

Leonard Restricted Platform Carbonate Play

Play Geology

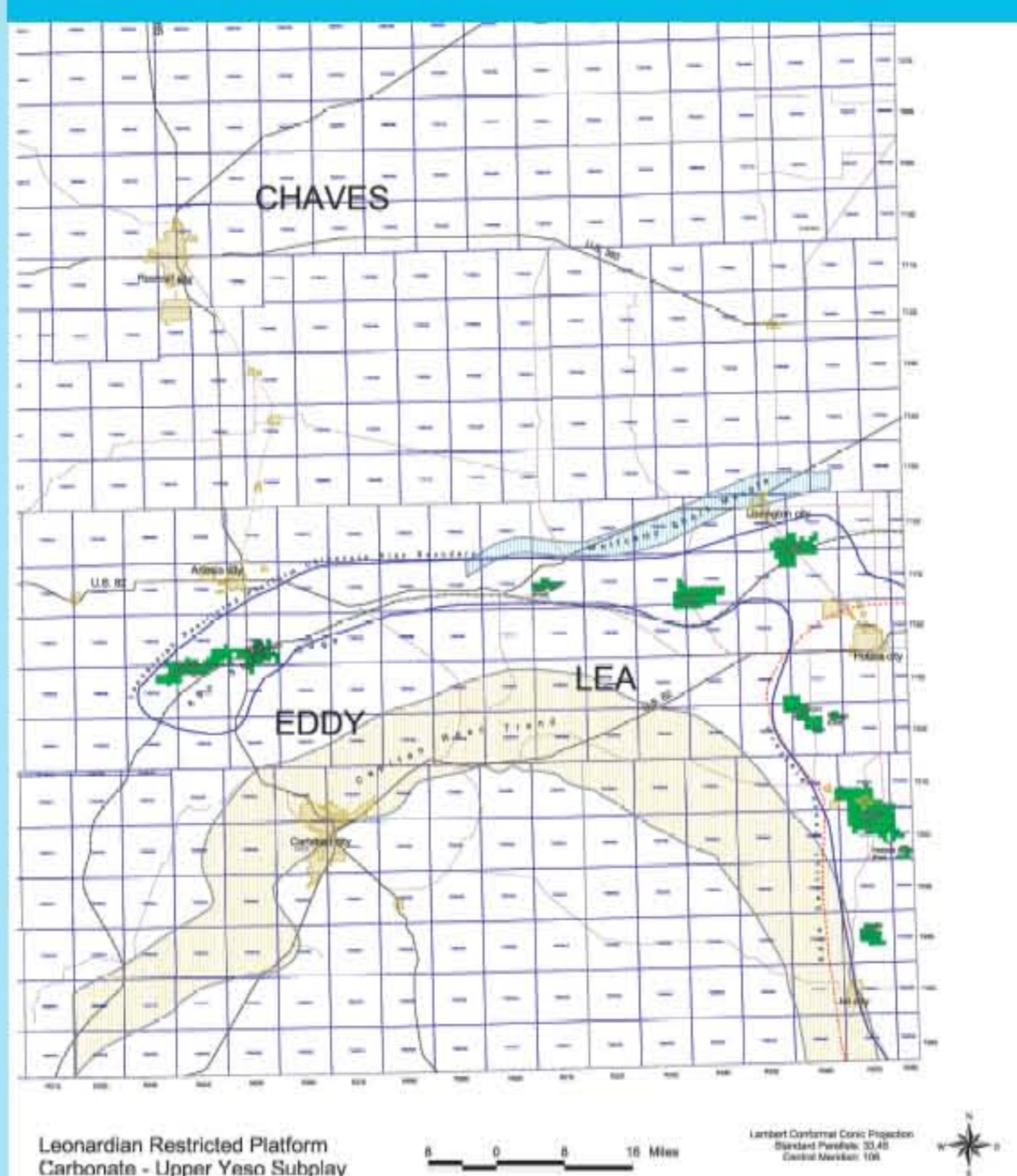
Reservoirs in the Leonard Restricted Platform Carbonate Play lie on the Northwest Shelf of the Permian Basin and on the Central Basin Platform. On the Northwest Shelf, the play extends along a curvilinear trend near the shelf margin and extends east into Texas. On the Central Basin Platform, the play extends along a trend on the western edge of the platform and south into Texas. Reservoirs are mostly dolostones and limestones in the Yeso Formation (Permian: Leonardian) but Yeso sandstones are productive in some reservoirs. Reservoir strata were deposited on a restricted carbonate platform and a variety of depositional facies are present. Traps are generally formed by low-relief anticlines. Facies variations in reservoir strata create porosity pinchouts on anticlinal noses as well as unevenness in reservoir quality across a structure, resulting in compartmentalization of some reservoirs. A single structure may yield productive pay in multiple zones. There are 102 known discovered reservoirs in the New Mexico portion of this play, 34 of which have produced more than 1 MMBO. Cumulative production from these 34 reservoirs was 431 MMBO as of 2000.

