

CHAPTER 11

CULTURAL AND PALEONTOLOGICAL RESOURCES

11.1 AFFECTED ENVIRONMENT

11.1.1 Introduction/Region of Influence

This section includes a definition of cultural resources and a summary of the cultural background of the project area. Also included are discussions of known resources and previous investigations and brief descriptions of federal and state regulations that pertain to cultural resources. Following this section is a definition of paleontological resources (fossils), including a regional background review, followed by a description of known resources in the project area.

11.1.2 Regulatory Considerations

National Historic Preservation Act. Cultural resources are protected primarily through the National Historic Preservation Act (NHPA) of 1966 and its implementing regulations (found at 36 CFR 800), the Archaeological and Historic Preservation Act of 1974 (16 USCA 469 – 469c), the Archaeological Resources Protection Act of 1979 (16 USCA 470aa – 470mm), and CEQA. Section 106 of the NHPA requires federal agencies to consider the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places (NRHP). Consultation with the State Historic Preservation Officer (SHPO), Native American Tribes, and other interested parties is part of the regulatory process.

Santa Cruz County General Plan. Section 5.9 of the General Plan (Santa Cruz County 1994b) describes policies and programs regarding rare and unique hydrological, geological, and paleontological resources in Santa Cruz County. These policies and programs are concerned with identification, protection, and designation of significant resources.

11.1.3 Cultural Resources Overview

Cultural resources include prehistoric resources (before written history), Native American resources (associated with ancestors of living Native Americans), and historic resources (after European contact and settlement). Prehistoric resources are physical properties resulting from human activities that predate written records and are generally identified as isolated finds or sites. Prehistoric resources can include village sites, temporary camps, lithic scatters (stone tools),

roasting pits/hearths, milling features, petroglyphs (rock art), rock features, and burials. Native American resources are sites, areas, and materials important to living Native Americans for religious, spiritual, or traditional reasons. Historic resources can include archaeological remains and architectural structures. Submerged cultural resources (historical and cultural resources in the marine environment) may include prehistoric remains, inundated cities, harbors, shore installations, and ship and aircraft wrecks.

11.1.4 Cultural Resources in the Project Area

A literature and records search was conducted by the Northwest Information Center at Sonoma State University in Rohnert Park, California to assess whether the proposed projects would affect significant cultural resources. The search included the National Register of Historic Places, California Inventory of Historic Resources, and maps and records of prehistoric sites from the McHenry Map Library, Santa Cruz County Public Library. No archaeological or historical resources eligible for the National Register were identified within the project area. Near the project area there are historical buildings, plantings of Monterey cypress, and a subsurface historical trash deposit (Corps 1998). Although none were reported or are visible, there may be historic resources below the surface of East Cliff Drive. In addition, a single prehistoric artifact was identified near the project area, although it was not found in an archaeological context (Corps 1998). The presence of the artifact nearby may suggest there are subsurface prehistoric deposits.

Monterey Bay contains numerous shipwrecks, and because ocean levels were significantly lower in prehistoric times, archaeological sites may exist in shallow areas or in the tidal zone. At least three reported historic shipwrecks have been plotted in the immediate vicinity of the project area (Ball and Chapman 1999). A field survey was not conducted for either shipwrecks or submerged prehistoric sites.

11.1.5 Paleontology

Paleontological Resources

Paleontological resources consist of the fossil remains of both vertebrates and invertebrates. Paleontological resources within the proposed project area were assessed through a records search of relevant scientific literature, review of two earlier paleontologic assessments for parts of the project area (Perry 1996; Naidu 1997), and a field survey. On July 8 and July 11, 2001, Tetra Tech, Inc.'s subconsultant Dr. Hilde Schwartz of the University of California, Santa Cruz, surveyed the entire project area.

The field surveys covered the segment of coastline between 33rd and 41st avenues and consisted of identifying significant fossils and fossiliferous (containing fossils) beds and recording their nature, location, and extent. Dr. Schwartz determined locations and bed correlation using a project area map provided by the County, and made an attempt to relocate fossil occurrences previously reported by Perry (1996) and Naidu (1997). The precise locations of fossils identified during the survey are not disclosed in this report to protect the resources from unauthorized collection.

