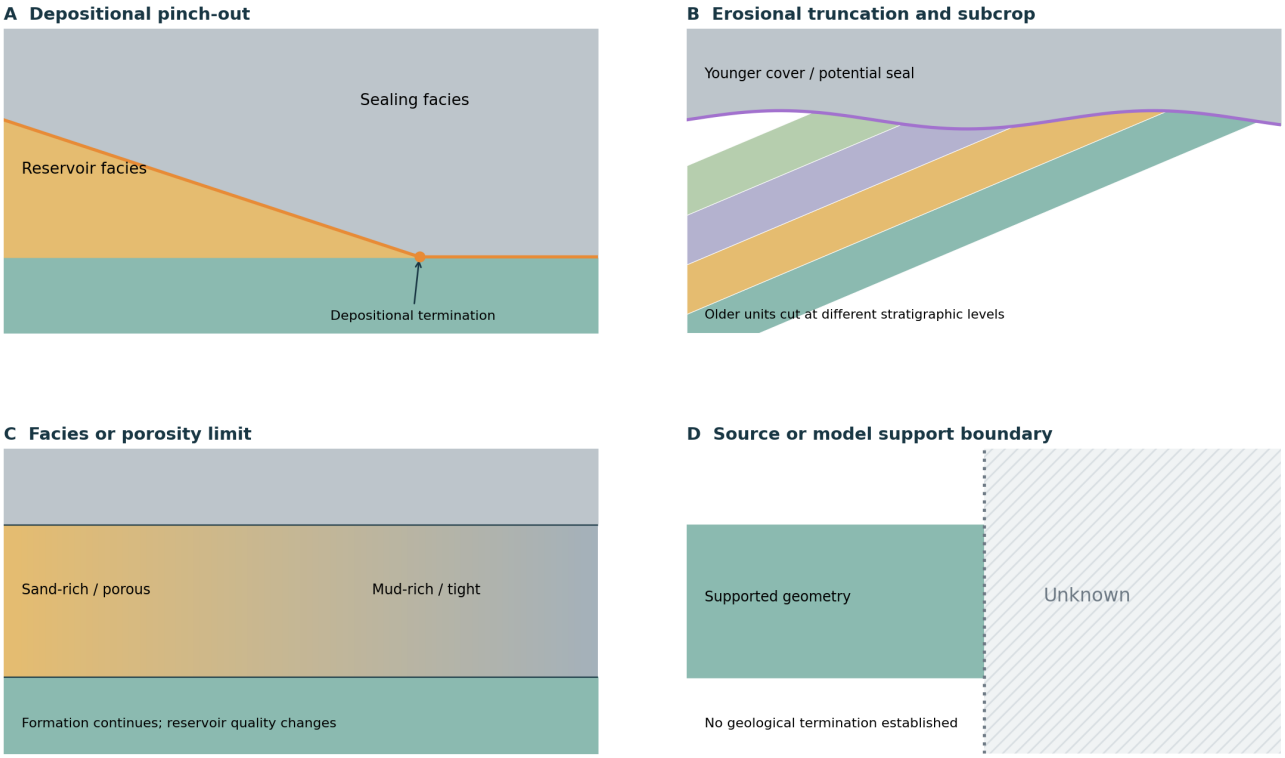
SASKATCHEWAN + MANITOBA / INTERPRETATION GUIDE

Formation edges and erosional surfaces

How to read zero edges, pinch-outs, thinning contours and model limits

A shared guide for the regional map atlases and 3D / VR models. The purpose is to preserve the distinction between published geometry, a proposed geological mechanism and the limits of available control.

Four edges that must remain different in maps and 3D



CONCEPTUAL - NOT TO SCALE. A published zero edge identifies a limit of preserved occurrence; its origin requires additional evidence.
Only A is a depositional pinch-out. B records removal. C is a reservoir-property change. D records an evidence limit.

Original conceptual cross-sections. They explain classification, not mapped positions or local closure. A zero-thickness line does not alone identify its cause.

