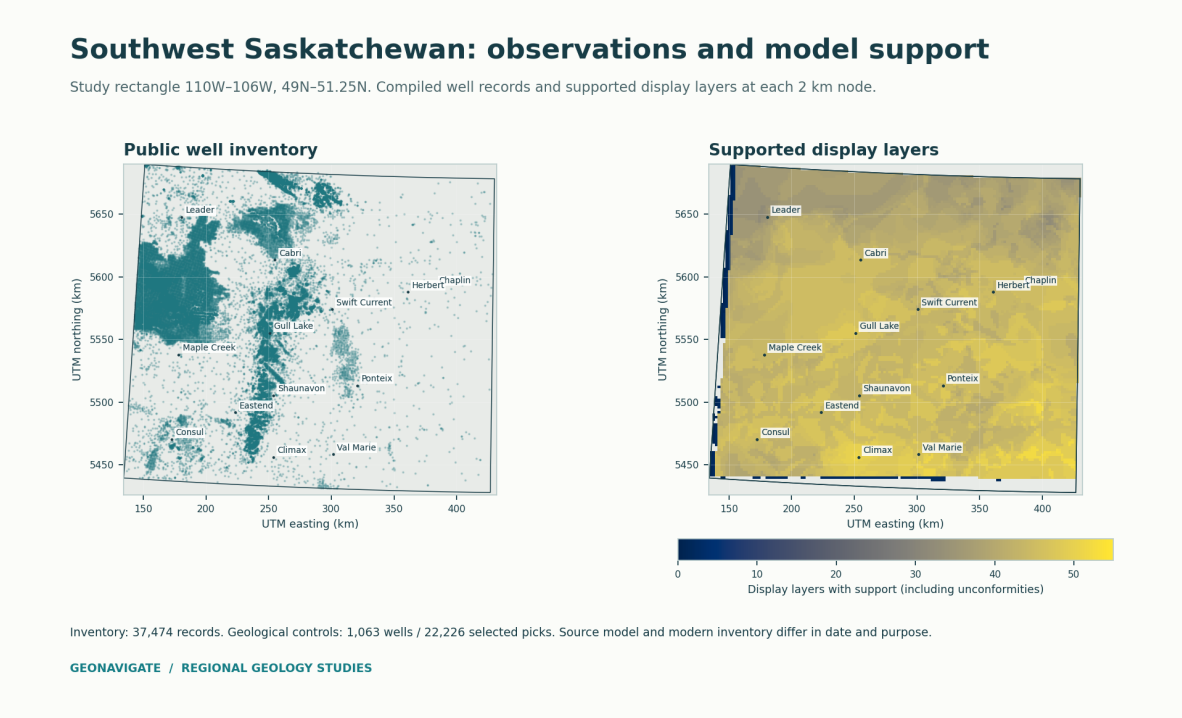
WESTERN CANADA SEDIMENTARY BASIN / SASKATCHEWAN

Southwest Saskatchewan

Geology, paleoenvironments and hydrocarbon potential

An independent regional study from the Alberta border to 106W,49N to 51.25N. Formation architecture, mapped wells and pools, depositional reconstructions and testable reservoir settings are integrated in a separate 3D/VR viewer.

3D display layers	Mapped pool features	Well inventory records
55	176	37,474



Compiled public well records and exact sampled source support across the SW study window. Dense wells do not guarantee detailed stratigraphic or survey data. The support count is not a reservoir-quality score.

Prepared 27 October 2026. Regional evidence synthesis and screening; no discovery probability, resource volume or drilling location is assigned.

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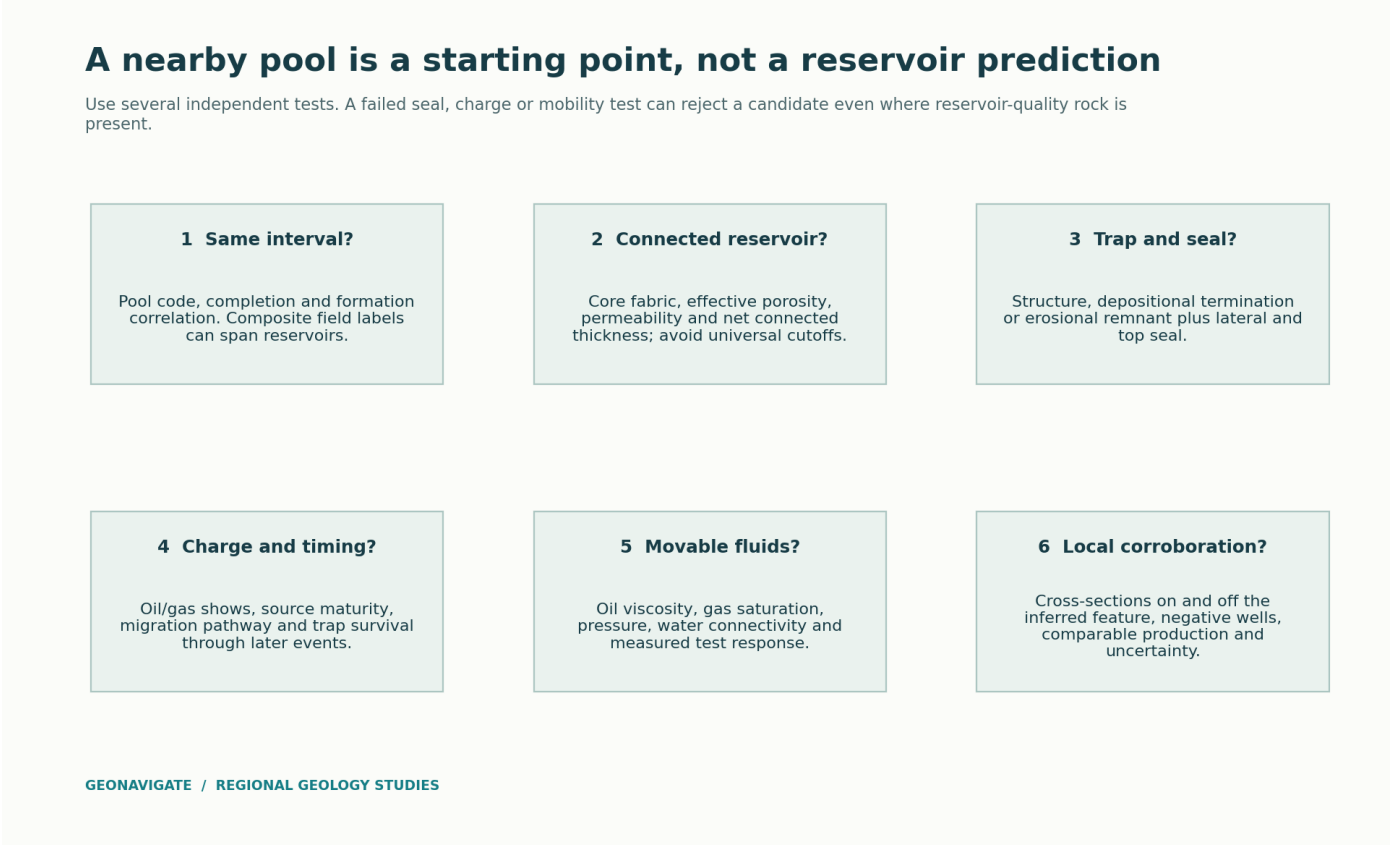
Regional findings and how to use this study

A separate western Saskatchewan regional study connecting formation geometry, depositional environments, actual published reservoir examples and testable near-pool hypotheses. The strongest small-pool analogues involve Upper Shaunavon tidal bodies, Lower Shaunavon diagenetic compartments, Roseray-Success remnants, Madison paleohighs and distinct Cretaceous shallow-gas systems.

The most useful next geological questions

- Upper Shaunavon: test stacked tidal-inlet, shoal and mixed carbonate-clastic bodies around established production. A local channel trend does not locate the regional coastline.
- Lower Shaunavon: correlate carbonate cycles and separate depositional fabric from dissolution, dolomitization and cement. Broad presence does not imply uniform connected permeability.
- Roseray-Success: reconstruct preserved sandstone remnants and the younger Cantuar valleys that cut and may seal their flanks. A remnant edge is not necessarily a depositional sand pinchout.
- Madison around Battle Creek and Rangeview: test buried paleohighs, altered carbonate and retained seal, while accounting for low-gravity oil, cement and water connectivity.
- Shallow western gas: distinguish discrete Belle Fourche reservoirs such as Senate from the low-permeability Milk River-Alderson system; their facies, fluid and completion questions differ.

These themes are supported in the formation chapters and named local settings below. They define an evaluation sequence, not a ranking of undiscovered reserves.



Interpretive workflow, not a numerical chance-of-success model. No discovery probability or reserves estimate is assigned. Local geological similarity must be established at the target horizon; surface distance alone is insufficient.

Scope, data and evidence limits

Core: 110°W to 106°W, 49°N to 51.25°N. This release clips model geometry and well inventory to that core. A 20 km shared context buffer is a rule for joining future regional builds; it is not additional modeled coverage in this release. Saskatchewan side of the Alberta border, including the Shaunavon and Swift Current districts and southwestern shallow-gas province. Dodsland/Kindersley are northern context for a later tile. All-age catalogue includes reservoirs, seals, possible source facies, unconformities and overburden; formation presence is conditional on actual mapped/well support.

Dataset	Included in this release	Interpretive limit
Regional model	55 display layers;45 stratigraphic units;7 unconformities;71,618km²	Derived from original published final-cut surfaces on a 2 km display grid. Layer count also includes basement and undivided/preliminary cover. It is not a count of independently mapped formation tops.
Historical well tops	1,063 public control wells;22,226 positive selected picks	Independent SPFPS well-pick compilation; not claimed as the identical edited 2023 modeling database.
Published model markers	19,856 source XYZ markers	Marker count is not well count; source points without UWI are not forcibly joined.
Well inventory	37,474 records after source processing	Bore identifiers, event records, plan traces, depths and sample catalogue matches retain their stated source basis.
Oil and gas pools	176 source features	Designated polygons are not fluid contacts or exact reservoir extents.
Samples and well logs	Core/cuttings catalogue availability and public well references where acquired	Catalogue presence is not sample examination. Individual log files and completion tests are not exhaustively interpreted.
Production and reserves	Published historical examples within their source dates	This release does not claim a complete well-by-well monthly production archive or estimate remaining reserves.

Current well-data coverage

Record class	Count / basis
Drilled or in-progress bores	35,294; source Drilling status is not completedTD
Horizontal classifications	5,943 total, including planned/cancelled legs
Mapped nonvertical plan traces	7,383; no complete depth-indexed surveys acquired
Reported measured depth	36,190 records; metres below source KB reference
Reported vertical depth	36,186 records; distinct from measured depth
KB elevation matched	1,061; other depth displays are relative, not known subsea positions
Historical bottom-formation match	27,146; conservative UWI and depth reconciliation, not new log interpretation
Sample catalogue match	10,091 bores; availability, not examined samples

Source inventory definitions

Aggregate completion associations by exact WELLBORE_CWI; preserve Boss, Leg and Whipstock bore IDs and all source OBJECTIDs. Full raw source attributes retained separately.

Depth / TD formation limitations

Historical BOTTOM_FM is used as TD formation only where normalized bore UWI matches uniquely and legacy total depth and current reported MD differ by no more than 5m; it remains a historical source interpretation, not a new log pick. Completion formations are separate attributes.

Pool placement on modeled surfaces

Of 176 designated pool features, 133 have some supported formation-surface placement and 43 remain entirely on the reference plane. Sixty-four have some fallback geometry, including 21 that also have supported placement. Partial geographic model support and unresolved commingled intervals are separate reasons for fallback. A draped polygon illustrates the named regional reference horizon; it does not locate every producing bed or define a fluid contact. Roseray has no independent modeled surface and remains unassigned in depth.

Regionalmodel

55 display layers derived from 49 distinct source-top geometries: 45 stratigraphic units, basement, 2 undivided/preliminary cover entries and 7 unconformities.

Currentinventory

37,474 wellbores after exact identifier deduplication; 5,943 horizontal classifications including planned/cancelled bores.

Pools

176 designated pool features after clipping; oil, gas and mixed classifications retained.

Missingdata

No complete 3D survey trajectories or monthly production-volume archive were acquired. Most well depths are reported relative to KB; only independently matched KB elevations support absolute elevation placement.

Sourcetiming

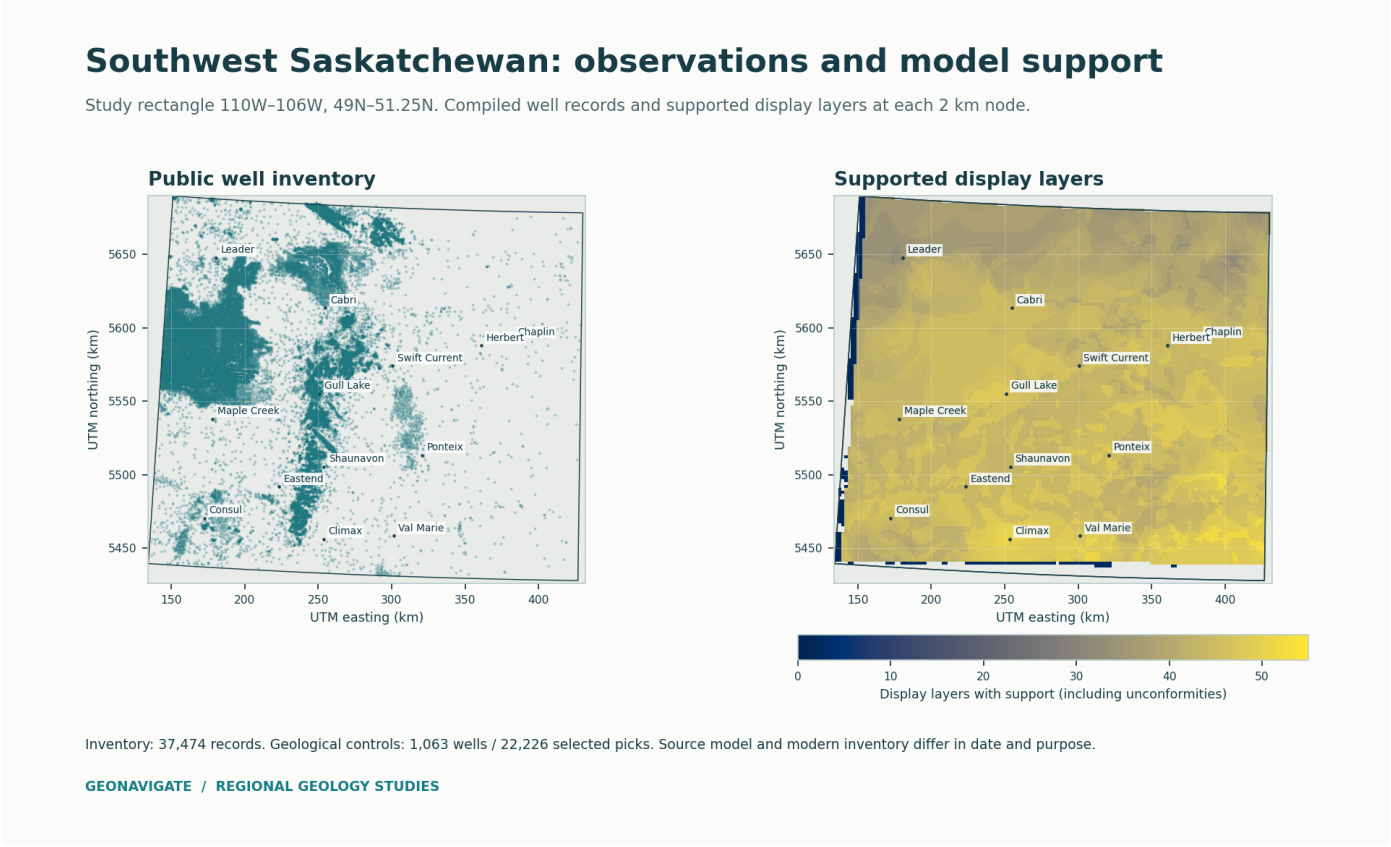
Modern well-layer extract 26 October 2026; public data acquired 27 October 2026. Historical SPFPS picks, 2023 GSC/SGS model and cited core studies have distinct source ages.

How depth and well trajectories are handled

Reported TD, measured depth, true vertical depth, source KB elevation, completion interval and formation at TD are distinct fields. A vertical illustration requires an actual reported depth and an explicit assumption where no complete survey exists. A 2D horizontal map trace remains a plan trace until depth-indexed survey stations support a 3D path. Missing depth is unknown; the deepest formation pick, core interval or sampled log point is not automatically TD.

Three different meanings of an edge

- Depositional termination: a facies body becomes thin or absent because of its original depositional geometry.
- Erosional termination: a younger surface removes formerly deposited rock, leaving subcrops or isolated remnants.
- Model support limit: a source mesh or data window ends. A blank cell is not proof of geological absence, a seal or an undiscovered pool.



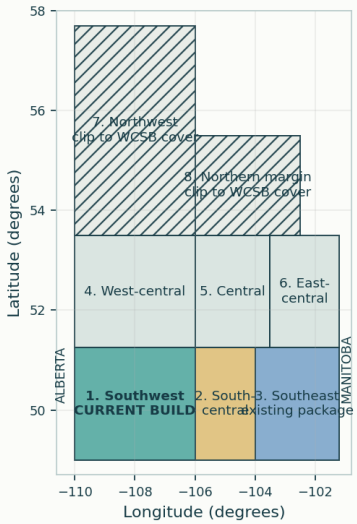
Compiled public well records and exact sampled source support across the SW study window. Dense wells do not guarantee detailed stratigraphic or survey data. The support count is not a reservoir-quality score.

A province-wide programme that fits together

Eight large indexing areas provide a repeatable way to build the Saskatchewan part of the Western Canada Sedimentary Basin. These are project-planning boundaries, not geological contacts, property boundaries or prospective-area polygons. Existing Southeast Saskatchewan coverage is retained.

Saskatchewan regional build programme

Eight large indexing areas. Rectangles organize the work; they do not trace sedimentary-basin limits, land ownership or hydrocarbon potential.



Northern rectangles include non-WCSB ground: final models must be clipped to mapped sedimentary cover. Internal context buffer: 20 km.

GEONAVIGATE / REGIONAL GEOLOGY STUDIES

Eight large indexing areas provide a repeatable way to build the Saskatchewan part of the Western Canada Sedimentary Basin. These are project-planning boundaries, not geological contacts, property boundaries or prospective-area polygons. Existing Southeast Saskatchewan coverage is retained. The 20 km context buffer is an analysis rule, not extra asserted model coverage. The existing southeast study retains its original footprint.

Region / status	Coverage and geological focus
Southwest Saskatchewan / Current build	Shaunavon, Swift Current, Gull Lake, Maple Creek, Eastend, Leader. Shaunavon carbonate/clastic systems; Roseray-Success erosion remnants; Mannville valleys; Madison paleohighs; western shallow gas.
South-central Saskatchewan / Proposed next	Assiniboia, Rockglen, Coronach, Moose Jaw, Regina. Transition from southwestern Jurassic reservoirs toward the Williston Basin carbonate subcrop; Watrous seal, paleorelief and salt modification.
Southeast Saskatchewan / Existing regional package	Weyburn, Estevan, Stoughton, Wapella, Wawota, Moosomin. Mississippian carbonate subcrops; Bakken-Torquay; Devonian framework and existing small-pool investigations.
West-central Saskatchewan / Future regional build	Kindersley, Dodsland, Kerrobert, Unity, Lloydminster. Viking oil; Mannville valley fills and heavy-oil reservoir architecture; western Paleozoic framework.

Region / status	Coverage and geological focus
Central Saskatchewan / Future regional build	Humboldt, Watrous, Wynyard, Melfort. Basinward-to-margin stratigraphic transitions, carbonate and evaporite architecture, regional seals and aquifers.
East-central Saskatchewan / Future regional build	Canora, Kamsack, Preeceville, Hudson Bay. Eastern subcrop/onlap margin, preservation and erosion; investigate charge rather than assuming reservoir presence means oil.
Northwest Saskatchewan / Future regional build	Meadow Lake, Loon Lake, Buffalo Narrows region. Mannville/heavy-oil transitions and the northern WCSB wedge, with stratigraphic support and charge limits explicit.
Northern and northeast WCSB margin / Future regional build	Waskesiu region and northern sedimentary-cover fringe. Thin sedimentary cover, outcrop/subcrop termination and evidence gaps at the northern/eastern basin margin.

Common rules across future builds

- Reuse original formation-top and GIS sources across a 20 km internal context buffer; assign wells unique provincial IDs to prevent duplicates.
- Build every region from supported data. Do not force surfaces to match across seams; document source-age, datum and correlation differences.
- Keep geological zero edges, erosional subcrops and model support limits as separate layers.
- Maintain exact source name and regional stratigraphic alias; do not silently equate Alberta, Saskatchewan and Manitoba members.
- For each region provide a 3D/VR viewer, surface and gross-thickness maps, geological study, pool/well evidence, sources and offline export.
- Future northern rectangles will be clipped to independently mapped sedimentary cover; no hydrocarbon potential is inferred from the project boundary.

Next phase after Saskatchewan: northern Montana and North Dakota

Begin after the Saskatchewan WCSB regional series is complete.

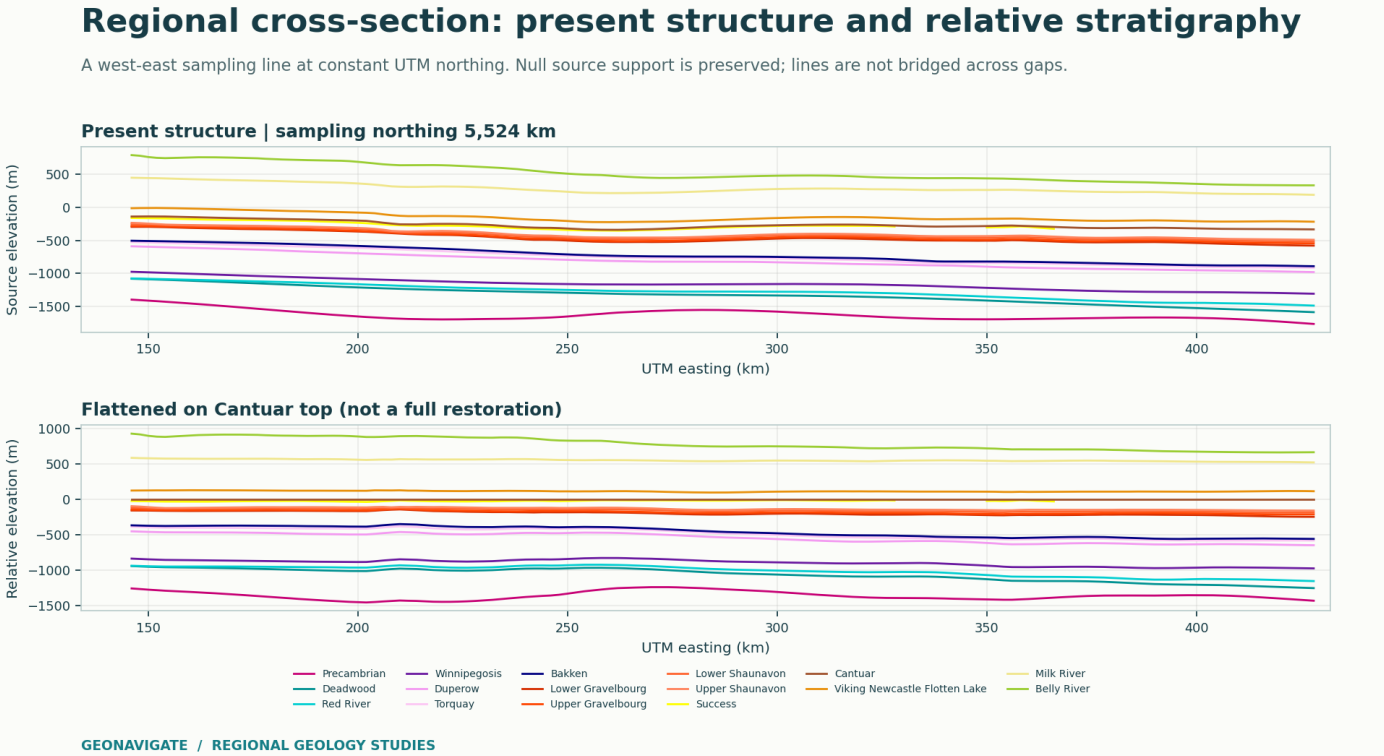
US study windows will be defined from official data coverage and geological domains; no US formation surfaces or well data are represented in the present SW Saskatchewan release.

Planned area	Purpose
Northern Montana	Extend south from Saskatchewan and Alberta-border studies; separate Sweetgrass Arch and northeastern Montana / Williston Basin settings.
North Dakota	Extend the Williston Basin framework south from southeast Saskatchewan and southwest Manitoba, then subdivide North Dakota using geological and data coverage.

Cross-border integration rules

- Use overlapping cross-border correlation windows rather than treating the international border as a geological contact.
- Preserve original US and Canadian formation/member terminology with explicit correlation confidence.
- Keep source feet/metres, KB reference, TVD/MD and vertical datum conversions traceable.
- Maintain state/provincial well identifiers and distinguish true directional surveys from map traces.
- Reconcile source vintage, pool definitions, oil/gas status and production reporting before comparing reservoirs.

Regional geometry and reconstruction



Section sampled at UTM northing 5524000m. The lower panel subtracts the same supported Cantuar top from each horizon. It does not restore compaction, paleobathymetry or faulting. Source: GSC Open File 8969.

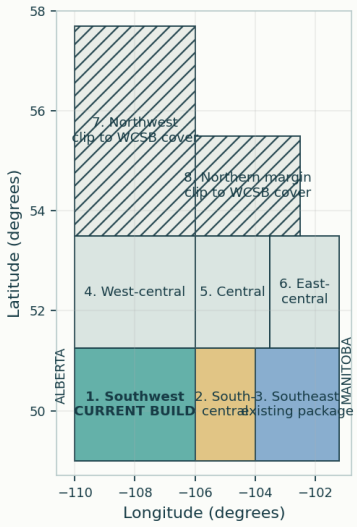
The sections retain source elevations and separately show relative stratigraphic geometry. Flattening on a marker removes its present relief from the display; it does not restore erosion, compaction, fault displacement, salt dissolution or original water depth. The original paleogeographic diagrams therefore state their conceptual status. A geographically located ancient shoreline requires its own facies controls and age correlation.

1. A western platform, changing basins and a disciplined test of a trap

This tile covers the Saskatchewan side of the Alberta border east to 106°W, from 49°N to 51.25°N. The Swift Current Platform occupied a changing position between the Sweetgrass structural province and Williston Basin. Present structure combines deposition, erosion and later movement. A formation edge is therefore an observation to explain, not an ancient shoreline or a ready-made trap [S01]. The detailed catalogue below includes reservoir intervals, seals, source facies and overburden; not every unit has an independent 3D surface.

Saskatchewan regional build programme

Eight large indexing areas. Rectangles organize the work; they do not trace sedimentary-basin limits, land ownership or hydrocarbon potential.



Northern rectangles include non-WCSB ground: final models must be clipped to mapped sedimentary cover. Internal context buffer: 20 km.

GEONAVIGATE / REGIONAL GEOLOGY STUDIES

Eight large indexing areas provide a repeatable way to build the Saskatchewan part of the Western Canada Sedimentary Basin. These are project-planning boundaries, not geological contacts, property boundaries or prospective-area polygons. Existing Southeast Saskatchewan coverage is retained. The 20 km context buffer is an analysis rule, not extra asserted model coverage. The existing southeast study retains its original footprint.

Basin history: several petroleum systems

Events must be related to the age of a reservoir and seal. Modern structure alone cannot reconstruct depositional geography.

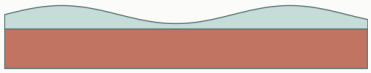
1 Paleozoic seas

Carbonate ramps, shoals, restricted lagoons and evaporites; later dolomite and cement alter primary pores.



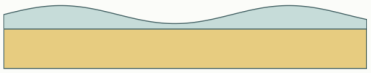
2 Erosion and exposure

Buried Madison paleohighs, karst and selective preservation; dissolution can improve pores or create water conduits.



3 Jurassic marine cycles

Gravelbourg and Shaunavon marine systems, mixed carbonate-clastic tidal deposits, and younger Vanguard sands.



4 Pre-Cantuar incision

Roseray-Success mesas and buttes survive valley erosion; muddy younger fill can seal their flanks.



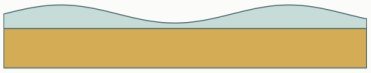
5 Cretaceous seaway

Separate Mannville, Viking, Belle Fourche and Milk River/Alderson systems; reservoir and gas origin vary.



6 Burial and later change

Charge, biodegradation, water movement, compaction, salt dissolution and uplift modify earlier traps.



CONCEPTUAL RECONSTRUCTION | NOT TO SCALE | No mapped ancient shoreline or prospect boundary is implied.

Conceptual synthesis of the formation studies and regional WCSB stratigraphy. The panels show processes, not a restored geographic map. Charge and seal must postdate or survive trap formation.