Permian	Leonardian	west Texas stratigraphy	New Mexico stratigraphy	New Mexico subplays	Number 1 MMBO reservoirs in subplay	Cumulative oil production MMBO	
		San Andres Fm.	San Andres Fm.				
		San Angelo Ss.	Glorieta Fm.				
		upper Clear Fork Fm.	Yeso Fm.	Paddock member	upper Yeso subplay	10	
	Blinebry member			Blinebry subplay			12
	Tubb sandstone			Tubb member	Tubb subplay	4	44
	lower Clear Fork Fm.			Drinkard member	Drinkard subplay	8	117
		Wichita Gp.	Abo Fm.				

In New Mexico four subplays are defined by the stratigraphic unit or units from which production is obtained within a reservoir:

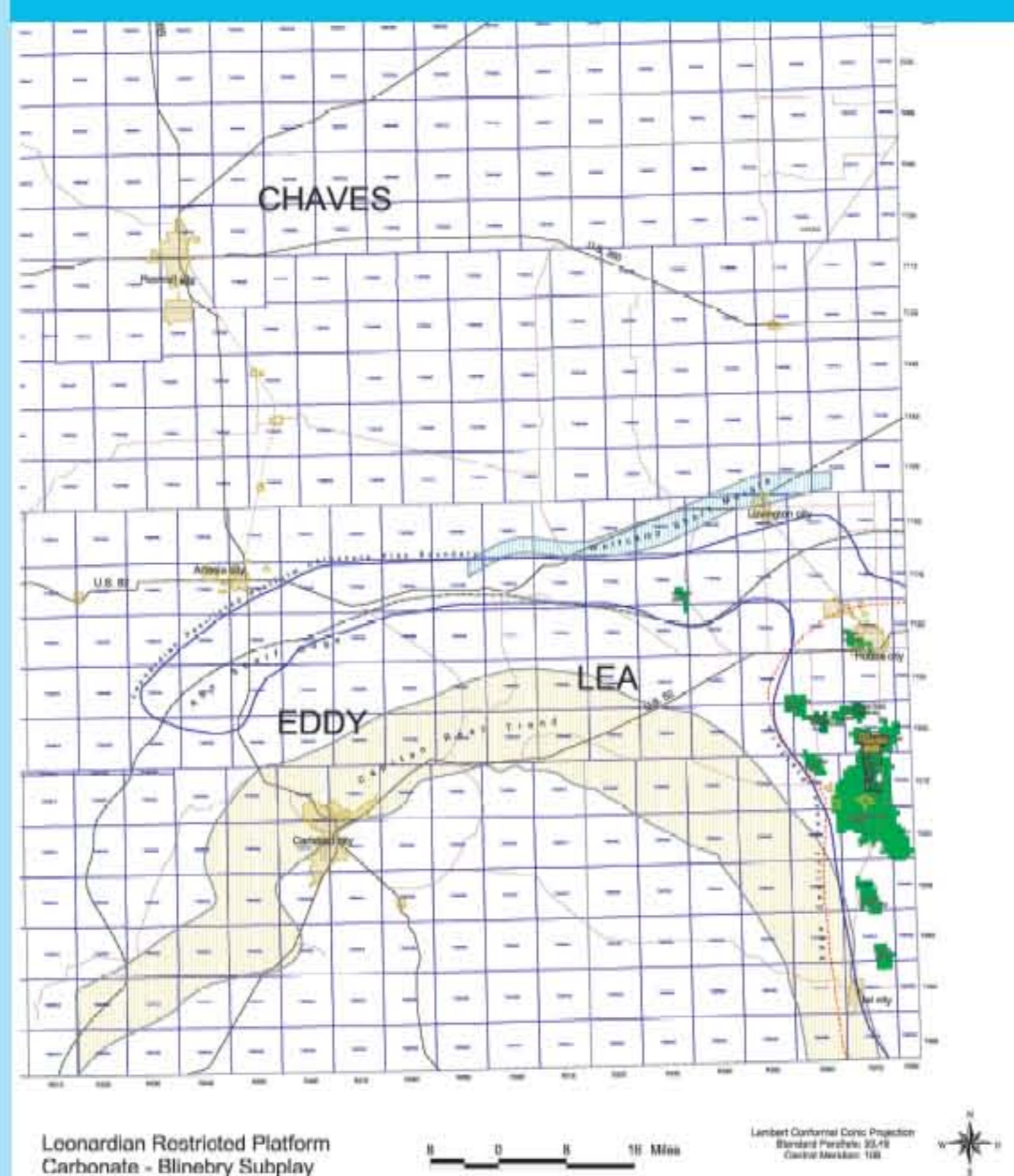
1. **Upper Yeso subplay** (Glorieta Formation & Paddock member of Yeso Formation)
2. **Blinebry subplay** (Blinebry mbr of Yeso Fm.)
3. **Tubb subplay** (Tubb mbr of Yeso Fm.)
4. **Drinkard subplay** (Drinkard mbr of Yeso Fm.)

