Call for Bids NS16-1 – Exploration history, geologic setting, and exploration potential: *Sable Subbasin Region*

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1. Overview

The NS16-1 Call for Bids includes six parcels over the Sable Subbasin and central Scotian Slope, two of which were nominated by industry (Figure 1.1). Parcels 1, 2, and 3, are located on the shelf, outboard of Sable Island. Parcels 4, 5, and 6 are south of Parcels 1-3 on the outer shelf and upper slope of the central Scotian margin.

Parcels 1 and 2 encompass the area between existing Sable Island area Exploration Licences and The Gully with the seaward limit of the parcels approaching 400 m of water depth (Figure 1.2). Parcel 1 contains the 1972 Eagle D-21 well which encountered 52 m of net gas pay in the Late Cretaceous Wyandot Formation and contains an estimated 1.3 trillion cubic feet (mean) of gas-in-place within a chalk reservoir. Parcel 1 also includes the Chebucto Canyon which provides a major conduit of sediment transport to the deep water parcels as well as providing multiple channel fill successions.

Parcel 2 is in an area that has received limited exploration attention over the last 35 years, with no exploration wells or 3D seismic over the Parcel. Most of the existing 2D seismic dates from the early 1980s. Thick Cretaceous and Jurassic sediments of the Sable Delta complex were heavily faulted over this area as the delta prograded seaward and the Sable Subbasin subsided. These growth faults provide a potential trapping mechanism that requires new seismic to be fully evaluated.

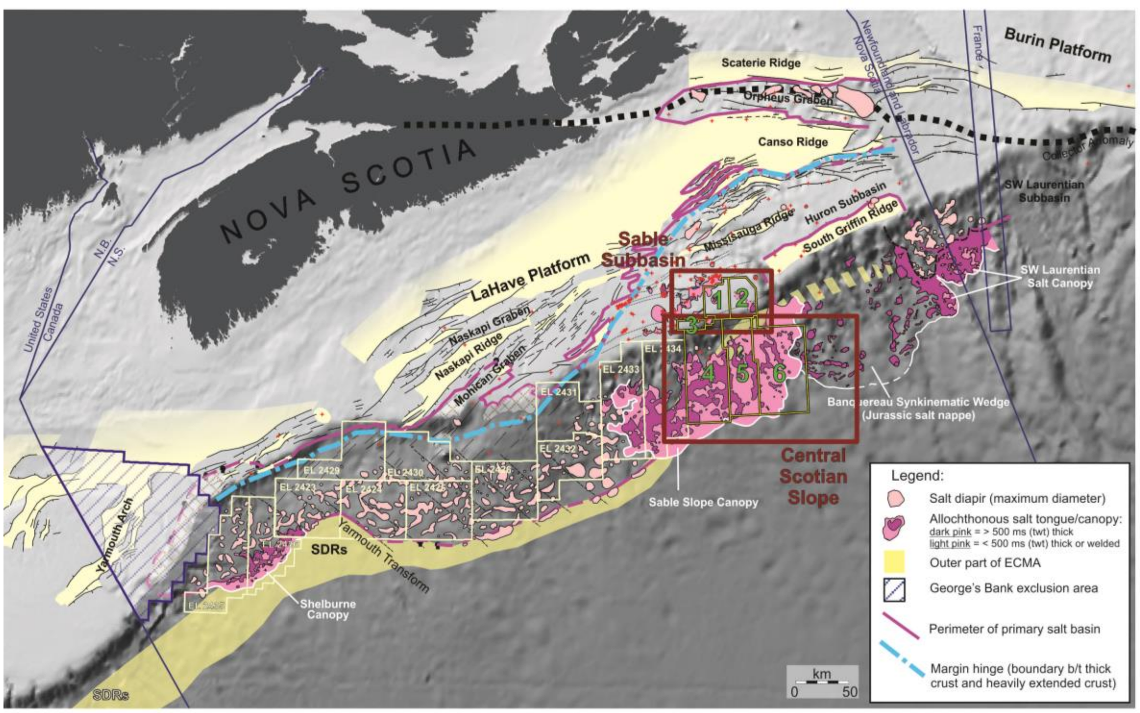


Figure 1.1 Basemap of the Scotian margin showing distribution of key structural elements. Some faults north of the Naskapi Ridge are from Wade and MacLean (1990). Most other elements are from Deptuck and Kendell (in prep).

Parcel 3 lies east of the Glenelg Significant Discovery, south of the North Triumph Production License and west of the Chebucto Significant Discovery. As evidenced at North Triumph, Cretaceous sands in this region are capable of excellent gas production. Water depths are less than 400m.

Parcels 4, 5, and 6 lie on distal portion of the Sable Subbasin. The water depths across these 3 parcels range from 150 - 4000 meters. There have been two wells drilled to date in these parcels, one of which encountered significant quantities of gas. The Annapolis G-24 well within Parcel 4 was drilled by Marathon in 2001 and encountered 27 meters of net gas pay. The main exploration targets within these parcels are believed to be deep water turbidite deposits in the Cretaceous interval. Recent internal studies by the CNSOPB's resource assessment team have identified numerous shelf margin canyon systems throughout the Cretaceous that erode sand-prone systems on the shelf and potentially delivered reservoir quality sands to this region. This implies that the risk of encountering reservoir quality sands is low to moderate within these parcels.

This Call for Bids website is divided into two main sections. For in depth details regarding parcels 1, 2 and 3 refer to the Sable Subbasin section, and see the Central Scotian Slope section for information specific to parcels 4, 5 and 6.

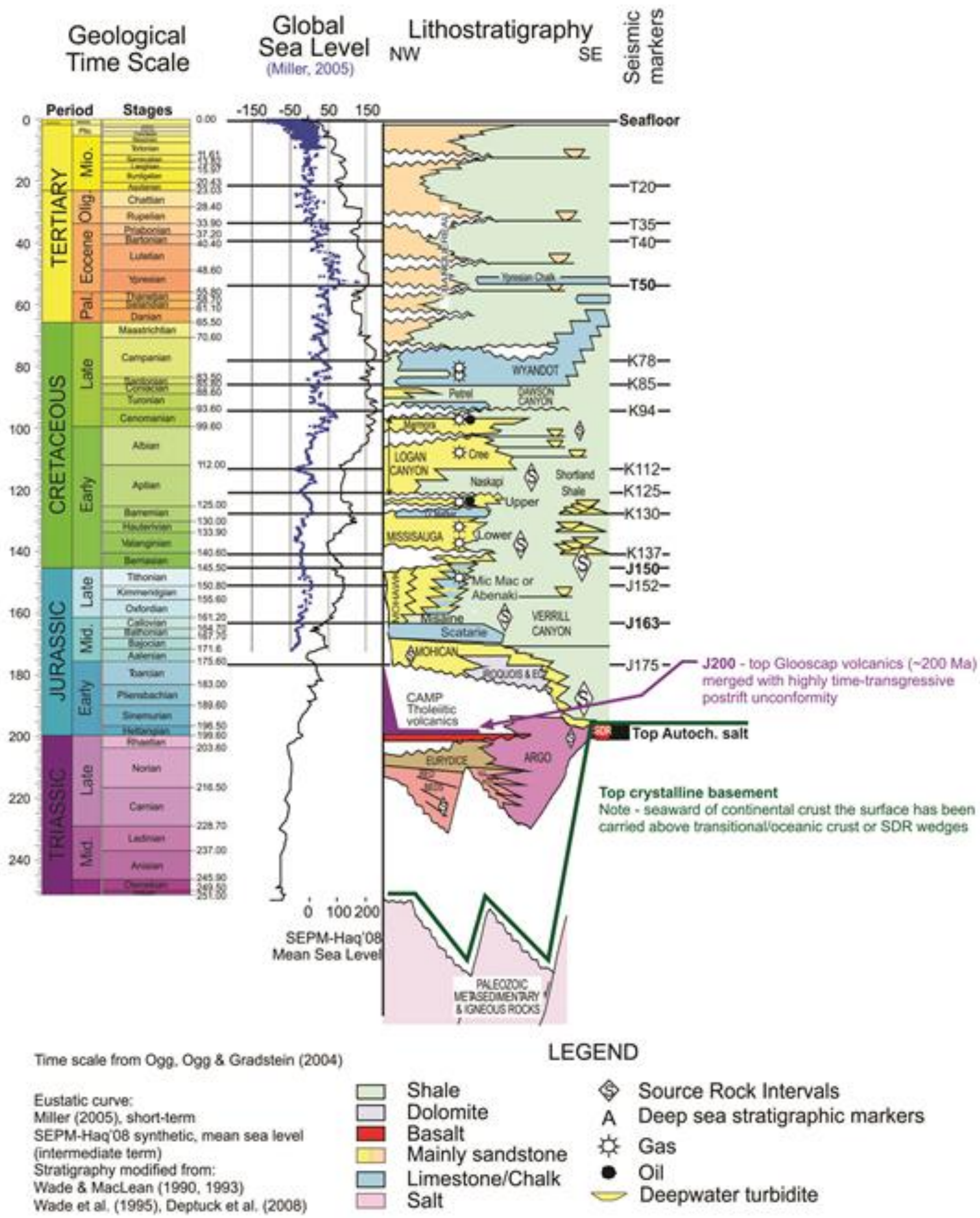


Figure 1.2 Stratigraphic column adpated from OETR (2011), with key seismic markers.

