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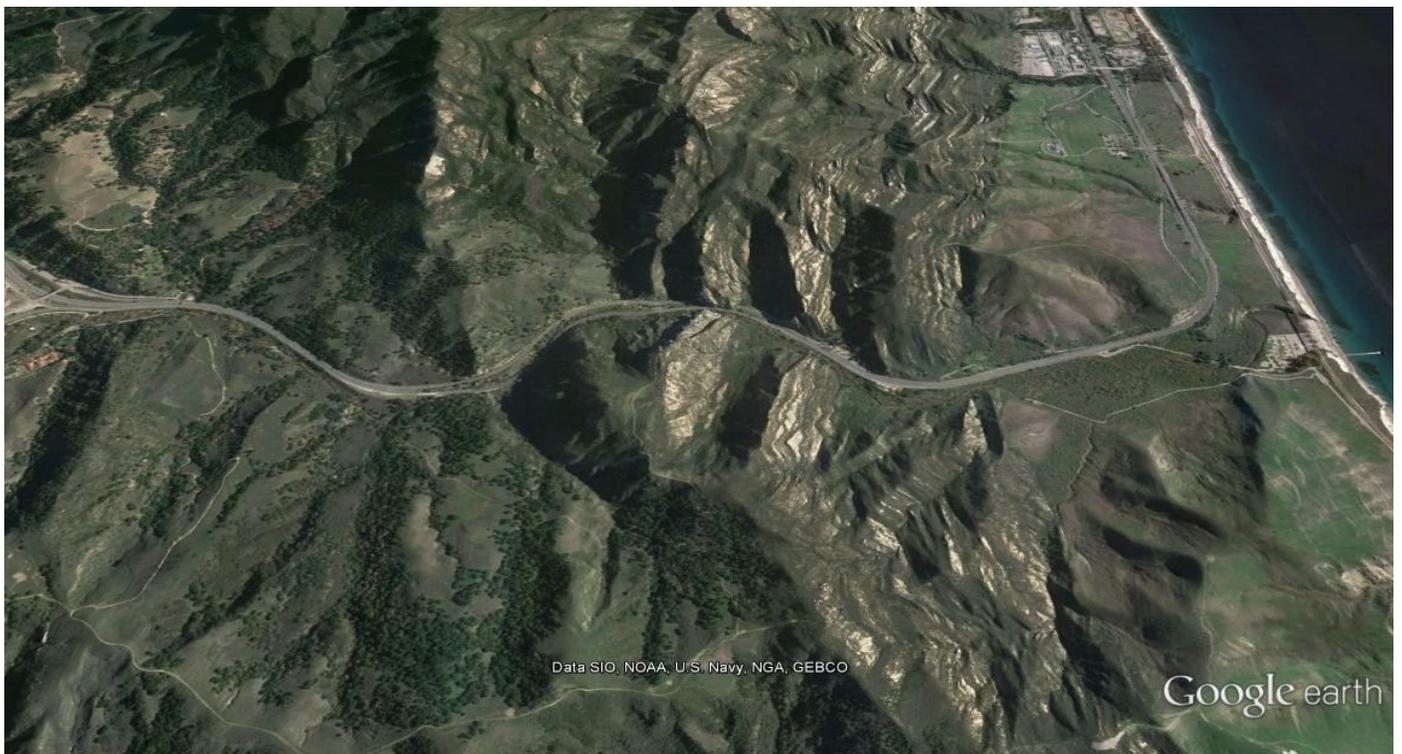
The Gaviota Creek Watershed

A Restoration Plan Update

February 2016

“Gaviota Creek watershed is one of the few coastal environments in southern California that has remained unchanged for the last century except for enlargement and relocation of transportation corridors.”

State Department of Parks and Recreation, 2007



Looking East over Gaviota Creek with State Park campground to the right of the picture and Las Cruces to the left

Report Prepared by the Coastal Ranches Conservancy

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PLAN SUMMARY

The Gaviota Coast is reputed to be one of the top 15 biodiversity hot spots on the planet. It is a region where the ranges of northern and southern species overlap, cold ocean currents meet warmer currents, and where many endemic species can be found. The Gaviota Creek watershed is the largest watershed along this coast.

Gaviota Creek offers a unique opportunity for restoration as much of the watershed is already protected by either public ownership (in Gaviota State Park and Los Padres National Forest) or by conservation easements held by non-profit organizations on privately-owned land. Land use on the privately owned portions of the watershed consists primarily of cattle grazing with little or no irrigated agriculture and only one known stream water diversion. In addition, the continued presence of sensitive and rare species such as the Southern Steelhead, Tide-water Goby, California Red-legged Frog, and South-Western Pond Turtle indicates the watershed and riparian corridor is reasonably healthy and that restoration from a biological viewpoint is possible and worth pursuing.

This document is intended to update and expand on the original watershed plan written in 2005 at the direction of the State Parks and with the assistance of the Cachuma Resource Conservation District. The 2005 Plan can be found in its entirety in Appendix 5. That planning effort included a number of stakeholder meetings about restoring Gaviota Creek and neighboring land owners were largely supportive of the efforts proposed at that time. Several of the watershed health issues discussed then have been dealt with but many remain. This Plan is intended to initiate further discussion with

stakeholders about watershed improvements and to signal a renewed emphasis on seeking funding to do additional restoration work. In addition, this Plan identifies a number of critical gaps in our understanding of the watershed which must be investigated, particularly in the area of water quality.

In summary, this Plan proposes conservation and restoration activities in the Gaviota Watershed that address the following issues:

- Preserving the quantity of water flowing in the creek
- Protecting and improving the water quality of the creek
- Restoring the creek's flood plain and lagoon
- Removing barriers to fish migration and floodplain function

PLAN BACKGROUND

Over the past 20 years, more than 14 plans and studies have been written about restoring some aspect of Gaviota Creek. Some of the recommendations made in these plans were implemented but there has been no sustaining, comprehensive approach to restoring the watershed. With so many inter-related issues, a comprehensive approach to implementing the recommendations of this and past plans is required. This Plan is an attempt to build on those past plans and begin to transform planning efforts into actual improvements in the watershed.

In 1999, the State Park initiated a project to remove two steelhead migration barriers adjacent to the highway rest areas. That same year, the County replaced the at-grade stream crossing at the State Park entrance with a bridge, which also improved steelhead access to the watershed, under most conditions. In 2002, a study by Conception Coast was published which rated Gaviota Creek as the most important steelhead stream in Southern Santa Barbara County. In 2005, a series of meetings were held with local residents and other interested parties about restoring certain aspects of the creek. These meetings and additional planning information was documented in a Watershed Management Plan (see Appendix 5). Several adjacent property owners expressed support at that time and additional work was done as a result of those meetings, including shoring up the old Highway 1 bridge at Las Cruces and removing an adjacent steelhead barrier.



An early view of the Gaviota Pass looking towards the ocean. This steel suspension bridge was built in 1915 and replaced by a concrete bridge in 1931.

Also in 2005, the County of Santa Barbara proposed to build a new access road and bridge crossing of Gaviota Creek within the State Park in order to eliminate flooding of the campground, provide safe year-around road access to the Park and the Hollister Ranch, and improve steelhead passage. Extensive analysis was made of the project’s impact on and benefits for steelhead and overall improvement to the stream’s floodplain. The project included a 256 ft. long bridge and a 782 ft. long bridge approach, both raised 12 feet above the flood plain. This design was severely criticized by environmental groups as being destructive of the flood plain, since the bridge approach would essentially act as a dam, and offering no net public benefit. These arguments carried the day and the project was abandoned; but the public did become more aware of the issues.

In 2007, a detailed study was completed regarding the feasibility of removing steelhead migration barriers (Love and Stoecker). This study provided further support for the concept of stream restoration, particularly the removal of barriers to steelhead migration although, again, no action was taken. From the study:

“A large-scale assessment of steelhead migration barriers and existing habitat conditions was conducted by Stoecker et al. in 2002, and included Gaviota Creek and some of its tributaries. Excellent spawning and summer rearing habitat was identified within Las Cruces Creek, which flows into Gaviota Creek approximately 4.4 miles upstream of the ocean. Additionally, habitat suitable for supporting populations of steelhead trout was identified in several other

tributaries and one adult steelhead was observed in upper Gaviota Creek, immediately below the Highway 101 culvert.

Although the stream system has habitat suitable for sustaining endangered Southern Steelhead, several significant migration barriers located within the lower reach of Gaviota Creek block fish from reaching spawning and rearing habitats.”

In late 2014, Coastal Ranches Conservancy, a small 501(c)(3) non-profit organization dedicated to nature conservation, restoration, and education along the Gaviota Coast, decided to take a look at what could be done on Gaviota Creek. The results of that look were encouraging: building on all of the prior studies, there appear to be many opportunities to conserve and restore this important watershed. It is anticipated that the conservation and restoration activities could also have an educational component, if the State Park wants to develop interpretive materials.

This watershed plan was prepared in-house by members of the Coastal Ranches Conservancy, with the assistance of experts in the local community and utilizing the previous work that has been done on Gaviota Creek and the Gaviota Coast. It is intended to be an action-oriented plan. Its purpose is to guide the work ahead, set priorities, help find funds to do the work, and help explain to donors and the general public the opportunities for protecting such a significant part of the Gaviota Coast with a rich history and biological importance.

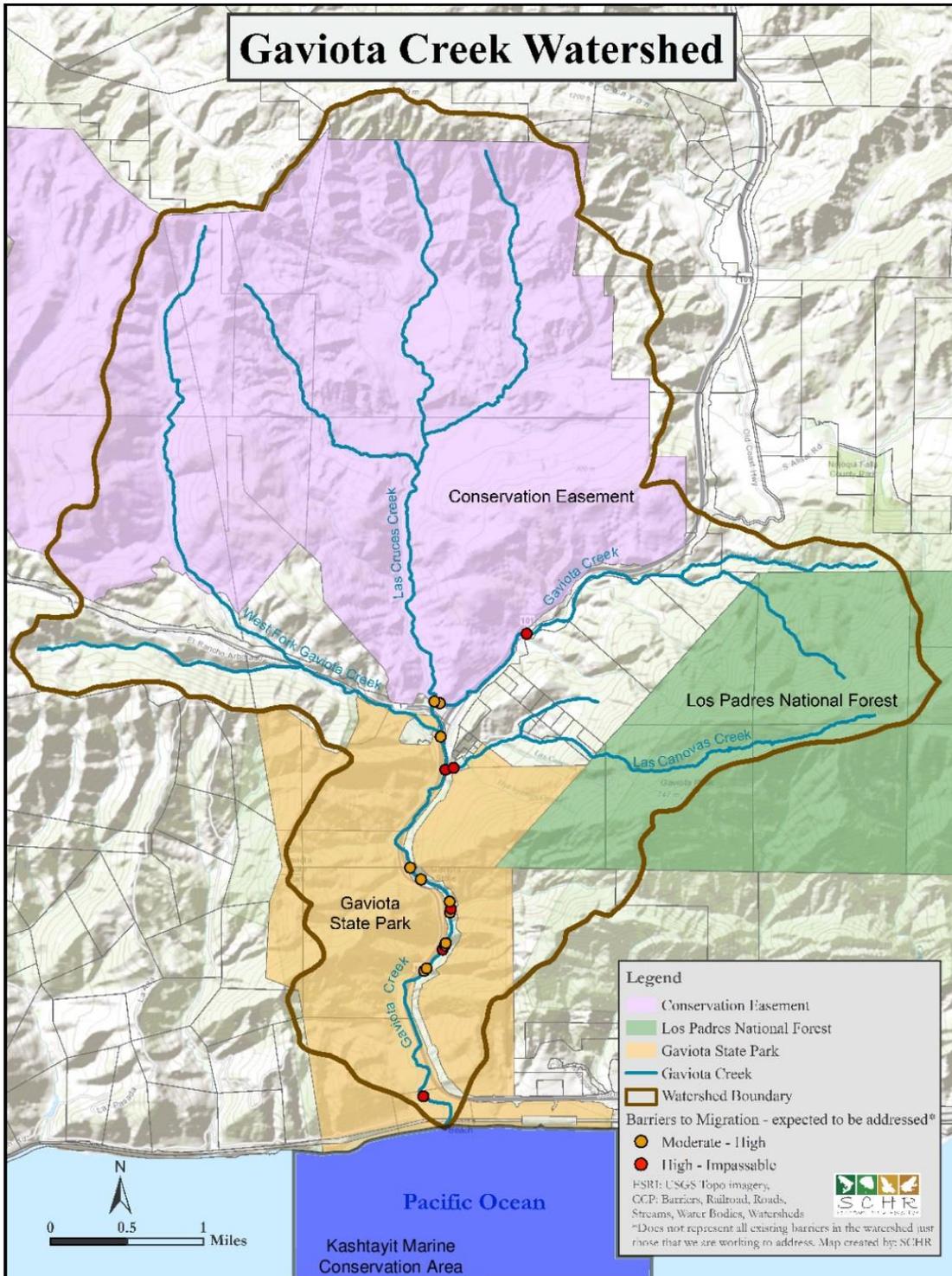
STAKEHOLDERS & PARTNERS

The parties who will have or are likely to have an interest in this Plan are known as stakeholders and partners. These people and organizations are invited to participate in the finalization of this Watershed Plan and in its implementation.

- All private land owners and residents of the watershed
- South Coast Habitat Restoration
- California Department of Parks and Recreation
- Hollister Ranch Owners Association
- California Department of Transportation
- Los Padres National Forest
- California Rangeland Trust
- Land Trust for Santa Barbara County
- Gaviota Coast Conservancy
- Vista de las Cruces Elementary School
- Santa Barbara Channelkeepers
- County of Santa Barbara
- California Department of Fish and Wildlife
- CalTrout
- NOAA Fisheries
- Central Coast Regional Water Quality Control Board
- Cachuma Resource Conservation District

WATERSHED OVERVIEW

At 12,903 acres, the Gaviota Creek watershed is the largest of the many watersheds along the Gaviota Coast, which is defined as the section of coastline from Point Conception to Goleta. The watershed is about 28 miles west of Goleta and 11 miles south of Buellton. It runs largely parallel to U. S. Highway 101 in a north-south direction and is crossed by State Highway 1, running east-west, at Las Cruces, a former roadside community and a historical point of interest.



The principal tributaries to Gaviota Creek include the West Fork, Las Cruces Creek, Middle Fork, Las Canoas Creek, and Hot Springs Creek tributaries.

The watershed's vegetation is varied but the four primary types are grassland, coastal sage, chaparral, and oak woodland. The oak woodlands occupy the more sheltered inland and north facing slopes while the grasslands are found on the south-facing slopes and heavier soils closer to the coast. Chaparral

is most commonly found growing on the sandstone-derived soils in the upland areas on the east side of the watershed.

Wildlife found in the watershed is typical for the region although biodiversity is likely better preserved due to the relative lack of human-caused impacts. According to an accounting by the National Park Service as part of their “Gaviota Coast Draft Feasibility Study of 2004” (done to consider whether a national seashore should be established along the Gaviota Coast), the region has the following numbers of “special status” species. Special status for our purposes means listed as rare, threatened, or endangered:

Plants	29 species
Insects	3 species
Mammals	7 species
Birds	34 species
Amphibians and Reptiles	7 species
Fish	4 species

Many of these special status species are dependent on Gaviota Creek’s riparian corridor, either as habitat or for dispersal across the landscape. These include the following, all of which are still present in this watershed:

- Southern Steelhead
- Tidewater Goby
- Arroyo Chub
- Two-Striped Garter Snake
- South Western Pond Turtle
- California Red-Legged Frog
- California Newt
- American Badger
- Mountain Lion

This large number of special status species is unusual and worth protecting and any restoration plans must take into account their needs. Additional information about the biology and bio-diversity of the Gaviota Coast can be found in the Gaviota Coast Feasibility Study done by the National Park Service (see Other Resources).

Kashtayit State Marine Conservation Area

An area off the mouth of Gaviota Creek has been declared a marine conservation area with a prohibition against commercial take of any marine resources and only allows recreational take of finfish, giant kelp, and invertebrates (excluding rock scallops and mussels). This marine conservation area has been named Kashtayit after the name of an important and large Chumash village that was nearby. It is the smallest of three marine protected areas found along the Gaviota Coast. The other two are at Point Conception and Campus Point. From the website describing the area: *“Kashtayit State Marine Conservation Area is intended as a heritage site with significant educational opportunities. Kashtayit SMCA is connected to Gaviota State Park, the traditional Chumash village site of Kashtayit. As a Traditional Cultural Place that plays a significant role in Chumash*

maritime culture, it is ideally suited for tribal co-management to promote 1) education and outreach, 2) marine stewardship, and Chumash maritime cultural preservation and revitalization.”



By maintaining a healthy Gaviota Creek watershed, it will help ensure that the Kashtayit Marine Conservation Area fulfills its promise of protecting marine productivity. A future restoration of the Gaviota Creek lagoon could be an important part of this as well.



Southern Steelhead in a Santa Barbara County stream

EXISTING CONDITIONS

Land Use

Approximately 71% of the Gaviota Creek watershed is private property; the majority of which is used to graze beef cattle. All of the public land, the remaining 29%, is dedicated to natural resource preservation and low impact recreation, except for Vista de las Cruces School and the transportation corridors.

Gaviota Creek Watershed Ownership Figure 1

Private Ownership	
Private Land Covered by Conservation Easement	6416 acres
Private Land not covered by Conservation Easement	2745 acres
Total Private Ownership	9161 acres
Public Ownership	
Calif. Dept. of Parks and Rec.	1893 acres
US Forest Service	1565 acres
CalTrans	284 acres
Vista de las Cruces School	18 acres
Total Public Ownership	3768 acres
Total Acres	12,921 acres approx.

Names of streams:

Gaviota Creek and its tributaries: West Fork, Las Cruces Creek, Middle Fork, Las Canovas Creek, Hot Springs Creek, (see map page 5)

Watershed location: Headwaters in the Transverse Ranges through Gaviota State Park to the Pacific Ocean.

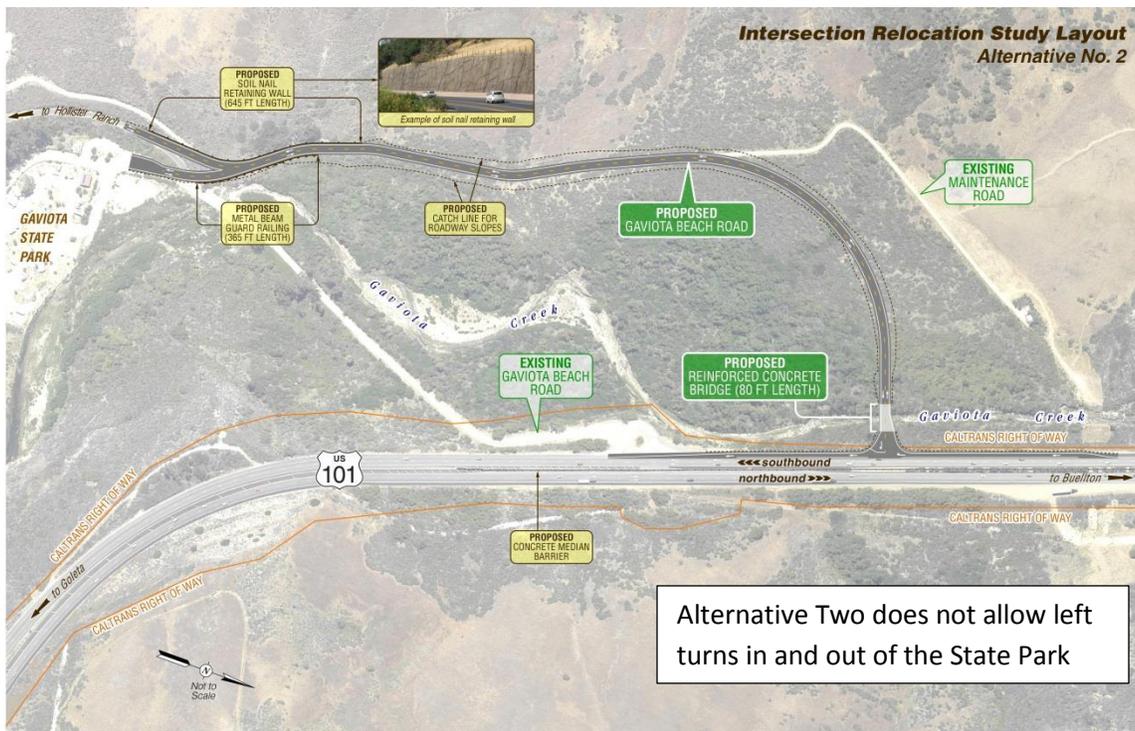
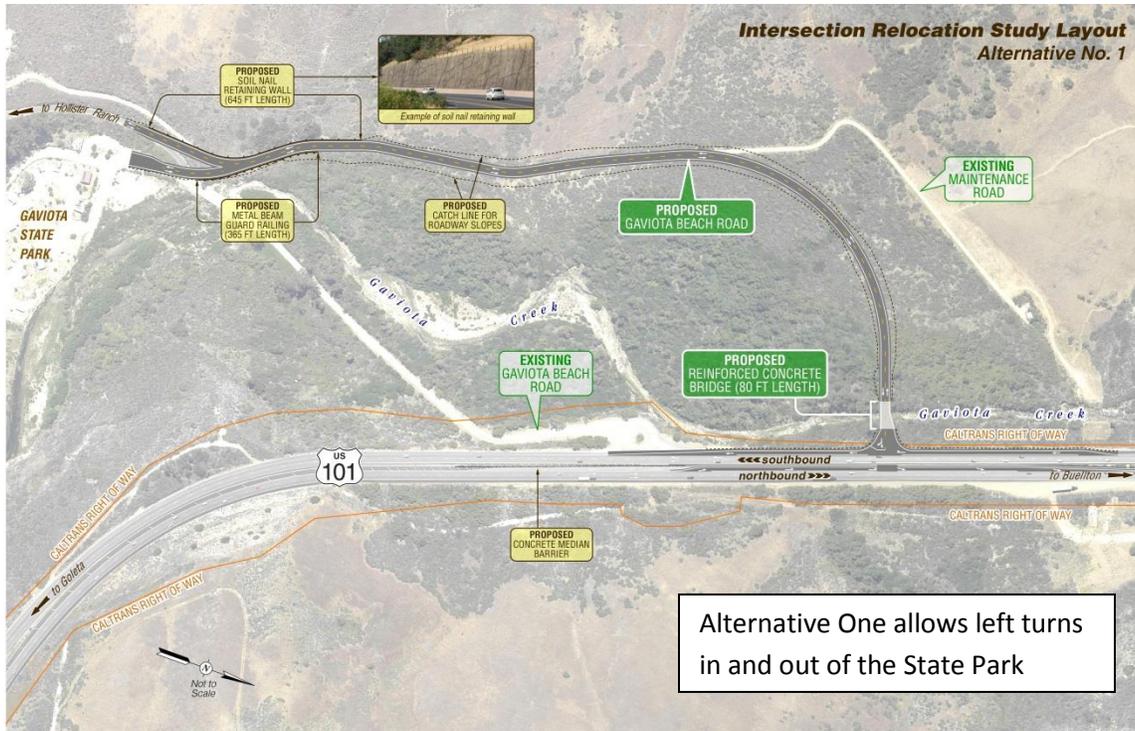
Obstructions and Barriers

Many of the challenges of restoring the Gaviota Creek watershed have to do with removing man-made barriers and obstructions. Some of these barriers restrict the ability of fish to migrate upstream. Others may interfere with the creeks natural functions, such as the transport of sediment. The manner in which Highway 101 was constructed through the Gaviota Pass and at the interchange with Highway 1 accounts for most of the obstructions. The other major obstruction is the Park entrance road and, in flood, the bridge over Gaviota Creek.

The best overview of the fish barriers can be found in the Conception Coast Study (12) and the Gaviota Fish Passage Assessment (1). The Conception Coast study points out that the construction of the Highway 1 and 101 interchange relocated the stream out of its historical bed and that this may have disconnected the creek from its subsurface flow, resulting in a stretch of stream that loses surface water flow more easily during the dry season or in drought. This dry section acts as another kind of barrier to fish and other aquatic life. The impact of this highway interchange on Gaviota Creek is a potentially significant issue but beyond the scope of this report; it will have to be addressed in more detail in the future.

The access road to the State Park and Hollister Ranch acts as a barrier across the entire middle flood plain of the creek. This barrier interferes with the flow of water, especially during flooding, concentrating the stream flow and the materials it carries during a flood rather than allowing it to spread out across the flood plain. The road bridge at the Park entrance is also a barrier during flooding events, since it is too low to allow debris to pass easily beneath it. This causes a barrier to form during high run-off, forcing the water to pass over the bridge rather than under it. As noted above, this has been a long-standing problem, not only for fish passage but also for Park visitors, campers, and the Hollister Ranch. Flooding can deposit mud and debris throughout the Park campground and interrupt access for many days at a time.