The wave-cut cliffs and platforms facing Monterey Bay below East Cliff Drive east of Soquel Point and west of the intersection of 41st Avenue and East Cliff Drive are two distinct rock units. The first unit consists of the upper 18 to 26 feet (5 to 8 meters) of coastal cliffs, which are composed of marine terrace deposits that accumulated on coastal beaches during the late Pleistocene, roughly 100,000 years ago (Bradley and Addicott 1968; Weber et al. 1999). Below this layer, the platforms and lower portions of the cliffs consist of the Purisima Formation, a marine sandstone/siltstone unit, composed of nearshore to outer continental shelf sediments (Touring 1959; Norris 1986). Previous testing to assign a date range to the Purisima layer included Radiometric dating, biostratigraphy, and magnetostratigraphy. The tests indicate that the Purisima formed between two and seven million years ago during the Late Miocene and Pliocene epochs (Clark 1981; Madrid et al. 1986).

The rocks in the cliffs and platforms east of Soquel Point are known to be fossiliferous, as noted in earlier studies conducted in the area (e.g., Perry 1977). Two more recent reports (Perry 1996; Naidu 1997) confirm that the area is rich in fossil resources. In simple terms, the geology in this location has created a window to the past that has revealed, and continues to reveal numerous fossil finds. A primary reason for this is that the Purisima and terrace deposits have been uplifted to their present elevations by movement along the San Andreas Fault to the east and by the San Gregorio-Hosgri Fault to the west (Anderson and Menking 1994).

In 1996, Perry evaluated the coastline between 33rd and 38th avenues, and Naidu (1997) evaluated the cliffs and platforms near the termination of 38th Avenue. Both reports determined that the coastal sedimentary rocks between 33rd and 38th avenues have high potential for containing significant nonrenewable paleontologic resources. The coastline at 41st Avenue is geologically and paleontologically similar to the 38th Avenue coastline and is only 800 to 1,000 feet (244 to 305 meters) away. The 41st Avenue area also has a high potential for containing significant nonrenewable paleontologic resources.

11.1.6 Project Area Paleontology

33rd to 36th Avenues

This coastal segment consists of 26- to 33-foot-high (8- to 10-meter-high) cliffs and locally extensive wave-cut platforms. The platforms and lower portions of the cliffs are eroded into the Purisima Formation, which consists of moderately consolidated siltstone and fine- to medium-grained, buff to gray sandstone. The Purisima layer in this area varies in thickness from about 8 to 11 feet (2 to 3 meters) above the level of the summer beach and is broken up in several places. The upper contact of the Purisima is typically marked by *pholad* (a kind of mollusk) clam borings that are filled by sediments from the overlying terrace deposits.

Trace fossils and invertebrate macrofossils are common and are particularly visible in thin (less than six inches thick) disconnected layers in the cliffs between 33rd and 34th avenues. The most significant fossiliferous layer in this area is a long and thin (about six inches thick) deposit that contains a diverse and extraordinarily well preserved fossil assemblage. It is best exposed in the cliffs near 36th Avenue and is part of a well-known “bone bed” or shell bed (Naidu 1997). This deposit also has been called the “crab marker horizon” (Madrid et al. 1986) and has been studied by paleontologists since the late 1930s (Perry, *in* Naidu 1997).

The shell bed layer has provided many macrofossils for collections at a minimum of five California research or learning institutions (see Naidu 1997). The fossil types identified in previous reports include more than 30 species of vertebrates, at least 30 species of mollusks, and 10 species of crustaceans, barnacles, echinoderms, plants, and a large number of delicate and rare species (Perry 1996; Naidu 1997). Field observations confirm this large variety. The paleontological importance of this bed belies its size: the horizon is unique to this portion of the coastline, and Naidu (1997) estimated that only 500 linear feet of the shell bed was accessible.

A significant percentage of the coastline between 33rd and 36th avenues is covered by riprap, seawalls, and retaining walls, making complete evaluation of fossil resources impossible at this time. In the 33rd to 36th avenue portion of the study area approximately 200 to 300 linear feet (61 to 91 linear meters) of the shell bed is exposed. The fossil deposits found within the exposed shell bed appear to be paleontologically significant.

