Sandstone Trends, Sequence Framework, and Depositional Settings of the Upper Cretaceous Woodbine Group: "Eaglebine" Play, Southern East Texas Basin*

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Abstract

The Woodbine Group of the southern East Texas Basin has come under increasing scrutiny as an emerging resource play. Termed the "Eaglebine" play, which also includes well developed overlying Turonian Eagle Ford Group sandstones; because it is in the early stages of development, little is known about the regional distribution and depositional character of the Woodbine reservoir facies. In Leon, Madison, and western Houston counties, the Woodbine section is significantly shalier than in the basin-axis area to the northeast, reflecting a regional facies transition to off-axis Pepper Shale facies of the southwest. Moreover, sandstone intervals are correspondingly thinner and discontinuous, ranging from only 0 to 20 ft (0-6 m) in thickness but locally >50 ft (>15 m).

Thickest sandstone intervals occur at the tops of at least five upward-coarsening, highstand-dominated sequences in the upper half of the Woodbine Group between third-order transgressive systems tracts above the Cenomanian Buda Limestone and at the base of the Eagle Ford Group. Correlation from the basin-axis area northeast of the study area indicates that the succession, which thins by at least one-third, is equivalent to only the lower two-thirds of the thickest Woodbine basin fill. The thinning represents systematic depositional pinch-out (onlap) of fourth-order sequences of the upper Woodbine section toward the west margin of the basin, as previously documented in a study of its east margin.

Gross-sandstone maps indicate that primary sandstone trends of the middle Woodbine sequences are oriented north-northeast to south-southwest, recording digitate delta lobes. Sandstones of the uppermost Woodbine section, which occur in the west part of the study area (western Houston County), are as much as 60 ft [18 m] thick and massive.

Two middle Woodbine cores from southwest Leon County are characterized by fine- to very fine grained, planar-stratified, and rippled sandstone overlying soft-sediment-folded siltstones. They represent fluvial-dominated, delta-front facies at the downdip terminations of the digitate delta. In contrast, facies from the uppermost Woodbine in Houston County contain beds of intensely burrowed, fine-grained sandstone

that most likely record deposition in a wave-dominated, lower- to mid-shoreface setting.

References Cited

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Hentz, T.F., and S.C. Ruppel, 2010, Regional lithostratigraphy of the Eagle Ford Shale: Maverick Basin to East Texas Basin: Gulf Coast Association of Geological Societies Transactions, v. 60, p. 325–337.

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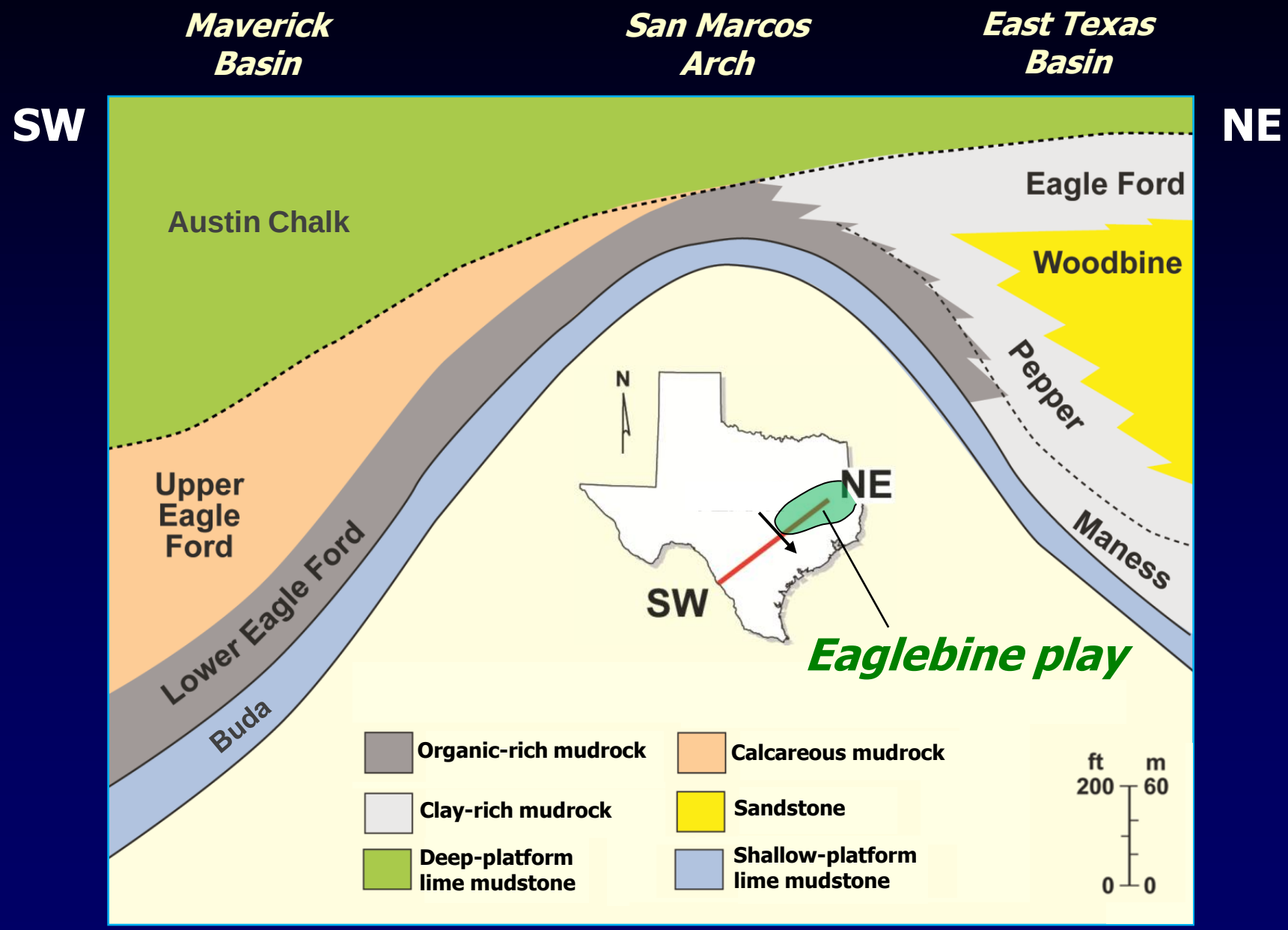
Objectives