A nearby pool is a starting point, not a reservoir prediction

Use several independent tests. A failed seal, charge or mobility test can reject a candidate even where reservoir-quality rock is present.

1 Same interval?

Pool code, completion and formation correlation. Composite field labels can span reservoirs.

2 Connected reservoir?

Core fabric, effective porosity, permeability and net connected thickness; avoid universal cutoffs.

3 Trap and seal?

Structure, depositional termination or erosional remnant plus lateral and top seal.

4 Charge and timing?

Oil/gas shows, source maturity, migration pathway and trap survival through later events.

5 Movable fluids?

Oil viscosity, gas saturation, pressure, water connectivity and measured test response.

6 Local corroboration?

Cross-sections on and off the inferred feature, negative wells, comparable production and uncertainty.

GEONAVIGATE / REGIONAL GEOLOGY STUDIES

Interpretive workflow, not a numerical chance-of-success model. No discovery probability or reserves estimate is assigned. Local geological similarity must be established at the target horizon; surface distance alone is insufficient.

Precambrian basement and inherited relief

Precambrian; later reactivation | basement / structural framework | framework

Crystalline basement underlies the sedimentary basin. Regional uplift, subsidence and inherited structures influenced accommodation, but the present Sweetgrass-Swift Current geometry cannot simply be projected unchanged into each geological period [S01].

Published observations

- The regional synthesis describes repeated changes between arch-related uplift and basin-related subsidence [S01].
- OF8969 provides regional geometry, not a local seismic fault interpretation [S02].

Reservoir settings to investigate

- Compare several horizons to test whether a high is inherited, depositional, erosional or related to later salt loss.

Criteria for a producing reservoir

- Require independent structural control and time-specific evidence of growth before using a basement feature to predict a reservoir.

Evidence that weakens the idea

- A broad basement high need not form closure in the connected reservoir above it.

Area significance. Entire tile; especially the Sweetgrass-side and Swift Current Platform transitions.

Sources: S01, S02, S72, S75. Full references follow.

Unconformities, missing section and formation edges

Multiple Paleozoic-Cenozoic episodes | bounding surfaces | mapping / preservation framework

A zero-thickness edge can reflect nondeposition, erosion or dissolution. Buried paleohighs and valleys have different trap implications even where their present top surfaces look similar. OF8969 explicitly distinguishes unit tops from unconformities [S02].

Published observations

- The model relates Success to sub-Cantuar, Big Valley to sub-Mississippian and Interlake to the top of the lower Paleozoic where these contacts coincide [S02].

Reservoir settings to investigate

- Track the rock immediately below and above each contact, then test whether the porous interval is enclosed.

Criteria for a producing reservoir

- Maintain modern structure and marker-flattened stratigraphic sections separately; check age and facies before interpreting thinning.

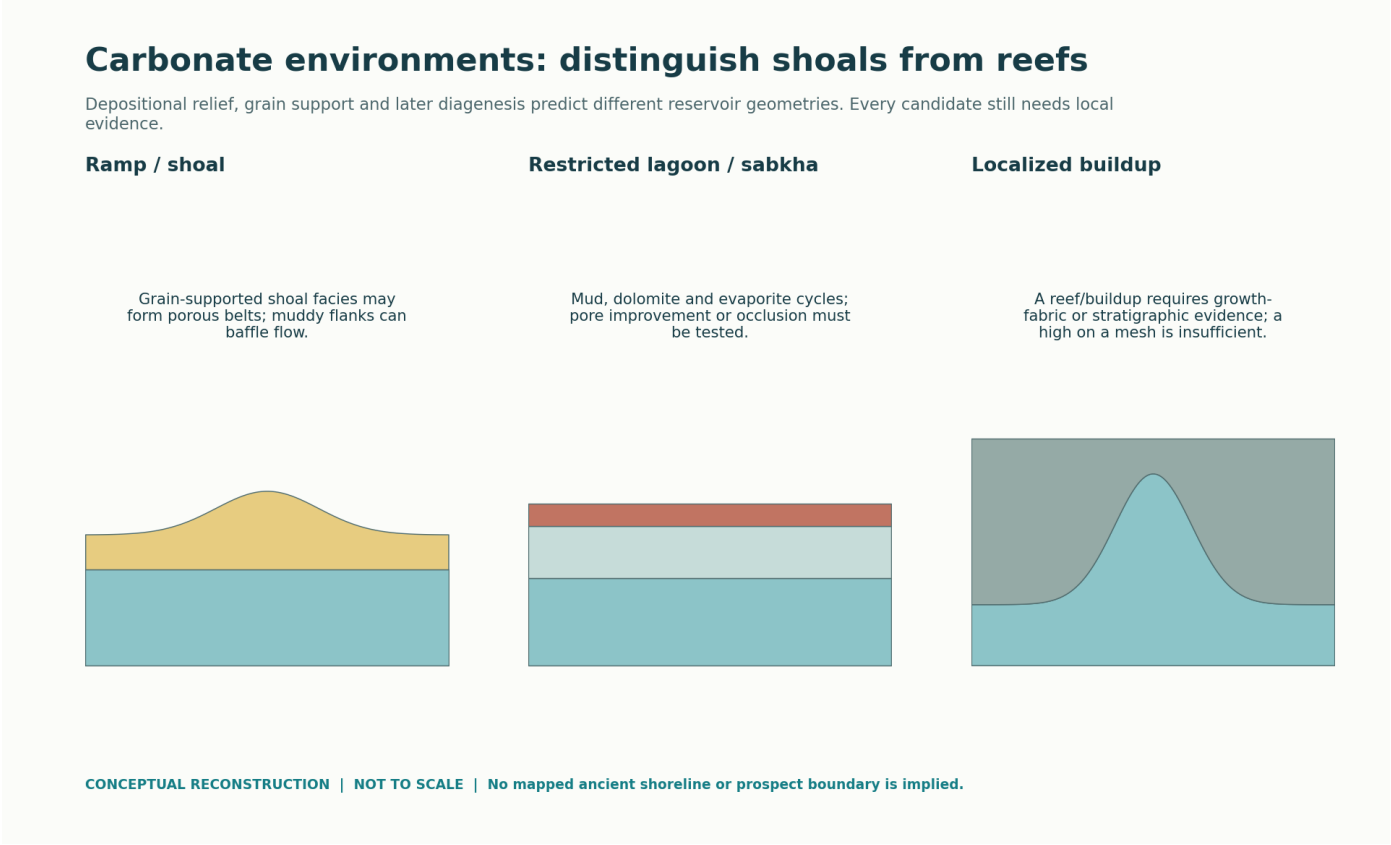
Evidence that weakens the idea

- Surface subtraction gives gross modeled interval thickness, not net reservoir or pay.
- Do not fill absent formations across an erosional gap to make an aesthetically complete stack.

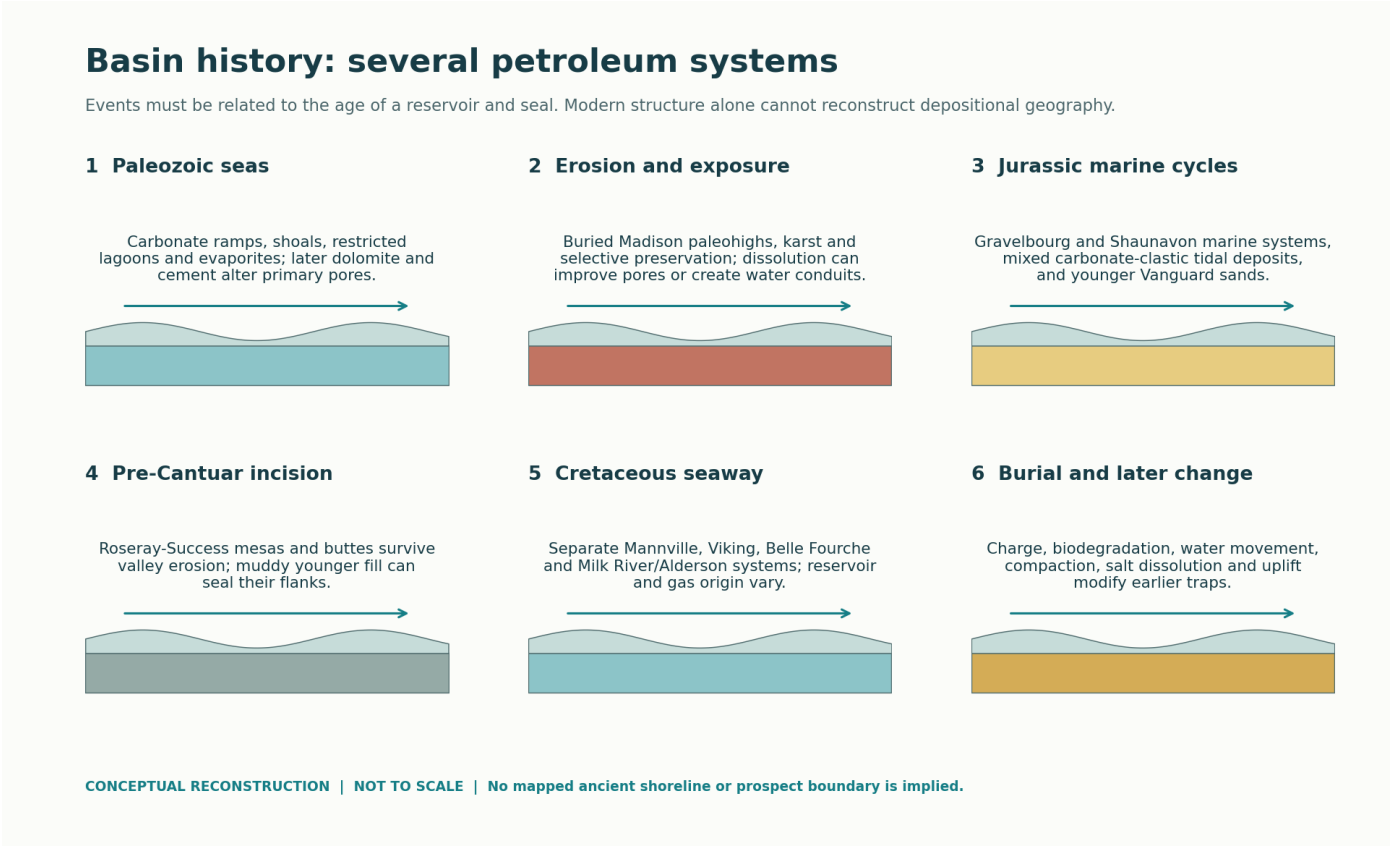
Sources: S02. Full references follow.

2. Cambrian to Silurian: marine sands and carbonate platforms

The oldest sedimentary targets require especially careful charge and seal tests. A clean basal sand can be an excellent saline-water reservoir without containing oil. Cambrian onlap and later truncation are different events; western basal sandstone and Earlie usage should not be folded indiscriminately into Deadwood. Ordovician-Silurian carbonates add cycles, diagenetic compartments and major pre-Devonian erosion.



Generic conceptual environments applicable to the documented Paleozoic and Jurassic carbonate discussions. These are not assertions of undiscovered reefs beneath any particular pool. Distinguish depositional fabric, structural relief and diagenetic pore creation.



Conceptual synthesis of the formation studies and regional WCSB stratigraphy. The panels show processes, not a restored geographic map. Charge and seal must postdate or survive trap formation.

Basal Cambrian sandstone and Earlie Formation

Cambrian | basal sandstone interval / formation | conditional deep reservoir; aquifer context

A marine transgression covered an irregular older substrate. Basal sand is overlain by glauconitic sand, silt and shale assigned to Earlie in the west; Earlie thins eastward [S21].

Published observations

- Regional lithology and contacts support shallow marine onlap; local thickness and preservation require actual wells [S21].

Reservoir settings to investigate

- Test cleaner onlap sand beneath a laterally persistent muddy cap.

Criteria for a producing reservoir

- Show effective permeability, hydrocarbon composition, closure or lateral seal and a viable migration route.

Evidence that weakens the idea

- Deep saline aquifer, cemented sand or non-hydrocarbon gas can mimic a visually attractive reservoir interval.

Sources: S21. Full references follow.

Deadwood Formation

Cambrian-Early Ordovician, regionally | formation | conditional deep reservoir / saline aquifer

Quartz-rich sandstone, siltstone and shale with subordinate carbonate record marine shelf deposition. In western Saskatchewan the unit can overlie Earlie, rather than resting everywhere on basement [S22].

Published observations

- Regional lithologic variability argues against treating the whole interval as one uniform basal sand [S22].

Reservoir settings to investigate

- Resolve individual cleaner beds and their shale barriers around deep penetrations.

Criteria for a producing reservoir

- Use core-calibrated porosity and permeability; evaluate water chemistry and fluid test evidence independently of gas shows.

Evidence that weakens the idea

- A thick formation can be dominated by non-reservoir muddy or cemented facies; sparse control makes a small closure uncertain.

Sources: S22. Full references follow.

Winnipeg Formation / Group

Ordovician | regional formation / group | conditional reservoir-seal pair

A basal sandy interval passes into finer marine sediment. The formal Black Island and Ice Box subdivisions are useful where demonstrably recognizable; their distribution is not identical [S23].

Published observations

- The western succession commonly rests on Deadwood [S23].

Reservoir settings to investigate

- Separate the basal reservoir candidate from its shale cover rather than map total Winnipeg as net sand.

Criteria for a producing reservoir

- Confirm the basal contact, sandstone connectivity, cover continuity and hydrocarbon charge.

Evidence that weakens the idea

- Hydraulic connection to a large water-bearing sand body may dominate the prospect; formation presence alone does not establish oil.

Sources: S23. Full references follow.

Black Island sandstone

Ordovician | member / formation in regional usage | conditional reservoir

Quartz sand represents the coarser part of the Winnipeg marine transgression; cleaner sediment may provide a carrier or reservoir where not cemented [S24].

Published observations

- The overlying Ice Box shale is an important but not universally persistent companion [S24].

Reservoir settings to investigate

- Investigate local sand pinchouts or structural relief only where shale containment is demonstrated.

Criteria for a producing reservoir

- Tie permeability and saturation to the same connected bed; check pressure against nearby water-bearing tests.

Evidence that weakens the idea

- An absent Ice Box cap can change the petroleum system even if Black Island sandstone remains.

Sources: S24. Full references follow.

Ice Box shale

Ordovician | member / formation in regional usage | potential seal / correlation

Green-grey silty marine shale, locally phosphatic, forms the finer part of the Winnipeg succession and thins toward basin margins [S25].

Published observations

- Lithology supports a potential baffle or seal, not proof of sealing capacity at every location [S25].

Reservoir settings to investigate

- Map cap continuity over Black Island and any erosional breaches.

Criteria for a producing reservoir

- Use actual shale thickness, fractures and pressure separation; distinguish muddy silt from impermeable shale.

Evidence that weakens the idea

- A zero edge can remove the very seal needed by the underlying sandstone hypothesis.

Sources: S25. Full references follow.

Red River: Yeoman and Herald carbonate cycles

Ordovician | formation with members | conditional carbonate reservoir / seal

Fossil-bearing lower carbonates and upper dolomite-evaporite cycles record an open-to-restricted platform evolution. Yeoman and Herald are subintervals, not interchangeable reservoir names [S26].

Published observations

- The upper cyclic succession offers potential juxtaposition of porous carbonate and tight evaporitic beds [S26].

Reservoir settings to investigate

- Search for preserved connected dolomite or grain-supported facies within a sealed cycle.

Criteria for a producing reservoir

- Demonstrate pore-throat connectivity, local hydrocarbon charge and intact intraformational or overlying seal.

Evidence that weakens the idea

- Dolomite may be tight; evaporite dissolution may breach rather than improve trapping.

Sources: S26. Full references follow.

Stony Mountain Formation

Ordovician | formation | conditional reservoir / stratigraphic context

Lower argillaceous fossil-rich marine carbonates pass upward into finer dolomite, including Gunton in regional terminology [S27].

Published observations

- The lithologic contrast supports distinct lower and upper flow behavior [S27].

Reservoir settings to investigate

- Test locally porous carbonate beds rather than the entire formation average.

Criteria for a producing reservoir

- Correlate the cleaner interval and enclosing tight beds; inspect cement, clay and fluid evidence.

Evidence that weakens the idea

- A carbonate log response alone cannot distinguish connected pores from dense dolomite or muddy limestone.

Sources: S27. Full references follow.

Stonewall Formation

Latest Ordovician-earliest Silurian, regional nomenclature | formation | conditional reservoir / stratigraphic context

Fine dolomite, argillaceous/sandy marker beds and locally evaporitic beds form a cyclic shallow platform succession [S28].

Published observations

- Regional marker beds aid correlation but are not automatically impermeable barriers [S28].

Reservoir settings to investigate

- Investigate a sealed dolomite cycle or a demonstrably contained subcrop remnant.

Criteria for a producing reservoir

- Separate original cycles from erosion and replacement; require fluid testing and pore-system evidence.

Evidence that weakens the idea

- Thin targets may be below regional-model resolution; reworked sandy markers are not evidence of an independent oil pool.

Sources: S28. Full references follow.

Interlake carbonate succession

Silurian | group / formation in regional usage | conditional carbonate reservoir / unconformity context

Cyclic shallow marine to restricted carbonates were later affected by major pre-Devonian erosion. Present distribution therefore combines original deposition with removal [S29].

Published observations

- The erosional top is critical to regional preservation [S29].

Reservoir settings to investigate

- Test porous preserved dolomite beneath a demonstrable Devonian cap; resolve exposure-altered zones separately.

Criteria for a producing reservoir

- Show which Interlake cycle survives and whether post-exposure cementation or dissolution governs permeability.

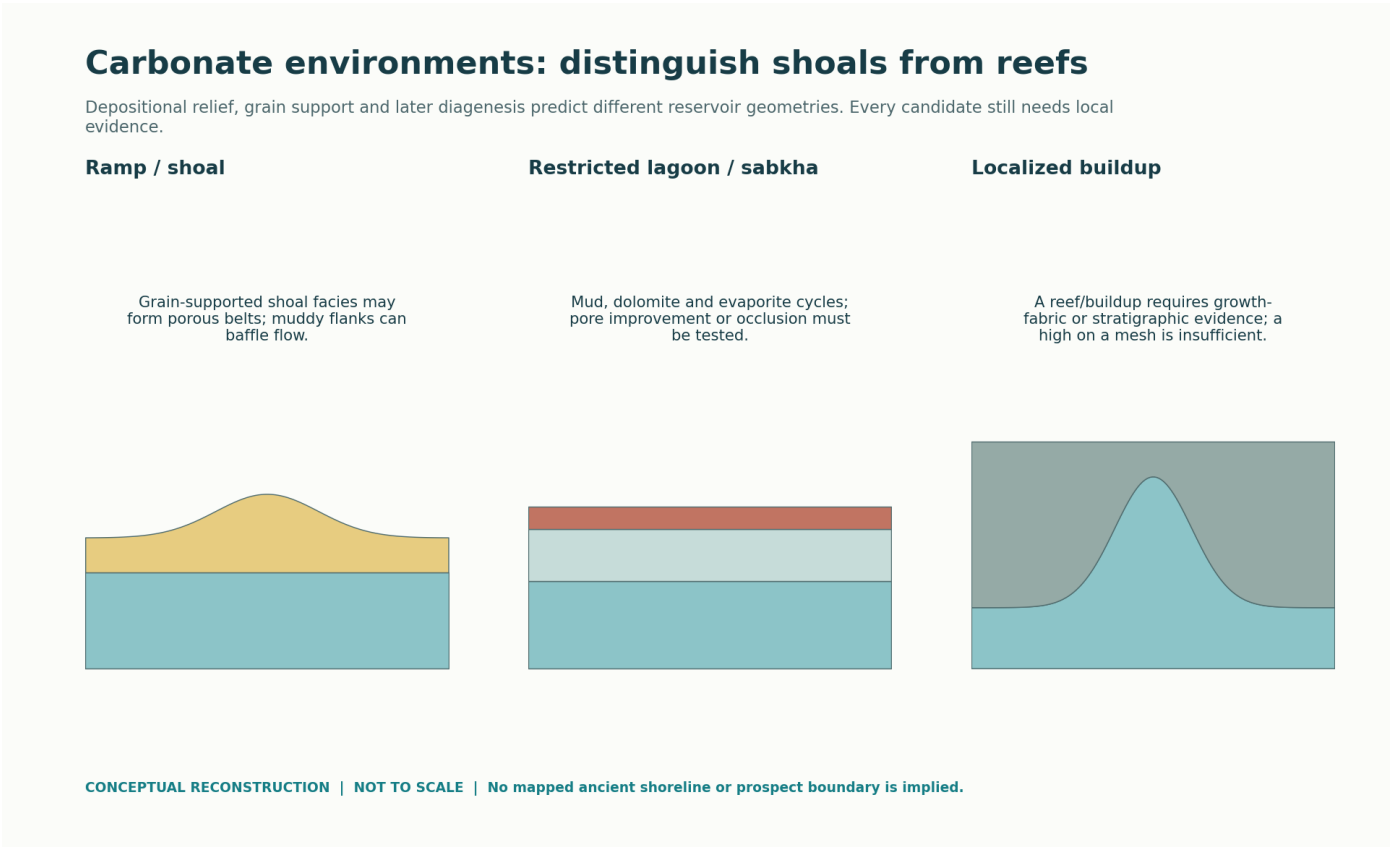
Evidence that weakens the idea

- Karst, fractures or a subcrop edge can connect to water; a regional unconformity surface cannot locate an individual trap.

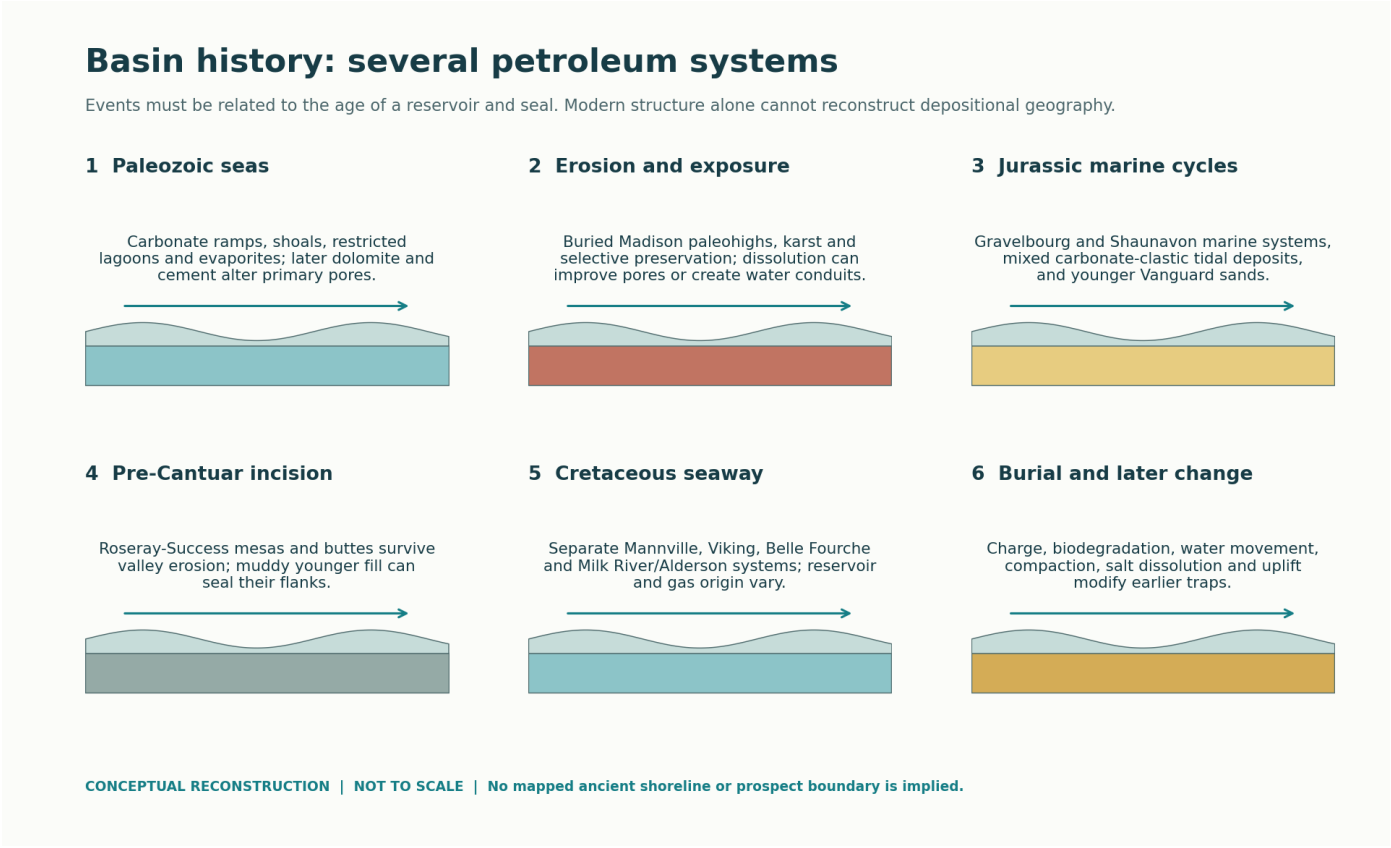
Sources: S29. Full references follow.

3. Middle Devonian: carbonate banks, evaporites and salt loss

This interval provides the most defensible regional setting for true carbonate buildups, especially Winnipegosis banks. A reef should be inferred from depositional relief and diagnostic facies, not from any thick carbonate. Prairie Evaporite introduces both sealing capacity and a later dissolution history; areas without salt must be separated into original absence and later removal.



Generic conceptual environments applicable to the documented Paleozoic and Jurassic carbonate discussions. These are not assertions of undiscovered reefs beneath any particular pool. Distinguish depositional fabric, structural relief and diagenetic pore creation.



Conceptual synthesis of the formation studies and regional WCSB stratigraphy. The panels show processes, not a restored geographic map. Charge and seal must postdate or survive trap formation.

Ashern Formation

Middle Devonian | formation | basal cover / potential baffle

Red to green argillaceous and dolomitic basal sediment records renewed deposition above the older eroded platform [S30].

Published observations

- The basal character links Ashern to the pre-Devonian surface [S30].

Reservoir settings to investigate

- Map it primarily as a basal facies and potential local baffle; test sand or carbonate exceptions only with direct evidence.

Criteria for a producing reservoir

- Verify lithology and continuity at the older carbonate subcrop.

Evidence that weakens the idea

- Red coloration, clay-rich fabric and thin discontinuous beds do not demonstrate an effective regional seal.

Sources: S30. Full references follow.

Winnipegosis Formation

Middle Devonian | formation | conditional carbonate-bank reservoir

A marine carbonate platform includes banks or buildups and lower-energy interbank sediment. Locally bituminous laminated facies contrast with more energetic carbonate accumulation [S31].

Published observations

- Regional descriptions explicitly recognize platform-bank-interbank differentiation [S31].

Local and regional orientation

No local bank outline or compass trend is assigned without well/seismic control.

Reservoir settings to investigate

- Test buildup margins, porous bank caps or sheltered flank facies where local stratigraphic relief is demonstrated.

Criteria for a producing reservoir

- Require a bank-specific thickness/facies pattern, connected pores, charge and a continuous cap; distinguish reef framework from transported skeletal debris.

Evidence that weakens the idea

- An isolated high in a coarse model is not a discovered reef. Exposure, cement or salt loss can erase expected reservoir/seal relationships.

Sources: S31. Full references follow.

Prairie Evaporite Formation

Middle Devonian | formation | seal / structural control / nonhydrocarbon resource context

Restricted evaporative basin conditions accumulated halite and potash-bearing salts with anhydrite and dolomitic sediment [S32].

Published observations

- Salt-bearing and salt-absent domains require separate interpretations of original extent and dissolution [S32].

Reservoir settings to investigate

- Use salt thickness and overburden deformation to test seal preservation, collapse accommodation or fracture pathways in adjacent reservoirs.

Criteria for a producing reservoir

- Compare sub-salt and supra-salt structure and intervening thickness; date deformation relative to deposition and charge.

Evidence that weakens the idea

- Collapse can create porosity or accommodation but can also open water pathways and destroy closure. Brine/potash resources are separate from hydrocarbon potential.

Sources: S32. Full references follow.

Dawson Bay Formation

Middle Devonian | formation | conditional reservoir / stratigraphic context

Basal red beds and overlying carbonates record renewed sedimentation above the evaporite succession. The unit thins westward and is absent in part of the far southwest [S33].

Published observations

- Published regional extent must constrain interpolation; it is not a blanket unit across this tile [S33].

Reservoir settings to investigate

- Evaluate preserved porous carbonate where overlain by sealing beds and where salt history is understood.

Criteria for a producing reservoir

- Confirm actual presence in wells, distinguish replacement from original facies and test charge.

Evidence that weakens the idea

- Extrapolation across a zero edge creates a fictitious reservoir; dissolution-related apparent thickness can be misleading.

Sources: S33. Full references follow.

