Carmel River Floodplain Restoration and Environmental Enhancement Project

March 2019

Technical Studies that are Bound Separately

Volume III:
Paleontology Reports

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Prepared For:

United States Fish and Wildlife Service

Monterey County Resource Management Agency

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Initial Paleontology Memo

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August 4, 2015

Denise Duffy
Principal
Denise Duffy & Associates, Inc.
947 Cass St. Suite 5
Monterey, CA 93940

RE: Paleontological Memorandum Report, CRFREE Project, Monterey County, California

1.0 INTRODUCTION

This memorandum report presents the results of the paleontological study for the Carmel River Floodplain Restoration and Environmental Enhancement (CRFREE) Project (Project) conducted by Paleo Solutions, Inc. (Paleo Solutions) for Denise Duffy & Associates, Inc. (DD&A) in support of the Project's Initial Study/Mitigated Negative Declaration (IS/MND) and Environmental Assessment/Finding of No Significant Impact (EA/FONSI). The purpose of this study was to determine if paleontological resources are known or reasonably anticipated within the Project Study Area (PSA) and to assess the potential for the proposed CRFREE Project to result in significant impacts/effects on paleontological resources. This work was required by the Monterey County Resource Management Agency (RMA) and California Department of Transportation (Caltrans) in order to fulfill their responsibilities as the lead agencies under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), respectively. All work was conducted to in compliance with NEPA, CEQA, local regulations, and Caltrans guidelines and standards.

1.1 PROJECT DESCRIPTION AND LOCATION

The RMA is proposing flood control improvements and enhancements to the native habitat and hydrologic function in the lower Carmel River floodplain in unincorporated Monterey County, California (Figure 1). The Project is located approximately one mile from the Carmel River mouth and immediately east of State Route 1 (SR-1) on property owned by the Big Sur Land Trust, California State Parks, Monterey Peninsula Regional Park District, and Clint and Margaret Eastwood.

Project tasks would include the following:

- Grading the existing farmland to create an elevated agricultural preserve and floodplain restoration.
- Replacing a portion of SR-1.
- Removing sections of earthen levees on the south side of the Carmel River channel and grading a portion of the eastern boundary of the Project to encourage flood flows to enter into the south floodplain area.

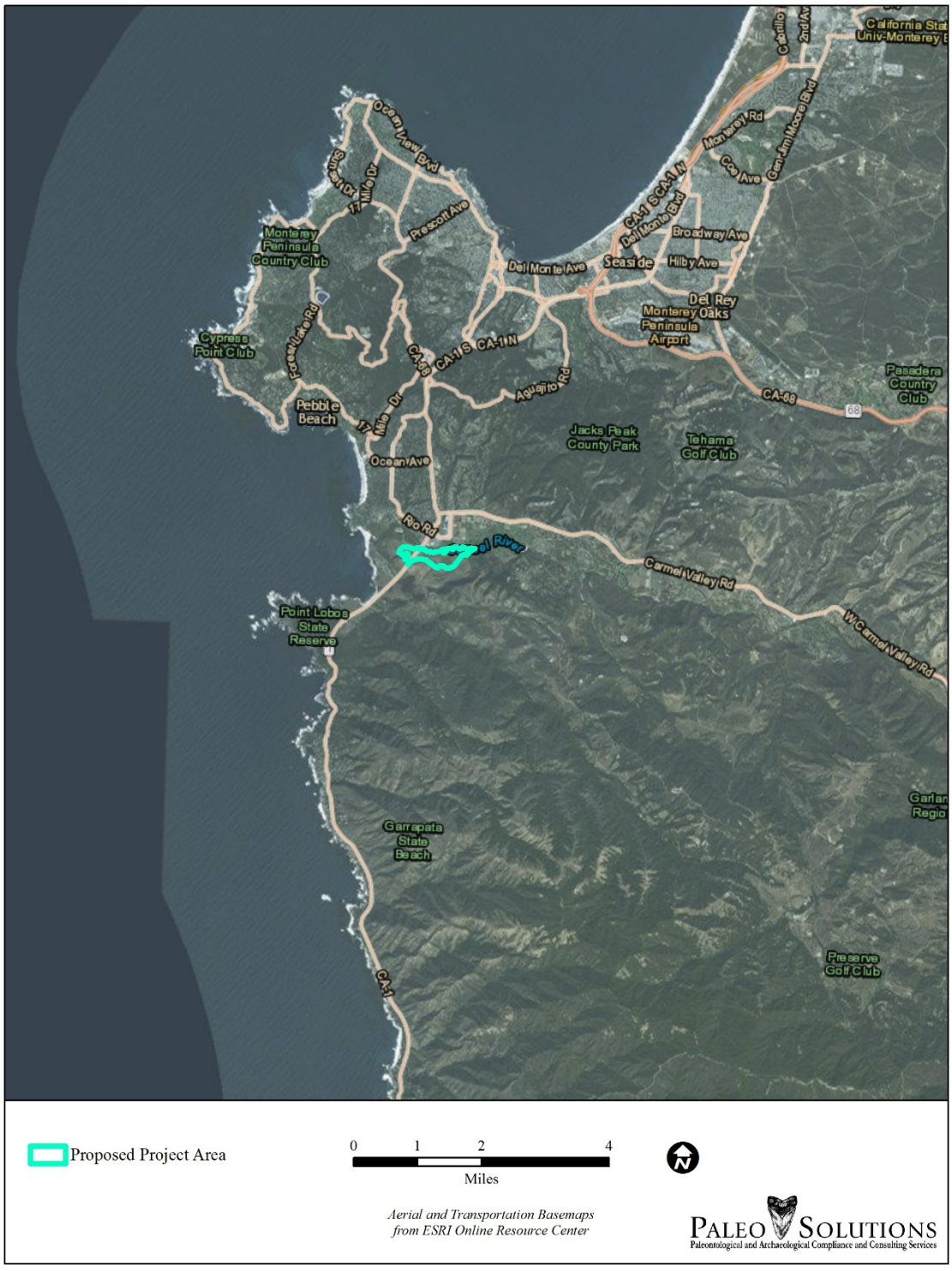

Figure 1. Project Location Map

1.2 METHODS

Paleontological research for the CRFREE Project included a geologic map review, literature search, and an institutional records search. The geology underlying the PSA was reviewed, as well as any geologic units occurring within a one-mile radius. The literature reviewed included published and unpublished scientific papers and available online databases. A paleontological records search of the PSA and a one-mile radius buffer was conducted by Dr. Ken Finger at the University of California Museum of California, Berkeley (UCMP). Courtney Richards, M.S. reviewed the geology and available literature and co-authored this report with Geraldine Aron, M.S. Paul Nesbit, M.S. prepared the GIS maps.

2.0 REGULATORY SETTING

This section of the report presents the federal, state, and local regulatory requirements pertaining to paleontological resources that will apply to this Project.

2.1 FEDERAL REGULATORY SETTING

If any federal funding is used to wholly or partially finance a project, occurs on federal lands, involves a federal permit, and/or includes a perceived federal impact, federal laws and standards apply, and an evaluation of potential impacts on paleontological resources may be required. The management and preservation of paleontological resources on public and federal lands are prescribed under various laws, regulations, and guidelines.

The National Environmental Policy Act of 1969 (NEPA)
The National Environmental Policy Act of 1969, [NEPA] as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258 § 4(b), Sept. 13, 1982) recognizes the continuing responsibility of the Federal Government to "preserve important historic, cultural, and natural aspects of our national heritage . . ." (Sec. 101 [42 USC § 4321]) (#382). With the passage of the Paleontological Resources Preservation Act (PRPA)(2009), paleontological resources are considered to be a significant resource and it is therefore now standard practice to include paleontological resources in NEPA studies in all instances where there is a possible impact.

Antiquities Act of 1906
The Antiquities Act of 1906 (16 United States Code [USC] 431-433) states, in part:

> That any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than ninety days, or shall suffer both fine and imprisonment, in the discretion of the court.

Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR 3]), the term "objects of antiquity" has been interpreted to include fossils by the National Park Service (NPS), the Bureau of Land Management (BLM), the Forest Service (FS), and other federal agencies. Permits to collect fossils on lands administered by federal agencies are authorized under this Act. However, due to the large gray areas left open to interpretation due to the imprecision of the wording, agencies are hesitant to interpret this act as governing paleontological resources.

2.2 STATE REGULATORY SETTING

California Environmental Quality Act (CEQA)
The procedures, types of activities, persons, and public agencies required to comply with the California Environmental Quality Act (CEQA) are defined in the Guidelines for Implementation of CEQA (State CEQA Guidelines), as amended on March 18, 2010 (Title 14, Section 15000 et seq. of the California Code of Regulations [i.e., 14 CCR Section 15000 et seq.) and further amended January 4th, 2013. One of the questions listed in the CEQA Environmental Checklist is: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" (State CEQA Guidelines Section 15064.5 and Appendix G, Section V, Part C).

State of California Public Resources Code
The State of California Public Resources Code (Chapter 1.7), Sections 5097.5 and 30244, includes additional state level requirements for the assessment and management of paleontological resources. These statutes require reasonable mitigation of adverse impacts to paleontological resources resulting from development on state lands, define the removal of paleontological "sites" or "features" from state lands as a misdemeanor, and prohibit the removal of any paleontological "site" or "feature" from State land without permission of the jurisdictional agency. These protections apply only to State of California land, and thus apply only to portions of the project, if any, which occur on State land.

2.3 LOCAL REGULATORY SETTING

Monterey County
The County of Monterey General Plan Conservation and Open Space Element (2007) contains goals and policies regarding paleontological resources. It establishes the goal of encouraging the conservation and identification of the County's Paleontological Resources. Policies OS-7.1 to OS-7.5 require the identification of important representative and unique paleontological sites through Phase 1 (reconnaissance level) paleontological review; compilation of the location and significance of the County's paleontological resources; and field inspection of areas determined to have high and moderate paleontological sensitivity. It also states that policies and procedures shall be established that encourage development to avoid impacts to sensitive paleontological sites.

3.0 BACKGROUND

3.1 GEOLOGIC CONTEXT

Geologic mapping by Dibblee and Minch (2007) indicates that the majority of the PSA is underlain by Quaternary alluvium (Qa). Minor amounts of Quaternary stream channel deposits (Qg), Quaternary landslide debris (Qls), and unnamed Miocene marine sandstone (Tus) are also mapped within the northern, southern, and eastern boundaries of the PSA, respectively. The distribution of the geologic units within the PSA is illustrated in Figure 2.

Quaternary Alluvium, Steam, and Landslide Deposits (Qa, Qg, Qls)
Quaternary alluvium (Qa) includes surficial deposits that are Holocene in age (11,000 years old or less) and may overlie older units (USGS, 2007). They occur as fan or fluvial deposits in all canyons and drainages as well in the lowest lying inland areas. Deposits are composed of poorly consolidated alluvial gravel, sand, silts and clay that comprise valleys and floodplains and may be of variable color, though they are often tan to brown (Jahns, 1954; Dibblee and Minch, 2007). Stream channel deposits (Qg) within the PSA are composed of gravels and sands laid down by the Carmel River, which flows along the northern boundary of the site (Dibblee and Minch, 2007). Quaternary landslide deposits (Qls) are late Pleistocene to Holocene (<126,000 years old) landslide deposits. Based on the geologic mapping (Dibble and Minch, 2007), these landslides appear to have originated primarily from outcrops of unnamed Miocene (23 to 5.3 million years old) marine sandstone and possibly, in part, from the Paleocene (66 to 56 million years old) Carmelo Formation.

Unnamed Miocene Marine Sandstone (Tus)
This unnamed unit (Tus) consists of Miocene (23 to 5.3 million years old), shallow marine sandstone that is yellowish in color. The sandstone has previously been attributed to the Los Laureles Sandstone, a member of the Monterey Formation (Bowen, 1965); the Temblor Formation (Trask, 1926); and the Vaqueros-Temblor Sandstone undifferentiated (Fiedler, 1944).

