality of Aleutian Canada Goose, a listed endangered species due to avian cholera, has been linked to the use of sewer ponds by this species in the northern San Joaquin Valley.

The agents in the wastewater responsible for avian cholera transmission are not completely understood, but one hypothesis being studied is that the calcium/magnesium ratio in the wastewater is favorable to the growth of avian cholera bacteria. The high densities of birds congregating on the ponds then leads to increased transmission of the disease within the bird populations.

Based on the analysis presented in the NOP for the EIR on the city's General Plan, the population of Los Banos is projected to grow from its present 16,000+ to between 40,000 and 60,000 by the year 2020. In addition, areas of the city are designated for commercial, commercial manufacturing, light industrial and industrial uses. The growth in population will increase the wastewater volume and the area needed for treatment, if the present method of sewage treatment were to continue. In addition, future commercial and industrial uses can introduce toxic components into the wastewater, such as heavy metals and chlorinated organic chemicals.

An increase in pond area would increase the surface area available to waterfowl and shorebirds, and could further increase the numbers of birds using these ponds as a resource, thereby further increasing disease risk within these populations. More significantly, the introduction of toxic components into the wastewater can pose new, more serious risks to the avian populations. Heavy metals are not removed by ordinary sewage treatment processes. Metals such as chromium, nickel and selenium are toxic to wildlife and may pose a significant health threat to the larger number of birds using the ponds.

If adverse impacts to waterfowl and other birds can be traced to the existing wastewater treatment ponds, mitigation could require the City changing to a more advanced

waste treatment process that eliminated such ponds. Alternatively, if the City were to provide high-level (e.g. tertiary) treatment, then instead of oxidation ponds, the clean water could be put into percolation ponds which would both provide pond habitat for wildlife and recharge of the groundwater.

When the city's population reaches a certain size, it is likely that the Regional Water Quality Control Board will require a higher degree of wastewater treatment (ie. secondary or tertiary treatment). Possible funding sources for a new wastewater plant include local sewer connection fees imposed upon new development and loan funding from the California State Revolving Fund for Construction of Wastewater Treatment Facilities administered by the State Water Resources Control Board.

TABLE 1
CITY OF LOS BANOS
DEVELOPMENT POTENTIAL ON VACANT LANDS

CATEGORY	VACANT ACRES			
RESIDENTIAL		TYPICAL DENSITY (DU/ACRE)	DWELLING UNITS POSSIBLE	SQUARE FEET POSSIBLE
PD	142.4	10*	1,420	
Low-Density 1-7 DU/ac	830.14	5	4,151	
Medium Density 8-17 DU/ac	31.32	10	313	
High Density 18-22 DU/acre	47.9	15	718	
TOTAL RESIDENTIAL	1,051.8		6,603	
COMMERCIAL		TYPICAL FLOOR AREA RATIO		
Neighborhood Commercial	12.7	.37		204,700
Retail	4.24	1.25		230,870
General	48.33	.42		894,733
Highway Commercial	368.3	.42		6,738,122
TOTAL COMMERCIAL	433.57			8,068,425
INDUSTRIAL				
Planned	255.4	.40		4,450,090
General	191.8	.50		4,177,400
TOTAL INDUSTRIAL	447.20			8,627,490

SOURCES: Urban Research Associates. December 1992. "Demography and Economic Development in Los Banos, California. The State of the City."
City of Los Banos General Plan.

* PD-zoned areas do not have a target density. Density is negotiated and can be any of the permitted residential densities allowed under the Los Banos General Plan. In practice, PD densities, considering other PD uses such as golf courses, have resembled multi-family more than single-family densities. Therefore, we have assumed a medium-density residential figure for the PD acreage as an "average" of what could be accommodated.

The historic rate of growth in residential development between 1980 and 1992 (12 year period) was 143 units per year. At this rate, and not even including the PD category, 1,052 acres of vacant land within the existing municipal boundary of Los Banos, could, by infill, accommodate growth over the next 36 years, without annexing any additional lands to the City. This would almost double the existing number of dwelling units and population.

II. LONG-TERM THREATS

Longer-term threats to the integrity of the resource conservation district will result from land use changes near the boundary of the district which will encroach on the district. Certain portions of the District boundary are already protected by virtue of already being in federal or state ownership (Map 7, page 27) or conservation easement. Other portions lie adjacent or near existing cities and communities that are slated for long-term growth. Over a period of 10 to 50 years, outward growth of these cities and communities will eventually threaten the integrity or functioning of the refuge areas. In addition, certain non-urban land uses, such as agricultural practices that do not take into account the seasonal needs of wildlife, on the periphery of the refuge may also be relatively incompatible with wildlife utilization.

A. Lands to be Protected -- The Buffer Principle as Applied to the GWMA

From the point of view of the entire reserve, the principles of conservation biology dictate the need for an overall buffer or transitional area between the interior of the wildlife reserve itself and the nearest completely incompatible (i.e. urban) uses.

- A narrow "barrier type" buffer is not practical for an area of almost 200,000 acres

- The value of the reserve has been described in terms of the ratio of interior to "edge". Edge is the boundary where the effects from the outside environment interact with the reserve. These effects include trespass, poaching, vegetation destruction, pollution in runoff, littering and dumping, noise, glare, predation and disease introduction from domestic animals/pests, mosquito spraying, destruction of wildlife prey and food species, invasion by exotic plant species, movement of reserve animals into inhospitable habitats etc. (Meffe and Carroll, 1994).

- The greater the ratio edge to interior, the more the interior of the reserve is impinged upon by outside impacts, and the less true, protected "interior" habitat remains (see diagram).

- The effect of edge is shown by the area to perimeter ratio. A reserve with a large interior compared to edge will have a large area to perimeter ratio, while a reserve with an unfavorable ratio of edge to interior will have a lower ratio.

- The same principle regarding edge that applies to the reserve and the surroundings, also applies to the need for a buffer. According to Meffe and Carroll, 1994,

  "the boundary model encourages the creation of buffers around reserves to increase available habitat... and to decrease exposure to adverse conditions from the developed world....If the generated edge forms within a buffer rather than within the reserve, then it is an added positive feature."

The effect of a one-mile versus a two-mile wide buffer is shown by computing the area to perimeter ratio around the GWMA.