Souris River Formation: Davidson, Harris and Hatfield cycles

Middle-Late Devonian | formation with members | conditional hydrocarbon reservoir; distinct brine/aquifer context

Repeated shale, carbonate and evaporite deposition records changing restriction and marine access. Regional subdivisions must be correlated before comparing reservoir quality [S34].

Published observations

- The lexicon recognizes cyclic lithologies and named members rather than one homogeneous carbonate [S34].

Reservoir settings to investigate

- Screen individual porous dolomite or grain-supported beds enclosed by tight cycle caps.

Criteria for a producing reservoir

- Document member-specific connected porosity, hydrocarbon composition, pressure and local seal integrity.

Evidence that weakens the idea

- Regional brine or mineral-resource interest does not establish oil charge. A thick Souris River section is not equivalent to thick net reservoir.

Sources: S34. Full references follow.

Second Red Bed Member

Middle Devonian | member of Dawson Bay | basal marker / potential baffle

Basal red shale of the Dawson Bay succession lies above the Prairie Evaporite or its older substrate where salt is absent. It belongs to a different cycle from the younger First Red Beds [S76].

Published observations

- The regional lexicon defines its basal position within Dawson Bay [S76].

Reservoir settings to investigate

- Map it as a contact and potential baffle above evaporite/carbonate; test whether relief reflects deposition, dissolution or erosion.

Criteria for a producing reservoir

- Use contacts, core and associated carbonate cycles, not colour alone, to correlate it.

Evidence that weakens the idea

- A red-bed surface does not prove a sealed dissolution trap or a continuous shale cap.

Sources: S76. Full references follow.

First Red Beds

Middle Devonian | basal member of Souris River | marker / potential baffle

The basal red-bed interval of Souris River starts a younger cycle above Dawson Bay in the Manitoba Group framework [S76].

Published observations

- It is stratigraphically distinct from the Second Red Bed despite the similar names [S76].

Reservoir settings to investigate

- Use the interval to isolate the basal Souris River contact and test local seal continuity.

Criteria for a producing reservoir

- Verify the marker against lithology and surrounding carbonate/evaporite cycles.

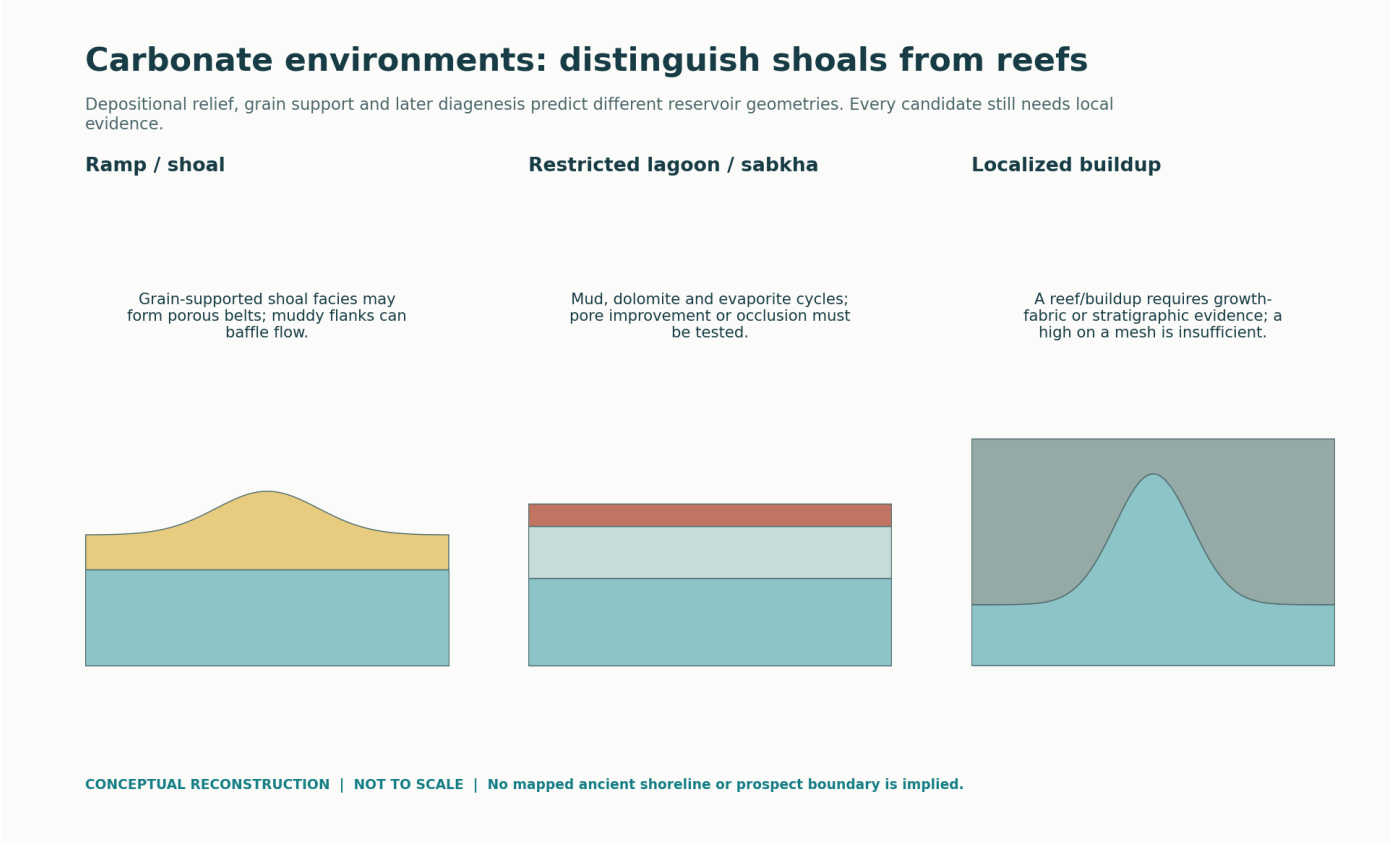
Evidence that weakens the idea

- A named marker may be sandy, dolomitic, thin or locally removed; it is not an automatic reservoir seal.

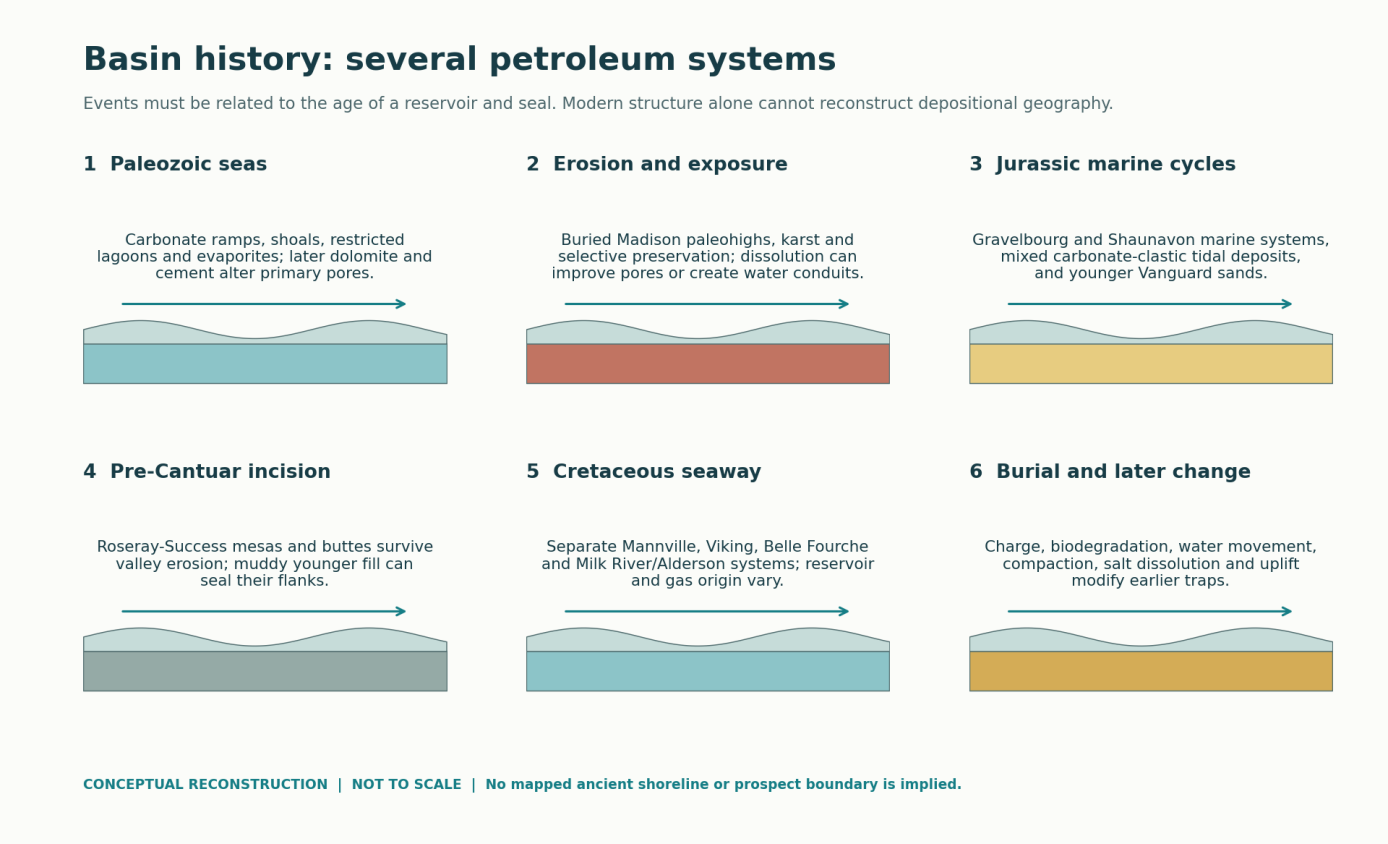
Sources: S76. Full references follow.

4. Late Devonian to earliest Mississippian: cycles, exposure and the Bakken system

Duperow, Birdbear and Torquay are different depositional and diagenetic systems. Southwestern carbonate cycles must not be assigned Alberta reef geometry or southeastern Saskatchewan performance without local evidence. The Bakken adds potential source and reservoir facies, but source presence, maturity, expulsion and reservoir saturation are separate questions.



Generic conceptual environments applicable to the documented Paleozoic and Jurassic carbonate discussions. These are not assertions of undiscovered reefs beneath any particular pool. Distinguish depositional fabric, structural relief and diagenetic pore creation.



Conceptual synthesis of the formation studies and regional WCSB stratigraphy. The panels show processes, not a restored geographic map. Charge and seal must postdate or survive trap formation.

Duperow Formation

Late Devonian | formation | conditional reservoir / stratigraphic context

Repeated limestone, dolomite and anhydrite, with local salt, record alternation between marine carbonate production and more restricted conditions [S35].

Published observations

- The cyclic lithology supports a compartment-by-compartment reservoir approach [S35].

Reservoir settings to investigate

- Look for porous subtidal or shoal carbonate beneath tight cycle caps, including diagenetic porosity that can be correlated.

Criteria for a producing reservoir

- Tie core fabrics to individual cycles and actual fluids; show continuity of both reservoir and cap.

Evidence that weakens the idea

- Regional thickness or anhydrite-free rock alone does not predict oil; dolomitization may reduce as well as improve pore connectivity.

Sources: S35. Full references follow.

Birdbear Formation

Late Devonian | formation | conditional reservoir / stratigraphic context

A lower carbonate interval and upper dolomite/evaporitic interval reflect marine-to-restricted platform deposition. Western facies changes include more argillaceous lower beds [S36].

Published observations

- Regional relationships do not imply that every Birdbear high is a Nisku-style reef [S36].

Reservoir settings to investigate

- Test cleaner lower carbonate or selectively porous upper dolomite within a sealed, charged compartment.

Criteria for a producing reservoir

- Resolve internal facies and the top contact; require connected effective pores and fluid evidence.

Evidence that weakens the idea

- Cement, anhydrite and muddy facies can dominate; a stratigraphic equivalent is not automatically an equivalent trap.

Sources: S36. Full references follow.

Torquay Formation

Late Devonian | formation | conditional reservoir / stratigraphic context

Dolomite, red/green mudrock and breccia record a restricted platform with exposure and evaporitic influences. Western unconformable relationships and regional subdivisions complicate simple layer correlations [S37].

Published observations

- Oxidized and brecciated beds demand a distinction between deposition and later alteration [S37].

Reservoir settings to investigate

- Investigate preserved cleaner dolomitic beds or locally connected fracture/diagenetic zones under a proven cap.

Criteria for a producing reservoir

- Identify the surviving subunit and actual pore system; test charge independently of nearby younger production.

Evidence that weakens the idea

- Oxidation, anhydrite cement, water connection and erosion can defeat a superficially attractive dolomite target.

Sources: S37. Full references follow.

Big Valley Formation

Latest Devonian | formation | conditional reservoir / stratigraphic context

Fossiliferous, locally argillaceous marine limestone records renewed marine conditions above the restricted Torquay succession [S38].

Published observations

- The unit is vulnerable to truncation and should not be forced through areas where absent [S38].

Reservoir settings to investigate

- Test a preserved carbonate remnant only where local porosity and sealing relationships are established.

Criteria for a producing reservoir

- Distinguish the top of the formation from the broader sub-Mississippian unconformity in the model.

Evidence that weakens the idea

- A contact coincidence in a regional model does not establish a separate continuous Big Valley reservoir.

Sources: S38, S02. Full references follow.

Bakken Formation: lower shale, middle interval and upper shale

Latest Devonian-Early Mississippian | formation with informal members | potential source / tight reservoir / seal

Organic-rich marine shales enclose a more silty/sandy middle interval. Member preservation changes toward the western basin margin [S39].

Published observations

- The lithologic architecture supplies a possible source-reservoir-seal combination, subject to local maturity and retention [S39].

Reservoir settings to investigate

- Evaluate actual middle-member facies and preserved shale cover in deeper controlled parts of the tile.

Criteria for a producing reservoir

- Measure organic richness and maturity, pore connectivity, fluid saturation and pressure; establish whether charge is local or migrated.

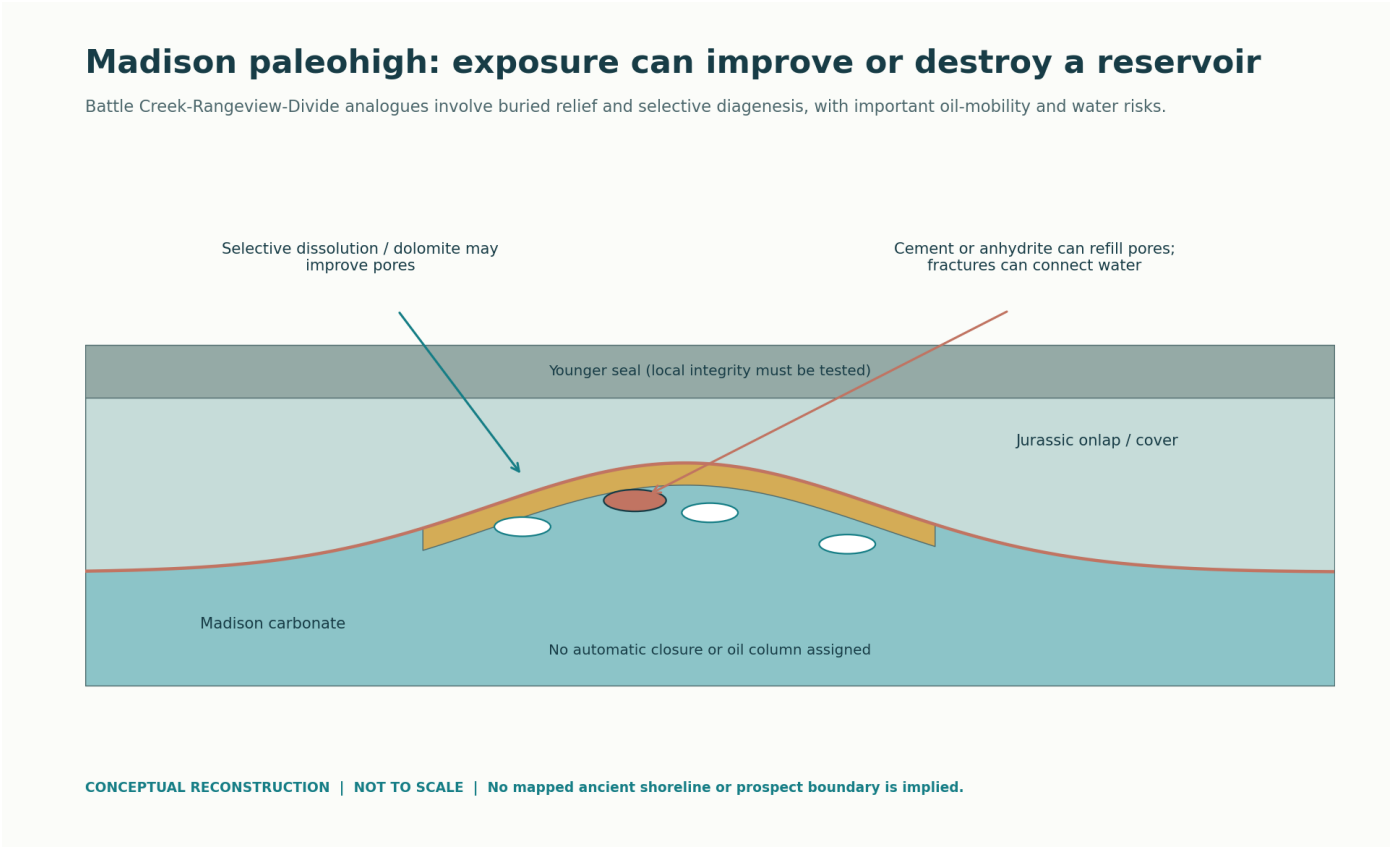
Evidence that weakens the idea

- Black shale is not proof of mature oil generation; regional truncation, low permeability or water saturation can dominate.

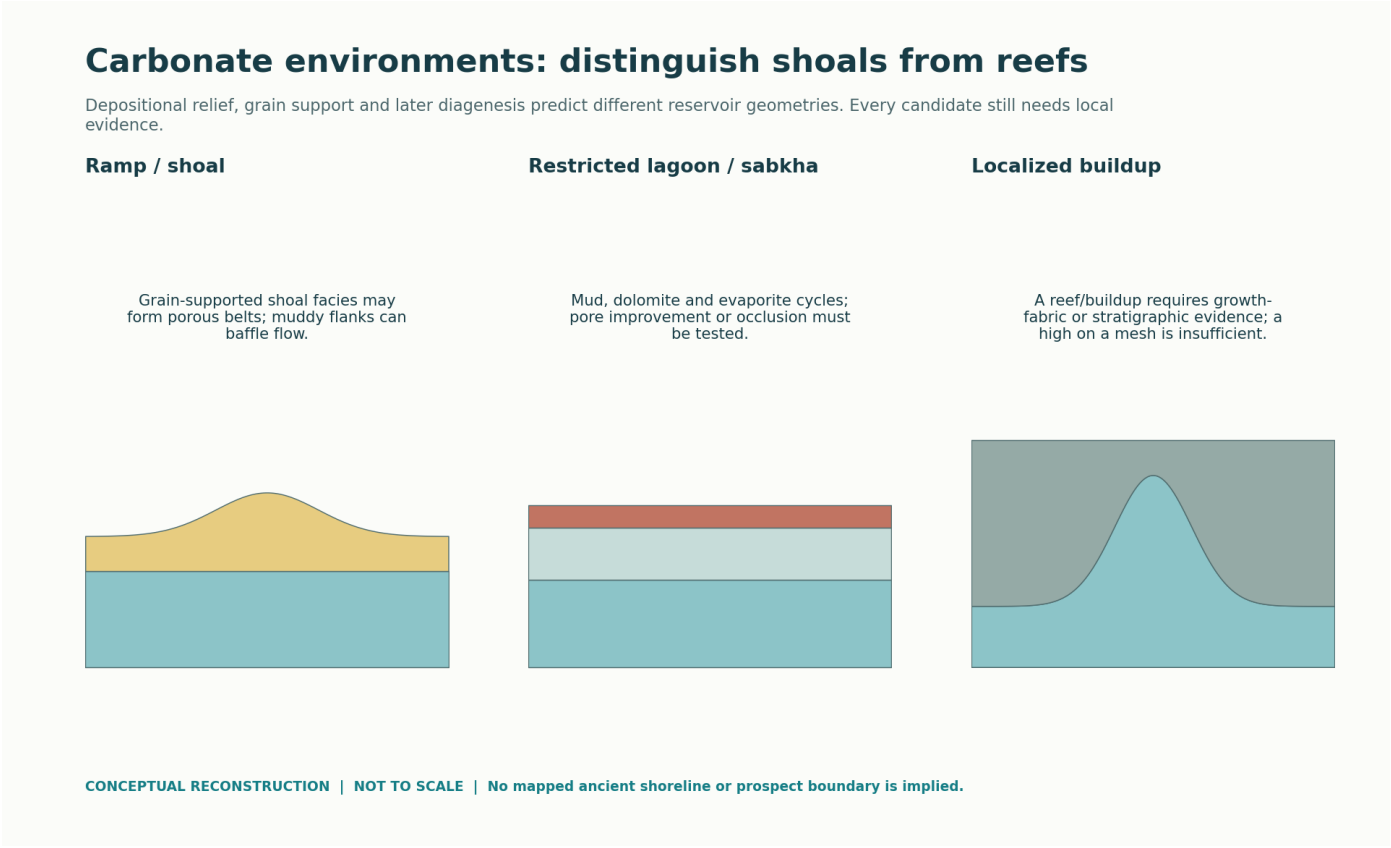
Sources: S39. Full references follow.

5. Mississippian: western ramp carbonates and the Madison unconformity play

Battle Creek, Rangeview and Divide establish a different southwestern Mississippian analogue from the classic southeastern subcrop belts. The useful target is the intersection of a preserved carbonate body, selective diagenetic improvement and a sealed paleohigh. Western Strathallen terminology crosses several eastern bed names. Killdeer is a contextual eastern unit and is absent from the Battle Creek-Rangeview study area [S06].



Conceptual section based on Kent and Kreis (2001). Published Battle Creek, Rangeview and Divide examples demonstrate local low-gravity oil systems, but exposure, karst and dolomitization are not uniformly beneficial. The diagram does not assert that all crestal rock is porous or all younger cover seals.



Generic conceptual environments applicable to the documented Paleozoic and Jurassic carbonate discussions. These are not assertions of undiscovered reefs beneath any particular pool. Distinguish depositional fabric, structural relief and diagenetic pore creation.

Madison succession and the sub-Mesozoic surface

Mississippian | group / formation in regional usage | proven regional reservoir system; local targets conditional

Marine carbonates and evaporitic intervals were exposed and dissected before younger cover. Western usage commonly groups a succession whose internal boundaries become difficult to carry from Montana or southeastern Saskatchewan [S40].

Published observations

- The regional unit is a composite; individual reservoir fabrics require finer subdivision [S40].

Reservoir settings to investigate

- Map the identity and alteration of the carbonate immediately under younger cover.

Criteria for a producing reservoir

- Demonstrate topographic or structural containment, connected porosity and cap continuity before assessing adjacent land.

Evidence that weakens the idea

- A model top-Madison surface cannot distinguish open pores from tight limestone or plugged karst.

Sources: S40. Full references follow.

Strathallen beds: lower muddy ramp and upper skeletal accumulations

Mississippian | western Saskatchewan marker-defined beds | carbonate reservoir host / western correlation framework

Lower argillaceous/laminated carbonates pass into skeletal ramp deposits. This western package spans Lodgepole and part of Mission Canyon equivalents rather than matching one eastern reservoir bed [S41].

Published observations

- Published western correlations extend across much of the tile; local grain-rich accumulations require closer well control [S41].

Reservoir settings to investigate

- Test connected skeletal-bank or altered subcrop facies independently of gross Strathallen thickness.

Criteria for a producing reservoir

- Use core fabrics, cement history and member-level correlation; preserve western nomenclature alongside eastern aliases.

Evidence that weakens the idea

- Skeletal grainstone can be calcite-cemented; a bank interpretation requires geometry as well as fossil fragments.

Sources: S41. Full references follow.

Lodgepole / lower Madison equivalents

Early Mississippian | formation / correlated interval | conditional reservoir / stratigraphic context

Lower laminated or argillaceous marine carbonate and cherty beds pass upward into more fossiliferous carbonate. Basin, slope and ramp facies must be distinguished [S42].

Published observations

- The regional lithology supports vertical environmental change, not a uniformly shallow shoal [S42].

Reservoir settings to investigate

- Investigate localized cleaner skeletal accumulations or altered subcrop where preserved.

Criteria for a producing reservoir

- Establish whether the target is a depositional grain-supported body, a dolomitized zone or an erosional remnant.

Evidence that weakens the idea

- Muddy/cherty facies and cement can eliminate effective reservoir even under a favorable structural high.

Sources: S42. Full references follow.

Mission Canyon and eastern Tilston-Frobisher-Alida correlation context

Mississippian | formation / correlated bed intervals | conditional reservoir / correlation context

Bioclastic and locally oolitic carbonate with dolomite and evaporitic beds records a shallow carbonate platform [S43].

Published observations

- Eastern bed names are useful reference markers but do not impose the same facies on western Saskatchewan [S43].

Reservoir settings to investigate

- Seek locally connected grain-rich or altered carbonate under an intact cap.

Criteria for a producing reservoir

- Correlate the same stratigraphic interval and check actual facies before transferring a known-pool analogue.

Evidence that weakens the idea

- Southeastern pool performance or net pay cannot be assigned to a western marker simply because names correlate.

Sources: S43. Full references follow.

Midale interval: eastern name and western context

Mississippian | marker-defined beds | correlation context; no blanket local reservoir claim

The Midale is a useful eastern marker-defined interval with western relationships to upper Strathallen. Its name alone does not establish a southeastern marly-vuggy reservoir couplet in this tile [S45].

Published observations

- The lexicon explicitly links the eastern marker to western stratigraphic equivalents [S45].

Reservoir settings to investigate

- Treat a Midale-labeled model plane as correlation context until local core and log picks identify the actual rock.

Criteria for a producing reservoir

- Retain source pick names and avoid converting a broad equivalent into member-scale reservoir geometry.

Evidence that weakens the idea

- A named plane can outlive the facies it originally represents; absence and truncation require explicit checking.

Sources: S45. Full references follow.

Charles evaporitic carbonate succession

Mississippian | formation / regional facies succession | seal and conditional carbonate reservoir context

Evaporitic and carbonate facies record increasing restriction; their boundaries can change with lateral facies and regional stratigraphic usage [S44].

Published observations

- Regional evaporites offer potential sealing beds where preserved [S44].

Reservoir settings to investigate

- Evaluate porous carbonate within a demonstrably retained evaporitic cycle, and cap continuity over lower reservoirs.

Criteria for a producing reservoir

- Identify the actual carbonate and evaporite beds from wells rather than assign a universal Charles seal.

Evidence that weakens the idea

- Truncation, dissolution and facies transitions may remove or breach the expected cap.

Sources: S44. Full references follow.

Ratcliffe and Killdeer: chiefly eastern contextual remnants

Mississippian | beds / regional equivalent | mainly outside-core correlation / preservation context

Restricted carbonates and evaporitic beds provide an eastern correlation context. Their preserved extent must be checked before applying the name to western model geometry [S46].

Published observations

- The southwestern Madison study states that Killdeer is absent in its Battle Creek-Rangeview area [S06, p 47].

Reservoir settings to investigate

- Use these intervals to test regional truncation and the transition into the next south-central tile.

Criteria for a producing reservoir

- Require an actual supporting well or mapped remnant for local presence.

Evidence that weakens the idea

- Do not fabricate a westward continuous reservoir layer from an eastern stratigraphic name.

Sources: S46, S06. Full references follow.

Poplar and Big Snowy remnants

Late Mississippian | beds / group in regional usage | preservation / contextual units

Younger carbonate-evaporite and mixed sedimentary successions have limited preserved distributions in southern Saskatchewan. Their relevance here is mainly the record of removal and possible local remnants [S47; S48].

Published observations

- Regional nomenclature sources describe overlying unconformities and restricted preservation [S47; S48].

Reservoir settings to investigate

- Check source-model zero edges and the deepest reliable wells near the eastern/southern boundary.

Criteria for a producing reservoir

- Establish presence and sealing relationships before adding a reservoir hypothesis.

Evidence that weakens the idea

- Interpolating these units across the whole southwest would exaggerate stratigraphic completeness and reservoir opportunity.

Sources: S47, S48. Full references follow.

Kisbey / K-2 marker: local lithology must be proven

Mississippian | sandstone interval / log marker | correlation interval; local reservoir lithology unresolved

Quartz-rich sandy beds occur within the carbonate succession in eastern analogue studies, but the K-2 marker can also represent evaporitic or carbonate lithologies. A mapped Kisbey marker in the southwest does not by itself identify sandstone [S77; S02].

Published observations

- The North Dakota-southeastern Saskatchewan core/log study explicitly separates a log marker from demonstrated sandstone [S77].

Reservoir settings to investigate

- Use a southwestern core or cuttings description to establish whether the mapped interval contains connected sand, porous carbonate or tight rock.