2. Sable Subbasin

2.1 Regional Geological Setting

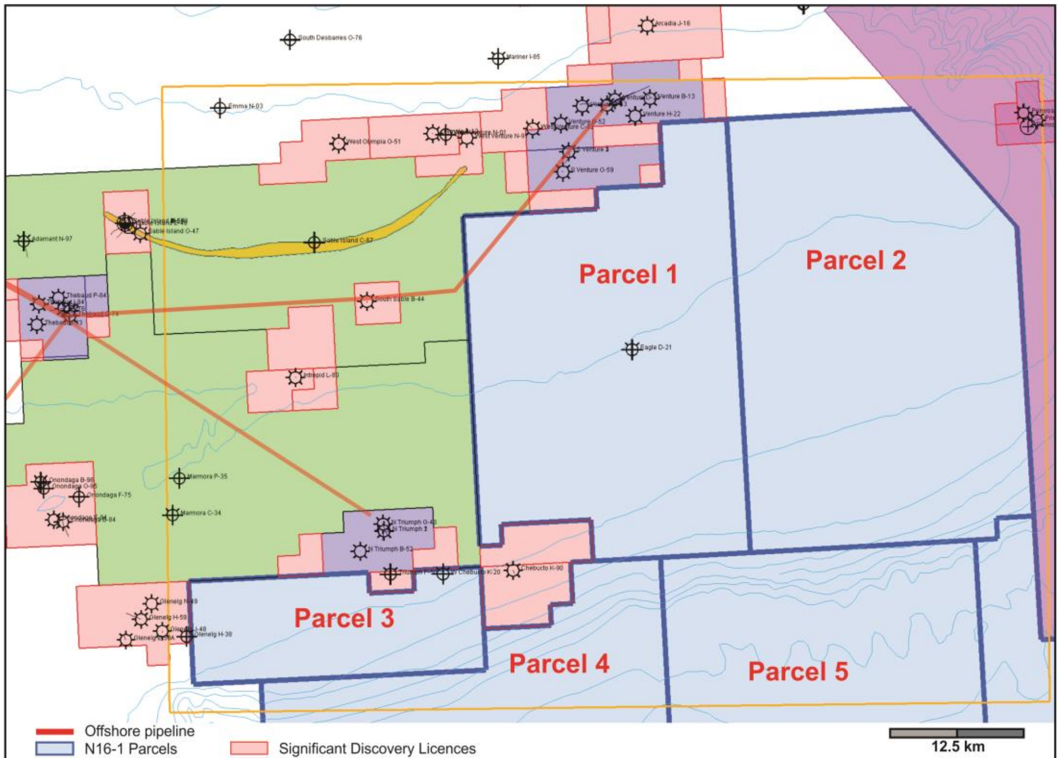
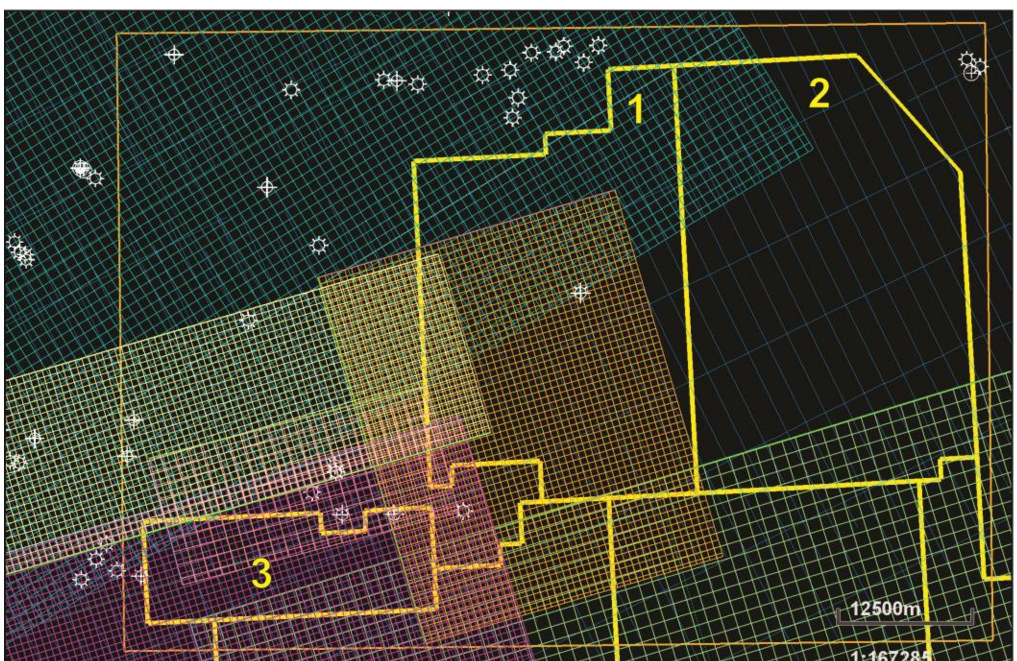


Figure 2.1.1 Parcels 1 to 3 in the Sable Subbasin.

Parcels 1, 2, and 3 are located in the Sable Subbasin where most of the Significant Discoveries in offshore Nova Scotia have been made (Figure 2.1.1). The CNSOPB has produced several detailed geological studies within the Sable Subbasin in recent Calls for Bids (CNSOPB, 2012, 2013). The following brief, regional geological summary includes information and updates from these reports. The CNSOPB has adopted the seismic horizon nomenclature proposed in OETRA (2011) Play Fairway Analysis. The Scotian Basin stratigraphic column indicates the key mapped horizons in this section (Figure 1.2). The digital seismic database used for interpretation and mapping in this study included one 2D and seven 3D data sets (Figure 2.1.3). The CNSOPB program numbers for these programs are also listed on this figure.

Basement and Salt

Salt mobilization played a role in forming the structures on all three parcels. Argo Formation synrift salt deposition on the Scotian Margin during the latest Triassic to earliest Jurassic is interpreted to be bounded by the basement highs which then influenced the expulsion of allochthonous salt bodies. Sediment loading and down-building by Early Jurassic fluvial and shallow marine systems loaded this salt which was commonly pinned in the basinward direction by basement ridges (Figure 2.1.4). Salt contact with these basement horsts



CNSOPB Seismic Project Numbers

NS24-M003-003E	NS24-M003-010E	8620-S014-006E
NS24-M003-006E	NS24-M055-001E	NS24-V003-001P,2P,3P
NS24-M003-007E	NS24-E040-001E	

Figure 2.1.3 Seismic data base used for interpretation and mapping in this project, consisting of one 2-D and seven 3-D data sets. All interpretation was done in the time domain. Orange box indicates the extent of maps in this section.

forced salt to climb vertically through the sedimentary section eventually forming either solitary salt diapirs or canopies. Allochthonous salt bodies vary in thickness from the large diapir under the Eagle structure to thin salt sheets under the northern portions of Parcels 1 and 2. The salt shapes drawn on this figure do not indicate salt thickness or position within the section.

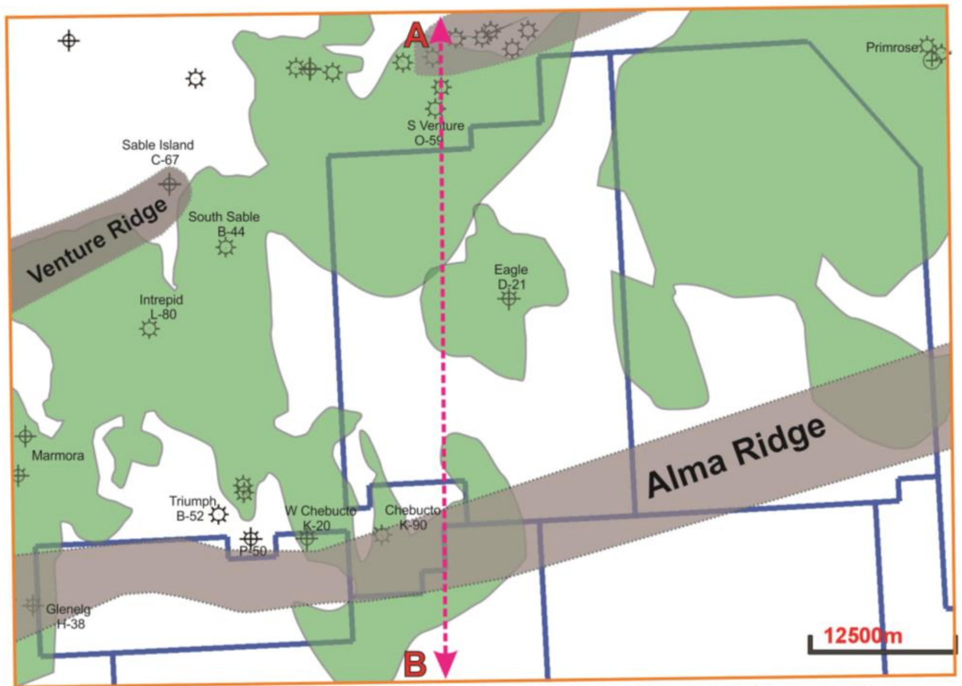


Figure 2.1.4 Basement ridges and allochthonous salt shapes over Parcels 1 to 3. Salt thickness or stratigraphic level is not distinguished. Dashed red line indicates location of Figure 2.1.5.

A cross section drawn from seismic data extends from the Abenaki Subbasin to the present day shelf break (Figure 2.1.5), with this study area extending from the Venture Ridge to the Alma Ridge. The Alma Ridge underlies the southern portions of Parcels 1 and 2, and most of Parcel 3 though this ridge is poorly imaged on existing seismic, especially the 2D.

Jurassic Succession

The Early to Middle Jurassic Mohican Formation is the initial post rift fill in the Scotian Basin composed of fluvial siliciclastics and is followed in the Middle and Late Jurassic by fluvial to shallow marine siliciclastics of the Mic Mac Formation and coeval carbonate platform and reef margin carbonates of the Abenaki Formation. The thick Mic Mac section is a significant reservoir for discovered hydrocarbons in the Sable Subbasin, although reservoir quality may be somewhat lower than the overlying Missisauga under Parcels 1 to 3. Burial depth, shelf edge canyons, salt influence, and lack of well penetrations make it difficult to correlate the Top Jurassic over the study area.

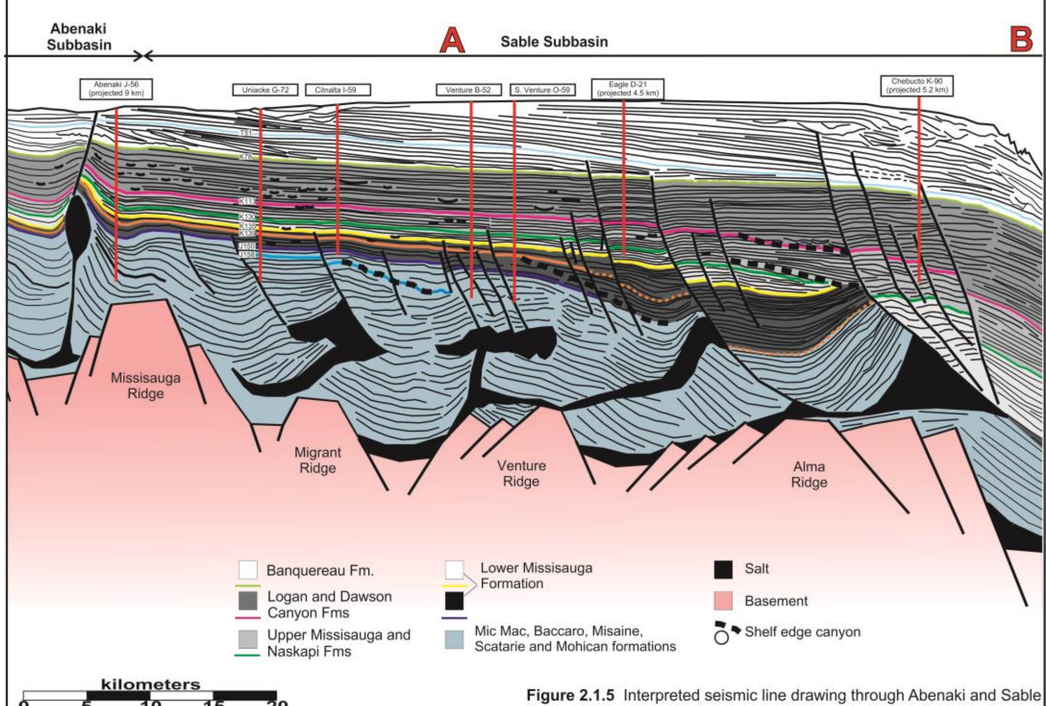


Figure 2.1.5 Interpreted seismic line drawing through Abenaki and Sable Subbasins. Line location shown in Figure 2.1.4.