upper Yeso subplay



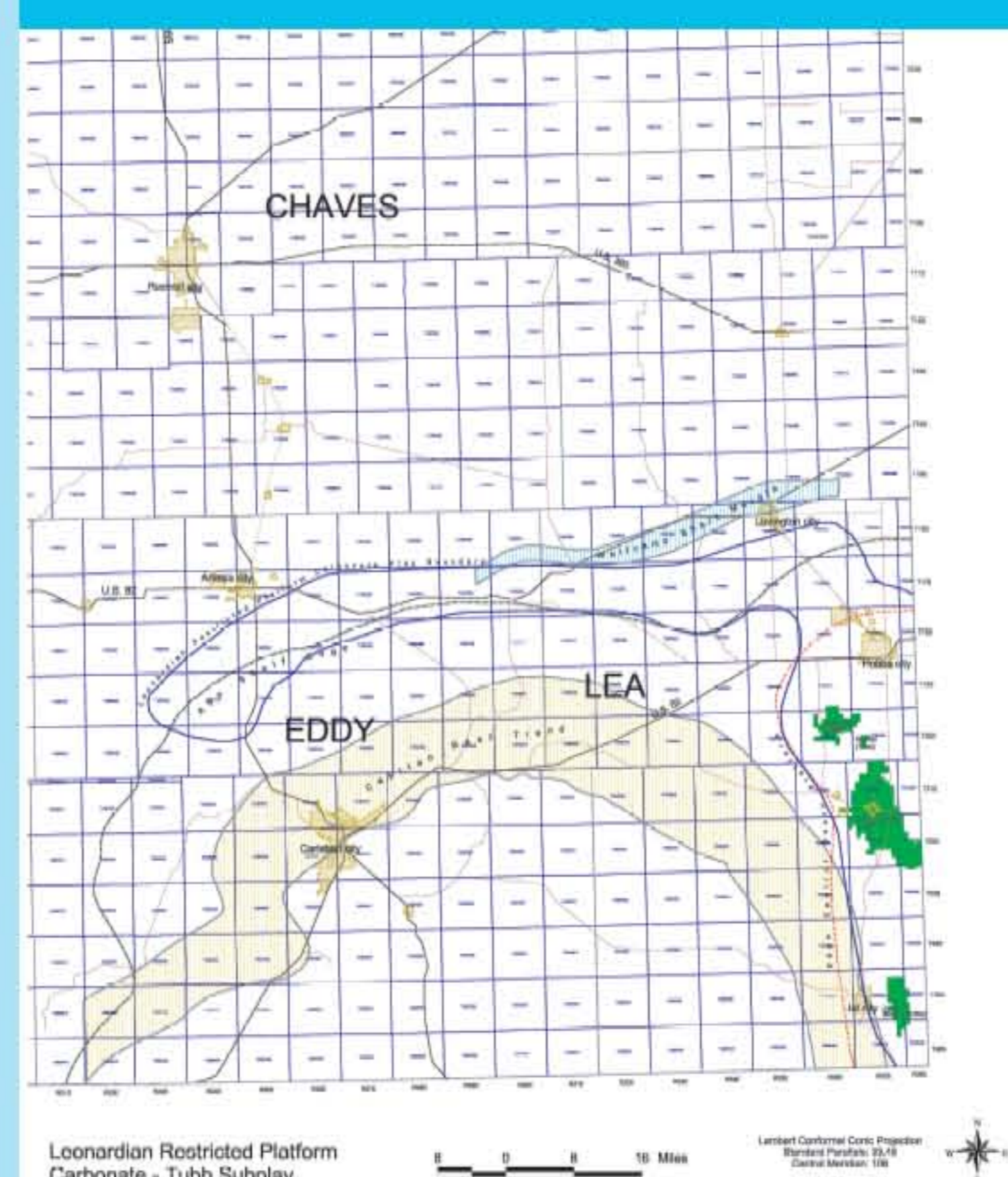
Reservoirs with > 1 MMBO cumulative production in the Leonard Upper Yeso subplay.