Criteria for a producing reservoir

- Preserve the marker name but assign a depositional environment only after local lithology and sedimentary structures are known.

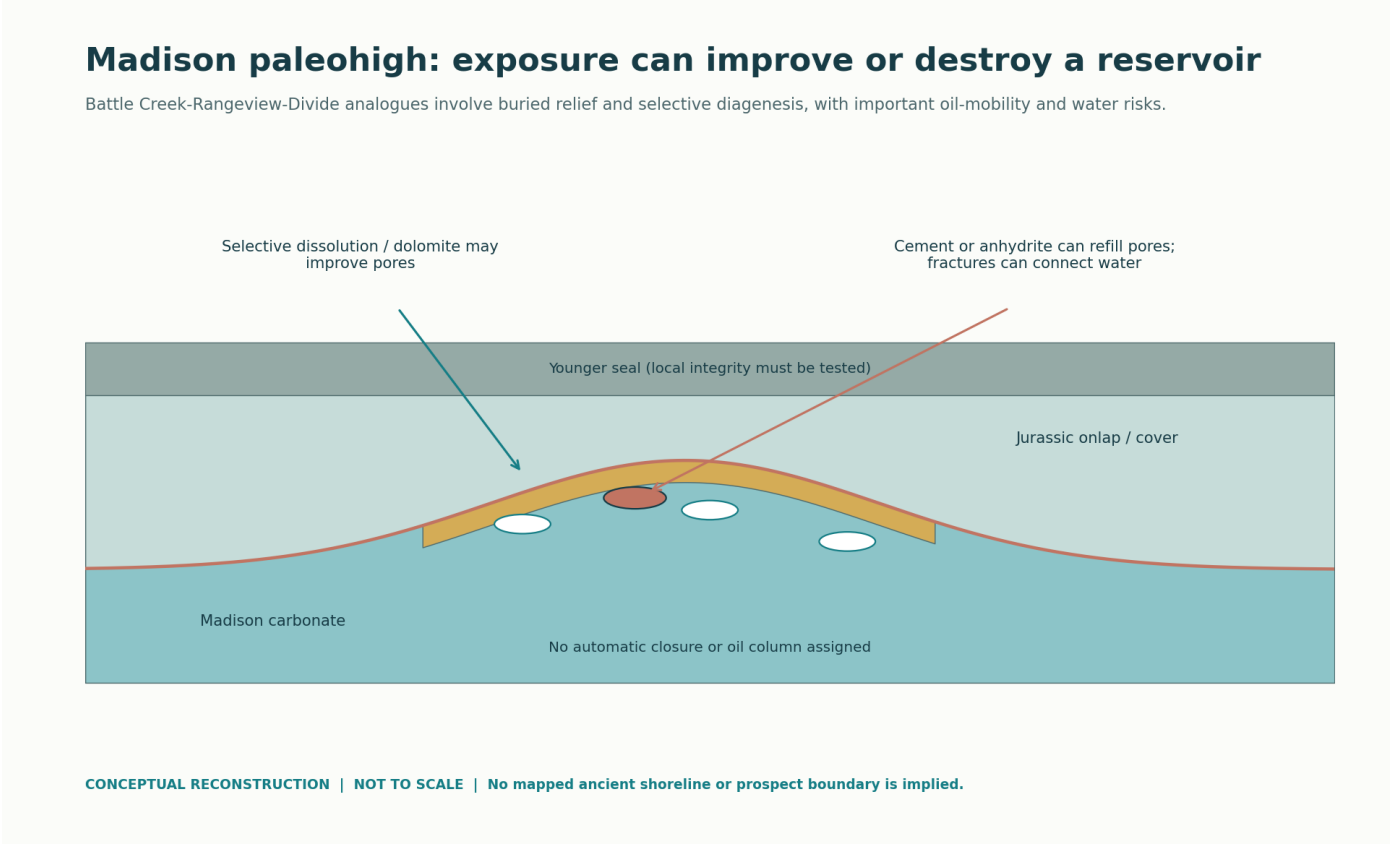
Evidence that weakens the idea

- Coastal dune, swash and shallow-marine interpretations from eastern studies cannot be transferred to this tile without evidence.

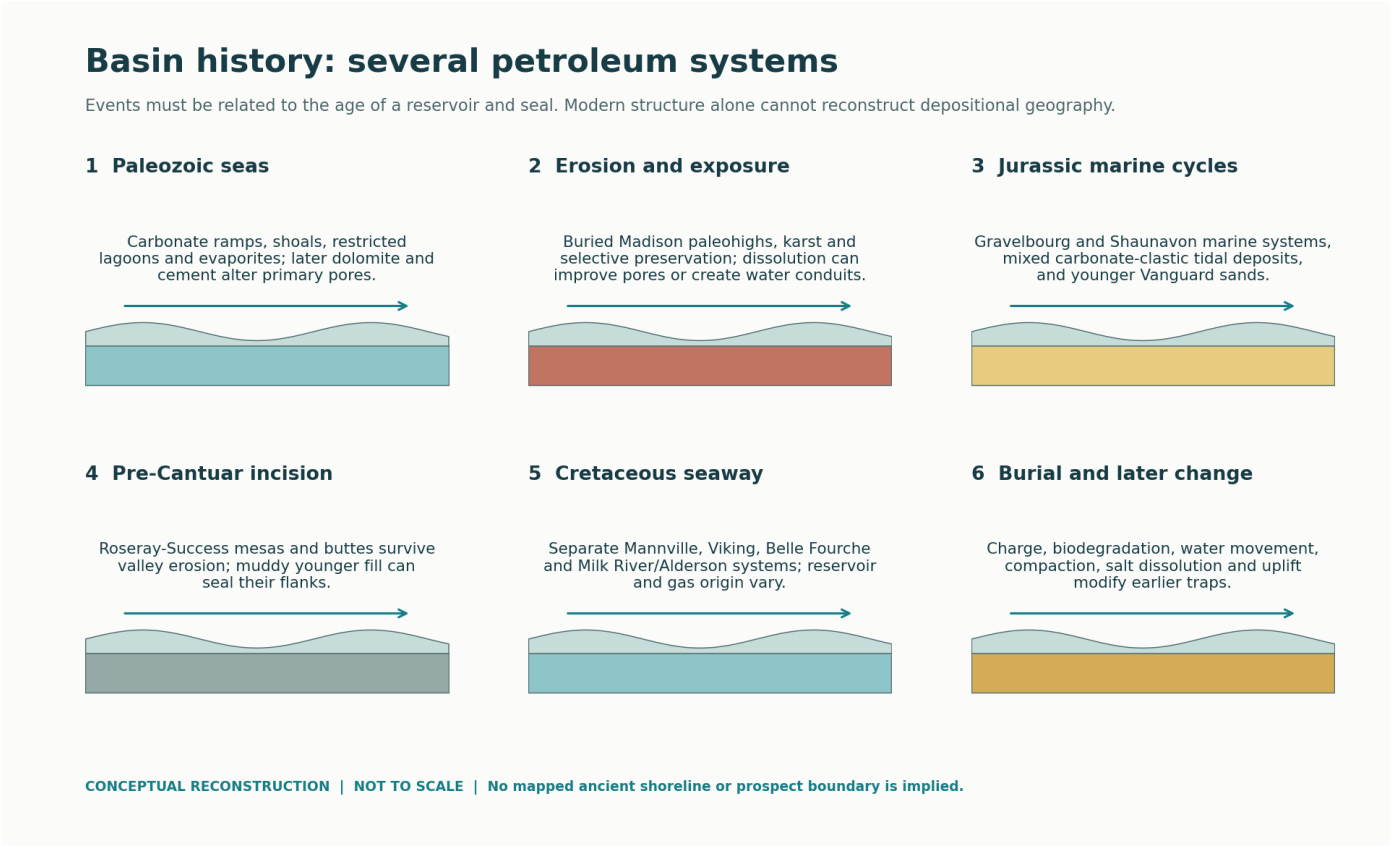
Sources: S77, S02. Full references follow.

6. Triassic to Middle Jurassic: red beds, evaporitic cover and marine return

The sub-Mesozoic contact is fundamental to the southwestern Madison play. Lower Watrous relief fill, upper Watrous evaporite and Gravelbourg onlap do different jobs. A carbonate directly overlain by Gravelbourg experienced a different fluid history from a carbonate isolated below Watrous; these are testable local relationships, not universal rules.



Conceptual section based on Kent and Kreis (2001). Published Battle Creek, Rangeview and Divide examples demonstrate local low-gravity oil systems, but exposure, karst and dolomitization are not uniformly beneficial. The diagram does not assert that all crestal rock is porous or all younger cover seals.



Conceptual synthesis of the formation studies and regional WCSB stratigraphy. The panels show processes, not a restored geographic map. Charge and seal must postdate or survive trap formation.

Lower Watrous red beds

Triassic in regional correlation; local age uncertainty | member / lower interval | potential seal / conditional basal-sand reservoir

Red mud, silt and sand filled relief and spread over older exposed rocks. Continental and restricted lowland conditions are consistent with the red-bed succession; individual sandy fills require local facies evidence [S49].

Published observations

- Lower and upper Watrous have different lithologies and sealing behavior [S49].

Reservoir settings to investigate

- Map mud-rich cover over Paleozoic subcrop and separately test any clean basal sand lens.

Criteria for a producing reservoir

- Distinguish depositional fill from reworked weathering residue; establish lateral and upper containment.

Evidence that weakens the idea

- Red beds can be discontinuous or sandy; cover presence is not proof of an effective cap.

Sources: S49. Full references follow.

Upper Watrous evaporitic interval

Jurassic | member / upper interval | potential regional seal

Anhydrite-rich restricted deposition created a potentially effective regional cap where the upper interval survives [S49].

Published observations

- Published western limits and onlap relationships mean it is not continuous across every southwestern paleohigh [S49].

Reservoir settings to investigate

- Map intact evaporite versus onlap windows and dissolution-affected areas.

Criteria for a producing reservoir

- Confirm actual thickness, lithology and structural integrity above the target.

Evidence that weakens the idea

- Evaporite absence may change both seal and diagenetic history; a single regional top cannot resolve local breaches.

Sources: S49. Full references follow.

Gravelbourg Formation: lower carbonate/evaporite and upper shale

Middle Jurassic | formation | onlap / diagenetic control / seal and local reservoir

Lower dolomitic limestone and evaporitic beds pass into darker fossil-bearing shale, recording restricted to more marine conditions during onlap [S50].

Published observations

- The unit can overstep Watrous onto older carbonates along the western margin [S50].

Reservoir settings to investigate

- Test the lower contact as a control on Madison alteration and the upper muddy interval as part of the cap system; evaluate local porous carbonate separately.

Criteria for a producing reservoir

- Correlate the two lithologic packages and their onlap position.

Evidence that weakens the idea

- A thin lower Gravelbourg over a high is not by itself proof of closure, reservoir quality or modern oil saturation.

Sources: S50. Full references follow.

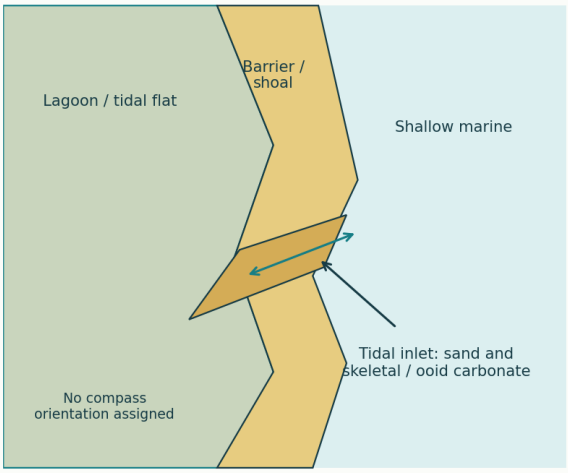
7. Shaunavon: a carbonate platform followed by a mixed tidal coastline

The Lower and Upper Shaunavon require different reservoir models. The lower member combines platform cycles with strong pore modification. The upper member combines muddy tidal flats, shoreface/ramp facies and erosive inlet channels. Neither member should be reduced to a single blanket oil-bearing plane. The member catalogue is scientifically finer than the regional 3D mesh.

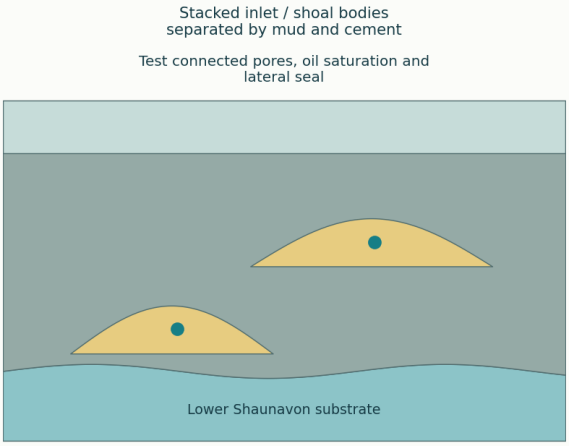
Upper Shaunavon: tidal inlets within a mixed shoreline

Core-based studies identify tidal influence and reservoir facies. A hypothetical local plan view shows what to test around an existing pool.

A Depositional setting (schematic plan)

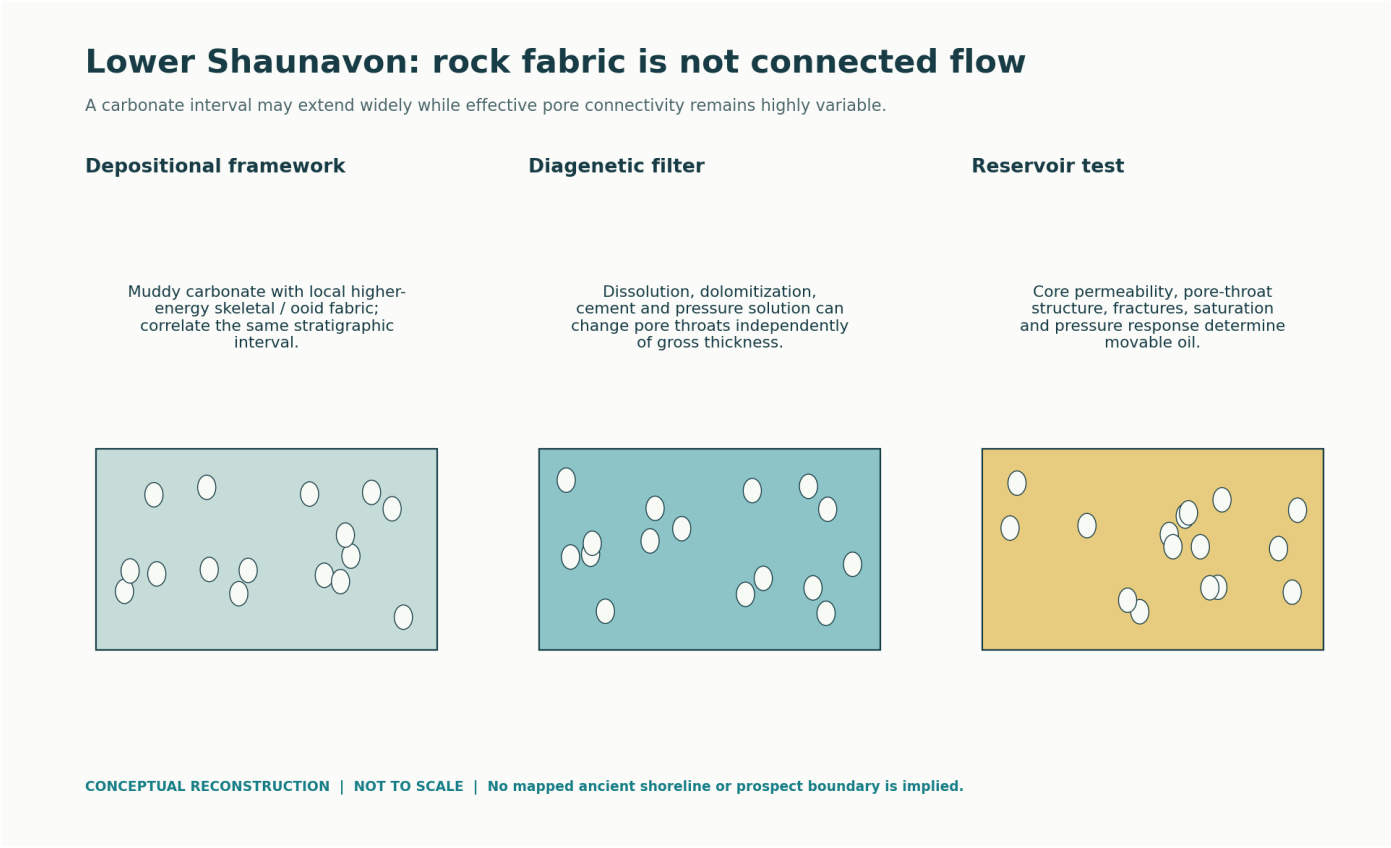


B Preserved reservoir cross-section



CONCEPTUAL RECONSTRUCTION | NOT TO SCALE | No mapped ancient shoreline or prospect boundary is implied.

Original schematic based on Hill and Salad Hersi (2016), who examined cores from 65 wells and interpreted a tidally influenced marginal- to shallow-marine system. Shapes and positions here are illustrative; no individual inlet or shoreline is geographically mapped. A nearby pool may occupy a different stacked body.



Conceptual pore-system comparison. Pore circles are not microscopy measurements and no porosity/permeability threshold is assigned. Primary depositional facies, diagenesis and completion performance must be assessed separately.

Lower Shaunavon Member

Middle Jurassic | member | proven reservoir; local pore quality and saturation conditional

A muddy carbonate platform shallowed into peloidal/oolitic and fossil-rich beds. At Leitchville-Bone Creek, petrography shows dissolution-generated pores alongside calcite and anhydrite cement that can block flow [S05].

Published observations

- Nineteen wells and 88 thin sections underpin the published local interpretation [S05, p 3].
- The cited study places its principal reservoir facies in the upper part of the member [S05, pp 8-9].

Local and regional orientation

Platform-to-shoal reconstruction is schematic; no local shoal boundary or compass direction is invented.

Reservoir settings to investigate

- Test the continuity of porous upper shoal facies and their diagenetic compartments; evaluate lower cyclic beds only where connected pores are measured.

Criteria for a producing reservoir

- Separate effective connected porosity from isolated molds; tie pore-throat size, saturation and completion response to the specific bed.

Quantitative examples: local scope only

- value: 5-20% solution-related porosity; 0.1-10 mD permeability; meaning: Published selected facies, not a regional range or economic cutoff; source: S05; page: 1; detailed facies pp 4-9

Well and core evidence

- uwi: 101/12-14-009-19W3/00; depth_m: 1349.7; evidence: Published thin section depicts anhydrite in pore throats near the member top; original authors report 25-30% cement in this sample. Not an independently remeasured sample.; source: S05; page: 8, Figure 8

Evidence that weakens the idea

- A porous ooid can be isolated by cemented throats. Gross member thickness and visually strong oil stain do not establish deliverability.

Area significance. Leitchville-Bone Creek and the wider Shaunavon trend.

Sources: S05, S51. Full references follow.

Upper Shaunavon Member

Middle Jurassic | member | proven heterogeneous reservoir

Mixed carbonate and siliciclastic sediment formed muddy tidal flats, shallow marine ramp/shoreface and erosive tidal inlets. The published 65-core-well study distinguishes these settings rather than treating every sandy bed as productive [S03].

Published observations

- Small tidal gullies are difficult to correlate; the more extensive inlet association is reported at Bone Creek, Instow, Illerbrun and Covington [S03].
- A local NW-SE trend describes inlet-bearing structural lows, not the orientation of the whole coastline [S03, pp 11-12].

Local and regional orientation

Regional coastal-to-offshore tendency and local inlet trends have different scales. Exact shoreline positions remain unresolved.

Reservoir settings to investigate

- Map each reservoir interval and its erosional boundaries; seek a connected inlet or gully body enclosed by muddy or cemented facies.

Criteria for a producing reservoir

- Combine core structures, mud drapes, coquina, trace fossils and erosion surfaces with logs; distinguish channel thickness from oil column.

Quantitative examples: local scope only

- value: 0.5-4 m tidal gullies; 3-16 m inlet association; meaning: Published sediment-body ranges within the 2016 study, not net pay or dimensions of every nearby pool; source: S03; page: 8 (gullies); 11 (inlets)

Evidence that weakens the idea

- The published shoreface/ramp association is commonly well cemented. A thick sand or a nearby producing pool does not establish lateral communication.

Area significance. Dollard-Rapdan-Eastend-Eastbrook and Bone Creek-Instow-Illerbrun-Covington.

Sources: S03, S04. Full references follow.

Upper Shaunavon B-E / U-unit reservoir subdivisions

Middle Jurassic | informal reservoir intervals | reservoir subdivision / correlation control

The Dollard-Eastend-Eastbrook-Rapdan study separates stacked reservoirs and an intra-member unconformity. Its reservoir letters describe a local correlation framework and should not be equated automatically with a different publication's facies associations [S04].

Published observations

- Preservation above and below the internal erosion surface changes the local target interval [S04].

Reservoir settings to investigate

- Compare like-for-like reservoir intervals across producing, wet and nonproducing wells.

Criteria for a producing reservoir

- Anchor each subdivision to core and traceable log markers; retain alternative correlations when erosional relief makes a tie ambiguous.

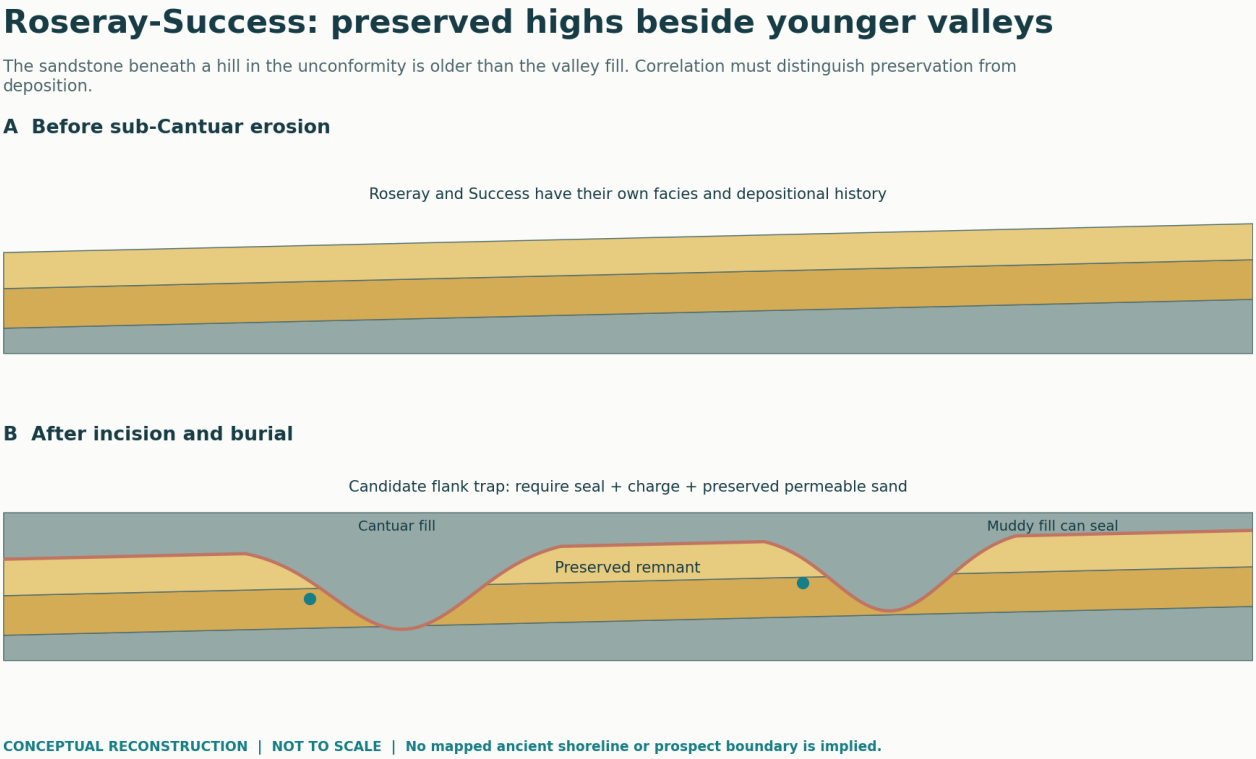
Evidence that weakens the idea

- A single Upper Shaunavon thickness map can combine several disconnected bodies and obscure the trap.

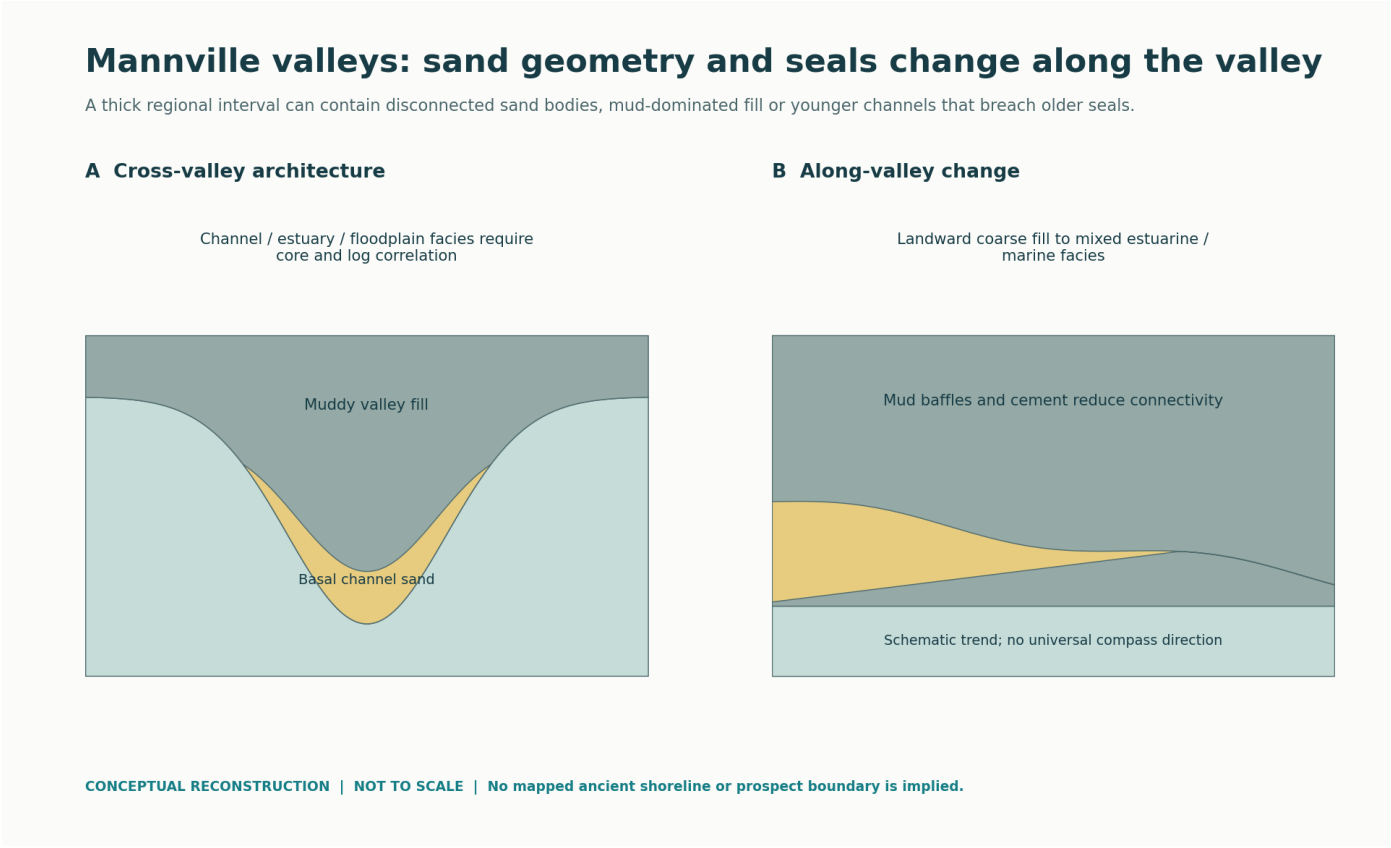
Sources: S04. Full references follow.

8. Later Jurassic to earliest Cretaceous: mud, sand and preserved remnants

Roseray and Success form a particularly useful small-pool analogue around the Swift Current area: sand deposition establishes potential reservoir, while later incision and lower-permeability fill can isolate preserved pieces. The regional sand belt and a sealed local remnant are different scales of explanation. Historical producing-zone names require reconciliation.



Original reconstruction of the published Roseray-Success butte/mesa and Cantuar valley-fill trapping model. Illustrative relief is not a measured section. A missing sandstone across a valley may be eroded rather than a primary depositional pinchout.



Conceptual anatomy of a valley fill. The same fill may form its own reservoir and seal an older Roseray-Success flank; those are separate trapping questions. No net-sand fraction or continuity distance is assumed.