Carmelo Formation (Tc)
While not mapped at the surface of the PSA, the Carmelo Formation may be encountered at depth in the western portion of the site boundaries. This Paleocene (66 to 56 million years old) formation consists of a granitic conglomerate and yellow brown coarse grained sandstone that was deposited in a shallow marine environment (Dibblee and Minch, 2007).

3.2 PALEONTOLOGICAL RESOURCES

Paleo Solutions requested a paleontological search of records maintained by UCMP. UCMP responded on 29 July 2015 that they do not have any vertebrate fossil localities within or adjacent to the proposed site boundaries (Finger, 2015; Appendix A). Literature searches and online database reviews were also negative for fossils within the PSA (Jefferson, 1991; UCMP, 2015; PBDB, 2015). The closest locality (UCMP V5525) is approximately one mile east of the Project in the Miocene Monterey Formation (not mapped within the PSA), which yield a tooth identified as great white shark (*Carcharodon*). Based on the age of the formation, it is likely that it belongs to the large, extinct species of shark called megalodon (*Carcharodon* or *Carcharocles megalodon*) (Finger, 2015).

Geologic units listed as Miocene marine sandstone have produced specimens of marine fish such as *Oligodiodon vetus* (UCMP, 2015). Additionally, formations similar in age, lithology, and depositional environment, such as the Vaqueros Formation, have produced scientifically significant marine vertebrates and abundant invertebrates. Recovered vertebrate fossils include whales (Cetacea; *Cetotherium furlongi*) and the extinct, hippo-like mammal *Desmostylus* (UCMP, 2015; PBDB, 2015).

Fossils are generally unknown from the Quaternary alluvium and Quaternary stream deposits, due to their young age. However, these young deposits are often underlain by older, paleontologically sensitive sediments at depth. Pleistocene (2.6 million to 11.7 thousand years old) older alluvial deposits in Monterey County have produced vertebrate material, including horse (*Equus* sp.), bison (*Bison latifrons*), and camel (*Camelops* sp.; Camelidae), as well as a variety of invertebrate and plant taxa (Jefferson, 1991; UCMP, 2015). If bedrock belonging to the unnamed Miocene marine sandstone unit are encountered subsurface, Miocene taxa such as the ones mentioned in the paragraph above may be discovered. Fossils are rare in the Carmelo Formation and generally consist of trace fossils and scarce invertebrates found in fine grained sandstone and mudstone layers (Clifton, 2013). Therefore, if this unit is encountered subsurface, it is unlikely that scientifically significant fossils will be recovered due to the conglomeratic and coarse-grained nature of the Carmelo recorded by Dibble and Minch (2007) in the vicinity of the PSA.

4.0 SENSITIVITY AND IMPACT ANALYSIS

Based on the results of the geologic map review and literature and museum records searches for the Project, the paleontological sensitivity of the geologic units within the PSA were ranked using Caltrans' tripartite scale (Caltrans, 2015) and a preliminary impact analysis was performed using available Project plans.

4.1 CRITERIA

Caltrans' paleontological sensitivity scale comprises three rankings: High Potential, Low Potential, and No Potential. The criteria for each ranking, as stated in Caltrans SER Chapter 8 (Caltrans, 2015), are as follows:

High Potential

Rock units which, based on previous studies, contain or are likely to contain significant vertebrate, significant invertebrate, or significant plant fossils. These units include, but are not limited to, sedimentary formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. These units may also include some volcanic and low-grade metamorphic rock units. Fossiliferous deposits with very limited geographic extent or an uncommon origin (e.g., tar pits and caves) are given special consideration and ranked as highly sensitive. High sensitivity includes the potential for containing: 1) abundant vertebrate fossils; 2) a few significant fossils (large or small vertebrate, invertebrate, or plant fossils) that may provide new and significant taxonomic, phylogenetic, ecologic, and/or stratigraphic data; 3) areas that may contain datable organic remains older than Recent, including Neotoma (sp.) middens; or 4) areas that may contain unique new vertebrate deposits, traces, and/or trackways. Areas with a high potential for containing significant paleontological resources require monitoring and mitigation.

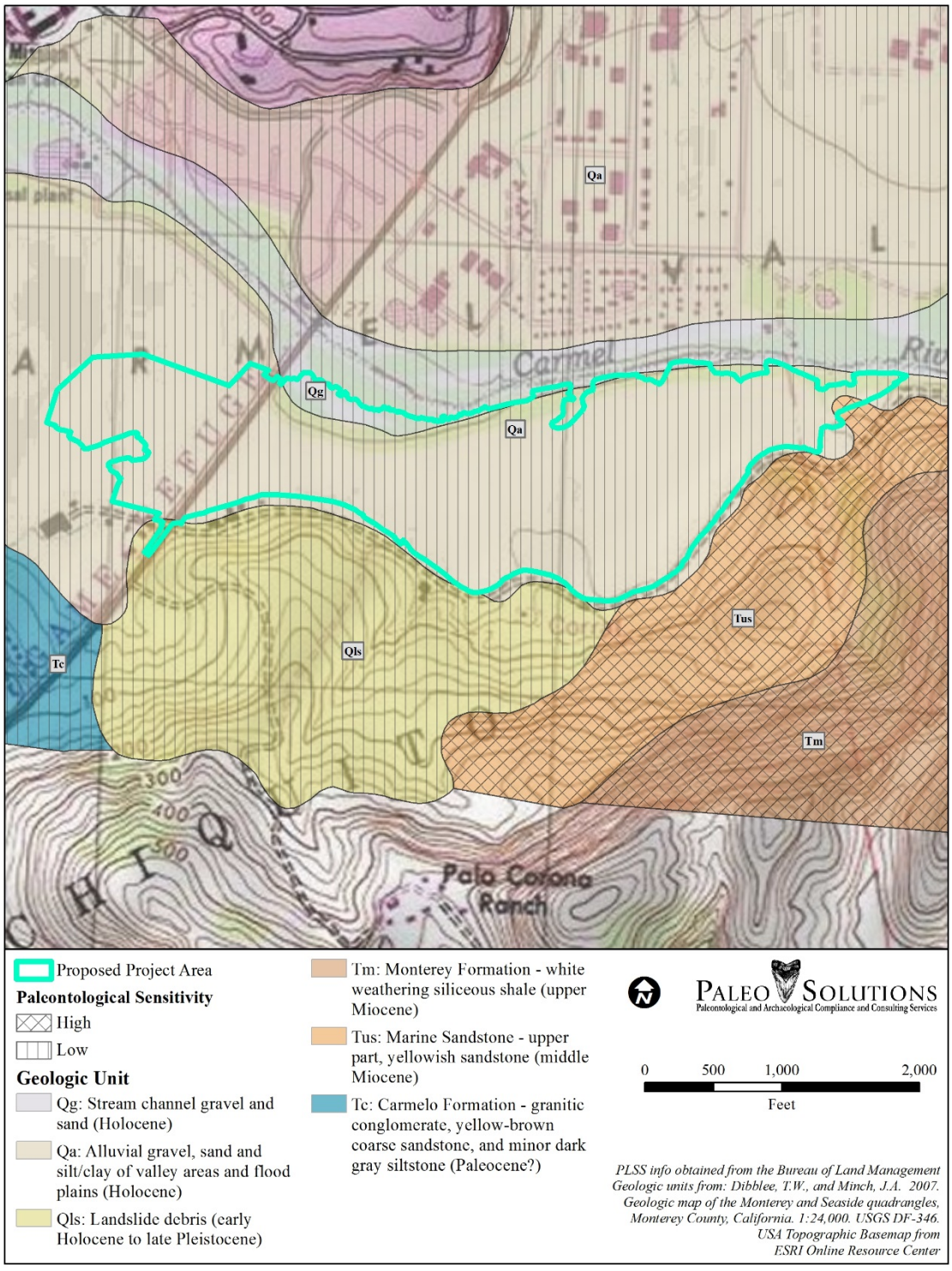

Figure 2. Project Geology Map

Low Potential
This category includes sedimentary rock units that: 1) are potentially fossiliferous, but have not yielded significant fossils in the past; 2) have not yet yielded fossils, but possess a potential for containing fossil remains; or 3) contain common and/or widespread invertebrate fossils if the taxonomy, phylogeny, and ecology of the species contained in the rock are well understood. Sedimentary rocks expected to contain vertebrate fossils are not placed in this category because vertebrates are generally rare and found in more localized stratum. Rock units designated as low potential generally do not require monitoring and mitigation. However, as excavation for construction gets underway it is possible that new and unanticipated paleontological resources might be encountered. If this occurs, a Construction Change Order (CCO) must be prepared in order to have a qualified Principal Paleontologist evaluate the resource. If the resource is determined to be significant, monitoring and mitigation is required.

No Potential
Rock units of intrusive igneous origin, most extrusive igneous rocks, and moderately to highly metamorphosed rocks are classified as having no potential for containing significant paleontological resources. For projects encountering only these types of rock units, paleontological resources can generally be eliminated as a concern when the [Preliminary Environmental Analysis Report] PEAR is prepared and no further action taken.

4.2 SENSITIVITY ANALYSIS

Fossils have been recorded from formations of similar age, lithology, and depositional environment as the unnamed Miocene marine sandstone (Tus) of Dibblee and Minch (2007). It is therefore assigned a high paleontological sensitivity.

Fossils are generally unknown from Quaternary alluvium and Quaternary stream channel deposits due to their young age. Reworked paleontological material from older deposits may be present, but would not meet significance criteria as the material would lack critical contextual information. Similarly, fossils from the Quaternary landslide deposits would also have been removed from their original location of deposition and would not be considered significant. Therefore, the Quaternary alluvium (Qa), Quaternary stream channel (Qg), and Quaternary landslide (Qls) deposits all have low paleontological potential at the surface. However, they may overlie older, high sensitivity deposits at depth, such as Pleistocene older alluvium and unnamed Miocene marine sandstone (Tus); both of which have produced scientifically significant vertebrate fossils in Monterey County. The Carmelo Formation, if encountered subsurface, has a low potential to produce significant fossils due to the lack of vertebrate fossils, rarity of invertebrate fossils and trace fossils, and anticipated conglomeratic and coarse grained lithology.

4.3 PRELIMINARY IMPACT ANALYSIS

Ground disturbance in geologic units and geographic areas known to contain scientifically significant fossils may produce adverse impacts to nonrenewable paleontological resources (State CEQA Guidelines, 14 CCR Sections 15064.5[3] and 15023; State CEQA Guidelines Appendix G, Section V, Part C).

Direct impacts to paleontological resources concern the physical destruction of fossils, usually by human-caused ground disturbance. Indirect impacts to paleontological resources typically concern the loss of resources to theft and vandalism resulting from increased public access to paleontologically sensitive areas. Cumulative impacts to paleontological resources concern the incremental loss of these nonrenewable resources to society as a whole.

There are no documented paleontological localities within the boundaries of, nor adjacent to the PSA. The Quaternary alluvium, stream channel, and landslide deposits mapped at the surface have low sensitivity for paleontological resource. However, these Quaternary sediments have unknown potential for producing significant paleontological resources at depths. The small area mapped as unnamed Miocene marine sandstone in the easternmost portion of the PSA has high potential for paleontological resources both at the surface and at depth. Therefore, Project activities within the PSA may potentially result in significant impacts to paleontological resources.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Due to the presence of highly sensitive Miocene marine sandstone within and immediately adjacent to the PSA at the surface, and the potential for paleontologically sensitive sediments at depth, it is recommended that a combined Paleontological Identification Report (PIR) and Paleontological Evaluation Report (PER) be prepared. The report should be prepared once construction plans, including depths and location of anticipated ground disturbing activities, have been completed in order to determine if paleontologically sensitive sediments will be impacted. If it is determined that construction activities may have an adverse impact/effect on paleontological resources, a Paleontological Mitigation Plan (PMP) should be prepared and implemented. Any earthmoving activities in the areas mapped as Miocene marine sandstone (Tus) should be monitored on a full time basis. Periodic paleontological spot checks should be conducted when excavation exceeds depths of five feet into the Quaternary alluvial (Qa, Qg) and landslide (Qls) deposits to determine if older, paleontologically sensitive sediments are present. If present, monitoring should be conducted during excavation into paleontologically sensitive sediments to reduce the impacts/effects to a less than significant level pursuant to CEQA and NEPA.