GEOGRAPHIC AREA	AREA (HECTARES)	PERIMETER (METERS)	RATIO	SHAPE FACTOR
GWMA	72,657	766,817	0.095	8.03
GWMA + 1-mile buffer	108,043	688,750	0.157	5.91
GWMA + 2-mile buffer	140,549	662,161	0.212	4.98

The rapidly increasing area to perimeter ratio is due to the change in "shape factor" of the total area inside the boundary. The shape factor is the relative amount of boundary ("edge") of the shape in question compared to the same area if its shape were a circle. A circle has the minimum ratio of perimeter to area of 1.0. The closer the area/perimeter ratio is to 1.0 the less its shape factor and the more favorable is the protected quality of the interior.

The GWMA with no external buffer has a shape factor of 8.03, meaning that its perimeter is 8 times more convoluted than a circle of equivalent area. The addition of a 1 mile buffer has reduced its shape factor to 5.91, and its effective edge or connectivity with outside influences by 26%. A two-mile buffer would reduce the shape factor to 4.98, and the effective edge by 38% from the GWMA boundary alone.

B. Effect of Likely Urban Expansion on Refuge Boundary

Using the GIS information on municipal boundaries and spheres of influence in relation to the GWMA boundary (Map 8, page 28), it was possible to determine whether the creation of a 1-mile buffer around the perimeter of the GWMA would impinge upon future expansion of the cities within the study area into their spheres of influence. The results were as follows:

SPHERE OF INFLUENCE LINE WITHIN ONE MILE OF GWMA BOUNDARY	SPHERE OF INFLUENCE LINE NOT WITHIN ONE MILE OF GWMA BOUNDARY
Gustine Volta Los Banos Santa Nella	Merced Atwater Dos Palos

Thus, within a 50-year planning period one can expect that traditional outward expansion of four of the seven existing urban communities in the study area will impinge on the wildlife area boundary, without buffer zone protection.

Using the principles developed above regarding the City of Los Banos, the overall recommendation is that all uses within the one to two mile buffer zone be *resource neutral* or *resource beneficial*, and that no *resource negative* uses be permitted by county, city or community plans within the buffer area.

C. Public Policy implementation methods

1. Economic Importance of the GWMA in the Region

The primary objective of adopting a new General Plan, and establishing spheres of influence around the existing urbanized area, is to promote the economic growth of Los Banos. Economic growth has traditionally been associated with economic prosperity. However, the rapidly escalating capital cost of providing new infrastructure, combined with the growing public reluctance of Californians to increase bonded indebtedness for public improvements, is changing the traditional picture.

The City of Los Banos is in the relatively unique situation of being located in close proximity to an immense wildlife resource area. The resource area was established by the USFWS under the authority of the Migratory Bird Treaty Act. That resource area has economic importance, by virtue of the public investment made to establish and maintain the resource area, and the monies spent in association with utilizing the resource area. The economic health of the City of Los Banos may be more dependent on long-term positive interaction with adjoining resource uses than with conventional urban development within its boundaries.

With respect to the above recommended changes to the Los Banos General Plan designed to reduce impacts to wildlife, the Grassland Water District should be recognized as an important element in the economy of Merced County, and a major contributor to the economic vitality of Los Banos itself. One example is the duck hunters, fishermen and others who purchase supplies, stay in hotels/motels, eat in restaurants etc. within the City.

Federal and state funds in excess of $41 million in 1994 dollars have been expended to acquire lands in putting together the refuges which now exist. In addition, well over $1

million is spent annually on restoration and enhancement on public and private wetlands within the Grasslands WMA. These are substantial commitments of funds whose value should be integrated into the City's and County's planning process.

Stoll (1989) estimated the total value of wetlands for recreation in California as $160 million, or $330/acre/year. For the GWMA, this would translate to $59.2 million annually for an area the size of the GWMA. A study by Loomis (1991) of the willingness of the public to pay to preserve San Joaquin Valley wetlands showed that the public was willing to pay up to $3,337 per acre to preserve wetlands, which for the GWMA would translate to almost $600 million. Table 2 is a summary of the expenditures by California residents and other participants for hunting, fishing, and passive recreation (bird watching, photography, sight-seeing etc.) in 1991. Total expenditures were over $2.6 billion statewide (USDI, 1991). The International Association of Fish and Wildlife Agencies (1994) reported that in 1991 migratory bird hunting general $129.1 million in retail sales, and including salaries and wages for an additional 3390 jobs created to serve migratory bird sporting activities, had a total economic multiplier effect equal to $281.5 million.

The area encompassed by the public and private wildlife refuges in the region vastly exceeds the acreage in any incorporated city or its sphere of influence, and undoubtedly exceeds the area of the all the incorporated cities together. Current data from the World Conservation Monitoring Centre (8/15/94) compiling the United Nations List of National Parks and Protected Areas lists 277 formally designated National Wildlife Refuges in the continental United States. For scale, the area of the GWMA would place it as the 10th largest -- in the top 4% -- among wildlife refuges (see graph, Figure 2). The GWMA is clearly among the most important on a national scale, and along with other Central Valley wetland resources, it is clearly important on an international scale. The GWMA deserves a level of protection vastly exceeding small park areas on a local level.

The scale and economic importance of the GWMA in the region must be taken into account in considering the land use objectives sought by the GWD. Merced County and its cities should consider *in economic terms*, the benefits gained by the inclusion within the county boundaries, a vast resource area. The economic benefits which accrue not only within the GWMA but to the City and County, depend on maintaining the biological integrity of the resource area. These economic benefits need to be considered in planning the future of the region, in addition to local economic objectives for conventional urban economic growth.

2. Role of the GWMA in the Public Forum

To be effective in protecting the wildlife resources of the GWMA, the Grassland Water District must establish a political presence and stature in the Merced region which equals that of any of the incorporated cities, or the County. The Grassland Water District should then be able to exert the same kind of planning authority as any of the other local agencies, including the ability to define its jurisdictional boundaries and its sphere of influence.

The City of Los Banos, for example, did not have to provide a justification for the expansion of its municipal boundary, planning area, and area of interest, except as defined in conventional local general planning law. The City of Los Banos is contemplating an urban

expansion more than double the size of its urban area when there is enough vacant land within its existing core area to serve reasonably anticipated growth over the next 30 years.