Rush Lake and shale-dominated Vanguard intervals

Jurassic | formation / group context | seal / marine background

Marine mud-dominated deposition interrupted and enclosed sandstone episodes. Southwestern Vanguard usage includes Rush Lake, Roseray and Masefield; correlations to Montana names require care [S52].

Published observations

- The group is a lithostratigraphic package, not a single reservoir layer [S52].

Reservoir settings to investigate

- Map muddy cover and lateral transitions adjoining Shaunavon or Roseray targets.

Criteria for a producing reservoir

- Verify actual shale continuity, erosion and sand tongues at each pool margin.

Evidence that weakens the idea

- A regional group thickness does not measure cap thickness over the connected reservoir.

Sources: S52. Full references follow.

Roseray Formation

Late Jurassic | formation | proven reservoir system; local remnant hypotheses conditional

Quartz-rich sandstone grades into muddier facies; flaser/lenticular bedding, low-angle lamination and burrowing support a shallow marine, locally tidal setting. A preliminary study identifies cleaner western sandstone and an eastward muddy transition [S08].

Published observations

- The broad sand-prone belt does not correspond to continuous oil: cited nonproducing cores/cuttings include more matrix and poorer pore quality [S08].

Local and regional orientation

Published broad sand belt is approximately north-south; local trap edges can have different orientations.

Reservoir settings to investigate

- Test cleaner preserved sand remnants and their contact with younger valley fill.

Criteria for a producing reservoir

- Distinguish depositional sand quality from the later erosional boundary that may provide lateral trapping.

Evidence that weakens the idea

- A regional facies trend cannot locate a local pinchout; cement, mud matrix and water connection can defeat an apparent extension.

Sources: S08, S09. Full references follow.

Masefield Formation / upper Vanguard cover

Late Jurassic | formation | potential seal / preservation control

Marine muddy sediment above Roseray provides younger cover within the Vanguard succession where retained [S52].

Published observations

- Its distribution must be separated from later erosional removal beneath Success and Cantuar [S52].

Reservoir settings to investigate

- Test whether remaining muddy cover encloses a Roseray reservoir or has been stripped from a paleohigh.

Criteria for a producing reservoir

- Correlate the cap separately from total Vanguard and quantify direct sandstone-to-valley-fill contacts.

Evidence that weakens the idea

- Missing upper cover can matter more than gross Roseray thickness; formation presence does not establish capillary sealing capacity.

Sources: S52. Full references follow.

Success S1

Late Jurassic in regional interpretation | informal unit | conditional sandstone reservoir / age control

Quartzose, locally kaolinitic sand and associated fine sediment occupy preserved parts of the Success succession. Marine palynology constrains at least part of S1 in the regional framework [S12].

Published observations

- The Success succession is not a single confidently dated, everywhere-fluvial sheet [S12].

Reservoir settings to investigate

- Identify an S1 body and its preserved boundaries before transferring a Roseray analogue.

Criteria for a producing reservoir

- Use core lithology, contact relationships and independent age control; separate reservoir sand from clay-rich alteration.

Evidence that weakens the idea

- Quartz-rich appearance does not guarantee permeability; kaolin can reduce effective pore throats.

Sources: S12. Full references follow.

Success S2 and local undifferentiated Success remnants

Latest Jurassic-Early Cretaceous, age uncertain regionally | informal unit / remnant interval | proven regional sandstone system; remnant trap context

Upper Success sand and finer beds record a separate depositional and erosional history. Local fluvial interpretation is supported by the regional study, but S2 age and correlation remain less secure than a simple formation label suggests [S10; S12].

Published observations

- Later Cantuar incision can leave isolated sandstone mesas or buttes [S09].

Reservoir settings to investigate

- Test a retained reservoir remnant whose sides are enclosed by lower-permeability fill.

Criteria for a producing reservoir

- Map both basal and upper contacts; use nearby nonproducing wells to distinguish absence from a tight equivalent.

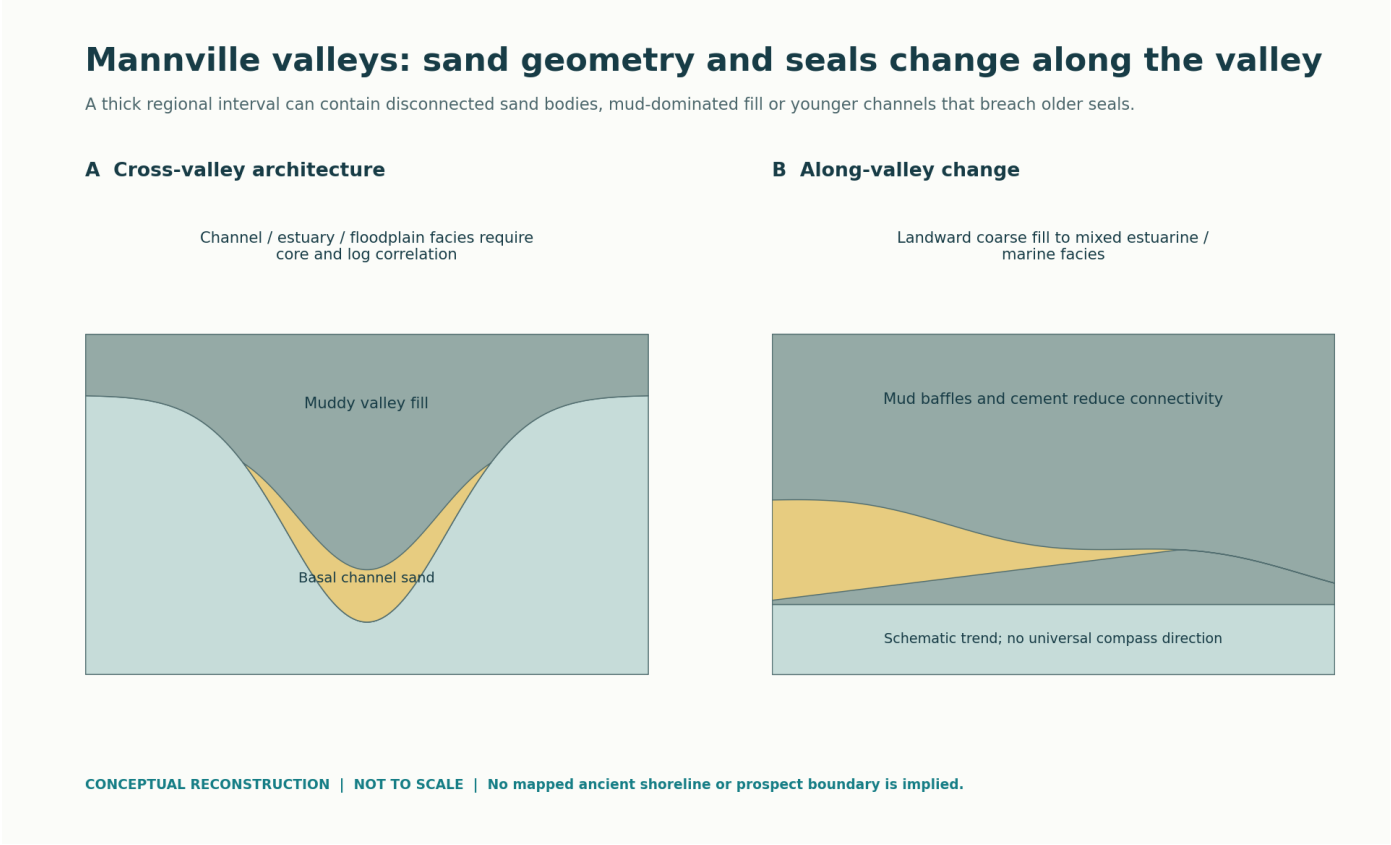
Evidence that weakens the idea

- Historical “Cantuar sand” production may have been reassigned to Success. Do not mix those names in a thickness or completion comparison.

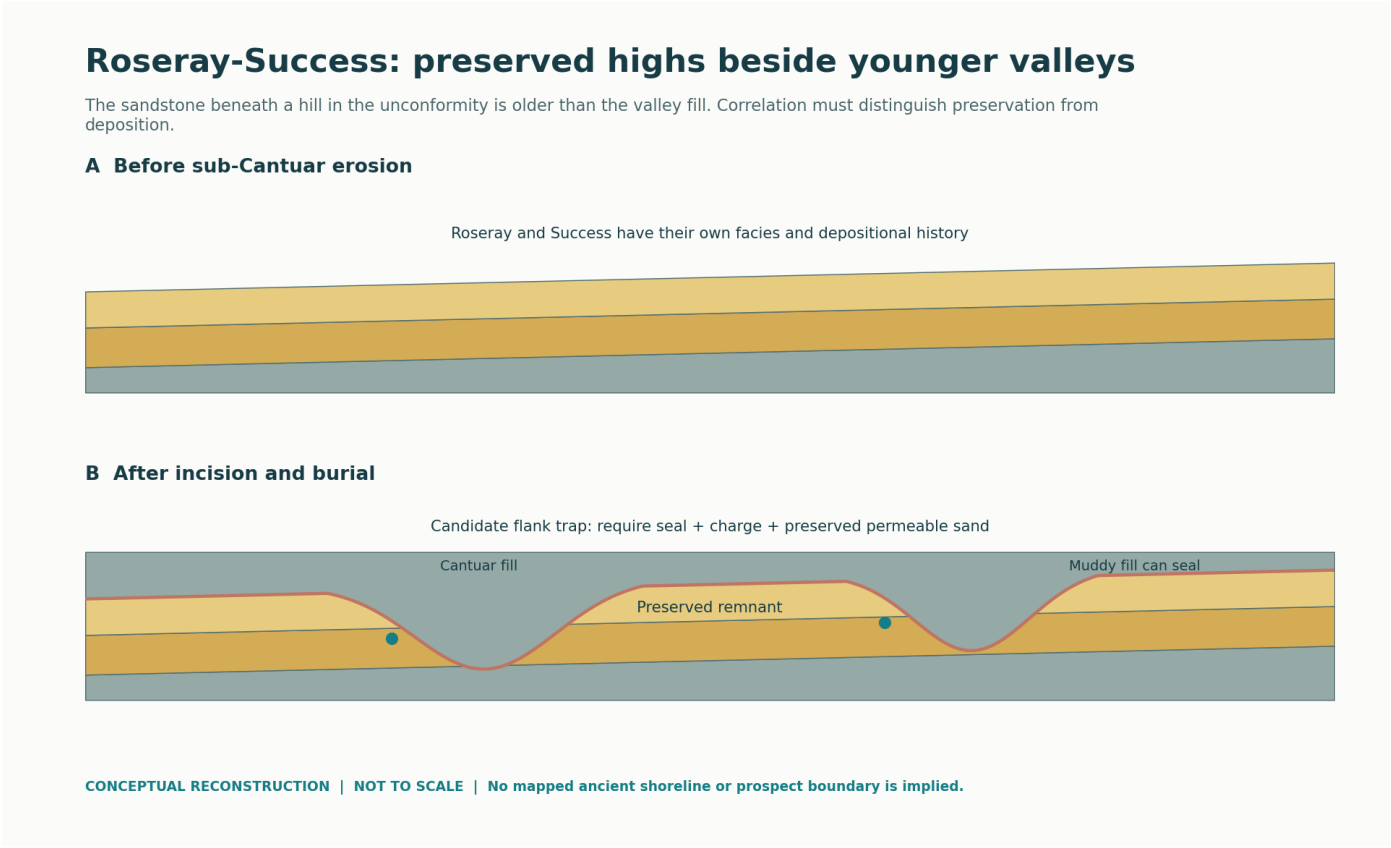
Sources: S09, S10, S12. Full references follow.

9. Mannville: incised valleys, floodplains and a brackish shelf

Mannville deposition did not simply drape a flat Jurassic surface. Cantuar occupied relief, and some of that fill can seal older Roseray-Success remnants. The fill itself may also contain reservoirs. Pense records a later marine/brackish phase, followed by Joli Fou flooding. Each relationship requires its own facies and correlation test.



Conceptual anatomy of a valley fill. The same fill may form its own reservoir and seal an older Roseray-Success flank; those are separate trapping questions. No net-sand fraction or continuity distance is assumed.



Original reconstruction of the published Roseray-Success butte/mesa and Cantuar valley-fill trapping model. Illustrative relief is not a measured section. A missing sandstone across a valley may be eroded rather than a primary depositional pinchout.

Cantuar Formation: McCloud, Dimmock Creek and Atlas context

Early Cretaceous | formation with regional members | conditional reservoir and demonstrated regional trap-cover setting

Valley, floodplain and locally marginal marine deposits include variable sand, mud and coal. Regional names encompass different sediment sources and degrees of weathering [S53].

Published observations

- Original log correlation in the Roseray-Success study identifies valleys, terraces and interfluves [S09].

Reservoir settings to investigate

- Test clean channel or estuarine sand inside the fill; separately test muddy valley fill as lateral seal to older sandstone.

Criteria for a producing reservoir

- Resolve erosional bases, channel stacking and mud continuity; compare along-valley and cross-valley sections.

Evidence that weakens the idea

- Not every valley contains reservoir-quality sand, and not every fill is an effective seal. Old well-zone names may conflate Cantuar with Success.

Sources: S53, S09. Full references follow.

Pense Formation

Early Cretaceous, Albian | formation | conditional marginal-marine reservoir

Brackish waters spread across a shallow Saskatchewan shelf, followed by repeated thin coarsening-upward shoreface successions [S13].

Published observations

- The regional reconstruction places Pense between largely continental Mannville systems and later broader marine flooding [S13].

Reservoir settings to investigate

- Evaluate cleaner shoreface or locally reworked sand within the muddy succession.

Criteria for a producing reservoir

- Identify each upward-coarsening cycle and its cap; test cement, clay, effective pores and saturation.

Evidence that weakens the idea

- A coarsening-upward log motif can have several causes and is not sufficient to assign a beach or reservoir.

Sources: S13. Full references follow.

Joli Fou Formation

Early Cretaceous, late Albian | formation | potential seal / correlation datum

Marine flooding deposited shale above the Mannville succession, providing a useful regional datum and potential cap [S54].

Published observations

- The marine shale separates the older valley/shelf succession from younger Colorado sandstone episodes [S54].

Reservoir settings to investigate

- Map cap continuity and local erosional or sandy exceptions over Mannville targets.

Criteria for a producing reservoir

- Use lithology and pressure evidence to establish sealing behavior at the target scale.

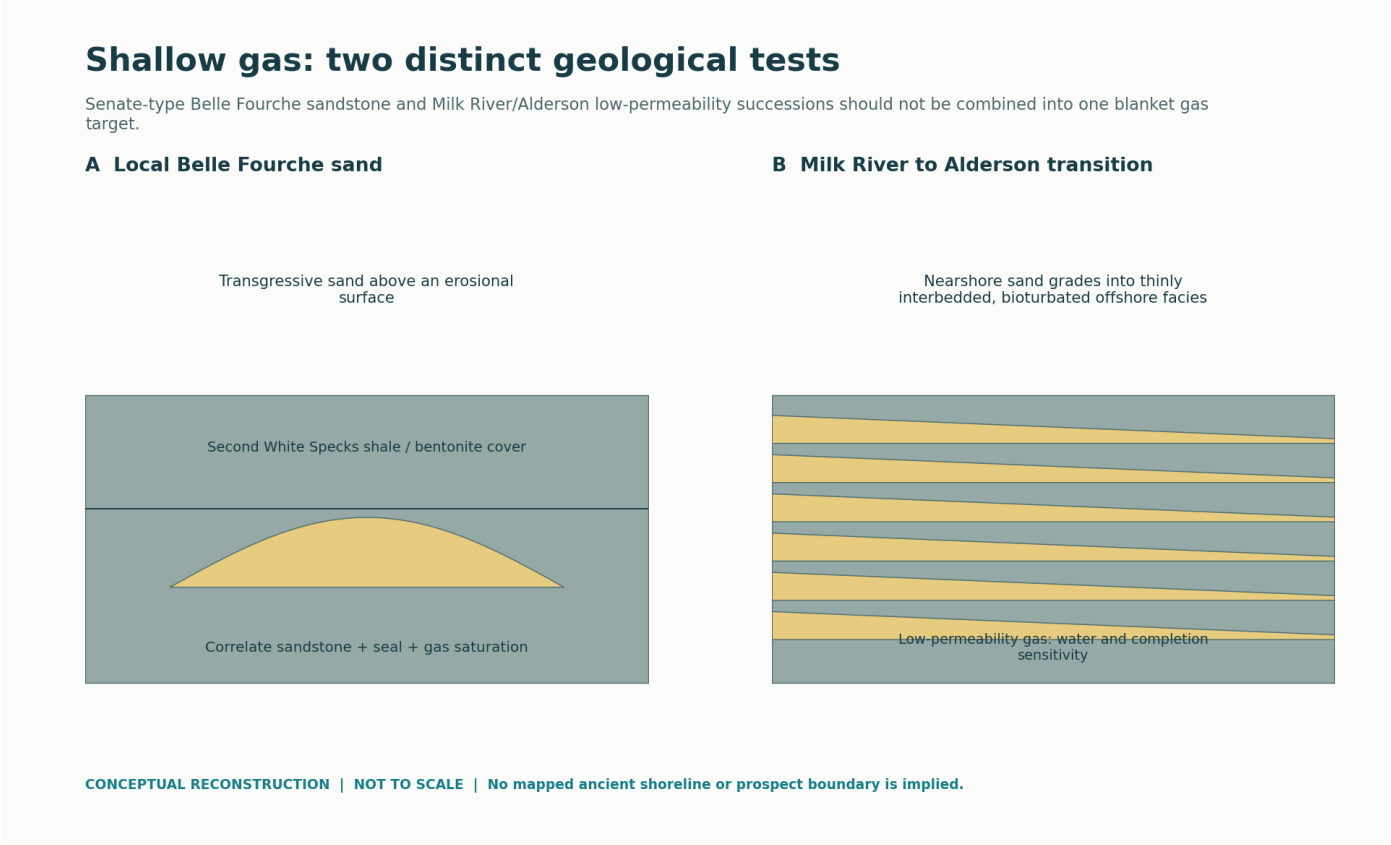
Evidence that weakens the idea

- A named shale may be thin, faulted or locally sandy; its regional presence alone does not resolve the trap.

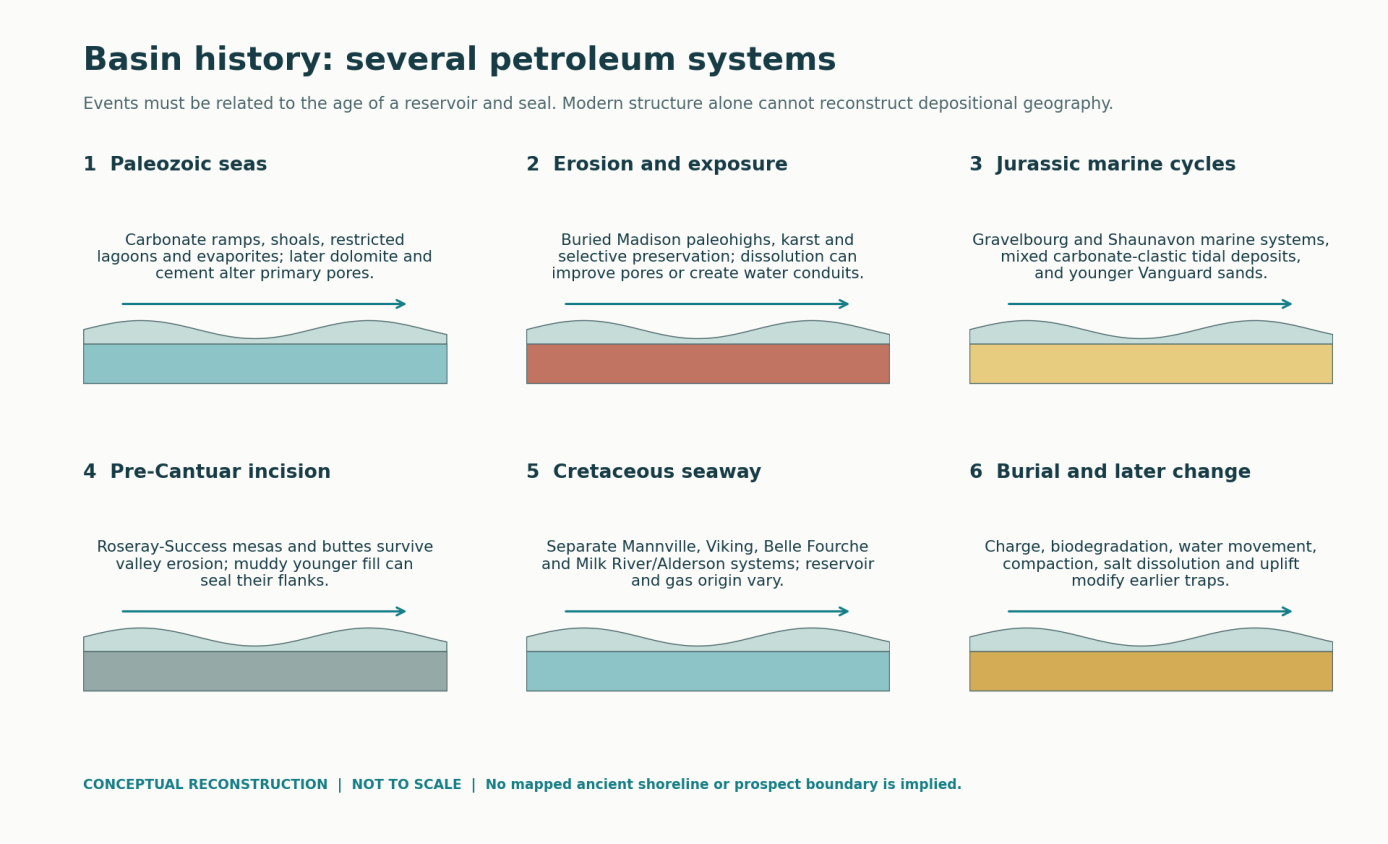
Sources: S54. Full references follow.

10. Lower Colorado: Viking sands, marine mud and Senate-type gas

Repeated advance and retreat of the Cretaceous sea created marine sand bodies among much thicker mud-rich intervals. Dodsland-style Viking development belongs mainly to the next northern tile; its existence is a regional analogue, not evidence for the same reservoir everywhere in the southwest. Senate and Merryflat require a separate upper Belle Fourche interpretation.



Two original conceptual sections. Senate reservoir architecture is tied to published Belle Fourche core/log studies; the Milk River-Alderson panel illustrates a regional nearshore-to-offshore transition and does not map a gas limit.



Conceptual synthesis of the formation studies and regional WCSB stratigraphy. The panels show processes, not a restored geographic map. Charge and seal must postdate or survive trap formation.

Viking Formation

Early Cretaceous, late Albian | formation | conditional reservoir; northern analogue context

Shelf, shoreface, reworked sand bodies and locally incised-valley deposits formed during changing relative sea level. Regional geometry varies through successive depositional episodes [S15].

Published observations

- A single sandy log motif cannot choose among shoreface, shelf ridge or valley fill [S15].

Reservoir settings to investigate

- Test a core-calibrated sand body with containment and charge near existing local well control.

Criteria for a producing reservoir

- Resolve sequence boundaries and sand-body orientation; compare porosity, permeability, saturation and pressure with actual offsets.

Evidence that weakens the idea

- Dodsland/Kindersley production north of this tile must not be presented as a local discovery or imported as a continuous belt.

Sources: S15. Full references follow.

Westgate Formation

Early Cretaceous, Albian | formation / member in older usage | seal / possible source context

Dark marine shale overlies Viking equivalents and precedes the distinctive Fish Scales interval [S55].

Published observations

- Regional fine-grained facies make it useful for correlation and as potential cover [S55].

Reservoir settings to investigate

- Treat it primarily as marine background/seal; assess local silt beds or natural-fracture targets only with direct data.

Criteria for a producing reservoir

- Distinguish fracture-connected reservoir behavior from log-scale apparent porosity.

Evidence that weakens the idea

- Source richness, thermal maturity and productive natural fractures cannot be assumed from dark color.

Sources: S55. Full references follow.

Fish Scales marker interval

Early-Late Cretaceous boundary interval | marker / formation in regional usage | correlation marker / local reservoir only if demonstrated

Fish-rich, locally sandy or phosphatic marine beds form a distinctive condensed/correlative interval between Westgate and Belle Fourche in regional schemes [S55; S56].

Published observations

- A marker is useful for tying sections, but correlation does not establish a laterally uniform reservoir [S55].

Reservoir settings to investigate

- Use it to constrain the geometry and age of nearby sandstone rather than infer pay from a marker response.

Criteria for a producing reservoir

- Check actual lithology, marker pick consistency and any local erosion.

Evidence that weakens the idea

- Different legacy schemes assign boundaries differently; a model surface should retain the source definition.

Sources: S55, S56. Full references follow.

Belle Fourche Formation and the Senate sandstone interval

Late Cretaceous, Cenomanian | formation / upper sandstone interval | proven local shallow-gas reservoir

Predominantly marine mud includes an upper sandstone episode. The Senate study interprets the legacy “2WS sand” as upper Belle Fourche transgressive sandstone above an unconformity and below Second White Specks cover [S07].

Published observations

- Senate and Merryflat establish a narrow, elongate shallow-gas analogue rather than a blanket sandstone reservoir [S07].

Reservoir settings to investigate

- Test onlap or preserved sand on paleorelief flanks within the correct stratigraphic interval.

Criteria for a producing reservoir

- Tie the unconformity, clean sand and overlying shale/bentonite; verify gas composition, pressure and permeability.

Quantitative examples: local scope only

- value: 15-30% porosity; permeability up to 340 mD; meaning: Published sandstone at the cited Senate sample locality; not a regional average, pay cutoff or current in-situ permeability; source: S07; page: 2-3

Well and core evidence

- uwi: 7-11-3-29W3; evidence: Published Senate sandstone sample locality; full event/UWI and sample depth must be reconciled before plotting a sample marker.; source: S07; page: 2

Evidence that weakens the idea

- Calling the reservoir “2WS” can place it on the wrong formation plane. A regional high need not contain the best preserved sand.

Area significance. Senate-Merryflat; analogous relief-flank settings remain hypotheses.

Sources: S07, S56. Full references follow.

Second White Specks Formation

Late Cretaceous, Cenomanian-Turonian | formation | potential seal / source and local gas context

Calcareous marine mud with bentonitic beds records widespread flooding above the Senate-type sandstone. It is distinct from the sandstone historically called “2WS sand” [S07].

Published observations

- The modern Upper Colorado framework treats it as a separate formation below Carlile [S18].

Reservoir settings to investigate

- Evaluate local seal continuity over sandstone and any independently demonstrated mudrock gas contribution.

Criteria for a producing reservoir

- Use calcareous microfossil fabric, bentonite markers and logs to identify the interval; require maturity and flow evidence for a source/reservoir claim.

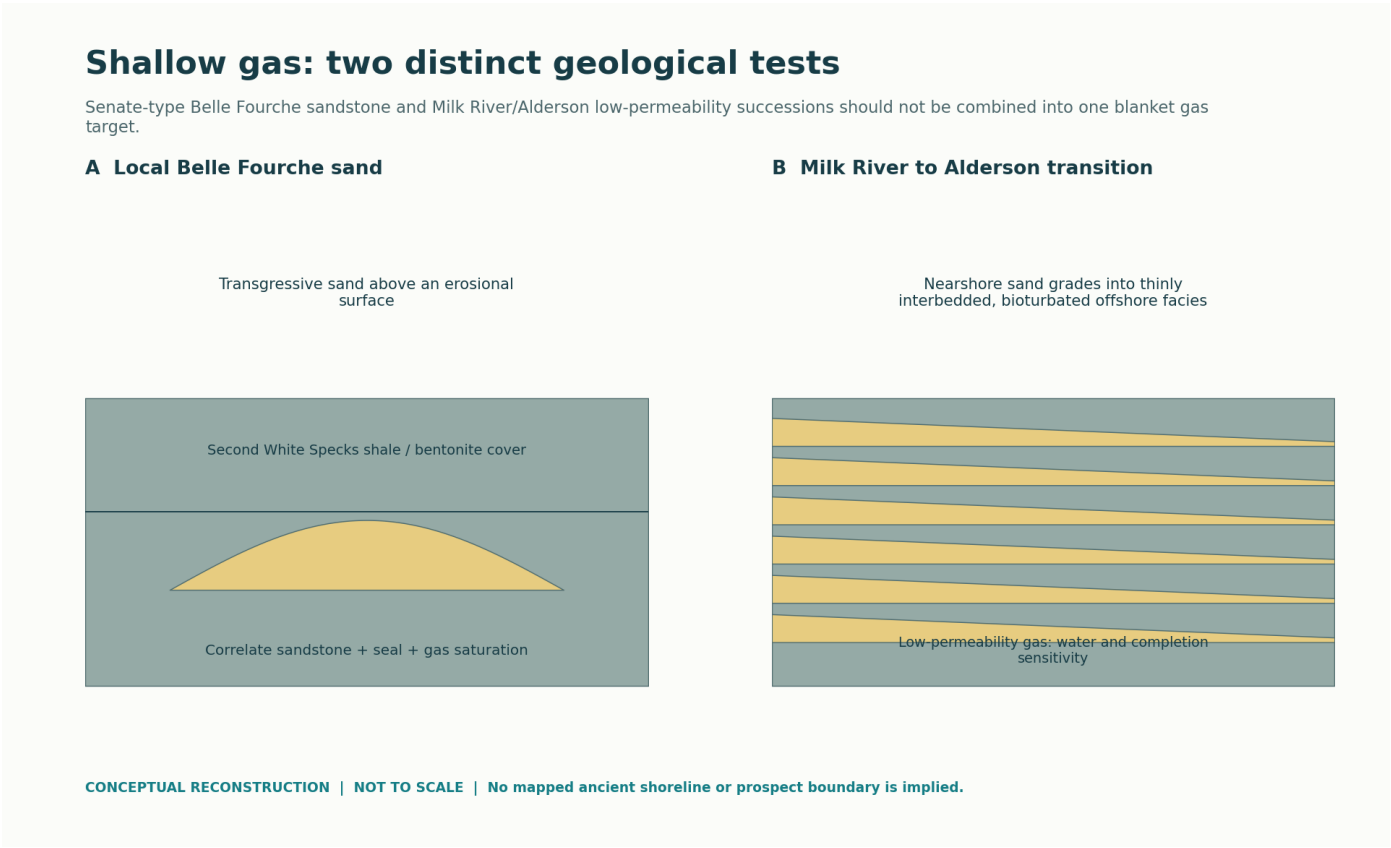
Evidence that weakens the idea

- A hydrocarbon-bearing sandstone below the formation does not prove that the overlying shale is a producible shale reservoir.

