

1. Introduction

Since 1999, the Department of Energy and Climate Change (DECC) (formerly the Department of Trade and Industry) has conducted Strategic Environmental Assessments (SEAs) prior to offshore licensing rounds.

SEA7 lies within the Atlantic Margin area, and its assessment was completed during 2007.

SEA7 incorporates Rockall Basin Quadrants 127-132, 138-142, 147-154, 157-165, 168-171 and 173-174, as well as parts of the adjacent Outer Hebrides Platform and Rockall High, plus parts of the Hatton Basin and Hatton High. However, only the area to the east of 13°W is currently available for licensing.

The remaining unlicensed acreage in SEAs 1 to 6, and SEA8 will also be available for licensing in the next offshore licensing round.

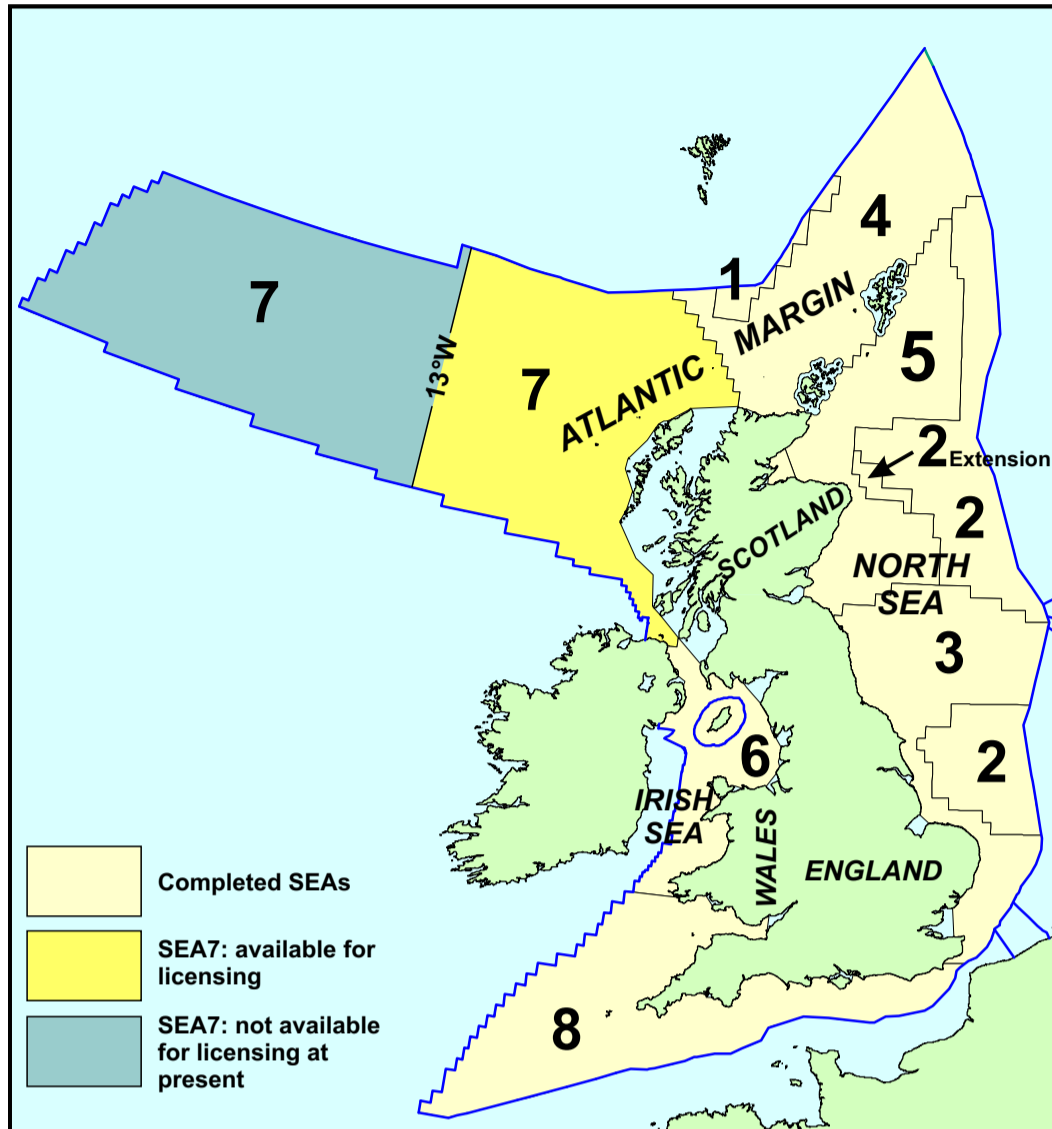


Fig. 1 Areas potentially open for licensing in the next offshore licensing round. Actual blocks on offer (including terms) and the timing of any Round will be announced on the DECC website www.og.decc.gov.uk.

The Rockall Basin has:

- Proven source rocks
 - Proven hydrocarbon systems
 - Proven traps
 - Proven reservoirs in post-rift and pre-rift plays:
- **Benbecula**
Paleocene Gas discovery
 - **Dooish (Irish Sector)**
Permo-Triassic and Middle Jurassic Gas condensate

