



CORRIDOR INVENTORY EXECUTIVE SUMMARIES



NATURAL



CULTURAL



GEOLOGICAL



HISTORICAL



RECREATIONAL



SCENIC

**Highway 1 in Monterey and San Luis Obispo Counties
SLO-1-71.4/74.3
MON-1-0.0/72.3**

**Caltrans District 5
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INTRODUCTION

The Big Sur Coast Highway Management Plan (CHMP) is designed to establish coordinated management of the Highway 1 corridor along this widely treasured coastline. The primary goal of the CHMP is to preserve, protect, and restore the area's unique qualities while ensuring the continued safe and efficient operation of the highway. The CHMP also fulfills the objectives of the Federal Highway Administration's National Scenic Byways program. This program calls for essentially two things (1) an inventory of intrinsic qualities, those unique and irreplaceable features that define the essence of the corridor and (2) a corridor management plan to ensure that these resources are managed for long-term preservation and enjoyment of these qualities.

In support of the CHMP, a series of resource inventories has been compiled for State Highway 1 along the Big Sur Coast, a 75-mile stretch from San Carpoforo Creek in northern San Luis Obispo County to the Carmel River in Monterey County.

The Scenic Byways program identifies six types of intrinsic qualities. These are listed below with the addition of geology as a special focus area. A combination of field investigations and research is reflected in the production of inventories corresponding to the following categories:

- Archaeological
- Cultural
- Geological
- Historical
- Natural
- Recreational
- Scenic

While not included here, it is important to note the following work is planned or underway: (1) shoreline habitat assessment to characterize the nearshore environment along the highway corridor and, (2) culvert inventory within the corridor to locate each feature (with GPS technology) and evaluate existing conditions, remaining service life and make recommendations for long-range sustainability.

Each inventory report includes maps and is a companion to a comprehensive Geographic Information System (GIS) database. As a collection, this 75-mile inventory is the most comprehensive resource inventory that has been compiled for a rural California highway corridor. The width of the corridor defined for the purpose of the data collection varies by resource. The investigation for archaeological resources, for example, focussed on the average 80-foot right-of-way. For natural qualities, vegetation communities were mapped along a 400-foot wide area (200-feet to each side of the highway centerline). For geology and landslides, the mapping covers areas 1 to 3 miles wide. The information was captured on either aerial photographs or USGS quadrangle maps (and in some cases is available in both formats).

This information resource not only provides the basis for developing specific corridor management strategies, enhancement projects, and other plan implementation measures, but it also offers tremendous value to other public agencies with resource management responsibilities. It is expected that various agencies, including the U.S.

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Forest Service, Monterey Bay National Marine Sanctuary, California State Parks, Coastal Commission, and County of Monterey, to name only a few, will use this database. Such information sharing should facilitate decision-making regarding highway-related activities within the various jurisdictions and support their respective management planning efforts. For example, Caltrans and regulatory agencies can consult the database for early information about sensitive resources in the vicinity of a project or storm damaged location and define a course of action to avoid, minimize or mitigate for impacts to these resources. The plans of the individual agencies will provide the structure and detail needed to ensure implementation of their responsibilities for implementation of the CHMP outside those areas controlled by Caltrans.

It is also anticipated that these agencies will participate over time in updating and expanding the inventory database. Such information sharing and cooperation among all stakeholders will help to achieve coordinated planning among agencies along this stretch of coast.

I. CULTURAL RESOURCES AND QUALITIES

There are four reports that complete the characterization of the inventory related to cultural resources. For purposes of the CHMP, a wide range of human occupation in the area is captured. The first two reports listed below offer a solid collection of the prehistoric and historic periods of settlement in the region. The third report addresses the trends of highway closures and effects on the community. The fourth report offers insight into contemporary lifestyles.

Subject:

Prehistoric (Archaeology) and Historic Resources within the Highway 1 corridor

Report Title:

Cultural Resources Inventory of Caltrans District 5 Rural Highways, Monterey and San Luis Obispo Counties, California: Coast Highway 1

FarWestern Anthropological Research Group, June 2001

Abstract: This inventory involved an extensive survey for prehistoric and historic archaeological sites, historic resources, and architectural properties in the immediate proximity of Highway, including the features associated with the Carmel to San Simeon Highway 1 Historic District.

Volume I: Findings from the survey and records search, including tabulated summaries of all resources.

Volume II: Prior and updated site records for all sites within the one-half mile study area.

Volume III: Catalogue of the historic district features associated with Coast Highway 1.

All previously recorded sites within the survey area (40 to 60 feet either side of centerline) were dealt with in some fashion (re-recorded, noted as outside the right-of-way, searched for but not located), as were several sites near or adjacent to the right-of-way that could be accessed. In total, 11 newly identified sites, 328 District features, plus 21 isolates, were recorded; 56 previously recorded sites were updated.

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Summary of Findings: In examining the history and pre-history of the area along the highway, several hundred prehistoric and historic archaeological sites were documented as well as more than 300 historic features associated with the highway. Those historic features include rock retaining walls, parapets, culvert headwalls, drinking fountains, and seven concrete arch bridges¹.

The history of the Big Sur region begins long before the area was settled by Euroamericans. Prior to contact, the area now known as Big Sur was inhabited by native speakers of the Costanoan, Esselen, and Salinan languages. Very little is known about their pre-contact lifeways or their territorial limits. Indeed, it is likely that local, socio-political groups residing near the edges of their language territories inter-married and, in some instances, were capable of speaking different languages and dialects. In regard to language differences serving as social and political divisions, Milliken (1990:82) clearly points out that concern for language boundaries has sometimes impeded scholars who have tried to understand native social interaction. Throughout aboriginal California, people along language boundaries considered it natural to learn two or more languages. Political organization based upon the language one spoke was nonexistent.

Initial contact between Europeans and most of the native inhabitants of the Big Sur coast came after missions were founded at Carmel and San Antonio. In the southern Big Sur region, the Spanish Portola expedition of 1769 travelled up the coast as far north as San Carpoforo Creek, where they turned inland. All subsequent early explorers followed a more inland route up the Salinas River Valley.

Prehistoric Sites

About 85 prehistoric sites or dual component sites with historic components were found that represent various combinations of flakes, shell, and midden, with minimal ground stone noted. Habitation sites refer to shell midden deposits containing a combination of flaked stone tools, debitage, ground stone, fire-cracked rock and occasional beads; these site types were the most common found. Another common site type was a shell midden with no associated artifacts noted; however, visibility at many of these sites was poor, and they were often identified solely by the shell midden noted in small areas among the dense brush. At a few sites, flakes or ground stone were noted in association. Two areas of displaced midden were identified; both were given primary numbers for future reference.