Sources: S07, S18. Full references follow.

11. Upper Colorado and Alderson: shallow gas within muddy marine systems

The shallow-gas model is not limited to clean sandstone or four-way structural closure. Thin sand laminae and sand-filled burrows can connect storage in muddy rock. Reservoir architecture, water saturation, gas composition and pressure must therefore be evaluated at a finer scale than a regional formation surface. Medicine Hat, Senate and Alderson are separate stratigraphic systems.



Two original conceptual sections. Senate reservoir architecture is tied to published Belle Fourche core/log studies; the Milk River-Alderson panel illustrates a regional nearshore-to-offshore transition and does not map a gas limit.

Carlile Formation

Late Cretaceous, Turonian | formation | marine background / conditional gas interval

Marine muddy sediment above Second White Specks forms a distinct lithostratigraphic interval in the revised southern Alberta-southwestern Saskatchewan framework [S18].

Published observations

- Carlile is not a synonym for the entire upper Colorado succession [S18].

Reservoir settings to investigate

- Test local cleaner silt/sand intervals or demonstrated gas-bearing fabrics without assuming a blanket conventional reservoir.

Criteria for a producing reservoir

- Correlate marker beds, actual facies and fluid evidence; establish pore connectivity at bed scale.

Evidence that weakens the idea

- Formation-scale thickness cannot resolve thin flow units or differentiate a regional seal from a local gas-bearing bed.

Sources: S18. Full references follow.

Niobrara Formation, including Verger and upper calcareous intervals

Late Cretaceous, Coniacian-Santonian, regionally | formation with regional members | marine host / reservoir-seal framework

Mud-dominated marine deposition alternated with finer sandstone/siltstone episodes. The formal Niobrara framework encloses more than the conspicuous upper white-speckled shale [S18].

Published observations

- Regional nomenclature separates Niobrara from underlying Carlile and overlying Milk River/Alderson-equivalent deposits [S18].

Reservoir settings to investigate

- Identify the actual thin reservoir interval and enclosing mud rather than use the formation name as a pore-quality proxy.

Criteria for a producing reservoir

- Tie member-scale logs to sedimentary fabric and cap continuity.

Evidence that weakens the idea

- A broad model plane cannot resolve Medicine Hat sand geometry or local mudrock gas potential.

Sources: S18, S71. Full references follow.

Medicine Hat sandstone/siltstone interval

Late Cretaceous | member / formation in regional usage | proven regional shallow-gas system; local targets conditional

Repeated fine-grained marine sandstone and siltstone cycles occur among muddy strata. This is a shallow-gas system with strong facies and pore-connectivity controls [S14].

Published observations

- An Alberta analogue measured sand-filled burrows using minipermeametry and micro-CT; the observations are sample-scale and outside the Saskatchewan core [S17].

Reservoir settings to investigate

- Evaluate laminated and burrow-connected flow units in separately correlated cycles near existing gas control.

Criteria for a producing reservoir

- Measure directional permeability, water saturation and pressure; distinguish gross sandy thickness from connected gas reservoir.

Evidence that weakens the idea

- A sandy-looking bed can be cemented, and a muddy-looking bed can transmit through burrows. Alberta sample properties are not local Saskatchewan measurements.

Sources: S14, S17. Full references follow.

First White Speckled Shale / upper Niobrara context

Late Cretaceous | member / marker interval | potential seal / regional datum

Calcareous marine mud provides a recognizable regional interval above Medicine Hat beds in traditional usage [S57].

Published observations

- Lithology and stratigraphic position support its use as a cap and datum where intact [S57].

Reservoir settings to investigate

- Test cap continuity and isolate any sandy interbeds as separate units.

Criteria for a producing reservoir

- Verify local marker definition and actual seal thickness.

Evidence that weakens the idea

- A marker surface gives no direct measure of capillary entry pressure or breach by fractures.

Sources: S57. Full references follow.

Milk River-Alderson system

Late Cretaceous, Santonian-Campanian regionally | formation / laterally related member | proven shallow biogenic-gas system

Nearshore Milk River sandstone in Alberta passes toward finer marine Alderson facies in the regional succession. Alderson in southwestern Saskatchewan includes mud-rich shore-margin and deltaic deposits [S58; S16].

Published observations

- Hatton research identifies productive potential in laminae and sand-filled burrows as well as apparently sandier beds [S16].

Local and regional orientation

Regional facies migration changes with time; no fixed Saskatchewan shoreline is mapped from modern gas-pool outlines.

Reservoir settings to investigate

- Map connected laminae/burrow fabrics, gas saturation and pressure around Hatton and other sampled shallow-gas areas.

Criteria for a producing reservoir

- Use bed-scale facies, directional permeability and fluid measurements; distinguish biogenic gas evidence from generic gas shows.

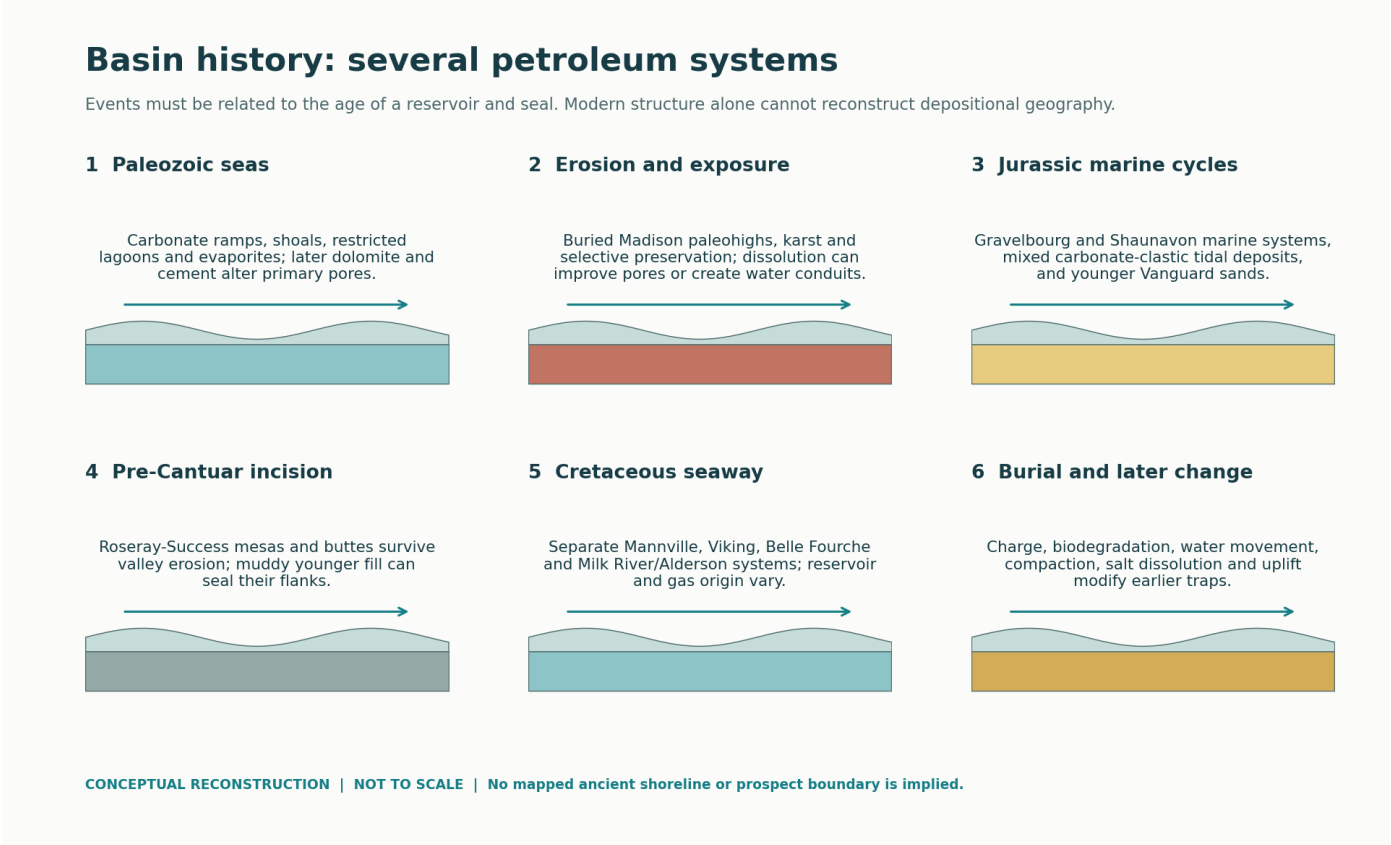
Evidence that weakens the idea

- Maximum gross sand need not mean maximum connected permeability. The regional Milk River surface may represent a bounding unconformity, not every Alderson flow unit.

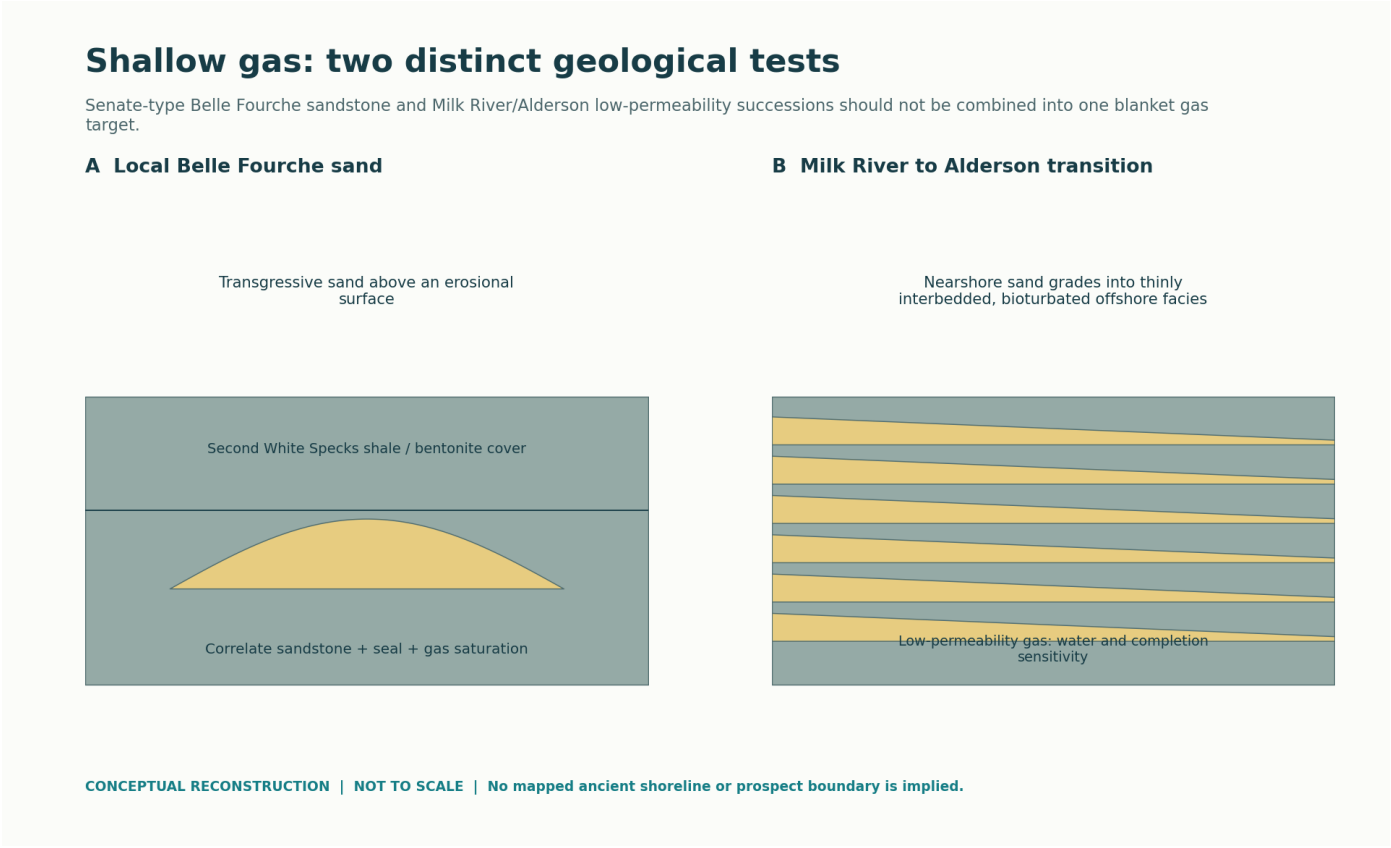
Sources: S16, S58, S02. Full references follow.

12. Late Cretaceous: renewed marine flooding and retreating coastlines

Lea Park/Pakowki, Judith River, Bearpaw and Eastend record repeated marine and coastal changes. These units matter for the overburden, seals, aquifers and basin history even where this study has not established a local conventional hydrocarbon play. “Belly River” on an old log or model is a legacy label that requires lithostratigraphic reconciliation.



Conceptual synthesis of the formation studies and regional WCSB stratigraphy. The panels show processes, not a restored geographic map. Charge and seal must postdate or survive trap formation.



Two original conceptual sections. Senate reservoir architecture is tied to published Belle Fourche core/log studies; the Milk River-Alderson panel illustrates a regional nearshore-to-offshore transition and does not map a gas limit.

Lea Park and Pakowki marine shale successions

Late Cretaceous, Campanian | formations / regional correlatives | marine seal / stratigraphic context

Marine shale with silt and fine sandstone records flooding and offshore deposition. Regional Lea Park and Pakowki usage overlaps but is not a universal one-to-one time equivalence [S59; S60].

Published observations

- Pakowki contacts and the Milk River-Alderson relationship include important regional changes [S14].

Reservoir settings to investigate

- Map muddy cover and any demonstrably connected sandy tongue above the shallow-gas system.

Criteria for a producing reservoir

- Preserve the source nomenclature and constrain local contacts with biostratigraphy or reliable markers.

Evidence that weakens the idea

- Do not combine every regional shale name into one purported impermeable blanket.

Sources: S59, S60, S14. Full references follow.

Judith River Formation and legacy Belly River usage

Late Cretaceous, Campanian | formation / legacy regional name | coastal/continental history; conditional reservoir / aquifer

Sand, silt, mud and coal record coastal to continental deposition as shorelines shifted. Channel and floodplain bodies are likely at local scales but require core/log evidence to locate [S61].

Published observations

- The plains use of Belly River as a single formation is obsolete in the cited lexicon; source-model labels may retain it [S70].

Reservoir settings to investigate

- Distinguish channel sand, marginal-marine sand and muddy floodplain before discussing reservoir or aquifer behavior.

Criteria for a producing reservoir

- Require local charge, retention, fluid and pressure evidence for a hydrocarbon claim.

Evidence that weakens the idea

- Coal or porous channel sand alone does not demonstrate economic gas or oil. Shallow water-bearing intervals may be the dominant resource.

Sources: S61, S70. Full references follow.

Bearpaw Formation

Late Cretaceous, Campanian-Maastrichtian regionally | formation | marine seal / local sand and aquifer context

A marine transgression deposited mud with local sandy tongues above the older coastal succession [S62].

Published observations

- The mud-to-sand pattern records time-varying shoreline position, not one permanent coast [S62].

Reservoir settings to investigate

- Evaluate a locally proven sand tongue within marine cover, while using the broader unit as overburden/seal context.

Criteria for a producing reservoir

- Correlate each tongue and test its continuity, water saturation and charge.

Evidence that weakens the idea

- A marine sandstone can be aquifer, tight rock or depleted gas reservoir; lithology alone does not discriminate.

Sources: S62. Full references follow.

Eastend Formation

Late Cretaceous, Maastrichtian | formation | regressive sedimentary history / aquifer; unproven local petroleum target

Fine sandstone and siltstone record regression from marine to more marginal conditions; marine fossils occur near the base in regional descriptions [S63].

Published observations

- Later erosion locally modifies the preserved succession [S63].

Reservoir settings to investigate

- Use sandstone geometry to reconstruct retreating shoreline and groundwater architecture; test hydrocarbons only where direct evidence exists.

Criteria for a producing reservoir

- Separate depositional coarsening from an erosional remnant and confirm cap/charge.

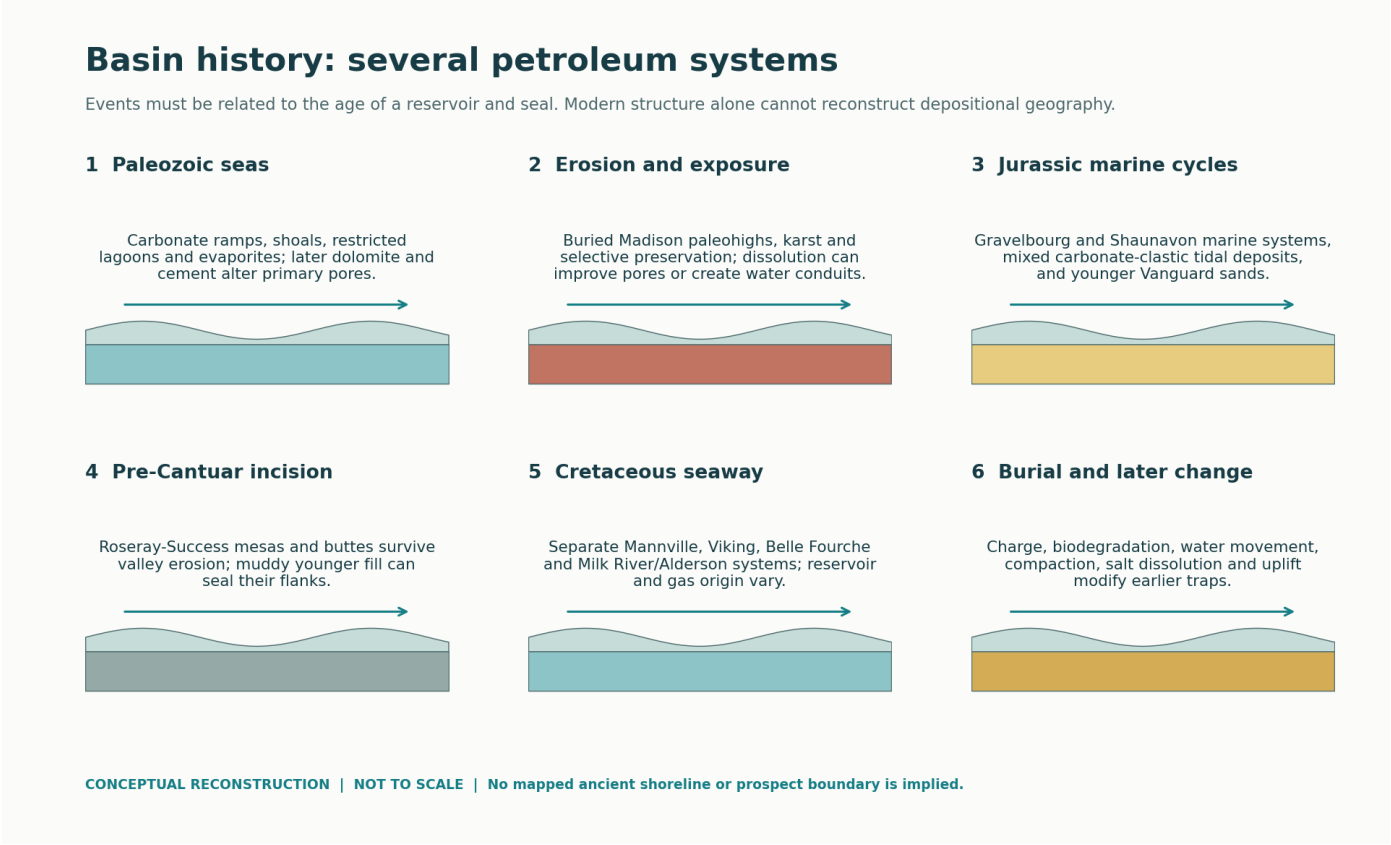
Evidence that weakens the idea

- Shallow exposure, freshwater circulation and removal of cover can prevent petroleum retention.

Sources: S63. Full references follow.

13. Latest Cretaceous to Cenozoic: weathering, rivers, coal and uplift

The youngest preserved deposits explain erosion, burial removal and groundwater pathways. They are included to make the regional geological history complete, but this study does not promote every sandstone or coal as an oil/gas reservoir. The preliminary regional sub-Quaternary surface is particularly inappropriate for local shallow-water or engineering decisions [S02].



Conceptual synthesis of the formation studies and regional WCSB stratigraphy. The panels show processes, not a restored geographic map. Charge and seal must postdate or survive trap formation.

Whitemud Formation

Latest Cretaceous | formation | weathering / continental history / aquifer-aquitard

Kaolinitic sand/clay with carbonaceous mud and lignitic material records strongly weathered sediment in a continental setting [S64].

Published observations

- Clay-rich and cleaner sandy facies can have sharply different hydraulic behavior [S64].

Reservoir settings to investigate

- Map weathered sand and clay chiefly for paleogeography and aquifer/aquitard context.

Criteria for a producing reservoir

- Require measured permeability and fluids before proposing a petroleum role.

Evidence that weakens the idea

- Kaolin-rich sand can have poor effective flow despite high apparent porosity; shallow cover and charge are unresolved.

Sources: S64. Full references follow.

Battle Formation

Latest Cretaceous | formation | marker / aquitard context

Bentonitic clay and volcanic ash-derived material form a distinctive fine-grained continental interval [S65].

Published observations

- The regional lithology makes it useful as a marker and potential aquitard [S65].

Reservoir settings to investigate

- Use its presence to constrain erosion and stratigraphic preservation.

Criteria for a producing reservoir

- Check continuity and reworking rather than treating an ash-rich marker as an assured seal.

Evidence that weakens the idea

- Thin or eroded clay cannot contain a hypothetical reservoir simply because it is recognizable on a log.

Sources: S65. Full references follow.

Frenchman Formation

Latest Cretaceous, Maastrichtian | formation | continental history / aquifer; unproven local petroleum target

Cross-bedded and upward-fining sandstone with mud records fluvial channels and floodplains above an erosive base [S66].

Published observations

- The erosional geometry can remove older beds and connect younger sands [S66].

Reservoir settings to investigate

- Map channel architecture for the final Cretaceous landscape and groundwater context.

Criteria for a producing reservoir

- Evaluate a petroleum claim only if charge, cover, fluid and retention evidence are present.

Evidence that weakens the idea

- A channel-shaped sand is not an oil pool; exposure and freshwater flow may dominate.

Sources: S66. Full references follow.

Ravenscrag Formation

Paleocene in modern regional usage | formation | continental history / coal and groundwater context

Continental sand, mud and coal accumulated in river, floodplain and wetland settings [S67].

Published observations

- Legacy broad Ravenscrag usage included strata now separated as Frenchman; age labels should follow the selected stratigraphic scheme [S67].

Reservoir settings to investigate

- Distinguish sand aquifers, coal-bearing wetlands and muddy baffles in the post-Cretaceous landscape.

Criteria for a producing reservoir

- Any coal-gas proposal needs actual gas content, saturation, pressure, permeability and water handling evidence.

Evidence that weakens the idea

- Coal presence is not a demonstrated recoverable gas resource; conventional oil charge and retention are not established here.

Sources: S67. Full references follow.

Swift Current Creek beds

Eocene | regional sedimentary unit | Cenozoic landscape / aquifer context

Fluvial sand and gravel preserve part of the younger continental landscape in southwestern Saskatchewan [S68].

Published observations

- Preserved remnants provide evidence of river transport and later erosion [S68].

Reservoir settings to investigate

- Use remnants to reconstruct landscape history and possible shallow groundwater pathways.

Criteria for a producing reservoir

- Verify mapped extent and sedimentology before using the name beyond its documented occurrence.

Evidence that weakens the idea

- No conventional hydrocarbon reservoir is established by this study.

Sources: S68. Full references follow.

Cypress Hills Formation

Cenozoic, chiefly Paleogene in regional usage | formation | uplift / drainage / groundwater context

High-level fluvial gravel and sandstone with resistant clasts record western sediment supply and a landscape later isolated by erosion [S69].

Published observations

- The unit is a preserved upland remnant, not a continuous blanket across the tile [S69].

Reservoir settings to investigate

- Use clast provenance and remnant elevation to test landscape evolution; investigate groundwater only with dedicated local data.

Criteria for a producing reservoir

- Separate depositional age, later uplift and subsequent incision.

Evidence that weakens the idea

- A high modern landform is not direct evidence of a deep petroleum closure beneath it.

Sources: S69. Full references follow.

Quaternary cover and modern terrain

Quaternary | unconsolidated cover / land surface | terrain / shallow cover context

Glacial and younger unconsolidated cover modifies the modern land surface and masks bedrock. It is a separate shallow geological system from the buried petroleum reservoirs.

Published observations

- OF8969 explicitly describes its sub-Quaternary surface as preliminary and unsuitable for shallow local projects [S02].

Reservoir settings to investigate

- Use modern terrain as geographic context; use dedicated surficial mapping and boreholes for shallow work.

Criteria for a producing reservoir

- Retain surface elevation, ground level, KB and subsurface datum as separate quantities.

Evidence that weakens the idea

- A regional DEM or preliminary bedrock surface cannot support site-scale groundwater, geotechnical or shallow drilling decisions.

Sources: S02. Full references follow.

Local settings near established pools

These are evidence-based analogue settings and falsifiable geological hypotheses. Proximity to a pool does not establish a shared reservoir, pressure system, seal or oil charge. Each setting identifies what would have to be true, and what observations would reject it.

1. Leitchville-Bone Creek: connected pores in upper Lower Shaunavon

Area

Leitchville and Bone Creek pool neighborhoods

Intervals

- Lower Shaunavon

Documented evidence

- The published petrographic study ties actual cores and thin sections to these pool areas [S05].

Interpretation

Shallow carbonate cycles provide the grain-rich host; later dissolution and cement control useful connectivity.

Local setting to test

A nearby retained upper shoal bed could contain a separate charged compartment where pore throats remain open and surrounding facies or cap contain it.

Required conditions

- Same reservoir bed, measured connected pores and hydrocarbon saturation.
- Demonstrable enclosing seal and compatible pressure history.

Decisive observations

- Compare core/thin sections across producing and wet offsets.
- Audit horizontal landing intervals and completion dates before comparing productivity.

Negative evidence

- Isolated molds, cemented throats, water-bearing connected offset or removed upper bed.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S05

2. Instow-Illerbrun-Covington: upper Shaunavon inlet bodies

Area

Instow, Illerbrun, Covington and Covington South

Intervals

- Upper Shaunavon inlet association / E-U3 context

Documented evidence

- The core-based facies study associates these named pools with the inlet association [S03].

Interpretation

Erosive inlet fill creates sand/coquina bodies within a heterogeneous tidal setting.

Local setting to test

A neighboring inlet segment may be isolated by muddy inter-inlet sediment or cemented facies, but continuity along the published inlet trend must be tested.

Required conditions

- Match erosional base and internal facies, not only top elevation.
- Confirm connected porosity and fluid containment.

Decisive observations

- Construct cross-trend and along-trend well sections with core ties.
- Test pressure communication between adjacent completed bodies.

Negative evidence

- A continuous wet body, absent cap, tight fill or incompatible reservoir correlation.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S03

3. Dollard-Rapdan-Eastend-Eastbrook: stacked reservoirs and erosion

Area

Southern Shaunavon trend, T3-7 R19-21W3 in the cited study

Intervals

- Upper Shaunavon B-E intervals

Documented evidence

- The 2013 study maps separate reservoir intervals and an internal unconformity in this district [S04].

Interpretation

Stacking and selective preservation can put different reservoirs at the same modern structural level.

Local setting to test

A small pool analogue may occur where one retained reservoir pinches into tight facies beneath a surviving cap, even if the whole member remains thick.

