3.8 PALEONTOLOGICAL RESOURCES

Paleontological resources are fossilized remains or traces of prehistoric plants and animals, and associated deposits, exclusive of human remains (Deméré and Walsh 2003). Paleontological resources (e.g., bones, teeth, shells, wood, etc.) are found in geologic deposits within which they were originally buried and can provide a historic record of environmental conditions outside of human influence, depending on the age and characteristics of the formation. These resources represent limited, nonrenewable, and sensitive scientific and educational resources.

Based on past studies and findings throughout the San Diego region, local geologic formations have been assigned paleontological resource sensitivity, indicating their potential to contain paleontological resources of scientific importance. CEQA requires that a determination be made as to whether a project could directly or indirectly destroy a unique paleontological resource or site or unique geological feature. If an impact is significant, CEQA requires the identification of feasible measures to minimize the impact.

No excavation is proposed as part of the materials disposal/reuse component of the Enhancement Project. Additionally, no excavation or dredging would occur under the No Project Alternative; thus, the No Project Alternative would not have the potential to directly or indirectly disturb or destroy paleontological resources. Therefore, the analysis in this section focuses on the lagoon enhancement efforts associated with each of the three build alternatives.

Several studies have been completed to characterize geologic formations and their potential for containing paleontological resources. The following analysis is based on the baseline conditions established in *Paleontological Resources, San Diego County, California* (Deméré and Walsh 2003), and the *Limited Geotechnical Investigation and Input to Buena Vista Lagoon Restoration Project* (TerraCosta Consulting Group, Inc. 2008). Due to the inherently static nature of paleontological resources, conditions described in these reports accurately reflect conditions at the time of NOP publication.

3.8.1 EXISTING CONDITIONS

Regulatory Setting

A full description of the regulatory setting for this document can be found in Appendix B. The following laws, regulations, policies, and plans are applicable to this resource area:

- Administrative Code; Title 14, Section 4307

Due to the relationship between fossils and geologic formations in which they can occur, the geology of an area provides a reasonable basis for predicting the potential for the presence of paleontological resources. As discussed in Section 3.6 Geology and Soils, the project site is underlain by relatively horizontally stratified sandstones and claystones of the upper-middle tertiary Santiago Formation (Tsb). In addition to sediments associated with the Santiago Formation, slopes and terraces around the perimeter of the lagoon are characterized by Quaternary artificial fill soils (Qaf), and Quaternary coastal terrace deposits (Qby). Quaternary beach and bar deposits (Qb) exist fronting the beach near the inlet of the lagoon. Sediment within the lagoon is characterized by fill soils (Qaf), consisting of both dredged material and land-derived graded soils, and natural alluvium (Qal).

Generalized potential sensitivity for different geologic deposits within San Diego County are provided in *Paleontological Resources, San Diego County, California* (Deméré and Walsh 2003). The project site is located within the Coastal Plain region of the Peninsular Ranges Province. The Coastal Plain region is underlain by a "layer cake" sequence of marine and nonmarine sedimentary rock units that record portions of the last 140 million years of the earth's history. Over this period of time, the relationship of land and sea has fluctuated drastically such that, currently, there are ancient marine rocks preserved up to elevations of around 900 feet above sea level and ancient river deposits as high as 1,200 feet. Faulting related to the local La Nación and Rose Canyon Fault Zones has broken up the sedimentary sequence in the Coastal Plain region into a number of distinct fault blocks in the southwestern portion of San Diego County, while in the northern area of the county, the effects of faulting are not as great and the rock units are relatively undeformed (Deméré and Walsh 2003). Descriptions of the geologic formations found within the project vicinity and their corresponding paleontological resource sensitivities are summarized in Table 3.8-1.

As shown in Table 3.8-1, the potential for the presence of paleontological resources exists within the areas of the project site containing Unnamed River Terrace Deposits, Unnamed Marine Terrace Deposits, and the Santiago Formation. River and/or Marine Terrace Deposits are found along the northeastern and southwestern shorelines of the Coast Highway Basin, and surrounding areas to the north and south of the lagoon. Limited areas of the surface of the Santiago Formation are exposed along the southeastern shoreline of the Coast Highway Basin, as well as the southwestern shoreline of the I-5 Basin (TerraCosta Consulting Group, Inc. 2008).