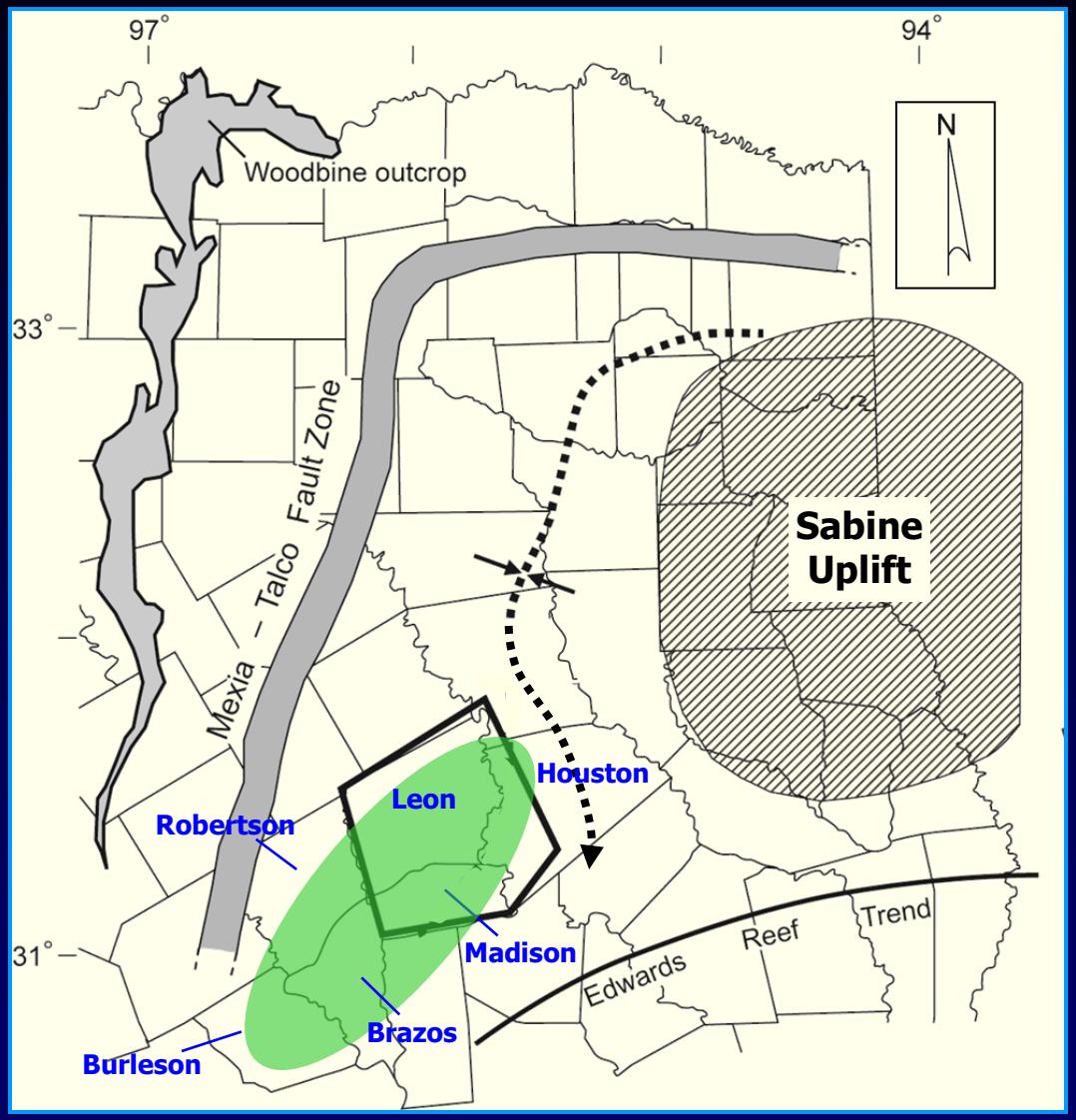
- Regional stratigraphic setting
- Distribution of Woodbine sandstones in the active part of play
- Depositional environments from gross-sandstone mapping and core interpretation
- Implications for exploration strategies

Regional Lithofacies



Hentz and Ruppel (2010)