Required conditions

- Identify the same lettered/local reservoir in every comparison well.
- Map the reservoir edge separately from the member edge.

Decisive observations

- Rebuild interval-specific isopachs from traceable picks.
- Include water-bearing and dry offsets and check completion-zone assignments.

Negative evidence

- Apparent sand connectivity caused by miscorrelation across the unconformity.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S04

4. West of the main Shaunavon trend: re-audit historical shows

Area

Western flanks of the established Upper Shaunavon trend; no new prospect boundary assigned

Intervals

- Upper Shaunavon

Documented evidence

- A 2014 SGS presentation documents historical cored oil shows west of the main producing trend [S11].

Interpretation

Some similar reservoir fabrics were encountered outside established development, but stain is weaker evidence than mobile production.

Local setting to test

A historical show may justify a modern data review if the original interval, fluid tests, completion limitations and newer offset results remain consistent with retained mobile oil.

Required conditions

- Exact well/sample identity and current offset inventory.
- Measured saturation and mobility, intact trap and resolved water risk.

Decisive observations

- Retrieve original core, DST and abandonment/production records.
- Check whether later wells have already tested or disproved the proposed extension.

Negative evidence

- Residual immobile stain, water-only tests, breached trap or a later dry offset.

Confidence and limits

Historical show evidence only; no verified new commercial accumulation or available land claim.

Sources: S11

5. Battrum: facies quality plus a preserved Roseray body

Area

Battrum and adjacent named Roseray pools

Intervals

- Roseray
- local Success context

Documented evidence

- Official designations include Battrum Roseray pools; regional studies establish variable sandstone quality and remnant trapping [S19; S08; S09].

Interpretation

Depositional sand quality and later erosion/cover both contribute; neither alone explains the trap.

Local setting to test

A nearby preserved clean remnant could be contained against muddier valley fill where both its top and sides remain sealed.

Required conditions

- Separate Roseray from Success and historical Cantuar labels.
- Confirm permeable sand, lateral closure and cap.

Decisive observations

- Map top and base contacts through a loop of wells around the remnant.
- Compare matrix/clay and cement with nearby nonproducing sand.

Negative evidence

- A continuous water-bearing connection or permeable valley fill that drains the remnant.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S19, S08, S09

6. Cantuar-Fosterton-Success: remnant sandstone versus true valley fill

Area

Cantuar, Fosterton and Success field neighborhoods

Intervals

- Success
- Roseray
- Cantuar

Documented evidence

- The regional Success-Mannville synthesis names these producing districts and emphasizes historical zone terminology [S10].

Interpretation

Older preserved sandstone and younger fill can occupy adjacent positions but have different reservoir roles.

Local setting to test

An isolated older remnant or a separate clean sand inside the younger fill could form a small compartment, requiring opposite geometric tests.

Required conditions

- Resolve age/unit identity first.

- Show where the porous body ends and what seals it.

Decisive observations

- Build an along-valley and cross-valley section including the deepest incision.
- Reconcile completion intervals with current tops rather than field names.

Negative evidence

- Misassigned Success/Cantuar sand, muddy non-reservoir fill or no lateral seal.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S10, S09

7. Gull Lake-Webb-Beverley: test the edge of the preserved sand system

Area

Gull Lake, Webb, Beverley and nearby Swift Current-side districts

Intervals

- Roseray-Success
- Cantuar cover

Documented evidence

- The historical regional synthesis lists these districts within the southwestern sandstone-producing system [S10].

Interpretation

Remnant preservation and changes in sand quality are competing explanations for a nearby nonproducer.

Local setting to test

A nonproducing gap could contain an unconnected remnant, but it could equally represent removed sand or tight equivalent facies.

Required conditions

- Demonstrate retained sand and containment rather than extrapolate through the gap.

Decisive observations

- Separate absent, wet and tight wells in the database.
- Use cuttings/core to distinguish clay-rich sandstone from a true zero edge.

Negative evidence

- No reservoir at the mapped interval, open water connection or cap removed by incision.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S10, S08, S09

8. Battle Creek-Battle Creek West: altered carbonate beneath onlap

Area

Southwestern corner, Battle Creek pool neighborhoods

Intervals

- Madison / Strathallen
- Gravelbourg cover

Documented evidence

- The 2001 study documents heavy-oil reservoirs and the relationship to paleohighs; official pool designations identify the Madison intervals [S06; S19].

Interpretation

Paleotopographic position, later structure and selective alteration act together.

Local setting to test

A neighboring preserved paleohigh may retain porous altered carbonate where Jurassic cover contains it, but the model must also explain low-gravity oil and water behavior.

Required conditions

- Actual porous zone beneath an intact cap, not just a topographic high.
- Oil mobility and pressure evidence from comparable intervals.

Decisive observations

- Map direct Gravelbourg-on-Madison versus Watrous-covered contact.
- Compare core alteration with structural and paleotopographic maps independently.

Negative evidence

- Calcite/anhydrite plugging, strong water connection or no closure at the top of connected porosity.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S06, S19

9. Rangeview and Rangeview East: test open versus filled alteration

Area

Rangeview pool neighborhoods

Intervals

- Madison / Strathallen

Documented evidence

- Published cores include both reservoir-enhancing alteration and anhydrite-filled karst in the district [S06, p 53].

Interpretation

Karst is a process history; its resulting pore system may be open, isolated or completely filled.

Local setting to test

A small connected compartment could occur beside a cemented alteration zone only if measured permeability and fluids demonstrate the boundary.

Required conditions

- Open connected pores rather than cavern-shaped cement.
- Pressure containment and adequate cap.

Decisive observations

- Log cement-filled and open intervals separately in core.
- Tie the alteration to the unconformity, not to a uniform formation thickness.

Negative evidence

- Filled cavities, tight adjacent rock or an alteration zone connected to water.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S06

10. Divide: separate depositional carbonate from the later trap

Area

Divide district within the southwestern Madison analogue area

Intervals

- Madison / Strathallen

Documented evidence

- Divide is one of the oil-bearing districts included in the published southwestern Mississippian study [S06].

Interpretation

The original ramp carbonate and the much later unconformity/onlap geometry must be reconstructed separately.

Local setting to test

An adjacent preserved grain-rich body could matter where subsequent alteration and cover create containment; grainstone occurrence alone is insufficient.

Required conditions

- Reservoir fabric, connected pore system, cap and charge in the same local body.

Decisive observations

- Compare a marker-flattened carbonate section with a modern structure section.
- Audit all intervening wet tests before suggesting continuity.

Negative evidence

- Cemented skeletal rock or missing cap despite favorable depositional fabric.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S06

11. Senate-Merryflat: upper Belle Fourche transgressive sand

Area

Senate and Merryflat

Intervals

- Upper Belle Fourche sandstone; legacy 2WS sand

Documented evidence

- The government case study documents both pools and their upper Belle Fourche sandstone setting [S07].

Interpretation

Sand preserved or onlapping on paleorelief flanks is capped by younger marine cover.

Local setting to test

A similar flank could retain a small sand body if local correlation proves the same event and an intact cap.

Required conditions

- Correct formation assignment, clean connected sand, gas saturation and pressure.

Decisive observations

- Flatten a section on a reliable overlying marker and map the erosional/onlap surface.
- Check gas composition and water-bearing offsets.

Negative evidence

- No preserved sand, leaky cover, water-filled sand or a different stratigraphic interval.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S07

12. Hatton: gas flow through laminae and burrow networks

Area

Hatton gas-pool study district

Intervals

- Alderson / Milk River regional equivalent

Documented evidence

- Original facies/permeability research explicitly examines Hatton cores [S16].

Interpretation

Mud-rich shallow marine and deltaic deposits can contain thin connected sand fabrics that a gross sand map misses.

Local setting to test

A nearby interval classified as muddy may contribute gas if its sand-filled burrows or laminae form a connected saturated network.

Required conditions

- Measured directional permeability and pressure; appropriate gas saturation.

- Correct member and facies correlation.

Decisive observations

- Sample both sandy and bioturbated muddy intervals.
- Compare flow behavior with lamina/burrow architecture and water sensitivity.

Negative evidence

- Disconnected burrows, water-dominated pores or low pressure despite visible sand.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S16

13. Leader-Shackleton / Abbey-Lacadena context: separate gas systems

Area

Northwestern portion and northern margin; core-boundary clipping retained

Intervals

- Alderson / Milk River
- Medicine Hat

Documented evidence

- The Senate comparison distinguishes widespread low-permeability Alderson gas at Abbey-Lacadena near Shackleton from the cleaner Senate sandstone [S07].

Interpretation

Regional gas-bearing muddy systems require bed-scale connectivity and pressure evaluation rather than an oil-pool structural model.

Local setting to test

Additional connected intervals near established gas control could exist where local facies, saturation and pressure are favorable; no continuous gas belt is inferred from place names.

Required conditions

- Assign each completion to its actual interval and retain outside-core context separately.

Decisive observations

- Compare bed-scale logs, core, gas composition and pressure for each system.
- Normalize historical production for completion date, completed interval and drainage.

Negative evidence

- Water-dominated intervals, depletion, absent flow fabrics or an unsupported formation assignment.

Confidence and limits

Established analogue system; proposed nearby extensions are untested and are not delineated prospects.

Sources: S07, S14, S16

14. Deeper Swift Current-side carbonate windows: a screening question

Area

Deeper controlled parts of the tile; no specific undiscovered pool polygon

Intervals

- Winnipegosis
- Souris River
- Duperow
- Birdbear

Documented evidence

- Regional stratigraphy establishes potential porous hosts and seals; it does not establish local oil saturation [S31; S34-S36].

Interpretation

Banks, cycle-specific carbonate pores and salt-related alteration are distinct possible reservoir mechanisms.

Local setting to test

Only an independently charged, preserved and sealed porous body qualifies as a local petroleum lead. Brine-bearing porosity belongs to a separate resource question.

Required conditions

- Direct reservoir and fluid measurements, intact seal and timing-compatible charge.

Decisive observations

- Start with deepest existing penetrations, tests and core.
- Compare sub-salt and supra-salt structure before attributing a feature to a reef or collapse.

Negative evidence

- Water-only fluids, immature/unconnected source, dense carbonate or breached salt-related structure.

Confidence and limits

Regional geological possibility only; no proven local new hydrocarbon accumulation.

Sources: S31, S32, S34, S35, S36

Model methods and reproducibility

Regional surfaces

Resample the original published final-cut triangles at 2 km nodes inside SW study rectangle; no extrapolation outside source triangles. Surfaces remain interpolated regional geological interpretations, not observations at every cell.

Resolution

2 km display grid; original source volumetric model is 2 km×2 km×10m. Not appropriate for local well placement or small-pool delineation.

Thickness

Explicit source-stratigraphic-column top/base difference; no net-pay calculation. A missing support mask is not proof of absence.

Historical controls

SPFPS public TVD picks; original source columns preserved. Actual formation picks remain distinct from erosional boundary picks. Independently displayed and not claimed to be the exact 2023 edited constraints.

Source model markers

Original 2023 XYZ markers retained by horizon; exported marker file lacks UWI identifiers, so marker count is not interpreted as number of wells.

Edge meaning

Original cut-surface boundaries may reflect geological limits or model boundary; zero edges cannot be assumed to delineate a seal or trap.

Preliminary cover

BaseQuaternary is a preliminary working surface. Use no shallow-geology interpretations from it.

Well separation

ModernIRIS wellbores and plan traces are stored separately; never deriveTD from deepest formation pick.

Composite intervals

The Second White Specks-to-Fish Scales interval includes Belle Fourche strata; it is not Second White Specks thickness alone. Upper Colorado is composite. Deadwood-to-Precambrian includes Earlie/basal Cambrian sandstone where present. Dawson Bay excludes separately modeled Second Red Bed, and Souris River excludes First Red Bed. Source interval definitions must be used when comparing formation isopachs; internal units and net reservoir thickness are not independently resolved.

Vertical reference

Source GOCAD objects declare metres, positive elevation, Mean Sea Level. No specific modern geodetic vertical datum realization or conversion is asserted. Independent historical tops use KB minus reported TVD.

Formation / model crosswalk

A named reference top and the gross interval beneath it are different quantities. The Second White Specks top to Fish Scales interval includes Belle Fourche because no independent Belle Fourche top is available. Upper Colorado is also composite. The Deadwood top to basement interval includes Earlie and basal Cambrian sandstone where present. Dawson Bay and Souris River exclude the separately modeled Second and First Red Bed intervals, respectively. The atlas labels these distinctions. Exact-top links in the viewer identify a represented reference horizon; they do not imply that every internal reservoir bed or formal formation thickness is resolved.

Specific model correlation limits

- Roseray has no independent modeled surface; do not substitute Masefield or Success for pool-depth placement.
- The 2nd White Specks top to Fish Scales interval also includes Belle Fourche because its independent top is absent.
- Masefield and Success reference tops coincide with unconformities in the source column; submembers and local remnant geometry remain unresolved.
- Strathallen spans several eastern marker-defined intervals and must remain context only.
- Kisbey names a marker; sandstone lithology is unproven by the model itself.
- Quaternary and Above Belly River are broad cover intervals; source model warns against shallow local use.

Modeled interval	Source top and base	Support / interpretation
Quaternary	DEM top to Unconformity Sub Quaternary	Preliminary source sub-Quaternary surface was approximately translated from DEM to markers. Original authors explicitly advise against its use for shallow-geology studies. Cover is undivided and is not a Cenozoic reservoir model. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Above Belly River	Unconformity Sub Quaternary top to Belly River	Preliminary source sub-Quaternary surface was approximately translated from DEM to markers. Original authors explicitly advise against its use for shallow-geology studies. Cover is undivided and is not a Cenozoic reservoir model. Unit top is restricted to nodes with both explicit source-column boundaries and positive gross interval >0.5m. The complete unconformity is shown separately; its extent does not establish presence of this unit. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Sub-Quaternary unconformity	Erosional surface only; no thickness.	Published erosional bounding surface. Its presence does not establish which underlying or overlying reservoir unit is preserved. No net pay, reservoir thickness or seal quality inferred. No thickness assigned to an unconformity surface.
Belly River	Belly River top to Lea Park	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.

Modeled interval	Source top and base	Support / interpretation
Lea Park	Lea Park top to Unconformity Sub Lea Park	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Milk River	Unconformity Sub Lea Park top to Upper Colorado	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Unit top is restricted to nodes with both explicit source-column boundaries and positive gross interval >0.5m. The complete unconformity is shown separately; its extent does not establish presence of this unit. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Sub-Lea Park unconformity	Erosional surface only; no thickness.	Published erosional bounding surface. Its presence does not establish which underlying or overlying reservoir unit is preserved. No net pay, reservoir thickness or seal quality inferred. No thickness assigned to an unconformity surface.
Upper Colorado	Published Upper Colorado top to Second White Specks marker: a composite regional interval.	Upper Colorado is a composite regional interval in the released model. Its individual internal formations, members and reservoir facies are not independently resolved. Regional top and gross thickness do not identify a productive reservoir. Gross vertical separation of the published Upper Colorado and Second White Specks markers. Constituent formations and members are not independently separated; this is not a single reservoir thickness or net pay.
2nd White Specks	Second White Specks marker to Fish Scales marker: a composite interval including Belle Fourche strata.	The displayed top is the published Second White Specks marker. The interval below it extends to Fish Scales and includes Belle Fourche strata; those constituent units are not independently separated by this regional model. Source cut boundaries include geological truncation and model support limits. Gross vertical separation of the published Second White Specks and Fish Scales markers. This composite interval includes Belle Fourche strata and is not the thickness of the Second White Specks alone, reservoir net thickness or net pay.
Fish Scales	Fish Scales top to Westgate	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Westgate	Westgate top to Viking Newcastle Flotten Lake	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.

Modeled interval	Source top and base	Support / interpretation
Viking Newcastle Flotten Lake	Viking Newcastle Flotten Lake top to Joli Fou	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Joli Fou	Joli Fou top to Pense	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Pense	Pense top to Cantuar	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Cantuar	Cantuar top to Unconformity Sub Cantuar	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Success	Unconformity Sub Cantuar top to Unconformity Sub Success	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Unit top is restricted to nodes with both explicit source-column boundaries and positive gross interval >0.5m. The complete unconformity is shown separately; its extent does not establish presence of this unit. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Sub-Cantuar unconformity	Erosional surface only; no thickness.	Published erosional bounding surface. Its presence does not establish which underlying or overlying reservoir unit is preserved. No net pay, reservoir thickness or seal quality inferred. No thickness assigned to an unconformity surface.
Masefield	Unconformity Sub Success top to Rierdon	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Unit top is restricted to nodes with both explicit source-column boundaries and positive gross interval >0.5m. The complete unconformity is shown separately; its extent does not establish presence of this unit. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.

Modeled interval	Source top and base	Support / interpretation
Sub-Success unconformity	Erosional surface only; no thickness.	Published erosional bounding surface. Its presence does not establish which underlying or overlying reservoir unit is preserved. No net pay, reservoir thickness or seal quality inferred. No thickness assigned to an unconformity surface.
Rierdon	Rierdon top to Upper Shaunavon	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Upper Shaunavon	Upper Shaunavon top to Lower Shaunavon	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Lower Shaunavon	Lower Shaunavon top to Upper Gravelbourg	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Upper Gravelbourg	Upper Gravelbourg top to Lower Gravelbourg	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Lower Gravelbourg	Lower Gravelbourg top to Upper Watrous	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Upper Watrous	Upper Watrous top to Lower Watrous	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Lower Watrous	Lower Watrous top to Unconformity Sub Mesozoic	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.

Modeled interval	Source top and base	Support / interpretation
Sub-Mesozoic unconformity	Erosional surface only; no thickness.	Published erosional bounding surface. Its presence does not establish which underlying or overlying reservoir unit is preserved. No net pay, reservoir thickness or seal quality inferred. No thickness assigned to an unconformity surface.
Ratcliffe	Ratcliffe top to Midale	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Midale	Midale top to Frobisher	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Frobisher	Frobisher top to Kisbey	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Kisbey	Kisbey top to Alida	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Alida	Alida top to Tilston	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Tilston	Tilston top to Souris Valley	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Souris Valley	Souris Valley top to Bakken	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.

Modeled interval	Source top and base	Support / interpretation
Bakken	Bakken top to Unconformity Sub Mississippian	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Big Valley	Unconformity Sub Mississippian top to Torquay	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Unit top is restricted to nodes with both explicit source-column boundaries and positive gross interval >0.5m. The complete unconformity is shown separately; its extent does not establish presence of this unit. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Sub-Mississippian unconformity	Erosional surface only; no thickness.	Published erosional bounding surface. Its presence does not establish which underlying or overlying reservoir unit is preserved. No net pay, reservoir thickness or seal quality inferred. No thickness assigned to an unconformity surface.
Torquay	Torquay top to Birdbear	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Birdbear	Birdbear top to Duperow	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Duperow	Duperow top to Souris River	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Souris River	Souris River top to 1st Red Bed	The source column models First Red Bed separately. This Souris River gross interval excludes that separately modeled red-bed interval; stratigraphic nomenclature must be checked before comparing published formation isopachs. Gross vertical separation of the published Souris River top and First Red Bed top. The separately modeled First Red Bed interval is excluded; this is not total Souris River thickness under classifications that include that basal member, nor reservoir net thickness.

Modeled interval	Source top and base	Support / interpretation
1st Red Bed	1st Red Bed top to Dawson Bay	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Dawson Bay	Dawson Bay top to 2nd Red Bed	The source column models Second Red Bed separately. This Dawson Bay gross interval excludes that separately modeled red-bed interval; stratigraphic nomenclature must be checked before comparing published formation isopachs. Gross vertical separation of the published Dawson Bay top and Second Red Bed top. The separately modeled Second Red Bed interval is excluded; this is not total Dawson Bay thickness under classifications that include that basal member, nor reservoir net thickness.
2nd Red Bed	2nd Red Bed top to Prairie Evaporite	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Prairie Evaporite	Prairie Evaporite top to Winnipegosis	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Winnipegosis	Winnipegosis top to Ashern	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Ashern	Ashern top to Meadow Lake	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Interlake	Unconformity Top LPaleo top to Stonewall	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Unit top is restricted to nodes with both explicit source-column boundaries and positive gross interval >0.5m. The complete unconformity is shown separately; its extent does not establish presence of this unit. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.

Modeled interval	Source top and base	Support / interpretation
Top Lower Paleozoic unconformity	Erosional surface only; no thickness.	Published erosional bounding surface. Its presence does not establish which underlying or overlying reservoir unit is preserved. No net pay, reservoir thickness or seal quality inferred. No thickness assigned to an unconformity surface.
Stonewall	Stonewall top to Stony Mountain	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Stony Mountain	Stony Mountain top to Red River	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Red River	Red River top to Winnipeg	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Winnipeg	Winnipeg top to Deadwood	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.
Deadwood	Published Deadwood top to Precambrian: composite basal Cambrian-Ordovician interval, including Earlie/basal Cambrian sandstone where present.	The source column places Precambrian directly below the Deadwood top. The resulting composite interval includes Earlie/basal Cambrian sandstone where present; these underlying units have no independent surfaces in this release. Gross vertical separation of the published Deadwood top and Precambrian surface. This includes Earlie and basal Cambrian sandstone where present; it is not an isolated Deadwood Formation isopach or reservoir net thickness.
Precambrian	Precambrian top to unknown basement base	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Gross vertical difference between source-column top and base surfaces only where both have original triangle support; negative differences and unsupported bases are null. Not reservoir net thickness or net pay.

Source units without supported local model geometry

The following source-column units have no accepted preserved-interval geometry in this study. A historical pick or broader bounding unconformity can exist without supporting a local 3D formation interval. This is a model-support result, not proof of complete geological absence.

Unit	Source-column interval	Model support
Big Snowy	Unconformity Sub Mesozoic top to Poplar	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control. Unit top is restricted to nodes with both explicit source-column boundaries and positive gross interval >0.5m. The complete unconformity is shown separately; its extent does not establish presence of this unit.
Poplar	Poplar top to Ratcliffe	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control.
Meadow Lake	Meadow Lake top to Unconformity Top LPaleo	Regional formation framework. Original source cut boundaries include geological truncation and model limits; local pool depth, pay and quality require well/log control.

Recommended local workflow

- step: 1; title: Define one pool and one interval; detail: Resolve official pool code, producing formation, completion interval and date. Pool polygons are administrative designations; they are not oil-water contacts or reservoir-body outlines.
- step: 2; title: Make the well control comparable; detail: Separate surface location, bottom-hole position and actual trajectory. Preserve MD, TVD, ground, KB and subsea datum. A horizontal flag without survey coordinates does not supply an azimuth or lateral path.
- step: 3; title: Correlate the geological event; detail: Tie core, cuttings and logs to reliable bounding markers. Show modern structure and a flattened stratigraphic section. Keep absent, eroded, unpicked, wet, tight and untested intervals as different states.
- step: 4; title: Describe before naming the environment; detail: Record grain size, sorting, bed contacts, mud drapes, fossils, trace fossils, cross-bedding, exposure fabrics and cement. Test alternatives: tidal inlet versus shoreface; carbonate shoal versus reef; original sand lens versus erosional remnant.
- step: 5; title: Measure flow and fluids; detail: Use effective porosity, directional permeability, capillary behavior, local water resistivity and corrected logs. A gross isopach is not net pay; stain, fluorescence, oil-cut mud and sustained mobile production are separate evidence classes.
- step: 6; title: Close the trap and petroleum-system argument; detail: Map top of connected porosity, lateral termination and cap. Test charge source, maturity, migration, timing, retention and water risk. A nearby productive interval establishes a useful analogue, not automatic charge of every adjacent formation.
- step: 7; title: Look for the observation that would disprove the hypothesis; detail: Preserve wet connected offsets, tight cores, missing caps, mismatched ages, filled karst and incompatible pressure evidence. Do not omit these to make the map look more prospective.
- step: 8; title: Advance a resolved local question; detail: Only after the existing evidence is coherent should higher-resolution seismic, additional core work or a targeted test be considered. This regional study does not select a drill site or calculate reserves.

Scientific limits

- No new numerical interpretation of raw LAS curves or physical samples was completed for this release. Published case studies and the acquired well-top/sample-availability catalogues are distinguished throughout.
- No monthly production quantities or full surveyed 3D well paths were acquired for this release. The current well inventory and plan-view traces should not be described as production history or measured 3D trajectories [S73].
- This is an evidence-based regional and analogue study. Published authors performed the cited core and thin-section investigations; this project has not independently relogged every well or remeasured their

samples.

- The scientific catalogue is more detailed than the 3D model. A group, a member, an informal reservoir interval and a regional unconformity are not interchangeable surfaces. Exact surface links require a verified crosswalk.
- OF8969 is a regional geological model. Its preliminary sub-Quaternary surface is not suitable for shallow local groundwater or engineering projects. Local channel, reef, karst and fault geometry may be unresolved.
- Surface differences are gross modeled interval thicknesses, not observed net pay, effective reservoir thickness, petroleum saturation or evidence of a continuous depositional wedge.
- Pool designations, formation surfaces, well paths, tops, core studies and production records have different dates and purposes. Their coincidence in 3D does not prove communication or common fluid contact.
- Vertical wellbores drawn in the absence of surveys are explicit assumptions. A horizontal designation alone does not establish lateral azimuth, length or formation along the well. Model-derived formation at TD is conditional on valid geometry and stratigraphic coverage.
- Historical source measurements describe particular samples, intervals and methods. They are not universal economic cutoffs, current reservoir pressure, a current production total or a modern estimate of recoverable resources.
- Paleoenvironment figures are schematic reconstructions. No exact new shoreline, inlet, reef, fault, unconformity topography or undiscovered pool boundary is asserted where local data do not resolve it.
- Oil shows west of the Shaunavon trend and historical Madison exploration leads require reconciliation with later wells. This study does not claim those areas remain undrilled, untested or available for acquisition.
- Deep porosity, brine/mineral potential, geothermal or water-storage potential and hydrocarbon potential are separate assessments. A good aquifer or dissolved-mineral reservoir is not evidence of petroleum charge.
- Most place-specific analogue areas are qualitative study neighborhoods, not resource polygons. Northern Dodsland/Kindersley context belongs to a subsequent west-central tile; any contextual halo must remain visibly separate from the core.
- No reserves, production forecasts, economic breakevens or numerical discovery probabilities are inferred from this regional work.

3D and VR use

The browser package includes 1x and 25x vertical GLBs, named formation objects, pools and a separate well-location/plan scene. Vertical exaggeration changes the appearance of relief and apparent dip. Headset support depends on browser WebXR capability and has not been physically tested with a headset in this build. The offline viewer runs through its included local loopback server; opening index.html directly may block module and data loading.

References and data sources

Bracketed source identifiers refer to the cited source register. Original figures in this report are conceptual reconstructions or plots derived from the documented numerical sources. Government source material is attributed to the Geological Survey of Canada, Saskatchewan Geological Survey and Saskatchewan Ministry of Energy and Resources as applicable. This study is independent and is not endorsed by those organizations. Public source PDFs remain linked; they are not republished as an appendix.