Table 2 Expenditures for Hunting, Fishing, and Nonconsumptive Wildlife-Associated Recreation in California, 1991

Activities by Participants 16 Years Old and Older in California

Fishing	
Anglers	2,677,000
Days of Fishing	23,994,000
Average days per angler	9
Trip-related expenditures	$829,902,000
Food and lodging	$378,452,000
Transportation	$157,839,000
Other	$293,611,000
Hunting	
Hunters	446,000
Days of Hunting	5,211,000
Average days per hunter	12
Trip-related expenditures	$107,884,000
Food and lodging	$55,403,000
Transportation	$39,473,000
Other	$13,008,000
Primary Nonconsumptive	
Primary nonresidential participants	3,845,000
Days of participation	42,353,000
Average days per participant	11
Trip-related expenditurs	$929,358,000

Source: USDI, Fish and Wildlife Service. 1991. National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, California.

The City of Los Banos claims to need this expansion area for its economic well being and to be responsive to private developer demands for growth.

The Grassland Water District has an equally strong basis for its own land use imperative -- the protection of the wildlife resources within its boundaries and its own role in the economic vitality of the region.

D. Further Research Needs

Detailed studies of species of concern in the Grasslands Management Area are also needed to establish with greater certainty the auxiliary habitat width and levels of connectivity required, and the specific types of land use in these zones that are compatible with native wildlife. Critical information includes data on home range size, movements, and habitat preferences. Additional research should be directed toward refining the concepts of resource beneficial, neutral and negative land uses as they relate to the resources of concern.

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Maps

The maps on the following pages are based on information from the following sources:

Satellite imagery (processed to enhance wetland habitat), Ducks Unlimited.

Base maps of roads and city spheres of influence, Merced Data Special Services.

General plan maps and updates and land use categories, Valley Planning Associates.

Natural Diversity Database of rare, threatened and endangered species, Natural Heritage Division, Department of Fish and Game.

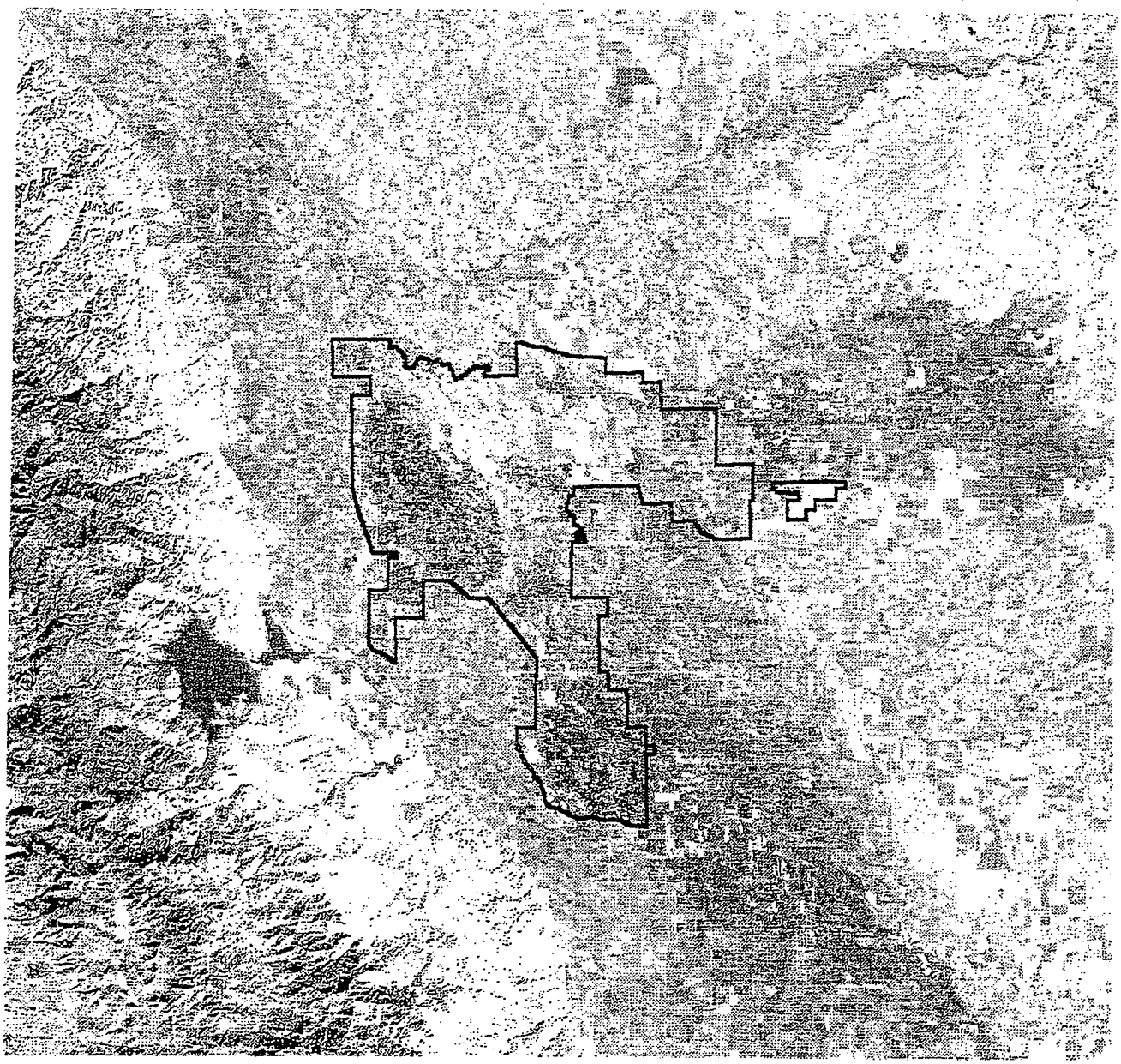
Boudaries for public lands and surface water features, Bureau of Reclamation.

Grassland Water District boundaries, Grassland Water District.

Grassland Wildlife Management Area boundary, U.S. Department of Fish and Wildlife.