In the event that a qualified paleontologist determines that the sediments observed within the PSA are not conducive to fossil preservation, monitoring and spot checking activities should be reduced after consultation with RMA and Caltrans. If unanticipated paleontological discoveries are made when a qualified paleontologist is not onsite, work in the immediate vicinity (~20 feet) should be halted until the find can be evaluated by a qualified paleontologist.

If you have any questions concerning the results of this study, please contact Geraldine Aron at geraldine@paleosolutions.com.

Sincerely,

Courtney Richards, M.S.
Supervisor/Assistant Project Manager

Geraldine L. Aron, M.S.
Principal Investigator

6.0 REFERENCES

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2007 Divisions of geologic time—Major chronostratigraphic and geochronologic units: U.S. Geological Survey Fact Sheet 2007-3015, 2 p

APPENDIX A

UCMP Records Search Results

From: Ken Finger <kfinger@berkeley.edu>
Date: Wed, Jul 29, 2015 at 10:36 AM
Subject: Re: Record Search for Carmel River Floodplain Restoration (Paleo Solutions Inc)
To: Paul Nesbit <pnesbit@paleosolutions.com>

Hi Paul,

The UCMP database lists 394 fossil localities in the Monterey Quad, none of which are within or adjacent to the project site boundaries. The vast majority of the sites are represented by Recent invertebrates. Vertebrate fossils were recovered at 5 localities, the nearest to the project site is Carmel Quarry ((V5525) in the Miocene Monterey Formation about one mile to the east (in the adjacent Seaside Quad), and it yielded a tooth identified as Carcharodon (greate white shark), although the age suggests it is probably the much larger, non-ancestral, extinct species, Carcharocles megalodon.

Ken

On Jul 27, 2015, at 1:56 PM, Paul Nesbit <pnesbit@paleosolutions.com> wrote:

Dr. Finger,

My name is Paul Nesbit and I am a GIS specialist with Paleo Solutions Inc. I have been asked to send in a Record Search request for a new project: Carmel River Floodplain Restoration. This email provides the necessary billing information and the project information we have sent in map requests to other museums. If there is anything else you need please do not hesitate to ask and I will do provide whatever is necessary.

Attached is a ZIP file that contains a Microsoft Excel spreadsheet with the USGS 7.5' Quadrangle information (Monterey) for the project. This spreadsheet includes SiteID, USGS Quadrangle, Quadrangle ID, and Center Point Location in Degrees, Minutes, Seconds (DMS).

Also included in the ZIP folder is a PDF file of the project area plotted on a 1:24,000 topo basemap. This map also identifies the USGS 7.5' Quadrangle with a call-out in the map frame.

Billing Info:

Project Name: Denise Duffy & Associates, Inc. (DDA)-Carmel River Floodplain Restoration

Please let me know when we may expect results from this record search and feel free to contact me if you have any questions or concerns.

Cheers,

Paul Nesbit

GIS specialist
Paleo Solutions Inc.
pnesbit@paleosolutions.com

Paleontological Identification Report, Evaluation Report, and Paleontological Mitigation Plan

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PALEONTOLOGICAL IDENTIFICATION REPORT, EVALUATION REPORT, AND MITIGATION PLAN FOR THE CARMEL RIVER FLOODPLAIN RESTORATION AND ENVIRONMENTAL ENHANCEMENT PROJECT, MONTEREY COUNTY, CALIFORNIA

(05-Mon-1; PM 71.9/72.3; EA 1F650; PI 05 1400 0043)

Prepared for:

DENISE DUFFY & ASSOCIATES, INC.

Denise Duffy, Principal
947 Cass St. Suite 5
Monterey, CA 93940

CC:

CALIFORNIA DEPARTMENT OF TRANSPORTATION, DISTRICT 5

UNITED STATES FISH AND WILDLIFE SERVICE

BIG SUR LAND TRUST

&

MONTEREY COUNTY RESOURCE MANAGEMENT AGENCY

Prepared by:

Courtney Richards, M.S. – Principal Paleontologist

1/13/2016

Date

PALEO SOLUTIONS, INC.

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PSI Report Number: CA15MontereyDDA02R

JANUARY 13, 2016

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FIGURES

EXECUTIVE SUMMARY

This combined Paleontological Identification, Evaluation Report, and Paleontological Mitigation Plan (PIR/PER/PMP) presents the results of the paleontological study for the Carmel River Floodplain Restoration and Environmental Enhancement (CRFREE) Project (Project) conducted by Paleo Solutions, Inc. (Paleo Solutions) for Denise Duffy & Associates, Inc. (DD&A). The purpose of this study was to determine if paleontological resources are known or reasonably anticipated within the Project Study Area (PSA) and to assess the potential for the proposed CRFREE Project to result in significant impacts/effects on paleontological resources. The PMP was designed to reduce Project impacts/effects on paleontological resources to below the level of significance pursuant to the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).

The Monterey County Resource Management Agency (RMA or County) and Big Sur Land Trust (BSLT) are proposing flood control improvements and enhancements to the native habitat and hydrologic function in the lower Carmel River floodplain on 129 acres in unincorporated Monterey County, California. The Project is made up two components: 1) the Floodplain Restoration Component, which will consist of clearing, grading, excavation, and planting of native vegetation within the historic floodplain; and 2) the Causeway Component, which will replace a portion of the State Route 1 (SR-1) roadway embankment with a 360-foot long causeway section.

Paleontological research for the CRFREE Project included a geologic map review, literature search, institutional records search, and review of project construction plans and geotechnical reports. The results of the study were used to complete paleontological sensitivity and impact analyses and to develop a paleontological mitigation plan.

There are no documented paleontological localities within the boundaries of, nor adjacent to the PSA. The Quaternary alluvium, stream channel, and landslide deposits (Qa, Qg, Qls) mapped at the surface have low sensitivity for paleontological resource. However, these Quaternary sediments have unknown potential for producing significant paleontological resources at depths. The unnamed Miocene marine sandstone (Tus) mapped in the southeastern portion of the PSA has high potential for paleontological resources both at the surface and at depth. Therefore, Project activities within the PSA may potentially result in significant impacts to paleontological resources if these sensitive sediments are encountered during excavation.

Any earthmoving activities in the areas mapped as Miocene marine sandstone (Tus) should be monitored on a full time basis. Due to the potential for Miocene marine sandstone to shallowly underlie the Quaternary alluvium and landslide deposits at the base of the hills, excavations near the southern boundary of the Project site that are greater than five feet in depth should be periodically spot checked. In the remainder of the PSA, excavations exceeding a 10 foot depth should be spot checked to see if underlying paleontologically sensitive Pleistocene alluvium or bedrock is being impacted with the exception of pile driving and removal of existing utilities. In the event of unanticipated paleontological resource discoveries during Project related activities, work must be halted within 20 feet of the discovery until it can be evaluated by a qualified paleontologist.

1.0 INTRODUCTION

This combined PIR/PER/PMP presents the results of the paleontological study for the CRFREE Project conducted by Paleo Solutions for DD&A in support of the Project's Initial Study/Mitigated Negative Declaration (IS/MND) and Environmental Assessment/Finding of No Significant Impact (EA/FONSI). The purpose of this study was to determine if paleontological resources are known or reasonably anticipated within the PSA and to assess the potential for the proposed CRFREE Project to result in significant impacts/effects on paleontological resources. The PMP was designed to reduce Project impacts on paleontological resources to below the level of significance pursuant to CEQA and NEPA. This work was required by the RMA in order to fulfill their responsibilities as the lead agency under CEQA, United States Fish and Wildlife Service (USFWS or Service) as the lead agency under NEPA, and California Department of Transportation (Caltrans) as a federal cooperating agency. All work was conducted to in compliance with NEPA, CEQA, local regulations, and Caltrans guidelines and standards.

1.1 PROJECT DESCRIPTION AND LOCATION

The RMA is proposing flood control improvements and enhancements to the native habitat and hydrologic function in the lower Carmel River floodplain in unincorporated Monterey County, California (Figure 1). The Project is located approximately one mile from the Carmel River mouth and immediately east of SR-1 on property owned by the BSLT, California State Parks, Monterey Peninsula Regional Park District, and Clint and Margaret Eastwood. The CRFREE Project proposes to restore the hydrologic and ecological function and connectivity of the Odello East property with the southern floodplain and Carmel Lagoon.

The Proposed Project would improve hydrologic connectivity between the Proposed Project site and the Carmel River Lagoon Enhancement Project by allowing flood flows to pass under SR-1 from the east side of the floodplain to the west side of the floodplain. In addition, the Proposed Project would also reduce potential flooding hazards to SR-1 and developed north overbank areas by accommodating the lateral dispersal of floodwaters onto the south overbank area during storm events. The Proposed Project would restore native riparian habitats on a portion of the Odello East and State Parks property and preserve the site's agricultural heritage with an approximately 23 acre agricultural preserve, raised out of the Federal Emergency Management Agency (FEMA) 100-year floodplain.

The Proposed Project would address the long standing problems of floodplain constriction and flood management while preserving the site's agricultural heritage and improving wildlife habitat. The Project would: 1) remove approximately 1,470 feet of the south bank levee to allow the lateral dispersal of floodwater onto the south overbank area and Project site; 2) restore approximately 100 acres of historic native coastal floodplain habitat on existing agricultural land