Blinebry subplay



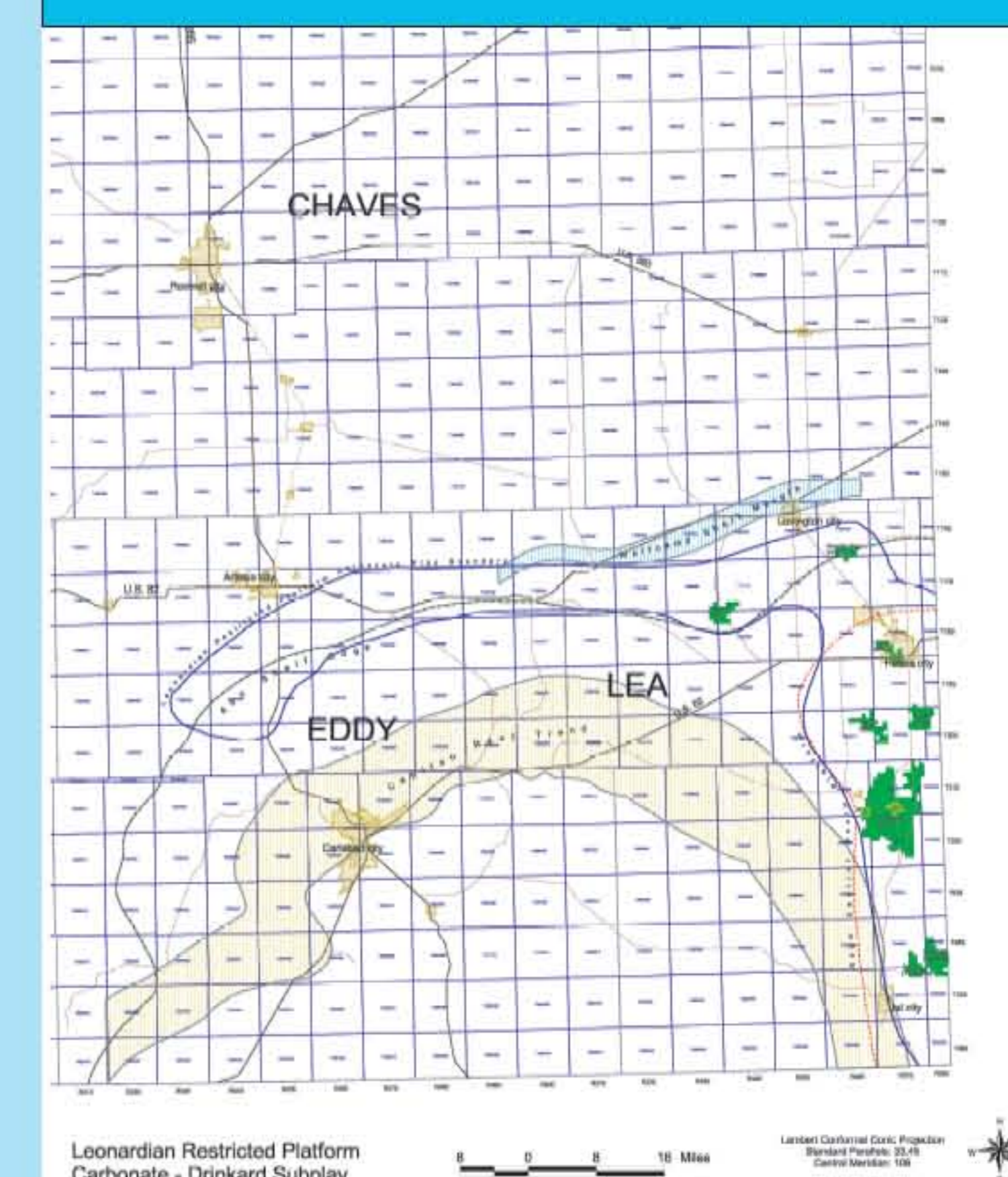
Reservoirs with > 1 MMBO cumulative production in the Leonard Blinebry subplay.