MAP 1

LandSat View of the GRASSLAND WILDLIFE MANAGEMENT AREA



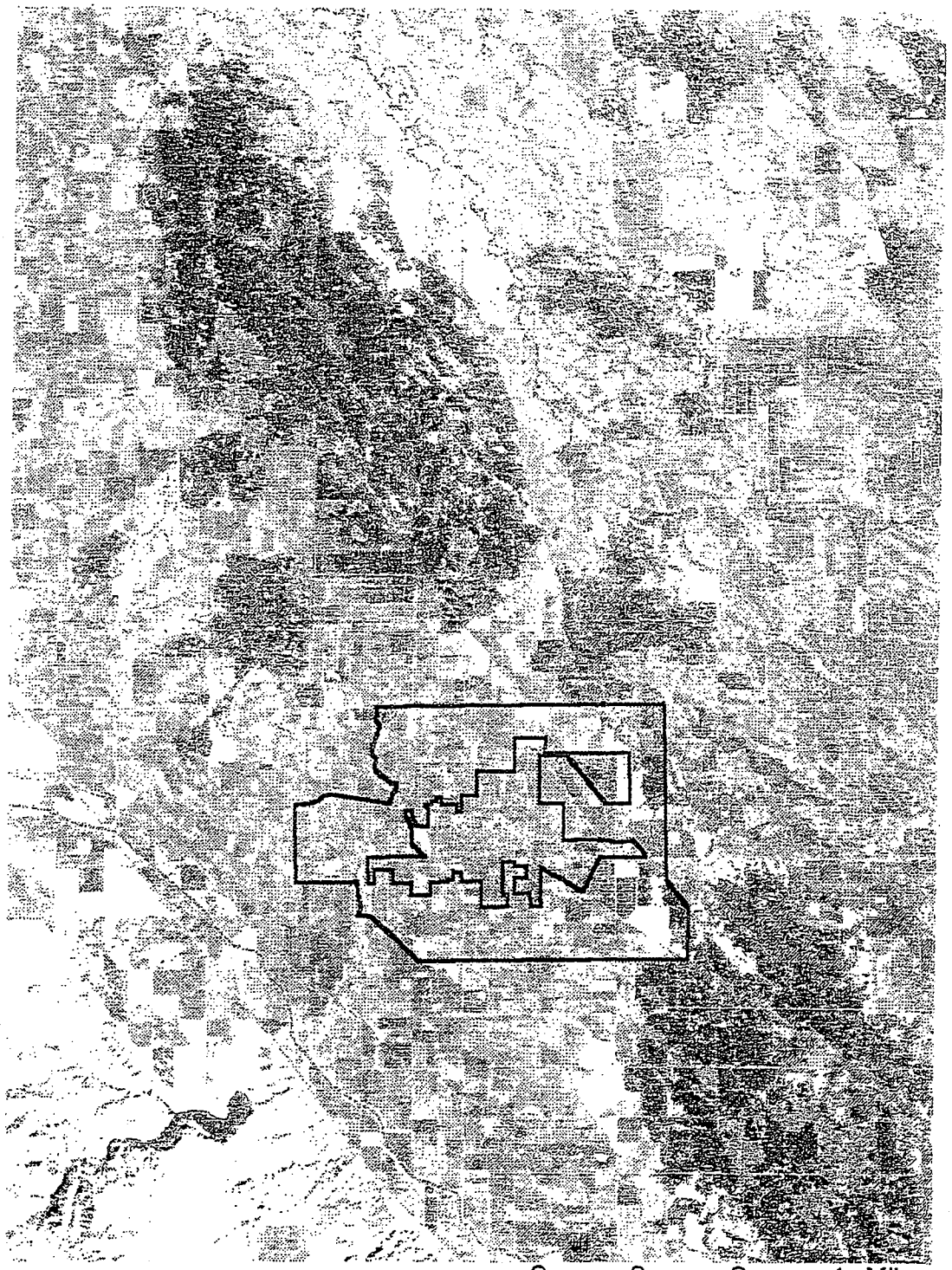
6 0 6 12 18 24 30 Miles

Thomas Reid Associates

MAP 2

Los Banos

current city limit and proposed expansion

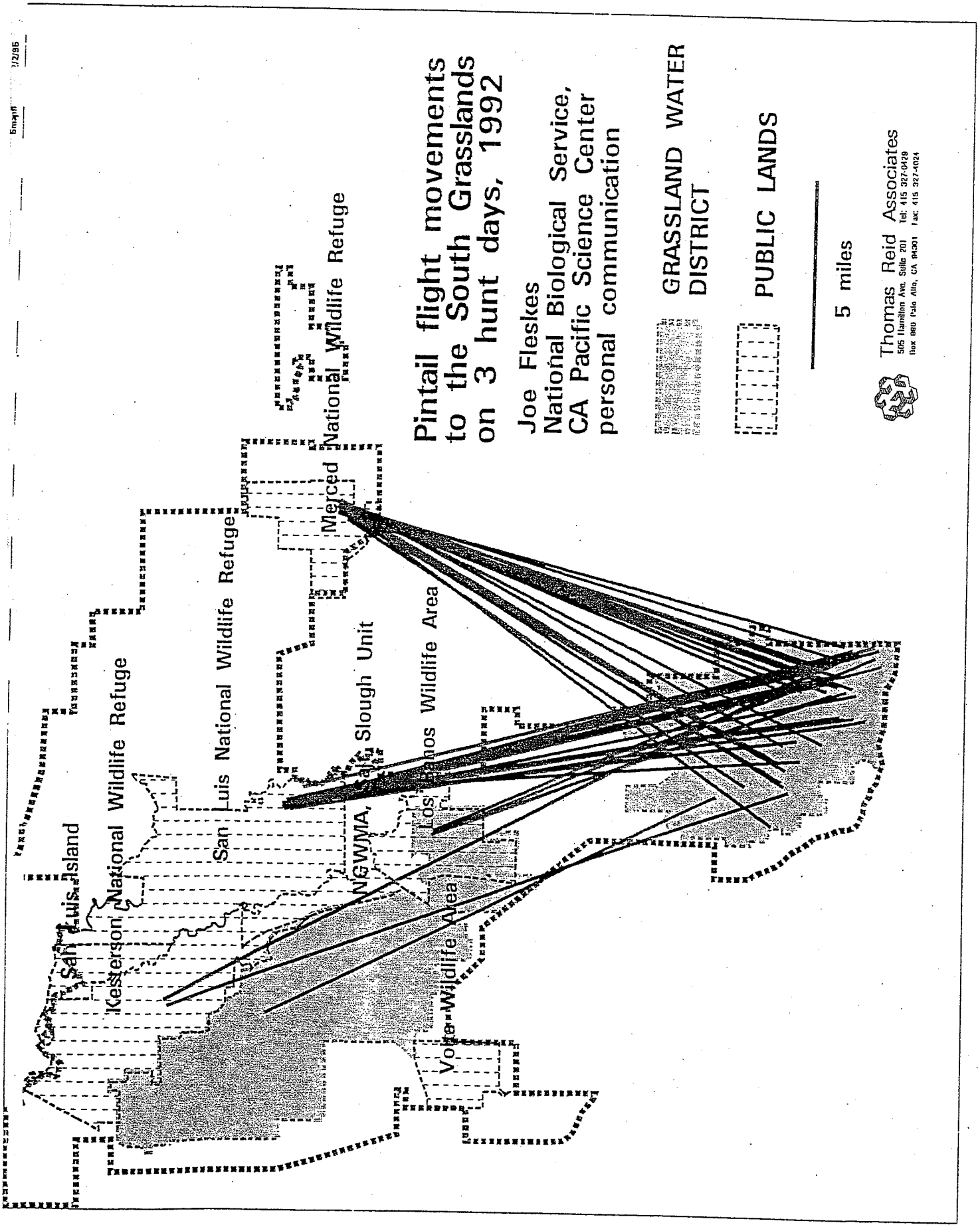


Blue and magenta areas to the north and southeast are wetlands and prime wildlife habitat.