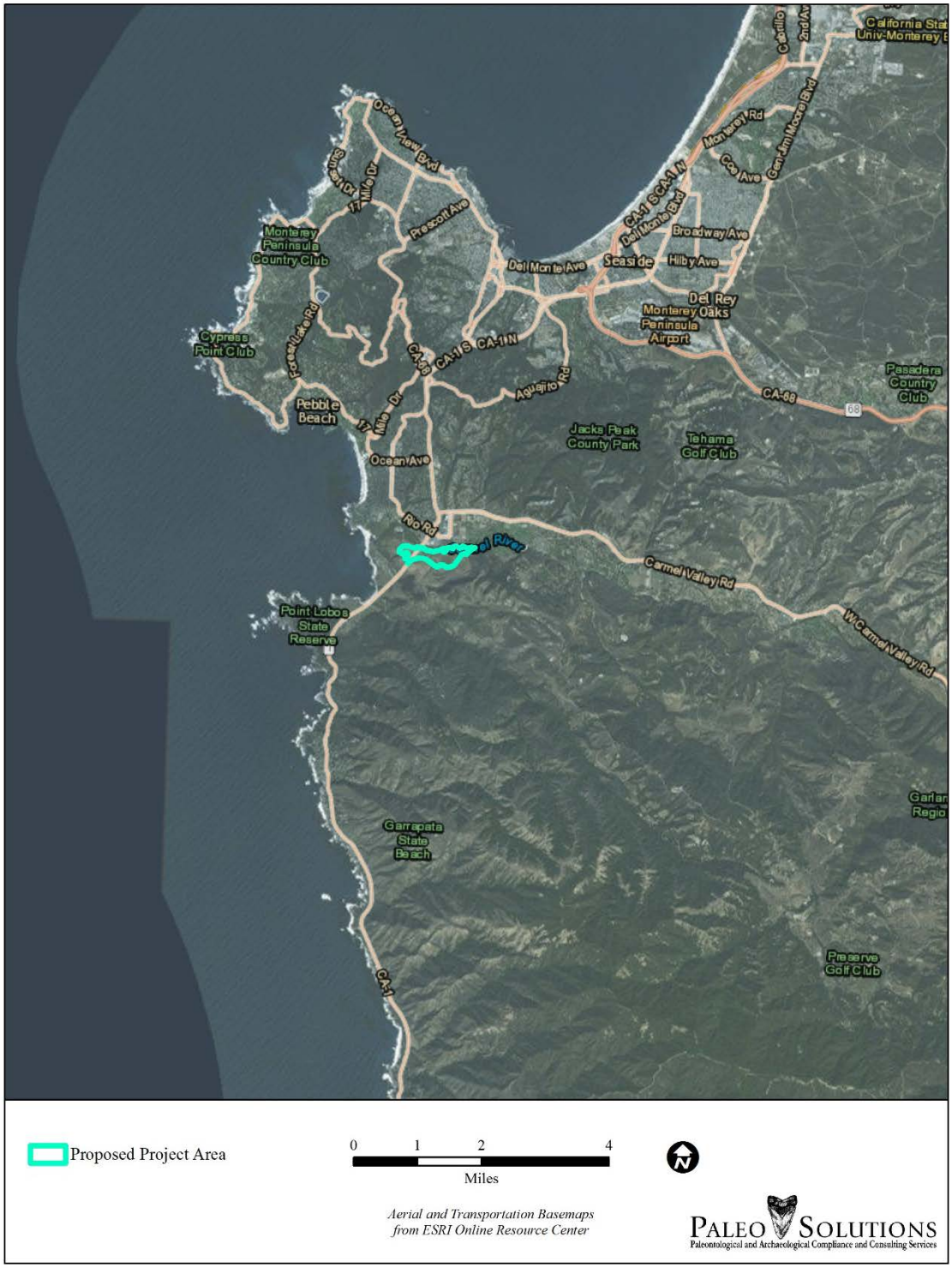

Figure 1. Project Location Map

to allow the site to function as part of the historical Carmel River floodplain and to provide additional habitat to the lower Carmel River ecosystem; 3) create an approximately 23 acre agricultural preserve to achieve the goal of preserving the agricultural heritage of the Project area in a manner that is compatible with adjacent habitat; and 4) replace a segment of SR-1 with a 360-foot causeway to provide floodwater conveyance under the highway and connectivity with the Carmel Lagoon, and reduce flood hazards to SR-1. Grading would be completed within the reconnected floodplain to establish the topographic diversity that characterizes floodplain environments in similar settings. The Proposed Project entails two interdependent Project components, as described in detail below.

Floodplain Restoration

The Floodplain Restoration Component would occur on 123 acres within the 129-acre PSA. This component of the Proposed Project would: 1) remove approximately 1,470 feet of the south bank levee in order to improve floodplain hydrology, 2) restore floodplain topography to approximately 100 acres of existing farmland to support native habitat restoration, and 3) preserve the agricultural heritage of the site by creating an approximately 23-acre agricultural preserve raised outside of the FEMA 100-year flood boundary using fill material from the other Project components.

Construction activities would include clearing, grading, excavation, and planting of native vegetation within the historic floodplain. Approximately 100 acres of existing farmland would be graded to create the topographic characteristics necessary to support the restoration of native floodplain habitats. Grading activities within the floodplain would entail approximately 440,000 cubic yards of cut and 22,000 cubic yards of fill. The excess fill will be utilized to elevate the approximately 23-acre agricultural preserve. The following is a more detailed discussion of each of the key elements associated with this component of the Proposed Project.

Levee Removal

Approximately 1,470 feet of the south bank levee would be removed in order to improve floodplain hydrology. Currently, the system of south bank non-engineered levees serves to contain existing river flows and floodwaters in the main river channel. The Proposed Project would reduce the height of portions of the existing levees in order to allow flows to spread into the south overbank area, which is part of the historical floodplain. Several portions of the existing levee, approximately 3,180 feet in length, would remain to preserve important areas of existing vegetation that would support colonization and expansion of riparian plant communities to the floodplain. No work is proposed to occur below ordinary high water (OHW) in the main channel. This element is an integral part of the Project's flood control and restoration objectives, as removal of portions of the existing south bank levees would enhance the hydrologic connectivity of the main Carmel River channel and the south overbank of the lower Carmel River to the Carmel Lagoon. Levee removal would also improve the overall ecological function of the Odello East property as a floodplain by providing the hydrologic conditions to support the restoration of native vegetation communities within the floodplain.

Floodplain Grading

The floodplain would be graded to create the topographic characteristics necessary to support floodwater conveyance under SR-1 and restore the site's longitudinal connectivity with the

Carmel Lagoon. Floodplain improvements would include topographic modifications consistent with riparian habitat conditions, channelization to resemble flow paths in older floodplains, and channel segments supporting designed to support native upland habitat.

Agricultural Preserve

An approximately 23-acre agricultural preserve would be constructed on the southern portion of the site, where organic agricultural uses would be consolidated in order to maintain the agricultural heritage of the area. Construction of the agricultural preserve would entail creating an elevated terrace and farm access road above the existing floodplain to avoid inundation from floods as large as a 100-year flood event. The elevated agricultural preserve would be created using excess fill material from the levee removal, floodplain grading, and construction of the Causeway Component.

Maintenance/Access Roads and Trails

A network of access roads is included as part of the design. The access road begins at SR-1, south of the causeway, and follows the south boundary of the land owned by the BSLT. One branch of the access road continues onto the southern boundary of the agricultural field and rejoins the floodplain at the eastern end of field, near the existing River Pond. A second access road branches off west of the proposed agricultural water quality pond, traverses the floodplain in the north-south direction over one of the topographic diversity islands, and provides maintenance access to the north portions of the restored floodplain, the removed levee sections, and the existing well on the north side of the property.

A clearance of a minimum of 10 feet has been provided underneath the causeway, near the north abutment, for a future trail connection between the east and west portions of the floodplain. Additionally, the maintenance access roads have the ability to function as dirt trails, if desired.

Restoration Management Plan

The Project site will be actively revegetated following grading according to the Restoration Management Plan (RMP) prepared for the Project to accelerate native vegetation establishment (HTH, 2015). Revegetation implementation will establish a mosaic of habitats across the site, including willow and cottonwood riparian forest, mixed riparian forest, coastal scrub, and grassland that will feature various canopy heights and structures. This mosaic will provide a diverse array of foraging, breeding, and nesting habitats for birds and other wildlife. Willow and cottonwood riparian forest will be planted in dense stands, primarily in the downstream half of the Project site, including an area adjacent to willows at the south arm of the Carmel Lagoon, the lower elevation floodplain locations west and east of the SR-1 road alignment, an area along the intermittent creek, and an area downslope of the remnant stock pond. Mixed riparian forest will be planted on the outboard slopes of the existing levee, in the higher elevation portions of the floodplain between distributary channels, and in locations where the floodplain transitions to the uplands associated with Palo Corona Regional Park. Distributary channels and maintained flow conveyance areas (MFCAs) will be seeded with native grass and forb species to provide grassland habitat in linear strips that will bisect the Project site and further enhance the diversity of site habitats.

Restoration areas will be restored with a phased planting approach. This approach is necessary given the large size of the Project site and because a phased planting approach provides the opportunity to gather information on what planting techniques is successful in early phases and to apply them to future phases (adaptive management). The RMP provides a detailed restoration design for Phase I of the restoration and guidance for future phases, which are referred to as Phase II but which may actually entail multiple phases. All compensatory mitigation will be installed during Phase I, and the following phase(s) will target restoration of all remaining areas on the Project site.

The RMP also includes maintenance and monitoring of the revegetation areas. The revegetation areas will be maintained during the first three years following Phase I installation to aid in plant establishment and increase the likelihood that the plants will become self-sustainable. Maintenance will involve replacing dead plants, irrigating, and controlling weeds. The plant establishment period and associated site maintenance will be extended beyond three years if significant plant replacement is required because of low plant survivorship. It is expected that similar maintenance will occur during the plant establishment period for Phase II installation. Monitoring data collected by a qualified restoration ecologist will be used to evaluate the success of Phase I revegetation and the compensatory mitigation. Information obtained through this monitoring program will be used to guide maintenance throughout Phase I and help ensure that the revegetation areas achieve the success criteria outlined in the RMP. Maintenance activities may also be adjusted as part of adaptive management during Phase II. The maintenance, interim, and final success criteria described in the RMP apply only to the required acreage of compensatory mitigation. Additional restoration areas will not be held to these criteria.

The revegetation areas will be monitored over a 10-year period following installation, during Years 1–5, 7, and 10. All monitoring will be conducted by a qualified restoration ecologist. Maintenance, interim, and final success criteria will be based on tree and shrub percent survival, canopy percent cover, and a riparian habitat functional assessment. Hydrologic, geomorphic, and flood conveyance monitoring will be conducted to track the functioning of the site's hydrology. By Year 10, the revegetation areas will be sufficiently established to determine whether they will eventually reach the long-term goals with little chance of failure. If the final success criteria have not been met by Year 10, monitoring will continue until they have been met.

Causeway

The Causeway Component consists of replacing of a portion of the SR-1 roadway embankment (Route 1, Post Mile 72.0 to 72.3) with a 360-foot long causeway section. The northern end of the proposed causeway would be located approximately 1,150 feet southwest of the Oliver Road and SR-1 intersection, near the City of Carmel in Monterey County. The southern end of the causeway would be located approximately 2,000 feet northeast of the Ribera Road and SR-1 intersection. Construction-related activities would temporarily disturb approximately six acres in connection with the removal of a portion of the existing SR-1 embankment and Project grading.

The purpose of the proposed causeway is to accommodate flows that come into the south overbank area and to increase hydrologic connectivity between the Carmel Lagoon and the Proposed Project site. The causeway would allow floodwaters to pass from the Odello East

property under SR-1 to the floodplain and south arm of the Carmel Lagoon to the west without causing flooding at SR-1. The causeway would address existing deficiencies associated with this segment of SR-1, as described in the Project Study Report (PSR). The causeway would reduce flooding hazards to SR-1 under existing conditions and would provide shoulder widths consistent with Caltrans design requirements. The proposed causeway would increase flood conveyance for all floods, including a 100-year flood.

Construction of the proposed Causeway Component would include temporary traffic bypass sections, demolition of existing culverts and paving, two phases of utility relocation, ground improvement, pile driving, concrete placement, paving, and the eventual removal of traffic bypass sections. Grading activities would entail approximately 20,000 cubic yards of cut and 10,000 cubic yards of fill. Excess soil from the Causeway Component will be used to elevate the agricultural preserve.

Cut/Fill

Grading activities associated with the construction of the Proposed Project, including all Project components, would potentially disturb a maximum of approximately 129 acres; the Proposed Project would result in approximately 460,000 cubic yards of cut and 376,400 cubic yards of fill. All grading activities would balance on-site and no material would need to be imported or exported from the Project site.

Schedule

Construction of the Proposed Project is anticipated to occur over an approximately 12 to 18 month period beginning in late 2017. The Causeway Component would begin with construction of a temporary bypass road, and would end with removal of said bypass road and of the embankment below the newly constructed causeway. The Floodplain Restoration Component grading work east of the highway would occur concurrently with the highway work, and would entail mass grading; limited utility work; fine grading; and levee removal. The Floodplain Restoration Component grading work west of the highway would begin after removal of the highway bypass road, as construction vehicles and equipment would then be able to safely cross under the highway.

Implementation of the RMP will be broken into two phases: Phase 1 will be begin immediately after completion of site grading, and will include irrigation and planting over the western half of the Project to address the required mitigation areas. At that time the eastern half of the Project (the Phase 2 area) would be seeded, but not planted or irrigated. Subsequent planting and irrigation of the Phase 2 area will be accomplished over several years.

Funding

Project funding has been obtained from several Federal and State Agency grant programs, including the U.S. Environmental Protection Agency (EPA), Service, California Coastal Conservancy (CCC), California Wildlife Conservation Board, and California Department of Water Resources. Local funding match is being provided, in part, by the value of the Eastwood's land donation of a portion of the Project area. As of January 2015, approximately $12.5 million has been secured for construction of all Project components. Although there is currently a

funding gap, it is anticipated that additional grant funds will be secured by early 2017 to cover all Project components and costs, prior to the anticipated start of construction that year.

