

Geological and Paleontological
Survey of the
Bardwell Reservoir Basin
Ellis County, Texas

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GEOLOGICAL AND PALEONTOLOGICAL SURVEY OF THE BARDWELL RESERVOIR BASIN, ELLIS COUNTY, TEXAS

BOB H. SLAUGHTER AND JOHN T. THURMOND*

INTRODUCTION

DURING June, July, and August, 1964, the Shuler Museum of Paleontology of Southern Methodist University made a survey of that portion of Waxahachie Creek that is to be flooded by the construction of the Bardwell Dam. The work was done under the sponsorship of the National Park Service (Southwest Region).

The Quaternary deposits of Waxahachie Creek were mapped in detail and the bedrock geology outlined in general units. Extensive prospecting of all erosional and excavational exposures was carried out for the purpose of recovering both Cretaceous and Quaternary vertebrate and molluscan fossils. Two terraces were recognized above the present floodplain; the higher and older of the two contained identifiable remains of a mammoth and an excellent molluscan fauna.

Fossils recovered from the Cretaceous bedrock include a fairly complete lower jaw of a marine reptile (mosasaur) and specimens of one teleost and at least six species of elasmobranch fishes. A new genus and species of ganopristid sawfish is also included.

METHODS

Areas displaying well-preserved remnants of the terraces were mapped, using topographic maps prepared by the Fort Worth Office of the Corps of Engineers. After all exposures, both artificial and erosional, were visited, the map was revised and refined. The lithologic sequences of the Quaternary deposits were re-

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corded. Pollen samples and samples of radiocarbon dating were collected, sealed, and stored for a comprehensive future study of the history of the Trinity River drainage by the Shuler Museum of Paleontology.

Gravel sizes are in terms of the Wentworth Scale, and sediment colors are those of the *National Research Council Rock Color Chart*.

BEDROCK DEPOSITS

The Cretaceous bedrock dips to the south-southeast at approximately sixty feet per mile, and although only the upper Taylor Formation is exposed in the basin itself, the older Austin Chalk outcrops just upstream near the Ellis-Dallas county line and contributes source material to the alluvium in the valley. The Wolfe City Member of the Taylor is apparently exposed on the divides to the northeast but does not occur in the basin.

Bedrock fossils. The presence of specimens of the Cretaceous pelecypods, *Inoceramus* and *Exogyra*, was noted; but since better preserved specimens are available elsewhere, no attempt at recovery was undertaken.

The left mandible and other fragments of a mosasaur were recovered from a pit (map locality 1) just south of State Highway 34. The pit was excavated for materials to be used in raising the highway bridge over the proposed lake. The specimen is still in the plaster bandage and must be prepared before a generic assignment can be made. Approximately 2,000 pounds of the phosphatic zone producing the mosasaur was quarried and transported to the outdoor laboratory of the Shuler Museum, where processing was carried out for the possible recovery of fossil fish material. At least seven species of elasmobranch fishes and two species of teleost fishes were identified, including a new genus and species of a ganopristid sawfish. The faunal list follows:

FAUNAL LIST FROM ST. HWY. 34 CLAY PIT

<i>Corax</i>	- Tiger Shark
<i>Lamna</i>	- Porbeagle Shark
<i>Isurus</i>	- Mackerel Shark
<i>Raja</i>	- Skate

<i>Eotrigon</i>	- Sting Ray
<i>Ischyrhiza</i>	- Sawfish
Ganopristid	- New sawfish genus and species
<i>Enchodus</i>	- Two species of extinct teleosts
Mosasauro	- Marine reptile

It would be advantageous to wash an additional ton or two of this matrix in an attempt to extend the fauna, with the hope of adding to current Shuler Museum work concerning the fish fauna of Texas phosphates. Also, more material of the new form is desirable. It is further hoped that erosion of the Taylor Formation in the pit and other dam excavations will produce additional reptile material over the next two or three years.