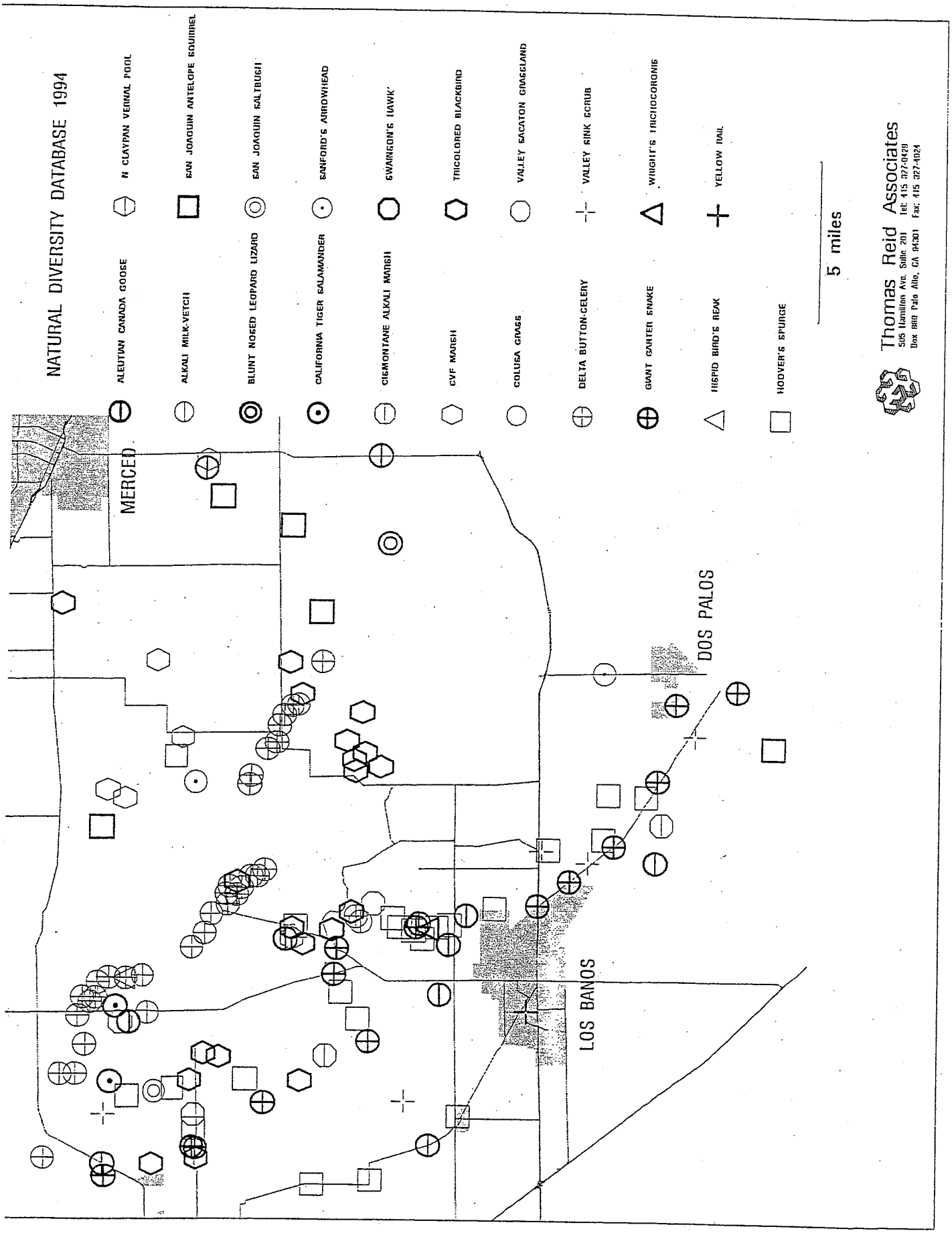
2 0 2 4 Miles

Thomas Reid Associates

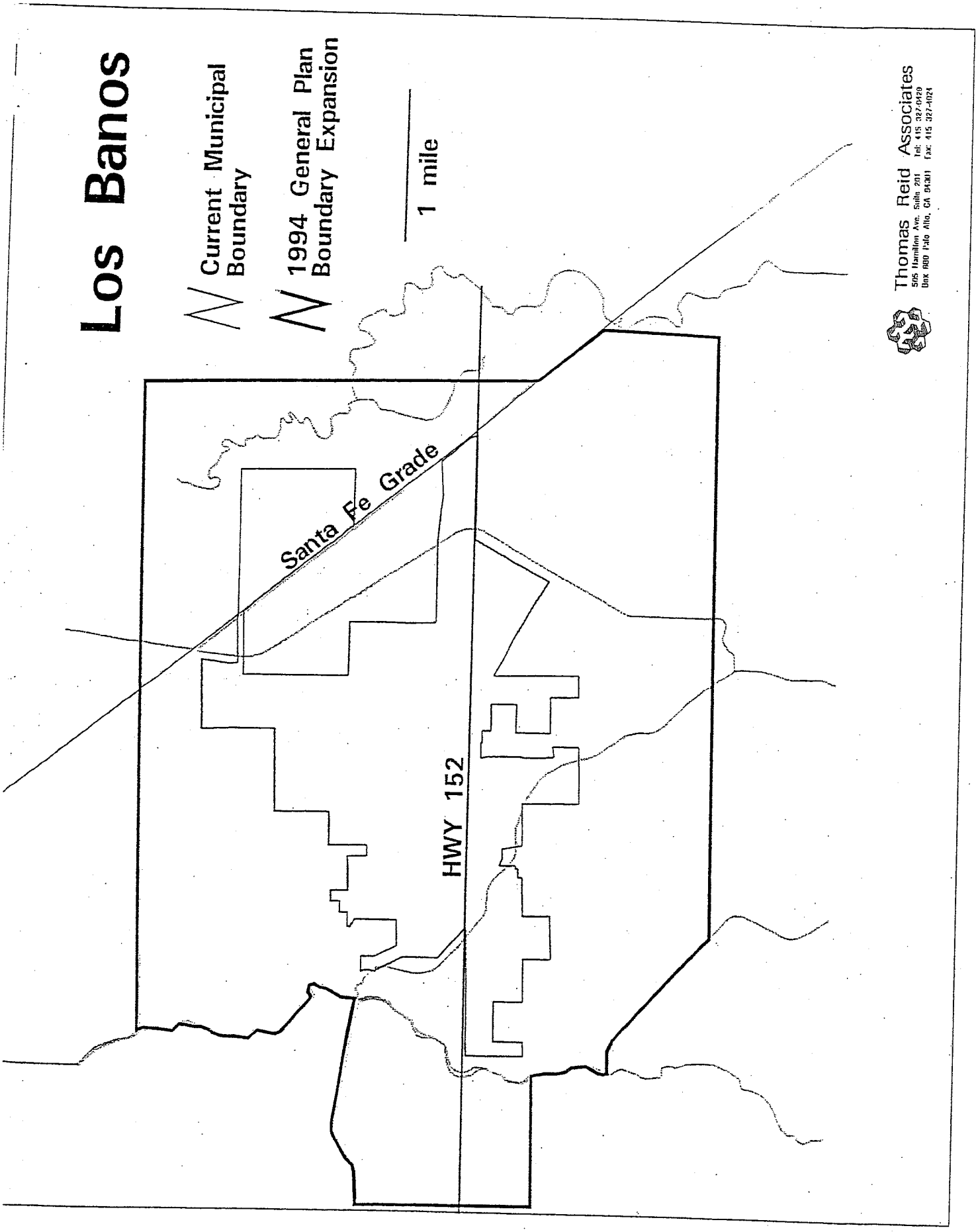
MAP 3


Pintail flight movements to the South Grasslands on 3 hunt days, 1992
Joe Fleskes
National Biological Service, CA Pacific Science Center
personal communication
GRASSLAND WATER DISTRICT
PUBLIC LANDS
5 miles
Thomas Reid Associates
505 Hamilton Ave. Suite 201
Tel: 415 327-0429
Fax: 415 327-4024
Merced National Wildlife Refuge
San Luis National Wildlife Refuge
Kesterson National Wildlife Refuge
San Luis Island
NGWMA, Salt Slough Unit
Los Banos Wildlife Area
Volta Wildlife Area