The 18- to 22-foot-thick (5- to 7-meter-thick) marine terrace deposits on top of the Purisima Formation in this area consist of poorly consolidated conglomerates mixed with poorly consolidated sandstones. The conglomerates represent coastal fluvial deposits, while the sandstones are beach deposits. Perry discovered several rare horse teeth in the marine terrace deposits in the southwestern portion of the proposed project area, and a whale vertebra in terrace deposits adjacent to the project area (Perry 1996). The most recent field survey revealed only rare shell fragments in the terrace deposits.

38th Avenue

Both the Purisima Formation and the marine terrace deposits contain numerous fossils in the vicinity of 38th Avenue and the nearby stairway. Naidu (1997) reported the significance of the shell bed in this area (where it is now largely covered by a seawall), and Perry (1996) describes abundant mollusks and vertebrate remains in the terrace deposits. A field survey revealed abundant invertebrate fossils, bone pebbles, and one whale vertebra in the shell bed near 38th Avenue; however, there were no significant fossil finds observed in the terrace deposits.

Due to faulting, the shell bed in the Purisima Formation layer in this area of the cliff is 6 to 7 feet (1.8 to 2 meters) lower than in the coastal segment to the west. The Purisima and terrace deposits are partially obscured near 38th Avenue by the present stairway, riprap, and retaining walls. The fossil deposits within the shell bed section that is visible, however, appear to be paleontologically significant.

41st Avenue

The coastline near the intersection of 41st Avenue and East Cliff Drive is similar to the other portions of the proposed project area. The Purisima Formation (where not covered by riprap) is 13 to 16 feet thick (4 to 5 meters thick) and intensively fractured and faulted. Invertebrate macrofossils (including the bivalves *Anadara* and *Macoma*) and trace fossils are common, especially in the platform east of the stairway and along the upper contact of the unit. No vertebrate fossils were observed. The shell bed may be present in the cliff east of the stairway, but structural offset of beds and the type of rock formation makes identification difficult.

The marine terrace deposits near 41st Avenue consist of 23 to 26 feet (7 to 8 meters) of mixed conglomerates and sandstones. They are steeper and less accessible here than elsewhere. A field survey, where possible in this section, did not reveal any identifiable fossils in the cliff walls.

11.2 ENVIRONMENTAL CONSEQUENCES

Impact Methodology and Thresholds of Significance

Cultural Resources

CEQA requires state agencies to consider the effects of their actions on important archaeological resources, as defined in Section 15064.5. CEQA states that a project may have a significant effect on the environment when the project damages an important archaeological resource. Section 106 of the NHPA states that an undertaking has an effect on a historic property (i.e., NRHP-eligible resource) when that undertaking may alter those characteristics of the property that qualify it for inclusion in the NRHP. An undertaking is considered to have an adverse effect on a historic property when it diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. There are no known culturally significant sites within the project area, but there is the potential for undiscovered sites beneath the surface and possibly under East Cliff Drive.

Paleontological Resources

Paleontologic sensitivity or potential is a qualitative measure of the density and scientific value of fossils in a site. It also gauges the probability that development of a site would directly or indirectly destroy a unique, scientifically significant paleontologic resource. Such a resource is generally considered to consist of vertebrate remains, unusual, useful, or exceptionally well-preserved trace fossils or invertebrate/plant remains, or exceptionally rich or diverse fossil assemblages. A three-part classification of paleontological sensitivity is outlined by the Society of Vertebrate Paleontology (1995) and is used by many paleontologists. It includes high sensitivity, low sensitivity, and undetermined sensitivity rankings. Within this classification scheme, a high sensitivity site is one, which has one of the following characteristics:

- Is underlain by or contains exposures of sedimentary rocks or some types of volcanic rocks that are of the right age, origin, and location to *potentially* contain significant fossils; or
- Is underlain by or contains exposures of sedimentary rock or some types of volcanic rocks that are *known* to contain significant fossils; or
- Contains potentially datable remains older than the historic period, including nests and middens (a deposit of shells, bones, and other artifacts that suggest previous human settlement).