Table 3.8-1
Geologic Formation Characteristics and Paleontological Resource Sensitivity

Formation	Characteristics	Sensitivity
Later Quaternary Alluvium	Alluvial sediments of relatively recent age (i.e., generally younger than 10,000 years old). Consists of poorly consolidated clays, silts, sands, and gravels generally laid down by ephemeral streams.	Low
Unnamed River Terrace Deposits	Deposits of coarse-grained, gravelly sandstones, pebble and cobble conglomerates, and claystones generally occur at levels above the active stream channels and represent the sediments of ancient river courses. These deposits have produced well-preserved remains of aquatic vertebrates and terrestrial mammals.	Moderate to High
Unnamed Marine Terrace Deposits	Deposits consist of a basal nearshore marine unit, producing large and diverse assemblages of marine invertebrate fossils, and an upper nonmarine unit, producing sparse remains of terrestrial mammals.	Moderate to High
Santiago Formation, Member C	Deposits consist predominantly of fine- to very coarse-grained, white to gray-white, friable, cross-bedded, arkosic sandstone with interbeds of green to green-brown siltstones, silty mudstones, and claystones. The maximum exposed thickness is approximately 100 feet.	High

Source: Deméré and Walsh 2003

3.8.2 SIGNIFICANCE CRITERIA

Pursuant to Appendix G to the CEQA Guidelines, a significant impact to paleontological resources would occur if implementation of the Enhancement Project would result in the following:

A. Direct or indirect destruction of a unique paleontological resource or site or unique geologic feature.

3.8.3 IMPACT ANALYSIS

As previously described, there is a direct relationship between fossils and the geologic formations in which they are contained. As such, with information specific to the geology of a particular area and the corresponding paleontological resource potential, it is possible to reasonably assess whether fossils may or may not be found during excavation in the underlying geologic materials or formations. As paleontological resources are typically irregularly dispersed throughout a geologic formation, both horizontally and vertically, it is not possible to predict the specific location of fossils within a particular formation.

Direct impacts to a paleontological resource could result from ground-disturbing activities that disrupt subsurface geologic formations and cause the destruction or alteration of a paleontological resource. Such activities could include, but are not limited to, grading, excavation, trenching, boring, and tunneling. Indirect impacts to paleontological resources are

not specifically caused by development of a project, but rather may be a reasonably foreseeable result of such development. For example, increased erosion during or after completion of a project or the unauthorized tampering or removal of a fossil or paleontological resource from a project site could result in the destruction or loss of surface fossils. Activities that place material on top of existing surface areas, such as building up dikes or placement of material to level a surface, do not typically have the potential to adversely impact subsurface resources.

Freshwater Alternative

A majority of project-related ground disturbance under the Freshwater Alternative would occur during dredging activities that would be limited to portions of the lagoon basins that are generally underlain by fill soils and alluvial deposits. As shown in Table 3.8-1 above, later Quaternary alluvial sediments are assigned a low paleontological resource sensitivity because of their young age. These alluvial deposits are found throughout the lagoon to a depth of at least -40 feet NGVD (TerraCosta Consulting Group, Inc. 2008). As discussed in Chapter 2 Description of Project Alternatives, two construction approaches are proposed for the placement of dredged sediments. Under both approaches, dredged materials suitable for beneficial use would be placed at the identified beach and/or nearshore sites. Those materials not suitable for beach or nearshore placement would be transported to LA-5 for offshore placement under Approach 1. Under Approach 2, an overdredge pit measuring up to -32 feet NGVD would be created to accommodate material not suitable for beach or nearshore placement.

Under Approach 1, dredging and excavation under the Freshwater Alternative would occur to a maximum depth of approximately -9 feet NGVD for the creation of the fishing areas in the Railroad and Coast Highway Basins. Dredging activities in the Weir and I-5 Basins would occur to a maximum depth of approximately -1.6 feet NGVD. Additionally, dredging to optimize the hydraulic connections between the basins (i.e., in the channels) would occur to a maximum depth of approximately -2.0 feet NGVD. Under Approach 2, depth of dredging and excavation would be similar to that described under Approach 1, with the exception of the Coast Highway Basin, which would contain the overdredge pit up to -32 feet NGVD. The overdredge pit would be created within the alluvial and fill soils within this basin, and would not be expected to result in the destruction or disturbance of paleontological resources. As such, it is not anticipated that paleontological resources would be encountered during dredging activities under the Freshwater Alternative.