Read the evidence class before interpreting a line

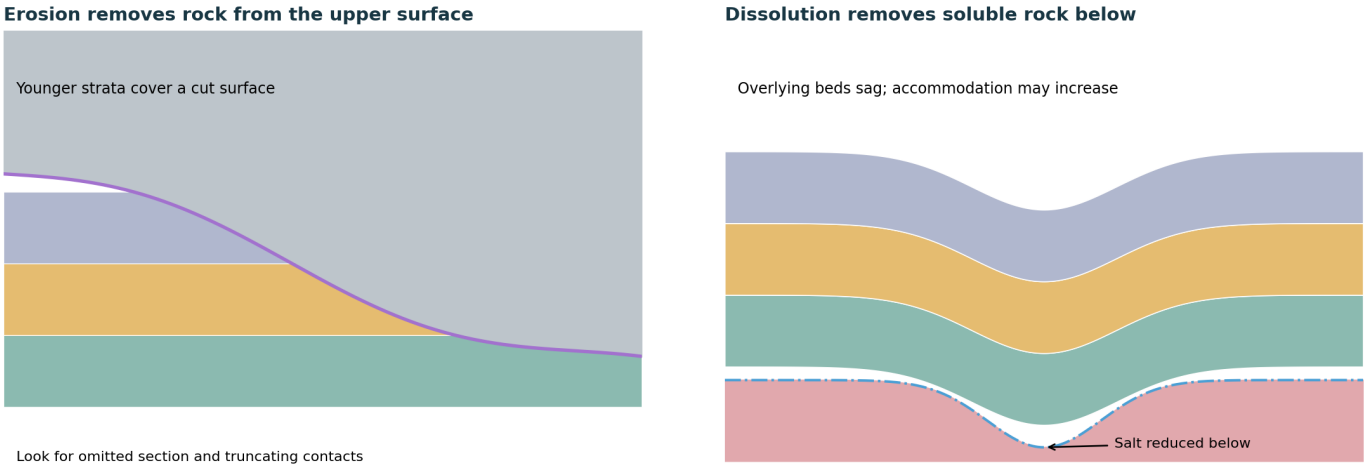
Class	What it establishes	What it does not establish
Published formation zero edge	The source maps a limit at which the named preserved interval is absent or approaches zero.	Depositional origin, exact subcrop position, a reservoir seal or a fluid contact.
Depositional pinch-out	The bed or facies body terminates through its original accumulation pattern, supported by correlation/facies evidence.	That the enclosing formation disappears, or that hydrocarbons are present.
Erosional truncation / subcrop	A younger surface removes older strata; the affected older unit meets that surface.	Original shoreline direction or preserved reservoir quality.
Reservoir facies / porosity limit	Connected sand, dolomite porosity or another effective reservoir property changes laterally.	A zero edge of the entire formation.
Model-derived thin interval	A positive low-thickness contour from the specified supported top/base interval.	Zero thickness or proof of either deposition or erosion.
Support limit / map clipping	The available model, data or project domain ends.	Geological absence. It is retained as an uncertainty boundary.
Salt-dissolution front	Evidence suggests removal of soluble strata and associated modification of the overburden.	An erosional land surface or a reliably sealed petroleum trap.

A zero edge identifies where a preserved interval reaches its mapped limit. Classifying its origin requires additional evidence. A named stratigraphic contact or administrative polygon boundary is not automatically a zero edge. Published mapping may contain both erosional and depositional segments; preserve that uncertainty instead of assigning one cause to the entire line.

Three spatial relationships to reconstruct

- Formation preservation: where the complete named interval remains and where it is omitted or removed.
- Reservoir distribution: where connected sand, carbonate fabric or secondary pores occur inside that preserved interval.
- Trap and seal: where structure, juxtaposition and fluid history could retain hydrocarbons. Neither of the first two maps supplies this automatically.

A missing interval can have more than one geological cause



CONCEPTUAL - NOT TO SCALE. Both processes can modify thickness, structure and seals; they can also act at different times in the same area.
Compare multiple horizons, core fabrics, evaporite residues and the timing of overlying thickening before assigning a mechanism.
A fracture or collapse trend may enhance flow, compartmentalize it or breach a seal; it is not automatically a trap.