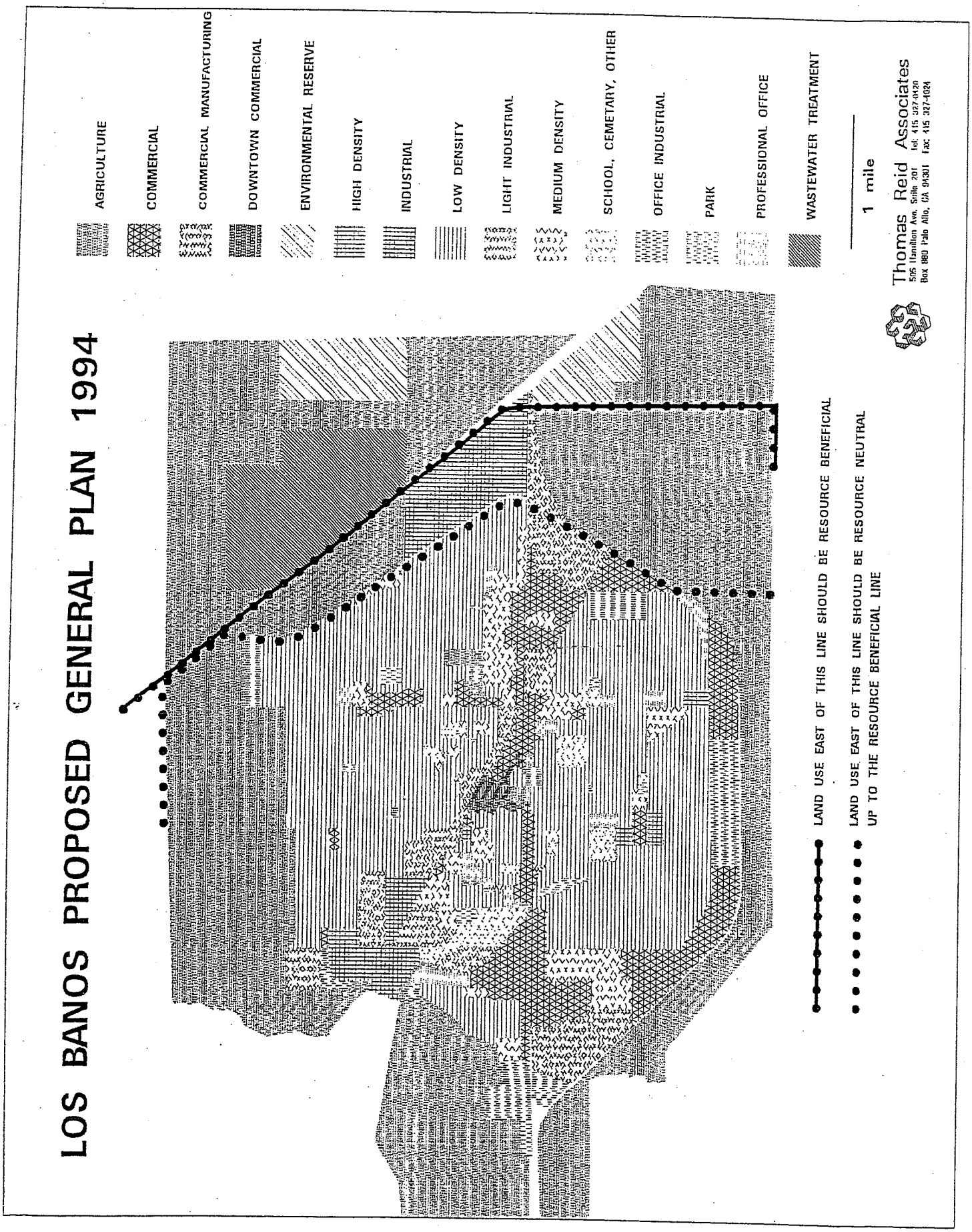
MAP 4


NATURAL DIVERSITY DATABASE 1994
ALEUTIAN CANADA GOOSE
ALKALI MILK-VETCH
BLUNT NOSED LEOPARD LIZARD
CALIFORNIA TIGER SALAMANDER
CISMONTANE ALKALI MARSH
CVF MARSH
COLUSA GRASS
DELTA BUTTON-CELERY
GIANT GARTER SNAKE
HISPID BIRD'S BEAK
HOOVER'S SPURGE
N CLAYPAN VERNAL POOL
SAN JOAQUIN ANTELOPE SQUIRREL
SAN JOAQUIN SALTBUSH
SANFORD'S ARROWHEAD
SWAINSON'S HAWK
TRICOLORED BLACKBIRD
VALLEY SACATON GRASSLAND
VALLEY SINK SCRUB