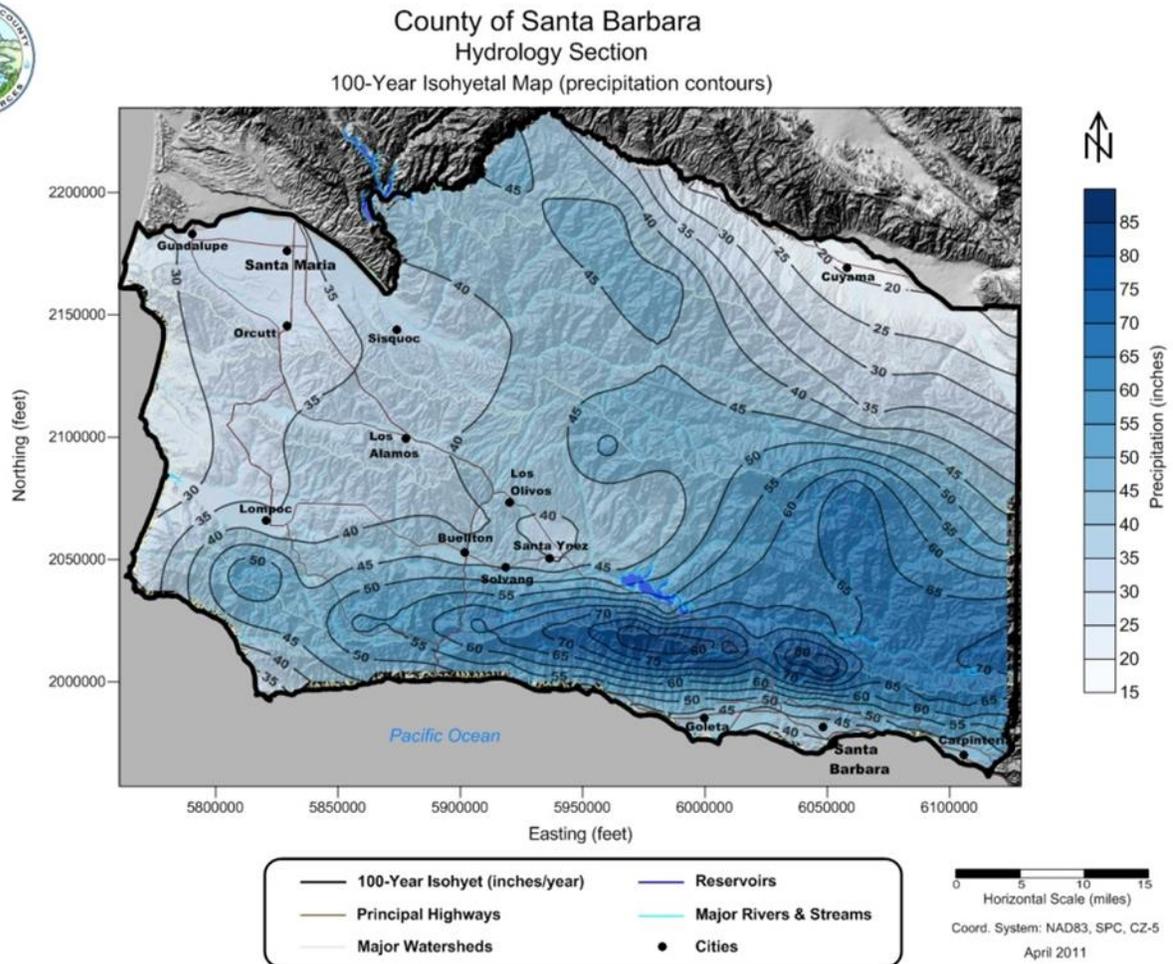
In 2010, CalTrans, at the request of the State Park, prepared two alternative design studies for a new access road which would move the road entirely out of the floodplain and route the access across an 80 foot bridge and down the west side of the creek on an existing road to the park entrance. This project has not progressed much since 2010, apparently due to a lack of funding. The County has said they have no interest in helping solve the access road problem (5) so it will likely be up to the State to find the money. The project was estimated to cost about \$10 million in 2010.



Hydrology and Rainfall

The Gaviota Coast region is among the highest rainfall areas in the southern coastal region of California. However, storm water runoff peaks and then recedes very rapidly because of the steep topography, steep stream gradients, and impervious rock outcroppings. Because of this, Gaviota Creek can be described as a flashy watershed, characterized by rapid increases and decreases in flow during and immediately following storm events. Rainfall patterns and amounts vary widely from year to year, as the current drought (2012-2015) amply demonstrates.

One possible reason for the relatively good sustaining water flow in Gaviota Creek is demonstrated in the map below. Note the higher rainfall concentration around Gaviota Peak, which rises to nearly 2460 feet just east of the creek. As much as 70 inches per year falls on this high point and much of that rainfall drains down the north-facing slope of the mountains and into the Gaviota watershed.



Mean annual rainfall, measured at Gaviota State Park is 18.09 inches with extremes over the past 50 years ranging from a high of 35 inches to a low of 7 inches. Figure 2 below is a 50 year rainfall graph with measurements taken at the mouth of Gaviota Creek.

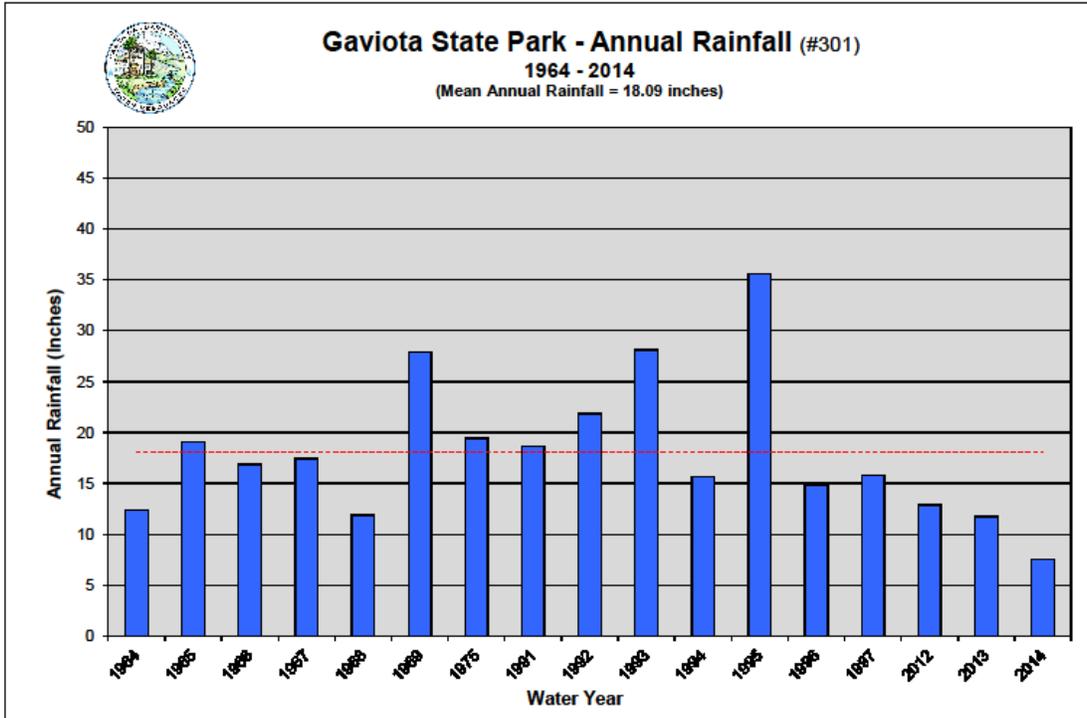


Figure 2

Figure 4 shows a streamflow graph of Gaviota Creek from 1979 to 1983. Both 1978-9 and 1983 were El Nino years. The difference between winter flows and summer flows is dramatic. Flow ranges from a low of .06 cubic feet per second (cfs) in the summer of 1982 to a high of 900 cfs 6 months later in January of 1983. The streamflow gauge was damaged by flooding in 1986 and was not repaired, so more recent records are not available.

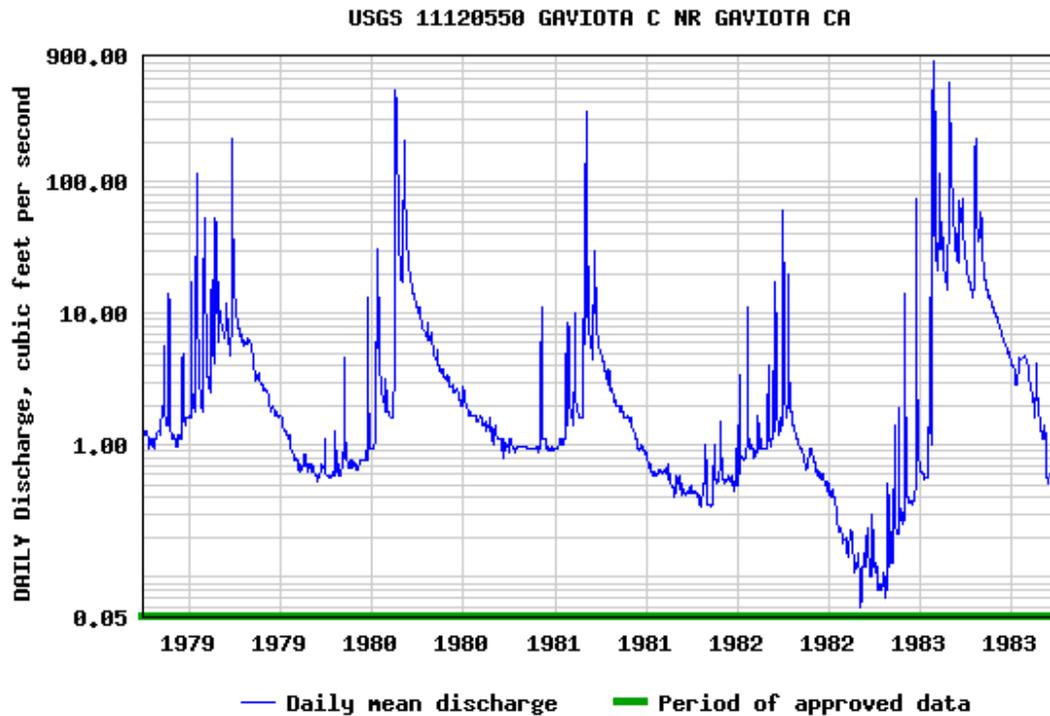


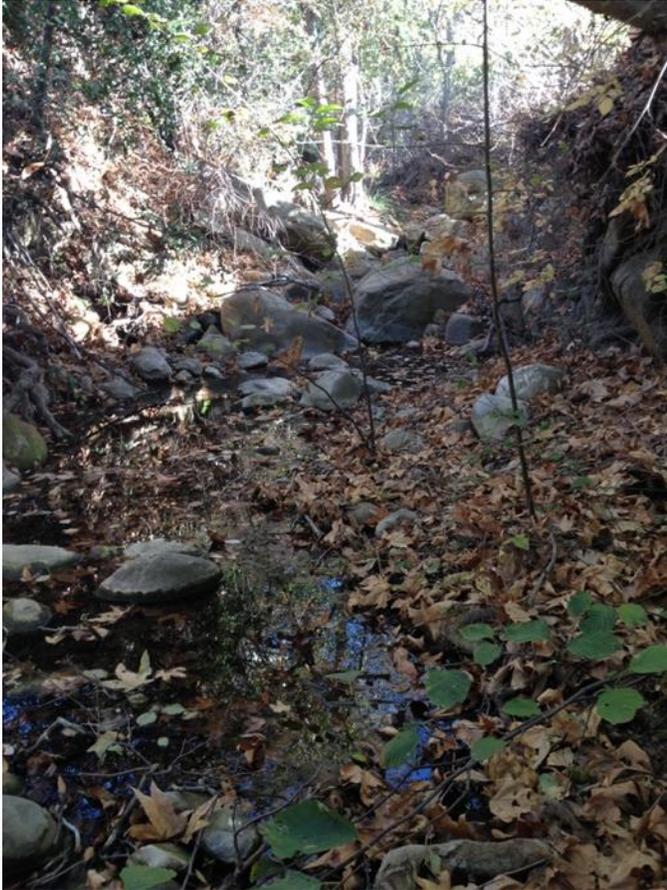
Figure 4

Water Quantity

Perennial streams in Southern California are relatively rare because of rainfall patterns. Where they do exist, the water has often been used for agriculture or domestic use, resulting in the loss of the plants and animals dependent on a healthy surface flow of water. Gaviota Creek has not been heavily impacted by water diversions as of yet. This is one of the key reasons that it still supports the many sensitive species which can no longer be found elsewhere.

As indicated above, the flow of water in Gaviota Creek can vary wildly, from .06 cfs to 900 cfs within the same 12 month period. In 1983, peak flows of 5270 cfs were recorded. The main stem of the creek generally has perennial flows that are sustained by numerous springs (7). The upper reaches of the tributaries do not generally have sustained, year-around flows although steelhead are found high-up in some tributaries above dry sections of the creek (5). There are no licensed water diversions of Gaviota Creek and no record of filings for appropriation of water. There is no irrigated commercial agriculture in the watershed although dry farming was done on one ranch in the past. Water from a spring adjacent to Hot Springs Creek on State Park property is presently used to supply the two Gaviota Rest Stops and Gaviota State Park. Water use by this system is estimated by the State Park, as follows: “Peak monthly use averaged over last ten years is 514,747 gallons. Annual water demand averaged over same ten year timeframe is 4,007,406 gallons per year.” (6) This

can be converted into 12.29 acre feet per year. Apparently there is also occasional diversion of stream water from at least one other upstream ranch but we are led to believe that this is insignificant (5).



Even after five years of unprecedented drought, the Las Canovas Creek branch of Gaviota Creek provides critical base flows of stream water to keep wildlife and stream vegetation alive. Photo taken in November of 2015.

Water Quality

Good water quality is essential to the health of stream life. There are several ways of looking at the stream water quality of Gaviota Creek. One is to examine its biochemical and physical characteristics such as temperature, dissolved oxygen (DO), sediment, and chemical constituents. Another way, known as rapid bioassessment, uses the number and types of stream invertebrates as an indicator of water quality. For the first method, one can utilize the Central Coast Regional Water Quality Control Board (RWQCB) data. Their data showed levels of boron and chloride exceed water quality standards. In addition, water sampling at the creek mouth showed levels of *Enterococcus* and *E. coli* bacteria that exceeded standards. As a result, Gaviota Creek was designated as an impaired water body in 2006 under section 303d of the 1972 Clean Water Act. We are told (2) that this impaired designation for the boron, sodium, and chloride salts is currently being reviewed because the presence of these salts is to be expected given the marine nature of the underlying soils and rocks of the watershed. There is a question as to whether the excessive and preventable erosion in the watershed may cause the elevated salt levels found, however. The bacteria levels remain a potential problem for recreational water contact at the creek mouth and nearby beach. More work needs to be done to determine the source of the

bacteria and whether it can be remediated or is part of the natural background. Past studies have suggested it may come from the septic system serving the roadside rest areas, although we are aware of no evidence for this. Additional testing to determine the source of the bacteria will be necessary.

A second method of water quality investigation, rapid bioassessment, was also conducted by the RWQCB and by the County of Santa Barbara as part of its creek program. This method involves the sampling of the stream's benthic macro-invertebrates which are then sorted by their taxonomy into family and sometimes genus. The presence and abundance of specific invertebrates that are sensitive to water quality can then be used to calculate an Index of Biological Integrity (IBI).

Data collected by both the RWQCB and Ecology Consultants at the State Park entrance can be found in Figure 6 below. In general, the IBI for Gaviota Creek shows the creek ranges from "poor" to "good" depending on the year (Brinkman and RWQCB). The Gaviota IBI scores are compared to Arroyo Hondo Creek, which is widely considered to be one of the healthiest and least disturbed of all of the creeks in the region. Detailed results of this analysis can be found in Appendix 3 and 4.

Comparison of Watershed Health using Index of Biological Integrity Score

Courtesy of Jeff Brinkman, Ecology Consultants Inc. and the Central Coast RWQCB

Year	Gaviota Creek-Brinkman	Gaviota Creek-RWQCB	Arroyo Hondo Creek-Brinkman
2001	42		
2002	34		66
2003	54		68
2004			
2005	30	30	25
2006			67
2007	36	43	58
2008	44	44	58
2009			64
2010	30		67
2011	24		61
2012	49		65
2013	54		65
2014	14		47

Classifications of Biological Integrity and Scoring Ranges

Excellent 61 to 70 Good 48 to 60 Fair 31 to 47 Poor 9 to 30 Very Poor 0 to 8

Figure 6

Gaviota Creek has the unique situation of sharing the narrow canyon just north of the roadside rest areas (the Gaviota Pass) somewhat un-equally with Highway 101. Several potential water quality issues can be raised in regards to runoff from the surface of Highway 101. First, this section of highway experiences a large number of vehicle accidents including roll-overs where the vehicle ends up in the creek. There is high potential for fuel spills as a result of these accidents. If a sizable fuel spill were to reach the creek, this is likely to be highly toxic to stream life. Accidents of this type have happened in other watersheds, so there is ample precedent for this concern.

In addition recent studies indicate that surface runoff from heavily used highways may be toxic to fish and invertebrates (8). Presumably this is because of the metals and petroleum by-products that are deposited on the road surface by motor vehicles and which can be flushed into the stream at high concentrations if not filtered first through the soil. It is in this stretch where the concern is focused since there is little space for storm-water runoff to be diverted other than directly into the stream. Also, this stretch of stream contains several deep and permanent pools which are important as a dry season refuge for steelhead, increasing the potential for serious harm to the steelhead population. Some investigation will need to be made of this potential problem in the near future.



As seen here, storm water runoff is discharged directly into the stream channel in the Gaviota Pass section of the creek. This arrangement could allow fuel spills on the highway to drain directly into the creek and precludes natural bio-filtration of the road wastes through soil.

Geology and Soils

The watershed bisects the Transverse Range and much of it is very steep and geologically unstable because of its potential for faults and landslides. The underlying rock is marine sedimentary from the late Cenozoic and Mesozoic eras and the soils derived from it are complex. Some believe this complexity contributes to the high species diversity. A soils map which illustrates this complexity can be found in the Appendix.



The trail head for the .7 mile hike to the Gaviota Hot Springs warns of the possible presence of mountain lions. The Springs mark the location of the Santa Ynez fault.

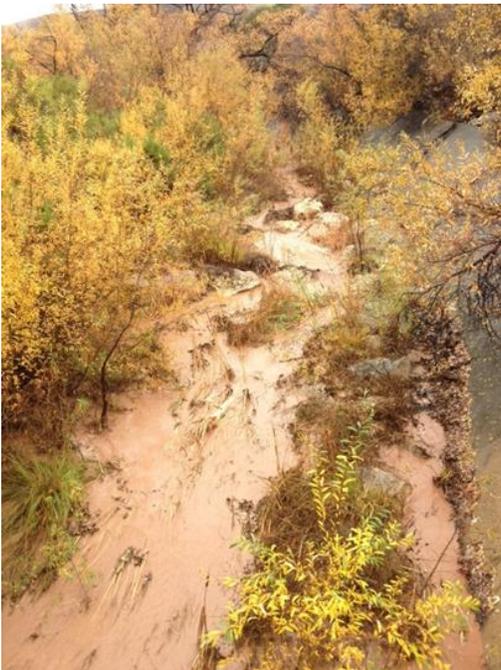
The highest point in the watershed is Gaviota Peak (2,460 feet) which rises to the east above the Las Canovas Creek, about three miles inland of the ocean. The creek itself is bisected by a branch of the Santa Ynez Fault which likely caused the original split in the mountain range known as Gaviota Pass. The slopes above the creek are very steep and in many areas highly erosive. CalTrans installed protective fencing in many areas to reduce the incidence of rocks and debris falling into the traffic lanes of the highway.

During periods of high winter runoff, the Las Cruces branch of the creek carries a high sediment load which looks pink in suspension (see the photo below).



Pink-colored sediment deposits in the main stem of Gaviota Creek just upstream of the northbound Highway 101 tunnel.

As seen in the aerial photograph below, there appears to be extensive stream bank erosion in the upper tributaries to Las Cruces Creek. It is unknown whether this erosion is primarily due to soil conditions or to past land use practices.



High sediment loads in early winter run-off; January 2016.



Stream bank Erosion in Las Cruces Branch of Gaviota Creek

The Las Canovas Creek branch of Gaviota Creek also contains heavy sediment deposit in its bed (7). The sediment in the Las Canovas Creek does not have the pink coloration one finds in Las Cruces Creek. The source of the sediment in Las Canovas Creek is unknown as, other than the dirt road ascending to the ridge top, there is no other obvious human-caused disturbance in that part of the watershed that would explain the sediment. More research needs to be done to understand all of the sources of sediment in Gaviota Creek, as excessive sediment may smother aquatic insects and steelhead eggs, among other things.

Wind

There are frequent high velocity winds in the Gaviota Pass area, due to the topography which acts as a funnel for frequent NW winds coming ashore north of Point Conception and warm season Santa Ana winds. These strong and frequent winds influence the local climate to a great degree, drying out the soil and vegetation. They make it difficult to farm irrigated crops or orchards and increase the severity of wildfires.



The Gaviota Wind Caves are found in the upper reaches of the sandstone buttresses which rise above Highway 101 in this photo. They are evidence of the force of local winds and can be reached by a popular trail from Gaviota State

SUMMARY OF PROPOSED RESTORATION ACTIVITIES

The following list is a first cut at what has been identified as key restoration activities and issues in rough order from highest priority to lowest. This list and the priorities will be refined as additional meetings are held with the Stakeholders.

1. Remove the 9 steelhead migration barriers in the main stem of Gaviota Creek within the State Park and CalTrans owned properties.
2. Develop plans and seek funding for the replacement of the existing entrance road to Gaviota State Park and Hollister Ranch with a new road and crossing that avoids the Creek's flood plain, will not be subject to flooding, and not constitute a barrier to steelhead.
3. Conduct studies to find the source of water quality problems which have caused the creek to be listed as impaired under section 303d of the Clean Water Act.
4. Conduct studies to determine the source and causes of excess sedimentation.
5. Develop a plan to protect and improve the stream water quality by:
 - a. Addressing storm water run-off
 - b. Investigating how to prevent a fuel spill on the highway from reaching the creek
 - c. Improving waste and trash disposal and possibly establishing regular trash removal in Highway 101 section
 - d. Addressing sources of sedimentation with a remediation plan.
6. Develop a plan to protect and improve the in-stream flow by looking at opportunities to
 - a. Investigate reducing current water use in the watershed by conservation
 - b. Investigate the purchase of water rights from willing sellers
 - c. Improve the retention of winter run-off for groundwater re-charge and summer flow augmentation

7. With State Parks, prepare a specific plan to restore the estuary at the mouth of Gaviota Creek. Seek funding for this restoration and implement the plan.
8. Support the effort by the California Rangeland Trust and the Land Trust for Santa Barbara County to work with the upstream private property owners who wish to place conservation easements on their properties.
9. Where land owner support exists, remove the remaining steelhead barriers on private land.
10. Where land owner support exists, begin to implement plan to reduce stream sedimentation by:
 - a. Re-planting riparian vegetation in upland areas
 - b. Placing erosion control structures where appropriate
11. Develop management plans to remove and control exotic invasive species such as crayfish, bullfrogs, pepper trees, castor bean, Arundo, and pampas grass.
12. Conduct a comprehensive stream habitat assessment and investigate whether appropriate conditions exist to support spawning of a larger steelhead population than now present. Address issues raised by this investigation.
13. Study the feasibility of relocating the road-side rest stops out of the immediate stream corridor.
14. With State Parks, develop and implement interpretive signage to explain the restoration to Park visitors

STEELHEAD RECOVERY GOALS

The presence of Southern Steelhead in Gaviota Creek has been one of the key drivers of restoration activity in the watershed over the past 20 years. The Southern Steelhead is one of the most sensitive and rare of all the animals found in the watershed and by initially focusing restoration actions on what the steelhead require, this will serve the needs of the many other species in the watershed.

This Plan utilized the NOAA Southern California Steelhead Recovery Plan of 2012 as a basis for selecting the actions which could be taken in the Gaviota Watershed to reach the goals of restoring a healthy population of steelhead. Many of the steps suggested by this Steelhead Recovery Plan have been incorporated into this Plan. Because of this, the following summary of the Steelhead Recovery Plan is being provided.