The Freshwater Alternative would also include replacement of the existing 50-foot weir with a new 80-foot weir, which would require widening the channel at this location. Excavation to widen the channel would occur on the south side of the inlet in an area consisting of River and/or Marine Terrace Deposits, which have been identified as having moderate to high paleontological

resource sensitivity. **Although located in a previously disturbed area, due to the assigned resource sensitivity, excavation of the geologic materials at this location could result in direct, potentially significant impacts to paleontological resources under the Freshwater Alternative (Criterion A).**

As discussed in Section 3.2 Hydrology, erosion could occur in and around the channels connecting the basins during large storm events under the Freshwater Alternative. However, areas identified as having the potential for erosion within lagoon channel cross sections would be protected with erosion control products and vegetated material to stabilize soils. Thus, no substantial long-term erosion would result from implementation of the Freshwater Alternative. No other portion of the project site or surrounding area would be susceptible to long-term erosion under the Freshwater Alternative. **Therefore, the Freshwater Alternative would not result in indirect impacts to paleontological resources (Criterion A).**

Saltwater Alternative

Similar to the Freshwater Alternative, ground-disturbing activities under the Saltwater Alternative would occur during dredging activities that would be limited to portions of the lagoon basins that are generally underlain by fill soils and alluvial deposits. This alternative would also include the option of creating an overdredge pit to accommodate materials not suitable for beach or nearshore placement. Dredging under the Saltwater Alternative would occur to a maximum depth of approximately -2.5 feet NGVD for each of the basins if no overdredge pit is created. If an overdredge pit is created, dredging would occur to a maximum depth of approximately -32 feet NGVD in the Coast Highway Basin. Dredging to optimize the channels connecting the basins would occur to a maximum depth of -2.5 feet NGVD. As previously discussed, materials within the lagoon are anticipated to consist of fill soils and alluvial deposits to a depth of at least -40 feet NGVD. As such, dredging within the basins under the Saltwater Alternative is not anticipated to result in damage to paleontological resources.

Under the Saltwater Alternative, the existing 50-foot weir within the Weir Basin would be replaced with a 100-foot-wide open inlet to provide tidal exchange. Geologic materials surrounding this inlet consist of River and/or Marine Terrace Deposits, which are identified as having moderate to high paleontological resource sensitivity. Excavation in this area would occur to a depth of -2.5 feet NGVD within the inlet itself and then create a -0.5 foot NGVD deep "channel" from the opening of the mouth of the inlet to the ocean. It is anticipated that, because deep excavations would not be required, most of the material excavated to create the open inlet would consist of alluvium. Furthermore, this area of the project site is located on and near the beach, and has historically been subjected to natural erosion and coastal processes that repeatedly disturb the on-site geologic materials. Notwithstanding, **excavation activities within an area**

containing River and/or Marine Terrace Deposits under the Saltwater Alternative could result in direct, potentially significant impacts to paleontological resources (Criterion A).

Similar to the Freshwater Alternative, areas identified as having the potential for erosion within lagoon channel cross sections under the Saltwater Alternative would be protected with erosion control products and vegetated material to stabilize soils. Thus, no substantial long-term erosion would result from implementation of the Saltwater Alternative. **Therefore, the Saltwater Alternative would not result in indirect impacts to paleontological resources (Criterion A).**

Removal of the weir and the opening of the inlet under this alternative would require periodic excavation to maintain the open inlet. This periodic maintenance would occur in an area known to contain geologic materials identified as having moderate to high paleontological resource sensitivity. However, as discussed above, this area of the project site has historically been subjected to natural erosion processes. Additionally, material removed during maintenance activities would be limited to littoral sand accumulating in the inlet area, as discussed in Section 3.3 Oceanography/Coastal Processes. **Therefore, it is unlikely that maintenance activities within this area would uncover previously undisturbed resources, and indirect impacts to paleontological resources would be less than significant under the Saltwater Alternative (Criterion A).**

Hybrid Alternative

The Hybrid Alternative consists of two options (A and B). Both options include the removal of the existing weir and the creation of an open inlet to the ocean. Hybrid Option A includes the construction of a channel connecting the tidal inlet from the ocean area through the Weir Basin and into the Railroad Basin, creating a perched water level, whereas Hybrid Option B would create an open inlet similar to that described under the Saltwater Alternative. Under both options, ground-disturbing activities would occur during dredging activities that would be limited to portions of the lagoon basins that are generally underlain by fill soils and alluvial deposits. Additionally, this alternative would include the option of creating an overdredge pit to accommodate dredged materials not suitable for beach or nearshore placement. Without an overdredge pit, dredging and excavation under the Hybrid Alternative (Options A and B) would occur to a maximum depth of approximately -8 feet NGVD for the creation of fishing areas in the northern portion of the Railroad Basin and the southwestern portion of the Coast Highway Basin, and dredging activities in the Weir Basin and the I-5 Basin would occur to a maximum depth of -2.5 feet NGVD and +1.6 feet NGVD, respectively. If an overdredge pit is created, dredging would occur to a maximum depth of approximately -32 feet NGVD in the Coast Highway Basin. Dredging to optimize the channels connecting the basins would occur to a maximum depth of -2.5 feet NGVD. As previously discussed, materials within the lagoon are