Cretaceous Succession

The Missisauga Formation was deposited throughout the Latest Jurassic and Early Cretaceous. This sand-rich sequence of fluvial, deltaic, and shallow marine successions has been divided into upper and lower members separated by an interval of generally thin

Hauterivian/Barremian oolitic limestones known as the O Marker (K130). The O Marker is seismically distinctive north of Parcels 1 and 2 but thins distally, falling below seismic limits of resolution in the Eagle area. A Hauterivian sequence, consistent with the O Marker interpreted to the north, has been carried across the entire study area and continued into deep water (Figure 2.1.6). This section is highly faulted and eroded by numerous canyon systems in the Chebucto and North Triumph areas.

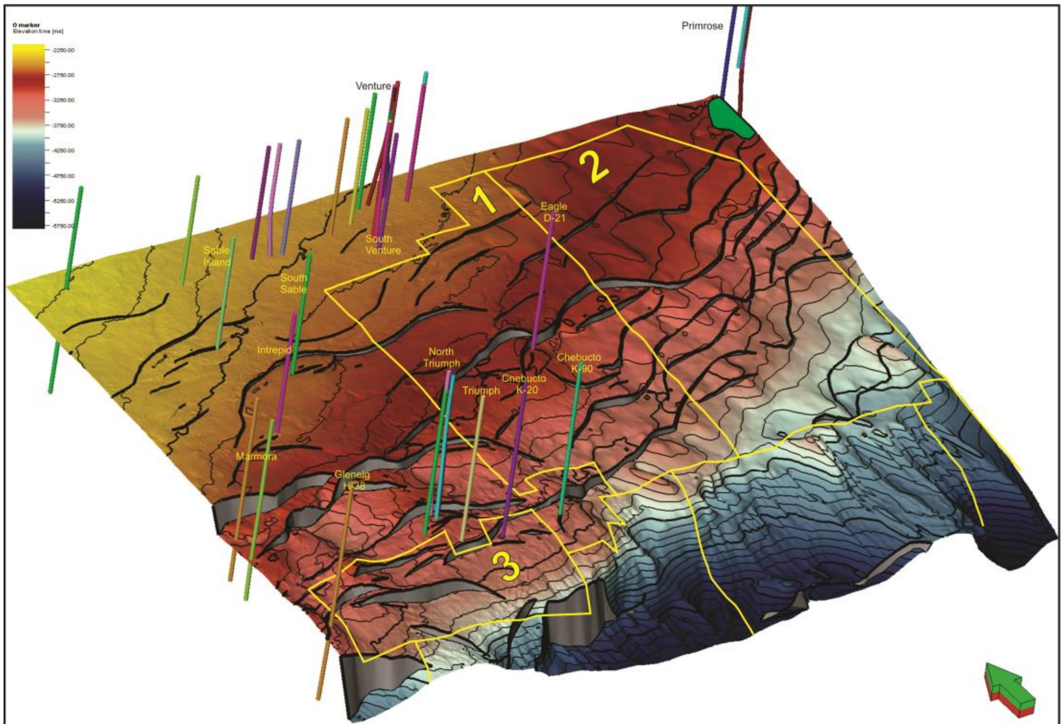


Figure 2.1.6 3-D perspective view of Hauterivian (K-130) time structure map showing Parcels 1, 2 and 3. Vertical exaggeration is 5X and contour interval is 100m.

Thick deposits of lower Missisauga sediments (K130-J150) cover the study area. A number of wells drilled in the West Venture, Citnalta, Olympia, West Olympia, Intrepid and Glenelg Significant Discovery areas encountered considerable reservoir quality sandstone and net gas pay within the Lower Missisauga section. Sable Offshore Energy Project fields currently producing gas from the Lower Missisauga section include Thebaud, Venture and South Venture.

Upper Missisauga reservoirs in Parcels 1 to 3 may be more prospective where the section becomes more deeply buried. Excellent production from these sands exists at the North Triumph field, with significant discoveries of gas at Glenelg and Chebucto.

The end of the Cretaceous period in the Scotian Basin saw a rise in sea level, basin subsidence and deposition of marine mudstones, marls and chalks of the Wyandot Formation. The top surface of the Wyandot Formation on seismic profiles corresponds to the K78 marker. This surface shows evidence of

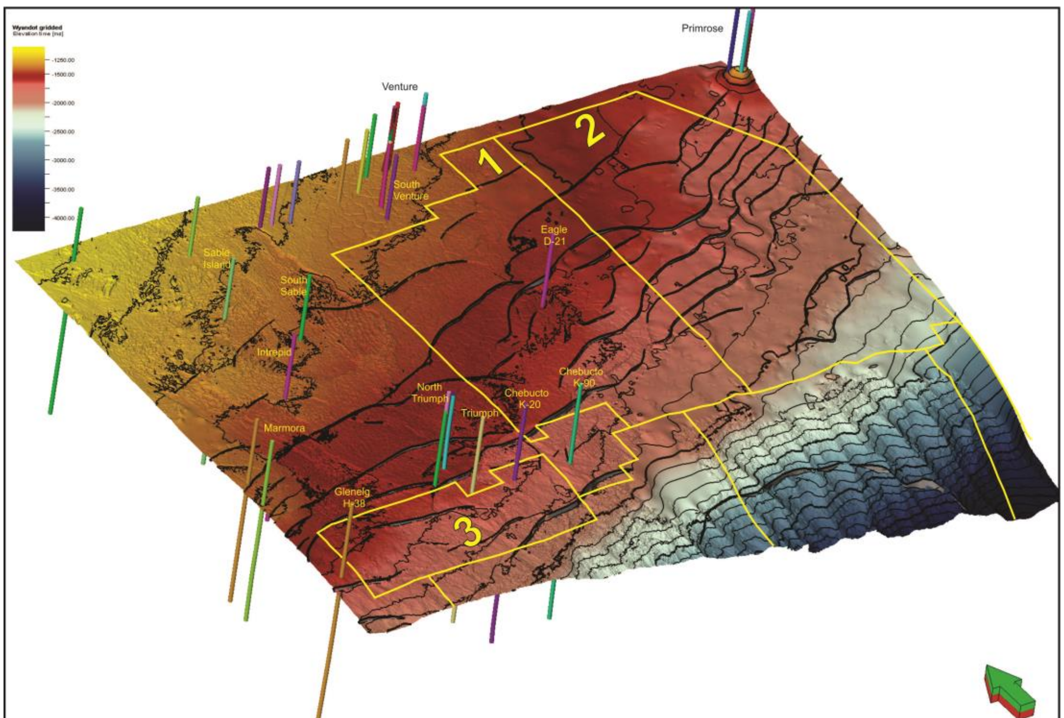


Figure 2.1.7 3-D perspective view of Wyandot (K-78) time structure map showing Parcels 1, 2 and 3. Vertical exaggeration is 5X and contour interval is 100m.

widespread mass transport systems that eroded the chalk and moved it down slope towards the basin as described in Smith et al. (2010). The mass transport scarps and blocks are evident on the NE corner of the Wyandot time structure map (Figure 2.1.7) and one mass transport corridor crosses the western half of Parcel 3.

Wyandot Formation chalks form the reservoir at the Eagle gas discovery in Parcel 1. The polygonal faulting pattern observed at this location (Figure 2.2.2) suggests that this chalk is in-situ and has not been remobilized my mass wasting processes.

2.2. Parcel 1 – Eagle

2.2.1 Parcel Description and Exploration History

Parcel 1 includes the Eagle D-21 gas discovery in the central portion of the Sable Subbasin with current water depths varying from 20 m to 170 m, and most of the block in less than 100 m. Eagle is the only well that has been drilled on this parcel (Figure 2.2.1).

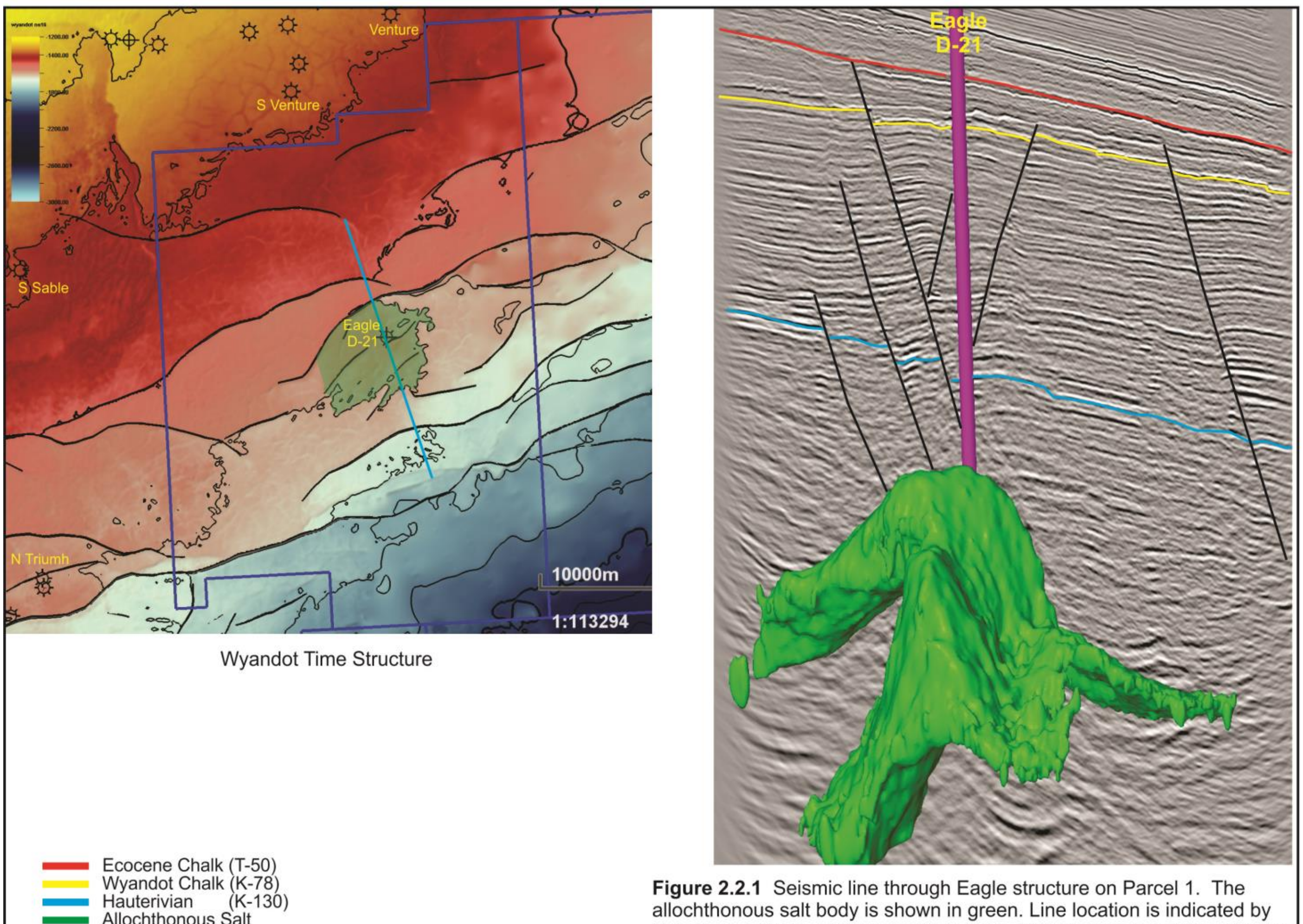


Figure 2.2.1 Seismic line through Eagle structure on Parcel 1. The allochthonous salt body is shown in green. Line location is indicated by blue line on Wyandot time structure map. Map closure is indicated by the green shading.