WRIGHT'S TRICHOCORONIS
YELLOW RAIL
5 miles
Thomas Reid Associates
505 Hamilton Ave. Suite 201
Tel: 415 327-0420
Box 888 Palo Alto, CA 94301
Fax: 415 327-4024
MERCED
DOS PALOS
LOS BANOS

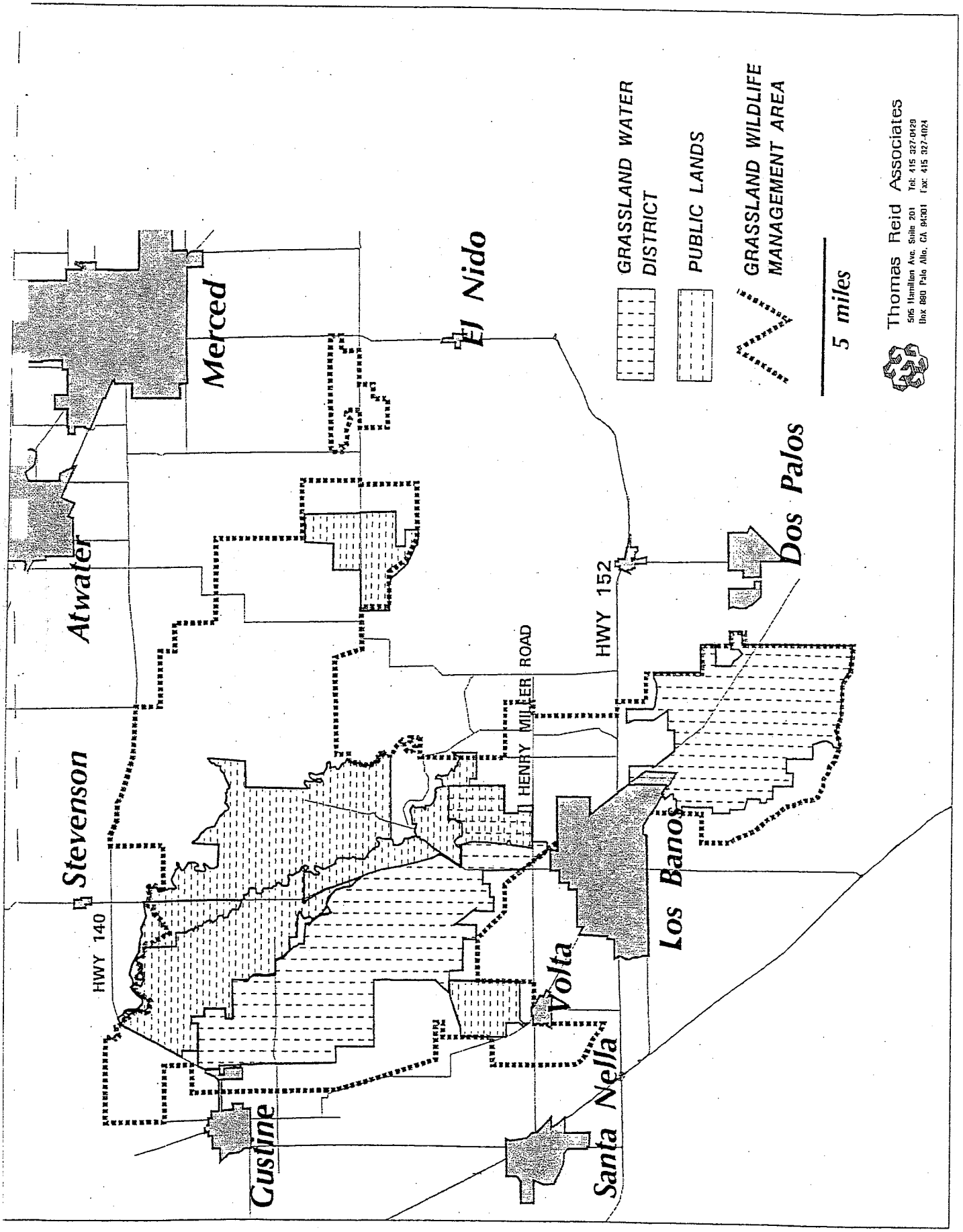
MAP 5


Los Banos
Current Municipal Boundary
1994 General Plan Boundary Expansion
1 mile
Santa Fe Grade
HWY 152
Thomas Reid Associates
505 Hamilton Ave. Suite 201
Box 800 Palo Alto, CA 94301
Tel: 415 327-0429
Fax: 415 327-4021