In terms of their age, the way they were deposited in the cliff, and fossil content, both the Purisima Formation and the marine terrace deposits exposed in the project area clearly meet all three of the above criteria. The platforms and cliffs in their entirety are considered to have high paleontologic sensitivity in accordance with the Society of Vertebrate Paleontology guidelines. The layers found in the Purisima Formation dated to the Miocene-Pliocene eras contain

abundant fossils and can be described as a world-class “shell/bone bed” that has considerable paleontological significance. The marine terrace deposits dated to the Pleistocene do not contain as many fossils, but do contain some significant remains.

11.2.1 Full Bluff Armoring (Alternative 1)

Significant Impacts

Impact 11.1 Impacts on Paleontological Resources

Both the marine terrace deposits and the Purisima Formation contain sensitive and significant paleontological resources. Extensive public use and modification of the cliffs and platforms in the project area has already occurred and as a result, fossils have already been both destroyed and covered over in the project area.

Bluff protection measures contained in Alternative 1 would affect sensitive and significant fossils in both the Purisima Formation and the overlying marine terrace deposits on the two proposed protection structure locations (33rd to 36th avenues and near the terminus of 41st Avenue). Because this project area is deemed to have high paleontologic sensitivity and is slated to undergo considerable construction and disturbance, this would be considered a significant impact.

Mitigation 11.1

To mitigate impacts from the proposed alternative, a mitigation plan shall be developed by Santa Cruz County Redevelopment Agency, and approved by the Planning Department, prior to any ground disturbance. The following actions described below are suggested requirements for a site-specific mitigation plan. The above agency shall be responsible for each of the measures and they may serve as permit conditions. The measures recommended below conform to guidelines established by the Society of Vertebrate Paleontology (1995), and also incorporate suggestions from Perry (1996) that address the unique conditions at the site. Nevertheless, even full compliance with the mitigation recommendations will not prevent the irretrievable loss of unique paleontologic data once seawall construction begins. Implementing the mitigation measures described below, however, would reduce the potential adverse effects to less than significant.

- Conduct paleontologic survey and surface collection (salvage) by a qualified paleontologist immediately before construction and after removal of existing riprap. Because coastal erosion in this region is rapid (especially in winter), important new fossils can be exposed at any time. A qualified paleontologist shall reexamine the protection structures and retaining structure building sites shortly before work begins. Furthermore, because extensive riprap presently obscures large sections of the platform and lower cliff in the proposed project area, it is imperative that those bedrock regions are examined after the riprap and debris have been removed. Any significant fossils found prior to construction shall be collected and salvaged according to Society of Vertebrate Paleontology guidelines (1995, 1996).
- Preserve fossil-rich Purisima Formation boulders from the base of the cliffs between 33rd and 35th avenues. Numerous eroded, fossiliferous Purisima boulders and cobbles adorn the beach at the southwest end of the project area. Because they

are out of place, these rocks do not have great paleoecological or biostratigraphic value; however, they may yet be paleontologically and educationally important. Any removal of smaller, more transportable materials shall be monitored by a qualified paleontologist.

Those materials deemed to have educational value shall be offered to local institutions for teaching or research. The materials could also be set aside for future educational landscaping of a municipal or county site, or may even be incorporated into the proposed Pleasure Point Park. An agreement shall be reached between the County of Santa Cruz Redevelopment Agency and a consulting paleontologist. The consulting paleontologist shall locate and organize the transport of materials to an interested institution (e.g., Long Marine Lab and the University of California, Santa Cruz). Once a recipient for the materials is located, an agreement shall be reached regarding the collection, transportation and storage costs associated with the materials. Larger boulders and blocks shall be left intact, on the beach area.