Highway One Historic District

The State Office of Historic Preservation has concurred that the Carmel to San Simeon Highway Historic District is deemed eligible for listing in the National Register of Historic Places under Criterion C (design/construction). The stone parapets, retaining walls, culverts, and fountains along Highway 1 embody the distinctive characteristics of a type (rustic style), period (1920s-1930s), and method of construction (handcrafted). They also possess artistic value as they harmonize with their natural and rugged environment along the Big Sur coast in a style that was popular in rural areas of the state throughout the Depression. As a District, these resources are related by geographical proximity, and united historically and aesthetically by their physical development. Also determined

¹ This inventory provides detail to the features referenced as part of the Historic Qualities inventory under the "Public Sector" theme and the construction of Highway 1.

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eligible to the NRHP are seven bridges along Highway 1: Big Creek, Bixby Creek, Rocky Creek, Garrapata Creek, Granite Canyon, Malpasos Creek, and Wildcat Creek.

A total of 328 features were recorded within the identified Carmel to San Simeon Highway Historic District. Features include stone parapets, retaining walls, culvert headwalls, and drinking fountains located immediately along the highway. Culverts are found throughout the District, particularly where the slopes are quite steep (e.g., Partington Ridge quadrangle); retaining walls are also prevalent in these areas.

Bridges

The seven concrete arch bridges on Highway 1 in Monterey County (Big Creek, Bixby Creek, Rocky Creek, Garrapata Creek, Granite Canyon, Malpasos Creek, and Wildcat Creek) have previously been evaluated individually and determined to be eligible for listing in the National Register of Historic Places. The bridges are best understood as a group, however, unified by a common roadway, a common setting, and a single design principle. These are the Big Sur Arches, which together comprise one of the most beautiful public works projects in the United States. They are perhaps the finest products of the Bridge Department of the California Division of Highways, which, in the opinion of bridge historian/engineer David Billington, was responsible for "the best series of arch bridges in the United States."

Fountains

There were originally six water fountains built along the Carmel-San Simeon Highway. Five of the six are still in existence (Soda Springs, Big Redwood, Willow Creek, Lucia, and Rigdon), although the Big Redwood Fountain (Post Mile 5.55) is now outside present limits of the roadway but is still considered a contributing element to the District. The fountains were constructed in response to the public need for water along remote and arid stretches of state highways, where commercial or other facilities were not available, and to alleviate the public's use of the Highway Department's maintenance yards. Some of the fountains, like those at Soda Springs (Post Mile 3.76) and Lucia (Post Mile 20.40), are simple stone affairs. The most elaborate and impressive are Willow Creek (P.M. 11.95) and the "Senator Elmer Rigdon Memorial Fountain" (P.M. 26.9). These are more appropriately described as roadside rest areas, as they have facilities for picnicking as well as elaborate stone walls and benches. The original bronze plaque that once graced the Rigdon Fountain is missing, and has been replaced with a simple wooden plaque.

In 1967, at the request of the Monterey County Public Health Department, four of the six water fountains were improved, and a fountain at Spruce Creek was demolished. The work included construction of new collector dams; the installation of tanks for settling, filtering, and storage of water; installation of piping from the collector dams to the tanks; and installation of piping from the tanks to the drinking fountains. In addition, a section of 6-foot high chain link fence with locked gate was installed at the Rigdon Memorial Fountain to fence off the water supply facilities from the public.

Culverts

Stone headwalls for corrugated-metal pipe culverts were built because of the ready availability of material, and the complementary nature of the headwalls with other similar structures (namely, walls and fountains), and with their rugged setting.

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As many as 237 culverts were recorded during the current survey. Culverts are predominately flat and "L"-shaped. Some have been repaired, reinforced, or protected with large redwood planks, corrugated tin, or what is referred to as "Quik-crete," a commercial product name for mixed cement and aggregate in a bag. Water can be added to the bag, which is used as a form for the concrete. Although the significance of the Historic District relates to a method of masonry construction no longer employed in highway projects, a number of concrete culverts with lintels, (one stamped with a 1928 date), have been included as District features; these appear to occur only south of Soda Springs.

Highway Markers

Five highway markers, identified as square concrete posts with an engraved "C" (California survey monument), were also recorded. These markers likely date to the 1930s, when the highway was constructed, so are considered District features.

Parapets

There are three types of parapets along Highway 1: arcade, a style of multiple arched windows built into the parapet wall (7% of the total); a monolithic wall with a crenelated top, the battlement style (85%); and a simple monolithic wall with a flat top and no decoration (8%). The walls are uncoursed; that is, the rocks are laid in a random order, not in layers. They are built of local stone of varying sizes and types, and held in place with cement mortar. The parapet is usually built on top of a rubble masonry retaining wall; in a few instances, the retaining wall extends slightly above the level of the roadway, forming a de-facto parapet (usually of the simple monolithic style with flat top). The less common arcade style occurs at the southern end of the route.

Retaining Walls

Due to the rugged nature of the topography, the location of rock retaining walls appears to have been left to the discretion of the resident engineer. On one "As-Built" plan, a notation reads "dry rubble retaining wall to be used as called for on the cross sections and as ordered by the engineer." Each retaining wall was built with a large footing, the width equaling 1/6 of the wall's height. The wall was battered or sloped at an angle of 1:12. The walls were built of the same material as the parapet walls, and in the same manner.

Subject:

Historic Qualities along the Highway 1 Corridor

Report Title:

Corridor Intrinsic Qualities Inventory: Historic Qualities

JRP Historical Consulting Services, November 2001

Abstract: Big Sur has a long and interesting history. Its residents have pursued a broad range of professions, activities, and lifestyles. The purpose of this report is to identify those historic qualities that "stir an appreciation of the past" so that, in the future, they will be preserved, protected, and restored. For the purposes of this inventory, "along the highway" was defined as "visible from the highway". This criterion of selection was necessary to define a defensible study area. The level of recordation was that of identification, rather than evaluation.

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Summary of Findings: Through fieldwork and extensive background research, the historic qualities inventory resulted in the identification and recordation of 91 historic properties along Highway 1 within the project limits. Valuable insight was gained through meetings with the Big Sur Historical Society with additional correspondence from or interviews with individuals in the community, business owners and employees as well as staff from Caltrans, U.S. Forest Service and State Parks.

The report summarizes the results of the survey and establishes a context through which the historic significance of the buildings identified may be evaluated. It does not discuss every property that was recorded in the field. Instead, this report has three primary purposes:

- To establish a historic context that identifies important themes in the history of this region
- To identify important examples of the various property types associated with those themes
- To specify the data gaps, or information that could be pursued in the future to build upon the results of this inventory

The historic context for this inventory focuses on four major historic themes that exemplify the resources inventoried. These themes, or patterns of events, provide an understanding as to how and why buildings and structures were constructed during various historic periods. This thematic approach to the history of a region has been recognized by historic preservation professionals as an effective means of establishing a framework for understanding the potential significance of historic resources.

