

PALEOENVIRONMENTS AND PALEOECOLOGY OF THE
EOCENE GREEN RIVER FORMATION,
FOSSIL BASIN, WYOMING

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Objectives

Investigations begun in 1981 of the paleoenvironments and paleocology of ancient Fossil Lake in Fossil Basin (Fossil Butte National Monument) were continued in 1982. The principle 1982 objectives of this continuing study were to:

1. Study and sample the paleontology of stratigraphic sections within Fossil Basin at locations representing the center and margins of the lake. Data collected from this study will provide insights into paleoecologic changes through time;
2. Continue detailed investigations of one time-synchronous stratigraphic unit by excavating additional "miniquarries." The "Lower Oil Shale" unit was quarried in 1981 and several additional quarries were excavated in 1982. The data from this part of the study will provide a picture of the paleocology and environments during one period of the lake's history; and
3. Continue field mapping and reconnaissance to determine the maximum size of Fossil Lake, inflow areas (delta locations), lake bottom gradients, and maximum extent of the Lower Oil Shale. This data will provide a paleogeographic context for evaluating the paleocology and paleoenvironments.

Methods

Three detailed vertical stratigraphic sections were studied and sampled during the 1982 field season. This part of the research involved carefully sampling each sedimentation unit so as to reveal the presence, amount, and preservation of fossils. Although fossil fish were the most abundant fossil found, other fossils included insects, plants, mollusks, and other invertebrates. Detailed analysis of this data is currently being conducted.

Two mini-quarries of the Lower Oil Shale were completed bringing the total to eight. This data is currently being analyzed.

Results

Mapping of the Lower Oil Shale unit continued into previously "un-explored" territory, allowing discovery of this unit in southern parts of Fossil Basin where it was not known previously to exist. This in turn allowed discovery of the southern-most margin of the lake during "Lower Oil Shale" time.

Aerial reconnaissance and mapping in western-most margins of Fossil Basin revealed a lacustrine-beach deposit consisting of beach-gravels and gastropods coated with laminated calcium carbonate (oncolites). This is a unique deposit that will reveal a previously unrecognized aspect of the lake's paleoenvironment.

Paleontologic studies of three stratigraphic sections revealed abundant fossil fish, plants, and invertebrate fossils in the Lower and Middle Beds, but rare fossils in the Upper Bed. Abundance of fossils varied within the Lower and Middle Bed, from barren to prolific zones.

Conclusions

Preliminary interpretations of data collected during the '81 and '82 field seasons indicate that although Fossil Lake was a fresh-alkaline lake with abundant fauna and flora during most of its history, it steadily evolved into a saline-alkaline lake that was basically barren of life. Its closing history was dominated by a shallow brine lake that dried up numerous times similar to playa-lake environments in desert regions today.