- Conduct paleontologic monitoring and salvage during construction. A qualified paleontologist shall monitor the building sites during any cliff or platform excavation. This is especially important at 41st Avenue, 38th Avenue, and between 33rd and 35th avenues, where either the Purisima Formation platforms that would be excavated for protection structure footings are particularly fossiliferous or where the exposed Purisima Formation and terrace deposits have previously yielded significant fossils. Construction shall stop as directed by the qualified paleontologist to avoid resources if significant finds are uncovered. Any significant fossils discovered during building activities shall be collected and salvaged. This measure shall be included in the construction contract of the firm hired to construct the projects.
- Prepare salvaged samples. Salvaged materials shall be identified by location, stratigraphic level, and known fossil content and stabilized before they are removed from the site.
- Store salvaged samples. With the understanding that museums and universities are not required to accept all fossil materials (Society of Vertebrate Paleontology 1996), the contracted paleontologist shall attempt to secure both a suitable and willing repository for storing any materials resulting from salvage operations. If a suitable repository is located, the County Redevelopment Agency shall make every reasonable effort to enter into a curation agreement with the repository that addresses the collection, transportation, and storage costs associated with salvaged materials. The County Redevelopment Agency shall cover the cost for a qualified paleontologist to monitor which materials are suitable for collection. Alternatively, if curation is not possible for all or some of the significant paleontological resources that would otherwise be lost due to project activities, then the County Redevelopment Agency shall relocate these resources in local public parks and/or local educational facilities as directed by the contracted paleontologist.
- Prepare a final report. The qualified paleontologist overseeing collection and salvage of fossils from the site shall prepare a final report when construction is complete and fossils have been salvaged, prepared, identified, and stored. The report shall

include methods, identity, stratigraphic position, significance, and final resting place of all salvaged fossils. Copies of the final report shall be sent to the Santa Cruz County Planning Department and to all relevant California repositories, agencies, or institutions as determined by the qualified paleontologist.

Implementing these mitigation measures would reduce this potential significant impact to a less than significant level.

Nonsignificant Impacts

Cultural Resources

The effect on Cultural Resources is not significant because there are no recorded sites within the project area. Finds within the Purisima layer are unlikely since this layer predates human occupation. Excavation on and below the road of East Cliff Drive, however, could uncover unrecorded cultural resources. If cultural resources are encountered by construction crews, a qualified archaeologist shall be employed to determine the significance of any unexpected discoveries. The archaeologist shall have the authority to stop further excavation and work with the county to mitigate any potential adverse effects.

Beneficial Impacts

Beneficial Impacts on Paleontological Resources

Alternative 1 would eliminate the public disturbance of these resources in the project area, and lessen the probability of the destruction of fossil resources that may occur during future emergency repairs such as the construction of retaining walls.

11.2.2 Partial Bluff Armoring with Full Improvements (Alternative 2)

Significant Impacts

Impact 11.2 Impacts on Paleontological Resources

Impacts on fossil resources during construction under Alternative 2 would be nearly the same as those described under Alternative 1. Construction impacts would be slightly less because armoring would not be as extensive, although significant fossil finds within the Purisima layer and fossil remains within the terrace layer will be affected under this alternative. Areas not protected within the marine terrace that are left exposed to the elements, however, will continue to erode from wave damage. Pedestrian traffic and unauthorized fossil collection will continue to have adverse impacts on fossil resources in the non-armored areas.

Mitigation 11.2

Mitigation shall be the same as described for Alternative 1. However, the mitigation measures would concentrate only on the areas where the bluff would be armored, or where construction would disturb the cliff.

To mitigate the impacts on the non-armored areas, the County of Santa Cruz Redevelopment Agency shall prepare a preservation plan to monitor and record fossil resources in the exposed

areas. However, long-term impacts on exposed paleontological resources would still be significant.

Nonsignificant Impacts

Cultural Resources

The effect on Cultural Resources is not significant because there are no recorded sites within the project area. The same process for unexpected discoveries stated above would be implemented for Alternative 2.

Beneficial Impacts

Beneficial Impacts on Paleontological Resources

Alternative 2 would eliminate public disturbance of these resources in the areas where Purisima and terrace deposits would be armored, and lessen the probability of the destruction of fossil resources that may occur during future emergency repairs such as the construction of retaining walls.

11.2.3 Partial Bluff Armoring with Limited Improvements (Alternative 3)

Significant Impacts

Impact 11.3 Impacts on Paleontological Resources

Impacts on fossil resources during construction under Alternative 3 would be similar to those described under Alternative 1. Construction impacts would be less because armoring would not be as extensive, although significant fossil finds within the Purisima layer would be affected under this alternative. Larger areas not protected within the marine terrace that are left exposed to the elements, however, would continue to erode from wave damage. Pedestrian traffic and unauthorized fossil collection would continue to have adverse impacts on fossil resources in the non-armored areas.