Original conceptual comparison. Manitoba examples include pre-Mesozoic truncation and the documented local Manson dissolution/structural interpretation. Sources R01-R03 and R17 in the main study.

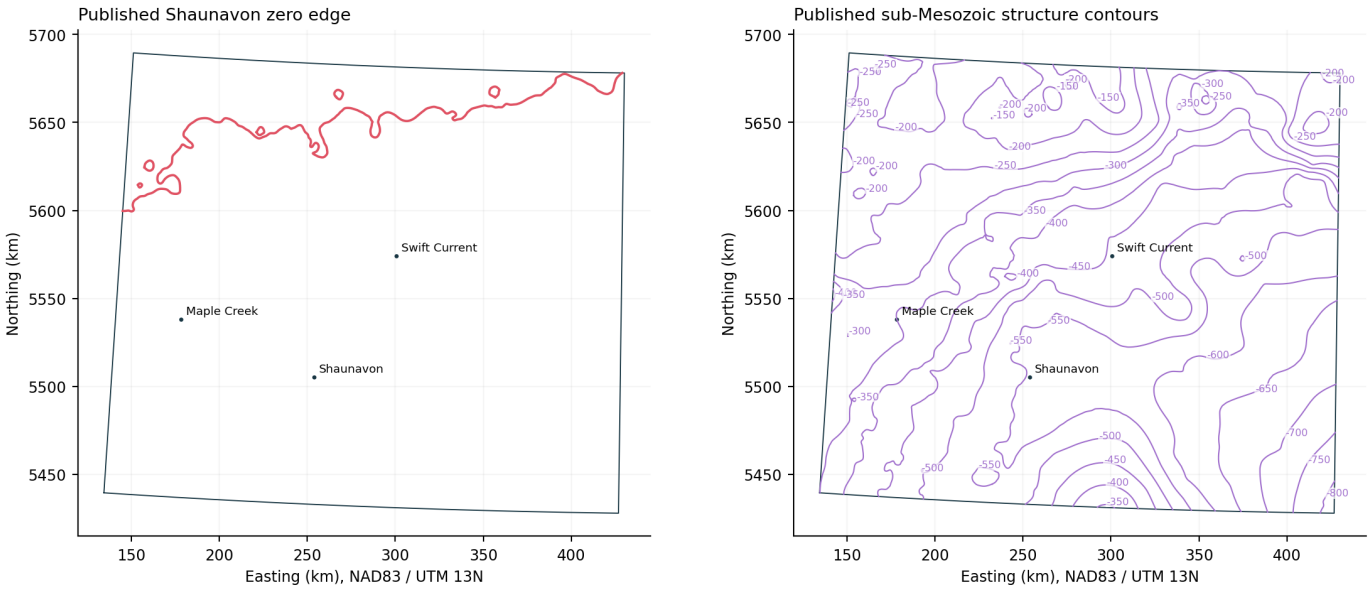
Evaluate the alternative explanation

An apparent thickness low may reflect nondeposition, erosion, dissolution, a composite interval, a miscorrelated pick or model support. Test contrasting explanations with correlated wells, sample fabrics and several bounding horizons. A more detailed line drawing is not a substitute for these observations.

Saskatchewan: independently published edges

Saskatchewan: source-mapped zero edges and erosional-surface contours

The two line classes answer different questions; their attributes must not be interchanged.



Actual provincial GIS geometry, clipped to southwest study. Zero-edge cause remains unclassified. Structure values are source elevations in metres.
The regional framework was prepared on modified 2 km grids; detailed vector vertices do not establish pool-scale accuracy.
Source: Marsh and Love (2014), SGS Open File 2014-1; Saskatchewan Mesozoic map services. No new fault or prospect boundary inferred.