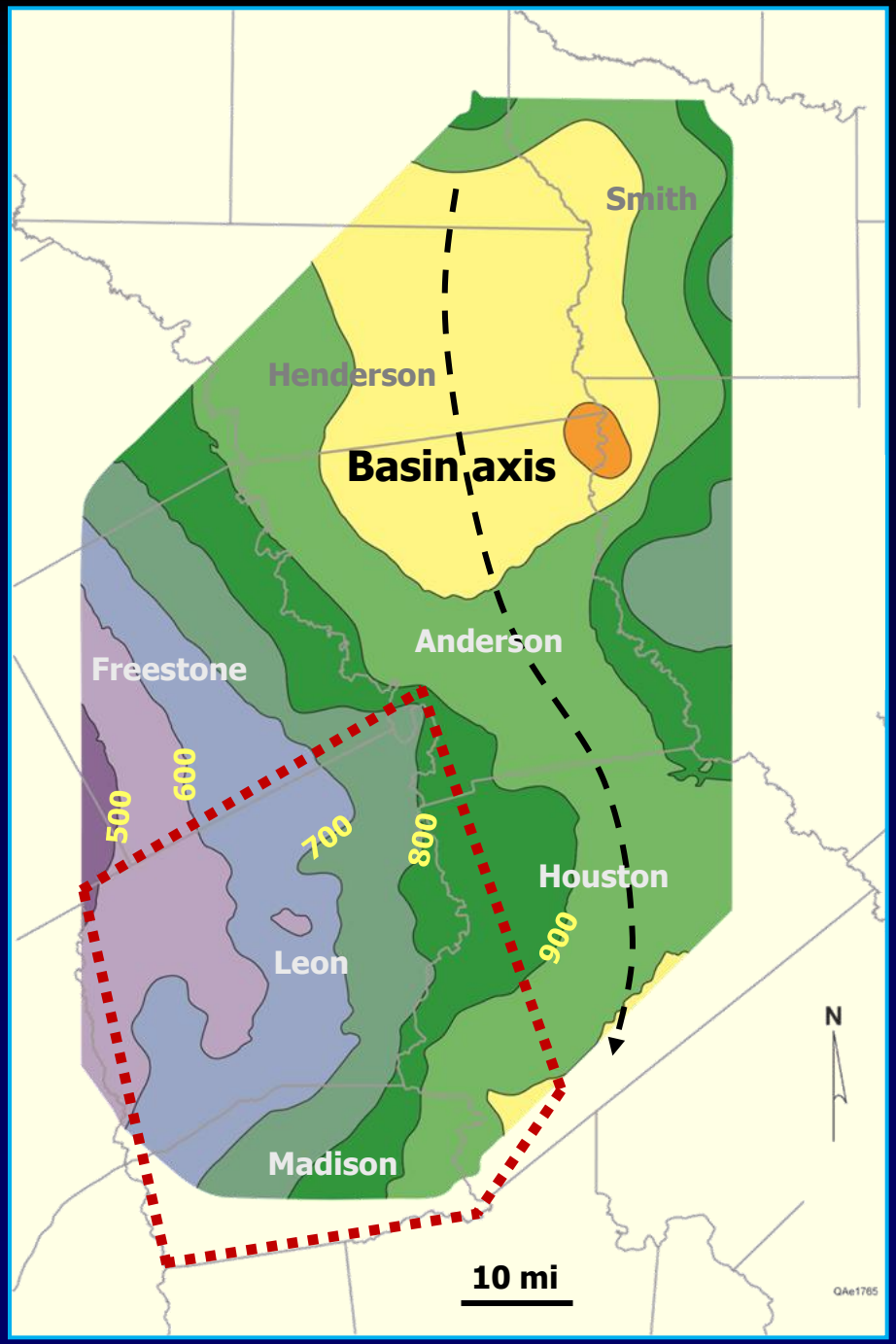
East Texas Basin



Study area

Basin axis

Play area (most active)



Woodbine Thickness

Isochore (ft)