In the early 1970s, Shell Canada acquired a large offshore acreage position, which included the Eagle area, and acquired 2D seismic which was used to define the Eagle prospect. The Shell et al. Eagle D-21 well was spudded on April 22, 1972 approximately 22 km southeast of Sable Island in 51 m of water. The well reached a total depth of 4660 m in the Early Cretaceous lower Missisauga Formation encountering 52 m of net gas pay in the late Cretaceous chalk of the Wyandot Formation. Gas was recovered from all three well tests.

In July, 1999 Mobil Oil Canada partnered with Shell Canada and Imperial Oil to acquire a number of exploration licences in the Sable Subbasin that included the Eagle discovery. The partnership acquired seismic data over a number of their licences, including the northern portion of the current Eagle block. In 2002, following the merger between Exxon and Mobil, ExxonMobil and partners Shell and Imperial acquired 700 km^2 of 3D seismic over the Eagle discovery and large portion of Parcel 1. In July, 2004 ExxonMobil's Exploration Licence, a portion of which covered Eagle, expired and the land reverted to crown.

As a result of the NS07-1 Call for Bids, a licence including the Eagle field was awarded to Ammonite Corporation under a "promote license" scenario where the 25% work deposit was deferred for three years. Ammonite returned the parcel to Crown on December 31, 2012 with no deposit being paid.

2.2.2 Geological Setting

A seismic dip line through the Eagle D-21 well shows a salt-cored, faulted rollover anticline with two antithetic faults (Figure 2.2.1). The Eagle gas reservoir is located within Late Cretaceous Wyandot Formation with the formation top indicated in yellow on the seismic line. The structure is bounded on the north and northwest by a major northeast-southwest trending growth fault and mapped closure is indicated by the green shading on the Wyandot time structure map.

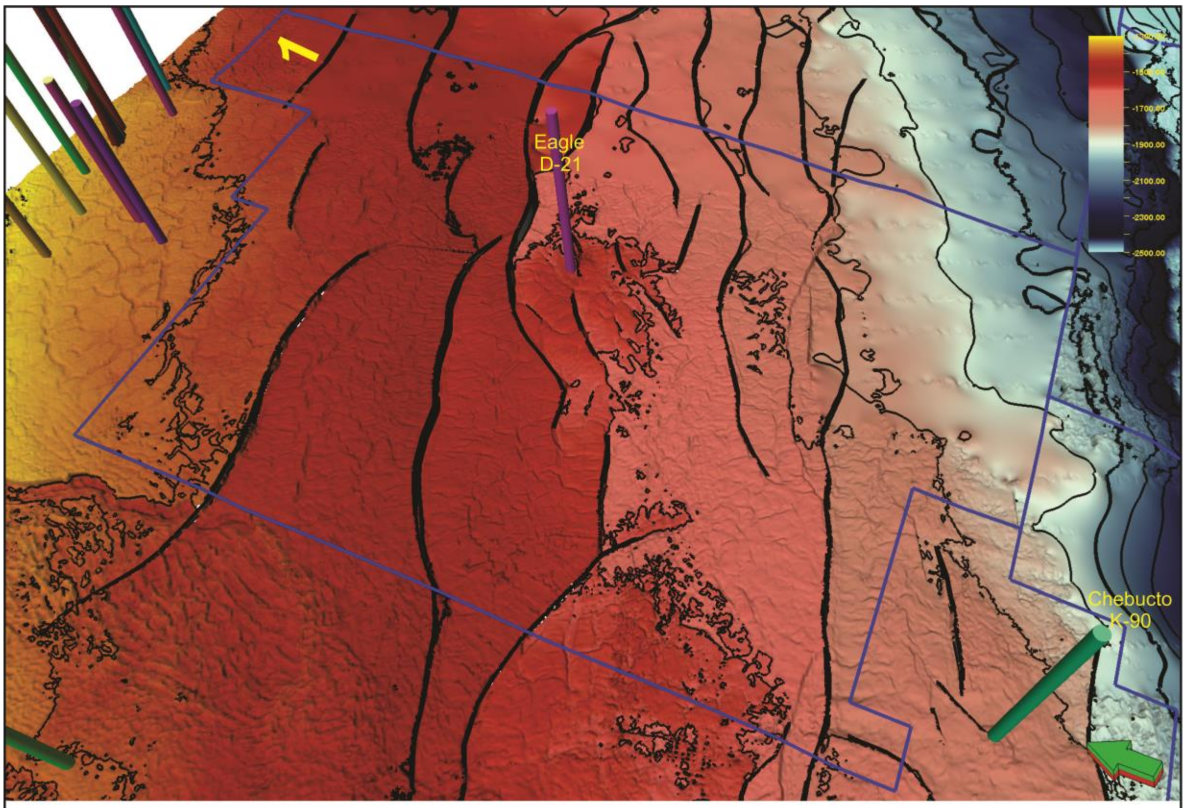


Figure 2.2.2 3-D perspective view of Wyandot (K-78) time structure map on Parcel 1. Vertical exaggeration is 5X and contour interval is 100m. Structural closure at Eagle is evident.

The reservoir is a thick, continuous package of limestones, marls and chalks representing deposition on a stable, shallow, open-marine continental shelf. Well data indicates that the Wyandot carbonates are generally lime mudstones that are soft, chalky, fossiliferous, pyritic, argillaceous and interbedded with marls and calcareous grey shales and mudstones. The polygonal faulting pattern is obvious over much of the chalk surface (Figure 2.2.2). The acoustic seismic amplitude map draped over the time structure map shows a dimming, indicated in yellow, of the Wyandot reflection that approximates the mapped closure of the gas-charged chalk (Figure 2.2.3). This dimming may result from an increase in porosity within the chalk.

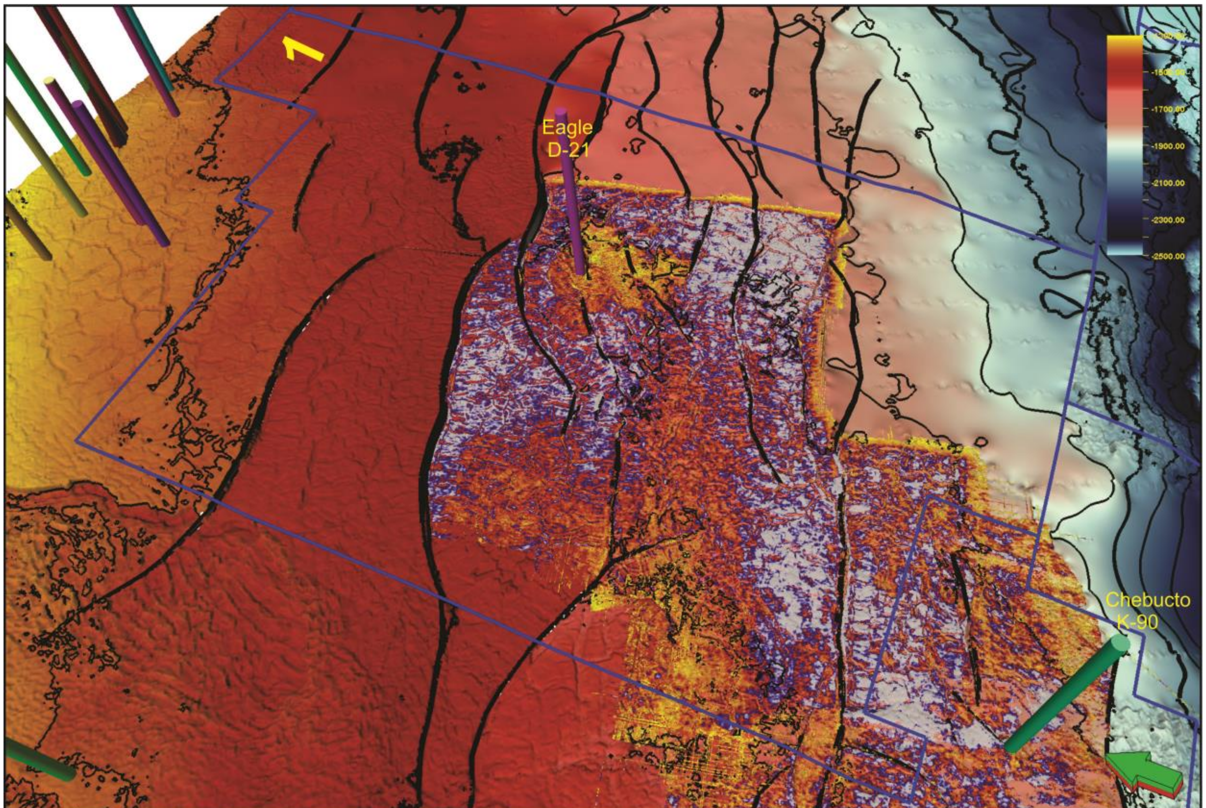


Figure 2.2.3 3-D perspective view of Wyandot (K-78) seismic amplitude draped over Wyandot time structure map on Parcel 1. Amplitude is associated with high porosity and closely corresponds to the structure.

The top seal of the trap is provided by the overlying shales of the Tertiary Banquereau Formation. The lateral extent of the reservoir to the east, south and southwest is probably limited by a combination of structural and stratigraphic trapping due to the generally low matrix permeability of the reservoir. The northern bounding fault seals where the Wyandot reservoir is juxtaposed against shales and tight limestones of the underlying Dawson Canyon Formation.

2.2.3 Formation Evaluation

A detailed petrophysical assessment was conducted by the CNSOPB on Eagle D-21. A few minor, scattered gas shows were encountered in the Missisauga Formation from 4100 m to 4660 m (TD); however none of these sands are interpreted to contain significant hydrocarbon accumulations. The main reservoir in Eagle is the Wyandot Formation which has a gross thickness of 190 m at the D-21 well and consists of interbedded limestones, marls and chalks. The Wyandot reservoir is normally pressured but slight overpressure was detected near the base of the well in the Missisauga Formation.

A complete suite of primary logging measurements were acquired over most of the well, including the Wyandot Formation (Figure 2.2.4) and three continuous conventional cores were cut in the reservoir interval (Table 2.1).

Core#	Interval (m MD)	Recovery
1	1638.6 – 1649.0 m	9.4 m
2	1649.0 – 1658.4 m	8.8 m
3	1658.4 – 1667.6 m	8.7 m

Table 2.1 Eagle conventional core intervals.