anticipated to consist of fill soils and alluvial deposits to a depth of at least -40 feet NGVD. As such, dredging within the basins under the Hybrid Alternative (Options A and B) is not anticipated to result in damage to paleontological resources.

Similar to the Saltwater Alternative, excavation activities to create the open inlet would occur to a depth of -2.5 feet NGVD within the inlet itself and then create a -0.5 foot NGVD "channel" from the opening of the mouth of the inlet to the ocean. Similar to the Saltwater Alternative, it is anticipated that most of the material dredged to create the open inlet under the Hybrid Alternative (Options A and B) would consist of alluvium. Furthermore, this area of the project site is has historically been subjected to natural erosion processes that repeatedly disturb the on-site geologic materials. Notwithstanding, **excavation activities within an area containing River and/or Marine Terrace Deposits under the Hybrid Alternative (Options A and B) could result in direct, potentially significant impacts to paleontological resources (Criterion A)**.

Indirect impacts associated with the Hybrid Alternative would be similar to those of the Saltwater Alternative. The lagoon channel cross sections under this alternative would be protected with erosion control products and vegetated material to stabilize soils. Thus, no substantial long-term erosion would result from the Hybrid Alternative. **Therefore, the Hybrid Alternative would not result in indirect impacts to paleontological resources (Criterion A).**

Removal of the weir and the opening of the inlet under either option of this alternative would require periodic excavation to maintain the open inlet. Similar to the Saltwater Alternative, this periodic maintenance would occur in an area known to contain geologic materials identified as having moderate to high paleontological resource sensitivity. However, this area of the project site has historically been subjected to natural erosion processes, and material removed during maintenance activities would be limited to littoral sand accumulating in the inlet area. **Therefore, it is unlikely that maintenance activities within this area would uncover previously undisturbed resources, and indirect impacts to paleontological resources would be less than significant under the Hybrid Alternative (Criterion A).**

No Project Alternative

No excavation or dredging would occur under the No Project Alternative; thus, the No Project Alternative would not have the potential to directly or indirectly disturb or destroy paleontological resources. No materials would be dredged or excavated that would need to be disposed of or used for littoral cell nourishment under the No Project Alternative. As a result**, there would be no impact to paleontological resources (Criterion A).**

3.8.4 MITIGATION MEASURES

Excavation activities associated with the widening of the inlet channel (e.g., during weir replacement or creation of an open tidal inlet) under all three build alternatives would occur in areas consisting of River and/or Marine Terrace Deposits, which are geologic materials identified as having a moderate to high paleontological resource sensitivity. The following mitigation measures are required to reduce the potentially significant direct impacts to paleontological resources under the Freshwater, Saltwater, and Hybrid Alternatives.

Paleo-1 If significant paleontological resources are encountered during excavation or other ground-disturbing activities within and south of the inlet containing River and/or Marine Terrace Deposits, work in the area of the discovery shall be temporarily halted and a qualified paleontologist shall be contracted to properly assess the resource(s), and develop and implement a paleontological resource monitoring and fossil recovery program. The monitoring and recovery program may include monitoring of future ground disturbance, worker training, resource assessment and recovery, proper documentation, curation, and/or other measures as deemed appropriate.

Paleo-2 A final Paleontological Resource Mitigation Report that documents the results, analysis, and conclusions of all phases of the Paleontological Monitoring Program shall be prepared, if excavation or other ground-disturbing activities into River and/or Marine Terrace Deposits occurs and monitoring is required.

Implementation of Mitigation Measures Paleo-1 and Paleo-2 would ensure that the important scientific information associated with discovered paleontological resources is appropriately documented and available for future use and study. By protecting and preserving the scientific value of the resources, the direct impacts to paleontological resources would be reduced to a less than significant level for the Freshwater, Saltwater, and Hybrid Alternatives.