- 1) Pioneer (pre-highway) settlement
- 2) Development of tourist-oriented facilities after the highway was completed
- 3) Occupation of the area by notable individuals
- 4) Development of public sector infrastructure

A fifth category (“Other”) was necessary to include those events and historic properties not reflected in any of the four major themes.

Pioneer Settlement

The pioneer era in Big Sur began during California's Mexican Period (1821-1846) and lasted for over a century, culminating with the completion of the Carmel-San Simeon highway in 1937. The settlers who ventured into this region, with family names such as Pfeiffer, Bixby, Post, Harlan, and Dani, made a living through a variety of activities including subsistence agriculture, stock raising, mining, timber harvesting, and road-building.

Tourism Industries

By the time the Carmel-San Simeon highway was completed in 1937, the pioneer era in Big Sur had come to an end. In its place, a new economy developed that was centered on tourism. Compared to the rugged roads that had previously served the Big Sur, the new highway provided easy access into and out of the region. The early families, which before had lived in virtual isolation, could now move freely up and down the coast. Perhaps more important to the economy of Big Sur was the fact that tourists could easily visit and experience first hand the region's spectacular beauty.

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Notable Individuals

Throughout much of the 20th century, Big Sur attracted notable individuals who established permanent or part-time residences there. Three residences along the highway stand out as particularly notable examples of this theme: the D.L. James House, designed in 1918 by renowned architect Charles S. Greene; the “Wild Bird” house, designed in 1958 by Nathaniel Owings; and the ranch of Linus Pauling, an important scientist and political figure, near Gorda.

Public Sector

Although historic and current residents of the Big Sur have celebrated their self-sufficiency, government has long played an important role in the history of the region. There are numerous public sector historic properties along Highway 1 that were built by local, state, or federal agencies. Probably the most significant federal sector property in the area is the Point Sur Lighthouse, one of the most visible and striking of all historic resources in the vicinity. Other public sector resources include the U.S. Forest Service ranger station at Salmon Creek, the maintenance station at Willow Springs originally built for the California Division of Highways (now used by its successor agency, Caltrans), and the gatehouses at the Point Lobos State Reserve. All of these resources were established in the 1930s, although some of the buildings in the complexes are of more recent vintage.

One of the most important public sector resources is the Highway 1 corridor itself, which has formally been determined eligible for listing in the National Register as a “linear historic district.” In addition to its many remarkable engineering features such as masonry railings, drinking fountains, and great highway bridges such as those at Bixby Creek and Wildcat Creek, the highway is also notable for its historic contribution to the region. Following its completion in 1937, it forever changed the character of Big Sur from an isolated frontier to a popular and easily accessible tourist destination.

Other

The inclusion of an “other” category in this summary history of Big Sur is important, because humans and human events do not always fit into neat categories. This category includes resources that clearly express an aspect of Big Sur history and culture, but cut across the four major themes. For example, Big Sur boasts two notable institutions devoted to those seeking peace and contemplation: the Carmelite Monastery, built in the Medieval Italian architectural style in 1931; and the Esalen Institute, an alternative learning center established in the 1960s. The Big Sur Grange Hall, built in 1949, commemorates the long pioneer era of the region and also serves as a public gathering place. Another property of community-wide interest is the Henry Miller Memorial Library, established in 1981 by Emil White, secretary and friend to author Henry Miller.

Data Gaps

The design of this inventory is such that not all properties that might be seen as associated with important events and persons in the history of the region will be recorded. Many of the best-known events associated with Big Sur occurred in buildings that are well beyond the highway viewshed. Furthermore, there are several ephemeral resources in existence along the roadway, including pack trails, traces of the original highway, old bridge abutments, and so forth. None of these ephemeral properties was recorded because there are no associated buildings. Although these off-road and ephemeral sites are not part of the intrinsic qualities of the highway, they are certainly

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part of the history of the county and the region and deserve recognition and further study.

Subject:

History of Storm Damage Related Highway Closures

Report Title:

History of Road Closures

JRP Historical Consulting Services, November 2001

Abstract: This report addresses the historical and evolving relationship between the people of Big Sur and the Coast Highway, focusing especially upon the impact of frequent road closures on the people of the area. It addresses the question of why the highway was built, i.e. the transportation need the highway was designed to fulfill. It also discusses changes in the population and traffic along Highway 1 through the Big Sur country after the highway was completed. It traces the known instances of major closures along the highway and characterizes these in terms of the location, length, and cost of the closure. Finally, the report closes with interpretive comments on the effects of the closures on the people who live and work in the area, as well as the tens of thousands who visit the area.

Summary of Findings: Over a long period of time (from the mid-1930s to the present), road closures have been one of the few constants of life in Big Sur. The population and economy of the area have always been in flux, as is true of all other parts of California. Road closures at any given point in time have affected the people and businesses that were in the area. The numbers of resorts and permanent residents have grown over the years, and the value of the investment in those homes and businesses has grown at a much faster rate. To that extent, the impact of the closures has grown more severe in recent years, as more expensive homes and resorts have been built and used on a more year-round basis. On the other hand, technological and organizational improvements over the years, coupled with the community's ability to galvanize in the face of adversity, have improved Big Sur's ability to deal with such events. Nonetheless, the historic record suggests that closures will continue into the future on a reasonably predictable basis, with major closures coming in clusters that coincide with wet weather patterns and summertime fire events. If the level of investment and use at Big Sur continues to grow, the severity of the impact of closures will also increase correspondingly.

Subject:

Contemporary Cultural Life

Report Title:

Corridor Intrinsic Qualities: Cultural Qualities

Parsons-Brinckerhoff, November 2001.

Abstract: Cultural quality is evidence and expressions of the customs or traditions of a distinct group of people; these may include crafts, music, dance, rituals, festivals, speech, food, special events and vernacular architecture as they are currently practiced.

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For the Big Sur coast, these expressions are evident in community and major events and punctuated by the connection to artists and writers as well as spiritual and meditative places.

Summary of Findings: Capturing the “evidence and expressions of the customs or traditions” of the Big Sur corridor is challenging given the fact that many residents are attracted to the area because of its remoteness and isolation. Also, while the resident population is small, it comprises individuals with a wide range of income levels, interests, beliefs, and traditions.

The dramatic terrain along the Big Sur coast and the large areas of land under public ownership creates a dispersed pattern of development within the buildable areas along the cliffs and within the valleys, with homes scattered along the corridor in isolated pockets. The Big Sur Valley is the primary commercial and social center of the area, although residents of the northern part of the corridor are more closely aligned with the Monterey area. Residents of the more remote and isolated southerly area are less involved in community activities in the Big Sur Valley. People are attracted to the area for a variety of reasons including generational traditions, alternative lifestyles, employment opportunities, seclusion in a beautiful setting, artistic expression, meditative/spiritual enrichment or simply for a completely reclusive life.