Tubb subplay



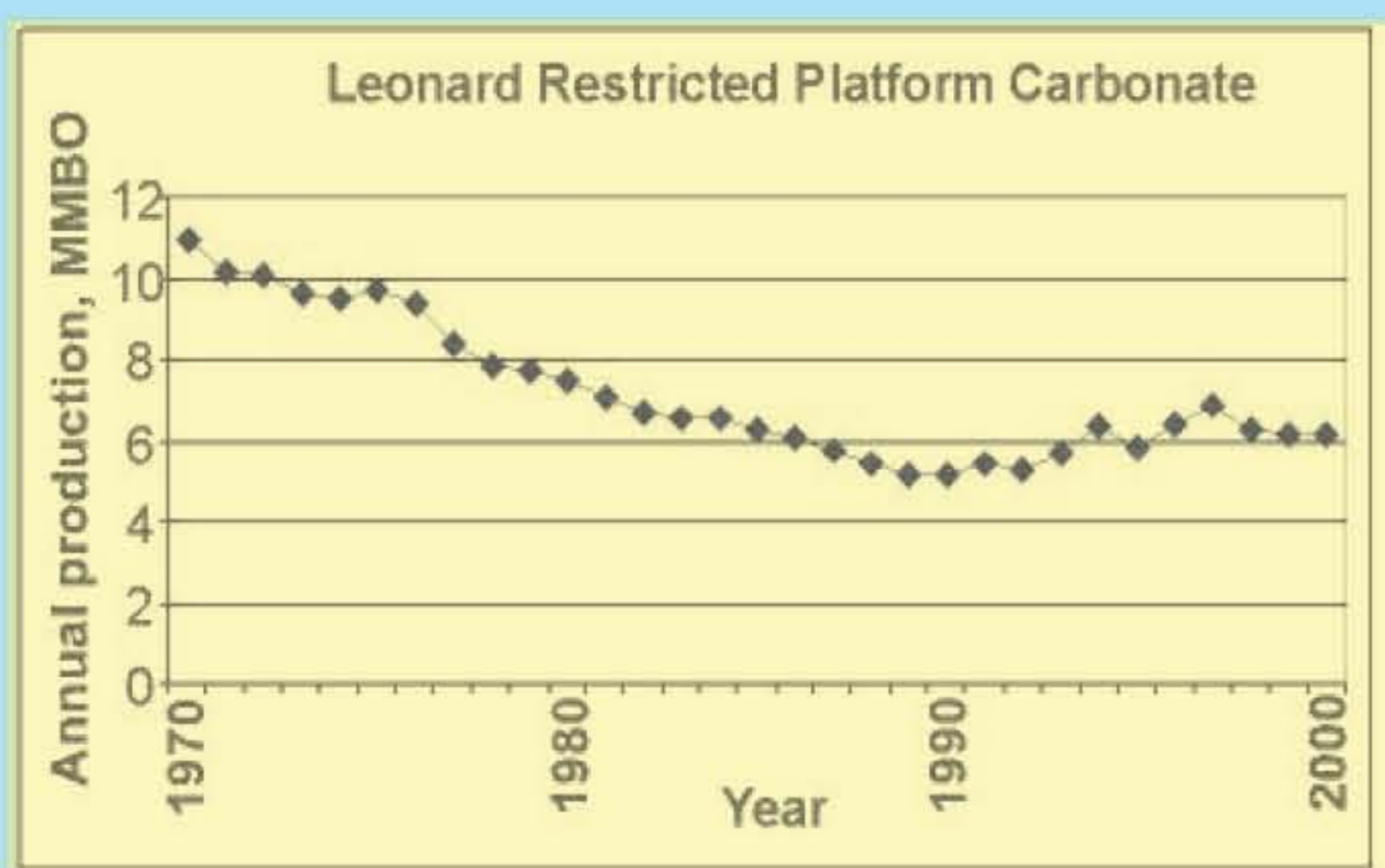
Reservoirs with > 1 MMBO cumulative production in the Leonard Tubb subplay.

