CDOT PALEONTOLOGY ANALYSIS AND DOCUMENTATION PROCEDURES

Introduction

Paleontology is the study of plant and animal life of past geologic time, including their evolutionary history, and their paleoecological interrelationships. For the purposes of this document, the term "paleontological resources" includes not only fossils but also the associated physical items and data that contribute to the understanding of the fossils, such as associated datable rocks or organic matter and the physical characteristics of the fossils' associated sedimentary matrix. This area of study does not include prehistoric human remains and their associated cultural artifacts (e.g. stone tools or pottery), which are the domain of archaeology. Additionally, in Colorado, plant and animal remains found in deposits post-dating the end of the Pleistocene Epoch approximately 11,700 years ago are not considered paleontological in nature due to the likelihood of human influence.

Legal Background

The Historical, Prehistorical, and Archaeological Resources Act [Colorado Revised Statute 24- 80-401ff, the State Antiquities Act] protects all fossils on state-owned lands and lands controlled by any subdivision of state government. Title to fossils on state-owned lands is reserved to the state. Permits are required to collect, damage, or destroy fossils covered under the State Antiquities Act. While the requirement to locate and assess the scientific importance of fossils on state-owned lands is not stated explicitly in the law, it is implicit in the requirement to avoid any damage to, destruction or removal of the resource without a permit. The CDOT Staff Paleontologist or any paleontological consultant working for CDOT must be named on a current State of Colorado permit to search for and collect fossils on state-owned lands. Permits can be obtained from the Office of Archaeology and Historic Preservation (OAHP) in Denver.

Federal law and regulations similarly protect fossils on federally owned lands. The requirement to inventory fossils on federally owned lands or on federally funded projects again is not explicit for the most part, but inventories may be required on Bureau of Land Management (BLM) administered lands by regulations pertaining to the Federal Land Policy and Management Act (FLPMA) of 1976 [U. S. Code, Title 43, Section 1732]. This section authorizes the Secretary of the Interior to issue regulations providing for the use, occupancy, and development of public lands through leases, permits, and easements. It is this section that the BLM has opted to use to regulate and issue permits for the collection of fossils on its lands in lieu of 16 USC Sec. 421-433 (the Antiquities Act of 1906), which has been ruled unconstitutionally vague in the Tenth Circuit Court of Appeals. The CDOT Staff Paleontologist or any paleontological consultant working for CDOT must be named on a current State of Colorado BLM fossil collecting permit to collect fossils on BLM-administered lands in Colorado. Permits can be obtained from the Colorado State Office of the BLM in Denver.

Fossil collection on United States Forest Service (USFS) administered lands is regulated under 36 CFR 261.9(i), which prohibits "[e]xcavating, damaging, or removing any vertebrate fossil or removing any paleontological resource for commercial purposes without a special use authorization." The CDOT Staff Paleontologist or any paleontological consultant working for CDOT must hold a current USFS Special-Use Permit to collect vertebrate fossils on USFS- administered lands in Colorado.

The Federal Highway Administration (FHWA) considers protection of fossils on FHWA-funded projects a NEPA issue, but the extent of work required to protect the resource is based on the degree of protection afforded by each state's laws.

Threshold Criteria for Impacts

Generally paralleling the archaeological program, paleontological clearances to proceed to construction, commence maintenance activities, or initiate materials excavation are required for all projects that propose any effect off the existing road prism, all CDOT-provided materials sources, and those materials

sources adjacent to Interstates where direct contractor access to the roadway is an issue. Previous disturbance, including cutting and even paving of an area to be impacted, does *not* automatically relieve the responsibility to consider potential affects to paleontological resources, particularly on projects where excavation to previously undisturbed bedrock is anticipated. Typically (although not exclusively), the scientific importance of paleontological resources is not as intimately tied to their precise original location (as in the case of archaeological resources), so that even surface finds of fossils in previously disturbed areas can be of scientific importance.

Paleontological Clearance Process

Information Required to Initiate a Paleontological Clearance

The minimum data to be provided with a request for paleontological clearance are:

(1) project name and number;
(2) for a linear highway project, its beginning and ending mileposts;
(3) for a linear highway project, the width of the corridor requiring clearance, measured each direction from centerline (If the corridor to be cleared is the existing right-of-way only, providing that fact is sufficient.);
(4) for a materials source, its location in relation to nearest highway milepost;
(5) for a materials source, its legal location, either descriptive or plotted on a 1:24,000 scale topographic map;
(6) for a materials source, the dimensions of the area for which clearance is being requested;
(7) copies of any pertinent signed rights-of-entry forms;
(8) a proposed clearance due date.

When available, plan, profile, and cross-section sheets are a valuable data source that aid in the paleontologist's assessment of the nature and scope of proposed affects to known and potential paleontological resources. If not provided with a paleontological clearance request, they may be requested by the paleontologist.

Paleontological Research Prior to On-the-Ground Reconnaissance

Upon receipt of a paleontological clearance request from the Region Planning and Environmental Manager (RPEM) or his/her designee, the paleontologist conducts a search for pertinent published and unpublished research data and the availability of geologic map data relevant to the proposed linear highway project corridor or materials source. This initial research may reveal that a proposed linear highway project corridor or materials source does not require on-the-ground reconnaissance for paleontological resources because there is no potentially fossiliferous bedrock cropping out at or near the existing ground surface within the proposed project limits. The paleontological assessment must include use of the best (that is, in most cases, the largest-scale available) geologic maps in identification of geologic units encountered or expected to be encountered during paleontological survey.