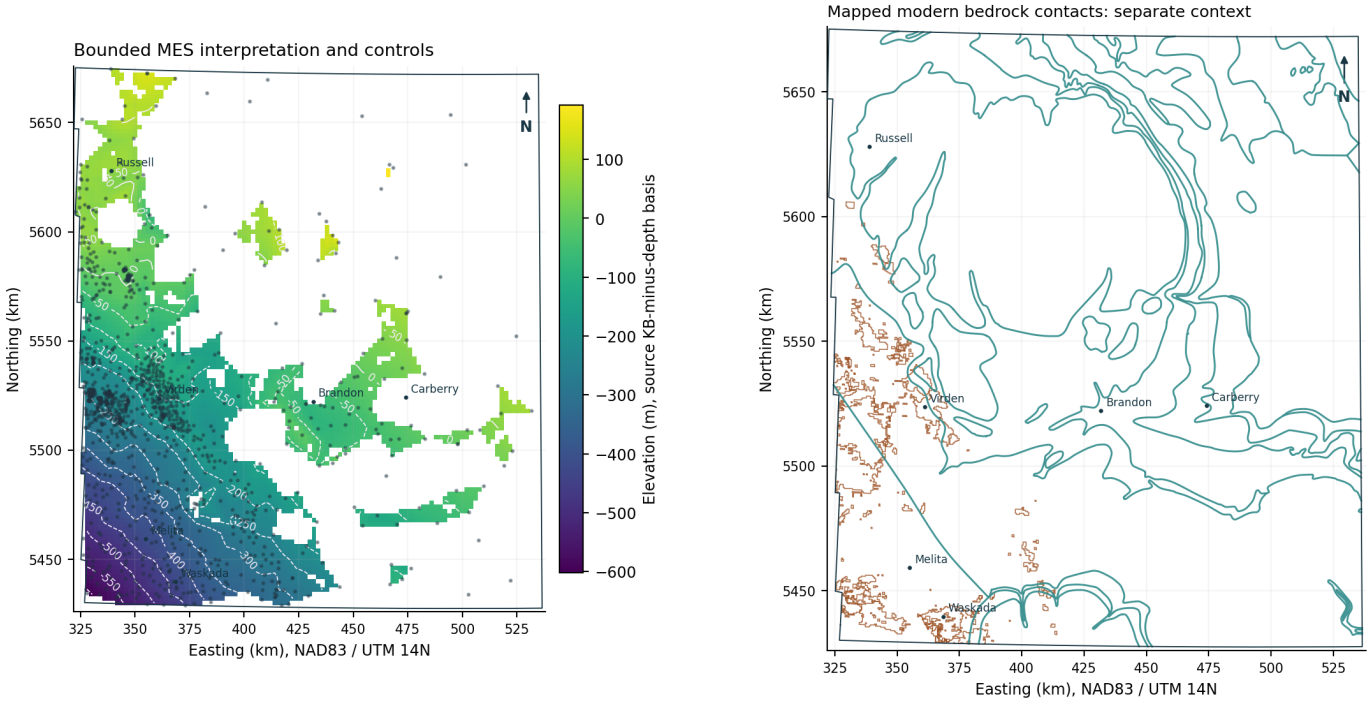
Actual government GIS lines. The Shaunavon zero-edge layer supplies occurrence-limit geometry, not genetic classification or elevation. The unconformity contour layer supplies mapped structural elevations. Source: SGS Open File 2014-1 and Mesozoic GIS.

The provincial geological map layers provide independently mapped zero edges. Their source class is retained; unspecified genetic origin remains unspecified. Arbitrary CAD ZLEVEL values on a zero-edge layer must not be treated as elevation. Only a structure-contour layer with a documented elevation attribute supplies a structural contour value.

Manitoba: subcrop interpretation and a picked surface

Two different surfaces: buried sub-Mesozoic and modern bedrock

Do not interpret a modern contact as a deep subcrop or an original depositional shoreline.



MES: 1,173 accepted vertical-classified records; 1,163 unique locations; 4,202 supported 2 km nodes. 50 m contours.
No extrapolation: within control hull, 7.5 km of a control, maximum 20 km triangle edge. Five-fold holdout MAE 5.965 m; RMSE 10.002 m.
38 conflicting display nodes masked; source picks retained. Holdout is not independent pick validation; full surveys/datum conversion unverified.
Sources: MGS TGI historical MES records; Manitoba mapped bedrock contacts; existing pool inventory. Erosional relief is not a mapped trap.