STRATIGRAPHY AND PALEONTOLOGY OF THE TERRACES

SECOND TERRACE ABOVE THE FLOODPLAIN (T-2)

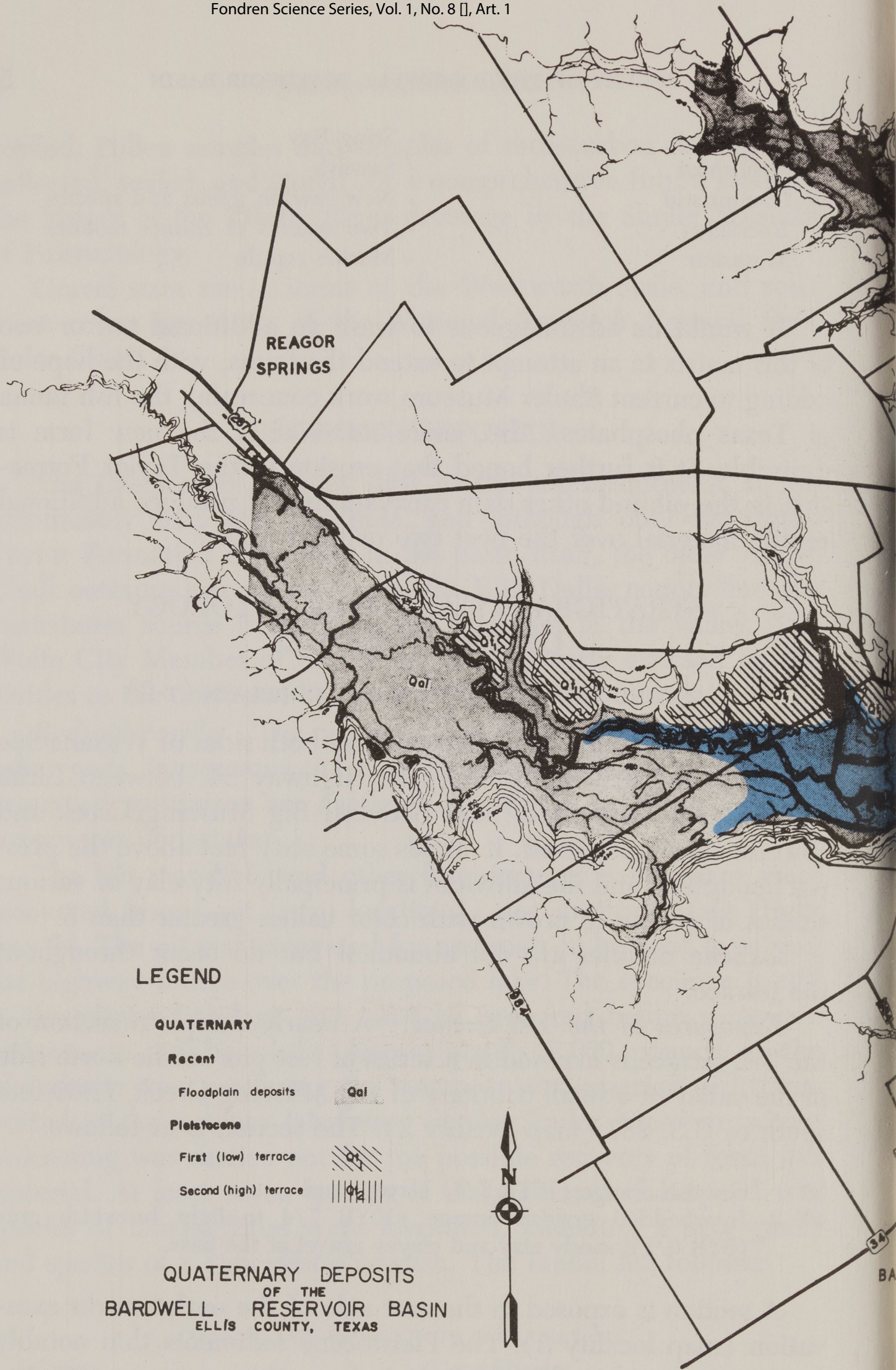
The T-2 terrace is well preserved on both sides of Waxahachie Creek, particularly south of Texas Highway 34; between Little and Big Mustang creeks; and between Big Mustang Creek and Waxahachie Creek itself. It stands some sixty feet above the present floodplain, and the alluvium is principally silty clay of various shades of yellow to brown with color values greater than 5.

Caliche nodules are not abundant but do occur throughout the terrace.

Exposures of the T-2 terrace. A nearly complete section of the T-2 terrace is exposed in a series of test pits on the north side of the valley of a small tributary of Big Mustang Creek, 1,500 feet south of U.S. 287 (map locality 2). The section is as follows:

- 10' Grayish orange (10YR 7/4) clayey sand.
40' + Interbedded grayish orange (10YR 7/4 to light brownish gray (5YR 6/1); sandy clay and clayey gravel at the base.