[S01] Kent & Christopher (1994). Geological history of the Williston Basin and Sweetgrass Arch. Geological Atlas of the Western Canada Sedimentary Basin, chapter 27

Regional tectonic and stratigraphic framework; historical synthesis, not a modern local prospect map.

https://ags.aer.ca/publications/atlas-western-canada-sedimentary-basin/chapters/chapter-27-williston-basin-and

[S02] Bédard, Marsh, Hillier & Music (2023). 3D geological model of the Western Canadian Sedimentary Basin in Saskatchewan, Canada. GSC Open File 8969

Model methodology and regional resolution. Unit-top and unconformity surfaces are distinct. Preliminary sub-Quaternary geometry is unsuitable for shallow local projects. Source report is linked, not redistributed.

https://doi.org/10.4095/331747

[S03] Hill & Salad Hersi (2016). Lithofacies characterization of the Middle Jurassic Upper Shaunavon Member in southwestern Saskatchewan: preliminary results. SGS Summary of Investigations, paper A-4

Core-based study: 65 wells, seven facies, three associations. Printed pp 1-13, especially pp 10-12 and conclusions. Published author interpretations, not new core logging by this project.

https://pubsaskdev.blob.core.windows.net/pubsask-prod/105438/105438-A-4_Hill_and_Salad_Hersi.pdf

[S04] Marsh & Hill (2013). Preliminary study of reservoir distribution in the Middle Jurassic Upper Shaunavon Member, southern Shaunavon oil field trend, southwestern Saskatchewan. SGS Summary of Investigations, paper A-7

Local reservoir subdivisions, intra-member unconformity and preservation; historical wells and completion context. Printed pp 1-13.

https://pubsaskdev.blob.core.windows.net/pubsask-prod/91933/91933-SOI2013V1_A7_Marsh_and_Hill.pdf

[S05] Grisak, Marsh & Qing (2012). Petrography of the Jurassic Lower Shaunavon Member reservoirs in the Leitchville/Bone Creek area of southwest Saskatchewan: preliminary results. SGS SOI 2011, paper A-4

Correct title verified inside PDF; search-engine metadata incorrectly labels Scimitar Lake. Nineteen wells and 88 thin sections; pp 3-9. Publication citation says 2012 in the 2011 volume.

https://pubsaskdev.blob.core.windows.net/pubsask-prod/94278/94278-A-4_Grisak_et_al.pdf

[S06] Kent & Kreis (2001). Mississippian Madison Formation low-gravity oilfields in southwestern Saskatchewan: examples of unconformity diagenesis controlling reservoir quality. SGS Summary of Investigations, pp 46-55

Battle Creek, Rangeview and Divide; paleotopography, meteoric alteration, dolomitization, anhydrite-filled karst and historical tests. Printed pp 46-55.

https://pubsaskdev.blob.core.windows.net/pubsask-prod/88655/88655-Kent-Kreis_2001_volume1_MiscRep2001-4.1.pdf

[S07] Saskatchewan Geological Survey (2005). The Senate Pool: a model for shoreface sand exploration in southwestern Saskatchewan. Prospect Saskatchewan, issue 1

Three-page original government case study. Upper Belle Fourche sandstone, historically called 2WS sand; distinguish from the overlying Second White Specks Formation.

https://pubsaskdev.blob.core.windows.net/pubsask-prod/90072/90072-Issue_1_Prospect_Sask_The_Senate_Pool.pdf

[S08] Koshin & Salad Hersi (2018). Variability of subsurface distribution of the Late Jurassic Roseray Formation, SW Saskatchewan. GeoConvention abstract

Preliminary original core/cuttings and facies study; one-page abstract, not a fully delineated reservoir map.

https://geoconvention.com/wp-content/uploads/abstracts/2018/188_GC2018_Variability_of_Subsurface_Distribution_of_the_Late_Jurassic_Roseray_Fm_SW_Sask.pdf

[S09] Li, Henderson & Stewart (2004). Well log study and stratigraphic correlation of the Cantuar Formation, southwestern Saskatchewan. CREWES Research Report 16

Original study of approximately 370 wells, correlated sections and isopachs; valley-fill sealing of preserved sandstone remnants.

https://www.crewes.org/Documents/ResearchReports/abstract.php?docid=CRR20041

[S10] Christopher (2003). Jura-Cretaceous Success Formation and Lower Cretaceous Mannville Group of Saskatchewan. Saskatchewan Geological Survey Report 223

Province-scale stratigraphic synthesis with southwestern examples. Historical producing-field nomenclature must be reconciled with later pool assignments.

https://pubsaskdev.blob.core.windows.net/pubsask-prod/90783/90783-Final_Report_223_Text.pdf

[S11] Marsh & Hill (2014). Off the beaten track: oil shows in the Upper Shaunavon Member, west of the main oil field trend, southwestern Saskatchewan. GeoConvention

One-page original abstract documents historical oil-stained cores west of the main trend. Oil shows are not demonstrations of mobile commercial oil.

https://old.cseg.ca/assets/files/resources/abstracts/2014/core/223_GC2014_Off_the_Beaten_Track.pdf

[S12] Geological Atlas of the Western Canada Sedimentary Basin (1994), chapter 18: Jurassic and lowermost Cretaceous

Regional correlations and age uncertainties, including Success S1 and S2.

https://ags.aer.ca/publications/atlas-western-canada-sedimentary-basin/chapter-18-jurassic-and-lowermost-cretaceous

[S13] Geological Atlas of the Western Canada Sedimentary Basin (1994), chapter 19: Cretaceous Mannville Group

Regional fluvial, brackish and marine systems; Pense shallow shelf and repeated shoreface successions.

https://ags.aer.ca/publications/atlas-western-canada-sedimentary-basin/chapter-19-cretaceous-mannville-group

[S14] Geological Atlas of the Western Canada Sedimentary Basin (1994), chapter 20: Cretaceous Colorado/Alberta Group

Marine sequences, Medicine Hat sandstone cycles and Milk River-Alderson relationships. Historical reserve estimates are not adopted.

https://ags.aer.ca/publications/atlas-western-canada-sedimentary-basin/chapter-20-cretaceous-coloradoalberta-group

[S15] Geological Atlas of the Western Canada Sedimentary Basin (1994), chapter 17: Paleogeographic evolution of the Western Canada foreland basin

Regional time-dependent shorelines, sediment supply and transgressive/regressive frameworks; does not resolve local shoreline position.

https://ags.aer.ca/publications/atlas-western-canada-sedimentary-basin/chapter-17-paleogeographic-evolution-wcfb

[S16] Lemiski and colleagues (2011). Sedimentological, ichnological and reservoir characteristics of the low-permeability, gas-charged Alderson Member, Hatton gas field, southwest Saskatchewan. Bulletin of Canadian Petroleum Geology 59, 27-53

Original facies and permeability investigation; public abstract consulted. Burrow-mediated connectivity and mud-rich shallow offshore/deltaic environments.

https://pubs.geoscienceworld.org/cspg/bcpg/article-abstract/59/1/27/58113/Sedimentological-ichnological-and-reservoir?redirectedFrom=fulltext

[S17] La Croix and colleagues (2013). Biogenically enhanced reservoir properties in the Medicine Hat gas field, Alberta, Canada. Marine and Petroleum Geology 43, 464-477

Author-institution publication record and abstract. Five centimetre-scale samples with minipermeametry and micro-CT; Alberta analogue, not Saskatchewan measurements.

https://advance.science.sfu.ca/easc/publications/browserecord.php?-action=browse&recid=11332

[S18] Nielsen and colleagues (2003). A new stratigraphic framework for the Upper Colorado Group (Cretaceous) in southern Alberta and southwestern Saskatchewan, Canada. Bulletin of Canadian Petroleum Geology 51, 304-346

Public original abstract: formal Carlile and Niobrara framework. No inaccessible full-text details assumed.

https://pubs.geoscienceworld.org/cspg/bcpg/article-abstract/51/3/304/57896/A-new-stratigraphic-framework-for-the-Upper?redirectedFrom=fulltext

[S19] Saskatchewan Ministry of Energy and Resources. Oil pool orders and pool code list

Official identification reference; designation does not establish current activity, an oil-water contact or the date of discovery.

https://pubsaskdev.blob.core.windows.net/pubsask-prod/95661/Pool_Order_List_for_Web_Site.pdf

[S20] Saskatchewan Geological Survey. Mississippian structure, isopach and zero-edge GIS services

Government regional map services; geometry and stratigraphic meaning must be retained separately from gridded 3D surfaces.

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

[S21] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Earlie

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/004000/GSCC00053004396.html

[S22] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Deadwood

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/003000/GSCC00053003832.html

[S23] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Winnipeg

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/016000/GSCC00053016596.html

[S24] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Black Island

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/001000/GSCC00053001436.html

[S25] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Ice Box

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/006000/GSCC00053006881.html

[S26] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Red River

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/012000/GSCC00053012586.html

[S27] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Stony Mountain

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/014000/GSCC00053014604.html

[S28] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Stonewall

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/014000/GSCC00053014592.html

[S29] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Interlake

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/006000/GSCC00053006978.html

[S30] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Ashern

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/000000/GSCC00053000496.html

[S31] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Winnipegosis

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/016000/GSCC00053016600.html

[S32] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Prairie Evaporite

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/012000/GSCC00053012175.html

[S33] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Dawson Bay

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/003000/GSCC00053003793.html

[S34] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Souris River

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/014000/GSCC00053014085.html

[S35] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Duperow

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/004000/GSCC00053004331.html

[S36] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Birdbear

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/001000/GSCC00053001392.html

[S37] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Torquay

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/015000/GSCC00053015339.html

[S38] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Big Valley

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/001000/GSCC00053001333.html

[S39] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Bakken

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/000000/GSCC00053000705.html

[S40] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Madison

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/008000/GSCC00053008973.html

[S41] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Strathallen

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/014000/GSCC00053014638.html

[S42] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Lodgepole

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/008000/GSCC00053008638.html

[S43] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Mission Canyon

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/009000/GSCC00053009922.html

[S44] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Charles

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/002000/GSCC00053002766.html

[S45] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Midale

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/009000/GSCC000053009713.html

[S46] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Ratcliffe

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/012000/GSCC000053012509.html

[S47] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Poplar

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/012000/GSCC000053012052.html

[S48] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Big Snowy

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/001000/GSCC000053001329.html

[S49] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Watrous

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/016000/GSCC000053016133.html

[S50] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Gravelbourg

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/005000/GSCC000053005876.html

[S51] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Shaunavon

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/013000/GSCC000053013611.html

[S52] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Vanguard

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/015000/GSCC000053015770.html

[S53] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Cantuar

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/002000/GSCC000053002280.html

[S54] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Joli Fou

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/007000/GSCC000053007217.html

[S55] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Westgate

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/016000/GSCC00053016299.html

[S56] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Belle Fourche

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/001000/GSCC00053001121.html

[S57] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: First White Speckled Shale

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/004000/GSCC00053004961.html

[S58] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Milk River

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/009000/GSCC00053009784.html

[S59] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Lea Park

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/008000/GSCC00053008323.html

[S60] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Pakowki

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/011000/GSCC00053011476.html

[S61] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Judith River

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/007000/GSCC00053007256.html

[S62] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Bearpaw

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/000000/GSCC00053000966.html

[S63] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Eastend

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/004000/GSCC00053004444.html

[S64] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Whitemud

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/016000/GSCC00053016419.html

[S65] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Battle

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/000000/GSCC00053000893.html

[S66] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Frenchman

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/005000/GSCC00053005334.html

[S67] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Ravenscrag

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/012000/GSCC00053012524.html

[S68] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Swift Current Creek

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/014000/GSCC00053014823.html

[S69] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Cypress Hills

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/003000/GSCC00053003670.html

[S70] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Belly River: legacy usage

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/001000/GSCC00053001144.html

[S71] NRCan Weblex / CSPG Lexicon of Canadian Stratigraphy: Colorado Group

Government-hosted stratigraphic lexicon. Regional lithology, contacts and nomenclature; legacy absolute-age scales and historical exploration statements are not adopted.

https://weblex.canada.ca/html/003000/GSCC00053003233.html

[S72] Marsh & Love (2014). Regional stratigraphic framework of the Phanerozoic in Saskatchewan. SPFPS, SGS Open File 2014-1

Official source metadata for the 156-map programme: 2 km modified kriged grids; compiled and edited regional-project well picks with adjacent-jurisdiction control. Linked example is the Milk River zero-edge metadata, not the whole archive.

https://gis.saskatchewan.ca/egis/rest/services/Economy/Mesozoic/FeatureServer/12/iteminfo

[S73] Government of Saskatchewan. Current Petroleum GIS: vertical and non-vertical wellbores, core and cuttings catalogues

Current inventory queried by the data pipeline. Plan-view non-vertical geometry is not a surveyed 3D trajectory. Core/cuttings catalogue rows establish reported availability, not sample inspection.

https://gis.saskatchewan.ca/arcgis/rest/services/Economy/Petroleum/MapServer

[S74] Government of Saskatchewan. Oil and gas pools: official dataset catalogue

Government distribution record and source-service context. Pool geometry and codes require the data build’s documented source endpoint and snapshot; administrative polygons are not reservoir-fluid contacts.

https://open.canada.ca/data/en/dataset/68d7d69d-2d94-fa01-d2a5-ad66f4e56dc0

[S75] Saskatchewan Geological Survey. Public SPFPS TVD well-top control layer

Historical regional stratigraphic-control layer acquired by the data pipeline. It is not the complete current well inventory and is not identical to the edited OF8969 modeling input set.

https://services3.arcgis.com/zcv98lgAl8xQ04cW/arcgis/rest/services/SPFPS_TVD_SK_data/FeatureServer/0

[S76] NRCan Weblex / CSPG Lexicon: Manitoba Group, including First and Second Red Beds

Regional lithostratigraphic definition: First Red Beds at the base of Souris River; Second Red Bed at the base of Dawson Bay. Similar colour does not establish equivalent age or genesis.

https://weblex.canada.ca/html/009000/GSCC00053009101.html

[S77] Waltz (1996). The depositional environment of the Kisbey Sandstone from the Madison Group, north-central North Dakota. University of North Dakota thesis

Original core/log study in North Dakota and adjacent southeastern Saskatchewan. External analogue used only to explain why a K-2 log marker does not guarantee local sandstone; not a southwestern Saskatchewan facies map.

https://commons.und.edu/theses/313/

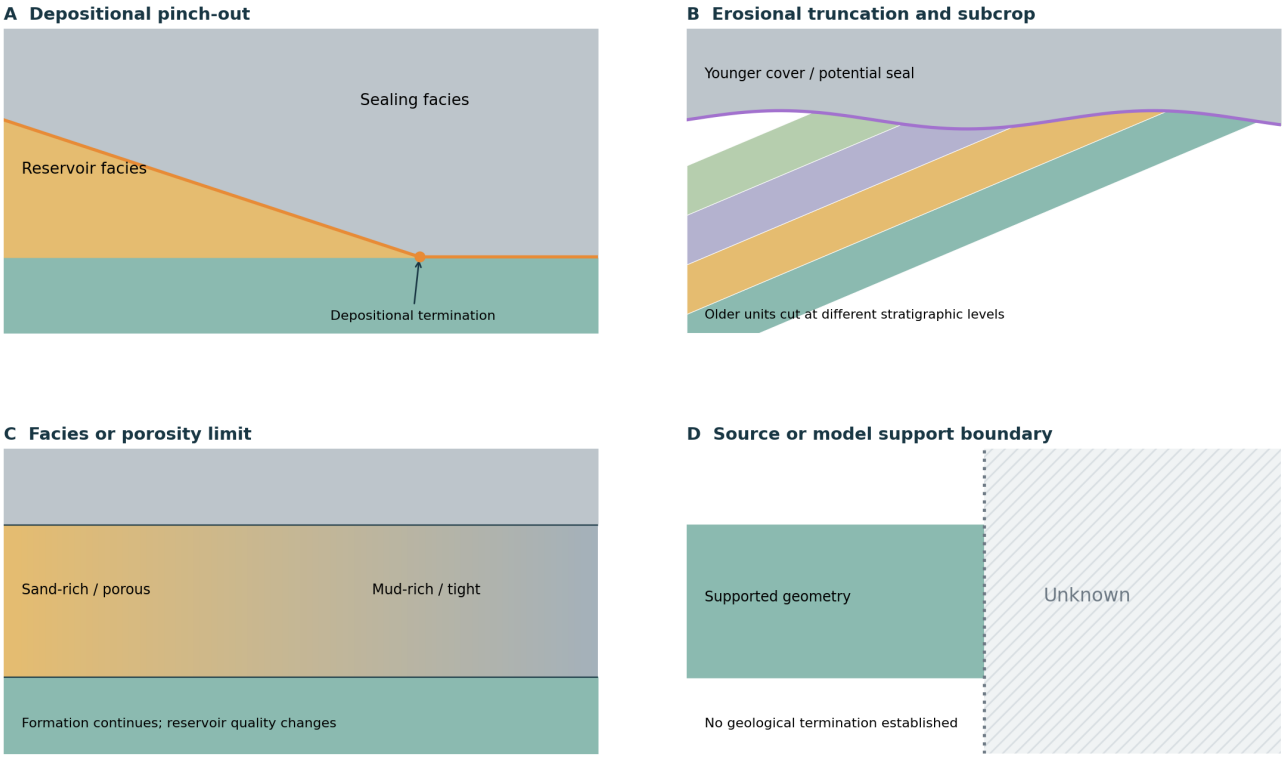
SASKATCHEWAN + MANITOBA / INTERPRETATION GUIDE

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

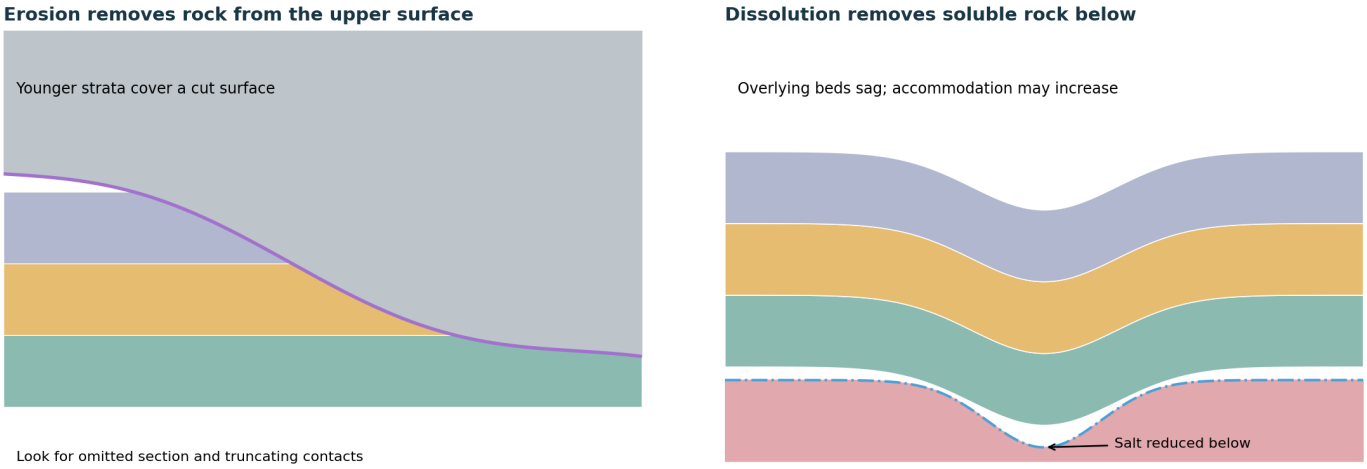
Class	What it establishes	What it does not establish
Published formation zero edge	The source maps a limit at which the named preserved interval is absent or approaches zero.	Depositional origin, exact subcrop position, a reservoir seal or a fluid contact.
Depositional pinch-out	The bed or facies body 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.

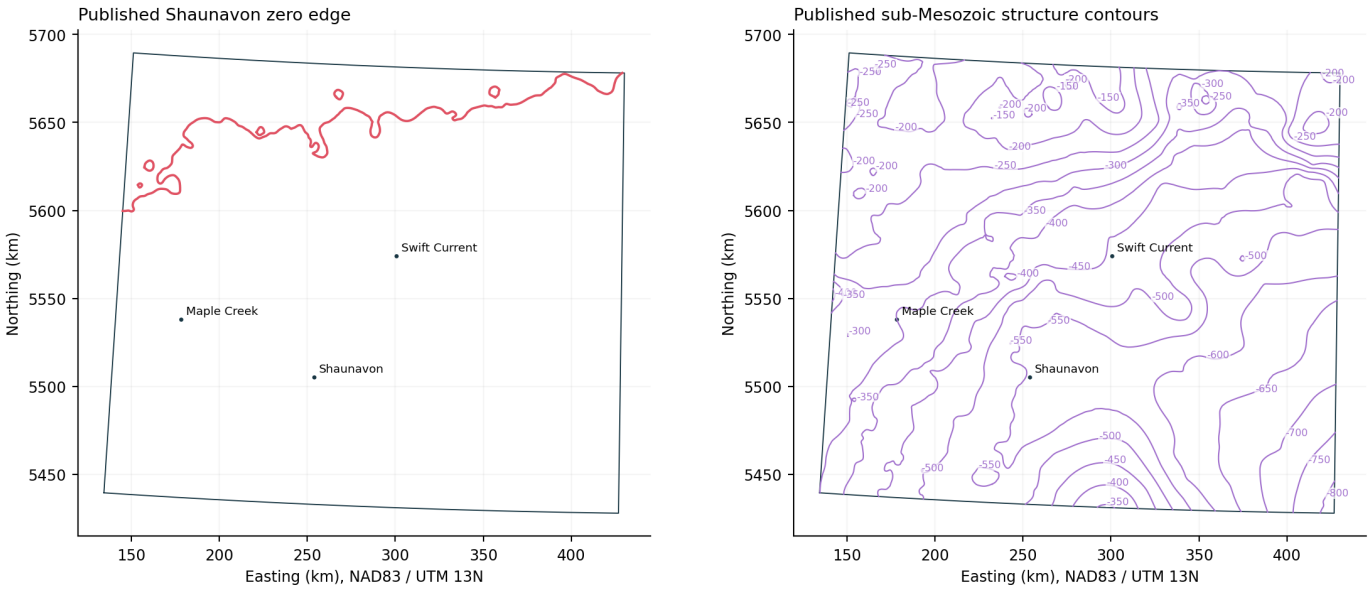
Evaluate the alternative explanation

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.

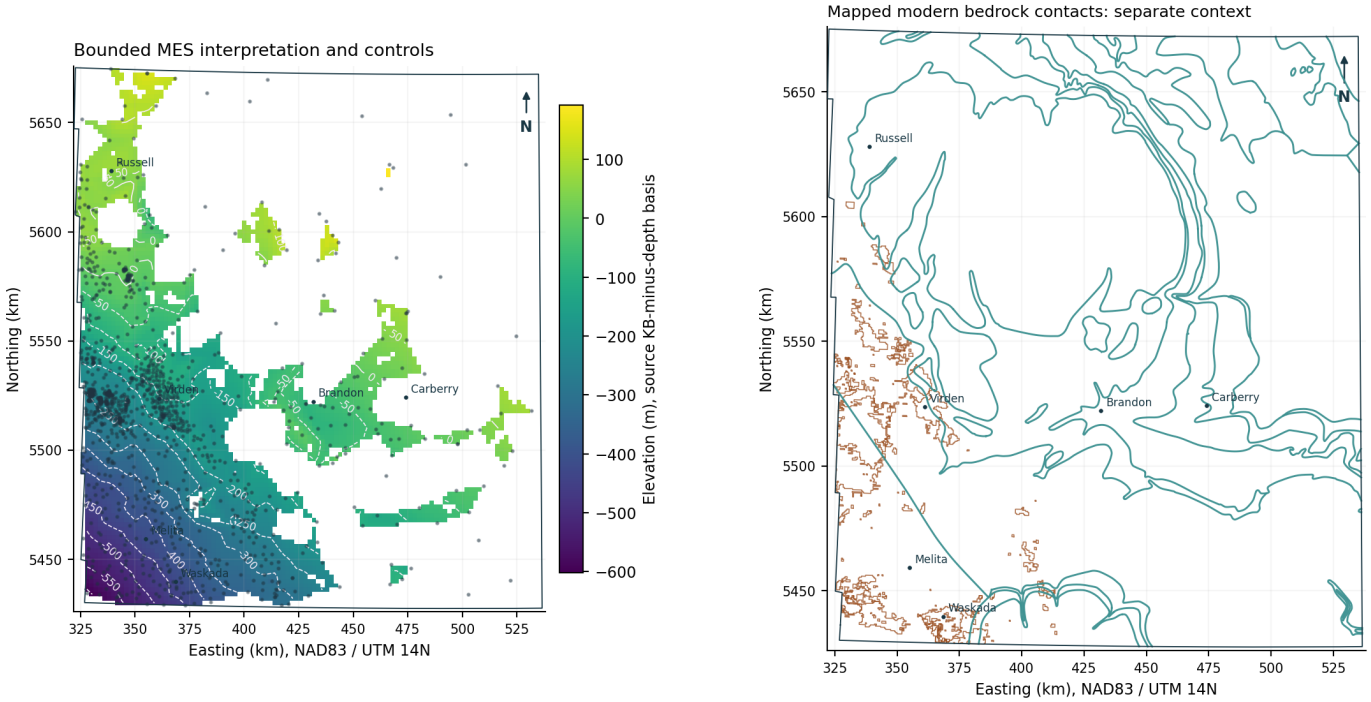
Actual government GIS lines. The Shaunavon zero-edge layer supplies occurrence-limit geometry, not genetic classification or elevation. The unconformity contour layer supplies mapped structural elevations. Source: SGS Open File 2014-1 and Mesozoic GIS.

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.

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.

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

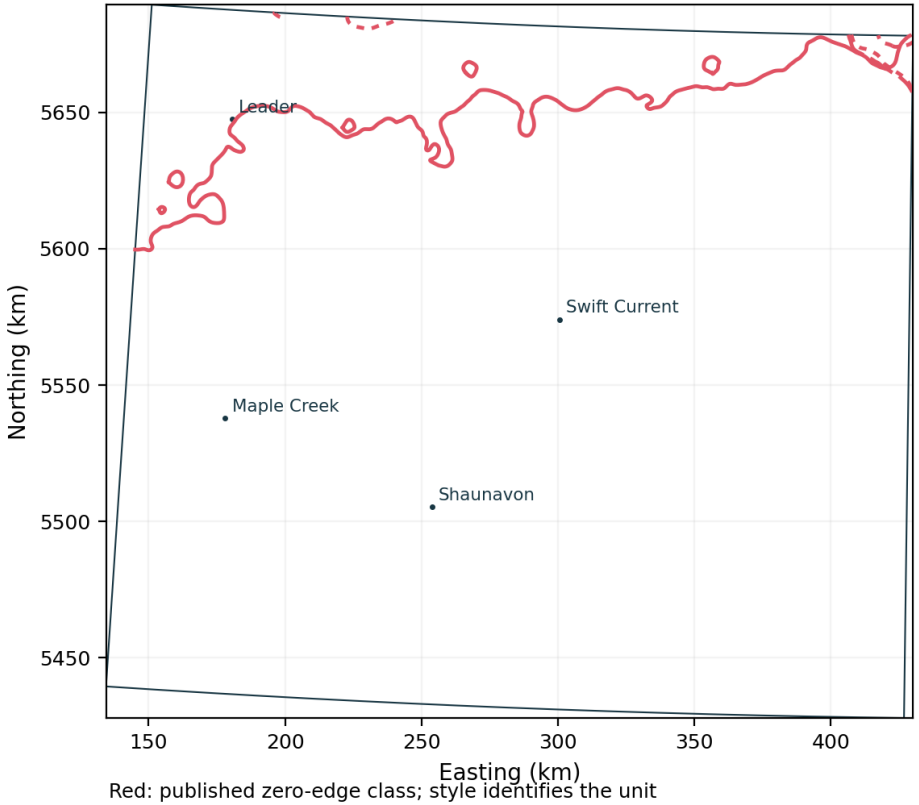
Manitoba P-1: Paleozoic erosion map

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

Southwest Saskatchewan: formation edges and erosion

Release coverage: 159 zero-edge feature records and 194 unconformity-contour records.
The plate selects a few units; the data package retains all five added unconformity-contour families.

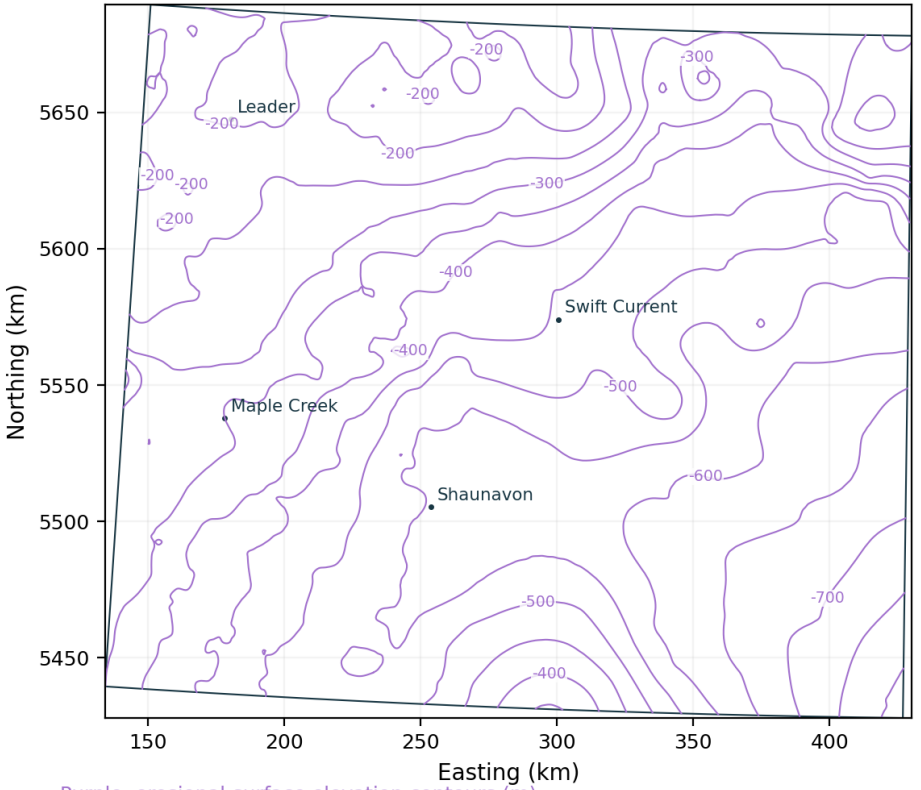
Selected published formation zero edges



Red: published zero-edge class; style identifies the unit

Shaunavon Mississippian Bakken

Published sub-Mesozoic structure contours



Purple: erosional-surface elevation contours (m)
Contour values use the released source datum.

Modern map coordinates: NAD83 / UTM 13N, EPSG:26913. Source: Marsh and Love (2014), SGS Open File 2014-1; provincial GIS.
Zero-edge origin remains unspecified. A structural contour is not the perimeter of an unconformity, a shoreline or a fluid contact.
Source framework uses modified 2 km grids; detailed vertices do not establish pool-scale precision. No prospect boundary is assigned.