Routine core analysis indicated porosities ranging from 19 to 36% with an average of 28%, with permeabilities ranging from 0.2 to 50 mD with an average of 0.6 mD. Core plugs containing fractures typically had the highest permeability. Core permeabilities are generally <2.0 mD, however all plugs had measured permeabilities above the 0.1 mD reservoir cut-off typically used for gas reservoirs.

Three production tests were conducted in the Wyandot Formation (Figure 2.2.4) with each zone being acidized prior to testing to improve deliverability (Table 2.2). PT #2 consisted of a 9.5 hours flow period followed by a 12 hours shut-in time. Analysis of the transient data from this test suggests a low permeability zone consistent with core permeability, initial reservoir pressure of 2350 psi, and very low total skin value.

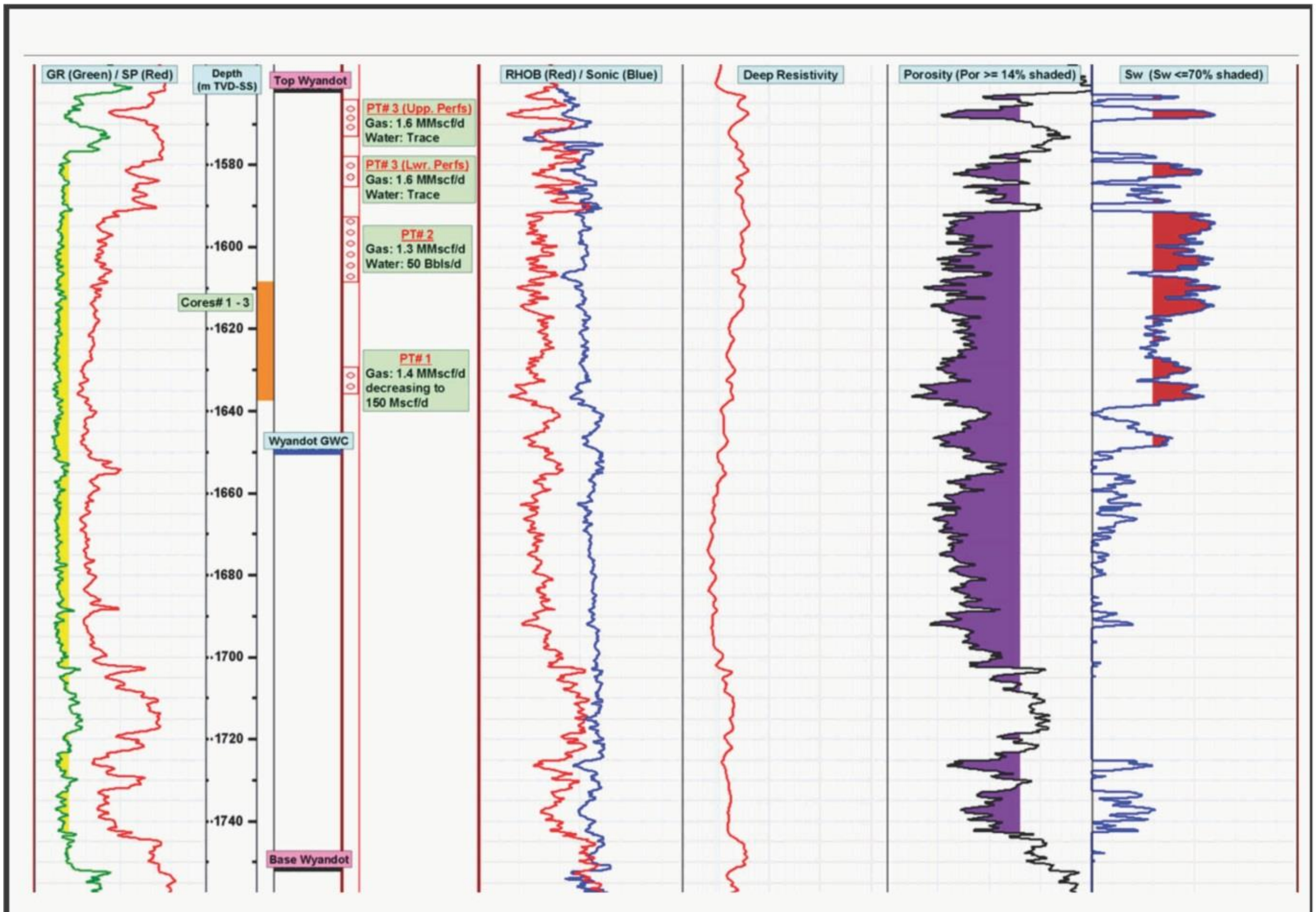


Figure 2.2.4 Eagle D-21 petrophysical evaluation.

The reservoir properties obtained from this test were used to generate models to assess gas recovery from different well configurations. It was concluded that recovery from a multi-staged horizontal well could be significantly higher than a vertical well (15 – 20 times greater) and capable of delivering gas at substantially higher rates. This multi-staged horizontal well model also suggests that the production rate drops rapidly during the first few years of production but the decline rate decreases to low values after this initial production period. This production profile enables production rates to be sustained at lower values for a longer period of time.

<table>
<tr><th>Production Test</th><th>Top (m MD)</th><th>Base (m MD)</th><th>Gas Rate (Mscf/d)</th><th>Condensate Rate (M3/d)</th><th>Condensate Rate (Bbls/d)</th><th>Water Rate (M3/d)</th><th>Water Rate (Bbls/d)</th></tr>
<tr><td>1</td><td>1659.6</td><td>1666.0</td><td>1600.6</td><td>0</td><td>0</td><td>Trace</td><td>Trace</td></tr>
<tr><td>2*</td><td>1622.8</td><td>1638.6</td><td>1300.3</td><td>0</td><td>0</td><td>8*</td><td>50*</td></tr>
<tr><td>3
(upper perfs)**</td><td>1594.1</td><td>1603.2</td><td rowspan="2">1400.4 decreasing to 150</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td></tr>
<tr><td>3
(lower perfs)**</td><td>1608.1</td><td>1615.4</td></tr>
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***** The salinity of the recovered water in PT# 2 was 16,000 ppm while the salinity of the formation water is estimated to be 85,000 ppm, which suggests the produced water is likely mud filtrate.

****** In PT# 3 the upper and lower perforations were tested together.

Table 2.2 Eagle D-21 production tests.

A petrophysical assessment of the Eagle D-21 well was conducted using all available log, core and test data (Table 2.3). A log-defined gas-water contact (GWC) was interpreted at 1680.3 m MD / -1650.1 m TVD-SS. Due to the limited matrix permeability of the Wyandot a considerable transition zone, caused by capillary pressure effects, is evident on logs. This transition zones extends approximately 30 m above the GWC.

Zone	Top (m MD)	Base (m MD)	Net Pay (m TVD)	Net Pay Por. (%)	Net Pay Perm. (mD)	Sw (%)
Wyandot	1592.3	1782.2	52	27	0.50	54

Table 2.3 Eagle D-21 petrophysical assessment.

2.2.4 Reserves Estimate

Eagle has reservoir characteristics that are similar to the Ekofisk field in the Norwegian sector of the North Sea (Table 2.4). Ekofisk is an offshore chalk reservoir that has produced commercially since 1971 and contains vast reserves of both oil and natural gas. Ekofisk is located in water depths ranging from 70 to 75 m with Eagle in similar water depths of approximately 50 m.

Field	Age	Primary Lithology	Porosity (%)	Matrix Permeability (mD)
Eagle	Late Cretaceous	Chalk	19 – 36	0.2 – 1.4
Ekofisk	Late Cretaceous	Chalk	25 – 40	0.1 - 10

Table 2.4 Eagle and Ekofisk comparison.

Due to the nature of chalk reservoirs, enhanced production techniques such as acidizing, hydraulic fracturing and multiple fracture horizontal wells, are often required to improve production. The CNSOPB conducted internal reservoir engineering studies of the Eagle field and estimated that recovery factors of up to 60% are possible if the field is developed using multiple fracture horizontal wells. The results of this reservoir simulation were used to guide the recovery factors used in the Eagle probabilistic resource assessment (Tables 2.5 and 2.6).

Eagle - Original Gas in Place			
P90	**P50**	**P10**	**Mean**
25.3 E9M3	35.4 E9M3	47.3 E9M3	36.0 E9M3
892 Bcf	1,250 Bcf	1,670 Bcf	1,270 Bcf

Table 2.5 Eagle Field probabilistic resource assessment results for original gas in place.

Eagle - Recoverable Gas in Place			
P90	**P50**	**P10**	**Mean**
8.0 E9M3	13.3 E9M3	20.4 E9M3	13.8 E9M3
283 Bcf	471 Bcf	720 Bcf	489 Bcf

Table 2.6 Eagle probabilistic resource assessment results for recoverable gas in place.

2.2.5 Exploration Potential

On Parcel 1, in addition to the Eagle reservoir, a number of exploration prospects are observed on the Hauterivian time structure map (Figure 2.2.5). The contour interval of this map is 100 ms and therefore only highlights the structural trends. Two of these prospects, West Australia North Eagle, have been described by ExxonMobil (2002).

The West Australia prospect has simple closure west of the Eagle field on the same bounding fault. The North Eagle prospect has simple closure along the same fault as South Sable B-44. Both are interpreted to contain a number of stacked sands trapped within simple and fault-dependent closures mapped at several levels within the Logan Canyon and Mississauga formations. Larch is another closure that exists along this fault trend (see Figure 2.2.5). Below the TD of