The tourism industry also affects the cultural traditions and events in the Big Sur area. Many of the commercial businesses along the corridor cater to tourists, and many of the events listed in the area are marketed to a wider population to bring additional visitors to the area in the dry season.

The Big Sur community has a long tradition of volunteerism and community events which comprise contemporary expressions of that tradition. Big Sur residents come together to celebrate social, cultural and charitable events in the limited number of venues in the Big Sur Valley. Since the local community activities occur throughout the year, scheduled activities during the rainy season are more susceptible to cancellation or postponement, depending on weather and road conditions.

II. GEOLOGY AND LANDSLIDES

Two reports have been completed that characterize geology and landsliding along the coast. One is a comprehensive overview of the natural phenomena, the other is a complete inventory of locations where landsliding is affecting Highway 1. A third study is currently underway to evaluate long-term volume contributions of sediment to the ocean. The results of the initial pilot study are provided here.

Subject:

Characterization of Geology and Landslides

Report Title:

Landslides in the Highway 1 Corridor: Geology and Slope Stability along the Big Sur Coast.

California Division of Mines & Geology, November 2001.

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Abstract: The Big Sur coast along Highway 1 has a richly varied geologic composition, which has led to an abundance of a wide variety of landslides. Uplift of the Santa Lucia Mountains and continuing wave erosion at their base has formed precipitous slopes in many types of bedrock and overlying surficial deposits. This evaluation identified and mapped over 1500 landslides along the study area.

Summary of Findings: No part of the Big Sur coast is without some landslide potential, but the potential for damage to the highway is concentrated in areas where several aspects of the geology and geography converge to make landslide movement more likely. The potential for landsliding depends on the steepness of slopes, wave erosion, bedrock types and weathering characteristics, rainfall, geologic structure and faulting, and modification of slopes for roadway or other construction.

The potential for landslide damage to the highway ranges from low in the Pacific Valley area to very high in the Lopez Point-Lucia area. Landslide types range from small debris flows, common in the northern part of the study area, to very large rock slides in the Lucia area.

South of Hurricane Point, wave erosion of weak rocks along the southwest side of Sierra Hill undermines harder but faulted and fractured rocks on a steep slope. In Big Sur, deeply weathered metamorphic rocks of the Sur complex are particularly susceptible to debris flows when heavy rains follow a wildfire. The bedrock at Julia Pfeiffer Burns State Park is probably the most landslide-resistant along the entire coast, but the steep slopes failed in response to the extraordinary rainfall of 1983. At Lucia, the rocks are so weak that the constant wave erosion at the base of the slopes and typical rainfall patterns are sufficient to cause sliding, but ground movement accelerates in response to heavy rainfall and has also been triggered by an historic earthquake. South of Pacific Valley, numerous shear zones containing serpentinite cut the weak Franciscan Complex bedrock. These exceptionally weak seams within an already weak rock lead to a concentration of large, active landslides second only to the Lucia area.

Regional Overview

The Big Sur coast is located within the long and geologically complex part of the Coast Ranges geomorphic province, which extends for about seven hundred miles within California from Santa Barbara County to the Oregon border. The Big Sur coast is noted for its dramatically high, steep slopes, which rise from sea level to over 3000 feet within less than three miles.

Rock types of the Coast Ranges belong to all three major rock classes: igneous, metamorphic and sedimentary. The most widespread geologic unit is the Franciscan Complex, composed of variably metamorphosed fine to medium grained graywacke sandstone and highly sheared shale. Other minor components of the Franciscan Complex include serpentinite, greenstone and chert.

Within the Coast Ranges extending southeast from Monterey and Salinas, a block of distinctive rocks is bounded by the San Andreas fault on the east and the Sur-Nacimiento faults on the west. This rock mass is known as the Salinian block. The geology of the Salinian block is quite different from the rest of the Coast Ranges. In contrast to the areas underlain by the Franciscan complex, where no crystalline basement rocks are exposed, large areas of the Salinian block are underlain by granitic

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and metamorphic rocks. One of the more extensive areas of granitic rocks is the northern Big Sur coast, from Rocky Creek north to Monterey. Metamorphic rocks of the Sur complex and overlying Cretaceous through Miocene sedimentary rocks underlie the remainder of the Salinian block from Rocky Creek south along the coast or just inland to south of Lopez Point.

In areas underlain by the Franciscan complex, all of the rock types tend to be weak, intensely sheared and slightly metamorphosed sedimentary rocks or overlying unconsolidated deposits. The tectonics of the region, driven by right-lateral motion on the San Andreas fault system, has led to compression and uplift of these sedimentary rocks in recent geologic time. Uplift of such weak rocks has led to high rates of erosion and abundant landslides.

The Salinian block bedrock is harder and in most places more resistant to landsliding than typical Franciscan bedrock, but the steep natural slopes lead to numerous landslides in most rock units. Deep weathering of many Salinian block rocks has broken down mineral grains within once-hard and landslide resistant rocks, leading to surficial layers in many areas of "decomposed" or weakened rocks that are relatively prone to landsliding. Landslides in Salinian block bedrock are both large intact blocks of bedrock that move as rock slides, and areas of deeply weathered coarse soils that mobilize as debris flows. Sedimentary rocks overlying the Salinian block basement are commonly weaker than the granitic and metamorphic rocks and more prone to sliding as intact masses on weak bedding planes.

Landslides

More than 1500 landslides were mapped in the Highway 1 corridor area between San Carpoforo Creek and Point Lobos. The landslides shown on the maps tend to be the larger, deep seated slides that affect large areas.

In this study landslides were recognized, classified, and mapped based on their morphology. Each landslide was also characterized and described by type (materials and type of movement). Furthermore, level of activity was estimated and confidence of interpretation.

The predominant types of landslides found in the study area are:

ROCK SLIDES: A slide involving bedrock in which much of the original structure is preserved.

ROCK FALL: A landslide in which a fragment or fragments breaks off of an outcrop of rock and falls, tumbles or rolls downslope.

EARTH FLOW: A landslide composed of mixture of fine grained soil, consisting of surficial deposits and deeply weathered, disrupted bedrock.

DEBRIS SLIDE: A slide of coarse grained soil, commonly consisting of a loose combination of surficial deposits, rock fragments, and vegetation.

DEBRIS FLOW: A landslide in which a mass of coarse-grained soil flows downslope as a slurry.

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Note: DEBRIS SLIDES and DEBRIS FLOWS are commonly found on a landform called a *DEBRIS SLIDE SLOPE*, which represents the coalesced scars of numerous landslides that are too small to depict on a map of the scale for this report.