1.2 METHODS

Paleontological research for the CRFREE Project included a geologic map review, literature search, institutional records search, and review of project construction plans and geotechnical reports. The geology underlying the PSA was reviewed, as well as any geologic units occurring within a one-mile radius. The literature reviewed included published and unpublished scientific papers and available online databases. A paleontological records search of the PSA and a one-mile radius buffer was conducted by Dr. Ken Finger at the University of California Museum of California, Berkeley (UCMP) (see Appendix A). The results of the geologic map review, literature and museum records searches were used to complete a paleontological sensitivity analysis using Caltrans' sensitivity criteria; impact analysis; and to develop a paleontological mitigation plan.

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Courtney Richards, M.S. reviewed the geology and available literature and co-authored this report with Geraldine Aron, M.S. Paul Nesbit, M.S. prepared the GIS maps (see Appendix B for qualifications). Copies of this report were submitted to Denise Duffy & Associates, Caltrans, USFWS, BSLT, and RMA. Paleo Solutions retained an archival copy of all Project information.

2.0 REGULATORY SETTING

This section of the report presents the federal, state, and local regulatory requirements pertaining to paleontological resources that will apply to this Project.

2.1 FEDERAL REGULATORY SETTING

If any federal funding is used to wholly or partially finance a project, occurs on federal lands, involves a federal permit, and/or includes a perceived federal impact, federal laws and standards apply, and an evaluation of potential impacts on paleontological resources may be required. The management and preservation of paleontological resources on public and federal lands are prescribed under various laws, regulations, and guidelines.

The National Environmental Policy Act of 1969 (NEPA)

The National Environmental Policy Act of 1969, [NEPA] as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258 § 4(b), Sept. 13, 1982) recognizes the continuing responsibility of the Federal Government to "preserve important historic, cultural, and natural aspects of our national heritage . . ." (Sec. 101 [42 USC § 4321]) (#382). With the passage of the Paleontological Resources Preservation Act (PRPA)(2009), paleontological resources are considered to be a significant resource and it is therefore now standard practice to include paleontological resources in NEPA studies in all instances where there is a possible impact.

Antiquities Act of 1906

The Antiquities Act of 1906 (16 United States Code [USC] 431-433) states, in part:

> That any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than ninety days, or shall suffer both fine and imprisonment, in the discretion of the court.

Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR 3]), the term "objects of antiquity" has been interpreted to include fossils by the National Park Service (NPS), the Bureau of Land Management (BLM), the Forest Service (FS), and other federal agencies. Permits to collect fossils on lands administered by federal agencies are authorized under this Act. However, due to the large gray areas left open to interpretation due to the imprecision of the wording, agencies are hesitant to interpret this act as governing paleontological resources. The Antiquities Act of 1906 does not apply to the CRFREE Project as it does not include any federal lands.

Paleontological Resources Preservation Act (PRPA)

The Paleontological Resources Preservation, Omnibus Public Lands Act, Public Law 111-011, Title VI, Subtitle D (PRPA, 2009) directs the Secretaries (Interior and Agriculture) to manage and protect paleontological resources on federal land using “scientific principles and expertise.” PRPA incorporates most of the recommendations of the report of the Secretary of the Interior entitled Assessment of Fossil Management on Federal and Indian Lands (2000) in order to formulate a consistent paleontological resources management framework. In passing the PRPA, Congress officially recognized the scientific importance of paleontological resources on some federal lands by declaring that fossils from these lands are federal property that must be preserved and protected. The PRPA codifies existing policies of the BLM, National Park Service, U.S. Forest Service, Bureau of Reclamation, and U.S. Fish and Wildlife Service, and provides the following:

- Uniform criminal and civil penalties for illegal sale and transport, and theft and vandalism of fossils from federal lands
- Uniform minimum requirements for paleontological resource-use permit issuance (terms, conditions, and qualifications of applicants)
- Uniform definitions for “paleontological resources” and “casual collecting”
- Uniform requirements for curation of federal fossils in approved repositories

Federal legislative protections for scientifically significant fossils applies to projects that take place on federal lands (with certain exceptions such as Department of Defense). This document does not specifically trigger any paleontological requirements, other than those under NEPA for project impact evaluations if there is a federal nexus. PRPA does not apply to the CRFREE Project as it does not include any federal lands.

2.2 STATE REGULATORY SETTING

California Environmental Quality Act (CEQA)

The procedures, types of activities, persons, and public agencies required to comply with the California Environmental Quality Act (CEQA) are defined in the Guidelines for Implementation of CEQA (State CEQA Guidelines), as amended on March 18, 2010 (Title 14, Section 15000 et seq. of the California Code of Regulations [i.e., 14 CCR Section 15000 et seq.) and further amended January 4th, 2013. One of the questions listed in the CEQA Environmental Checklist is: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" (State CEQA Guidelines Section 15064.5 and Appendix G, Section V, Part C).

State of California Public Resources Code

The State of California Public Resources Code (Chapter 1.7), Sections 5097 and 30244, includes additional state level requirements for the assessment and management of paleontological resources. These statutes require reasonable mitigation of adverse impacts to paleontological resources resulting from development on state lands, and define the excavation, destruction, or removal of paleontological "sites" or "features" from public lands without the express permission of the jurisdictional agency as a misdemeanor. As used in Section 5097, "state lands" refers to lands owned by, or under the jurisdiction of, the state or any state agency. "Public lands" is defined as lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

2.3 LOCAL REGULATORY SETTING

Monterey County

The County of Monterey General Plan Conservation and Open Space Element (2007) contains goals and policies regarding paleontological resources. It establishes the goal of encouraging the conservation and identification of the County's Paleontological Resources. Policies OS-7.1 to OS-7.5 require the identification of important representative and unique paleontological sites through Phase 1 (reconnaissance level) paleontological review; compilation of the location and significance of the County's paleontological resources; and field inspection of areas determined to have high and moderate paleontological sensitivity. It also states that policies and procedures shall be established that encourage development to avoid impacts to sensitive paleontological sites.

3.0 DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES

As defined by Murphey and Daitch (2007): "Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. Paleontological resources include not only fossils

themselves, but also the associated rocks or organic matter and the physical characteristics of the fossils' associated sedimentary matrix.

The fossil record is the only evidence that life on earth has existed for more than 4.6 billion years. Fossils are considered non-renewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced. Fossils are important scientific and educational resources because they are used to:

- Study the phylogenetic relationships amongst extinct organisms, as well as their relationships to modern groups;
- Elucidate the taphonomic, behavioral, temporal, and diagenetic pathways responsible for fossil preservation, including the biases inherent in the fossil record;
- Reconstruct ancient environments, climate change, and paleoecological relationships;
- Provide a measure of relative geologic dating that forms the basis for biochronology and biostratigraphy, and which is an independent and corroborating line of evidence for isotopic dating;
- Study the geographic distribution of organisms and tectonic movements of land masses and ocean basins through time;
- Study patterns and processes of evolution, extinction, and speciation;
- Identify past and potential future human-caused effects to global environments and climates."

Fossil resources vary widely in their relative abundance and distribution and not all are generally regarded as significant. Vertebrate fossils, whether preserved remains or track ways, are classed as significant by most federal agencies and professional groups. In some cases, fossils of plants or invertebrate animals, "noteworthy occurrences of invertebrate or plant fossils" (BLM, 1998) are also considered significant and can provide important information about ancient local environments. According to the BLM (2007), a significant paleontological resource is generally considered to be of scientific interest if it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has an identified educational or recreational value. Paleontological resources that may not be considered to have scientific significance include those that lack provenience or context, lack physical integrity due to decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Paleontological resources are significant if they are scientifically judged to provide important data concerning key research interests in the study of taxonomy, evolution, biostratigraphy, paleoecology, or taphonomy.

The full scientific significance of individual fossil specimens or fossil assemblages often cannot be accurately predicted before they are collected, and in many cases, before they are prepared in the laboratory and compared with previously collected material. Pre-construction assessment of significance associated with an area or formation must be made based on previous finds, characteristics of the sediments, and other methods that can be used to determine paleoenvironmental conditions.

A separate issue is the potential of a given geographic area or geologic unit to preserve fossils. Information that can contribute to assessment of this potential includes:

- The existence of known fossil localities or documented absence of fossils nearby and in the same geologic unit (e.g. "Formation" or one of its subunits);
- Observation of fossils within the project vicinity;
- The nature of sedimentary deposits in the area of interest, compared with those of similar deposits known elsewhere (size of particles, clasts and sedimentary structures conducive or non-conducive to fossil inclusion) that may favor or disfavor inclusion of fossils; and
- Sedimentological details, and known geologic history, of the sedimentary unit of interest in terms of the environments in which the sediments were deposited, and assessment of the favorability of those environments for the probable preservation of fossils.

4.0 BACKGROUND

4.1 GEOLOGIC CONTEXT

Geologic mapping by Dibblee and Minch (2007) indicates that the majority of the PSA is underlain by Quaternary alluvium (Qa). Minor amounts of Quaternary stream channel deposits (Qg), Quaternary landslide debris (Qls), and unnamed Miocene marine sandstone (Tus) are also mapped within the northern, southern, and eastern boundaries of the PSA, respectively. The distribution of the geologic units within the PSA is illustrated in Figure 2.

Quaternary Alluvium, Stream, and Landslide Deposits (Qa, Qg, Qls)

Quaternary alluvium (Qa) includes surficial deposits that are Holocene in age (11,000 years old or less) and may overlie older units (USGS, 2007). They occur as fan or fluvial deposits in all canyons and drainages as well in the lowest lying inland areas. Deposits are composed of poorly consolidated alluvial gravel, sand, silts and clay that comprise valleys and floodplains and may be of variable color, though they are often tan to brown (Jahns, 1954; Dibblee and Minch, 2007).

Stream channel deposits (Qg) within the PSA are composed of gravels and sands laid down by the Carmel River, which flows along the northern boundary of the site (Dibblee and Minch, 2007). Quaternary landslide deposits (Qls) are late Pleistocene to Holocene (<126,000 years old) landslide deposits. Based on the geologic mapping (Dibble and Minch, 2007), these landslides appear to have originated primarily from outcrops of unnamed Miocene (23 to 5.3 million years old) marine sandstone and possibly, in part, from the Paleocene (66 to 56 million years old) Carmelo Formation.

Unnamed Miocene Marine Sandstone (Tus)

This unnamed unit (Tus) consists of Miocene (23 to 5.3 million years old), shallow marine sandstone that is yellowish in color. The sandstone has previously been attributed to the Monterey Formation (Clark et al., 1997); Los Laureles Sandstone, a member of the Monterey Formation (Bowen, 1965); the Temblor Formation (Trask, 1926); and the Vaqueros-Temblor Sandstone undifferentiated (Fiedler, 1944).