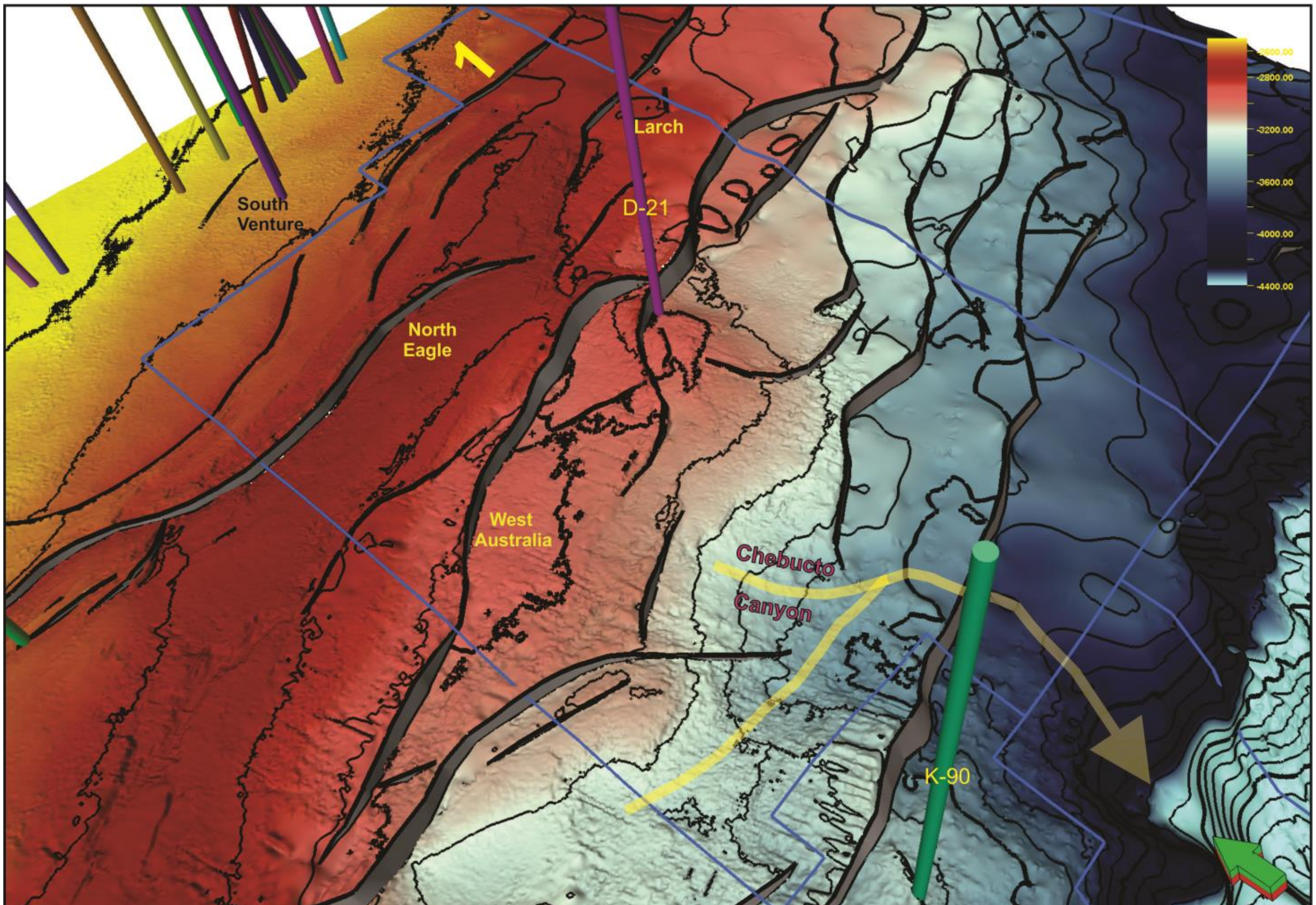

Figure 2.2.5 3-D perspective view of Hauterivian (K-130) time structure map on Parcel 1. Vertical exaggeration is 5X and contour interval is 100m. Three leads and the Chebucto Canyon are labelled.

Eagle D-21 the Reliance prospect is another large, high relief, crestally-faulted closure within the Early Cretaceous lower Missisauga Formation, and is stratigraphically deeper than possible reservoir sections in the other prospects.

The southern extent of Parcel 3 approaches the slope break and is dominated by the Alma Ridge. The Ridge and associated salt tectonics create complex structures that cannot be accurately delineated on 2D seismic profiles in this area. Further mapping and depth conversion may define additional leads along these numerous fault trends.

2.3 Parcel 2

2.3.1 Parcel Description and Exploration History

Parcel 2 is covered only by sparse digital seismic profiles and contains no wells. Although two 3D seismic survey outlines extend over the Parcel, there is no subsurface coverage (Figure 2.1.3). The 1983 vintage 2D seismic used in this mapping project, indicated by the blue lines, has 2 km dip and 8 km strike spacing. Husky Oil acquired 2D seismic over this area in the mid-1980s and identified a number of leads. This data set was not available in digital format for this interpretation but would greatly improve the resolution of the mapping.

The Primrose oil and gas discovery is located 7 km east of the block. Shell's **Primrose N-50** well (1972) was one of the first exploration successes in the Scotian Basin and was drilled in 91 m (298 ft) of water to test a shallow salt diaper (Figure 2.3.1). It was terminated at 1713 m (6052 ft) bottoming in Argo salts. Significant hydrocarbon pay was present and tested in Wyandot (gas and condensate), Logan Canyon (gas and condensate) and Iroquois (oil and gas) formations (Table 2.7). Refer to Smith et al. (2014) for a more comprehensive re-evaluation of the Primrose field including an updated resource assessment.

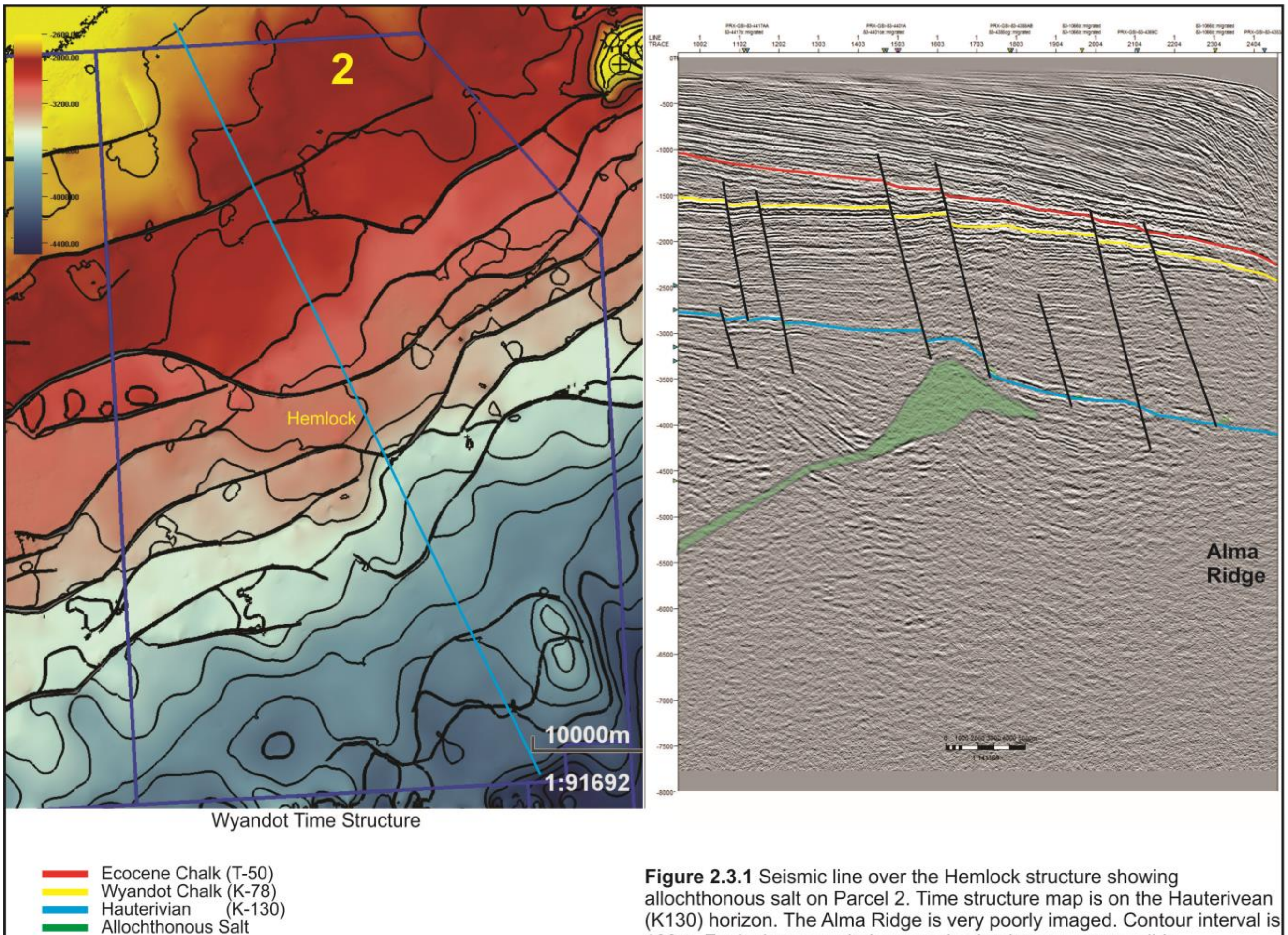

Figure 2.3.1 Seismic line over the Hemlock structure showing allochthonous salt on Parcel 2. Time structure map is on the Hauterivean (K130) horizon. The Alma Ridge is very poorly imaged. Contour interval is 100m. Fault closure, salt drape and subsalt traps are possible.

Zone[1]	Formation	Top (m MD)	Base (m MD)	Gross Thickness (m TVD)	Net Pay Thickness (m TVD)	Net Pay Porosity (Average)	Sw (Average)
1 (gas)[2]	Wyandot	1356.4	1446.0	89.6	42.9	0.229	0.35
2 (gas)[3]	Logan Canyon	1497.9	1571.3	73.3	12.6	0.227	0.32
3 (gas)[3]	Iroquois	1608.5	1642.9	34.4	4.3	0.161	0.52
3 (oil)[3]	Iroquois	1642.9	1657.4	14.5	4.6	0.155	0.47

[1] **Zones:** Defined by the CNSOPB
[2] **Zone 1 Cut-offs:** PHI ≥ 0.16, Vsh ≤ 0.40, Sw ≤ 0.60 (PHI=0.16 equivalent to 0.1 MD permeability)
[3] **Zones 2 & 3 Cut-offs:** PHI ≥ 0.10, Vsh ≤ 0.40, Sw ≤ 0.60

Table 2.7 Log-defined hydrocarbon zones in the Shell Primrose N-50 well (Smith et al., 2014).

2.3.2 Geological Setting

Parcel 2 borders the western boundary of The Gully which is a large post Pleistocene submarine canyon that bisects the shelf and slope just east of Sable Island. The allochthonous salt bodies in Parcel 2 are poorly imaged on the sparse, vintage 2D seismic data available for this study. One seismic example through the Hemlock prospect (Figure 2.3.1) shows salt being expelled seawards by prograding Lower Missisauga sands. The Alma Ridge is present at the south end of this seismic line but is very poorly imaged. The influx of sediments from the Sable Delta combined with salt extruded over the Alma Ridge resulted in the deposition of a thick, highly faulted Missisauga section in Parcel 2. The density of normal faults and spacing of the seismic profiles make fault correlation challenging across the parcel.