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Published subcrop maps and the bounded historical-pick surface answer complementary questions: which older unit is exposed beneath cover, and the elevation of the picked unconformity. A model-support outline and a small positive isopach are separate, lower-order evidence layers. They must not be presented as measured geological zero edges.

Custom contours in 3D and VR

- Select the formation and choose structure or gross interval thickness. Structure contours describe an elevation surface; thickness contours describe a top/base difference, not an elevation. A thickness isoline displayed on a formation plane is still an attribute contour.
- Set a positive contour interval in metres. The offset selects the reference level for that sequence. For example, 50 m with zero offset gives ..., -100, -50, 0, 50, 100 ... for elevations; a 10 m thickness interval gives 0, 10, 20 ... only where supported values actually cross those levels.
- Contours are calculated from the same supported grid triangles used for the display. Null or unsupported triangles must not be bridged. A small interval produces more lines; it does not add well control, improve the 2 km source resolution or establish a smaller feature.
- Compare top and base structure, where a valid base is available, with gross thickness. Parallel structure and nearly constant thickness are different from converging top/base surfaces. Neither pattern alone determines geological cause.
- Use the classified-edge layer and source inspector separately from custom contours. A chosen 5 m contour is a thinning indicator, not an official zero edge. The absence of a 0 m contour does not prove the unit never terminates; the mapped values may end at a source-support limit.
- In VR, keep vertical exaggeration visible. Exaggeration alters the visual steepness of structures and apparent spacing in elevation. It does not change source metres, the chosen contour values or the horizontal position of the classified edge.
- The portable GLB downloads contain fixed 50 m structure contours. Adjustable intervals and offsets are controls in the live browser / VR viewer. Edge segments without supported formation elevation remain separately named reference context at 0 m in the portable package; that reference height is not a geological depth.

A defensible local extension test

Question	Supporting observation	Contrary or unresolved evidence
Is the target present?	Correlated top/base or a documented reservoir bed in penetrating wells.	No penetration, absent or uncertain picks, ambiguous correlation.
Is the edge geological?	Source-classified edge or local stratigraphic evidence of termination.	Mesh boundary, clipping line, sparse data or arbitrary positive isopach.
What caused it?	Truncation, onlap/facies relations, dissolution fabrics and event sequence.	Several mechanisms explain the same geometry.
Is there connected reservoir?	Core-calibrated properties and continuity at the target interval.	Cemented pores, muddy fill, isolated vugs or disconnected bodies.
Can oil or gas be retained?	Charge evidence plus effective seal/trap and compatible fluid data.	Water-bearing test, breached seal, immature source without migration evidence.

These tests organize geological investigation; they do not calculate reserves, recommend a drilling location or assign a discovery probability.

Primary references

Saskatchewan Mesozoic mapping service

https://gis.saskatchewan.ca/egis/rest/services/Economy/Mesozoic/FeatureServer

Manitoba Williston Basin TGI maps

https://www.manitoba.ca/iem/geo/willistontgi/maps.html

Manitoba TGI 3D model and historical databases

https://www.manitoba.ca/iem/geo/willistontgi/3dmodel.html

Nicolas and Barchyn (2008), Paleozoic synthesis, GP2008-2

https://www.manitoba.ca/iem/info/libmin/GP2008-2.pdf

Nicolas (2009), Mesozoic synthesis, GP2009-1

https://www.manitoba.ca/iem/info/libmin/GP2009-1.zip

Nicolas (2012), Three Forks stratigraphy, GR2012-3

https://www.manitoba.ca/iem/info/libmin/GR2012-3.pdf

Fulton-Regula (2024), Manson reservoir observations

https://www.gov.mb.ca/iem/geo/field/roa24pdfs/GS2024-23.pdf

Manitoba M-2: Mississippian erosion and subcrop map

https://www.gov.mb.ca/iem/geo/stratmaps/pdfs/m-2.pdf

Manitoba P-1: Paleozoic erosion map

https://www.gov.mb.ca/iem/geo/stratmaps/pdfs/p-1.pdf