A section is exposed in the east side of the outlet works excavation (map locality 3). The Pleistocene sediments thin notably to the west within fifty feet. It is from this exposure that the Pleistocene molluscan fauna was recovered. The list of this fauna, identified by Dr. E. P. Cheatum, follows:



LEGEND

QUATERNARY

Recent

Floodplain deposits **Qal**

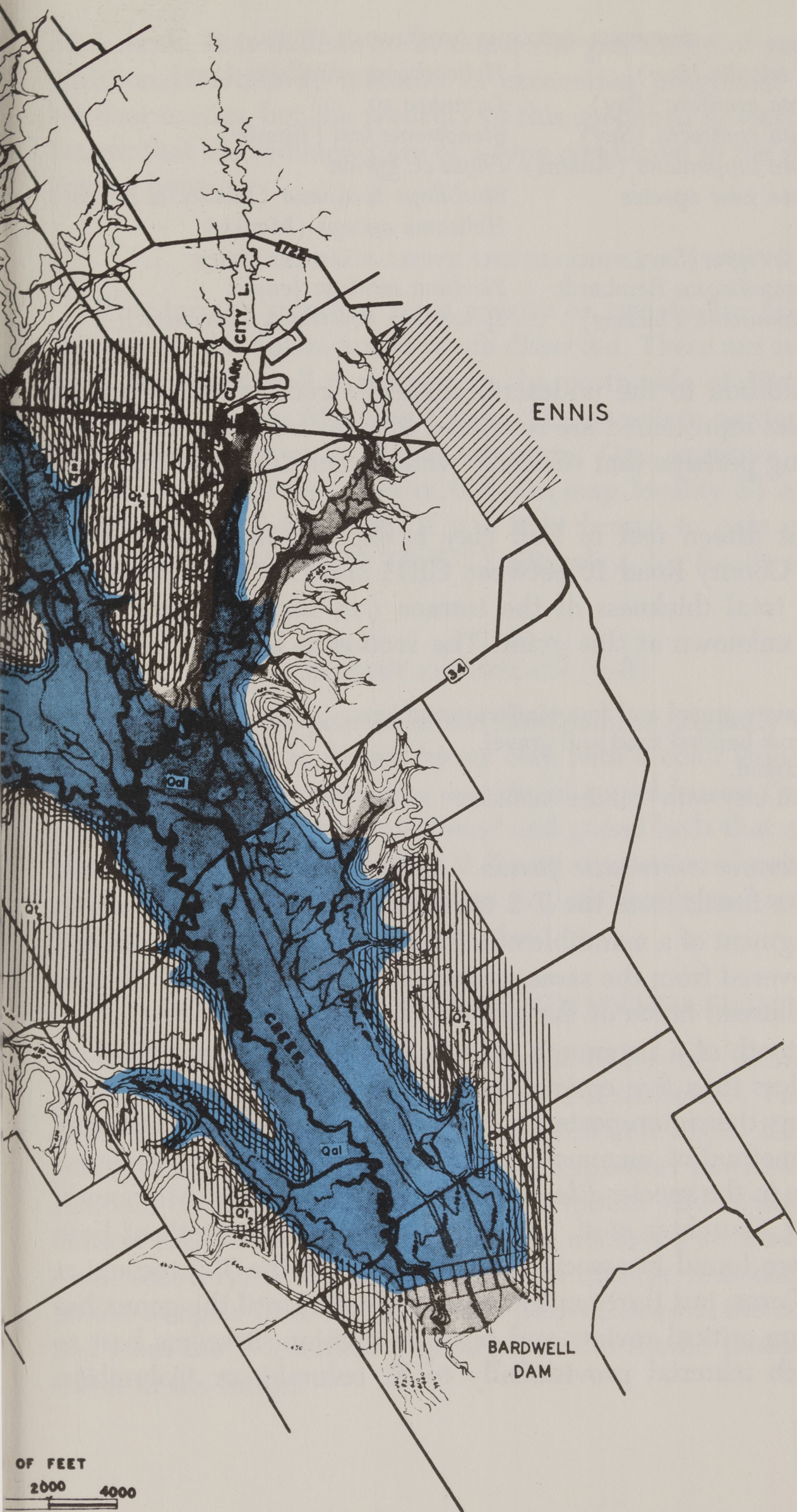
Pleistocene

First (low) terrace **Q1**

Second (high) terrace **Q2**

**QUATERNARY DEPOSITS
OF THE
BARDWELL RESERVOIR BASIN
ELLIS COUNTY, TEXAS**

prepared by
SHULER MUSEUM
of
PALEONTOLOGY
SOUTHERN METHODIST UNIVERSITY
1964



BARDWELL SPILLWAY MOLLUSCAN FAUNA

<i>Helisoma trivolis</i> (Say)	<i>Helicodiscus parallelus</i> (Say)
<i>Gastrocopta armifera</i> (Say)	<i>Lymnaea</i> sp.
<i>Gastrocopta contracta</i> (Say)	<i>Stenotrema leai</i> (Binney)
<i>Gastrocopta tappaniana</i> (Adams)	<i>Physa</i> cf. <i>gyrina</i>
<i>Gastrocopta</i> new species	<i>Strobilops texasiana</i> (Pilsbry & Ferriss)
	<i>Helisoma anceps</i> (Menke)
<i>Amnicola integra</i> (Say)	
<i>Vallonia gracilicosta</i> Reinhardt	<i>Pisidium nitidum</i> Jenyns
<i>Hawaiiia miniscula</i> (Binney)	<i>Sphaerium striatum</i> (Lamarck)

In addition to the undescribed species recovered, several of the species represented are restricted to areas farther north today, suggesting perhaps that summers were cooler during T-2 deposition.

About fifteen feet of buff clay is exposed in a small creek crossing County Road 10 between CR11 and CR27 (map locality 4). The total thickness of the terrace (or, for that matter, the clay) is unknown at this point. The section is as follows:

- 6' Clayey gravel and foraminiferal sand lens.
- 4' + Cross-bedded sand and gravel.
- 10' Masked.
- 15' Buff clay with "caliche" nodules.

T-2 terrace vertebrate fossils. Only fragmentary identifiable vertebrate fossils from the T-2 terrace have been found thus far.

A fragment of a mandible of a Leopard Frog, *Rana* cf. *pipiens*, was recovered from the same washings that produced the Pleistocene molluscan fauna at the spillway.

The tooth of a mammoth collected at map locality 4 displays slightly less than five enamel bands in a one-hundred-millimeter line along the anteroposterior face. If one adheres to Osborn's (1942) method of mammoth identification, this would place our specimen in the species *Elephas imperator*, or Imperial Mammoth. However, Slaughter *et al.* (1962) pointed out that teeth of both types were found in association in deposits of the T-2 terrace at Dallas, Texas, just thirty miles from Bardwell. Until the genus has undergone critical review and possible revision, it seems best to refer such material provisionally to *E. columbi*, or Columbian