Mitigation 11.3

Mitigation shall be the same as described for Alternative 1. However, the mitigation measures would concentrate only on the areas where the bluff would be armored, or where construction would disturb the cliff. Alternative 3 would leave more marine terrace exposed to the elements.

To mitigate impacts to the non-armored areas including the marine terrace formation, the County of Santa Cruz Redevelopment Agency shall prepare a preservation plan to monitor and record fossil resources in the exposed areas. However, long-term impacts on exposed paleontological resources would still be significant.

Nonsignificant Impacts

Cultural Resources

The effect on Cultural Resources is not significant because there are no recorded sites within the project area. The same process for unexpected discoveries stated above would be implemented for Alternative 3.

Beneficial Impacts on Paleontological Resources

Alternative 3 would eliminate public disturbance of these resources in the areas where Purisima layer would be armored, and lessen the probability of the destruction of fossil resources that may occur during future emergency repairs such as the construction of retaining walls.

11.2.4 Groins and Notch Infilling (Alternative 4)

Significant Impacts

Impact 11.4 Impacts on Paleontological Resources

Non-armoring measures contained in Alternative 4 would create the least adverse impacts from construction on paleontological resources. Filling wave-cuts, however, would constitute an adverse impact in the Purisima Formation where fossils are present. Bluff areas not protected within the Purisima and marine terrace that are left exposed to the elements, however, would continue to erode from wave damage. Pedestrian traffic and unauthorized fossil collection would continue to have adverse impacts on fossil resources in the non-armored areas.

Mitigation 11.4

To minimize impacts of groin construction on fossil resources under Alternative 4, the same mitigation measures as described for Alternative 1 shall be used with preconstruction survey, collection, and construction monitoring limited to areas where there would be infilling of wave cuts and other construction-related disturbance. Alternative 4 leaves most of the Purisima and marine terrace deposits that contain fossil resources exposed to the elements.

To mitigate the impacts on the non-armored areas, the County of Santa Cruz Redevelopment Agency shall prepare a preservation plan to monitor and record fossil resources in the exposed areas. However, long-term impacts on exposed paleontological resources would still be significant.

Impact 11.5 Impacts on Cultural Resources

As stated above, there are no known cultural resources in the road of East Cliff Drive. The area offshore, however, has not been surveyed for submerged cultural resources so it is not known whether prehistoric or historic sites exist in the submerged proposed groin areas. Construction of artificial groins has the potential to damage or destroy unrecorded cultural sites.

Mitigation 11.5

To minimize impacts of construction on cultural resources, Santa Cruz County Redevelopment Agency shall ensure that any areas to be disturbed by groin construction are surveyed by a qualified archaeologist and potential cultural sites are avoided. The plan to mitigate possible disturbance of unrecorded submerged sites shall include the following measures:

- Project Area Survey. Prior to any offshore disturbance, the area where groins would be placed or where construction equipment has the potential to disturb the seabed shall be surveyed by a maritime archaeologist that qualifies under the Secretary of the Interior's Standards. If no sites are found, then a negative report shall be the only additional required task.

- Site Recording. If sites are found, they shall be recorded according to current professional standards by a qualified archaeologist.
- Regulatory Consultation. Recorded sites shall be evaluated for eligibility to local, state, or federal historical resource registers in consultation with appropriate regulatory agencies.
- Preservation Plan. A plan to avoid and preserve discovered sites shall be developed in consultation with appropriate local, state, and federal agencies.
- Final Report. A final report of the findings meeting all regulatory requirements shall be submitted to the County Planning Department, and the State Historic Preservation Office.

Implementing these mitigation measures would reduce this potential significant impact to a less than significant level.

11.2.5 No Action Alternative

Paleontological Resources

There would be no impacts on existing paleontological resources under the No Action Alternative. However, continued erosion, wave damage, pedestrian traffic, and unauthorized fossil collection could have adverse affects on paleontologic resources in the future if they are not protected.

Cultural Resources

There are no known cultural resources within the project area. Continued erosion, however, may in time reveal unrecorded sites within the cliff face and below East Cliff Drive.

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