NOAA Southern California Steelhead Recovery Plan- 2012

Threats to Steelhead in Gaviota Creek

1. Very High Threats
 - a. Roads
 - b. Culverts and crossings that create passage barriers
 - c. Levees and channelization
 - d. Wildfires
 - e. Recreational facilities
2. Medium Threats
 - a. Upslope/Upstream Activities
 - b. Flood Control Maintenance
 - c. Agricultural Development
3. Low Threats
 - a. Groundwater Extraction
 - b. Urban Development
 - c. Mining and Quarrying
 - d. Dams and Surface Water Diversions

The Steelhead Recovery Plan lists the following recovery actions for Gaviota Creek. The listing order is significant with the highest priority steps first.

Recovery Actions for Steelhead in Gaviota Creek

1. Manage agricultural development and restore riparian zones
2. Manage livestock grazing to maintain or restore aquatic habitat functions
3. Develop, adopt, and implement agricultural land-use planning policies and standards
4. Develop and implement plan to remove or modify fish passage barriers within the watershed
5. Develop and implement flood control maintenance program
6. Conduct groundwater extraction analysis and assessment
7. Develop and implement groundwater monitoring and monitoring program

8. Develop and implement stream bank and riparian corridor restoration plan
9. Develop and implement watershed-wide plan to assess the impacts of nonnative species and develop control measures
10. Develop and implement nonnative species monitoring program
11. Develop and implement public education program on nonnative species impacts
12. Manage roadways and adjacent riparian corridor and restore abandoned roadways (e.g., Gaviota State Beach/Hollister Ranch access road)
13. Retrofit storm drains to filter runoff from roadways (e.g., U.S. Highway 101)
14. Develop and implement estuary restoration and management plan
15. Review and modify applicable County and/or City Local Coastal Plans
16. Develop, adopt, and implement urban land-use planning policies and standards
17. Retrofit storm drains in developed areas
18. Develop and implement riparian restoration plan to replace artificial bank stabilization structures
19. Review California Regional Water Quality Control Board Watershed Plans and modify Stormwater Permits
20. Review, assess and modify NPDES wastewater discharge permits
21. Develop and implement an integrated wildland fire and hazardous fuels management plan

The Steelhead Recovery Plan considers Gaviota Creek a “Core Two” priority for recovery. This makes it the highest rated stream for steelhead recovery on the Gaviota Coast.

PREVIOUS PLANS AND REPORTS OF SIGNIFICANCE

Gaviota Creek Watershed Management Plan- 2005

This Plan was prepared by the Cachuma Resource Conservation District at the request of the State Park. It contains excellent material characterizing the watershed’s geology, biology, climate, etc. It also reports in detail on a series of meetings held with nearby residents and other stakeholders. We have chosen to include the full text of this Plan in Appendix 5 because it was not widely distributed at the time and is not yet available on the internet. This Plan is intended as an extension of the 2005 Plan, utilizing the latest information.

Gaviota Creek Fish Passage and Geomorphic Assessment- 2007

This excellent study was done in 2007 by Michael Love and Associates and Stoecker Ecological. This was before the release of the Steelhead Recovery Plan but this is an excellent study and contains much detailed information about Gaviota Creek and the steps necessary to improve steelhead passage. The next steps in the removal of fish passage barriers will be much simpler because of the information found here.

From the study:

“...Gaviota Creek produces relatively high summer base flows and maintains cool water temperatures in the headwaters of the mainstem, Las Canoas Creek, and the lower mainstem. The watershed also contains one of the largest lagoon systems along the southern Santa

Barbara County coast, which is ideal for steelhead rearing, food production, and acclimation between fresh and saltwater. Also, the estuary mouth is open to the ocean longer than most streams in the region, providing good access for steelhead adults and smolts. These characteristics make Gaviota Creek one of the highest ranking watersheds within the southern Santa Barbara County coast in terms of steelhead recovery potential and potential productivity.”



Survey Work being conducted in Gaviota Creek for the 2007 Fish Passage Study (4)

Other Resources and Background Documents

The Gaviota Coast received a lot of attention in the past 10-15 years and a number of reports were issued that document the natural resources and planning issues for the region. These include the following:

1. Gaviota Creek Fish Passage and Geomorphic Assessment- Michael Love Associates and Stoecker Ecological http://www.stoekerecological.com/reports/Gaviota_Passage_Report_FINAL.pdf
2. Santa Barbara County Gaviota Coast Plan Draft Environmental Impact Report-2015 http://longrange.sbcountyplanning.org/planareas/gaviota/gaviota_DEIR%20Chapters.php
3. Santa Barbara County Gaviota Coast Plan-2013 <http://longrange.sbcountyplanning.org/planareas/gaviota/gaviota.php>
4. Southern California Steelhead Recovery Plan- 2012 NOAA Fisheries
 - a. Summary http://fs.sdsu.edu/wp-content/uploads/2012/02/Southern_California_Steelhead_Recovery_Plan_Summary_Corrected_012712.pdf
 - b. Chapters 1-8 http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/south_central_southern_california/final_southern_california_steelhead_recovery_plan_volume_1.pdf

- c. Chapters 9-15 plus Appendices
http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/south_central_southern_california/final_southern_california_steelhead_recovery_plan_jan_2012_volume2.pdf
5. Gaviota Creek Watershed Management Plan, 2005 Cachuma RCD (see Appendix 5)
6. Gaviota Coast Study Group Report and Recommendations-2005
<http://longrange.sbcountyplanning.org/planareas/gaviota/documents/Gaviota%20Coast%20Study%20Group%20Report%20September%202005.pdf>
7. National Park Service Gaviota Coast National Seashore Feasibility Study-2003
<http://www.nps.gov/pwro/gaviota/index.htm>
8. Gaviota State Park Plan of 1979 <http://www.parks.ca.gov/pages/21299/files/542.pdf>
9. California State Parks: Representative Keystone Watersheds
http://www.parks.ca.gov/pages/23071/files/repkeystonewatersheds%208_2007%20w_table3%20noms.pdf
10. Southern Coastal California Creeks Bio-assessment Plan –Ecology Consultants Inc.
<http://www.santabarbaraca.gov/civica/x/filebank/blobdload.aspx?blobid=51561>
11. Gaviota Creek Fish Passage Enhancement- State Parks
<http://www.californiawetlands.net/upfiles/4269/Gaviota%20Creek%20Fish%20Passage%20Proposal.pdf>
12. Gaviota Creek Enhancement Plan 1991-State Parks
http://www.ecoatlas.org/upfiles/4189/Gaviota%20Creek%20Enhancement%20Plan_reduced.pdf
13. Gaviota Creek Fish Passage Enhancement 1999- State Parks
<http://www.ecoatlas.org/upfiles/4269/Gaviota%20Creek%20Fish%20Passage%20Proposal.pdf>
14. Steelhead Assessment and Recovery Opportunities in Southern Santa Barbara County-
Concepcion Coast/Stoecker
http://www.ecoatlas.org/upfiles/4271/final_steelhead_report_2002-06-21_compressed.pdf

CONCLUSION AND NEXT STEPS

The potential exists to restore and further protect the natural resource values found today in the Gaviota Creek watershed. While the watershed is by no means pristine, it has decent stream flow and little development of any kind. Even in 2015, the fifth year of a severe drought, there is sufficient water to support a small population of steelhead trout, pond turtles, and red-legged frogs. Water quality is also good and there is the potential to improve water quality with better land use practices and management of storm-water runoff.

The next steps to begin to implement this plan are:

1. Convene additional stakeholder meetings and refine the plan based on input
2. Work with key decision makers to inform them of the opportunities
3. Actively seek grants to begin work on the high priority items

The greater Santa Barbara community has in the past shown strong support for the protection of the natural beauty and resources of the Gaviota Coast. The success of the Arroyo Hondo Preserve owned by the Land Trust for Santa Barbara County, which protects a watershed similar to the Gaviota, is a good example of this support. Our hope is that the Gaviota Creek watershed can attract similar funding and attention and provide equal opportunities for recreation and education as the Arroyo Hondo Preserve.

CITATIONS

1. Gaviota State Park Plan of 1979
2. Mary Hamilton, Central Coast RWQCB
3. Jeff Brinkman, Ecology Consultants Inc.
4. See: "Gaviota Creek Fish Passage and Geomorphic Assessment"
http://www.stoekerecological.com/reports/Gaviota_Passage_Report_FINAL.pdf
5. Anecdotal based on first hand conversations with land owners
6. Local State Park personnel
7. Personal Observation
8. See: "*Soil bioretention protects juvenile salmon and their prey from the toxic impacts of urban stormwater runoff*" J.K. McIntyre et al
<http://www.fws.gov/wafwo/pdf/Soil%20bioretention%20protections%20juvenile%20salmon%20from%20stormwater.pdf> and "*A Sensory System at the Interface between Urban Stormwater Runoff and Salmon Survival*" Jason F. Sandahl et al
http://www.pebbledocs.org/Fisheries/Sandahl_2007_CuOlfactoryInhibition1.pdf and "*Coho salmon spawner mortality in western US urban watersheds: bioinfiltration prevents lethal storm water impacts*" Julann A. Spromberg et al <http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12534/pdf>

APPENDICES

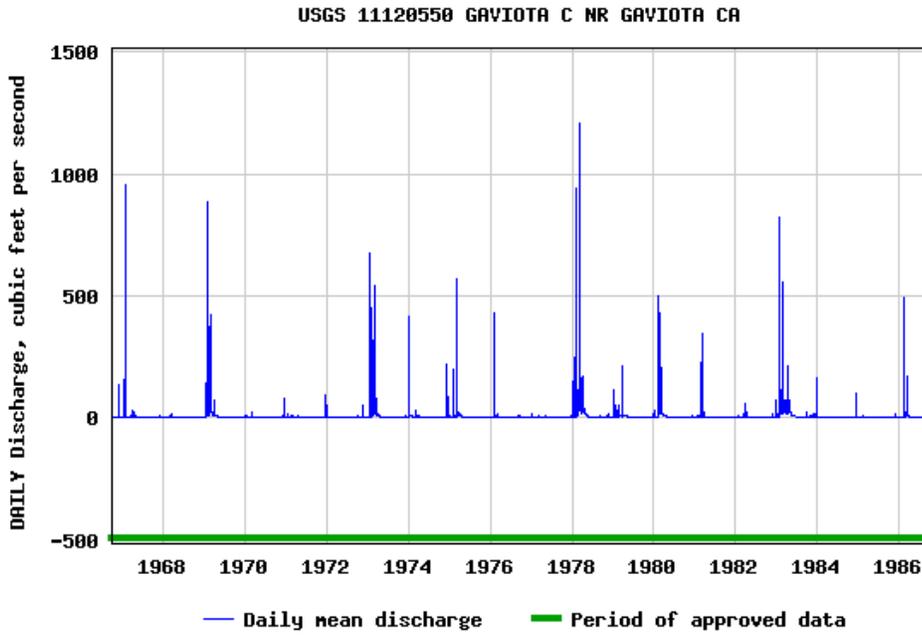
Appendix 1

Gaviota Creek Water Quality Data from CCAMP Program conducted by Central Coast RWQCB

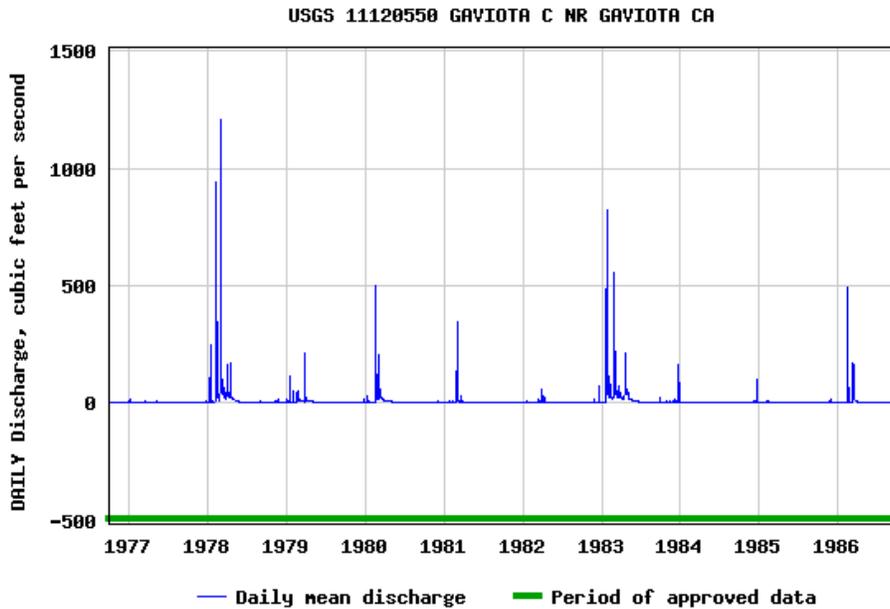
Analyte Name	Units	Min	Mean	Geomean	Median	Max	Sample No.	Dates	Aquatic Life Goal	Human Health Goal
Algae-filamentous	%	0	16	2	5	80	24	2001-2004	50	
Algae-floating mats	%	0	1	0	0	20	83	2005-2012	20	
Ammonia as N, Total	mg/l	0.010	0.051	0.028	0.025	1.600	134	2001-2014	1.900	30.000
Ammonia as N, Unionized	mg/l	0.0001	0.0021	0.0006	0.0005	0.0790	227	2001-2014	0.0250	
Boron, dissolved	mg/l	0.14	1.11	1.03	1.00	2.00	132	2001-2014	1.50	1.00
Calcium	mg/l	140.0	224.1	220.4	210.0	270.0	22	2012-2014		
Chloride	mg/l	19.0	195.8	177.1	170.0	470.0	130	2001-2014		
Chlorophyll a	ug/l	0.010	2.519	0.975	0.000	41.010	126	2001-2015	15.000	
Coliform, E. coli	MPN/100 ml	2	831	58	63	69,000	105	2005-2014		126
Coliform, Fecal	MPN/100 ml	2	1,621	102	80	160,000	131	2001-2014		200
Coliform, Total	mpn/100 ml	30	5,580	977	900	160,000	142	2001-2014		1,000
Dissolved Solids, Total	mg/l	360.0	1,262.9	1,233.1	1,190.0	2,010.0	275	2001-2014		500.0
Flow, field measurement	cfs	0.0	3.9	0.8	0.0	52.2	138	2005-2012		
Hardness as CaCO3	mg/l	201	637	626	609	1,000	134	2001-2014		
Magnesium	mg/l	17.0	53.3	52.3	51.0	84.0	139	2001-2014		
Nitrate as N	mg/l	0.01	0.11	0.04	0.04	2.50	134	2001-2014	1.00	10.00
Nitrate, Nitrite as N	mg/l	0.02	0.13	0.06	0.05	2.52	133	2001-2014	1.00	10.00
Nitrite as N	mg/l	0.002	0.014	0.011	0.010	0.100	133	2001-2014	0.150	1.000
Nitrogen, Total	mg/l	0.07	0.86	0.51	0.45	9.27	43	2001-2014	0.90	
Nitrogen, Total Kjeldahl	mg/l	0.04	0.50	0.31	0.37	8.90	134	2001-2014	0.90	
OrthoPhosphate as P	mg/l	0.008	0.042	0.030	0.029	1.120	132	2001-2014	0.130	
Oxygen, Dissolved	mg/l	4.54	8.34	8.18	9.56	13.56	331	2001-2015		
Oxygen, Saturation	%	46.1	90.0	88.4	100.1	144.8	331	2001-2015	85.0	
pH	-log[H+]	6.87	7.79	7.79	7.84	8.98	331	2001-2015		
Phosphorus, Total as P	mg/l	0.012	0.174	0.055	0.049	6.500	107	2001-2012		
Salinity	ppt	0.26	1.02	1.00	0.90	1.57	233	2001-2015		
Silica as SiO2	mg/l	7.9	22.0	21.7	21.0	29.0	64	2008-2014		
Sodium	mg/l	32	159	152	150	251	135	2001-2014		60
Specific Conductivity	uS/cm	100.1	1,686.6	1,558.5	1,676.0	2,914.0	331	2001-2015		
Sulfate	mg/l	124.0	438.6	425.6	460.0	481.0	19	2001-2002		
Suspended Solids, Total	mg/l	0.5	67.7	3.2	2.2	5,800.0	241	2001-2014	30.0	
Turbidity	ntu	0.1	29.5	0.6	0.0	2,044.0	141	2001-2015	25.0	1.0
Urea	mg/l	0.008	0.010	0.009	0.010	0.028	40	2008-2014		
Water Temperature	Degrees C	7.8	19.0	18.7	17.3	27.7	331	2001-2015	18.0	

Appendix 2

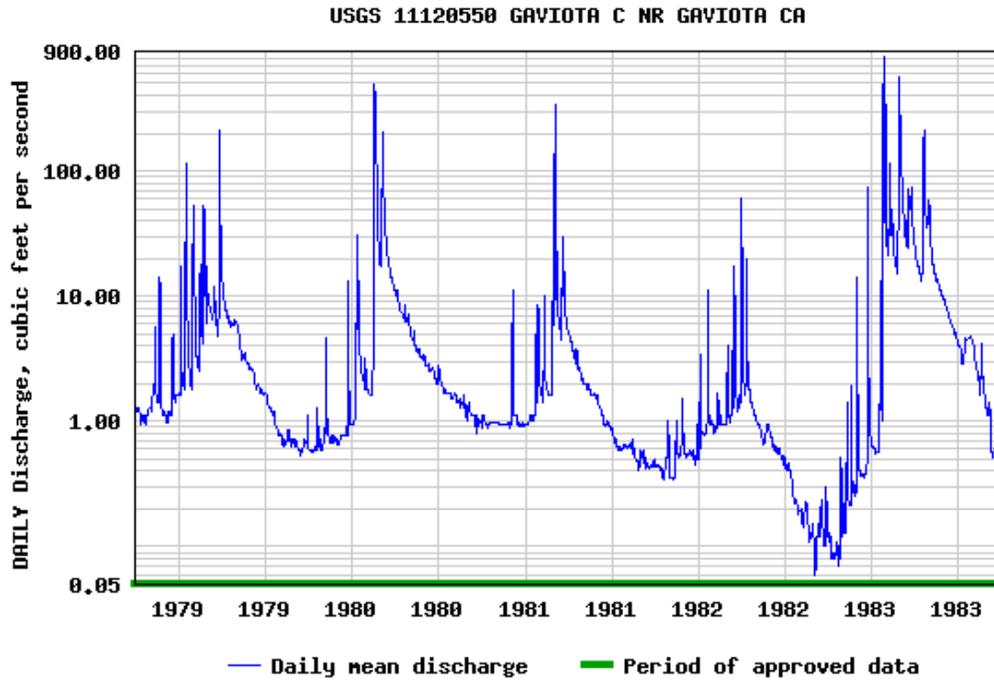
GAVIOTA CREEK STREAMFLOW DATA- 20 years



GAVIOTA CREEK STREAMFLOW- 10 years



Daily Streamflow- 10-1-78 to 9-30-1983



Appendix 3

GAVIOTA CREEK Benthic Macro Invertebrate (BMI) Data

Courtesy of Jeff Brinkman, Ecology Consultants Inc.

Study Reaches	Year	Order	Elevation (ft.)	Gradient	% wilderness	% urban	% agriculture	% herbaceous	% undisturbed	Stream temp. (c)	pH	Dissolved oxygen (mg/l)	Specific cond. (microS @ 25 c)	% riparian canopy cover	Wet width (ft)	HABITAT ASSESSMENT SCORE	IBI Score	Class. of Integrity	# EPT families	% sens BMIs	Tolerance Value Avg.	# insect families	% sh+pred	% PT	% tol BMIs	BMI density (#/sq. m)
GAV1	2002	3	25	0.01	59	0	0	41	79	19.1	8.2	11.7	1617	13	70	53	Good	8	33	4.76	22	17	15	24	1988	
GAV1	2003	3	25	0.01	59	0	0	41	79	18.5	8.6	9.7	1593	15	13	78	41	Fair	8	20	5.38	20	11	10	36	791
GAV1	2005	3	25	0.01	59	0	0	41	79	15.2	8.5	9.3	1240	0	16	68	12	Poor	1	1	6.15	7	1	0	39	495
GAV1	2007	3	25	0.01	59	0	0	41	79	24.3	8.1	13.2	1930	7	19	78	51	Good	9	39	4.31	19	8	15	18	1886
GAV1	2007	3	25	0.01	59	0	0	41	79	18.5	8.1	6.7	1540	42	9	78	46	Good	9	40	4.86	20	11	11	35	3667
GAV1	2008	3	25	0.01	59	0	0	41	79	16.0	8.0	9.7	1813	33	16	83	33	Fair	6	16	5.86	17	10	6	47	251
GAV1	2008	3	25	0.01	59	0	0	41	79	20.6	8.2	9.6	1619	60	13	80	38	Fair	9	25	5.60	22	11	4	47	165
GAV1	2009	3	25	0.01	59	0	0	41	79	20.1	8.0	6.3	1793	50	11	75	39	Fair	9	26	5.49	21	6	6	43	372
GAV1	2010	3	25	0.01	59	0	0	41	79	18.3	8.2	9.7	1690	65	12	78	31	Poor	6	26	5.80	16	14	1	50	77
GAV1	2011	3	25	0.01	59	0	0	41	79	19.9	8.2	5.9	1554	77	4	83	24	Poor	7	5	6.52	15	7	3	57	292
GAV1	2012	3	25	0.01	59	0	0	41	79	18.5	8.1	7.2	1643	80	4	83	49	Good	8	63	3.35	17	9	6	8	174
GAV1	2013	3	25	0.01	59	0	0	41	79	14.6	7.5	8.1	2029	58	3	85	54	Good	9	55	4.17	16	27	17	35	1065
GAV1	2014	3	25	0.01	59	0	0	41	79	14.1	7.5	7.3	2778	62	2	83	14	Poor	4	5	6.98	11	8	1	72	206
GAV2	2002	3	260	0.02	54	0	0	46	77	24.8	8.2	9.6	1548	13	58	49	Good	9	39	4.92	22	11	16	35	831	

Analyte Name	Units	Min	Mean	Geomean	Median	Max	Samples	Dates	Aquatic life Goal	Human health Goal
California Stream Condition Index	score	0.596	0.860	0.847	0.890	0.991	6	2001-2008	0.800	
EPT Index(%)	%	16.0	30.7	27.9	30.0	50.0	7	2001-2008		
EPT Individuals	Individuals	78.0	152.3	138.1	150.8	251.0	7	2001-2008		
EPT Taxa	Taxa	4.0	9.3	8.7	9.0	16.0	7	2001-2008	12.0	
Intolerant EPT Taxa	Taxa	1.0	1.8	1.5	1.8	4.0	5	2001-2008		
Intolerant Individuals	Individuals	1.0	3.3	2.8	3.0	7.0	6	2001-2008		
Intolerant Taxa	Taxa	1.0	2.0	1.7	1.5	4.0	6	2001-2008		
NorCal IBI	Score	20.0	31.4	30.6	29.5	44.0	7	2001-2008	40.0	
Percent Dominant Taxon	%	28.0	56.7	54.1	57.6	77.0	7	2001-2008		
Percent Predator Taxa	%	21.0	31.1	30.3	32.0	44.0	7	2001-2008		
Percent Predators	%	1.0	4.0	3.1	4.0	8.0	7	2001-2008		
Percent Tolerant Taxa (8-10)	%	5.0	20.2	17.6	22.0	32.0	6	2001-2008		
Sensitive EPT Index (%)	%	1.0	1.4	1.3	1.3	2.0	7	2001-2008		

	Sensitive EPT Individuals	Individuals	3.0	6.4	5.8	6.5	10.0	7	2001-2008		
	SoCal IBI	Score	29.0	38.4	37.6	38.0	53.0	7	2001-2008	40.0	
	Taxonomic Richness	Taxa	10.0	23.0	21.6	22.5	36.0	7	2001-2008		

See: <http://www.santabarbaraca.gov/civicax/filebank/blobdload.aspx?BlobID=16728>