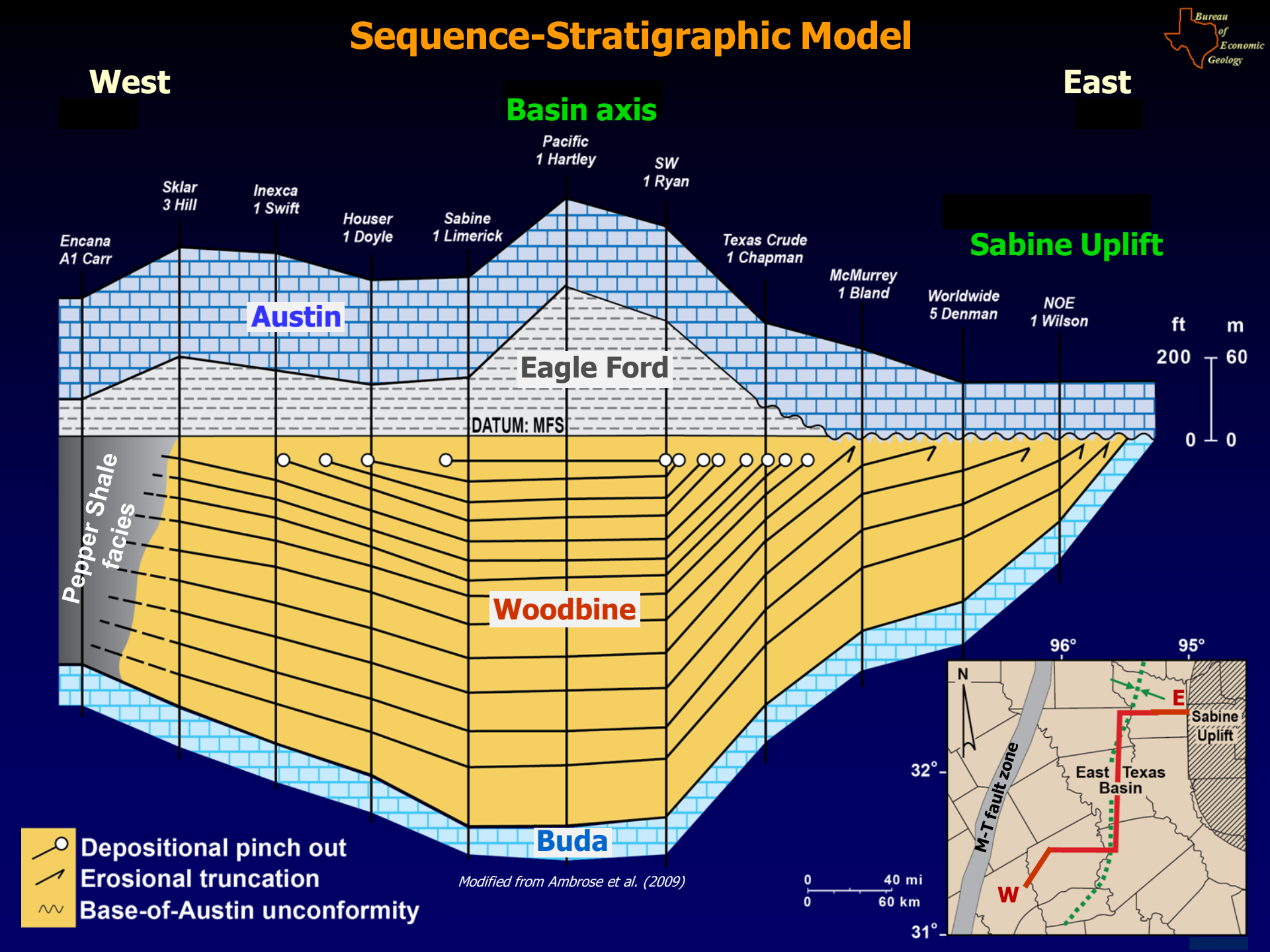
1100–1200

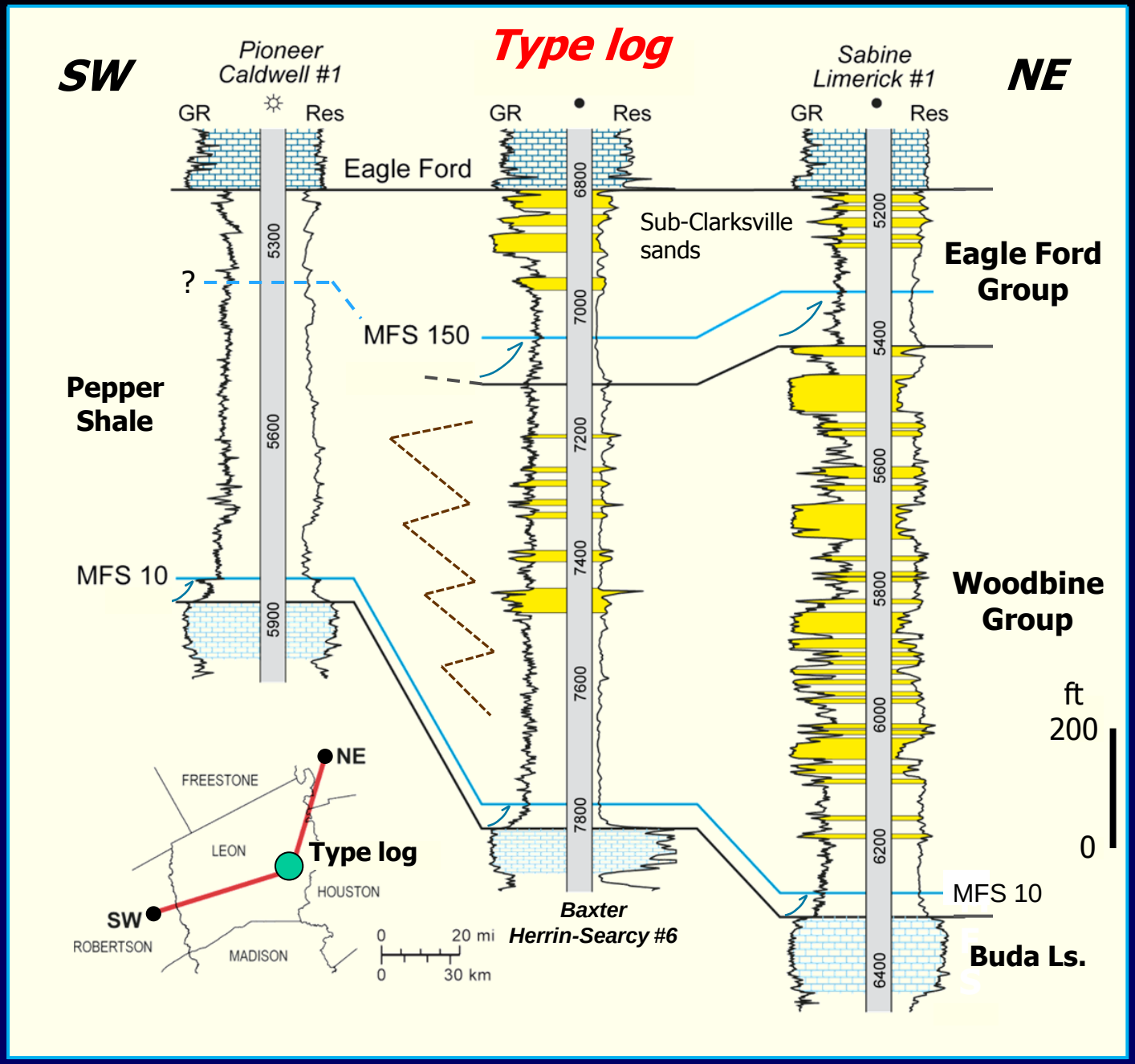
400–500

Contour interval 100 ft

Study area

Sequence-Stratigraphic Model