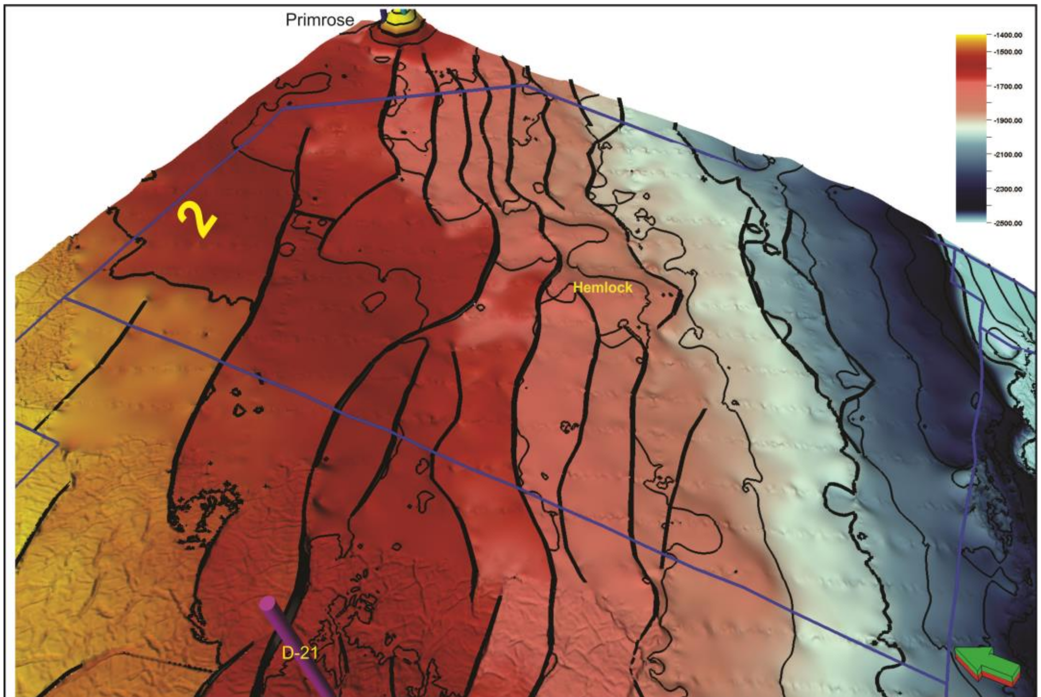

Figure 2.3.2 3-D perspective view of Wyandot (K-78) time structure map on Parcel 2. Vertical exaggeration is 5X and contour interval is 100m.

2.3.3 Exploration Potential

Structural closures are evident on the Wyandot time structure map even with the 100 ms contour interval (Figure 2.3.2). The Hauterivian 3D time surface also shows closures produced by rollovers against the faults with the large Hemlock prospect extending over three fault blocks (Figure 2.3.3). This map also has 100 ms contour intervals so only large trends are evident. Many of these rollover structures, including Hemlock, are accentuated by salt tectonics. Another lead could exist where Lower Missisauga sands are trapped under the overhanging salt.

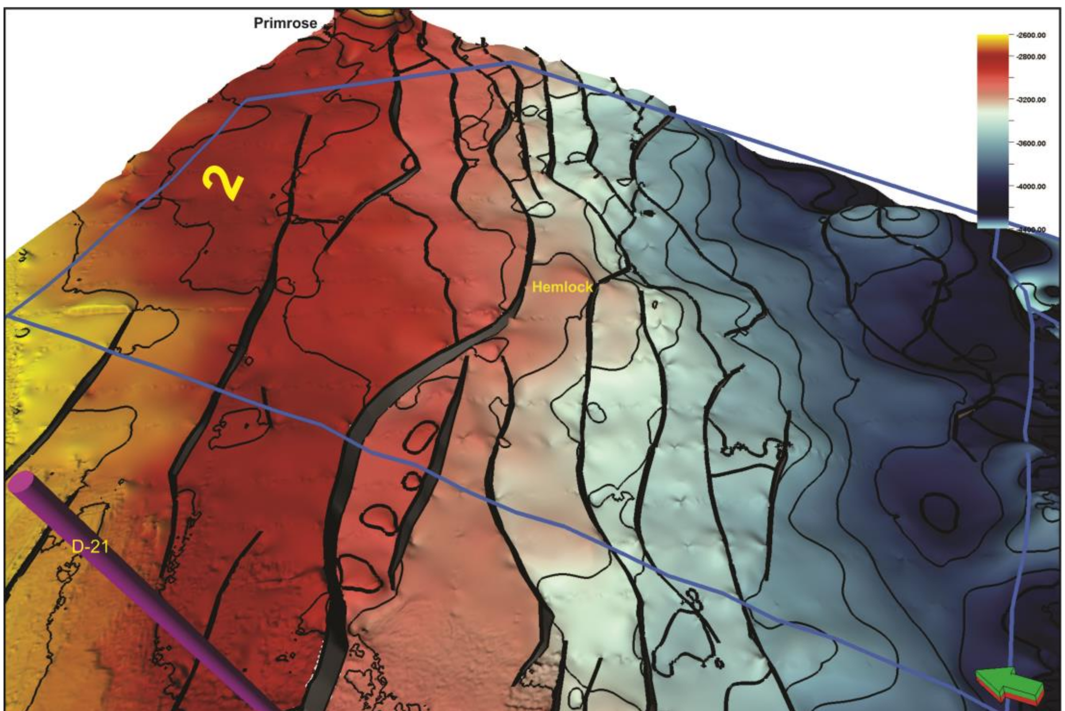

Figure 2.3.3 3-D perspective view of Hauterivian (K-130) time structure map on Parcels 2 with 5X exaggeration. Contour interval is 100m. The Hemlock lead is labelled.

These structures are on trend with the North Triumph producing gas field and the Glenelg and Chebucto Significant Discoveries. Integration of additional existing 2-D data or acquisition of a new 3D seismic survey would be required to properly image these traps. A closure in the southeast corner of Parcel 2 is created by drape over the Alma Ridge but is difficult to image on the available 2D seismic. Better imaging of this ridge is required to adequately evaluate this area's potential.

2.4 Parcel 3

2.4.1 Parcel Description and Exploration History

Parcel 3 is located near the outer edge of the present day Scotian Shelf. It is surrounded by numerous gas discoveries including the Sable Energy Project's (SOEP) North Triumph field which is currently on production (Figure 2.4.1). The North Triumph Production Platform lies six km to the north of Parcel 3 and has produced 280.3 BCF of gas to the end of February 2016 with production beginning in 2000 (Figure 2.4.1). Three Significant Discovery Licences found along the north border of Parcel 3, held by ExxonMobil Canada Properties since 1990, are remnants of the original North Triumph Significant Discovery Licences after the Production Licence was created.

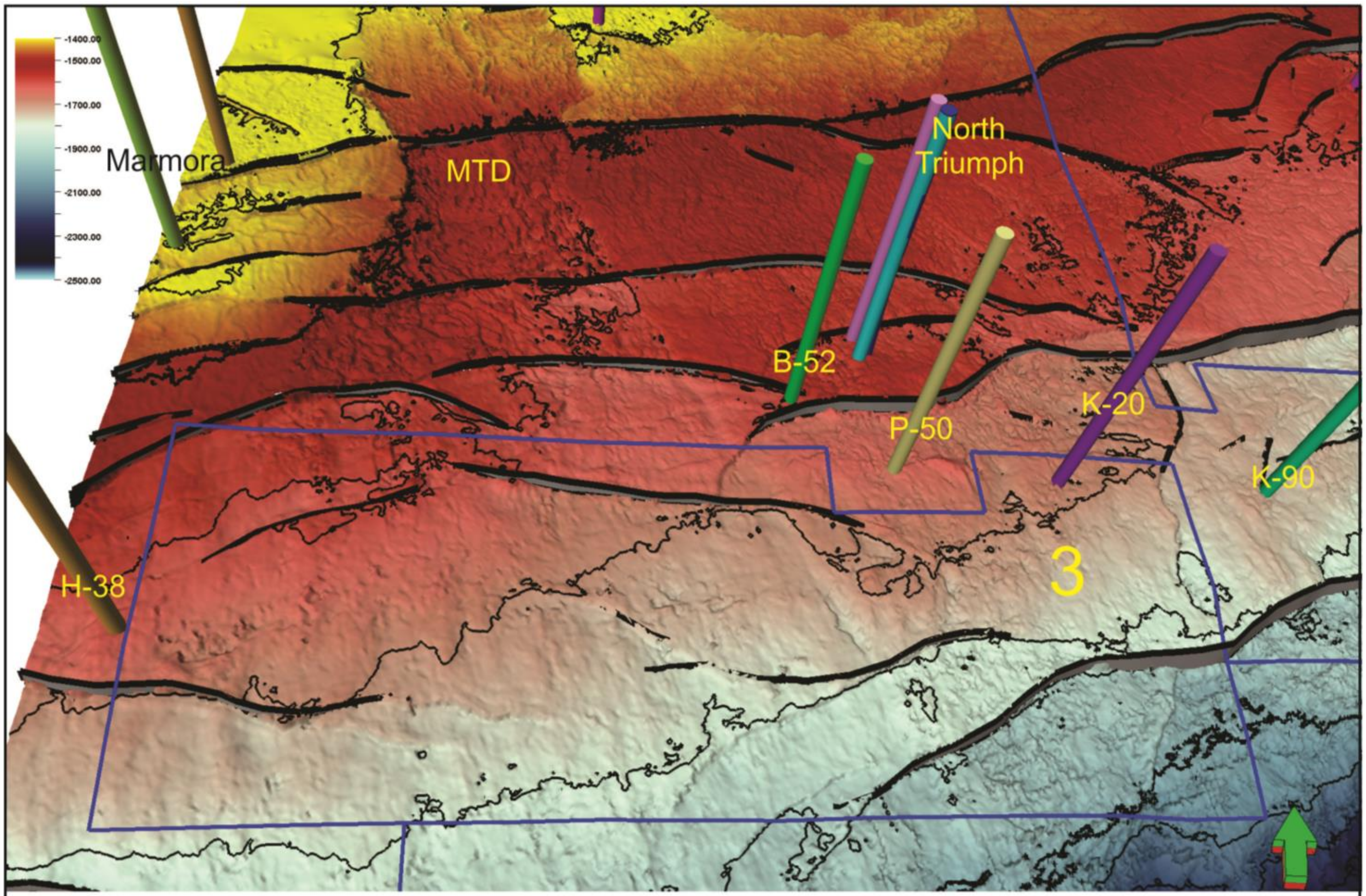

Figure 2.4.1 3-D perspective view of Wyandot (K-78) time structure map on Parcel 3. Vertical exaggeration is 5X and contour interval is 100m. A prominent mass transport deposit (MTD) corridor intersects the western portion of the Parcel .

The Glenelg J-48 Significant Discovery Licence bordering the west side of Parcel 3 has been held by ExxonMobil Canada Properties since 1990. It has a mean OGIP of 700 BCF found within sandstones of the upper Missisauga (Barremian) and Logan Canyon (Albian) Formations (Smith et al., 2014).

The Chebucto K-90 Significant Discovery is composed of two licences, with the north licence owned by Shell Canada Limited and the south licence owned by ExxonMobil Canada Properties. The Chebucto field has a mean OGIP of 1.0 TCF found within strata of the Early Cretaceous (Albian) Cree member of the Logan Canyon Formation, and at the top of the Missisauga Formation (Aptian) (Smith et al., 2014).

The Triumph P-50, well drilled in 1971 by Shell, lies just to the north of Parcel 3 and penetrated a number of well-developed Barremian aged Missisauga Formation fluvial and shallow marine sandstones with good to excellent porosities but were mostly wet. The well drilled through a fault and into the footwall of the North Triumph structure, with the result that the main targets (Upper and Lower members of the Missisauga formation) in the hanging wall were not tested.

The Husky-Bow Valley West Chebucto K-20 well (1984) is the only well drilled within the parcel. The well penetrated a 2000 m thick Logan Canyon Formation that contained a far greater amount of sand than the K-90 well. These sands, ranging from 5-20 m thick, were mostly fine to very fine grained, variably porous (tight to very good porosity) and represented deposition in a shallow marine setting along with associated shales and siltstones. The basal 100 m of the Cree Member was composed of a near continuous marine sandstone succession with fair to very good porosity and a number of intervals with staining and strong fluorescence but no associated elevated mud-gas readings. While thick good quality Missisauga sands were also penetrated, only one was gas bearing (Table 2.8). Sand 1 was subsequently tested and flowed gas at 4.13 MMscf/d with some depletion noted in the test analysis report. More details on this well can be found in the well history section.