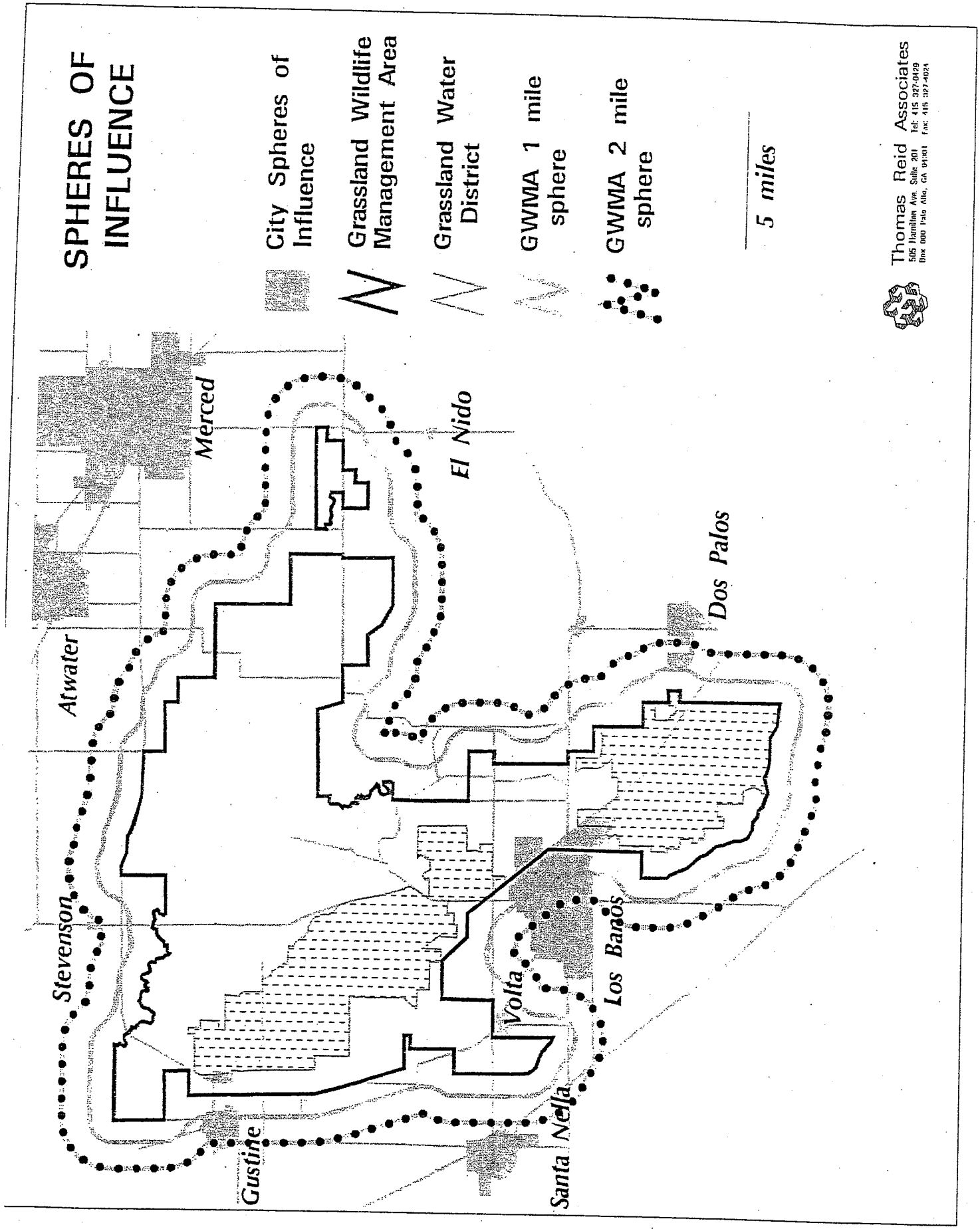
MAP 6


LOS BANOS PROPOSED GENERAL PLAN 1994
AGRICULTURE
COMMERCIAL
COMMERCIAL MANUFACTURING
DOWNTOWN COMMERCIAL
ENVIRONMENTAL RESERVE
HIGH DENSITY
INDUSTRIAL
LOW DENSITY
LIGHT INDUSTRIAL
MEDIUM DENSITY
SCHOOL, CEMETARY, OTHER
OFFICE INDUSTRIAL
PARK
PROFESSIONAL OFFICE
WASTEWATER TREATMENT
1 mile
Thomas Reid Associates
505 Hamilton Ave. Suite 201 Tel: 415 327-0420
Box 980 Palo Alto, CA 94301 Fax: 415 327-1024
LAND USE EAST OF THIS LINE SHOULD BE RESOURCE BENEFICIAL
LAND USE EAST OF THIS LINE SHOULD BE RESOURCE NEUTRAL
UP TO THE RESOURCE BENEFICIAL LINE

MAP 7


Merced
El Nido
Atwater
Stevenson
Dos Palos
Los Banos
Volta
Santa Nella
Gustine
HWY 140
HWY 152
HENRY MILLER ROAD
GRASSLAND WATER DISTRICT
PUBLIC LANDS
GRASSLAND WILDLIFE MANAGEMENT AREA
5 miles
Thomas Reid Associates
505 Hamilton Ave. Suite 201 Tel: 415 327-0429
Box 880 Palo Alto, CA 94301 Fax: 415 327-4024

MAP 8


SPHERES OF INFLUENCE
City Spheres of Influence
Grassland Wildlife Management Area
Grassland Water District
GWMA 1 mile sphere
GWMA 2 mile sphere
5 miles
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Fax: 415 327-4024
Merced
El Nido
Atwater
Dos Palos
Stevenson
Los Banos
Volta
Santa Nella
Gustine