Factors Influencing Slope Stability in the Highway Corridor

The uplift of the Coast Ranges, the inclination of slopes, the underlying rock types and geologic structures, landforms, fire history, rainfall and waves related to winter storms all influence the slope stability along the Highway 1 corridor between San Carpoforo Creek and Point Lobos. In addition to the natural processes that have lead to numerous landslides along the coast, construction practices used in building the original highway and in maintaining it have locally affected the stability of slopes.

Slope steepness: Slopes along the Highway 1 corridor range from moderate to extremely steep. The steepest slopes are along the sea cliffs. Some sea cliffs are as steep as 150% and as high as 400 feet. More typically sea cliffs are about 200 feet high and have about 100% slopes. Slopes that are this steep are characterized by bare rock outcrops and landslide scars. Most landslides on these very steep slopes involve shallow soil and loose rocks, moving as debris slides and rock falls. Slopes to the crest of the ridge above the highway are not so precipitous, but many slopes as steep as 50 to 60 % extend to the ridge crests at over 2000 feet.

These steep slopes are formed by the uplift of the mountains that has been ongoing for millions of years, combined with wave erosion along the coast. Unfortunately, there apparently have been no studies of the terraces and uplift rates between the San Simeon fault at San Carpoforo Creek and the Sur-San Gregorio fault zone at Hurricane Point. The uplift rate for this part of the coast, the majority of the study area, is not known.

Wave erosion: The ocean helps to maintain the steepest slopes in the sea cliffs by removing loose rock deposited at the base and undermining the base of slopes, triggering landslides. The effect of wave erosion is greatest where steep high slopes extend upwards from the beach, without intervening marine terraces, and where weak rocks are found at sea level. Erosion of weaker rocks at sea level contributes to the instability of the harder rocks higher on the slopes. Landslide debris is eventually removed by the waves, decreasing the overall stability of the slide mass.

Rock type: Bedrock geology also has a very strong influence on the types and activity of landslides. The rock units in this highway corridor range from massive, hard rocks with few fractures (notably the charnockitic tonalite and granitic rocks) to weak rock with pervasive shear surfaces and fractures (the Franciscan melange). The melange is much more prone to landsliding. The tonalite is less prone to large rotational landslides and forms very steep slopes along the coast (however, those slides that have occurred historically have been large and very damaging, notably the 1983 McWay (or J.P. Burns) slide). The granitic rocks on the northern part of the Big Sur coast, the quartz-diorite, granodiorite and granite, are similarly resistant to large landslides, though some slides are found in all units.

Weathering: The weathering characteristics of the bedrock units are also important factors in controlling the size and density of landslides. Weathering is not as important in rocks that are weak and soil-like in their unweathered state, but in hard rocks the speed and depth of weathering influences the potential for landslides.

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Precipitation: Rainfall is a major factor influencing landslides. The Big Sur segment of Highway 1 receives up to 60 inches of rainfall annually, up to four times as much as the Salinas Valley on the landward side of the Santa Lucia Mountains. This amount of rainfall adds to the level of saturation of the landslide masses on the coastal slopes, decreasing their stability. Long-term steady rain leads to deep saturation of landslide masses and tends to destabilize the larger, deeper types of landslides. Short-term, very intense rain tends to trigger the shallower types of landslides, such as debris slides and debris flows.

Fire: Wildfires also contribute to the triggering of debris flows. The effect of fire on debris flow potential has been most clearly shown in the Big Sur River watershed, where a fire in 1971 was followed by debris flows in 1972.

Geologic structure: The northwest trend of geologic structure, which is the similar orientation of bedding, shear zones and faults, controls the general trend of ridges and stream valleys. Bedding and shear zones dip to both northeast and southwest, leading to planes of weakness that favor landslides that move in those directions. The overall structural grain and orientation of common planes of weakness leads to relatively large landslides on slopes that face northeast and southwest.

Landforms: The landforms created by landslides, in some cases, help to perpetuate the slides. Closed depressions, troughs and benches that commonly form near the headscarps of landslides allow increased percolation of water into the slide mass and along the slide plane, accumulate rainwater and destabilize the slide. Shallow debris slides may destabilize the adjacent upslope area when they move. This leads to a progressive upslope sequence of debris slides or debris flows.

Highway 1: The construction and maintenance of Highway 1 across many marginally stable and unstable slopes has also contributed to the triggering of new or renewed movement on landslides. In many cases, original construction of the highway left many steep cut slopes above the road. Blasting used during the original construction, left loose and fractured rocks on many steep cut slopes, which has contributed to rock falls and small debris slides.

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Subject:

Landslides Affecting Highway 1

Report Title:

Potential Slope Instabilities in the Highway 1 Corridor: Road Condition and Hazard Potential at sites between San Carpoforo Creek and Carmel Highlands

California Department of Transportation, September 2001.

Abstract: The objective of this study was to identify locations along the highway alignment that pose existing and potential geologic problems for the roadway and to summarize site features and potential landslide effects in tabular form. This report is a compilation of existing records kept by Caltrans Geotechnical staff and the results of field reconnaissance for first-hand observations. Tabular data and a photographic library are stored in an ArcView GIS database for easy review and presentation of data and to facilitate future tracking and monitoring of the locations.

Summary of Findings: A total of 88 locations along Highway 1 exhibit potential for slope instability where the highway is or could be affected by landsliding activity. Half of these locations are within the southern 25 miles of the study area (1/3 of the length of the study area) from Lopez Point south. Each location is evaluated for current road conditions and proximity of the instability to the roadbed or potential impact of the instability to the roadway.

Subject:

Sediment Contributions to the Ocean

Report Title:

Pilot Study for the Long-Term Volumetric Sediment Contribution from Landslides: Big Sur Coastline, California.

Abstract: This study will characterize the long-term sediment contributions from landslides along the Big Sur coast. The geographic limits of the study correspond to that portion of the coast where the steep slopes of the Santa Lucia Mountain Range plunge uninterrupted to the Pacific Ocean. The primary research goals are (1) to quantify the historic volume of sediment that enters the ocean (within the Monterey Bay National Marine Sanctuary) through coastal landslide processes and (2) to assess the spatial distribution of volume losses and gains using historical and recent aerial stereo photographs. The results are essential for the development of a management plan for Highway 1 that strives to maintain this highly scenic corridor while minimizing adverse impacts on nearshore biologic communities. The focus on quantifying the long-term average annual sediment yield to the littoral system from coastal slope failures and examining the spatial distribution of volumetric losses will provide a better understanding of the relationship between the geology of the region and the pervasive landslide processes.