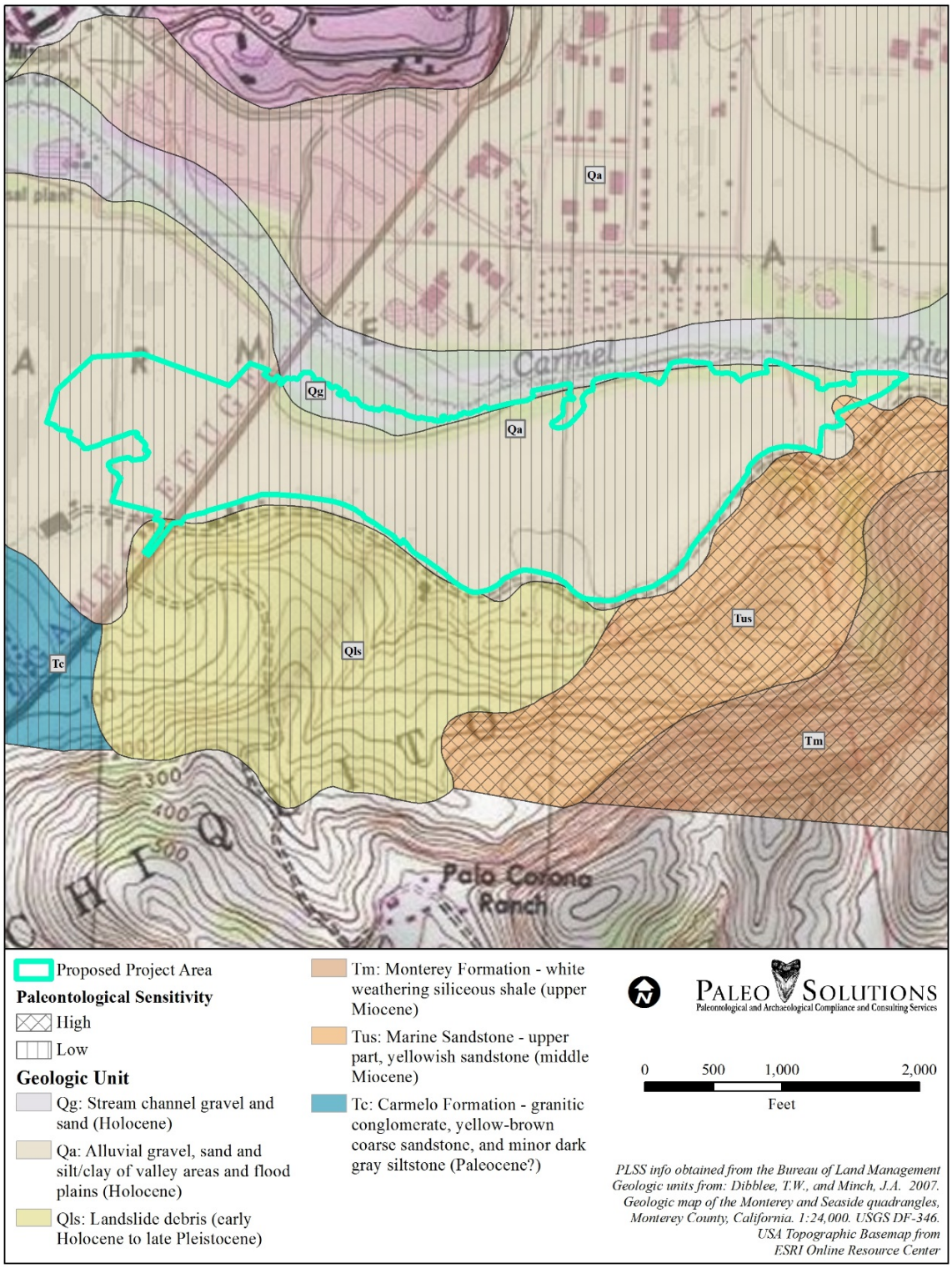

Figure 2. Project Geology Map

Carmelo Formation (Tc)

While not mapped at the surface of the PSA, the Carmelo Formation may be encountered at depth in the western portion of the site boundaries. This Paleocene (66 to 56 million years old) formation consists of a granitic conglomerate and yellow brown coarse grained sandstone that was deposited in a shallow marine environment (Dibblee and Minch, 2007).

4.2 PALEONTOLOGICAL RESOURCES

Paleo Solutions requested a paleontological search of records maintained by UCMP. UCMP responded on 29 July 2015 that they do not have any vertebrate fossil localities within or adjacent to the proposed site boundaries (Finger, 2015; Appendix A). Literature searches and online database reviews were also negative for fossils within the PSA (Jefferson, 1991; UCMP, 2015; PBDB, 2015). The closest locality (UCMP V5525) is approximately one mile east of the Project in the Miocene Monterey Formation (not mapped within the PSA), which yield a tooth identified as great white shark (*Carcharodon*). Based on the age of the formation, it is likely that it belongs to the large, extinct species of shark called megalodon (*Carcharodon* or *Carcharocles megalodon*) (Finger, 2015).

Geologic units listed as Miocene marine sandstone have produced specimens of marine fish such as *Oligodiodon vetus* (UCMP, 2015). Additionally, formations similar in age, lithology, and depositional environment, such as the Vaqueros Formation, have produced scientifically significant marine vertebrates and abundant invertebrates. Recovered vertebrate fossils include whales (Cetacea; *Cetotherium furlongi*) and the extinct, hippo-like mammal *Desmostylus* (UCMP, 2015; PBDB, 2015).

Fossils are generally unknown from the Quaternary alluvium and Quaternary stream deposits, due to their young age. However, these young deposits are often underlain by older, paleontologically sensitive sediments at depth. Pleistocene (2.6 million to 11.7 thousand years old) older alluvial deposits in Monterey County have produced vertebrate material, including horse (*Equus* sp.), bison (*Bison latifrons*), and camel (*Camelops* sp.; Camelidae), as well as a variety of invertebrate and plant taxa (Jefferson, 1991; UCMP, 2015). If bedrock belonging to the unnamed Miocene marine sandstone unit are encountered subsurface, Miocene taxa such as the ones mentioned in the paragraph above may be discovered. Fossils are rare in the Carmelo Formation and generally consist of trace fossils and scarce invertebrates found in fine grained sandstone and mudstone layers (Clifton, 2013). Therefore, if this unit is encountered subsurface, it is unlikely that scientifically significant fossils will be recovered due to the conglomeratic and coarse-grained nature of the Carmelo recorded by Dibble and Minch (2007) in the vicinity of the PSA.

5.0 SENSITIVITY AND IMPACT ANALYSIS

Based on the results of the geologic map review and literature and museum records searches for the Project, the paleontological sensitivity of the geologic units within the PSA were ranked using Caltrans' tripartite scale (Caltrans, 2015) and an impact analysis was performed using available Project design plans (40% Caltrans plans and 35% County plans) and geotechnical studies (Kleinfelder, 2008).

5.1 SENSITIVITY CRITERIA

Caltrans' paleontological sensitivity scale comprises three rankings: High Potential, Low Potential, and No Potential. The criteria for each ranking, as stated in Caltrans SER Chapter 8 (Caltrans, 2015), are as follows:

High Potential

Rock units which, based on previous studies, contain or are likely to contain significant vertebrate, significant invertebrate, or significant plant fossils. These units include, but are not limited to, sedimentary formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. These units may also include some volcanic and low-grade metamorphic rock units. Fossiliferous deposits with very limited geographic extent or an uncommon origin (e.g., tar pits and caves) are given special consideration and ranked as highly sensitive. High sensitivity includes the potential for containing: 1) abundant vertebrate fossils; 2) a few significant fossils (large or small vertebrate, invertebrate, or plant fossils) that may provide new and significant taxonomic, phylogenetic, ecologic, and/or stratigraphic data; 3) areas that may contain datable organic remains older than Recent, including *Neotoma* (sp.) middens; or 4) areas that may contain unique new vertebrate deposits, traces, and/or trackways. Areas with a high potential for containing significant paleontological resources require monitoring and mitigation.

Low Potential

This category includes sedimentary rock units that: 1) are potentially fossiliferous, but have not yielded significant fossils in the past; 2) have not yet yielded fossils, but possess a potential for containing fossil remains; or 3) contain common and/or widespread invertebrate fossils if the taxonomy, phylogeny, and ecology of the species contained in the rock are well understood. Sedimentary rocks expected to contain vertebrate fossils are not placed in this category because vertebrates are generally rare and found in more localized stratum. Rock units designated as low potential generally do not require monitoring and mitigation. However, as excavation for construction gets underway it is possible that new and unanticipated paleontological resources might be encountered. If this occurs, a Construction Change Order (CCO) must be prepared in order to have a qualified Principal Paleontologist evaluate the resource. If the resource is determined to be significant, monitoring and mitigation is required.

No Potential

Rock units of intrusive igneous origin, most extrusive igneous rocks, and moderately to highly metamorphosed rocks are classified as having no potential for containing significant paleontological resources. For projects encountering only these types of rock units, paleontological resources can generally be eliminated as a concern when the [Preliminary Environmental Analysis Report] PEAR is prepared and no further action taken.

5.2 SENSITIVITY ANALYSIS

Fossils have been recorded from formations of similar age, lithology, and depositional environment as the unnamed Miocene marine sandstone (Tus) of Dibblee and Minch (2007). It is therefore assigned a high paleontological sensitivity.

Fossils are generally unknown from Quaternary alluvium and Quaternary stream channel deposits due to their young age. Reworked paleontological material from older deposits may be present, but would not meet significance criteria as the material would lack critical contextual information. Similarly, fossils from the Quaternary landslide deposits would also have been removed from their original location of deposition and would not be considered significant. Therefore, the Quaternary alluvium (Qa), Quaternary stream channel (Qg), and Quaternary landslide (Qls) deposits all have low paleontological potential at the surface. However, they may overlie older, high sensitivity deposits at depth, such as Pleistocene older alluvium and unnamed Miocene marine sandstone (Tus); both of which have produced scientifically significant vertebrate fossils in Monterey County. The Carmelo Formation, if encountered subsurface, has a low potential to produce significant fossils due to the lack of vertebrate fossils, rarity of invertebrate fossils and trace fossils, and anticipated conglomeratic and coarse grained lithology.

5.3 IMPACT ANALYSIS

Ground disturbance in geologic units and geographic areas known to contain scientifically significant fossils may produce adverse impacts to nonrenewable paleontological resources (State CEQA Guidelines, 14 CCR Sections 15064.5[3] and 15023; State CEQA Guidelines Appendix G, Section V, Part C).

Direct impacts to paleontological resources concern the physical destruction of fossils, usually by human-caused ground disturbance. Indirect impacts to paleontological resources typically concern the loss of resources to theft and vandalism resulting from increased public access to paleontologically sensitive areas. Cumulative impacts to paleontological resources concern the incremental loss of these nonrenewable resources to society as a whole.

There are no documented paleontological localities within the boundaries of, nor adjacent to the PSA. The Quaternary alluvium, stream channel, and landslide deposits mapped at the surface have low sensitivity for paleontological resource. However, these Quaternary sediments have unknown potential for producing significant paleontological resources at depths. The small area mapped as unnamed Miocene marine sandstone (Tus) in the southeastern portion of the PSA has high potential for paleontological resources both at the surface and at depth. Therefore, Project activities within the PSA may potentially result in significant impacts to paleontological resources if these paleontologically sensitive sediments are encountered during excavation.

The anticipated impacts and required level of monitoring are described by Project component below. Full time monitoring should be implemented during excavations in to native Pleistocene sediments and Miocene marine sandstone if encountered. The listed depths and locations at which spot checking and monitoring should be triggered are based on the geologic mapping and subsurface information available in the geotechnical report and will initially be implemented, but will be modified as needed by the qualified paleontologists, in consultation with the County,

Service, and Caltrans, based on the sediments types, depths, and distributions observed during monitoring during the life of the Project.

Excavations into areas called out for periodic spot checks should be checked on a daily basis for at least the first three days to allow for the paleontological monitor to fully assess the onsite conditions and impacted sediments. If it is determined that Pleistocene alluvium and Miocene marine sandstone are not being impacted, this can be reduced to weekly checks.

Floodplain Restoration Component

The surface of the Floodplain Restoration Component is mapped almost entirely as non-sensitive Quaternary (Holocene-aged) alluvium and stream channel deposits (Qa, Qg). However, the hills that boarder the PSA to the south and southeast are comprised of paleontologically sensitive Miocene marine sandstone (Tus), with a small area of Tus mapped within the PSA. Due to the proximity of the hills to the Project site, the Miocene sandstone unit may shallowly underlie the Quaternary alluvium (Qa) and landslide deposits (Qls) mapped along the southern boundary of the Project site.