West Chebucto K-90							
Zone	**Formation**	**Top (m MD)**	**Base (m MD)**	**Gross Thickness (m TVD)**	**Net Pay Thickness (m TVD)**	**Net Pay Porosity (Average)**	**Sw (Average)**
1a	Lower Missisauga	5017.9	5041.5	23.6	3.4	0.12	0.60
1b	Lower Missisauga	5066.6	5086.1	19.5	2.0	0.11	0.55
1c	Lower Missisauga	5107.2	5126.2	19.0	2.7	0.11	0.57

Table 2.8 West Chebucto K-20 reservoir sand properties.

Parcel 3 is covered by portions of three 3D seismic surveys and numerous early 1980s 2D surveys. The parcel's bathymetry is generally flat-lying with a shallow dip to the southeast. Water depths range from 50 to 200 m, with depths increasing to 400 m in a small part of the parcel's southeast corner.

A similar parcel was awarded to 1164214 Alberta Ltd in the NS08-1 Call for Bids for $7,871,173.60 under a "promote licence" agreement where the 25% work deposit was deferred for three years. The parcel returned to Crown with no deposit being paid.

2.4.2 Geological Setting

Parcel 3 is located above the distal margin of Early Cretaceous deltas where porous Missisauga sands have a lower net to gross and increased shale thickness providing good fault seal potential. As evidenced by the excellent gas recoveries at the North Triumph field and the Alma field to the west, this, and a thick Naskapi shale top seal has proven to be an effective combination. Interactions between fluvial deltaic clastics, mobilized salt, and the Alma ridge combine to produce numerous potential hydrocarbon-bearing structures on the parcel. Remobilized Wyandot Formation chalk across large areas of Parcel 3 may also form prospective reservoir targets (Figure 2.4.1).

2.4.3 Exploration Potential

A number of leads have been identified in Parcel 3. Poplar is a large closure mapped at the Hauterivian level on the western portion of this parcel and east of the undeveloped Glenelg Field (Figure 2.4.2). The Alma Ridge at the core of this structure is poorly imaged on the small 3D survey (Figure 2.4.3). The edge of another 3-D survey also fails to adequately resolve the Alma Ridge at this location, making it difficult to clearly define the deeper structures and determine the extent of mobilized salt.

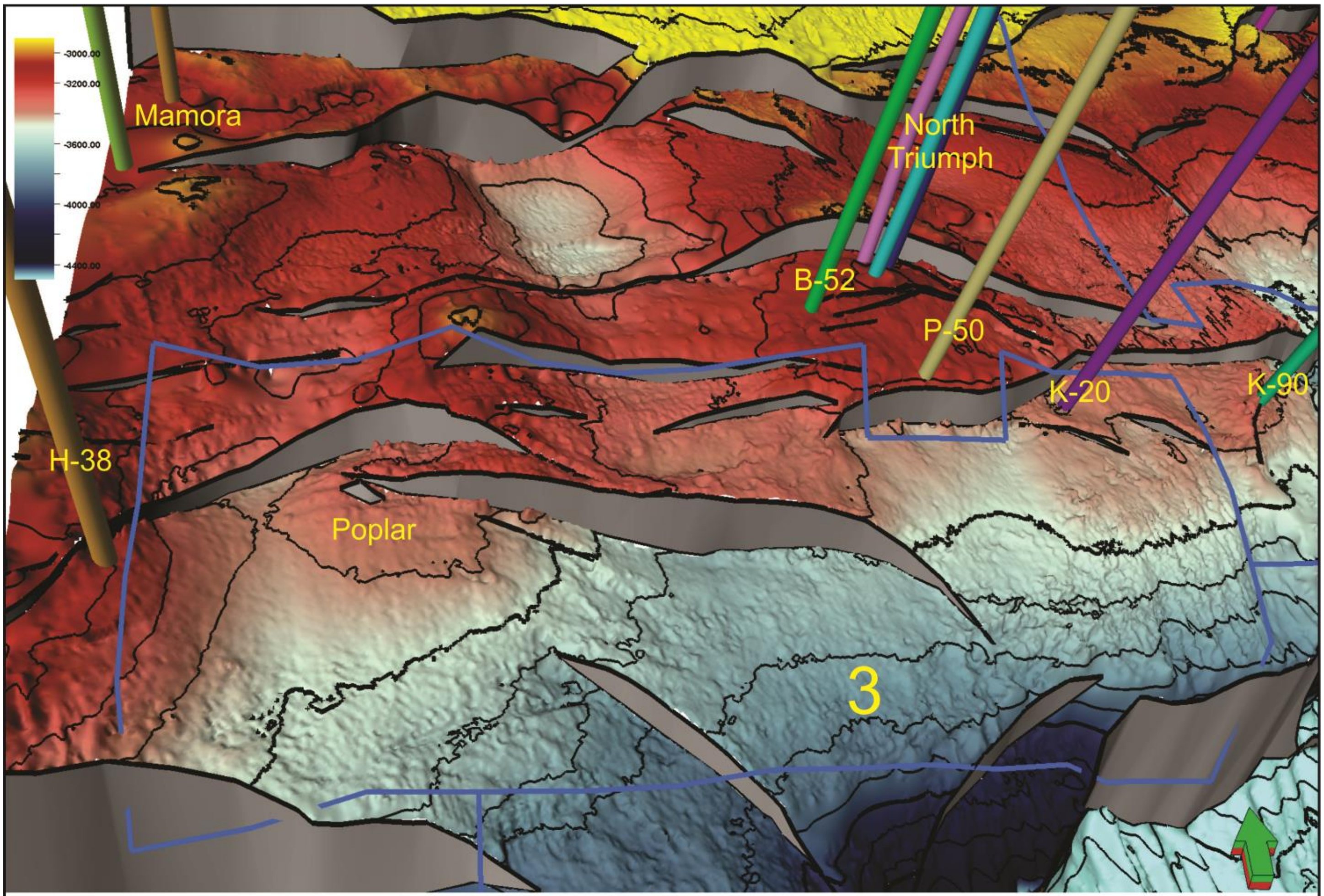

Figure 2.4.2 3-D perspective view of Hauterivian (K-130) time structure map on Parcel 3. Vertical exaggeration is 5X and contour interval is 100m. The Poplar lead is highlighted.

At deeper levels, the crest of the structure migrates south towards the center of the parcel. Closure further east along the Poplar fault near the center of the parcel may also exist but requires more detailed mapping and depth conversion.

Missisauga reservoir sands are expected to be equivalent to those found at Glenelg, Triumph, and Chebucto having good porosity with thick overlying sealing shales. This is an area with proven reservoir quality sands and gas-charge.

Shallower rollover closures at the Wyandot level may also be present with the possibility of a remobilized chalk reservoir.

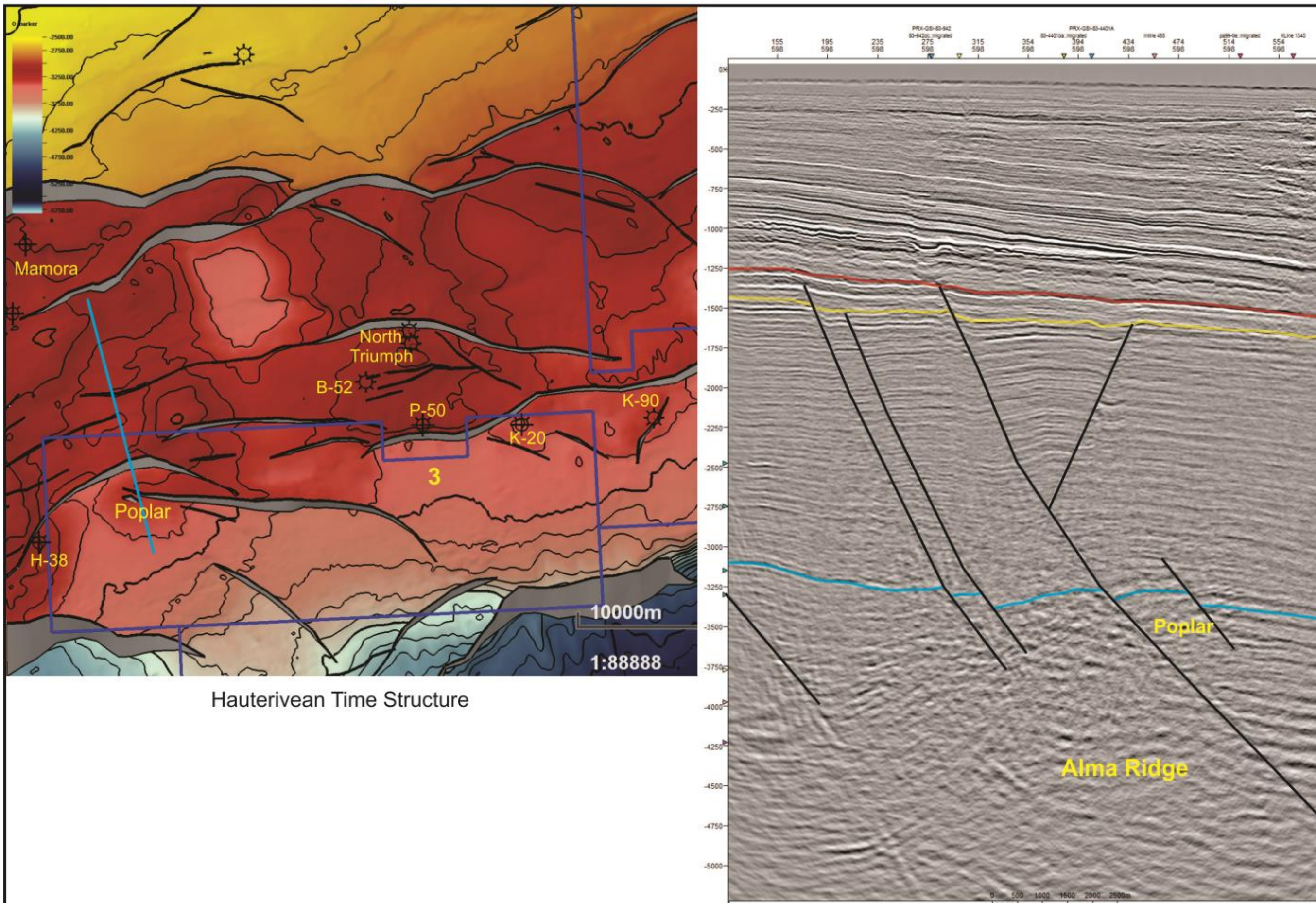

Figure 2.4.3 Seismic line through Poplar structure on Parcel 3. Line location is indicated by blue line on Hauterivean time structure map. The poor imaging of the Alma Ridge makes salt identification difficult.

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