The primary tools employed in this study are digital photogrammetry and GIS. Historical and recent vertical aerial photography are processed using digital photogrammetry to produce Digital Terrain Models (DTMs) from 3D stereo models. GIS is used to calculate volume changes and to assess the spatial distribution of the terrain changes. The historical photography is from 1942 (1:30000) and the recent photography was collected

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in 1994, at a 1:24000 scale. These photographs provide a base for determining a 52-year end-point volumetric change rate for two pilot study areas.

Summary of Findings: Two pilot study areas were chosen in order to test and refine the processing techniques and data analysis for the study. These locations are near Wreck Beach and Lopez Point. Both pilot areas are underlain by the Franciscan Formation but the Wreck Beach pilot area is underlain by more resistant sedimentary strata while the Lopez Point pilot area is located within intensely sheared metasedimentary rock and paleo-landslide deposits. Each pilot area was demarcated by identifying from the stereo photography those portions of the coastal slope that show evidence of active landsliding and where the eroded material would have a direct pathway to the ocean at the base of the slope. The two pilot areas are outlined on orthophotographs. The Wreck Beach pilot area is 1.3 km², and extends along approximately 2.5 km of coastline; the Lopez Point pilot area is 2.2 km² and extends along an approximately 5.2 km stretch of coastline. Highway 1 passes directly through the Lopez Point pilot area, but is several hundred meters inland of the Wreck Beach pilot area.

The rate of volume change (net loss in both cases) is calculated over a period of 52 years. Since the pilot areas differ in size, the results are presented as m³ normalized to the km² of each area. The volumetric loss rate in these two areas differs by more than an order of magnitude. As described above, the geology differs dramatically in these two areas; the northern pilot area (Wreck Beach) is dominated by sandstones and graywackes while the southern pilot area (Lopez Point) is located in weaker materials, including ancient landslide deposits and sheared metavolcanic rocks (Hall, 1991). The existence of a significant embayment of the coast beginning at Lopez Point is further evidence that the material along this portion of the coastline is less resistant and erodes at a faster rate than the Wreck Beach pilot area to the north.

The pilot study concludes that long-term volumetric sediment contribution to the littoral system from coastal landslides can be quantified using aerial photography processed with digital stereo photogrammetry to produce Triangulated Irregular Network (TIN) models of the terrain for different years. The TIN models can be subtracted from each other to quantify the net volume change for a given area; volume gains and losses can be plotted as contours of change to assess the change distribution. This technique of dynamic landscape modeling provides valuable information regarding the variability in magnitude and distribution of sediment entering the littoral system that can be useful for the management of landslide material in an environmentally sensitive and remote portion of the central California coast.

Pilot studies completed for two areas exemplify the dramatic variation in volumetric loss rates in an area where the complex geology results in a variety of lithologies being exposed along the coastal slope. Where the slope is formed in resistant interbedded sandstones and siltstones, the volumetric loss rate is nearly thirty times smaller than the volumetric loss rate in an area underlain by highly sheared metasedimentary rocks and mélangé.

III. NATURAL QUALITIES

Report Title:

Corridor Intrinsic Qualities Inventory: Natural Qualities

Parsons Transportation Group, November 2001.

Abstract: A characterization of natural terrestrial environments was performed with the primary purpose to identify and map vegetation communities, potentially jurisdictional waters, potential wildlife corridors, potentially suitable habitat for special-status species, and the degree of exotic plant invasion. The survey also inventoried relative densities of seacliff buckwheat (*Eriogonum parvifolium*) as a primary indicator of potential habitat for Smith’s blue butterfly (*Euphilotes enoptes smithi*); a federally listed endangered species. The inventory characterizes a 400-foot wide corridor with its focus on the immediate 80-foot wide highway right-of-way (40 feet on each side of the highway centerline). Incidental sightings of notable resources beyond these limits were also recorded.

Summary of Findings: The report with accompanying maps and database are the results of field-collected data from September 2000. The following describes each of the natural resource types recorded.

Biotic Communities

Biotic communities were mapped using descriptions and nomenclature in accordance with the *Preliminary Descriptions of Terrestrial Natural Communities of California* (Holland 1986) and previously collected information. Mapping efforts extended out 200 feet from the highway centerline along both sides of Highway 1.

Biotic Communities Documented Within the Corridor Study Area

Central coastal scrub	Upland redwood forest	Non-native grassland
Coastal sage-chaparral scrub	Monterey pine forest	Coastal terrace prairie
Northern coastal bluff scrub	Monterey cypress forest	Ruderal/disturbed
Central maritime chaparral	California bay forest	Windrow
Central coast riparian scrub	Coast live oak forest	Intertidal
Central coast cottonwood-sycamore riparian forest	Central dune scrub	Riverine
	Northern foredune	

Potential Jurisdictional Waters

Key site characteristics used to determine potential jurisdictional status included indicators for the presence of water, incision, and hydrophytic vegetation. A total of 368 potential jurisdictional features were identified and mapped within the corridor study area. These features were divided into six primary categories by type. The totals for each category are as follows: small ephemeral drainage = 216, stream/creek = 100, river = 3, seep/spring = 44, pond = 2, and potential wetland = 3. Wetland delineations were not completed during the field review.

Potential Wildlife Corridors

For the purposes of this study, potential wildlife corridors are defined as drainages lined with significant vegetative cover, potential game trails, and areas identified as “hot spots”

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due to road kill information. Furthermore, each aquatic feature within the corridor study area was evaluated for its potential to support anadromous fish. Riparian corridors represented the majority of potential wildlife corridors identified during the field review.

Dr. J. Smiley, manager of the Landels-Hill Big Creek Reserve is currently conducting an informal survey to help identify and locate roadkill “hot spots” that may correspond with wildlife corridors. This survey should also help to illustrate the magnitude of roadkill within the corridor and the diversity of species affected. The survey began in October 2000 and is currently ongoing (J. Smiley, pers. comm.). To date, mammals have accounted for approximately 84 percent of the total roadkill observations, while reptiles and birds have represented approximately 10 percent and 5 percent, respectively.

Relative Densities of Seacliff Buckwheat

Along the Big Sur Coast, seacliff buckwheat serves as the principal host plant for the federally endangered Smith’s blue butterfly.

For the purpose of this study, a classification system developed for another site in Monterey County (Garland Ranch, Arnold 1991) was modified in order to rate the relative density of buckwheat within each vegetation community polygon as opposed to evaluating habitat quality for Smith’s blue butterfly. The categories were defined as: absent = no plants observed within the vegetation community; low = plants sparsely distributed, stands containing less than 25 plants per acre; medium = stands containing 25 to several hundred plants per acre; and high = stands containing several hundred or more plants per acre, with a mix of age classes. The overall rating for each vegetation community (mapped as polygons) was determined by the stand within that community with the highest relative density. The location of each buckwheat stand of medium or high relative density was denoted on aerial photos and the nearest milepost was recorded on data sheets. These stands were most often located in central coastal scrub, roadcuts, coastal sage-chaparral, and ruderal/disturbed areas.