Appendix 4

2001-2008 CCAMP (RWQCB) Data from Gaviota Creek

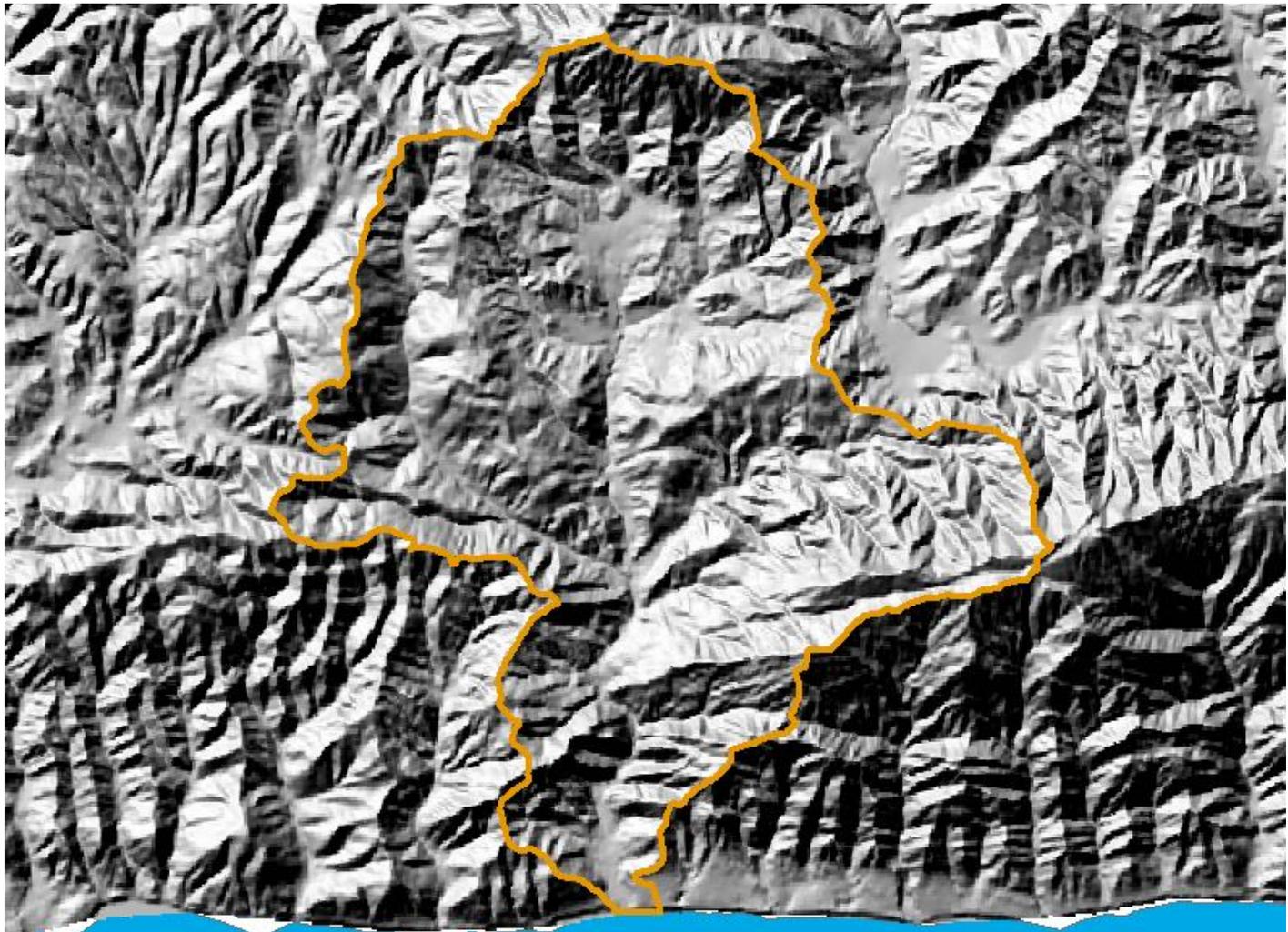
Benthic Macro Invertebrate Sampling

Analyte	Units	Min	Mean	Geomean	Median	Max	Samples	Aquatic Life Goal
California Stream Condition Index	score	0.596	0.860	0.847	0.890	0.991	6	0.800
EPT Index(%)	%	16.0	30.7	27.9	30.0	50.0	7	
EPT Individuals	Individuals	78.0	152.3	138.1	150.8	251.0	7	
EPT Taxa	Taxa	4.0	9.3	8.7	9.0	16.0	7	12.0
Intolerant EPT Taxa	Taxa	1.0	1.8	1.5	1.8	4.0	5	
Intolerant Individuals	Individuals	1.0	3.3	2.8	3.0	7.0	6	
Intolerant Taxa	Taxa	1.0	2.0	1.7	1.5	4.0	6	
NorCal IBI	Score	20.0	31.4	30.6	29.5	44.0	7	40.0
Percent Dominant Taxon	%	28.0	56.7	54.1	57.6	77.0	7	
Percent Predator Taxa	%	21.0	31.1	30.3	32.0	44.0	7	
Percent Predators	%	1.0	4.0	3.1	4.0	8.0	7	
Percent Tolerant Taxa (8-10)	%	5.0	20.2	17.6	22.0	32.0	6	
Sensitive EPT Index (%)	%	1.0	1.4	1.3	1.3	2.0	7	
Sensitive EPT Individuals	Individuals	3.0	6.4	5.8	6.5	10.0	7	
SoCal IBI	Score	29.0	38.4	37.6	38.0	53.0	7	40.0
Taxonomic Richness	Taxa	10.0	23.0	21.6	22.5	36.0	7	

Gaviota Creek
Santa Barbara County, California

WATERSHED MANAGEMENT PLAN
A WORKING DOCUMENT

Standard Agreement No. C0342005



Prepared for: **State of California Resources Agency**
Department of Parks and Recreation
Channel Coast District
911 San Pedro Street
Ventura, CA 93001

Prepared by: **Cachuma Resource Conservation District**
920 East Stowell Road, Santa Maria, CA 93454

Gaviota Creek
Santa Barbara County, California

WATERSHED MANAGEMENT PLAN
A WORKING DOCUMENT

Prepared for:

California Department of Parks and Recreation

April 2005

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**GAVIOTA CREEK
WATERSHED MANAGEMENT PLAN
A WORKING DOCUMENT**

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GAVIOTA CREEK WATERSHED MANAGEMENT PLAN

FOREWORD – Part of the watershed was severely damaged by a wildfire in June 2004 - principally on Gaviota State Park property. The plan was subsequently adjusted to reflect pre and post fire conditions to the extent possible.

In general, environmental damages are greatest during the first year following a wildfire the extent of which varies depending on early storm intensities, amount of floatable debris, preventive measures taken before and during the winter season, burn intensity, and variable rates of response during regeneration of discrete plant communities. During preparation of this document substantial effort was made to identify potentially erosive conditions associated with roads and trails within Gaviota State Park. While those areas identified in the plan certainly warrant attention, other hazardous areas not identified may present additional problems – problems that are associated with the burn area such as slope failure due to dry ravel or old landslide failures that were in some form of stability before the fire.

Section 1 – INTRODUCTION

1.1 Plan purpose and goal: The Gaviota Creek Watershed Management Plan was prepared by the Cachuma Resource Conservation District (RCD) in response to a request for assistance from the California Department of Parks and Recreation (CDPR). The purpose was to develop a stakeholder driven consensus plan that addressed natural resource issues of concern within the watershed with specific emphasis on Park property to serve as a guide for long-term management of the watershed. A companion report entitled “Assessment of Roads, Trails, and Erosion Features on Gaviota State Park” was prepared as a complement to this plan.

1.2 Funding and scope of work: Funding for this project was provided by the California Department of Parks and Recreation through Interagency Agreement #C0342005.

The Gaviota State Park property consists of a main unit, a discontinuous ocean front strip extending from Canada Alcatraz easterly to Arroyo Hondo, and two smaller ocean front strips, one near Arroyo Quemado, and one near Tajiguas Creek. The main unit encompasses an area of 2,525.8 acres, 1,893.5 acres of which are within the Gaviota Creek hydrologic province. The remainder of the main unit infringes in part on the Agua Caliente Creek watershed and several small unnamed drainages to the west, and from Canada del Barro to Canada del Cementerio on the east. Most of the efforts on park property under this project were confined to the main unit and principally for assessments within the Gaviota Creek watershed. Assessments on park property that infringed on other watersheds were limited to critical review of the status of roads and trails.

The agreement defines the scope of work under four primary tasks:

Task 1: Conduct landowner interviews and facilitate group input in preparation of the plan. The objectives were:

- To gauge private landowner interest in the development of a comprehensive plan for the entire watershed including their vision for management.
- To encourage landowner cooperation in completing field assessments relating to soil erosion and other water quality issues, assessment and repair of fish passage barriers, and similar natural resource concerns.
- To introduce ranch planning concepts and documentation of management practices employed and best management practice concepts.

Task 2: Collect existing data relating to the watershed and a technical assessment of watershed concerns. The objectives were:

- To prepare a comparative analysis of historic land use changes that may have affected the resources.
- To complete field assessments throughout the watershed, subject to landowner approval, to determine the extent of soil erosion, stream habitat quality, invasive species, and similar issues.
- To prepare a report summarizing existing data as well as new information collected under this project.

Task 3: Complete a detailed field assessment of all roads, trails, and other facilities within the Park to determine the extent of soil erosion. The objectives were:

- To determine the extent of erosion and specific locations.
- To prioritize areas of concern.
- To prepare conceptual designs and cost estimates to repair eroded areas. The designs and associated costs are of sufficient detail to facilitate budgeting for implementation.

Task 4: Complete a Geographic Information System (GIS) database. The objectives were:

- To gather all existing GIS information relating to the watershed that supports the goals of this project.
- To prepare new GIS layers as appropriate to support the goals of the project. Layers include Global Positioning System (GPS) data specifically locating features, structures or other issues of concern.
- To provide links and query functions to text and tables that support various GIS layers.

1.3 Plan organization: The plan includes both printed text and maps that were developed using Geographic Information System (GIS) ArcGIS version 8.3 software. The maps developed were considered relevant and necessary support of the text statements and consist of overlays of various watershed attributes. Other GIS overlays and links to text

or tables that are not shown were used as reference during preparation of the plan. A list of electronic references is included in the Reference Documents section of the Appendices. Some of the electronic files have links to text or tabular databases that can be queried by entering any parameters that exist in the database.

Overlays are displayed on digitized year-2000 color aerial photographs and/or seamless U. S. Geological Survey (USGS) 7.5 minutes quadrangle backgrounds.

1.4 Previous plans or studies:

Gaviota Creek Watershed Management Plan Data Reconnaissance. L.C. Lee & Associates, Inc., October 2002. Provides general background information of the watershed, an overview of existing data, recommendations for future data collection in development of the management plan, and long-term goals.

California Fish Passage Assessment Database. Pacific States Marine Fisheries Commission, et al (January 2004). Identifies potential fish passage barriers, apparent cause, and status of the barrier.

Conception Coast Project. Stoecker, et al (2002). Provides an assessment of southern Santa Barbara County natural resources.

Gaviota Beach Road and Bridge Replacement Project, Bridge No. 51C-324. Prepared by Quincy Engineering, Inc. for the County of Santa Barbara Department of Public Works, March 21, 2003. Road access and bridge replacement plan.

Reconnaissance Hydrologic and Geomorphic Analysis of Gaviota Creek. Mitchell Swanson, Swanson & Associates (July 10, 1991). Watershed conditions and analysis of a ford replacement to access campgrounds.

Recruitment of Quercus agrifolia in central California: the importance of shrub-dominated patches. Journal of Vegetation Science 9: 647-656, Ragan M. Callaway & Frank W. Davis (1998). Provides a detailed study of plant communities found on Park property.

1.5 Local participation:

1.5.1 Private Landowner meeting – January 22, 2004: The meeting was held at Vista Del Mar School to inform the landowners of the project and gauge their interest in participating in the development of a watershed management plan. Initially the group was apprehensive and questioned the plan goals, or the need for a plan. Perhaps this was a reaction because of their collective bad experiences with the recent National Seashore proposal. Nonetheless, all were interested in preserving and improving the long-term health of the watershed, and after much discussion on the value of a plan to achieve this goal the discussion focused on specific objectives that might be considered. Two issues were of particular interest; preservation and improvement of the Steelhead fishery and

maintenance of the old Highway 1 Bridge to ensure an alternative exit from Vista Del Mar School in case of an emergency. Another issue, water quality, was brought up by the RCD. It was noted that the creek was on the 303(d) list, the precursor for issuance of Total Maximum Daily Load (TMDL) requirements. In this case it would be for coliform bacteria. While cattle could be part of the cause for excessive bacterial counts, it was explained that this is not necessarily fact, and the cause(s) would have to be determined during the development of the TMDL by the Regional Water Quality Control Board.

There was some discussion about the general structure of the plan and the value of some plan components that could be used by landowners such as GIS layers of various watershed attributes. In general, the meeting was well received, and it was agreed that the RCD would keep the group updated on progress.

1.5.2 Public landowner meeting of September 29, 2004: A meeting with CDPR staff, the RCD, and representatives from Caltrans and the Las Padres National Forest (LPNF) was held to receive their input concerning the focus of the plan. Vista Del Mar School was represented by a school board member. (CDPR and Caltrans are the principal managers of state land in the watershed and LPNF is the manager of federal lands.).

Both Caltrans and the LPNF expressed a desire to maintain good relationships with the private land owners and Gaviota State Park. The LPNF was particularly interested in maintenance of the Gaviota Peak Trail since this was their principal motorized access to an isolated part of the National Forest – an area of approximately 7,600 acres. It was noted that a relatively small part (1,565 acres) of the LPNF was in the Gaviota Creek watershed and the principal use was recreational hiking. It was further stated that there was a grazing allotment, but it had little impact on the watershed since there was limited grazing land available. The RCD suggested that perhaps the road could be opened for motorized public access to the LPNF. This would provide significantly greater access to the public since it is approximately two miles of relatively steep land just to get to the Forest boundary. LPNF acknowledged that this was an alternative being discussed during the development of a new forest management plan.

Caltrans was particularly interested in the watershed plan because of their difficulties in obtaining permits from regulatory agencies to complete projects in the Gaviota Creek corridor, and felt that the plan might expedite permit processing. The issue of barriers to fish passage was discussed, particularly those related to several Caltrans grade control structures. They were aware of the concern, but stated that budget limitations prohibited them from improving access at this time; however, it was stated that a Caltrans weir plan for San Luis Obispo Creek has been widely accepted by regulatory agencies and they would make it available should an implementation project be funded for Gaviota Creek. CDPR brought up a future opportunity of relocating the rest stop from its current location at Gaviota Tunnel to oil company property located approximately 1.5 miles south of the Park entrance should this property become public domain when oil company operations are completed. The Caltrans representative stated that the concept would likely be supported by the agency because of several issues associated with the rest stop, particularly safety.

1.5.3 Private landowner meeting of October 26, 2004: All of the landowners were represented which was an illustration of their interest when considering that the meeting was held during a rather intense rain storm. A brief review of the previous discussion was followed by an update of progress in development of the plan. Various GIS layers of the watershed attributes were displayed and there was interest in obtaining copies of some of the information for personal use. Of particular interest were seamless aerial photo base maps with soils displayed.

Specific issues were discussed relative to what landowners would like to see addressed in the plan. One of the major topics of concern was the truck pull off and rest area at Nojoqui Pass. The landowners all agreed that this is an unregulated dump that includes, among other things, significant human waste, and they would like to see the stop regulated and equipped with sanitary facilities or closed. The RCD suggested that there was some discussion with Caltrans and CDPR concerning a proposal to move the rest stop facilities from Gaviota Tunnel to a site east of the park that is currently occupied by oil companies should the land become available. There was group consensus that should this proposal become a reality it should also include adequate truck parking and the Nojoqui site be closed.

A second topic of interest was steelhead habitat. Landowners were willing to install improvements if necessary on their respective properties, but it seemed that it would be a futile effort unless downstream barriers were fixed. Specifically, Caltrans grade control structures downstream of Gaviota Tunnel, the old Highway 1 Bridge and a box culvert on Nojoqui Grade. Continued interest was expressed in stability of the old Highway 1 bridge which is undermined. The undermining is a concern because total failure would not only affect fish passage, but would also eliminate an alternative exit for Vista Del Mar School in case of an emergency. The bridge also provides access to private land. There was also a concern about poor erosion control at Caltrans work sites in the Highway 1 corridor. During the storm it was observed that these sites were eroding and discharging substantial soil into the stream channels.

The topic of the rest stop at Gaviota Tunnel was revisited and it was noted that should the site be relocated it might reduce the in-stream bacterial count if the septic system was sealed. Also, water that is currently diverted to that system could be returned to Gaviota Creek.

1.5.4 Joint meeting of December 15, 2004: Most of the private landowners were present and all public agencies except the LPNF. The first part of the meeting was primarily focused on the plan development, including a review of issues presented in earlier discussions. Issues presented in earlier meetings included data sharing; water quality, quantity, and rights; fisheries and fishery impairments; livestock grazing; recreational access to the LPNF; agricultural conservation planning; funding sources; general health of the watershed and concerns; public health and safety; wildfire and preventive treatments. New issues discussed were noxious weed management including the use of

herbicides, rodent control including the use of pesticides, culvert locations and capacities, and sharing a directory of contacts associated with the plan.

Discussion then focused on the plan development and ultimate implementation. The landowners, to this point, had not had an opportunity to review and comment on the plan except for verbal exchanges during the various meetings. CDPR staff explained that it is their policy to complete internal review of all planning documents before public release, and they would do so after review of the draft. Landowners also expressed a desire to continue dialog with agencies after the plan is published to work toward implementation, and expressed a desire to pursue implementation of at least one project as soon as possible to maintain group interest. To that end the RCD volunteered to investigate various sources of funding to address fish barrier concerns including the barrier at the old Highway 1 Bridge since the stability of that bridge is a principal focus of landowner concern. The Caltrans representative stated that they would cooperate to the extent possible with services that might include design assistance, sharing of previous biological assessment information, and assistance during construction. The park staff was supportive of any effort and stated that they would cooperate fully during the planning and implementation.

1.5.5 Summary of meetings: As a result of the meetings four broad categories of interest evolved, including:

(1) Water quality and availability – In general, the water supply is uniquely protected because of its topography which would preclude any large scale development of irrigated annual crops, a climate that is not conducive to raising perennial crops that are typically grown in nearby areas, and an apparent lack of groundwater in quantities to support irrigated agriculture. About 29 percent of the watershed is public domain, and current zoning prohibits any large scale urbanization of private holdings. There are no water diversions except for relatively modest amounts used to support public facilities. Nevertheless, water quality is an issue of concern because of elevated bacterial counts and to a lesser degree sedimentation in the lower reaches. In total, long term sediment yield due to excessive soil erosion is not a problem except for service roads within the Park. There will be some acceleration of sediment yield in the short term due to the recent wildfire. The principal water quality concern is elevated fecal and total coliform bacterial counts that exceed thresholds established under Section 303 of the federal Clean Water Act. It is the responsibility of the State through the Central Coast Regional Water Quality Control Board (RWQCB) to determine sources and mitigation requirements through the issuance of maximum allowable bacterial discharge and to identify probable sources. This issuance is commonly referred to as a Total Maximum Daily Load (TMDL). The pollutant sources in this watershed could be in total, or in part, related to wild animals, livestock, or human influences.

(2) Public health and safety: The principal public health concerns in the watershed include trash and human waste at the Nojoqui Grade truck stop and water-based recreational activities during periods with elevated bacterial counts. The two primary issues concerning safety are the Gaviota Pass rest stops and stability of the old Highway

1 Bridge. The rest stops have limited parking and traffic congestion at times, and ingress and egress is somewhat hazardous. The bridge is a primary concern of the private landowners because it serves as an emergency exit from Vista Del Mar School. Other than safety hazards associated with various recreational activities, the entrance to the Park campgrounds, and pier is a safety concern because of debris accumulation and water discharges over the crossing in extreme wet weather conditions.

(3) Working relationships: Perhaps the most important outcome from the meetings was the establishment of a dialog between private and public land owners, and a recognized need to work collaboratively to facilitate implementation of project measures. Sharing information will facilitate opportunities for funding private lands through established USDA conservation programs, provide valuable background information for landowners during the preparation of personal management plans, facilitate applications for grant funding and permit processing, and ensure good working relationships.

(4) Watershed health: Gaviota Creek watershed is one of the few coastal environments in southern California that has remained unchanged for the last century except for enlargement and relocation of transportation corridors. Overall this a relatively healthy environment, and maintaining this environment and improving the overall health of the watershed is the goal of all parties. Nonetheless, there are concerns. Along with issues stated above, there is a concern about the apparent reduction from historic levels in spawning steelhead. Although there is little hard evidence of these reductions, long time landowners all agree that steelhead were much more numerous before creek modifications were made related to highway construction, and physical evidence in the form of migration barriers would support their claims.

Other concerns expressed related to improving watershed health included: control of noxious weeds, oak forest management, endangered species and their habitats, and funding to accomplish goals.

Section 2. BACKGROUND

2.1 Location and general features: The watershed of 12,902.8 acres is the largest of many north to south flowing streams in southern Santa Barbara County. It is dissected from north to south by U. S. Highway 101 and east to west by State Highway 1. The Gaviota State Park entrance is located near the Gaviota Creek outlet, approximately 11 miles south of Buellton and 28 miles west of Goleta. The principal tributaries to Gaviota Creek include Las Canovas, Hot Springs, and Las Cruces creeks. Except for the uppermost headwaters, all of the tributaries and the main stem have perennial flows that are sustained by numerous springs. The project location is shown on Figure 2.1 (page over).

For the most part the watershed is very steep and geologically unstable because of fault lines that dissect the area and numerous landslides. In June 2004, a wildfire burned through the southern reach of the watershed consuming most of the vegetation will

doubtless result in a substantial increase in soil erosion and debris yield during the next few years.

The highest point is Beacon Peak at 2,856 feet. The peak is the easternmost point in the watershed located about three miles inland of the ocean. The watershed is one of the highest rainfall areas in coastal southern California; however, because of steep topography and many rock outcroppings stream discharge peaks and recedes rapidly.

Gaviota Creek is included in the California Unified Watershed Assessment Santa Barbara Coastal Hydrologic Unit Area #18060013. This unit includes numerous watersheds in southern Santa Barbara County extending from a point near Surf south of the Santa Ynez River delta to Rincon Creek at the Santa Barbara/Ventura County line.

As part of the assessment process the project area was divided into five sub-watersheds. The sub-watersheds are shown on Figure 2.1A (following Figure 2.1).

- Gaviota Creek Downstream (2,237 acres) – Includes the drainage downstream of the confluence of all the major tributaries.
- Gaviota Creek Upstream (2,362 acres) – Includes the main stem upstream to the headwaters.
- Gaviota West Fork (2,615 acres) – Included the hydrologic province draining from the western headwaters to the confluence with the main stem. (This is an unnamed tributary on most published maps.)
- Las Canovas/Hot Springs Creeks (894 acres) – Includes the combined hydrologic area of both tributaries.
- Las Cruces Creek (4,795 acres) – Includes the entire Las Cruces Creek sub-watershed.

The sub-watersheds are similar in that they are in a relatively natural state, have the same geologic origins, and for the most part have steep slopes. They are dissimilar in that most of the Gaviota Upstream, Gaviota West Fork, and Las Cruces units are used to graze beef cattle; whereas, the other units are not grazed, but subject to greater human impacts because of recreational activities. The Gaviota Downstream unit also has numerous utility encumbrances that require service roads for maintenance access.

Ground cover types are similar, but the distribution varies considerably. The dominant cover in the Las Cruces and Gaviota West units is annual grass land at 65% and 41%, respectively. Brush dominates in the other units with 60% cover in the Gaviota Downstream unit, 57% in the Las Canovas unit, and 43% in the Gaviota Upstream unit. Oak woodlands are distributed throughout all units with the greatest canopy cover in the Gaviota West unit at 36%. The smallest oak canopy cover is in the Las Cruces unit (11%).

Gaviota Downstream, Las Cruces, and Las Canovas sub-watersheds have significant historic accelerated erosion in the form of landslides and gullies (23%, 21% and 16% of the surface areas, respectively). The historic erosion in the Gaviota Downstream and Las

Canovas units might be linked to two attributes they have in common – each is very steep with approximately two-thirds of the unit having slopes greater than 25%, and each has approximately one-half of the surface areas dominated by rock. Such conditions promote high velocity and high volume runoff which are the catalysts for soil erosion. Las Cruces sub-watershed is also relatively steep, but only about 10% rock. However, most of the soils are geologic derivatives of surficial sediments that have a moderate propensity to erode.

2.2 Social characteristics: This watershed is an entirely rural landscape with few permanent residents. Vista Del Mar, a small grammar school with approximately 90 students, is located within the project area; however, most students and faculty do not reside in the watershed. Gaviota State Park offers campgrounds and day use, and is utilized at or near capacity during the warmer months with modest use at other times.