Regional Sandstone Occurrence

Low-order transgressive systems tract

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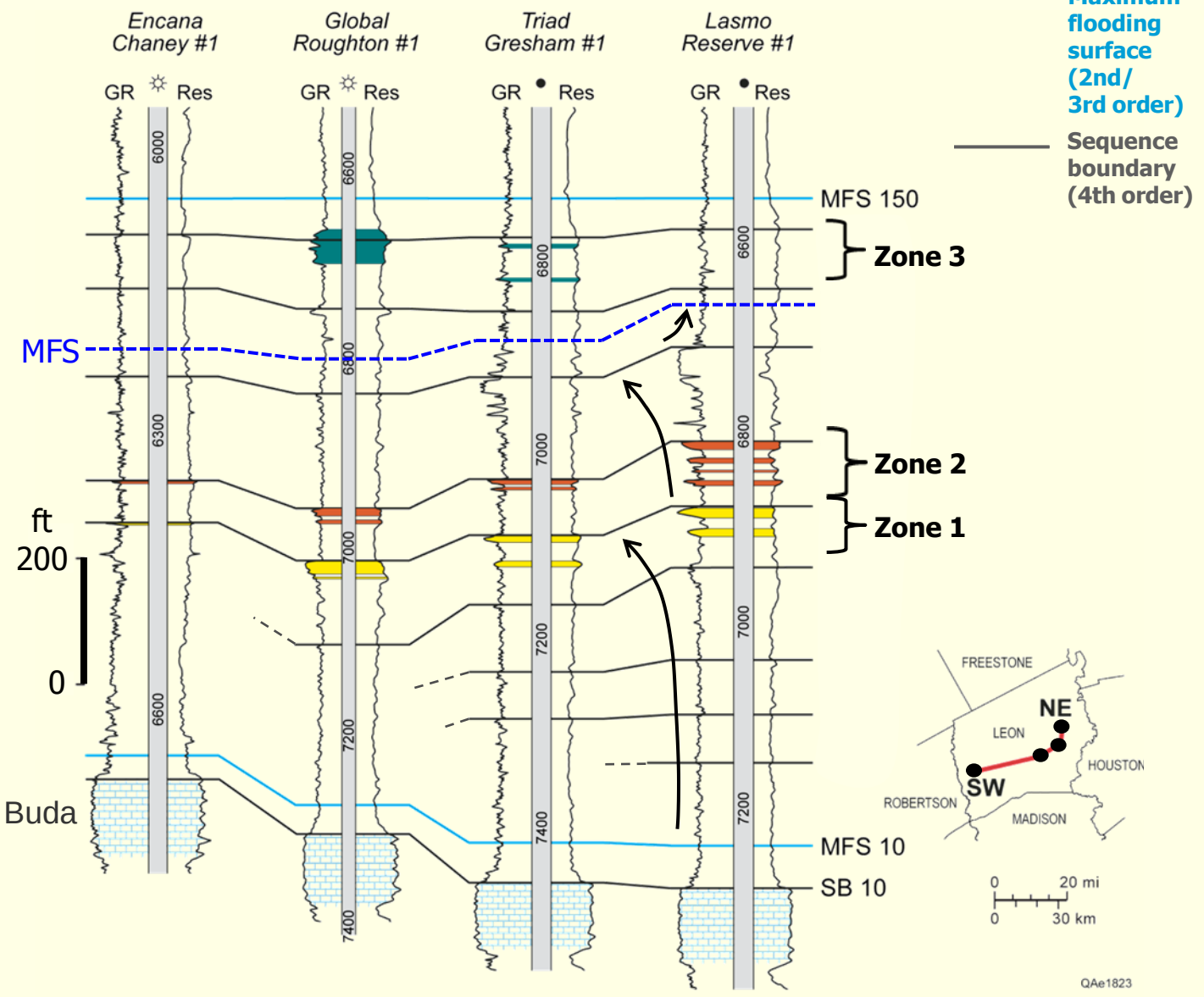