It should be noted that stands of buckwheat with a low relative density constituted the majority of the observations. Although these smaller stands may not be capable of supporting viable populations of Smith’s blue butterfly, they may be capable of providing necessary resources for dispersing butterflies (Arnold 1991, Kellner 1989).

Degree of Exotic Plant Invasion

Degree of exotic plant invasion is described using a percent cover classification system described in the Big Sur Management Area Invasive Weed Index (USFS 1998). This system utilizes the following descriptors: trace = less than 1 percent cover; light = 1 to 5 percent cover; moderate = 5 to 25 percent cover; and severe = 25 to 100 percent cover.

The percentage of exotic plant cover was determined for the average right-of-way for each vegetative community (mapped as polygons for the GIS database), using the descriptors described above, and the dominant exotic species within each polygon were recorded. Incidental information pertaining to the extent of exotic invasion in the area extending from the outer edge of the right-of-way out to 200 feet was also recorded. Naturalized European grasses, such as wild oat (*Avena fatua*), Italian ryegrass (*Lolium multiflorum*), ripgut grass (*Bromus diandrus*), and soft cheat (*Bromus hordeaceus*), were excluded from the analysis due to the high level of naturalization that they have attained within this corridor.

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Exotic species identified during the survey included: pampas grass (*Cortaderia jubata*), kikuyu grass (*Pennisetum clandestinum*), ice plant (*Carpobrotus spp.*), eupatory (*Ageratina adenophora*), French broom (*Genista monspessulana*), Italian thistle (*Carduus pycnocephalus*), Cape ivy (*Delairea odorata*, formerly *Senecio mikanioides*), mustard (*Hirschfeldia incana*), and fennel (*Foeniculum vulgare*). A number of ornamentals and cultivated plants, such as English ivy (*Hedera helix*), Cape ivy, greater periwinkle (*Vinca major*), and garden nasturtium (*Tropaeolum majus*), that were originally planted for landscaping purposes have escaped and become invasive species.

Overall, the degree of exotic plant invasion is greatest within the 80-foot highway right-of-way. Beyond the right-of-way, exotic plant invasion is most often associated with previously disturbed areas -- for example, where sidecasting was conducted or landslides have occurred. Exotic plant invasion is also typically high in areas surrounding residential development.

Potentially Suitable Habitat for Special-status Species

Potentially suitable habitat for special-status species is defined as areas where special-status species are known to exist or have the potential to exist based on range, habitat, and presence of important habitat elements. A number of special-status species have the potential to occur within the corridor; these include but are not limited to, Smith's blue butterfly, steelhead (*Oncorhynchus mykiss*), California red-legged frog (*Rana aurora draytonii*), two-striped garter snake (*Thamnophis hammondi*), California condor (*Gymnogyps californianus*), Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), Little Sur manzanita (*Arctostaphylos edmundsii*), Hutchinson's larkspur (*Delphinium hutchinsoniae*), and Monterey pine (*Pinus radiata*). Detailed species-specific studies were not conducted during the field inventory.

IV. RECREATIONAL QUALITIES

Report Title:

Corridor Intrinsic Qualities Inventory: Recreational Qualities

Patillo-Garret & Associates, November 2001.

Abstract: The results of this inventory re-emphasize the relationship between the landscape of the coast and the recreational opportunities it offers. The dramatic, precipitous landforms of the Big Sur Coast, coupled with limited shoreline and inland access, have constrained the development of recreation along much of the highway. Landforms conducive to recreation development are rare commodities: sandy beaches, broad coastal terraces, rolling open terrain and gentle shoreline slopes. Even access for touring visitors is limited by the narrow, winding roadway and lack of public side roads off the highway. This dynamic between opportunity and constraint has caused the development of coastal recreation to locate in those public lands that can provide accessibility, whether to a cobble-strewn beach, or a mountain overlook. The result is a dispersed arrangement of recreational areas, forming a necklace of unique and site specific, recreational opportunities along the Coast Highway.

Summary of Findings:

The recreation qualities inventory was produced from information collected by field observation, supplemented with information from secondary sources such as history books and guidebooks, local publications, and Internet sources. The Big Sur Coast's

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most prominent recreation features, as covered in this report, are organized and described by geographic area or segment. For each segment, the report presents a thematic overview of the intrinsic recreational qualities and then follows with a description of particular recreation features. Although not all recreation features recorded in the inventory are described in the report, they are all included within the GIS database and are shown on the maps provided in the report. The report is not intended to serve as a recreation guidebook for the Big Sur region. Nor is it to serve as a management action plan, though management efforts will be able to utilize this recreation data to inform future planning efforts.

To facilitate the discussion of recreation resources, recreation activities were grouped into three themes: Touring, Educational and Contemplative, and Active Sports. The primary recreational use of the highway is for sightseeing or traveling to tourist destinations, either by motor vehicle or—to a lesser degree—by bicycle. Touring is the primary recreation theme, followed by Educational and Contemplative pursuits and destinations such as retreats, nature preserves, and individual explorations and then by Active Sports such as water sports, hiking, and bicycling.

Recreational Themes

While the report focuses on a journey along the coast from south to north through the study segments, each of which offers varying degrees and types of recreation, this summary concludes by describing the recreation highlights within each of the three recreation themes: Touring, Educational and Contemplative, and Active Sports.

Touring

While touring the coast, the experience is ever changing, from the remote and wild southern and central sections to the gradually more gentle and civilized northern section. The coastal landscape offers a rich visual display of form and character from precipitous mountains and ravines to forested river valleys, coastal plains and beaches. Nestled into this landscape are numerous formal and informal touring attractions, from vista points, to State Parks and resorts. Although complete service facilities along a Big Sur journey are limited, at 75 miles long, the Coast Highway is a reasonable day tour. (It should be noted that touring the coast is best accommodated by traveling from north to south. This allows the best windshield survey of the setting and direct and safe access to most of the vista and access points along the shore-side shoulder of the highway.)

Touring highlights include the lodging facilities at the Ragged Point Inn and Resort, Gorda Springs Resort, and Lucia Lodge, the numerous facilities in the Big Sur Valley, and lodgings in the north around Carmel Highlands. Camping areas are available throughout the central and southern coast areas: Plaskett Creek, Kirk Creek, and Limekiln Beach in the south; Julia Pfeiffer Burns State Park, in the central coast; and Pfeiffer-Big Sur State Park, Ventana Inn, and Andrew Molera State Park in the Big Sur Valley area.