Drinkard subplay

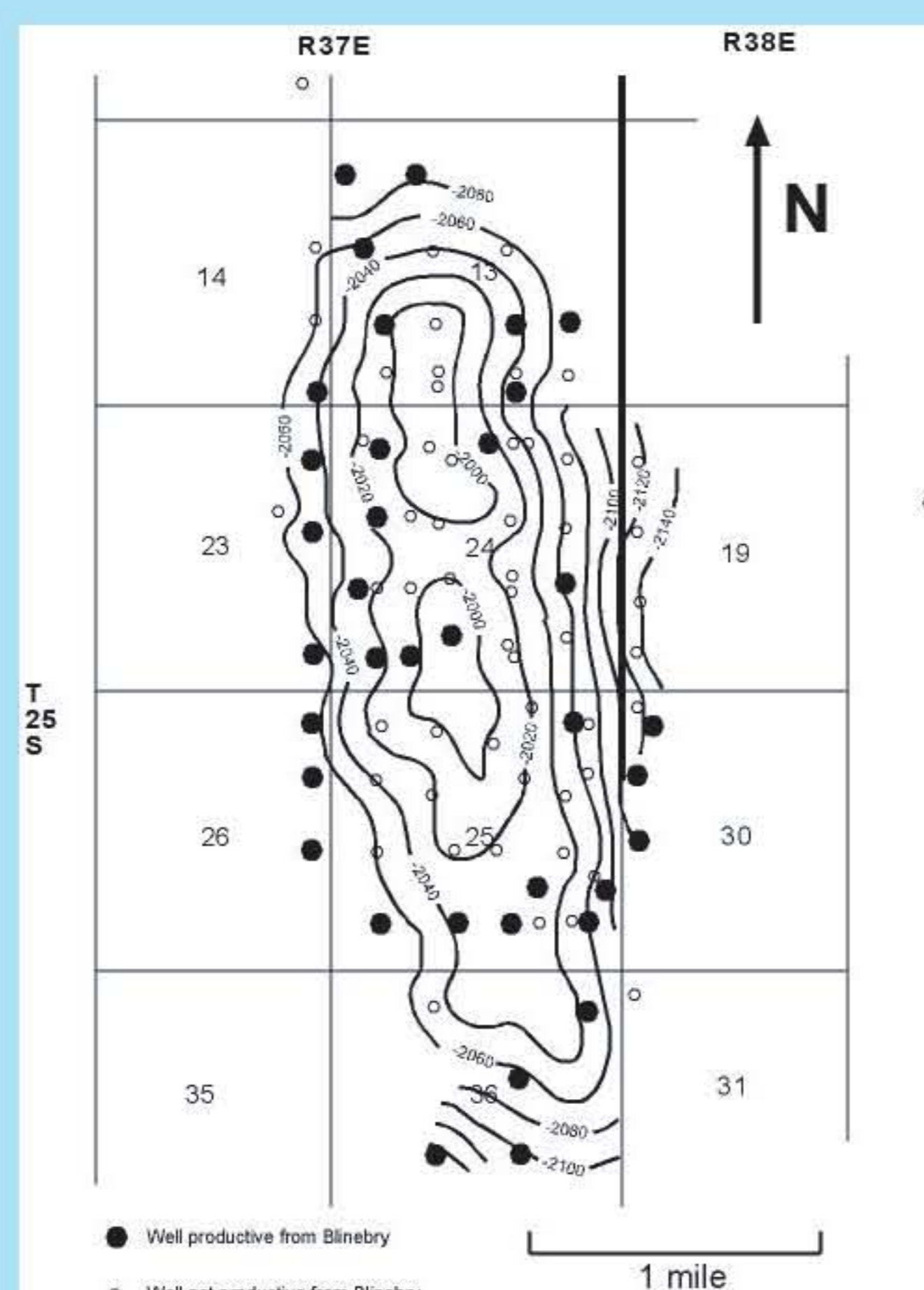


Reservoirs with > 1 MMBO cumulative production in the Leonard Drinkard subplay.