Any earthmoving activities in the areas mapped as Miocene marine sandstone (Tus) should be monitored on a full time basis. Due to the potential for Miocene marine sandstone to shallowly underlie the Quaternary alluvium and landslide deposits at the base of the hills, excavations near the southern boundary of the Project site that are greater than five feet in depth should be periodically spot checked (see Sheet G-2, G-4, G-5, and G-6 of the Monterey County Grading Permit Plan Set Draft 35% Plans [dated 5/1/2015]). In the remainder of the Project site, excavations exceeding a 10 foot depth should be spot checked to see if underlying paleontologically sensitive Pleistocene alluvium or bedrock is being impacted.

Causeway Component

Geologic mapping indicates that the surface of the Causeway Component is entirely covered by non-sensitive Quaternary (Holocene-aged) alluvium (Qa). The geotechnical report for the Causeway (Kleinfelder, 2008) does not distinguish between older and younger alluvium; however, boring logs indicate that there is a change in lithology at a depth of approximately five to ten feet below the existing ground surface. A review of the Caltrans 40% design indicates that excavation related to the Causeway Component of the Project will primarily be shallow (less than five feet below the existing ground surface) and is therefore anticipated to impact disturbed and/or Holocene-aged sediments. However, deeper excavations, such as the bridge abutments, may impact underlying paleontologically sensitive Pleistocene alluvial sediments. Therefore, spot checking should be implemented during excavations greater than 10 feet. If Pleistocene sediments conducive to fossil preservation are observed, spot checking should be increased to full time monitoring.

Pile driving related to the Causeway foundation will also likely impact paleontologically sensitive sediments due to the depth of disturbance. However, pile driving is not conducive to paleontological monitoring and any fossils would be destroyed by the construction process. Activities related to the relocation of utilities are not expected to impact paleontologically sensitive sediments since excavations are anticipated to be within disturbed sediments and the utilities are being relocated to utility casings within the bridge deck. Therefore, paleontological

monitoring is not recommended during pile driving or utility relocation activities regardless of the depth of disturbance.

6.0 PALEONTOLOGICAL MITIGATION PLAN

6.1 PROPOSED RESEARCH

Pleistocene-aged alluvial deposits, if encountered at depth, and Miocene marine sandstone in the Project area have the potential to contain scientifically important fossil remains that could be unearthed during construction in areas where native sediments are disturbed. The fossils found in California provide critically important paleoecological and paleoenvironmental data. They provide direct evidence of the composition and phylogenetic diversity of the paleobiota, paleobiologic features of individual taxa, and evolutionary relationships of the fauna and flora through time. In combination, the fossil assemblages at individual localities, together with the sediments in which they are preserved, also provide indirect evidence of the nature of paleo climates and environments, and importantly, the geographic distributions of different paleoenvironment types such as the fluctuating ocean shorelines, locations of inland lakes and swamps, upland habitats, and lowland habitats such as basin floors. It is important to bear in mind that the type and scope of research that can be accomplished for a paleontological construction mitigation project is entirely dependent upon the types and numbers of fossils that are discovered and their sediment logical context. If no fossils are discovered, then no paleontological research will be possible.

Despite the relatively rich Pleistocene fossil record of California, the timing of the transition from the Irvingtonian to the Rancholabrean North American Land Mammal Age (NALMA) is poorly documented and hence not well understood. For example, the first appearance (stratigraphically lowest) of the bison marks the beginning of the Rancholabrean NALMA, but there are few identifiable and stratigraphically well documented specimens of bison known from California, and those that do exist are not associated with reliable age dates. Thus, the timing of the beginning of the Rancholabrean is in question, and may be older or younger than the estimate of 300,000 years BP (before present) that has traditionally been accepted by paleontologists. In addition to the timing of the Irvingtonian-Rancholabrean transition, the composition of the faunal assemblages that comprise these biochronologic intervals and the finer details of faunal composition and change within them is also not well understood and remains problematic. Traditionally, larger mammals have been designated as index fossils and have been the focus of biostratigraphic efforts since the provincial NALMA system was codified by the Wood Committee in 1941. However, more recent work, especially on the Eocene biostratigraphy and biochronology of San Diego and Ventura counties (e.g. Walsh, 1996; Whistler and Lander, 2003), has demonstrated the value of utilizing small mammals because of their phylogenetic diversity and the potential to obtain statistically larger samples of specimens via screenwashing of bulk matrix samples.

Fossil recoveries in the marine sandstone would increase our understanding of the diversity of taxa in the eastern Pacific Ocean during the late Miocene. Additionally, any recovered fossils could help to assign the unnamed unit to one of the named formations in the area. This would

give us a better understanding of the geology of the Carmel region and the Miocene paleo depositional environment.

The recovery of fossils from Project excavations as the result of implementation of the mitigation measures outlined below, would add to existing paleontological data and help better document the prehistory of California. The recovered fossils will provide information that may be useful in more accurately and precisely determining the ages of the sedimentary units in which they were preserved depending upon the biostratigraphic utility of the fossil specimens and potential for radiometric dating. Depending upon the types of fossils that are recovered from Project excavations and the quality of their preservation, the existing fossil record of California will be enhanced by the addition of new specimens of known taxa, the discovery of taxa that have not been previously reported from the general area, and possibly the discovery of previously unknown taxa. In combination, the fossil assemblage from the Project site would have the potential to add new paleoecologic and paleoenvironmental information to our existing knowledge of the Pleistocene and Miocene of California.

6.2 SCOPE OF WORK

The mitigation and fossil recovery plan is designed to reduce Project impacts/effects on paleontological resources to below the level of significance pursuant to CEQA and NEPA. The proposed mitigation plan consists of the following five components that will be more fully described below:

1) Construction Monitoring
2) Fossil Salvage
3) Screenwashing of Bulk Matrix Sampling
4) Laboratory Preparation, Analysis, and Museum Curation
5) Reporting

Construction Monitoring

Paleo Solutions will provide spot checking and monitoring as outlined in Section 5.3. If Pleistocene sediments or Miocene marine sandstone are observed during spot checking, full time monitoring shall be implemented. The spot checks should occur on a daily basis for at least the first three days to allow for the paleontological monitor to fully assess the onsite conditions and impacted sediments. If it is determined that paleontologically sensitive sediments are not being impacted, this can be reduced to weekly checks. Monitoring and spot checking are not recommended for pile driving regardless of depth since any recovered fossil resources would likely be heavily damaged due to the excavation methods. Additionally, monitoring and spot checking efforts may be reduced, at the discretion of the qualified paleontologist in consultation with the County, Service, and Caltrans, if it is determined that only previously disturbed and Holocene-aged alluvial sediments are being impacted, or if sediments are deemed to be non-conducive to fossil preservation.

Paleontological resource monitoring of construction excavations involves field inspections of cut slopes, trenches, spoils piles, and all graded surfaces in accordance with Project safety requirements for occurrences of freshly exposed fossil remains. The primary responsibility of

paleontological monitors should always be to adhere to all Project safety requirements, and to only inspect and evaluate fossil discoveries when conditions are safe to do so. If a fossil is discovered by a monitor in a construction excavation, the monitor must immediately notify the equipment operator and/or site project manager to stop work, and then mark the area surrounding the site with flagging until the discovery can be fully explored and evaluated. The paleontological monitor shall immediately notify the Principal Paleontologist, site project manager, and Resident Engineer (RE). Construction activities in the immediate vicinity of the site shall stop until authorization for work to continue is provided by the qualified paleontologist. If a concentration of fossils are found, the area will be flagged and the site project manager, RE and Principal Paleontologist, Ms. Aron, will be notified to determine necessary action. Any action will be communicated to the contractor and responsible agencies.

Construction activities can continue outside of an appropriate buffer to the discovery site based on the size of the fossil and in consultation with the site project manager and/or RE. All scientifically important fossils should be salvaged and fully documented within a detailed stratigraphic framework as construction conditions and safety considerations permit. Significance criteria and salvage procedures are discussed below.

Paleontological monitors should always wear hard hats and orange safety vests, and attend any required safety meetings. Monitors should be equipped with flagging, survey stakes, and tools for fossil exploration and salvage including x-acto knives, awls, brushes, picks, chisels and shovels. Other essential tools for monitors include chemical preservatives such as vinac or butvar, cyanoacrylate glue, specimen containers such as vials and plastic bags, a GPS receiver, a field notebook, data recording forms, a digital camera, and a plaster kit. All paleontological monitors will have sufficient paleontological training and field experience to demonstrate acceptable knowledge of fossil identification, collection methods, paleontological techniques, and stratigraphy.

Unanticipated Discoveries

Prior to earthmoving activities, a qualified paleontologist shall provide a worker training program to inform construction personnel of the possibility for fossil discoveries, and will instruct personnel to immediately inform their supervisor if any bones or other potential fossils are unearthed at the Project site and a paleontological monitor is not present. In such a case, workers should immediately cease all activity within a 20 foot radius of the discovery site until a qualified professional paleontologist can be mobilized to the Project site to examine and evaluate the find. If necessary, appropriate salvage measures will be developed in consultation with the responsible agencies and in conformance with Caltrans guidelines and best practices in mitigation paleontology. Work may not resume in the discovery area until it has been authorized by a qualified paleontologist.

Fossil Salvage

When scientifically significant fossil discoveries are made by construction monitors, they will be quickly and professionally be explored and evaluated in order to minimize construction delays. Additional paleontologists should be brought to assist with the salvage as needed. Salvages may consist of the relatively rapid removal of small isolated fossils from an active cut, to hand-quarrying of larger fossils over several hours, to excavations of large fossils or large numbers of

smaller fossils from a bone bed over several days. The duration of each excavation is determined by the size, preservation, and number of fossils at each locality, and all excavations must be carried out in consultation with the site project manager.

At each paleontological locality, data recorded will minimally include the field number, date of discovery and date of collection, geographic coordinates, elevation, formation, stratigraphic provenance, lithologic description of sediment that produced the fossil(s), type(s) of fossils and type(s) of element(s), taphonomic and paleoenvironmental interpretations, associations with other fossils, photograph(s), and collector(s). All fossils must be properly labeled prior to removal from the locality where they were discovered.

Screenwashing of Bulk Matrix Samples

Scientifically significant fossils of microscopic size consisting of vertebrates, invertebrates, plants, or trace fossils, may be identified during monitoring. The locations of these discoveries should be sampled and later screenwashed and picked in the paleontological laboratory in order to fully document the microfaunal or microfloral diversity. For a project of this size, it is recommended that a 200 to 1,000 pound matrix sample be quickly collected from the locality and removed from the site in order to avoid impeding construction. The size of the sample should be based on the extent of the fossil-bearing horizon or deposit. Construction equipment can often expedite this process by assisting with the removal of matrix from the excavation and establishment of a stockpile in an area removed from construction equipment in order to permit the paleontological monitor to transfer the matrix from the stockpile to buckets and remove them from the site.

Laboratory Preparation, Analysis, and Museum Curation

All fossils and bulk matrix samples collected at the Project site will be removed to a secure paleontological laboratory for preparation to the point of identification and curation. Fossil preparation involves the removal of any sedimentary rock matrix or sediment from the fossil remains, treatment with archival chemical stabilizers, gluing of broken fragments, and construction of a supporting storage cradle as appropriate (mostly for large specimens). Preparation of small fossils may require the use of a binocular microscope. Fossil-rich concentrate from bulk matrix samples may require heavy liquid separation prior to picking under a microscope.

Following preparation, all fossils should be inventoried and identified to taxon and element by a technical specialist, as necessary. Identification should be to the lowest taxonomic level possible. All fossils should be labeled with field locality number, collector, date of collection, taxon, and element description at a minimum. The properly inventoried fossil collection should then be analyzed taxonomically, taphonomically, biostratigraphically, and as appropriate depending upon the nature of the fossil collection in order to accomplish the goals of the research design. All data, including the results of the analysis and research on the fossil collection, should be compiled along with the fossil specimen inventory and detailed paleontological locality forms, maps and photos for inclusion in a paleontological mitigation report.