Educational and Contemplative

Educational and Contemplative opportunities for the individual are abundant along the route, although formal, publicly accessible facilities are rare. Each cove, bluff, trail, and water feature offers a unique place to investigate the richness of the Big Sur environment. The Big Sur coastline itself is protected by the Monterey Bay National Marine Sanctuary designation, and offers many opportunities for marine study and inquiry. In the north, the Point Lobos Reserve is the crown jewel, providing extensive

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preserved marine and upland ecosystems. Designated natural systems study areas such as the Southern Redwood Botanical Area and Big Creek Reserve provide restricted use areas for scientists and students.

Two prominent formal Educational and Contemplative facilities are found within the Big Sur Coast: Esalen Institute and the New Camaldoli Hermitage. Esalen provides a range of programs and sessions in alternative education, transformation practices, and restorative experiences along with soothing hot springs. Lucia's New Camaldoli Hermitage, run by a group of Camaldolese Monks, offers retreats to the public by reservation and a small shop for tourists.

Active Sports

As noted previously, the inventory suggests that the rugged character of the landscape has influenced and limited the development of active sport recreation within the region. Yet for the novice and the seasoned enthusiast alike, there are still numerous opportunities. In the southern and central sections, the Los Padres National Forest encompasses the majority of the inland property along the coast, and the coastline itself from just south of Lucia to the San Luis Obispo County line. The proximity of the National Forest to the coast south of Lucia provides for a rich assortment of shoreline and inland trails and public use recreational features, such as beaches for surfing, diving, and fishing.

North of Lucia, where the Los Padres Forest pulls back from the coastline and the highway, private land ownership restricts access to areas off the highway. Fortunately, as you travel north there are several large tracts of state lands, either Reserves or Parks, which provide shoreline access for Active Sports pursuits. Family-oriented active recreation is best served at one of these coastal State Parks, or within the Big Sur Valley at Pfeiffer-Big Sur State Park.

Trails are most common in the south and central sections and are predominantly restricted to only hiker and horse use. Along the coast, the California Coastal Trail (CCT) provides a continuous trail link through the region, although to complete the route several sections of the CCT utilize the highway shoulder as a connector between actual trail segments. Inland from the highway, the Los Padres Forest is typically designated wilderness, (Ventana or Silver Peak), both of which preclude the use of any form of mechanized travel, including hang gliding and soaring. As a result, throughout the coast, mountain biking trails are limited, and cyclists typically follow graded dirt roads, the Nacimiento-Ferguson Road, or the highway.

Along the Coast Highway, serious and enthusiastic road cyclists, traveling for the day or overnight, take advantage of the highway's moderate traffic speeds and reasonable shoulders and make good use of the highway as an active recreation route.

V. SCENIC QUALITIES

Report Title:

Corridor Intrinsic Qualities: Scenic Qualities

Public Affairs Management, November 2001.

Abstract: This report evaluates the scenic qualities along the corridor, which create the vivid and positive memories people have of the Big Sur Coast. For purposes of this study, the inventory captures the scenic elements visible while traveling Highway 1. However, this inventory is not intended to catalogue every scenic element along the Big Sur Coast. The inventory focuses on the viewsheds, landscape units, major view locations, and intrinsic scenic features that are clearly evident from the perspective of the traveler along Highway 1.

Summary of Findings: In general, the highway corridor can be broken into three primary areas in terms of visual quality: 1) northern Big Sur Coast from the Carmel River to Point Sur; 2) central-Big Sur Valley; 3) southern Big Sur Coast.

North coast

The northern Big Sur Coast is more heavily travelled due to its proximity to Monterey and Carmel. This portion of the coast presents dramatic changes in scenic qualities. Travelling south there is a gradual progression from the urban and agricultural aesthetics of Carmel and Carmel Highlands to dramatic natural settings such as Garrapata State Park. Viewing opportunities are numerous along this portion of the highway. Many of the pull-outs are paved and well marked such as at Hurricane Point and Little Sur River. While others with dramatic views are not paved and less obvious to the traveler such as Granite Canyon and Garrapata Creek. Most of the view locations are in good condition with few detracting elements. The majority of the intrinsic scenic features along the northern Big Sur Coast are man-made such as Bixby Bridge, Notley's Cabin and the Carmelite Monastery. The pressures of development are clearly evident along this portion of the Coast. Power poles, residential development and road cuts on hillsides, to provide access to private property, are clear detractors from the natural scenic beauty. In many locations residents have planted trees for privacy, however, these trees also block views from the highway. The major threat to the scenic quality along this portion of the highway is from continued residential development.

Big Sur Valley

The Big Sur Valley provides a very different visual experience from the rest of Highway 1. Views are more intimate and rustic in character. This portion of the coast has few view locations, but a wealth of intrinsic features such as the Captain Cooper Redwoods, the rustic river resorts, Post Homestead, and Pfeiffer-Big Sur meadow. The primary elements that detract from this rustic aesthetic are power poles, signage and parking lots.

South coast

The southern Big Sur Coast presents a more natural and rugged scenic quality. There is relatively little residential development and commercial development is confined to two small rustic towns (Lucia and Gorda). View locations are less frequent and more formalized than in the northern segment of the corridor. Intrinsic scenic features also tend to be more natural features such as Square Black Rock, Cape San Martin, and Redwood Gulch. Landsliding is a major visual element along this portion of the highway

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and has a substantial effect on the overall visual quality; this is most noticeable at Rain Rocks. Along this stretch of the coast the major visual detractors are non-native pampas grass, berms and landslide rubble, and metal guardrails. Clearly, repair activities to keep the highway open have affected visual quality within this portion of the corridor. At most view locations large berms have been created along with piles of rocks and other slide debris - all detracting from the larger visual experience.

CONCLUSION

To have a better understanding of the complex array of resources along the Big Sur coast, both human and natural, is an important step toward developing sound management strategies and practices that will ensure their proper stewardship.

The information provided with each of these inventories will improve the ability of the transportation providers, resource managers, regulatory agencies, non-governmental organizations and the community to improve overall coordination activities throughout the corridor. It is both the collection of the information and the enhanced ability to access the data using ArcView GIS technology that will make the results of this effort most useful.

The inventory provides the foundation for the next steps in the planning process to outline the management strategies, produce the CHMP and evaluate the potential environmental effects of various practices. A desired outcome includes a higher level of efficiency for resource and regulatory decisions with regard to activities necessary to sustain Highway 1 as a reliable thoroughfare. In this manner, aspects of environmental streamlining would be promoted—i.e. agencies working collaboratively to ensure environmental responsibility is built-in. This process invests in better information and greater communication through all stages of planning, project development, construction and maintenance to avoid unnecessary conflicts, delays and cost overruns. The intended result is providing better overall service to the public and the environment.

With the completion of these documents, a process is being established that will promote collaborative management of this nationally designated Scenic Byway traversing the Big Sur coast, a most unique and widely-treasured place.