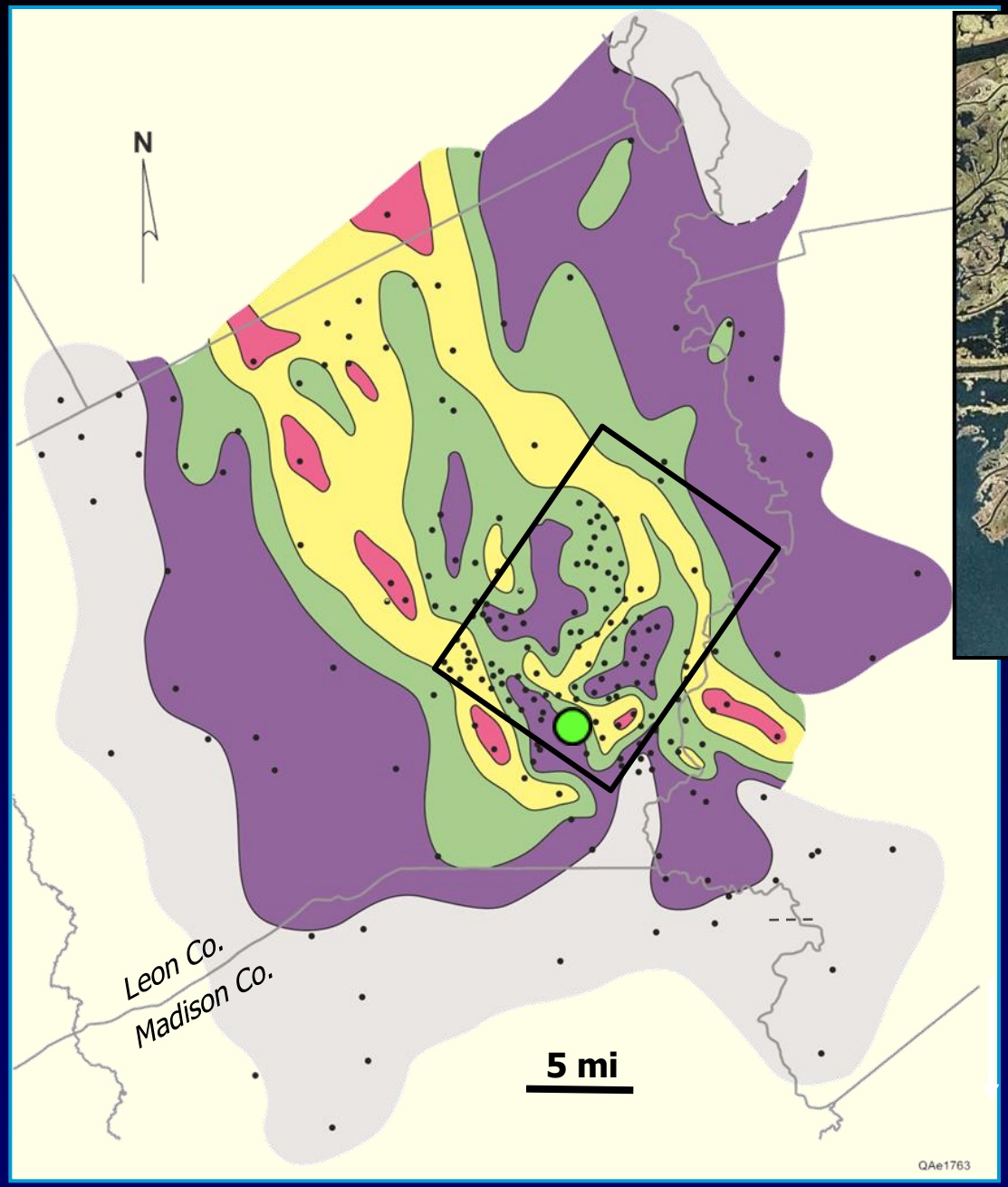
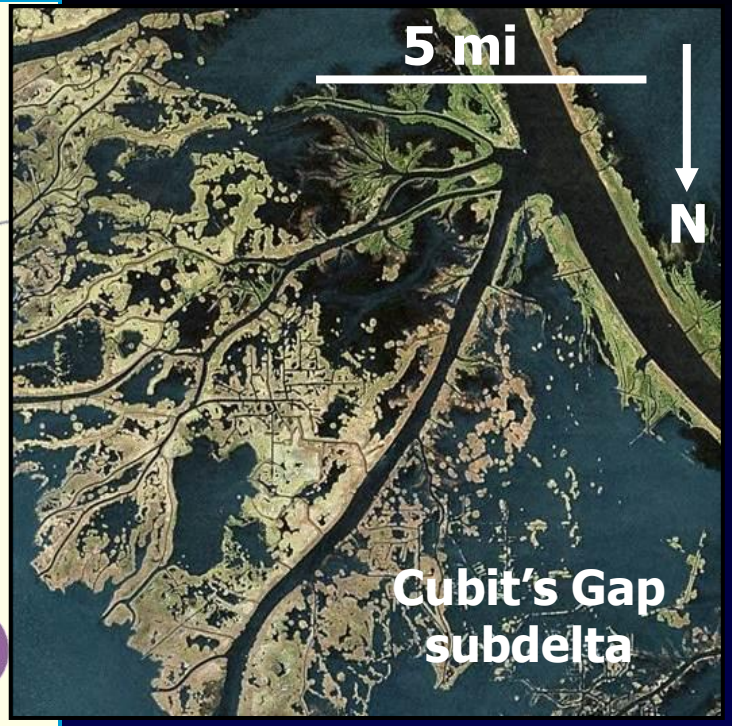
Mapped Reservoir Zones







Core (*Basin 1 Maude*)