2.3 Political districts: The following were the incumbents effective in 2005:

- Congressional District 23 (Lois Capps)
- State Assembly Districts 33 (Sam Blakeslee) & 35 (Hannah Beth Jackson)
- State Senate District 19 (Abel Maldonado)
- County Supervisor District 3 (Brooks Firestone)

2.4 Land use: Approximately 71 percent of the Gaviota Creek watershed is private property the majority of which is used to graze beef cattle or for infrastructure to support that industry. A few fields are dry-farmed in the Las Cruces sub-watershed. All of the public land, except for a school and the transportation corridors, are used for some form of recreation. Several service roads traverse Park property and provide access to an isolated parcel of the LPNF. Their principal use is to access and service various utilities that cross the properties, and for access in case of wildfire. All roads in Gaviota State Park except the campground access are closed to private motorized vehicles; however, foot, mountain bike, and horseback traffic is permitted. A summary of land ownership and dominant use follows. Figure 2.4 illustrates the land ownership and use (page over).

Table 2.4 – Land Ownership & Use

<i>Ownership</i>	<i>Total Acres</i>	<i>Percent Watershed</i>	<i>Grazed 1]</i>	<i>Dry-farmed 2]</i>	<i>Recreation 3]</i>	<i>Other 4]</i>
CA Dept. Parks & Recreation	*1,893.5	14.7	0	0	1,893.5	0
CA Dept. of Transportation	283.6	2.2	0	0	0	283.6
U.S. Forest Service	1,564.9	12.1	0	0	1,564.9	0
Private	9,160.8	71.0	8,690.7	206.9	0	245.3
Vista del Mar School	17.9	<1.0	0	0	0	17.9
Totals	12,902.8	100.0	8,690.7	206.9	3,458.4	546.8

* Denotes acres within the Gaviota Creek watershed. The gross area within the main park is 2,525.8 acres. Gaviota State Park also manages several discontinuous ocean front strips extending easterly from the main park to a point near Tajiguos Creek.

1] The extent of grazed land was taken from California Department of Conservation (DOC) Important Farmland Maps (2000). Some of the area included in the estimate includes heavily forested areas, rock outcroppings, farmsteads, and steep topography that restrict cattle access.

- 2] Dry-farmed land was also taken from DOC maps with revisions to reflect existing conditions. The revisions were made using aerial photography and verified with landowner interviews.
- 3] Recreational use estimates were limited to Gaviota State Park and National Forest land.
- 4] Other land includes school property, and idle private land.

2.5 Land cover: The following land cover assessment was abstracted from the California Department of Forestry and Fire Protection “Fire and Resource Assessment Program (011/01/2002). This project compiled land cover data from best available resources into a single data layer using a common system classification. The data is provided in GIS as 100-meter grids (~2.47 acres/grid). Each grid is representative of the dominant land cover. However, there is some conflict in interpretation concerning dry-farmed parcels in the Las Cruces sub-watershed. Although agriculture appears to be the dominant use for some of the grid assignments, the land cover was assigned to other categories. A detailed discussion of the documentation methodology is available on the Internet at <http://frap.cdf.ca.gov/projects/frapveg/index.html>. The document defines 55 habitat types in California, six of which apply to this project area. A display of the habitat types is shown in Figure 2.5 (page over). Figure 2.5 also shows the extent of the 2004 wildfire within the Gaviota Creek watershed. Table 2.5 is an estimate in acres of habitat types based on land ownership. It includes pre and post fire land cover conditions.

Table 2.5 – Land Cover (acres)

<i>Land Ownership 1]</i>	<i>Annual Grassland</i>	<i>Barren</i>	<i>Coastal Oak Woodland</i>	<i>Coastal Scrub</i>	<i>Mixed Chaparral</i>	<i>Montane Riparian</i>	<i>Burn Total</i>
Pre-fire conditions							
State Park	272.9	53.5	461.2	498.4	565.7	41.8	0
National Forest	5.1	0	134.1	0	1,560.8	0	0
Caltrans	0	118.6	0	0	0	0	0
Private	4,978.5	0	2,012.5	1,651.3	384.1	163.3	0
Totals (Pre-fire)	5,256.5	172.1	2,607.8	2,149.7	2,510.6	205.1	0
% watershed	40.8	1.3	20.2	16.7	19.4	1.6	0
Land cover burned							
State Park	154.6	40.3	134.7	220.4	517.8	31.4	1,099.2
National Forest	2.6	0	16.4	0	141.7	0	160.7
Private	7.7	9.0	54.0	39.1	212.2	15.1	337.1
Total burned	164.9	49.3	205.1	259.5	871.7	46.5	1,597.0

1] State Park acreage is for that part of the main Park unit that is within the Gaviota Creek watershed.

A study, “Recruitment of *Quercus agrifolia* in Central California: the importance of shrub-dominated patches” (Journal of Vegetation Science, Callaway & Davis 1998) included a detailed mapping of the dominant plant communities on Park property. A copy of this map is shown on Figure 2.5A (page following Figure 2.5). The map was modified for this project to show the extent and intensity of the June 2004 wildfire.

2.6 Wildfire history: The following wildfire history (Table 2.6) was provided by the CA Department of Forestry and Fire Protection (CDF) and the USDA-Forest Service (USFS):

Table 2.6 – Wildfire history

<i>Date</i>	<i>Name</i>	<i>Gross Area (Acres)</i>	<i>Gaviota (Acres)</i>	<i>Cause</i>
08/30/1926	Las Cruces	4,606	2,677	Arson
08/25/1944	Gaviota	792	469	Smoking
09/06/1955	Refugio	79,428	3,036	Human (USFS)
09/28/1997	Homestead	360	295	Unidentified
08/10/2000	Nojoqui	27	4	Unidentified
06/05/2004	Gaviota	7,440	1,597	Unidentified
*Totals		92,653	8,078	

* Most of the fires resulted in repeated burning of the same area.

A map display of historical wildfire locations is shown on Figure 2.6 (page over). For clarity, the June 2004 wildfire is shown on Figure 2.5 (Land Cover).

2.7 Creek channel historical changes: Several changes to the main stem creek channel have occurred in the 1900s with the most pronounced changes being associated with construction of Highway 101. The changes are chronicled in a report “Reconnaissance Hydrologic and Geomorphic Analysis of Gaviota Creek” (Mitchell Swanson, Swanson & Associates, July 10, 1991). In that report an analysis was made from review of aerial photographs taken in 1938, 1966, 1976, 1978 and 1986.

The 1938 photos show a reduced channel length of approximately 2,500 feet and straightening of three meanders associated with Highway 101 construction. They also show almost complete blockage of the channel due to road fill across the flood plain. The road fill was placed at the approximate location of the current park campground access. The 1966 photo showed some meander migration and a prominent sediment deposit upstream of the park road crossing. Additional road fill at the crossing is also noted. In 1976, the meander upstream of the road crossing has shifted eastward toward Highway 101. The 1978 photo shows significant changes that were the result of floods. Extensive lobes of sediment both up and downstream of the road crossing are noted and the road fill completely washed out. The entrance road fill was rebuilt and a new channel was formed along its base. The stream meanders are nearly abandoned because of the channel straightening associated with Highway 101. Large deposits of sediment are noted within the lagoon area. The 1986 photo shows a dramatic increase in riparian vegetation because of colonization of the sediment bars deposited in 1978. The stabilizing effect of this vegetation resulted in little effect on the stream channel even though there were several flood years subsequent to 1978. The report further assesses the problems associated with the road crossing and provides comments concerning circular culverts or box culverts as the best method for crossing Gaviota Creek acknowledging that a free span crossing would be best for the environment but was cost-prohibitive at the time.

2.8 Topography: The topography in the project area is shown on U.S. Geological Survey (USGS) topographic maps in a variety of scales. The most useful are 7.5 minute quadrangles at a scale of 1:24,000 (1" = 2,000'). Printed copies for the watershed include the Gaviota, Santa Rosa Hills, and Solvang quadrangles. All maps are available electronically from the USGS and can be displayed in seamless form. The topography in the Gaviota Creek watershed can best be described as steep. The most precipitous terrain is the south half of the watershed which is primarily Park and Forest Service land. Table

2.8 shows the approximate area for various slope ranges. Figure 2.8 is a display of the slope ranges (Page over).

Table 2.8 – Slope ranges

<i>Sub-watershed</i>		<i>0-15</i>	<i>15-30</i>	<i>30-50</i>	<i>50-75</i>	<i>75-100</i>
Gaviota d/s	Acres	295.3	667.3	843.5	346.5	84.2
2,236.8 Ac.	% w.s.	(13.2%)	(29.8%)	(37.7%)	(15.5%)	(3.8%)
Gaviota u/s	Acres	311.8	775.2	714.5	513.0	48.0
2,362.0 Ac.	% w.s.	(13.2%)	(32.8%)	(30.2%)	(21.7%)	(2.0%)
Gaviota West	Acres	441.4	1,165.0	920.6	87.6	0
2,614.6 Ac.	% w.s.	(16.9%)	(44.6%)	(35.2%)	(3.3%)	
Las Canovas	Acres	82.9	322.2	341.1	130.5	17.2
893.9 Ac.	% w.s.	(9.3%)	(36.0%)	(38.2%)	(14.6%)	(1.9%)
Las Cruces	Acres	1,415.4	1,869.2	1,404.5	105.9	0
4,795.0 Ac.	% w.s.	(29.5%)	(39.0%)	(29.3%)	(2.2%)	
Totals	Acres	2,546.8	4,798.9	4,224.2	1183.5	149.4
12,902.8 Acres	% w.s.	(19.7%)	(37.2%)	(32.7%)	(9.2%)	(1.2%)

2.9 Climate: Gaviota Creek watershed is in a unique coastal environment because of its proximity to Point Concepcion. Point Concepcion is the confluence of south to north and north to south ocean currents that affect not only the marine ecosystem, but also the terrestrial environment. There are frequent high velocity winds because of the topography which acts as a funnel into Gaviota Pass. Morning fog is common and there are few extremes in daily temperatures because of the moderating influence of the ocean. The region is among the highest rainfall areas in the southern coastal region of California; however, storm runoff peaks and recedes very rapidly because of the steep topography, steep stream gradients, and a relative abundance of impervious surface most of which is rock outcroppings. Because of these conditions it can best be described as a “flashy” watershed. The nearest official rain gage is located in Nojoqui Falls County Park about two miles due east of the northern part of Gaviota watershed at 343202 north latitude, 1201040 west longitude, elevation 720. The gage is operated by the Santa Barbara County Water Agency and identified as Station #236. Rainfall data listed in Table 2.9 were taken from that station’s record. The peak flow data were taken from U.S. Geological Survey streamflow gage #11120550. When in operation, the gage was located in Gaviota Creek near the Highway 101 tunnel at Gaviota Pass.

Table 2.9 – Rainfall and streamflow

<i>*Water Year</i>	<i>Total rainfall (Inches)</i>	<i>Maximum Daily rainfall</i>	<i>Maximum Monthly rainfall</i>	<i>Peak Flow (cfs) Gaviota Creek</i>
1966	28.85	8.24 (Nov.)	16.46 (Nov.)	+
1967	34.76	5.49 (Jan.)	11.81 (Jan.)	4,000
1968	14.32	1.49 (Mar.)	4.85 (Nov.)	94
1969	43.13	5.45 (Jan.)	20.24 (Jan.)	2,340
1970	12.20	2.76 (Jan.)	3.95 (Jan.)	161
1971	19.63	2.46 (Nov)	7.97 (Dec.)	318
1972	13.23	3.86 (Dec)	12.57 (Dec.)	458
1973	42.92	5.91 (Jan.)	16.58 (Feb.)	3,940
1974	22.26	3.33 (Jan.)	9.80 (Jan.)	1,110
1975	35.12	10.83 (Dec)	14.65 (Dec.)	2,050
1976	15.90	3.26 (Feb.)	14.14 (Feb.)	1,730
1977	18.01	2.41 (Jan.)	4.79 (Jan.)	96
1978	45.33	4.78 (Mar.)	15.67 (Mar.)	3,470

<i>*Water Year</i>	<i>Total rainfall (Inches)</i>	<i>Maximum Daily rainfall</i>	<i>Maximum Monthly rainfall</i>	<i>Peak Flow (cfs) Gaviota Creek</i>
1979	27.06	3.50 (Mar.)	9.20 (Jan.)	1,290
1980	+	+	+	2,560
1981	+	+	+	1,140
1982	+	+	+	227
1983	+	+	+	5,270
1984	+	+	+	439
1985	+	+	+	776
1986	+	+	+	2,560
1987-1990	+	+	+	+
1991	23.05	6.12 (Mar.)	15.62 (Mar.)	+
1992	29.91	4.58 (Dec.)	13.00 (Feb.)	+
1993	41.59	4.74 (Feb.)	12.57 (Feb.)	+
1994	20.09	2.74 (Dec.)	9.88 (Feb.)	+
1995	54.75	5.89 (Jan.)	31.95 (Jan.)	+
1996	16.48	2.04 (Jan.)	6.43 (Feb.)	+
1997	17.78	2.09 (Dec.)	5.51 (Dec.)	+
1998	60.40	5.90 (Feb.)	24.90 (Feb.)	+
1999	19.28	1.90 (Mar.)	7.91 (Mar.)	+
2000	27.07	5.60 (Apr.)	13.49 (Feb.)	+
2001	40.87	11.59 (Mar.)	16.75 (Mar.)	+
2002	11.89	2.06 (Nov.)	6.86 (Nov.)	+
2003	28.93	4.50 (Dec.)	5.28 (Feb.)	+
Average	28.33			

* The water year is September of the calendar year preceding the listed water year through August of the following year. For example, the 1966 water year was from September 1, 1965 through August 31, 1966.

+ Indicates no record available.

During the 27 years of recorded rainfall extreme variances from average were common. During the period, 12 years were 25% or more below average of which seven years were less than 37% of average, and 3 years less than 50% of average. Conversely, nine years were more than 25% of average of which seven years were more than 37% of average, and five years more than 50% of average. The median for the recorded period was approximately 25 inches. In the driest months of the year measured flows at the USGS gage ranged from 0.0 to approximately 1.0 cfs.

The Gaviota Beach Road and Bridge Replacement Project used four different analyses to calculate design discharges for 50-year and 100-year events. It determined that the flows would be 7,300-8,800 cfs and 10,400-10,600 cfs for the storm events, respectively. The highest recorded event when the USGS gage was in operation was 5,270 cfs in 1983; however, the extremely wet February, 1998 (24.90 inches) and/or the 24-hour precipitation high of 11.59 inches in March, 2001 may have resulted in flows greater than in 1983.

2.10 Soils: Soils in the project area were mapped by the USDA-Soil Conservation Service (currently known as the Natural Resources Conservation Service). They are described in two documents, Soil Survey of Santa Barbara County California South Coastal Part (Feb., 1981) and Soil Survey of Northern Santa Barbara Area, California (July, 1972). Most of the Park property is included in the southern survey and most of

the private land in the northern survey. The South Coast Survey is available in both printed and electronic form and mapped on 1:24,000 scale aerial photographs and in printed form they are compatible with USGS quadrangle maps. The original northern survey is available in printed form only, and in very short supply. The survey was projected on aerial photographs taken in that era at a 1:20,000 scale; however in 2004 the NRCS digitized and recompiled the survey. Derivatives from both surveys are included in this document; however, the digitized form of the northern survey has not yet been released for public use.

Soils in the project area are derived from ancient marine deposits, and for the most part are highly susceptible to erosion when disturbed. An indicator of soil vulnerability to erosion is the soils "K" factor. An explanation of "K" factors is contained in Section 3.2.2, and Figure 3.2.2b following page 21 shows the mapping of soils relative to "K" factor.

2.11 Geology: The geological interpretation for this report was prepared by Julia Grim, NRCS State Geologist.

Most of the watershed is mapped on Dibblee Geological Foundation Map DF-16 (Solvang and Gaviota Quadrangle). This map is available in digitized form and is included as Figure 2.11 (Page over). A small part of the western portion of the watershed is shown on Dibblee Geological Foundation Map DF-17 (Santa Rosa Hills and Sacate Quadrangle). That map is only available in printed form, and can be obtained from the Foundation.

As shown in Figure 2.11, the Gaviota Creek watershed is generally underlain by a thick series of mostly marine sandstones, siltstones, and shales that were uplifted and tilted as the Transverse Ranges began to rise, roughly 5-6 million years ago. Very generally, formations exposed in sub-watersheds south of Las Cruces dip moderately to steeply towards the south, with younger formations (including the Monterey and Rincon Shales and the non-marine Sespe Formation) exposed in the south, and older formations (including the Anita Shale and the Late Cretaceous-age Jalama Formation) exposed northward into the Gaviota Upstream sub-watershed. Complex folding and faulting along the Santa Ynez Fault system disrupts this otherwise predictable pattern of south-dipping formations in the sub-watersheds north of Las Cruces.

Two branches of the Santa Ynez Fault traverse the study area (Figure 2.11). Both branches are oblique thrust faults, where the south side is being up-thrown relative to the north, and lateral displacement is suggested but not fully understood. This movement is the result of compressive tectonic forces, and is responsible for creating the higher, steeper portion of the range in the eastern part of the study area on U.S. Forest Service property. The faults displace Pleistocene-age deposits and are therefore assigned a Late Quaternary age (Jennings, 1994, SCEC, 2003), which many consider potentially active.

Pleistocene and recent deposits discontinuously mantle the Tertiary formations, and reflect geological processes that continue in this dynamic setting:

- a. The short, steep drainages along the County's south coast provide limited but seasonally variable amounts of sediment to the coast, resulting in a narrow coastal plain and sea cliffs that are subject to erosional retreat (Norris, 2003);
- b. A band of Pleistocene-age marine terrace deposits form relatively flat areas along the coast and serve as evidence of uplift and/or sea level change;
- c. Large mudflows unleashed during the wetter Pleistocene deposited large cobbles and boulders as a "Fanglomerate", which is exposed locally along the north side of the South Branch Santa Ynez Fault near Gaviota Hot Springs were these deposits shifted westward to their present position by lateral motion along the fault;
- d. Alluvial gravels, sands, and fines accumulate in the stream channels; and
- e. Landslide deposits reflect historical and active slope failures. Dibblee's mapping suggests that shales of the lower Monterey and Rincon Formations are particularly prone to slope failures, especially where they are exposed above stream channels and along the Santa Ynez Fault. Smaller unmapped landslides also occur in the study area.

2.12 Wetlands: The USDI - Fish and Wildlife Service (FWS) classified and mapped wetlands in this area in accordance with "Classification of Wetlands and Deepwater Habitats of the United States" (FWS/OBS, 1979). The methods primarily involved stereoscopic analysis of aerial photographs. The interpretations reflect conditions as they existed when the photographs were taken, and were subject to photo interpretation error, so any activities proposed in suspected wetlands should have a field analysis before any work is performed. The maps are available from the FWS as GIS overlays. In GIS there are some minor changes in the water regime modifiers. In some cases, the FWS interpretations may not always agree with State or County wetland interpretations so the maps and designations should only be used as a guide.

The classification system segregates wetlands into five major divisions: Marine (ocean), Estuarine (estuaries), Riverine (rivers), Lacustrine (lakes) and Palustrine (marshy places). Each major class is then divided into sub-classes to further define the wetland characteristics and has modifiers to describe the water regime, water chemistry, soil, and any special characteristic. All of the major wetland classifications except Lacustrine occur in the watershed. The predominant classification in the watershed is Palustrine which was applied to most stream reaches. Modifiers are used to describe changes within the stream reaches. Also included in the Palustrine designation are several off-channel wetlands that are described as artificially constructed areas that pond water. A Riverine designation R4SBW was assigned to some headwaters that are intermittent streams. However, the FWS states that the designation R4SBW might not meet all requirements for a federal definition of wetlands. The sub-tidal reach at the Gaviota Creek delta is classified as an Estuarine wetland with a small portion at the outfall classified as Marine inter-tidal or sub-tidal wetland.

For this project a map on a USGS quadrangle background is shown for Gaviota State Park land only because of limitations in projecting the entire watershed at a readable scale. However, all of the watershed is in the RCD database and can be projected on a

large scale map should the need arise. The park wetland areas are shown on Figure 2.12 (page over).

2.13 Groundwater: There are no major aquifers in the project area listed by the County Water Agency; however, there doubtless are small groundwater reservoirs that could be developed for consumptive use and it is likely that some have been.

2.14 Endangered and threatened species: The information following was taken from the California Natural Diversity Database (CA Department of Fish and Game, January 2000) and the Federal Register:

- Tidewater goby (*Eucyclogobius newberri*): Listing status – Federal endangered (February 4, 1994). State species of concern.

The fish inhabits shallow lagoons and the lower reaches of coastal streams. It is unique from other gobys in California in that it can complete its life cycle in fresh or brackish water. In this project area, all of the lower reach of Gaviota Creek upstream to about one-half mile of Gaviota Pass is mapped as occupied habitat.

- Southern California Steelhead (*Oncorhynchus mykiss*): Listing-Federal endangered (October 17, 1997). State species of concern.

The Southern California Steelhead is an evolutionary significant unit determined to historically occupy suitable habitats from the Santa Maria River in northern Santa Barbara County as far south as the Santa Margarita River in San Diego County. The fish commonly spend two years in the ocean before entering fresh water to spawn, and they may return to the ocean and return again to fresh water to spawn more than one time. All of Gaviota Creek and its tributaries are occupied when flows are adequate to allow adult access from the ocean.

- Red-legged frog (*Rana aurora draytonii*): Listing status – Federal endangered (September 21, 2000). State species of concern.

The primary habitat is still or slow-moving water with dense shrubby riparian vegetation; however, they are known to make pronounced seasonal movements to other aquatic and terrestrial habitats. The documented occupied habitat for this project is from the estuary upstream to Highway 1; however, they are assumed to be present in all of the tributaries.

- Gaviota tarplant (*Hemizonia increscens ssp. Villosa*): Listing status – Federal endangered (March 20, 2000). State endangered (January, 1990).

The plant occurs in annual grassland in association with coastal sage scrub. There are no mapped populations shown for the Gaviota watershed; however, most of the coastal grassland along Highway 101 from about Canada del Barro westerly to

Canada Cementerio is mapped as habitat. The mapped area includes the grasslands on both sides of the Highway.

In addition to the federal listings the California Department of Fish and Game identifies the San Diego woodrat (*Neotoma lepida intermedia*), Southwestern pond turtle (*Actinemys marmorata pallida*), Arroyo chub (*Gila orcutti*), California tree frog (*Rana* ?), and the two-striped garter snake (*Thamnophis hammondi*) as species of concern. The California Native Plant Society lists Davidson's saltscale (*Atriplex serenana* var. *dauidsonii*), Black-flowered figwort (*Scrophularia atrata*), and the Sonoran maiden fern (*Thelypteris puberula* var. *sonorensis*) as sensitive species.

Other listed species that may utilize the watershed include Bald eagles, Swainson's hawks, California condors, and Southwestern willow flycatchers. In the near shore area, likely use would be by California brown pelicans, Southern sea otters, and California least terns. A grove of large trees located in the Park campground is a seasonal aggregation site for Monarch butterflies.

Management decisions for all of the federally listed species are the responsibility of the U.S. Fish and wildlife Service (FWS) except for the Southern California Steelhead which is the responsibility of the National Marine Fisheries Service (NMFS).

2.15 Cultural resources: The region was first explored by Europeans in 1769, and radiocarbon dates indicate that Chumash people and their ancestors or predecessors occupied the general area for over 9,000 years (Draft executive Summary Gaviota Coast Feasibility Study & Environmental Assessment, Johnson, April 2003). Spanish/Mexican settlement followed after establishment of a presidio in Santa Barbara in 1782 and the Santa Barbara Mission in 1786. The historic settlement and ranching patterns are largely preserved and are an exception to the highly developed Southern California Coast.

Cultural resources include historic, archeological, architectural, historic engineering, traditional cultural properties, and historic and cultural landscapes. The criteria for determining eligibility for listing in the National Register of Historic places are found in 36 CFR part 60 (NRCS, Technical Guide, July 2000). Scientific investigations and documentation of cultural sites of significance in the Gaviota area are on file with the Santa Barbara County Planning and Development Department. These data are secured and generally not available for public review. The National Historic Preservation Act of 1966, as amended, requires consultation with State, tribal and other parties of interest for that any activities that may affect the resource. Usually a determination if consultation is required will be made during the processing of work permits, and any mitigation requirements will be determined at that time.

Section 3. ISSUES AND OBJECTIVES

3.1 Water quality and beneficial uses

3.1.1 Overview: It is State policy to achieve the highest water quality possible to provide maximum benefit to the people of the state. In keeping with this policy, Division 7 of the California Water Code specifies that each Regional Water Quality Control Board (RWQCB) establish water quality objectives that are necessary for the reasonable protection of the defined beneficial uses. Section 303 of the Federal Clean Waters Act of 1972, as amended, requires that the State then submit for approval all water quality objectives prepared by the State to assure that they meet the requirements of the Act. The objectives have been completed and approved. They are contained in the Central Coast Region Water Quality Control Plan (1994). In addition to stating water quality objectives, Section 303(d) of the Act also requires a list of those waters that currently do not meet the objectives.