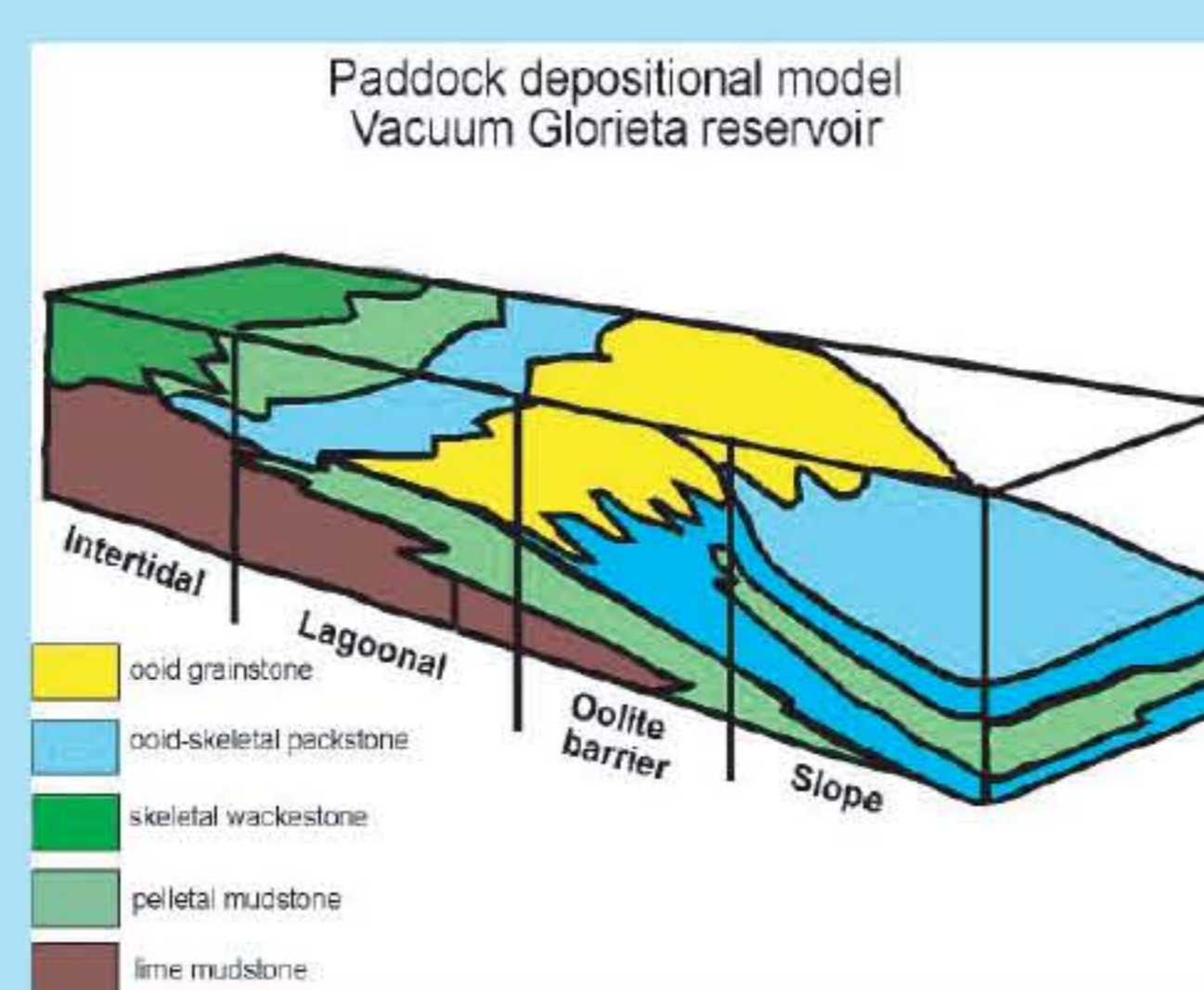
Production History



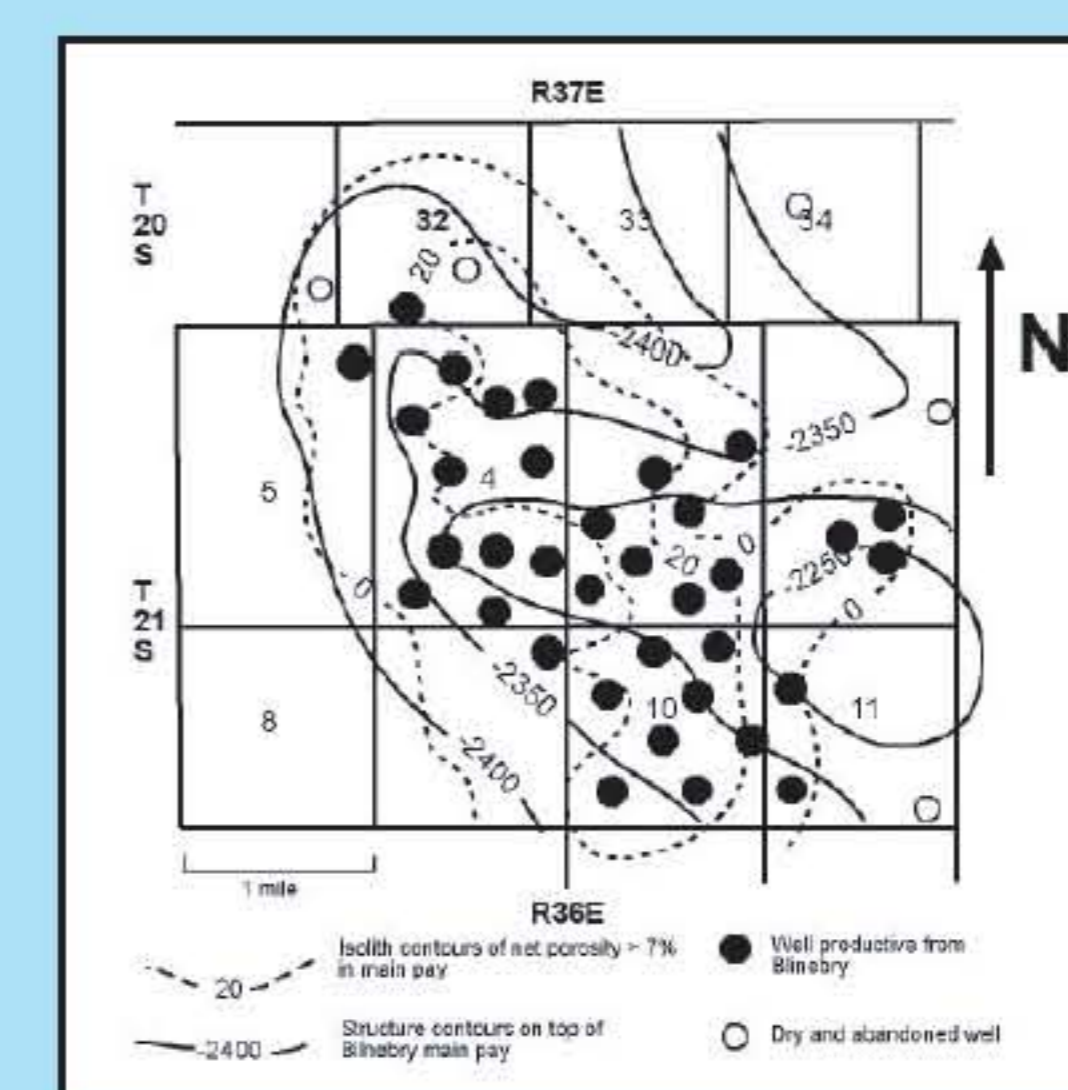
Production from this play has been in decline over the past 30 years as the large reservoirs, mostly discovered before 1965, were depleted. The increase in total production from this play during the early 1990's was a result of waterflooding and increased production in the Blinebry, Dollarhide, Vacuum, and Warren reservoirs.