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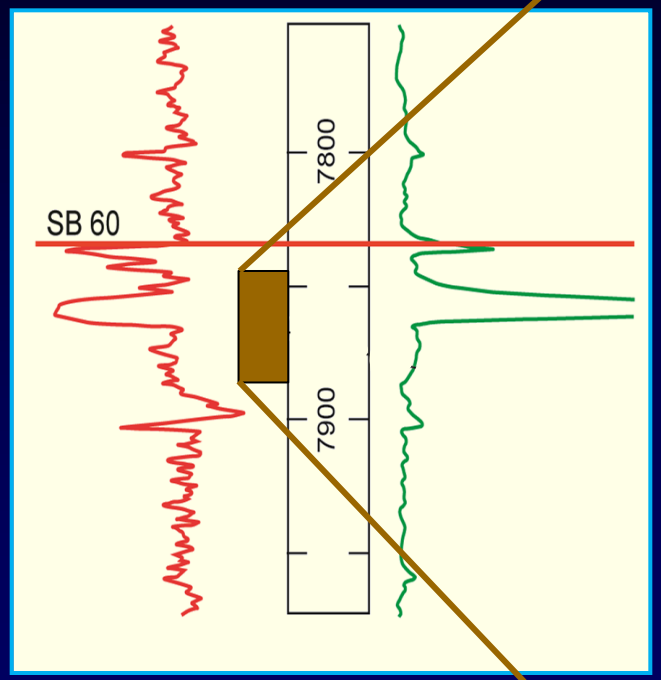
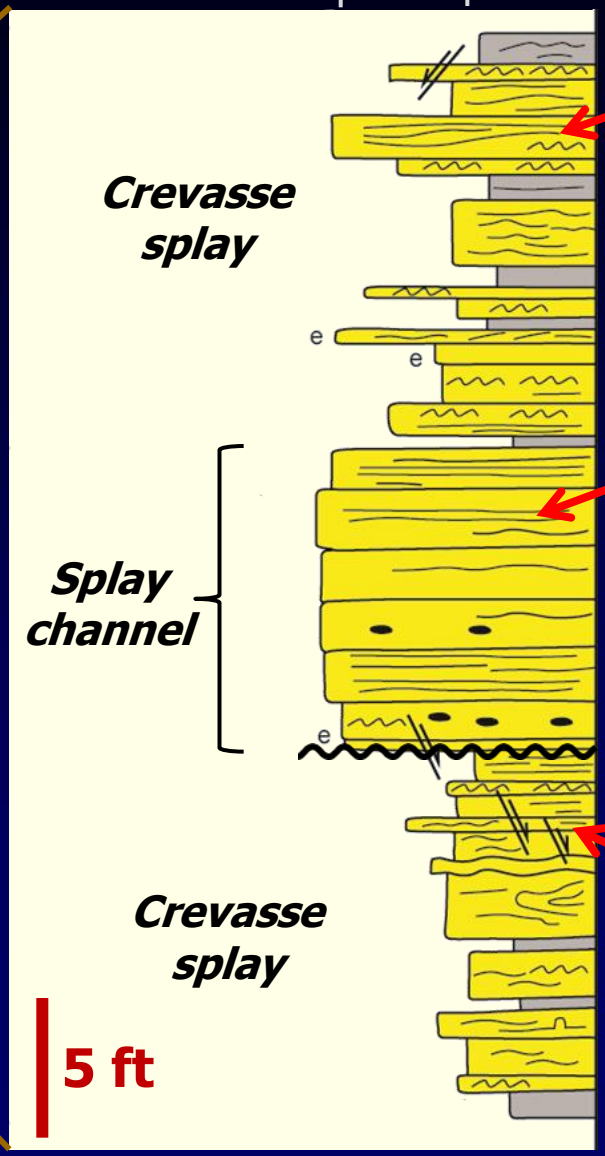
Basin Maude #1

Core





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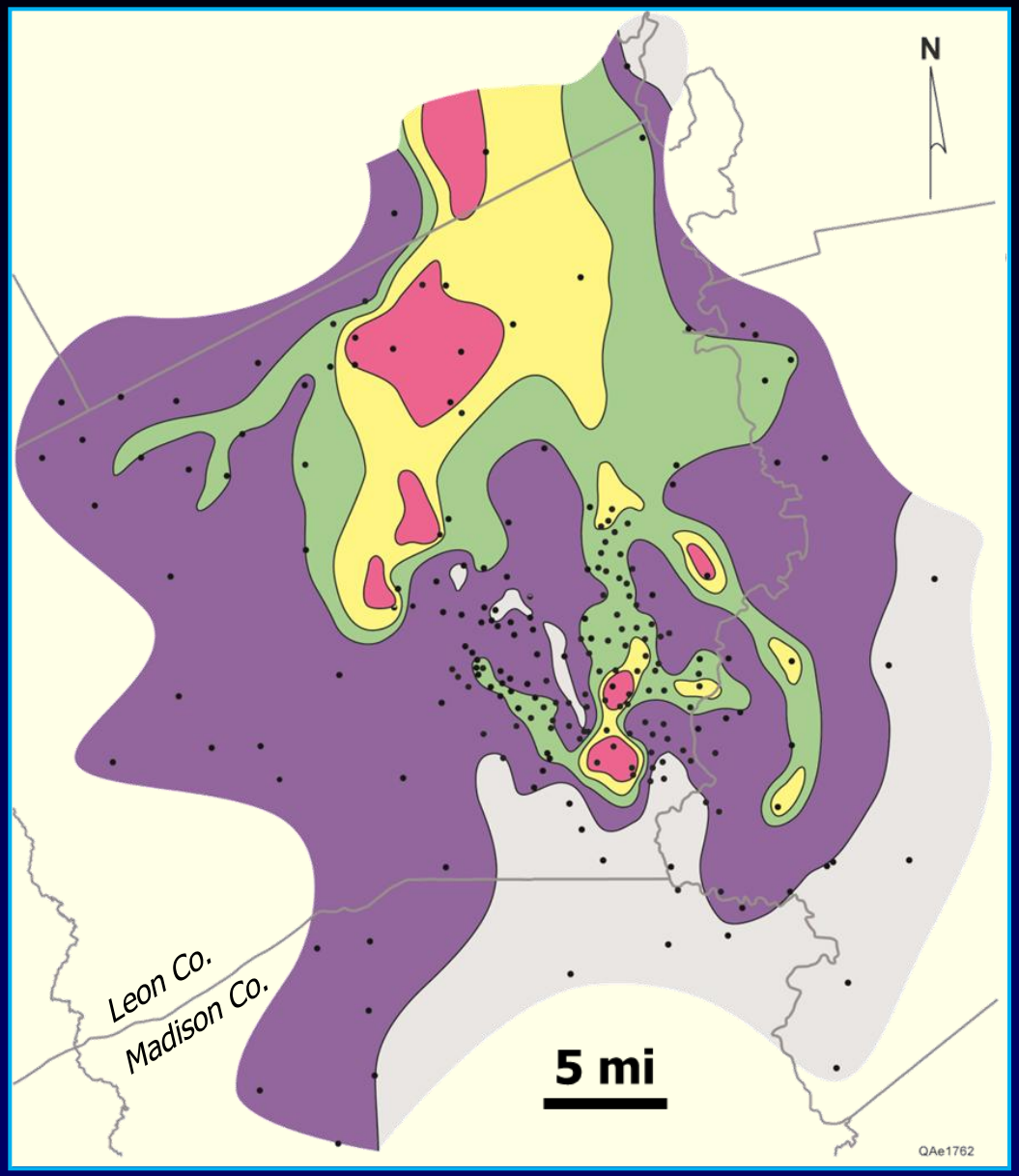