Beneficial uses for surface waters are divided into 24 categories. Seven of these categories do not apply to the Gaviota Creek watershed. The applicable categories are defined below.

Municipal and Domestic Supply - Uses of water for community, military or individual water supply systems including, but not limited to, drinking water supply. According to State Board Resolution No.88-63, "Sources of Drinking Water Policy", all surface waters are considered suitable, or potentially suitable, for municipal or domestic water supply except where:

- a. TDS exceeds 3000 mg/l (5000 uS/cm electrical conductivity);
- b. Contamination exists that cannot reasonably be treated for domestic use;
- c. The source is not sufficient to supply an average sustained yield of 200 gal/day;
- d. The water is in collection or treatment systems of municipal or industrial waste waters, process waters, mining waste waters or storm water runoff; and
- e. The water is in systems for conveying or holding agricultural drainage waters.

Agricultural Supply - Uses of water for farming, horticulture or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Ground Water Recharge - Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers. Ground water recharge includes recharge of surface water underflow.

Freshwater Replenishment - Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity) which includes a water body that supplies water to a different type of water body, such as streams that supply reservoirs and lakes, or estuaries; or reservoirs and lakes that supply streams. This includes only immediate upstream water bodies and not their tributaries.

Water Contact Recreation - Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs.

Non-Contact Water Recreation - Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach combing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Commercial and Sport Fishing - Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Warm Fresh Water Habitat - Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold Fresh Water Habitat - Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Estuarine Habitat - Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds). An estuary is generally described as a semi-enclosed body of water having a free connection with the open sea, at least part of the year, and within which the seawater is diluted at least seasonally with fresh water drained from the land. Included are water bodies, which would naturally fit the definition if not controlled by tide gates or other such devices.

Marine Habitat - Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Wildlife Habitat - Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Rare, Threatened or Endangered Species - Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

Migration of Aquatic Organisms - Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction and/or Early Development - Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Preservation of Biological Habitats of Special Significance – Uses of water that support designated areas or habitats such as established refuges, parks, sanctuaries, ecological reserves, or areas of special biological significance where the preservation or enhancement of natural resources requires special protection.

3.1.2 Issues: Waters that do not meet water quality objectives for the stated beneficial uses are listed under Section 303(d) of the Federal Clean Waters Act. Using this list of impaired waters, States are required to develop Total Maximum Daily Loads (TMDL) of pollutants that are critical to achieving water quality standards while considering seasonal variations and a margin of safety that accounts for uncertainty. When developing TMDLs, the States define the pollutant(s) for which the TMDL will be established, define in numeric terms the target objectives, and identify pollutant sources and quantify the loading capacity that can be assimilated without violating the water quality standard.

Samplings at the mouth of Gaviota Creek taken during a period extending from April 1997 through April 2001 indicated that the water quality standard was exceeded for at least one of the stated beneficial uses at least 20% of the time. The pollutant identified was total coliform bacteria, and the State Water Resources Control Board recommended that a TMDL be prepared. Probable pollutant sources were listed as unknown.

3.1.3 Objectives: Since a TMDL has not been prepared to identify the pollutant sources at the time of publication of this plan it would be premature to try to address the concern. Nevertheless, it appears inevitable that the RWQCB will act on the concern in the near future. The pollutant (total coliform bacteria) identified in this project area may come from faulty septic systems or other sources of human waste, wild and/or domestic animals, or a combination of sources. If domestic livestock are identified as a pollutant source it would be necessary for landowners to prepare and implement a plan for corrective actions. Similarly, any defective septic systems would require repair or replacement.

At the time of this project the apparent strategy of the RWQCB would be to promote voluntary compliance based on landowner participation in a collective watershed area. A reasonable period would be allowed to develop conservation plans, implement corrective practices, and develop a long term monitoring program. In the absence of water quality improvements within a certain time frame, regulatory actions would be taken. There are three levels of achieving compliance (See attachment D). A discussion of individual farm plans is contained in Attachment C.

3.2 Soil erosion and sedimentation

3.2.1 Overview: Soil erosion and the resultant sediment yield is a primary concern since it directly affects recreation and natural resources as well as maintenance of various

utilities that traverse through the area. Although some of the erosion is directly associated with land management and use, much of the sediment yield is geologic in nature due to unstable very steep terrain, and soils that are derived from ancient marine deposits that are highly susceptible to erosion. Compounding the problem are numerous landslides and gullies that were formed many years ago and have not yet stabilized. The watershed is also in one of the highest and most intense rainfall areas in Southern California. The weather pattern, combined with the land form and large areas of impervious surfaces such as public roads and rock outcroppings, results in a large discharge volume at high velocities during storm events contribute to channel erosion potential. Although the watershed might be characterized as unstable because of the natural features it does not have an accelerated erosion problem when compared to other south coastal watersheds largely because of land use. However, erosion can increase exponentially in the short term when there is a major land disturbance such as the wildfire of June 2004. That fire burned approximately 7,440 acres, 1,597 acres of which were within the Gaviota Creek watershed. The majority of the burn in the project area was on Park and U.S. Forest Service property, and an undeveloped private property parcel. All of the wildfire in the project area was within the downstream reaches of the watershed.

In general, most accelerated soil loss from erosion following a wildfire occurs during the first wet season following the fire, the extent of which largely depends on the early season storm intensities and duration, and the ability of the plant community to regenerate. Due to the heavy fuel load in some of the burned areas, ground temperatures were extremely hot and hydrophobic soil conditions can be expected which will accelerate runoff. In addition, extreme ground temperatures in some areas likely resulted in a substantial seed loss and damage to crown sprouting vegetation along with soil damage which may slow the vegetative recovery. The generally accepted period of recovery from accelerated soil losses related to wildfire is 3 to 5 years with total recovery of the ecosystem in 7 to 10 years. Estimates of the average annual sediment yield for both pre and post fire conditions are show in Tables 3.2.2j (pre-fire) and 3.2.2j(1) (post-fire).

3.2.2 Issues: To prioritize soil erosion and sources of sediment, the project area was divided into five sub-watersheds that form the hydrologic province of Gaviota Creek and an average annual sediment yield was calculated for each. Not included are several relatively small watersheds that discharge directly into the ocean. To accomplish this task, the Pacific Southwest Inter-Agency Committee (PSAIC) method for estimating average annual sediment yield was used.

PSIAC was developed in 1968, and revised in 1991, as an empirical relationship based on reservoir sediment surveys, watershed characteristics and erosion conditions. Nine different factors are evaluated and assigned a rating. These values are then summed for a total rating and correlated with the empirical data set to estimate average annual sediment yield. GIS overlays were used to assess various watershed attributes unless noted otherwise. The overlays were projected on base maps consisting of year-2000 aerial photographs and/or USGS 7.5-minute quadrangles.

Factors assessed in PSIAC include surface geology, soils, climate, runoff, topography, effective ground cover, land type and management, upland erosion, and channel erosion.

[a] *Surface geology*: Reference – Geologic Map of the Solvang and Gaviota Quadrangles and Geologic Map of the Santa Rosa Hills and Sacate Quadrangles. (Dibblee Geological Foundation, 1988)

Ratings in PSIAC are based on the rock type, hardness, weathering and amount of fracturing. Formations as a percentage of the watershed were determined, and a weighted rating was then made by assigning values to the various formations based on professional judgment and guidelines in PSIAC. Point assignments range from +2 (sandstone) to +5 (erosive surficial sediments). Ratings are shown in Table 3.2.2a. All ratings are positive (+). Headers in the table refer to the following:

- (2) Predominantly marine sandstone includes Gaviota Formation (Tgss, Tgsl); Vaqueros Sandstone (Tvq, Tvqcp); Sespe Formation (Tsp, Tspcq); Alegria Formation (Ta); Matilija Sandstone (Tma).
- (3) Undifferentiated interbedded marine shale and stone includes Gaviota-Sacate Formation (Tg-sa); Sacate Formation (Tsash, Tsass).
- (4) Older dissected surficial sediments consisting of weakly consolidated sand deposits, and weakly consolidated alluvial fans of silt, sand and gravel (Qog, Qoa). Marine shale includes Monterey Shale (Tmcg, Tm, Tml); Rincon Shale (Tr); Cozy Dell Formation (Tcd); Anita Shale (Tan).
- (5) Surficial sediments consisting of flood plain deposits (Qa). Landslide debris (Qls).

TABLE 3.2.2a – PSIAC Surface geology rating

<i>Sub-watershed</i>PSIAC rating.....				
	(2)	(3)	(4)	(5)	<i>Rating</i>
Las Cruces					
Acres	1,803	283	1,218	1,491	4,795
Rating	0.752	0.177	1.016	1.555	*3.50
Gaviota west					
Acres	751	161	1,345	358	2,615
Rating	0.574	0.183	2.056	0.685	*3.68
Gaviota u/s					
Acres	647	21	850	844	2,362
Rating	0.548	0.027	1.440	1.785	*3.80
Gaviota d/s					
Acres	1,287	470	186	294	2,237
Rating	1,150	0.630	0.332	0.655	*2.77
Las Canovas					
Acres	572	0	161	161	894
Rating	1.280	0.000	0.72	0.900	*2.80
Summary					
Acres	5,050	935	3,760	3,148	12,903
Rating	0.783	0.217	1.166	1.220	*3.39

* PSIAC rating = (% of total acres) (rate) + (% of total acres) (rate) +

[b] *Soils*: References – Northern Santa Barbara County Soil Survey (USDA Soil Conservation Service, 1972); Soil Survey of Santa Barbara County, South Coastal Part (USDA Soil Conservation Service (1981), Revised Universal Soil Loss Equation (RUSLE) handbook (NRCS, July 1997); and NRCS Technical Guide.

Soil ratings in PSIAC are based on how susceptible soil particles are to detachment and dispersal by runoff. This characteristic can be measured with some degree of accuracy by using the “K” factor in RUSLE. The “K” factor is a measure of the rate that a particular soil will erode. They take into consideration such soil values as texture, structure, clay and organic content and similar factors that would affect a soil susceptibility to erosion. “K” factors were developed experimentally by the NRCS and range from 0.10 to 0.64. Point values in PSIAC range from 0 (rock and aggregated soils) to + 10 (fine textured easily dispersed). “K” factors in this project area range from 0.15 to 0.43. Therefore, apportioned PSIAC ratings ranging from 2.34 (K=0.15) to 6.72 (K=0.43) were assigned. Weighted ratings were then determined based on computer analysis of the percent of each soil map unit. (“K” factors are not listed in the Northern Santa Barbara County Soil Survey because they were developed after its publication.)

Ratings are shown in Table 3.2.2b. All ratings are positive (+). Figure 3.2.2b (page over) shows the general location of soils with respect to the “K” factor rating.

(It should be noted that the soils rated as having the greatest potential for dispersal (K=0.43) are significantly less than the maximum soil dispersal value of 0.64. So, even the most vulnerable soils in this project are not rated at maximum PSIAC values.)

TABLE 3.2.2b – PSIAC Soils rating

<i>Watershed</i>		<i>0.00</i>	<i>0.15</i>	<i>0.17</i>	<i>0.20</i>	<i>0.24</i>	<i>0.28</i>	<i>0.32</i>	<i>0.37</i>	<i>0.43</i>	<i>Totals</i>
<i>K factor</i>		<i>0.00</i>	<i>0.15</i>	<i>0.17</i>	<i>0.20</i>	<i>0.24</i>	<i>0.28</i>	<i>0.32</i>	<i>0.37</i>	<i>0.43</i>	
<i>PSIAC rate</i>		<i>0.00</i>	<i>2.34</i>	<i>2.65</i>	<i>3.13</i>	<i>3.75</i>	<i>4.38</i>	<i>5.00</i>	<i>5.58</i>	<i>6.72</i>	
Las Cruces											
Acres		477	944	0	0	260	696	1,105	450	863	4,795
Rating		0.000	0.468	0.000	0.000	0.188	0.657	1.150	0.502	1.210	*4.18
Gaviota west											
Acres		54	527	0	85	179	617	830	70	253	2,615
Rating		0.000	0.468	0.000	0.094	0.263	1.007	1.600	0.167	0.676	*4.27
Gaviota u/s											
Acres		48	88	1,100	0	108	364	529	23	102	2,362
Rating		0.000	0.094	1.246	0.000	0.188	0.657	1.100	0.005	0.269	*3.56
Gaviota d/s											
Acres		86	190	1,168	11	0	123	559	17	83	2,237
Rating		0.000	0.012	1.378	0.031	0.000	0.263	1.250	0.056	0.269	*3.26
Las Canovas											
Acres		105	14	506	0	0	0	269	0	0	894
Rating		0.000	0.047	1.484	0.000	0.000	0.000	1.500	0.000	0.000	*2.99
Summary											
Acres		770	1,763	2,774	96	547	1,800	3,292	560	1,301	12,903
Rating		0.000	0.320	0.570	0.023	0.159	0.611	1.276	0.242	0.678	*3.87

* PSIAC rating = (% of total acres) (rate) + (% of total acres) (rate) +

[c] *Climate*: Reference – National Oceanic Atmospheric Administration (NOAA Atlas 2) precipitation maps for the southern half of California.

Climate factors in PSIAC are based on storm frequency, intensity, duration, snow and freeze-thaw characteristics. Snow and freeze-thaw are not a factor in this project area. To determine this rating, NOAA maps were used to identify storm intensities for the region and for the project area. Five-year 6-hour and 24-hour rainfall events through 100-year 6-hour and 24-hour events were determined for the project area and the southern half of California. This watershed is one of the highest rainfall intensity regions in Santa Barbara County. A comparative analysis of storm events in this project area with the Southern California region indicated that intensities in the project area were approximately 75% of the maximum intensities in the region for all storm events. Therefore, it was concluded that all sub-watersheds would be rated +7.5 for the climate factor because there was little variance in rainfall patterns within the sub-watersheds. (Point values in PSIAC range from 0 to +10, with +10 being the most intense rainfall.)

[d] *Runoff*: Reference – USGS 7.5 minute topographic maps, and hydrologic computations taken from the “Gaviota Beach Road and Bridge Replacement Project”, Quincy Engineering, Inc., March 21, 2003.

All of the named streams in the project area have year-round flows (blue-lined on topographic maps) except for relatively short reaches in the uppermost part of the respective hydrologic areas. The watershed referred to as the West Fork of Gaviota Creek is also a perennial stream for approximately 50 percent of its reach.

Gaviota Upstream, Gaviota Downstream, and the Las Canovas sub-basin have slopes of 10.4%, 14.4% and 10.4%, respectively. Gaviota West Fork and Las Cruces sub-basins have slopes of 3.6% and 5.4%, respectively. All of the hydrologic provinces have an abundance of rock, relatively short stream reaches. These factors combined with the steep gradients result in relatively short time of concentration for peak flows so a rating of +10 was assigned to all sub-watersheds. (Peak discharges at the Gaviota State Park entrance are estimated to be 9,110 cfs for a 50-year event and 10,730 cfs for a 100-year event.)

[e] *Topography*: Reference – California Spatial Information Library
http://www.gis.ca.gov/data_index.epl

PSIAC topography point values were assigned using the rating chart provided in PSIAC Table 2 (Topography Chart). In PSIAC, all slopes of 5% or less are assigned a rating of 0, and all slopes in excess of 30 % are rated at the maximum of 20 points. For this project slope ranges were determined at five percent intervals and the average PSIAC rating within each interval was assigned.

Topography ratings are shown in Table 3.2.2e. All ratings are positive (+).

TABLE 3.2.2e – PSAC Topography rating

<i>Sub-watershed</i>		<i>0.0</i>	<i>2.0</i>	<i>5.0</i>	<i>9.0</i>	<i>13</i>	<i>18</i>	<i>20</i>	<i>Total</i>
<i>PSAC rating</i>									
<i>Slope (%)</i>		<i><5</i>	<i>5>10</i>	<i>10>15</i>	<i>15>20</i>	<i>20>25</i>	<i>25>30</i>	<i>>30</i>	<i>Rating</i>
Las Cruces									
Acres		191	542	682	655	623	594	1,508	4,795
Rating		0.000	0.226	0.711	1.229	1.689	2.230	6.290	*12.38
Gaviota west									
Acres		70	158	214	312	399	454	1,008	2,615
Rating		0.000	0.121	0.409	1.074	1.984	3.125	7.709	*14.42
Gaviota u/s									
Acres		32	99	180	245	265	265	1,276	2,362
Rating		0.000	0.084	0.381	0.934	1.458	2.019	10.804	*15.68
Gaviota d/s									
Acres		70	98	127	178	238	252	1,274	2,237
Rating		0.000	0.088	0.284	0.716	1.383	2.028	11.390	*15.89
Las Canovas									
Acres		5	29	49	84	117	121	489	894
Rating		0.000	0.065	0.274	0.846	1.701	2.436	10.94	*16.26
Summary									
Acres		368	926	1,252	1,464	1,642	1,686	5,555	12,903
Rating		0.000	0.144	0.485	1.021	1.654	2.352	8.610	*14.27

* PSAC rating = (% of total acres) (rate) + (% of total acres) (rate) +

[f] *Effective ground cover*: Reference – Forest and Range 2002 Assessment (California Department of Forestry and Fire Protection, 2002), Important Farmland Maps (California Department of Conservation, 2002) and aerial photo interpretations.

In the Las Cruces sub-watershed there are several dry-farmed areas not identified, or not properly displayed in the reference documents. So, the extent of the dry-farmed areas was determined by photo interpretation and appropriate adjustments were made. Professional judgment based on field observations was used to assign a value for each cover type, and weighted ratings were determined by summing the ratings. In PSAC, ratings range from -10 for completely protected areas to +10 when ground cover does not exceed 20%. All burned areas, regardless of previous cover, were assigned a rating of +10.

Private Grasslands – Almost all of the private grasslands are used to graze beef cattle, and were assumed to have 50% effective cover in the early part of the wet season based on visual observations. All of the grasslands are dominated by introduced annual plants. (Rating -2)

Gaviota Park grasslands - Grasslands within Gaviota State Park were assumed to have 90% effective cover since there is no grazing in the Park except for modest use by a resident deer herd and some rooting by feral hogs. (Rating -8)

Coastal scrub (soft chaparral) – Most of the coastal scrub is dominated by Coastal, black and purple sagebrushes with some chamise and coyote brush interspersed. Sagebrushes

are allelopathic resulting in relatively poor understory development. Effective ground cover was estimated to be 50 percent. (Rating -2)

Mixed chaparral (hard chaparral) – Mixed chaparral has a variety of woody shrubs with the most conspicuous being Ceanothus, Chamise, Manzanita and Scrub Oak. This plant community forms dense thickets with extensive litter accumulation in the understory. Effective ground cover was assumed to be 100%; however, in the event of a wildfire the extensive fuel load can create extremely hot ground temperatures which can lead to major soil erosion problems in the succeeding wet seasons. (Rating -10)

Oak woodlands – All oak woodlands, including oak/grass savannas were assumed to have 70 percent effective ground cover since most areas are subject to grazing.(Rating -5)

Dry farmed annual cropland – Dry farmed annual crops were assigned an effective ground cover value of less than 20%. (This relatively low rating was based on an assumption that crop rotations would include spring annuals such as beans or Sudan grass would be grown at least once every three years. These crops require clean winter fallow of the fields to conserve moisture.) (Rating +10)

Other land – Includes paved roads, rock formations, farmsteads, and similar armored areas. They were assumed to have 80% effective cover. (Rating -7)

PSIAC Ratings are shown in Tables 3.2.2f (pre-fire) and 3.2.2f(1) (post-fire). Refer to text above for a description of the headers in the table.

TABLE 3.2.2f – PSIAC Ground cover rating (Pre-fire conditions)

<i>Sub-watershed</i>		-2	-8	-2	-10	-5	+10	-7	Total
<i>PSIAC rating</i>									
<i>Ground cover</i>		<i>Pvt grass</i>	<i>Park grass</i>	<i>Scrub</i>	<i>Chaparral</i>	<i>Oak wood</i>	<i>Dryfarm</i>	<i>Other</i>	<i>Rating</i>
Las Cruces									
Acres →		3,111	0	988	109	534	207	47	4,795
Rating →		-1.298	0.000	-0.412	-0.227	-0.557	+0.432	-0.069	*-2.13
Gaviota west									
Acres →		1,070	0	513	5	929	0	54	2,615
Rating →		-0.818	0.000	-0.392	-0.019	-1.776	0.000	-0.145	*-3.15
Gaviota u/s									
Acres →		683	0	21	1,015	530	0	48	2,362
Rating →		-0.578	0.000	-0.018	-4.297	-1.122	0.000	-0.142	*-6.16
Gaviota d/s									
Acres →		0	190	492	841	451	0	263	2,237
Rating →		0.000	-0.679	-0.440	-3.759	-1.008	0.000	-0.823	*-6.71
Las Canovas									
Acres →		35	83	20	491	162	0	105	894
Rating →		-0.078	-0.743	-0.045	-5.492	-0.906	0.000	-.0822	*-8.09
Summary									
Acres →		4,899	273	2,034	2,461	2,606	207	517	12,903
Rating →		-0.759	-0.169	-0.315	-1.907	-1.010	+0.160	-0.280	*-4.28

* PSIAC rating = (% of total acres) (rate) + (% of total acres) (rate) +

TABLE 3.2.2f (1) – PSAC Ground cover rating (Post-fire conditions)

<i>Sub-watershed</i>		-2	-8	-2	-10	-5	+10	-7	+10	Total
<i>PSAC rating</i>										
<i>Ground cover</i>		<i>Pvt grass</i>	<i>Park grass</i>	<i>Scrub</i>	<i>Chap</i>	<i>Oaks</i>	<i>Farm</i>	<i>Other</i>	<i>Burn</i>	<i>Rating</i>
Las Cruces										
Acres →		3,111	0	988	109	534	207	47	0	4,795
Rating →		-1.298	0.000	-0.412	-0.227	-0.557	+0.432	-0.069	0.000	*-2.13
Gaviota west										
Acres →		1,070	0	513	5	929	0	54	0	2,615
Rating →		-0.818	0.000	-0.392	-0.019	-1.776	0.000	-0.145	0.000	*-3.15
Gaviota u/s										
Acres →		683	0	21	1,015	530	0	48	0	2,362
Rating →		-0.578	0.000	-0.018	-4.297	-1.122	0.000	-0.142	0.000	*-6.16
Gaviota d/s										
Acres →		0	26	233	0	246	0	135	1,597	2,237
Rating →		0.000	-0.093	-0.208	0.000	-0.550	0.000	-0.422	+7.139	+5.87
Las Canovas										
Acres →		35	83	20	491	162	0	105	0	894
Rating →		-0.078	-0.743	0.045	-5.492	-0.906	0.000	-0.0822	0.000	*-8.09
Summary										
Acres →		4,899	109	1,775	1,620	2,401	207	389	1,597	12,903
Rating →		-0.759	-0.068	-0.0275	-1.256	-0.930	+0.160	-0.211	+1.236	*-1.20

* PSAC rating = (% of total acres) (rate) + (% of total acres) (rate) +

g] Land type & management quality: Reference – GIS overlays of land use, topography, soil survey, and visual assessment. Professional judgment, field reviews, and photo analysis were used to determine management quality. Point values in PSAC range from -10 to +10, with -10 being best.

PSAC ratings were assigned to each sub-watershed based on the principal land use with adjustments of +0.10 for each percent of land with a badland rating. All areas that burned during the wildfire were adjusted for the damaged landscape. Estimates are for the first year following the fire.

Las Cruces – This sub-watershed is principally private land used for grazing beef cattle on annual range. All of the rangelands were determined to have moderate to good grazing management and well maintained dirt roads so a general rating of -5 was assigned. However, the overall rating was reduced by +2.7 due to the extent of unstable geologic conditions for a net rating of -2.3.

Gaviota West – This sub-watershed is principally private land used for grazing beef cattle on annual range. All of the rangelands were determined to have moderate to good grazing management and well maintained dirt roads so a general rating of -5 was assigned. However, the overall rating was reduced by +1.2 due to the extent of unstable geologic conditions for a net rating of - 3.8.