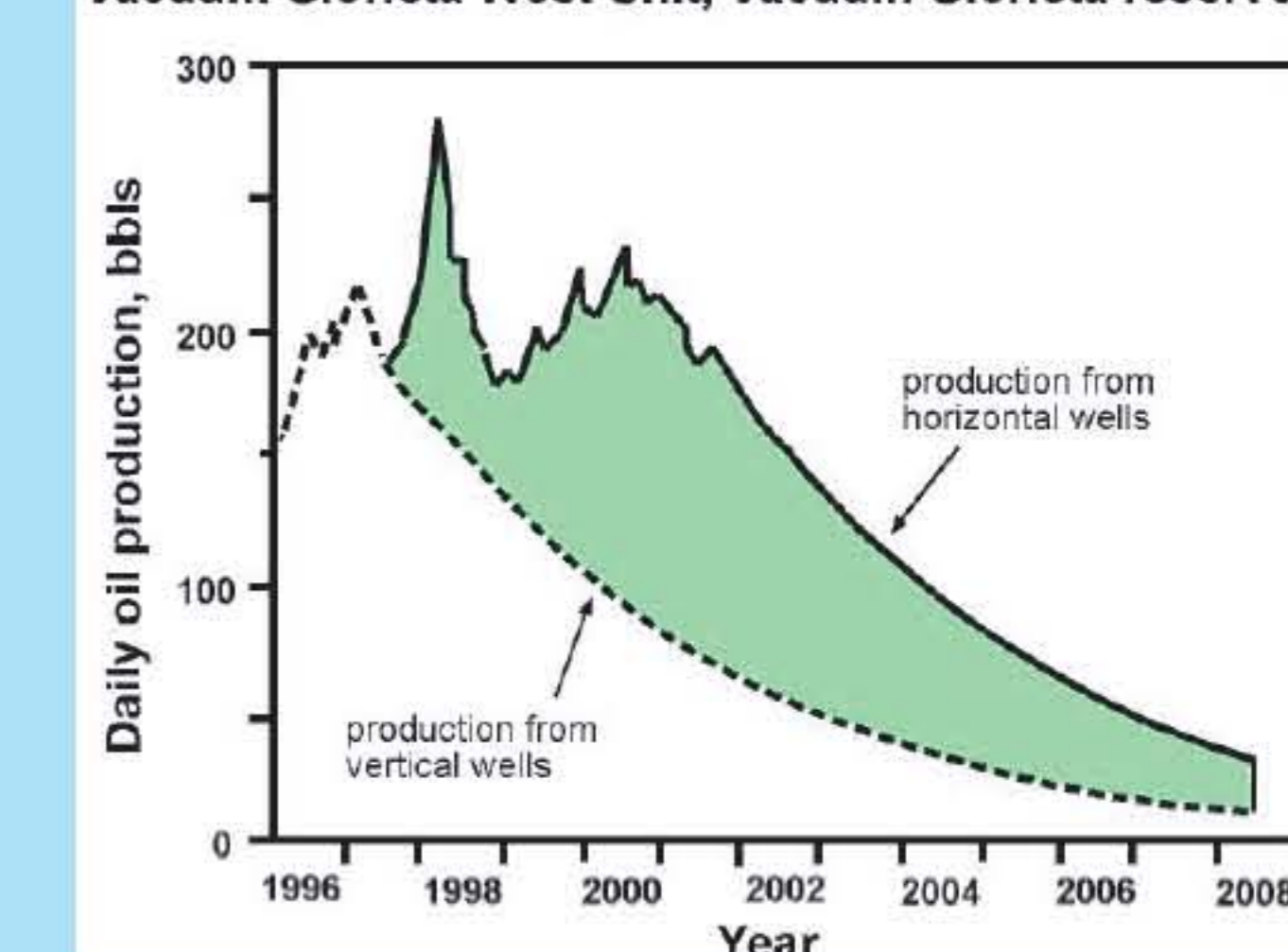
This structure contour map of the Blinebry member at the Justis Blinebry reservoir shows a typical trap in this play, formed by a low-relief anticline. One structure will typically form traps in multiple pay zones within multiple members of the Leonardian Yeso Formation. After Marshall and Foltz (1960).



The best reservoir strata are not blanket or sheet deposits that cover an entire trap-forming anticline. The block diagram of depositional environments in the Paddock member at the Vacuum reservoir (after Burnham, 1991) shows that the oolite barrier (which is the most prolifically productive facies) is not everywhere present. This type of facies distribution explains porosity trends in the Oil Center Blinebry reservoir (right; from Kincheloe and David, 1977) which are not evenly spread across the trap-forming structure.



Vacuum Glorieta West Unit, Vacuum Glorieta reservoir



The Paddock reservoir at Vacuum Glorieta consists of interbedded and interfingering facies, some of which are more densely fractured than others. The Paddock was waterflooded at the Vacuum reservoir. Premature water breakthrough in fractured lower Paddock dolostones left bypassed recoverable oil remaining in unfractured upper Paddock grainstones (Martin and Hickey, 2002). Texaco drilled 31 horizontal laterals off of existing vertical wells in the unfractured grainstones in an effort to produce unswept oil. 24 laterals were used as production wells and 7 laterals were used as water injection wells. The result was a substantial increase in production with an ultimate increase in recovery projected to be 2.6 MMBO. From Martin and Hickey (2002).