Mammoth. It is difficult to evaluate the possibility of recovering additional vertebrate material as excavation progresses and the pit floor erodes, but the recovery of this specimen at least demonstrates that the sediments are of a type conducive to the preservation of bone.

FIRST TERRACE ABOVE THE FLOODPLAIN (T-1)

This terrace stands a mere twenty or twenty-five feet above the present floodplain and is much dissected. There are only three small remnants well preserved on the north side of Waxahachie Creek west of Big Mustang Creek. The complete section cannot be determined from available exposures. One exposure south of CR 13 and 2,000 feet west of CR 10 (map locality 5) exposes a portion of the T-1 section. It is a light brown to pale yellowish brown (5 YR 6/4 to 10 YR 6/2) silty clay. No fossils were observed.

PRESENT FLOODPLAIN (T-0)

Only the upper portion of the floodplain is presently exposed. It is mostly black to brown loamy clay with a color value of 4 or less when wet and containing occasional gravel lenses. Coring has proven the presence of buried sand and gravel beds that may date back to the latest Pleistocene. If future excavation should expose these beds, it would be helpful to acquire fossils and samples of fossil pollen and radiocarbon samples.

CONCLUSIONS AND RECOMMENDATIONS

It is believed that Waxahachie Creek was a very young stream prior to the aggrading of its valley by T-2 sediments. This valley filling probably took place between 45,000 and 25,000 B.P. As the geology and possible fossil-producing exposures are now known, periodic trips to check additional excavations and erosion of the natural exposures is all that would be necessary to assure maximum recovery. It would be helpful to recover radiocarbon and pollen samples from the sediments buried beneath the floodplain and from the T-1 terrace if good exposures should present themselves in the future.

Both excavations under way and those already completed should be checked occasionally for additional material of Cretaceous marine reptiles and fishes until the dam is completed and the valley flooded. About two more tons of the phosphate zone should be processed to extend the pisces fauna as much as possible before this site is lost.

The Shuler Museum plans to trace the terraces in the Bardwell Basin to their confluence with terraces of the main Trinity River; thus, data collected under this contract may be included in the future Trinity River study.

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