Gaviota upstream – This sub-watershed is principally private land used for grazing beef cattle on annual range. All of the rangelands were determined to have moderate to good grazing management and well maintained dirt roads so a general rating of -5 was

assigned. However, the overall rating was reduced by +0.6 due to the extent of unstable geologic conditions for a net rating of – 4.4

Gaviota downstream – This sub-watershed is largely public land without motorized vehicle use except for official maintenance vehicles. It also contains a significant amount of private land not currently used that is in a relatively natural state. The general rating before the wildfire was at the maximum of -10; however, this was reduced by +3.2 due to the extent of unstable geologic conditions, and +3.0 because of the poor condition of service maintenance roads for a net rating of -3.8. This rating will doubtless improve after recovery from the wildfire because Gaviota State Park plans to correct erosion concerns associated with the dirt roads. In the short term there will likely be substantial soil loss because of the wildfire. A rating of +10 was assigned to the burned areas.

Las Canovas – This sub-watershed is almost all public land with little disturbance and was assigned an overall rating -10; however, this was reduced by +2.1 due to the extent of unstable geologic conditions for a net rating of -7.9.

[h] Upland erosion: Reference – Northern Santa Barbara County Soil Survey (USDA Soil Conservation Service, 1972), Soil Survey of Santa Barbara County, California South Coastal Part, and GIS overlay of land use.

Both soil surveys use an alpha designation for each mapping unit. Units with erosion concerns were also given a numeric code when erosion was observed by the soil surveyor. Land slides, gullies, and rough broken land were also given a special designation. There has been virtually no change in land use since the soil surveys were completed so no effort was made to adjust the soil survey information. Accelerated upland erosion areas are shown on Figure 3.2.2h (page over).

Ratings were assigned based on PSIAC Table 2, Chart h (Upland erosion). In PSIAC, ratings range from 0 to +25 depending on the area of concentrated flows resulting in gully development. Ratings are shown in Tables 3.2.2h (pre-fire) and 3.2.2h (1) (post-fire). All ratings are positive (+).

Headers in the tables refer to the following:

- (1) Map units with landslides (LaF). Most of the landslides are reasonably stable, nonetheless they are subject to movement and erosion in wet years. (Rating +15)
- (2) Map units with rough broken land (RuG). (Rating +17)
- (3) Map units with accelerated gully erosion (GuE, xx2 and xx3). (Rating +20)
- (4) Map units with dominated by rock outcroppings (SpG, GbG, CdG, MbH). (Rating +2).
- (5) Adjustment for current land use such as dryland farming, dirt service roads, and other disturbances. Adjustments were based on field reviews, aerial photo interpretation, and land manager discussions. (Rating +18)
- (6) All other land in Las Cruces, Gaviota West Fork, and Gaviota upstream was assigned a rating of +8 because of grazing impacts.

(7) All other land in the Gaviota downstream and Las Canovas watersheds are primarily Park, U.S. Forest, and private land not grazed. (Rating +4) A post fire rating of +25 was assigned.

(8) All burned area was assigned a rating of +25.

TABLE 3.2.2h – PSIAC Upland erosion rating (Pre-fire conditions)

<i>Sub-watershed</i>	<i>15</i>	<i>17</i>	<i>20</i>	<i>2</i>	<i>18</i>	<i>8</i>	<i>4</i>	
<i>PSIAC Rating</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>	<i>(7)</i>	<i>Rating</i>
Las Cruces								
Acres	233	0	780	478	307	2,297	0	4,795
Rating	0.729	0.000	3.253	0.199	1.152	3.832	0.000	*9.17
Gaviota west								
Acres	59	27	121	46	100	2,262	0	2,615
Rating	0.338	0.176	0.925	0.035	0.688	6.92	0.000	*9.09
Gaviota u/s								
Acres	17	0	33	1,089	100	1,123	0	2,362
Rating	0.006	0.000	0.279	0.922	0.762	3.804	0.000	*5.77
Gaviota d/s								
Acres	133	0	390	1,061	185	0	468	2,237
Rating	0.059	0.000	3.487	0.949	1.489	0.000	0.837	*6.82
Las Canovas								
Acres	0	0	145	484	40	0	225	894
Rating	0.000	0.000	3.244	1.083	0.805	0.000	1.007	*6.14
Summary								
Acres	442	27	1,469	3,158	732	5,682	693	12,903
Rating	0.514	0.036	2.277	0.489	1.021	3.523	0.214	*8.08

* PSIAC rating = (% of total acres) (rate) + (% of total acres) (rate) +

TABLE 3.2.2h (1) – PSIAC Upland erosion rating (Post-fire conditions)

<i>Sub-watershed</i>	<i>15</i>	<i>17</i>	<i>20</i>	<i>2</i>	<i>18</i>	<i>8</i>	<i>4</i>	<i>25</i>	
<i>PSIAC Rating</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>	<i>(7)</i>	<i>(8)</i>	<i>Rating</i>
Las Cruces									
Acres	233	0	780	478	307	2,297	0	0	4,795
Rating	0.729	0.000	3.253	0.199	1.152	3.832	0.000	0.000	*9.17
Gaviota west									
Acres	59	27	121	46	100	2,262	0	0	2,615
Rating	0.338	0.176	0.925	0.035	0.688	6.92	0.000	0.000	*9.09
Gaviota u/s									
Acres	17	0	33	1,089	100	1,123	0	0	2,362
Rating	0.006	0.000	0.279	0.922	0.762	3.804	0.000	0.000	*5.77
Gaviota d/s									
Acres	0	0	211	429	0	0	0	1,597	2,237
Rating	0.000	0.000	1.886	0.384	0.000	0.000	0.000	17.847	20.12
Las Canovas									
Acres	0	0	145	484	40	0	225	0	894
Rating	0.000	0.000	3.244	1.083	0.805	0.000	1.007	0.000	*6.14
Summary									
Acres	309	27	1,290	2,526	547	5,682	225	1,597	12,903
Rating	0.359	0.036	1.200	0.392	0.763	3.523	1.007	3.094	*10.37

(i) Channel erosion & sediment transport: References – Northern Santa Barbara County Soil Survey, Soil Survey of Santa Barbara County, California South Coastal Part, and USGS 7.5 minute quadrangles.

Literature and map reviews were supplemented by field observation and aerial photo interpretation. No rating changes were applied due to the wildfire since the channels in the burned areas were already rated at maximum PSIAC ratings.

Blue line stream miles, both perennial and intermittent, were determined by computer analysis. Lower order (other) watercourse measurements were estimated from review of topographic maps and added to the blue-lined stream miles to determine the total stream miles. Eroding stream channels in this project area are those with deep incision and active lateral erosion. A PSIAC rating of one was assigned to each percent of eroded stream channel up to a maximum of 25 percent. All sub-watersheds with 25% or greater streambank erosion were assigned a rating of 25. (In PSIAC, point values range from 0 to +25 with +25 being the worst possible condition.) Ratings are shown in Table 3.2.2i. All ratings are positive (+). Channel erosion sites are shown on Figure 3.2.2h (following page 26).

TABLE 3.2.2i - PSIAC Channel erosion rating

<i>Subwatershed</i>	<i>Perennial (miles)</i>	<i>Intermittent (miles)</i>	<i>Other (miles)</i>	<i>Total (miles)</i>	<i>Eroded (miles)</i>	<i>Erosion (%)</i>	<i>PSIAC rating</i>
Las Cruces	7.07	7.93	6.00	21.00	6.31	30.1	25.0
Gaviota west	2.56	3.98	2.62	9.16	2.80	30.6	25.0
Gaviota u/s	4.43	3.43	3.14	11.04	1.60	19.0	14.5
Gaviota d/s	3.29	1.09	1.72	6.13	1.75	28.5	25.0
Las Canovas	4.18	0.75	1.97	6.90	0.90	13.0	13.0
Summary	21.53	17.18	15.45	54.23	13.36	24.6	25.0

Table 3.2.2j summarizes the results for all of the sub-watersheds. Ratings were converted to average annual sediment yield in ac-ft/mi²-yr using PSIAC Table 2. As a crosscheck, the sub-total of factors a through g should closely correspond to the sum of factors h and i. In PSIAC, a difference of 10 or more points suggests that a field justification may be needed, or a re-evaluation may be necessary.

TABLE 3.2.2j - Sub-watershed average annual sediment yield (Pre-fire)

<i>Sub-watershed</i>	<i>Mi²</i>	<i>PSIAC a-g</i>	<i>PSIAC h-I</i>	<i>PSIAC Total</i>	<i>Yield Ac-ft/mi²-yr.</i>	<i>Total Yield Ac-ft/yr</i>	<i>Total Yield Yds³/Yr. (rounded)</i>
Las Cruces	7.49	33.13	34.17	67.3	0.93	6.97	11,200
Gaviota west	4.09	32.89	34.09	67.0	0.92	3.76	6,000
Gaviota u/s	3.69	29.28	20.27	49.6	0.50	1.85	3,000
Gaviota d/s	3.50	28.91	31.82	60.7	0.73	2.56	4,100
Las Canovas	1.40	23.56	19.14	42.7	0.38	0.53	900
Summary	20.17					15.67	25,200

TABLE 3.2.2j (1) - Sub-watershed average annual sediment yield (Post-fire)

<i>Sub-watershed</i>	<i>Mi²</i>	<i>PSIAC a-g</i>	<i>PSIAC h-I</i>	<i>PSIAC Total</i>	<i>Yield Ac-ft/mi²-yr.</i>	<i>Total Yield Ac-ft/yr</i>	<i>Total Yield Yds³/Yr. (rounded)</i>
Las Cruces	7.49	33.13	34.17	67.3	0.93	6.97	11,200
Gaviota west	4.09	32.89	34.09	67.0	0.92	3.76	6,000
Gaviota u/s	3.69	29.28	20.27	49.6	0.50	1.85	3,000
Gaviota d/s	3.50	45.29	45.12	90.41	2.14	7.49	12,000
Las Canovas	1.40	23.56	19.14	42.7	0.38	0.53	900
Summary	20.17					20.60	33,100

A regional sediment yield study completed by the NRCS (a.k.a. SCS) indicated that sediment yield from geologic sources in a stable watershed in this part of California would be 0.5 to 1.0 ac-ft/sq mi-yr (USDA-SCS, Dec. 1975). The study also suggests that 40% of the yield is from sheet and rill erosion and 60% from eroding gullies. This was a generalized study of the State and not intended for design purposes.

Gaviota upstream and Las Canovas sub-watershed sediment yields are relatively low because over 50 percent of the hydrologic provinces have dense closed canopy vegetative cover and much of the area is dominated by rock. However, there will be substantial accelerated erosion in the burned area (Gaviota downstream sub-unit) for several years with most of the impact likely to occur during the winter of 2004-05.

3.2.3 Objectives: Accelerated soil erosion is always a concern in any watershed because of its effects on utility of the land, sedimentation of wetlands, and similar concerns. One of the primary objectives of this plan was to assess Gaviota State Park property for accelerated soil erosion, particularly roads and trails, and make recommendations for repairs. The assessment and recommendations are contained in a separate document entitled “Assessment of Roads, Trails, and Erosive Features of Gaviota State Park”.

A field review of the watershed by the RCD, and a review of the burn team environmental report, indicated that there are few feasible practices that can be installed to lessen the post fire impacts except to clear culverts before and during the winter season. Much of the organic matter was consumed during the fire so there does not appear to be an abundance of floatable debris; however, erosion and sediment deposition will probably be a continuing concern until the watershed stabilizes. Of particular concern is the entrance road to the campground. This facility is currently a low water crossing with several culverts that have minimum function because of existing sediment deposition within the culverts. Until the free-span bridge is installed the stream crossing will continue to be a problem with frequent closures during the wet season.

An investigation of accelerated erosion sites on private property was beyond the scope of this project; however, all of the principal landowners in the watershed were apprised of the project and offered access to any maps or GIS overlays of various attributes associated with the watershed should they wish to use the material. In addition, Section 5 contains references and information that may be useful to develop or upgrade individual management plans. PSIAC can be used to help prioritize sub-watershed areas for more detailed study, or for implementation of best management practices.

3.3 Endangered and threatened species

3.3.1 Overview: The Southern California Steelhead is listed by the National Marine Fisheries Service (NMFS) as a distinct evolutionary significant unit with numbers low enough to warrant endangered species designation. Gaviota Creek watershed is one of the few in southern California that consistently hosts a viable run. Nevertheless, there are habitat concerns that must be reconciled to sustain the population over the long term.

Tidewater gobys utilize that reach of the main stem Gaviota Creek downstream of the campground access road, and there do not appear to be many opportunities to improve the habitat because of the relatively deep stream incision and high discharge velocities. They would receive an indirect benefit by any reduction in soil erosion and the resultant sediment which could degrade the habitat.

Red-legged frogs are mapped as occupying the same general habitat as the gobys in this project area; however, they are widely distributed throughout the Central Coast and may be in the upstream reaches of this watershed. The main strategy for protecting the frog is to maintain existing habitats.

There are no mapped colonies of the Gaviota tarplant in the Gaviota Creek watershed.

3.3.2 Issues: The principal habitat concerns of the Southern California Steelhead are fish passage barriers that inhibit access to potential spawning sites and limit use of the habitat during various life stages of the fish.

An extensive study of natural resources in southern Santa Barbara County entitled “Conception Coast Project” (<http://conceptioncoast.org>) was published in 2002. Included with this project was an assessment of streams from Jalama Creek to Rincon Creek at the Ventura County line relative to their value as steelhead habitat (“Steelhead Assessment and Recovery Opportunities in Southern Santa Barbara County, California”, Stoecker, et al 2002). A point system was established to categorize and prioritize streams that warranted in-depth study – a system using five parameters; watershed size, land in public ownership, stakeholder interest, and recovery potential (based on expert opinion). Twenty-four streams were evaluated with Gaviota Creek being assigned the second highest priority in the study area. A similar study completed by the Pacific States Marine Fisheries Commission (PSMFC) noted the same barriers, however, this study did not cite technical parameters used in the assessment. Both studies were funded, in part, by the California Department of Fish and Game.

The Conception Coast Study (CCS) focused on a bottom to top approach concentrating on evaluation of stream barriers since fish passage is an essential requirement for steelhead recovery. Other limiting factors including in-stream sediment, water temperature, stream depth, dissolved oxygen and water movement are discussed in generic form. Some of the parameters, such as pool or water depth were used to determine the degree of severity at barriers. In general, the barriers identified in the CCS

are the same as those identified in the PSMFC study; however, the CCS study provides substantial additional information such as measurement and recommendations that would improve fish passage. Both studies were largely restricted to public land, apparently because of access limitations.

In the CCS a point value rating was assigned to each barrier based on physical attributes of the site. An adjective was then used to describe the degree of severity based on the point totals. Severity was described as low, moderate, high, extremely high to impassable, or impassible. The study also rated habitat quality using a similar point system and adjective description ranging from extremely low to extremely high. Most of the main stem Gaviota Creek, the lower reaches of Las Canovas Creek, Las Nutrias Creek, and the lower reaches of the West Fork of Gaviota Creek were rated moderate to high habitat quality.

A total of 51 barriers were noted in the CCS with 19 rated to have a high to impassable severity index including two keystone barriers rated as impassable, a Caltrans box culvert on Nojoqui Grade and a Caltrans box culvert used to convey Las Canovas Creek under Highway 101 to its confluence with Gaviota Creek. They were rated #1 and #7, respectively, as the most critical barriers in the entire south coast study region. Nine of the barriers rated as impassable are in the extreme upstream reaches and are rated as impassable because of the steep stream gradients (> 10%) so there are no reasonable practices to mitigate those concerns. Twelve barriers were assigned a moderate severity index. It is noted in the study that the cumulative impacts of barriers, regardless of the degree of severity at individual sites, can have a significant effect on fish migration especially during periods of low flows when there may not be enough pool depth, or water depth on top of structures, for the fish to navigate the obstacles.

Table 3.3.2 following was abstracted from the referenced study. Highlighted barriers are described in detail in the CCP study.

Table 3.3.2 Fish Barriers

<i>Barrier No.</i>	<i>Barrier Type</i>	<i>Ownership</i>	<i>*Severity</i>
BR_GA_1	Undersized bridge	County	0.80
BR_GA_2	Grade control structure	Caltrans	0.60
BR_GA_3	Grade control structure	Caltrans	0.60
BR_GA_4	Grade control structure	Caltrans	0.80
BR_GA_5	Grade control structure	Caltrans	0.60
BR_GA_6	Grade control structure	Caltrans	0.60
BR_GA_7	Confined channel	Caltrans	0.70
BR_GA_8	Boulder blockage	Caltrans	0.80
BR_GA_9	Grade control structure	Caltrans	0.70
BR_GA_10	Grade control structure	Caltrans	0.70
BR_GA_11	Grade control structure	Caltrans	0.30
BR_GA_12	Grade control structure	Caltrans	0.30
BR_GA_13	Grade control structure	Caltrans	0.70
BR_GA_14	Bedrock chute	Gaviota Park	0.60
BR_GA_15	Bedrock chute	Gaviota Park	0.60
BR_GA_16	Bank revetment	Caltrans	0.50
BR_GA_17	Riprap channel	Caltrans	0.40

BR_GA_18	Box culvert	Caltrans	0.50
BR_GA_19	Stream alignment	Caltrans	0.50
BR_GA_20	Box culvert	Caltrans	1.00
BR_GA_21	Boulder cascade	Private	0.60
BR_GA_22	Bridge & grade control	Private	0.60
BR_GA_23	Waterfall	Private	0.90
BR_GA_24	Stream crossing	Private	0.00
BR_GA_25	Steep gradient	Private	1.00
BR_GA_SF_1	Stream crossing	Private	0.00
BR_GA_SF_2	Steep gradient	Private	1.00
BR_GA_WF_1	Bank revetment	Caltrans	0.60
BR_GA_WF_2	Box culvert	Caltrans	0.70
BR_GA_WF_3	Concrete blockage	Private	0.70
BR_GA_WF_4	Grade control structure	Caltrans	0.90
BR_GA_WF_5	Culvert	Caltrans	1.00
BR_GA_WF_6	Stream crossing	Private	0.00
BR_GA_WF_7	Stream crossing	Private	0.00
BR_GA_WF_8	Stream crossing	Private	0.00
BR_GA_WF_9	Stream alignment	Private	0.00
BR_GA_WF_10	Steep gradient	Private	1.00
BR_GA_WF_LN_1	Concrete channelization	Caltrans	0.90
BR_GA_WF_LN_2	Steep gradient	Private	1.00
BR_GA_CA_1	Box culvert	Caltrans	1.00
BR_GA_CA_2	Steep gradient	Private	1.00
BR_GA_CA_NF_1	Culvert	Private	0.00
BR_GA_CA_NF_2	Steep gradient	Private	1.00
BR_GA_CA_SF_1	Steep gradient	Private	1.00
BR_GA_CA_HS_1	Boulder cascade	Park	1.00
BR_GA_CR_1	Dam	Private	0.00
BR_GA_CR_2	Culvert	Private	0.00
BR_GA_CR_3	Culvert	Private	0.00
BR_GA_CR_4	Steep gradient	Private	1.00
BR_GA_CR_EF_1	Dam	Private	0.00
BR_GA_CR_EF_2	Steep gradient	Private	1.00

* Severity ratings: 0.2-0.5 (low), 0.6-0.7 (moderate), 0.8 (high), 0.9 (extremely high), 1.00 (impassable)

An unnumbered map of the CCS study follows this page. The map can be downloaded from the referenced Internet site.

3.3.3 Objectives: As noted previously, the CCS rated Gaviota Creek as the second most important creek in southern Santa Barbara County for steelhead habitat improvement consideration. Because of the steelhead's endangered species status every effort should be made by public and private land managers to improve the habitat and hasten recovery.

Nineteen barriers were cited in the CCS as critical to the recovery process, two of which (BR_GA_14 & 15) are natural bedrock chutes that were determined to have sufficient jump depth during moderate to high stream flows for fish to navigate the obstacles – no improvement actions were recommended. One site is the Gaviota State Park campground entrance road crossing of the creek (BR_GA_1). A proposed free span bridge should correct the barrier concern.

The most critical barriers noted in the study are two Caltrans box culverts serving as a conduit for the Gaviota Creek crossing of Highway 101 on Nojoqui Grade (BR_GA_20), the other at the Las Canovas Creek crossing of Highway 101 (BR_GA_CA_1). It should be noted that these barriers were rated #1 and #7, respectively, as the most critical sites in the entire CCS. During high flows high water velocities are generated because of the structural configurations, and during the drier periods, water spreads out to depths too shallow to permit fish passage. The discussion in the CCS concerning these sites is unclear whether it suggests total removal of the structures and replacement with a free span bridge, or removal of the hard bottom in the boxes. Replacement is an unlikely prospect because of the immense costs and extended disruption of this heavily used freeway, and removal of the invert would probably be infeasible because it would compromise the stability of the structures. Alternative solutions such as cutting a low flow channel with baffles to reduce velocities should be considered.

Eight Caltrans grade control facilities (BR_GA_2,3,5,6,9-13) were described collectively because of similarities in construction features, and severity of impairment. Jump heights varied from 1'9" to 4'4" as measured from the downstream pools to the tops of the structures. Pool depths varied from 1'10" to 6'4". Measurements were taken with stream flow estimated to be 4-6 cfs. Most of the facilities are experiencing significant undercutting, and the condition of the concrete was described as poor, or extremely poor, at many of the sites. The report suggests that the facilities be notched to concentrate low flows as short term improvements to fish passage. This might not be feasible unless the spillway aprons are thick enough to accommodate such measures. Cutting into the concrete would expose the aggregate which would have to be laminated to prevent accelerated erosion of the facilities, so significant additional depth would be required initially. As an alternative, some sort of baffle constructed on the aprons might be considered to concentrate low flows. Regardless of short term treatments, the structural concerns and stability of these structures and permanent fish passage improvements should be addressed. It is inevitable that some of the structures will fail in the near future. Removal does not appear to be an option because accelerated head cutting would result. Strategically placed rock weirs might be the best solution. Although weirs would add additional migration barriers, there would be relatively minor jump heights, more pools would be created, and in filling of undermined grade control facilities would occur which will extend their service lives. (The CCS suggests relocating the entire Highway 101 corridor to vacate the Gaviota Creek gorge as a long term solution – an unlikely prospect.)

Barrier BR_GA_4 is also a Caltrans grade control structure. This site was segregated from the other facilities because of a jump height of 6'10", and limited pool depth (3'7") that result in a severe migration impairment. The CCS suggests notching for this site also. In 1998 two boulder weirs were installed to reduce the jump height; however, one of the structures failed during extremely high flows in 2000. Replacement of these weirs should be considered with improved construction techniques – apparently there was undersized rock installed which could not withstand the high flows.

Barriers BR_GA_16,17 are the old Highway 1 bridge and concrete revetments immediately upstream of the bridge. The CCS notes undermining, bank erosion, and concrete damage and only suggests monitoring to ensure upstream fish passage. Contrary to the CCS report, the RCD recommends that this site be given priority consideration. Concrete revetments protecting the east abutment are nearing total failure, the invert is severely undermined, and there is significant bank scouring along the east bank immediately downstream of the bridge. Panels under the bridge are tilted in the direction of flow in addition to being badly deteriorated. It is unclear if the entire bridge abutment has shifted, or just the panels. Either way loss of these panels will result in major scouring under the east bank within the bridge and downstream with a tendency to migrate in an easterly direction toward the southbound lanes of Highway 101. Failure would likely be instantaneous with mass wasting.

Barriers BR_GA_18,19 are identified as a double box culvert and stream realignment during highway construction. The CCS has rated these as low severity impairments. There are no short term mitigation suggestions in the report. Realignment of the highway interchange was suggested as a long-term solution.

There are limited opportunities for other improvements in the riparian zone in the lower reaches of the watershed at this time because of deep channel incision, and the unknown effects on the channel when the low level crossing to Gaviota State Park campgrounds is removed. At present this crossing acts as a form of grade control, and although it does not appear that its removal will cause major changes in the stream's gradient there may be other reactions such as loss of some of the sand bars and willow colonies in the vicinity of the crossing.

3.4 Oak woodlands

3.4.1 Overview: Oak trees are a valuable asset to the natural plant community. They provide food and shelter for a great variety of wildlife, and they have some commercial value as firewood. Nevertheless, the overriding public concern for oak trees is their esthetic value in the view shed. Oak trees are relatively abundant in scattered stands throughout the watershed. According to mapping completed by the CDF and USFS, oak woodlands are dominant on approximately 20% (2,608 acres) of the watershed.

3.4.2 Issues: Historically, oak trees were cleared in areas visible to the public, and little concern was expressed for their management. However, in recent times cutting oak trees has become a contentious issue, and an ordinance was passed in 2003 amending Chapter 35 of the Santa Barbara County Code to regulate the management of deciduous oak trees – specifically Valley and Blue oaks. This ordinance applies to private land only.