A combination of literature search and on-the-ground reconnaissance performed on nearby projects is used to identify and determine the scientific significance of any fossil localities that may lie within the proposed linear highway project or material source limits. In addition to a published and unpublished literature search, a previously recorded fossil locality search at the Geological Section of the University of Colorado Museum (UCM), Boulder, the Denver Museum of Nature and Science (DMNS), and/or another repository museum appropriate to the location is conducted. Federal agencies may also require that their fossil locality databases be consulted when a survey is conducted on CDOT rights-of-way that intersect with federally owned lands.

On-the-Ground Reconnaissance

Pedestrian survey on state-owned lands must search out not only vertebrate fossils, but macroinvertebrate (non-microscopic animals without backbones) and macropaleobotanical (plant remains other than pollen) fossils as well. Federal agencies may only require consideration of possible affects to vertebrate fossils where CDOT rights-of-way intersect federally owned lands. Intermittent shallow subsurface sampling of bedrock exposures where plant and/or invertebrate fossils may be buried will be necessary. This should include cracking of limestone concretions common in some marine shale and sandstone lithologies and probing for leaf fossils in locations where literature search and on-the-outcrop experience indicate that they may be present. Vertebrate fossil searches may be conducted by surface examination alone.

Report of Results

The CDOT Staff Paleontologist provides reports of results to the appropriate RPEM. Report text, at a minimum, includes:

(1) The linear highway project location, with milepost limits and legal location of the endpoints of the linear survey to the quarter-quarter-quarter-quarter section, or the materials source location, located legally and in relation to the nearest highway milepost;
(2) Date(s) of on-the-ground reconnaissance (when applicable);
(3) The bedrock units known to crop out within the proposed linear highway project or materials source limits and the source(s) of that geologic data;
(4) The results of on-the-ground reconnaissance, including identification of any newly recorded and/or relocated previously recorded fossil localities;
(5) An assessment of all identified fossil localities' scientific significance, and
(6) A recommendation either for further paleontological investigation prior to project clearance, or clearance to proceed to project construction, commence proposed maintenance work, or initiate materials excavation. If appropriate, the clearance to proceed to project construction, commence proposed maintenance work, or initiate materials excavation will include stipulations for mitigation of impacts to paleontological resources during project construction or completion of proposed maintenance work or materials excavation.

Consultant reports are typically expected to provide a more detailed account of the factors described above than is typical of in-house reports because the CDOT Staff Paleontologist often keeps more detailed data on file where it is readily accessible for CDOT's use.

When CDOT requests a consultant to conduct a paleontological study, the Staff Paleontologist will review the report for sufficiency and thereafter provide the appropriate PRPEM a concurrence or modified concurrence with, or rejection of, the consultant's recommendations.

Although OAHP is responsible for enforcing the State Antiquities Act, and by inference, review of reports of survey addressing CDOT's efforts to satisfy that Act, OAHP has delegated report review responsibilities to the CDOT Staff Paleontologist. OAHP only requires that the CDOT Staff Paleontologist provide annual lists of clearance reports and fossil localities identified and specimens collected.

New fossil localities identified during field reconnaissance and previously recorded localities for which field survey has provided additional data, are recorded on fossil locality data sheets provided by the institution designated as the repository for specimens collected under the OAHP permit issued to CDOT or the paleontological consultant. Federal agencies may require separate recordation of fossil localities identified on federally administered lands. Consultant reports will include a record of any newly recorded fossil localities and previously recorded fossil localities for which field survey has provided additional locality data for insertion in the CDOT Staff Paleontologist's files. While paper copies of reports are

acceptable, digital copies are preferable to conserve document filing space and digital-only submissions are encouraged.

Mitigation

Effects to scientifically significant fossil localities are mitigated by avoidance and/or further collection and documentation of their associated resources. Paleontological mitigation may consist of controlled salvage excavation prior to linear highway project construction or materials source excavation; however, more commonly mitigation is completed through on-site monitoring of highway construction or materials excavation into bedrock deposits known to produce scientifically important fossils.

Mitigation through on-site monitoring includes collection of any scientifically important fossils and associated scientific data uncovered during major construction or materials excavation. On-site monitoring is typically the mitigation strategy adopted when (1) potentially fossiliferous bedrock is not exposed at the ground surface prior to major construction or materials excavation, but will likely be uncovered during those efforts; and (2) fossil density at previously identified scientifically significant fossil localities is such that controlled excavation prior to construction will not produce enough important fossils to represent a statistically valid sample in a timely and cost-effective manner. CDOT may request a paleontological consultant to conduct mitigation, but such efforts will be under the direct supervision of, and/or in close cooperation with, the CDOT Staff Paleontologist.

Information Required in NEPA Documents

An Environmental Assessment or Environmental Impact Statement typically should include only one to three paragraphs concerning paleontological resources in the Affected Environment and Mitigation section(s). If a special issue of concern is raised in the paleontological assessment report, additional information may be necessary and appropriate. In most instances, only a very brief summary of the geological and paleontological data presented in the paleontological assessment report need be included in the Affected Environment and Mitigation section. If applicable, the basis for determination of identified fossil localities' scientific significance should be provided. Additionally, the basis for concluding that there will likely be no effects to scientifically important paleontological resources should be provided.

A NEPA document should indicate special concerns to be studied further during the final design phase of future construction projects within the project study corridor. Final design may be an important phase in determining the nature and scope of any mitigation efforts required during construction. Specific subsurface soil, bedrock and groundwater conditions that may be relevant to the nature and scope of mitigation efforts are determined at that time for use in preparing construction plans.