Gross sandstone: *Zone 2*

- ≥ 30 ft
- 20–30
- 10–20
- 0–10
- 0

Leon Co.

Madison Co.

5 mi

QAe1764

0

Core
(*INEXCO 1 Dawson*)

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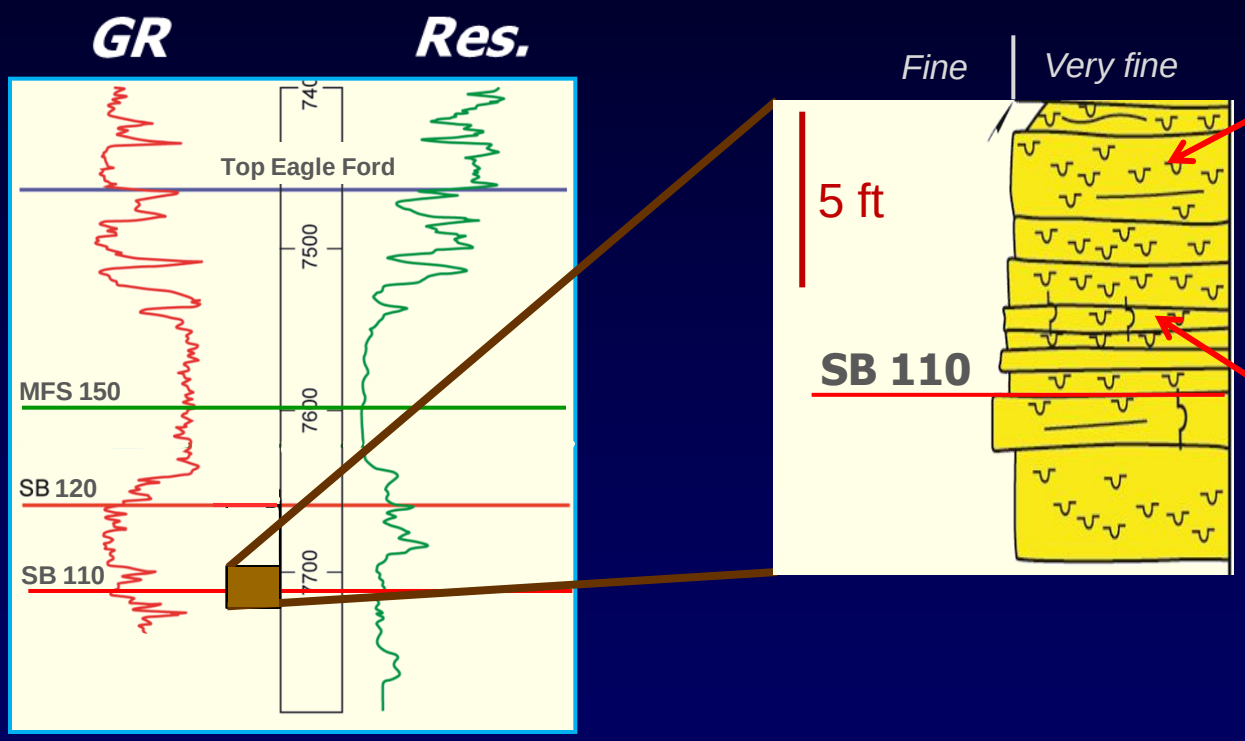
INEXCO 1 Dawson



Summary

- Regional trends of Woodbine Group in study area:
  - (1) Progressive westward depositional pinch out of sequences (14 to 9)
  - (2) Overall decrease in thickness of sequences
  - (3) Grading to Pepper Shale mudrock
- Regional terminations of fluvial- and wave-dominated delta systems
- Sandstone facies include distributary channel, crevasse splay, delta-front, and small-scale fluvial
- Design horizontals along S- to SE-oriented sand-transport trends