Report

A paleontological mitigation report will be delivered to RMA, USFWS, Caltrans, DD&A, BSLT, and the University of California Museum of Paleontology at Berkeley (or other appropriate fossil repository) within 30 days of the completion of field work, or as negotiated on consultation. The report shall include dates of field work, results of monitoring, fossil analyses, significance evaluation, conclusions, locality forms, and an itemized list of specimens.

6.3 DECISION THRESHOLDS

Paleontological spot checking and monitoring should cease when the potential for construction disturbance of undisturbed native Pleistocene sediments and unnamed Miocene sandstone concludes. Paleontological monitoring is not recommended in artificial fill (non-native sediments), previously disturbed sediments (including the surface of agricultural fields), or Holocene-aged sediments; however, spot-checking of excavations into these sediments will be conducted in order to check for the presence of underlying paleontologically sensitive deposits.

For the purpose of this Project, scientifically significant fossils are generally defined as those that are identifiable to taxon and/or element, and thus are potentially useful for scientific research purposes. However, unidentifiable fossils may also be collected if they are potentially useful to the overall analysis (see Section 3). For example, an unidentifiable bone fragment may be suitable for radiocarbon dating depending upon the preservation state of the bone. Rock or sediment samples may also be collected if they provide information necessary for depositional and paleoenvironmental interpretations.

Paleontological monitors should always use caution when making decisions about significance in the field, and collect fossils if they are unsure of their significance. For example, when monitoring construction sites it is often difficult to see the full extent of a fossil being salvaged because it is collected partially encased in sedimentary matrix and as a result it may not be possible to determine the significance of a fossil specimen until it has been partially prepared. Generally, bone fragments with no articular surfaces that are not associated with other fragments to which they might be re-assembled in the laboratory should not be collected, or should be discarded if they are found to be non-significant once they have been partially prepared in the laboratory.

6.4 SCHEDULE

A detailed construction schedule has not been determined at this time, however it is anticipated that the Project will take approximately 12 to 18 months to complete. The construction manager will notify Paleo Solutions at least 24 hours in advance, and up to 48 hours in advance when possible, when a monitor is needed on the construction site. It is not possible to predict the number and type(s) of fossils that might be discovered and salvaged during construction.

All paleontological work will be conducted under the direction of Qualified Paleontologist Geraldine Aron, M.S. in collaboration with Paleo Solutions' Paleontological Principal Investigator, Courtney Richards, M.S.

6.5 JUSTIFICATION OF COST ESTIMATE

Since an excavation schedule is not available at this time, monitoring full-day and half-day rates are provided in the preliminary cost estimate (see Section 6.6 below). These rates include all project management, supervision, quality control, paleontological monitoring, and other direct costs. The costs estimate also assumes attendance at one pre-construction meeting; recovery, identification, preparation, and analysis of up to ten small fossils as necessary to meet the research goals of the monitoring and make significance determinations; and final reporting.

Curation is necessary to provide research access to any significant fossils recovered. We will help make arrangements for fossil curation, if needed. These storage fees are to be negotiated by the client and are not paid by Paleo Solutions, nor included in the cost estimate.

6.6 COST ESTIMATE

Task	Cost
Pre-Construction Meeting and Coordination	$2,762
Paleontological Monitoring	Full Day Rate- $949 (4-8 hours) Half Day Rate- $667 (less than 4 hours)
Laboratory Work	$2,330
Final Report	$3,200

6.7 CURATION

If paleontological resources are recovered, they will be curated at the University of California Museum of Paleontology at Berkeley or other appropriate repository. Paleo Solutions will help make arrangements for fossil curation if needed. Storage fees will be negotiated and paid for by the Project owner.

6.8 PERMITS

No paleontological permits are required for this Project.

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APPENDIX A

RECORDS SEARCH RESULTS

From: Ken Finger <kfinger@berkeley.edu>
Date: Wed, Jul 29, 2015 at 10:36 AM
Subject: Re: Record Search for Carmel River Floodplain Restoration (Paleo Solutions Inc)
To: Paul Nesbit <pnesbit@paleosolutions.com>

Hi Paul,

The UCMP database lists 394 fossil localities in the Monterey Quad, none of which are within or adjacent to the project site boundaries. The vast majority of the sites are represented by Recent invertebrates. Vertebrate fossils were recovered at 5 localities, the nearest to the project site is Carmel Quarry ((V5525) in the Miocene Monterey Formation about one mile to the east (in the adjacent Seaside Quad), and it yielded a tooth identified as Carcharodon (greate white shark), although the age suggests it is probably the much larger, non-ancestral, extinct species, Carcharocles megalodon.

Ken

On Jul 27, 2015, at 1:56 PM, Paul Nesbit <pnesbit@paleosolutions.com> wrote:

Dr. Finger,

My name is Paul Nesbit and I am a GIS specialist with Paleo Solutions Inc. I have been asked to send in a Record Search request for a new project: Carmel River Floodplain Restoration. This email provides the necessary billing information and the project information we have sent in map requests to other museums. If there is anything else you need please do not hesitate to ask and I will do provide whatever is necessary.

Attached is a ZIP file that contains a Microsoft Excel spreadsheet with the USGS 7.5' Quadrangle information (Monterey) for the project. This spreadsheet includes SiteID, USGS Quadrangle, Quadrangle ID, and Center Point Location in Degrees, Minutes, Seconds (DMS).

Also included in the ZIP folder is a PDF file of the project area plotted on a 1:24,000 topo basemap. This map also identifies the USGS 7.5' Quadrangle with a call-out in the map frame.

Billing Info:

Project Name: Denise Duffy & Associates, Inc. (DDA)-Carmel River Floodplain Restoration

Please let me know when we may expect results from this record search and feel free to contact me if you have any questions or concerns.

Cheers,

Paul Nesbit

GIS specialist
Paleo Solutions Inc.
pnesbit@paleosolutions.com

APPENDIX B

QUALIFICATIONS

RESUME

Courtney Richards, MS
Principal Investigator - Paleontology

SUMMARY

YEARS OF EXPERIENCE
12 Years

EDUCATION
MS Biological Sciences
Marshall University, 2011

BS Earth and Space Science
University of Washington, 2006

CERTIFICATIONS

MINE SAFETY & HEALTH ADMIN
24-hr New/Inexperienced Metal/Non-Metal Surface Miners Certification

FIRST AID/CPR CERTIFIED

AFFILIATIONS

Society of Vertebrate Paleontology

PROFILE

Ms. Richards is a qualified paleontologist with extensive research, field and laboratory experience. She supervises field crews, performs paleontological surveys, mapping, monitoring; conducts sensitivity training and sample processing in accordance with project-related paleontological mitigation plans. Ms. Richards has conducted fieldwork for transportation, water, energy, and development projects throughout California. She has prepared sections of Paleontological Mitigation Plans and compliance reports to Caltrans, FHWA, and FTA requirements. Ms. Richards has personal expertise in fossil salvage, stratigraphy, fossil preparation, database analysis and identification. She has published papers on dinosaur and marine reptile paleontology research.

PROJECT EXPERIENCE

PG&E Winters Gas Training Facility
Pacific Gas & Electric (Yolo County, CA)

Paleontologist. Ms. Richards authored the Paleontological Technical Study performed background research, record searches, and sensitivity analysis to determine the potential project-related effects on paleontological resources during construction of the proposed PG&E Gas Training Facility - an approximately 50-acre site near Interstate 505 and Putah Creek in the City of Winters.

Regional Express Lanes Network Phase I Project Approval/Environmental Document
Metropolitan Transportation Commission (Alameda, Contra Costa, and Santa Clara Counties, CA)

Paleontologist. Ms. Richards prepared portions of a Paleontological Identification Report (PIR) for a 2,472-acre HOV lane to toll lane conversion project along portions of Interstates 580, 680, and 880 that aims to close gaps within the existing HOV lane system to increase travel time savings and reliability for carpools and buses in those corridors. The Express Lanes Network converts existing carpool lanes to express lanes and uses the revenue generated to finance completion of the carpool/express lane system.

State Route 99 San Joaquin Freeway/Bridge Widening
Caltrans District 6 (San Joaquin County, CA)

Paleontologist. Ms. Richards assisted in preparing a Paleontological Mitigation Plan (PMP), conducted paleontological resources awareness training for construction personnel, paleontological monitoring, and assisted in authoring a Paleontological Mitigation Report (PMR) for a 2.9-mile long freeway expansion project along SR 99.

State Route 12/88 Improvements near Jackson Creek
Caltrans District 10 (Amador County, CA)

Paleontologist. The California Department of Transportation, in cooperation with the San Joaquin Council of Governments and San Joaquin County, proposed a major improvement project in the Lockeford and Clements areas. Ms. Richards attended a pre-construction field meeting and prepared portions of a revised PMP.

RESUME

Geraldine Aron, MS
Principal Investigator - Paleontology

SUMMARY

YEARS OF EXPERIENCE
17 Total Years

EDUCATION
MS Geological Sciences
CSU Long Beach, 2008

BS Geological Sciences
CSU Long Beach, 2000

CERTIFICATIONS

BUREAU OF LAND MANAGEMENT
Paleontological Permit - CA
Paleontological Permit - AZ
Paleontological Permit - NV

UNITED STATES FOREST SERVICE
Permit - Angeles National Forest

CARTOGRAPHY & GIS SYSTEMS
CSU Long Beach, 2000

QUALIFIED PALEONTOLOGIST
Orange County
Riverside County
County of San Diego
City of San Diego

AFFILIATIONS

Society of Vertebrate Paleontology
Geological Society of America
Association for Women Geoscientists
Society for Sedimentary Geology (SEPM)

PROFILE

Geraldine is President and a Principal Investigator at Paleo Solutions Inc. (PSI). She has more than 17 years of experience as a professional paleontologist in natural resources management. She meets the professional standards as a paleontological Principal Investigator for the Society of Vertebrate Paleontologists, BLM, USFS, San Bernardino County, Orange County, San Luis Obispo, San Diego County, and other agencies that retain a professional list for qualified paleontologists. Geraldine has produced hundreds of technical reports, which include paleontological assessments, DEIRs, EIR/EIS, Paleontological Mitigation and Monitoring Plans, document reviews, and survey reports for CEQA/NEPA compliance. Geraldine has worked on more two dozen utility projects for PG&E, SCE, LADWP, and Sempra Utilities (SDG&E and SoCalGas) in California.

PROJECT EXPERIENCE

Jefferson to Stanford No. 2 60 kV Feasibility Project
Pacific Gas & Electric (San Mateo County, CA)

Principal Investigator/Project Manager. Ms. Aron oversaw the preparation of the paleontological resources review, including the paleontological inventory report (PIR) and Proponent's Environmental Assessment (PEA) for the project. Several potential routes were assessed for this project, and the feasibility and paleontological potential was determined for this project. The report and PIR were prepared according to CEQA guidelines.

Palermo-East Nicolaus 115 kV Transmission Line
Pacific Gas & Electric (Butte, Sutter, Yuba Counties, CA)

Principal Investigator and Project Manager. PG&E proposes to construct about 314 new poles and/or metal lattice tower supporting a 115-kV transmission line along an approximately 40-mile transmission line segment. The project route would follow the existing Palermo–East Nicolaus 115-kV Transmission Line between PG&E's Palermo and East Nicolaus substations within unincorporated areas of Butte, Sutter, and Yuba Counties. Ms. Aron conducted a desktop level review of the Paleontological Monitoring Plan (PMP), including geologic maps and taking into account PG&E's Paleontological Resource Standards and Procedures. The review was conducted to determine if additional studies are needed for the project.

Van Duzen-Peanut State Route 36 Highway Project
Caltrans District 1 (Humboldt County, CA)

Principal Investigator and Project Manager. Caltrans proposed to improve State Route 36 from MP36.1 to MP40.5 adjacent to the Van Duzen River in Humbodlt County, CA. Cooperating agencies included the FHWA, CFLHD and Caltrans. Ms. Aron co-authored a Paleontological Inventory Report (PIR) to determine the relative levels of paleontological sensitivity in geological formations that will be encountered during construction of the project.