In February 2004 State Senate Bill SB1334 (Kuehl) was introduced. This bill would govern the conversion of oak woodlands from one agricultural use to another agricultural use. In this bill “oak” means any species of the genus *Quercus*. Oak woodland is identified in the bill as land having five or more oak trees per acre except for valley oaks

(*Quercus lobata*) in which case one or more valley oaks per acre would constitute an oak woodland.

A schematic display of oak canopy cover is shown on Figure 2.5 (following page 8). All of those areas mapped are listed as being populated by Coast live oaks. A review of other mapping sources agrees with that conclusion. If there are other oak species present they are in too small in numbers to map at the scale used.

3.4.3 Objectives: Administration of the private land oak tree ordinance is vested with the County Agricultural Commissioner. There are no planned actions in this project that would result in any significant “take” of oak trees. If there is need for incidental removal of oak trees mitigation would be at the discretion of the Park.

In 2001, the California Oak Woodlands Conservation Program was enacted and implementation was approved in 2004. This program offers grants to private landowners as incentives to maintain and improve oak forests. The program includes four basic elements:

1. Purchase of oak woodland easements.
2. Restoration or enhancement projects
3. Long-term leases
4. Cost-sharing incentive payments to implement various conservation practices under long-term agreements that benefit the landowner and the oak woodland.

Landowners interested in the conservation program should contact the Agricultural Commissioner’s office.

3.5 Public health and safety

3.5.1 Overview: Public health and safety is always a concern, and because a significant part of this watershed is used for public recreation, as a public school, and is a heavily traveled transportation corridor, concerns were expressed during stakeholder meetings. Many of the concerns such as animal conflicts, beach use, and pier use have been addressed through outreach and educational programs, life guard stations, and pier operation safety classes.

There is no documentation of pesticide, or herbicide contamination, and because the use of chemical controls for vegetative or rodent management is highly regulated there should not be a concern in the future. Most of the herbicide use in this watershed is associated with vegetation control along highway berms. Little, if any, herbicide would be used by ranchers because there is an unfavorable benefit versus cost for large scale vegetation type conversions. Placement and the type of rodenticides is highly regulated by the Agricultural Commissioners office, and it is unlikely that there is wide-spread use because of costs and sometimes questionable effectiveness. Nonetheless, several health and safety concerns remain.

3.5.2 Issues: Water quality is a health issue for water-based recreation because of periodic elevated levels of coliform bacteria. Human waste and trash at the Nojoqui Grade truck stop is a site specific concern as well as possible source of contamination in watersheds on each side of the grade, one of which is Gaviota Creek.

The principal safety concerns are the rest stops at Gaviota Pass because of limited parking and location, the county road crossing to Gaviota Park campgrounds, and long-term stability of an emergency exit from Vista Del Mar School.

3.5.3 Objectives: The elevated bacterial contamination may be addressed when the RWQCB completes their assessment of the source(s). If they are identified as products of human waste or livestock, corrective actions will be required. Contamination from wild animals may not be correctible. On-site waste at the truck stop will require Caltrans actions, either closure of the site or by providing adequate waste control facilities.

Safety concerns related to the rest stops may be reconciled by relocation should oil company property located about one mile east of the rest stops become available. Access and road safety to Gaviota State Park will be greatly improved when the proposed free-span bridge is installed. Maintaining the old Highway 1 Bridge as an emergency exit from Vista Del Mar School is the principal concern of the school and most of the private landowners. Repair of this site should be a priority, not only because of the school's concerns, but also because of it potentially becoming a major steelhead barrier.

3.6 Other concerns: The principal concern, other than resource related issues, expressed by all stakeholders was to develop and maintain good working relationships to ensure the long-term viability of the watershed. The foundation for this relationship has been established through the group discussions, and this relationship should continue as mutually beneficial practices are implemented. There does not appear to be any conflict of purpose and just being good neighbors, sharing of information, and mutual support is the expressed goal.

Section 4. PUBLIC LAND RECOMMENDATIONS

4.1 Overview: Except for stream barriers the following recommendations were the result of issues brought up at public and private landowner meetings.

4.2 Caltrans:

4.2.1 Stream barriers – There are numerous fish barriers related to Caltrans facilities that should be corrected including undermined grade control structures in the gorge up and downstream of the tunnel, hard bottom box culverts under Highway 101 on Nojoqui Summit grade and at the Las Canovas confluence. The undermined facilities could be improved by installing weirs immediately downstream to elevate the stream gradient. Remedial mitigation to improve fish passage could be made by modifying the grade control structures to concentrate low flows. Box culvert would require re-configuration to concentrate low flows and reduce velocities during high flows, perhaps with a low flow

channel with baffles to reduce velocities. The creek incision that caused the undermining is apparently related, at least in part, to the construction of Highway 101 which took out some of the meanders and shortened the stream reach. (See Section 3.3.3)

4.2.2 Highway rest stops - Private landowners brought up an issue concerning indiscriminate waste disposal at the Nojoqui Summit truck pull off and rest area. The recommendation was to provide adequate garbage disposal facilities and in particular to install sanitary facilities for human waste disposal. As an alternative they recommended that the area be closed. Gaviota State Park staff stated that some of the oil processing land may become public domain in the future, and suggested that the public rest facilities at Gaviota Pass could be relocated to the oil processing site should it become available. This site should include adequate truck parking should it become available and the Nojoqui Summit site could be closed.

4.2.3 Erosion control – Better erosion control at work sites and containment at equipment staging areas during wet weather is recommended.

4.3 U.S. Forest Service: The principal concern of the LPNF was long-term maintenance of the Gaviota Peak Trail since this was the only motorized access to the property. A recommendation suggested was that LPNF consider an arrangement with Gaviota State Park to allow public motorized access at least to a staging area to expand public recreational opportunities.

4.4 Vista Del Mar School: The principal concern of the school was that the old Highway 1 Bridge be maintained as an alternative escape route from the school in case of an emergency.

4.5 County of Santa Barbara: The access road into Gaviota State Park campgrounds is part of the county road system up to the west bank of Gaviota Creek. At that point the road forks with one fork serving the campground the other traversing westerly through the Park for a relatively short distance before entering the Hollister Ranch complex - a private development located between the Park and Point Concepcion. The segment maintained by the county crosses the historic flood plain. The main stem crossing of the creek is currently constructed of concrete across the channel with relatively small culverts for low flows. The rest of the county maintained segment is paved across the flood plain and upland areas to Highway 101. The culverts are routinely filled with sediment so they are largely ineffective resulting in stream discharges over the concrete invert most of the time there are flows of any substance in the channel. Following periods of high flows sediment accumulates at the crossing and when removed is disposed of nearby by placing along both sides of the road in the unarmored reach of the flood plain. This accumulation has effectively dammed the area and concentrated flows into a discreet channel that has resulted in bank erosion within the Park complex. The plugged culverts are also a major barrier for migrating fish.

There are proposals to improve the crossing by installing a free span bridge.

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APPENDIX B – Acronyms and Technical terms

ACRONYMS:

BMP.....	Best Management Practice
CARCD.....	California Association of Resource Conservation Districts
CDPR.....	California Department of Parks and recreation
COE.....	U.S. Army Corps of Engineers
CWA.....	Clean Water Act
CWC.....	California Water Code
CZARA.....	Coastal Zone Reauthorization Amendment
ESU.....	Evolutionary Significant Unit
FOTG.....	Field Office Technical Guide
FWS.....	U. S. Fish and Wildlife Service
GIS.....	Geographic Information System
GPS.....	Global Positioning System
LF.....	Lineal feet
LPNF.....	Los Padres National Forest
NMFS.....	National Marine Fisheries Service
NOAA.....	National Oceanic Atmospheric Administration
NRCS.....	Natural Resources Conservation Service
PSIAC.....	Pacific Southwest Interagency Committee
RCD.....	Cachuma Resource Conservation District
RMS.....	Resource Management System
RUSLE.....	Revised Universal Soil Loss Equation
RWQCB.....	Regional Water Quality Control Board
SCS.....	Soil Conservation Service
SWRCB.....	State Water Resources Control Board
TMDL.....	Total Maximum Daily Load
UCCE.....	University of California Cooperative Extension
USDA.....	United States Department of Agriculture
USDC.....	United States Department of Commerce
USDI.....	United States Department of Interior
USGS.....	United States Geological Survey
UWA.....	Unified Watershed Assessment

TECHNICAL TERMS:

μS/cm.....	Microsiemens per centimeter
Ac-ft/yr.....	Acre-feet per year
cfs.....	Cubic feet per second
CO ₂	Carbon dioxide
mg/l.....	Milligrams per liter
TDS.....	Total dissolved solid

Appendix C – PRIVATE LAND RECOMMENDATIONS

Overview: Land use plans are the fundamental tools used whether dealing with regulatory agencies, or for personal management purposes. They are a requirement for virtually all work requiring regulatory agency permits, and in some cases they are a requirement to meet other regulatory requirements such as water quality issues. Undoubtedly, landowners have land use plans; however, these plans may not be in written form. Some may have existing conservation plans because of participation in various USDA benefits programs, or other reasons. Existing plans may address all issues of concern, or could be modified to address the issues. Under any circumstance, because of the many issues such as endangered species, water quality, wetlands, oak woodlands, or personal land management reasons it would be advantageous to have written planning documents. In general, most landowners are good stewards of the land, and in all likelihood are already applying most of the best management practices that only need documentation.

Conservation plans in broad terms consist of:

- Defining and prioritizing farm or ranch goals: Developing goals is useful for defining the reasons for preparing a conservation plan. Goals should include a statement of the type of operation, historical land use and future plans.
- Identifying issues of concern: Issues of concern that need be resolved to achieve the goals should be clearly stated. They may be requirements to satisfy such diverse issues as land use and operation changes, or perhaps a desire to document any best management practices that are being applied or are planned. They may include concerns for various forms of water pollution, or other resource issues such as wildlife habitat, endangered species management, and oak forest management.
- Inventorying infrastructure and natural resources: Inventories include all physical attributes that affect farm or ranch operations such as property lines, stock water systems, fences, roads, corrals, irrigation systems, ponds, structural devices for water control, and similar facilities. Information should be detailed to the extent possible and include such information as pump sizes, pipeline types and diameters, location of various plumbing and type in pipelines, trough and tank capacities, and similar details.

Natural resource inventories, at a minimum, should include soil survey maps and soil descriptions, topographic features and other attributes such as natural vegetation types, and any documented wetlands, archeological sites or endangered species habitats. All information should be marked on appropriately scaled maps, preferably aerial photographs, and supported with text or drawings.

- Documenting existing management practices: Documentation of existing practices employed on a farm or ranch is extremely important. For the most part, ranchers and farmers are good stewards of the land and documentation of existing practices will illustrate compliance with water quality and other resource management goals, and improve public perceptions of agricultural impacts on the environment.

- Identifying physical and management practices that will meet goals: In general, most practices listed under the engineering discipline require that the landowner get technical assistance for both design and implementation to ensure a quality product. Other practice disciplines might also require technical assistance, but at a much lower intensity. Almost all conservation plans require the integration of multiple practice measures.

In addition to the complexity of solving the physical concerns, at issue is also the management of endangered species that are prevalent throughout the watershed. Their habitats must be considered in all land management decisions in addition to a multiplicity of permit requirements from regulatory agencies and management of oak forests. Obtaining permits to work on conservation projects is perhaps the most difficult part of the implementation process. For example, a project that would involve work within a stream channel would likely require permits from the County, and numerous State and Federal agencies. Many of the permit requirements are redundant, and in some cases, they conflict with each other.

- Developing an implementation schedule: All conservation practice improvements should be documented. Documentation might include photographs, physical measurements, written description, or estimates using acceptable procedures.

Technical planning assistance: If it is the desire of landowners to develop plans, or upgrade existing plans, any of the information contained in this document such as aerial photos, USGS topographic maps, or any of the listed GIS overlays would be available from the RCD. However, it is beyond the scope of this contract to provide individual on-farm services. Nevertheless, on-farm technical assistance may be available through the NRCS, University of California Cooperative Extension depending on staff availability, the RCD (with an alternative funding source), or private consultants.

The RCD and NRCS conservation planning process is based on a resource management system (RMS) concept. A RMS plan is a collection and integration of sub-systems that address each resource issue independently. Each sub-system is evaluated to identify issues of concern, and one or more conservation practices are proposed to satisfy the concern. The final product is an integrated comprehensive plan that addresses soil, water, air, plant, animal, cultural resource issues and personal economic land use goals. All plans include maintenance and monitoring components.

Recently conditional agricultural discharge waivers were approved necessitating water pollution abatement from non-point sources when surface waters of the United States were documented to have impairments that affect one or more of the identified beneficial uses. One of the SWRCB strategies to address the issue was to allow voluntary compliance; i.e., landowners would be allowed to address water quality issues and make the necessary management changes to correct the problem. The concept was approved by the U.S. Environmental Protection Agency as a means to be in compliance with the Federal Clean Waters Act. To facilitate the process training courses for self-assessment ranch planning (California Rangeland Water Quality Management Plan) for irrigated agriculture (Farm Water Quality Planning Short Course) were developed by the

UCCE in cooperation with the NRCS and RCDs. Both courses are offered periodically in the Central Coast area. Copies of the course are also available in printed or electronic form without tutorial assistance. The principal focus of the course is water quality, and supplemental information would be required if all resources were addressed.

USDA-NRCS conservation practices are universally accepted and may be used in development of a conservation plan. The practices are written in three parts; standards to which they apply, a specification, and a practice requirement. The specifications provide general guidelines for construction of a practice, and the practice requirement defines the specific method and quantities for the project under consideration. The practices are available for review in the NRCS/RCD Santa Maria field office or they can be viewed and downloaded from the Internet at <http://www.nrcs.gov/technical/efotg>.

RCD data sharing policy: The RCD works cooperatively with the NRCS, and both agencies use the same data sharing policy. This policy states that private land planning information will not be released to anyone without permission of the landowner. Historically, most of the information was in printed form. In most cases, only two copies of the planning documents were prepared - one for the landowner and one for the office record. This policy will be continued with any electronic files that might be generated for individuals. One disc file of the landowner information will be maintained by the RCD, and the general database would then be cleared of all personal information. The landowner would be provided paper copies and an electronic file if desired. In some instances, planning information may involve multiple landowners, and the policy concerning privacy would be in effect.

It should be acknowledged that participation in cost-sharing projects with agencies or private foundations, or application for such, would require that the information be furnished to the sponsors. Processing of documents for regulatory agency permits would require similar disclosures. However, these disclosures would be made by the landowner.

Maps and GIS overlays that provide general information, and any related data links are already a matter of public record. Any maps or GIS overlays that are generated for specific properties would be proprietary information.

Appendix D – REGULATORY AUTHORITIES

Water quality: The Central Coast Regional Water Quality Control Board (RWQCB) is responsible for administering regulations established by the Federal Clean Water Act (CWA) and the California Water Code (Porter-Cologne Water Quality Control Act). Polluted runoff is also addressed under Section 6217(a) of the Coastal Zone Act Reauthorization amendments of 1990 (CZARA). Oversight of the RWQCB is provided by the State Water Resources Control Board

(SWRCB).

The CWA is the principal federal authority for water quality protection. It became law in 1972. At that time, it primarily addressed point sources of water pollution. In 1987, Congress amended the act to require states to address non-point source pollution (NPS) problems. That amendment requires that states adopt water quality standards to correct NPS pollution, and submit those standards to the U.S. Environmental Protection Agency (EPA) for approval.

The California Water Code (CWC), commonly referred to as the Porter-Cologne Act, is the principal state law governing water quality regulation in California. It is a comprehensive program to protect water quality and the beneficial uses of water directed through the RWQCBs and the SWRCB. Porter-Cologne requires that RWQCBs describe the beneficial uses of each of the regional water bodies, and determine water quality standards that must be maintained to allow those uses. The act also requires the RWQCB to prescribe actions that are necessary to achieve the water quality objectives.

The Coastal Zone Management Act of 1972 was amended by Congress in 1990 to specifically address water quality. This act (CZARA) principally focuses on non-point pollution problems as they relate to the protection of coastal waters. It requires state agencies to coordinate efforts to develop and implement management measures to achieve water quality objectives in the coastal environment.

In compliance with the statutes, the State has prepared a draft plan entitled “California’s Non-point Source Pollution Control Program” (July 2, 1999). This plan has a goal to improve water quality in affected water bodies by 2013. In addressing NPS concerns, Section 303(d) of the CWA requires states to prepare a list of surface water bodies that do not meet water quality standards unless pollution controls are applied. The RWQCB is in the process of developing Total maximum Daily Load (TMDL) of pollutants allowable to meet beneficial use standards established for surface water bodies. TMDL ratings are a process for assessing pollution problems, identifying likely sources, proposing corrective measures and establishing implementation timelines. San Antonio Creek’s TMDL list is currently scheduled for completion by 2006. Focus at this point in time is currently concerning excessive sediment; however, other pollutants may be identified when the site analyses are complete.

The State plan requires implementation of appropriate measures to reduce NPS sources of pollution using a three- tiered approach, with Tier 1 being the preferred method.

TIER 1: Voluntary implementation of Best Management Practices (BMPs) - This allows landowners flexibility and self-determination in deciding which practices are most appropriate for their situation.

TIER 2: Regulatory based encouragement to ensure implementation of BMPs -This tier allows the RWQCB two ways to use their regulatory authority. The RWQCB may waive adoption of waste discharge requirements on conditions that ensure BMPs are implemented, or they may provide direct enforcement by entering into agreements with other agencies that have authority to enforce the implementation of management practices.

TIER 3: Enforcement - This tier allows the RWQCB to adopt and enforce requirements that reduce pollution from waste discharges, including discharges from non-point sources. On July 9, 2004 the RWQCB adopted rules for allowing conditional waivers on irrigated land. Although there are no irrigated crop lands in the project area, some of the land owners may practice irrigated farming in other watersheds, and will be affected by the rules for conditional waivers. The procedure to qualify for a Tier 1 waiver requires filing a letter of intent to develop and implement a farm plan that addresses water quality issues by January 1, 2005, completing a 15 hour training course, and completing and maintaining the plan. Farmers following these procedures may qualify for a five-year Tier 1 waiver. All others will receive a one-year Tier 2 waiver until such time that they meet the requirements for a Tier 1 waiver. A three-year implementation period is allowed under a Tier 1 waiver.

At present, livestock ranchers are allowed to voluntarily develop plans that meet water quality objectives because of an agreement executed between the SWRCB and the California Cattlemen's Association. This agreement is not an exemption. It allows for voluntary compliance, and presumably there will be enforcement if water quality objectives are not met under the agreement.

Endangered species: The federal Endangered Species Act of 1973, as amended, vested authority to manage federally listed endangered and threatened species and their habitats with the U.S. Department of Interior Fish and Wildlife Service and the Department of Commerce National Marine Fisheries Service. This act has broad prohibitions related to the taking of sensitive species. A list of sensitive species documented, or assumed to occupy habitats, in this project area is contained in Section 2.14.

In addition to the federal listing, the State of California also lists endangered, threatened or rare species. This list does not always agree with the federal designation. Authority for management of sensitive species not included on the federal list is vested with the California Department of Fish and Game.

Land use: The allowable limits for land use are defined in the County of Santa Barbara Comprehensive Plan (General Plan). The County's Comprehensive Plan includes the following elements that are required by State law: Land Use, Circulation, Housing, Open Space, Conservation, Noise and Safety. The County has also adopted optional Comprehensive Plan Elements for the following: Agriculture, Environmental Resource Management, Energy Conservation, Scenic Roadways, Seismic Safety and Hazardous Waste. A Local Coastal Plan has been prepared for those areas that are in the coastal zone as defined in the California Coastal Act.

Wetlands: The federal Clean Water Act, Section 404, requires a permit from the U.S. Army Corps of Engineers for the discharge of dredged or fill material into the waters of the United States, including all defined wetlands. Subtitle B (Swampbuster provision) of the Food Security Act requires protection of wetlands for farmers to be eligible for USDA benefits programs. The NRCS usually makes wetland determinations under this program using federal guidelines for wetland definition. The federal interpretation of wetlands requires that for a site to be considered

a wetland it must have adequate hydrology to support the site, hydric soils, and a hydrophytic plant community. State and local interpretations of wetlands are more conservative requiring only one (County) or two (State) of the three conditions to be present.

Cultural resources: Cultural resources include historic, archeological, architectural, historic engineering, traditional cultural properties, and historic and cultural landscapes. Designation of cultural resources and determinations on any actions affecting the resources are determined by the cultural resource in question. Determinations are usually resolved by mutual agreement with the State Historic Preservation Officer, Tribal Historic Preservation Officer and the involved party. The principal regulations governing cultural resources are the National Historic Preservation Act, Archeological and Historic Preservation Act and the American Indian Religious Freedom Act.

Appendix E – PERMIT REQUIREMENTS

Overview: Structural erosion control practices require landscape alterations and frequently require work within stream channels. One or more permits may be required before starting construction. Any diversion of surface waters for consumptive use also requires filing for water rights. Other permits may be required if the project includes major land use changes. The conditions requiring additional permits are defined in the County Comprehensive Plan.

The California Association of Resource Conservation Districts (CARCD) has an excellent guide for navigating through the permit process entitled “Guide to Watershed Project Permitting for the State of California”. To obtain a copy call (916) 457-7904; FAX (916) 457-7934, or on the Internet at

<http://www.carcd.org/permitting/>

Santa Barbara County: County Ordinance 3937 (Grading Ordinance) regulates grading, excavation, filling, stockpiling of material and reclamation of land in unincorporated areas. Certain agricultural grading practices are exempt. Permit fees vary.

California Department of Fish and Game: A permit is required for any project that may impact a river, stream or lake pursuant to terms and conditions of the California Fish and Game Code Sections 1601 and 1603. Section 1601 defines Lake or Stream Bed Alteration permits requirements for public entities. Section 1603 defines requirements for private entities.

Contact: California Department of Fish and Game
4949 View Ridge Avenue
San Diego, CA 92123

Both permits require a non-refundable filing fee of \$154.00. No additional fee is required for projects up to \$25,000.00; however, an additional processing fee of \$618.75 is required for projects costing between \$25,000 and \$500,000. Projects over \$500,000 require a fee of \$1,236.50 in addition to the basic filing fee. A separate fee schedule is provided for public entities to perform routine maintenance projects in streambeds. Commercial sand and gravel operations also have a separate fee schedule.

Other requirements: The State sensitive species list does not always agree with the federal list. State listed species not on the federal list require consultation with the Department.

Regional Water Quality Control Board: Requires a permit certification that water quality standards as stated in the Water Quality Control Plan Central Coast Region are met. Application must also include Army Corps of Engineers Section 401 permit and California Department of Fish and Game Streambed Alteration permit, if applicable.

Contact: Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401- 7906

Fee: \$500.00

State Department of Water Resources, Division of Water Rights: Requires a water rights permit if surface water is taken by diversion for consumptive use. Dams used to store surface water runoff for irrigation or livestock consumption are considered diversions. Erosion or sediment control facilities installed within watercourses must be designed to drain all captured surface water within 30 days. Otherwise, water rights must be obtained.

Contact: State Water Resources Control Board
Division of Water Rights
1001 "I" Street, 14th Floor
Sacramento, CA 95814

Fee: Varies

U.S. Army Corps of Engineers: Requires a permit for the discharge of dredged or fill material into waters of the United States pursuant to terms and conditions of Sections 401 and 404 of the federal Clean Water Act.

Contact: U.S. Army Corps of Engineers
2151 Alessandro Drive, Suite 255
Ventura, CA 93001

Fee: None

Issuance of an Army Corps permit may also require consultation with the USDI - FWS and/or the U.S. Dept. of Commerce National Marine Fisheries Service (NMFS) if actions have a potential to affect federally listed sensitive species. NMFS is responsible for anadromous fin fish, shellfish, mollusks and marine mammals. FWS is responsible for all other species.

Contact: U.S. Fish and Wildlife Service
2493 Portola Road, Suite B
Ventura, CA 93003

Fee: None

National Marine Fisheries Service (NOAA Fisheries): Projects that may effect marine and anadromous fish and related habitats must be reviewed by NOAA Fisheries for any potentially harmful effects. When projects require a federal permit from the U.S. Army Corps of Engineers the consultation is conducted with Corps under Section 7 of the Endangered Species Act (ESA). When there is no other federal agency involved then a NOAA permit is required under Section 10 of the ESA.

Contact: NOAA Fisheries
Southwest Field Office
501 West Ocean Blvd. Suite 4200
Long Beach, CA 90802

California Coastal Commission: The California Coastal Act of 1976 requires a permit for any development that is within the coastal zone. "Development" under the act includes almost all activities that alter the land and any change in or under water.

Contact: California Coastal Commission
South Central Coast District
89 South California Street
Ventura, CA 93001