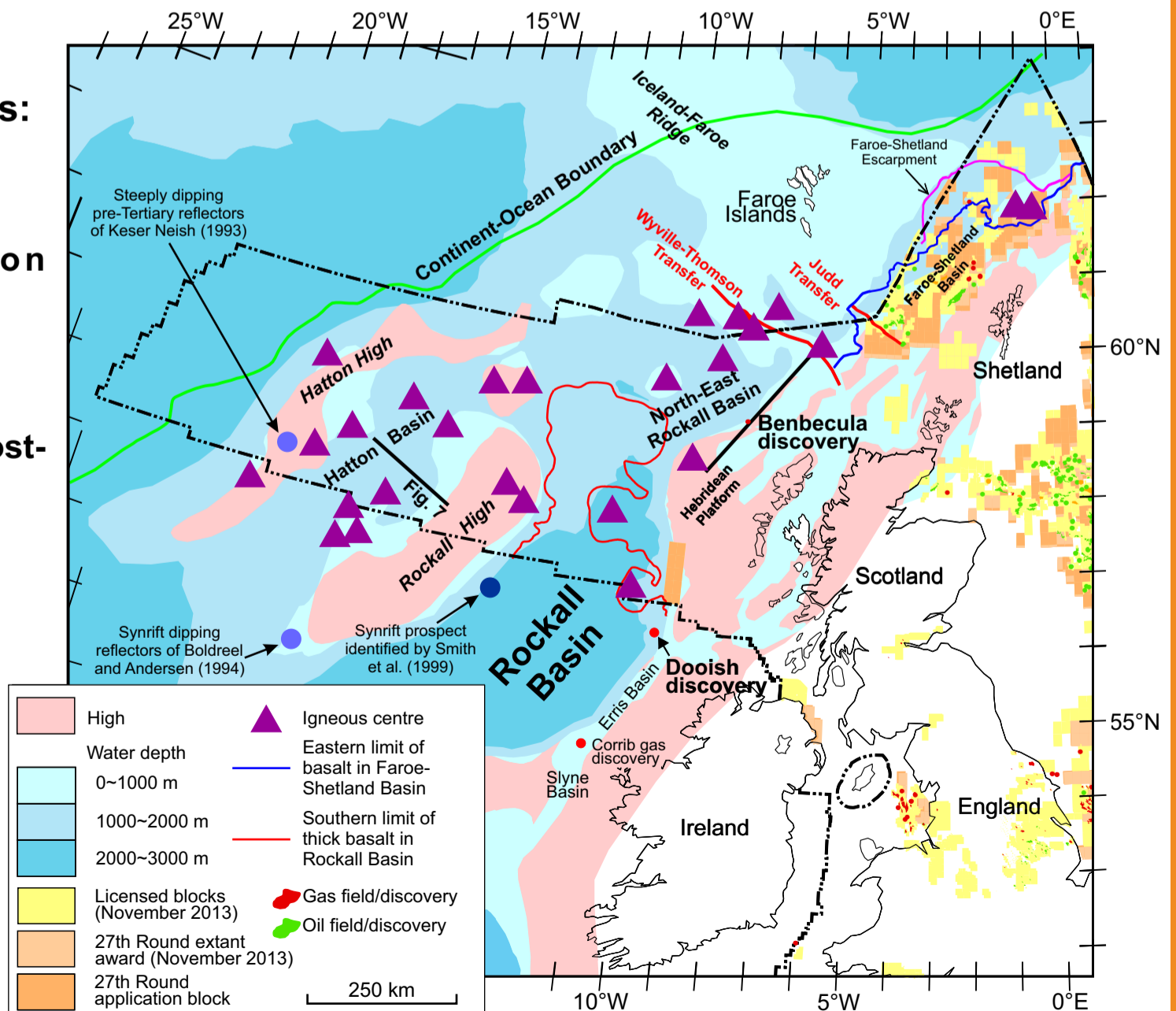


Fig. 2 Licensed areas and water depths across Rockall Basin

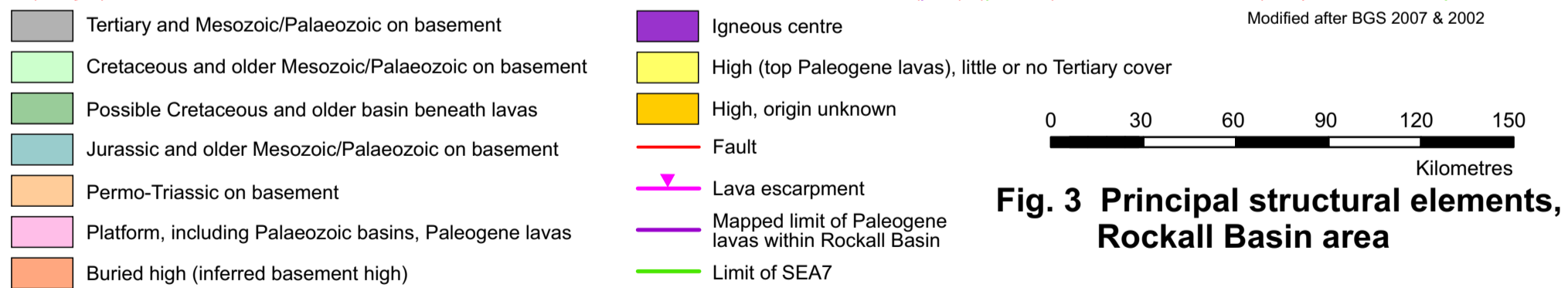
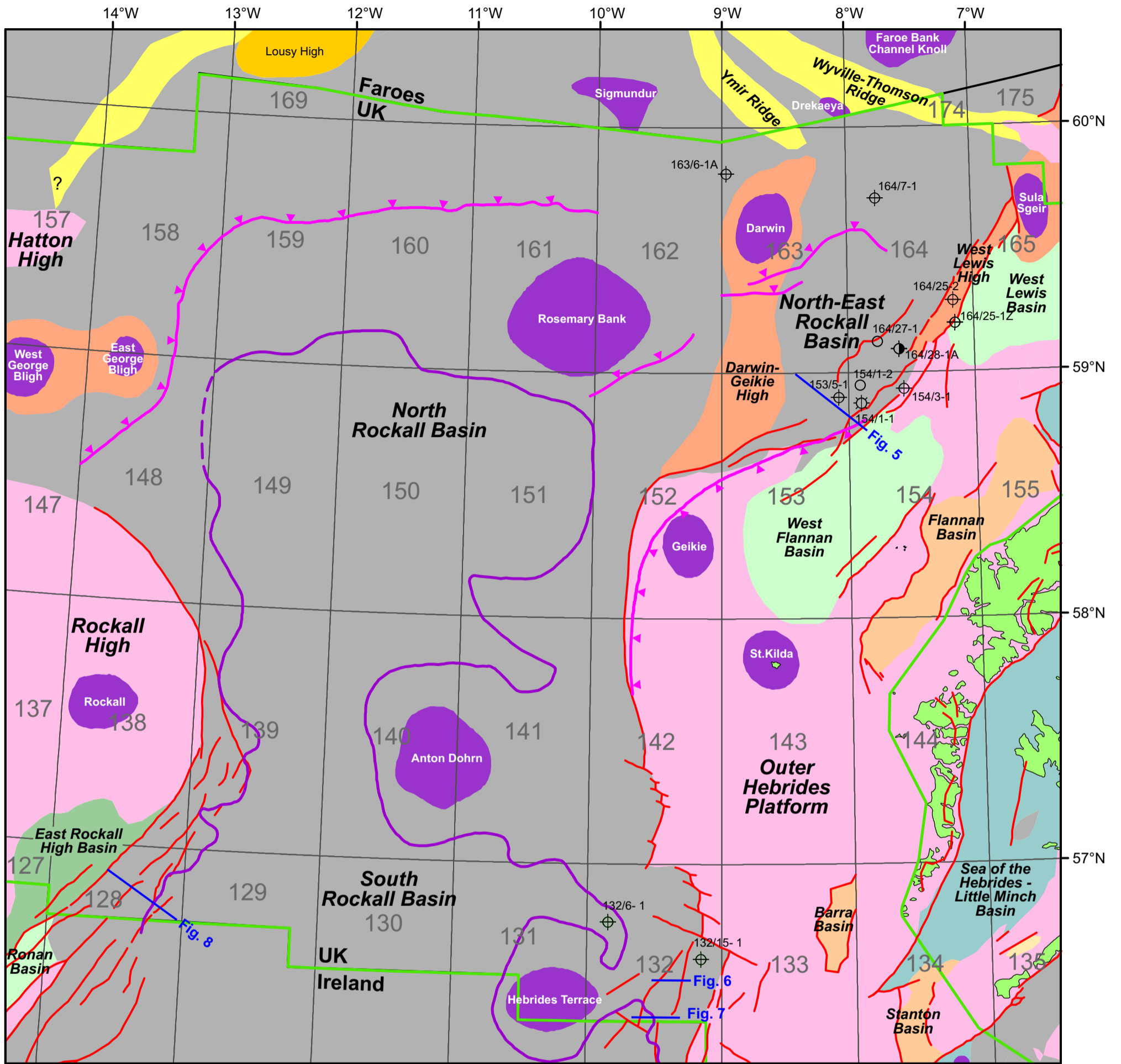


Fig. 3 Principal structural elements, Rockall Basin area

2. Structural Elements

The Rockall Basin is a N-S to NNE-SSW trending graben lying between the Rockall High in the west, and the Outer Hebrides Platform in the east. The North-East Rockall Basin is separated from the Faroe-Shetland Basin to the north-east by the Wyville-Thomson Ridge. Late Cretaceous to Early Eocene igneous intrusions are present within the basin and on the bounding highs. Associated lavas and tuffs cover much of the basin, and older strata in large parts of the basin are obscured on seismic data by thick extrusive rocks. The oldest sedimentary rocks penetrated within the UK sector of the Rockall Basin are Early Cretaceous (South Rockall Basin well 132/15-1); however, Jurassic rocks are inferred from seismic interpretation to be present across at least the eastern part of the Rockall Basin (Spencer *et al.* 1999).

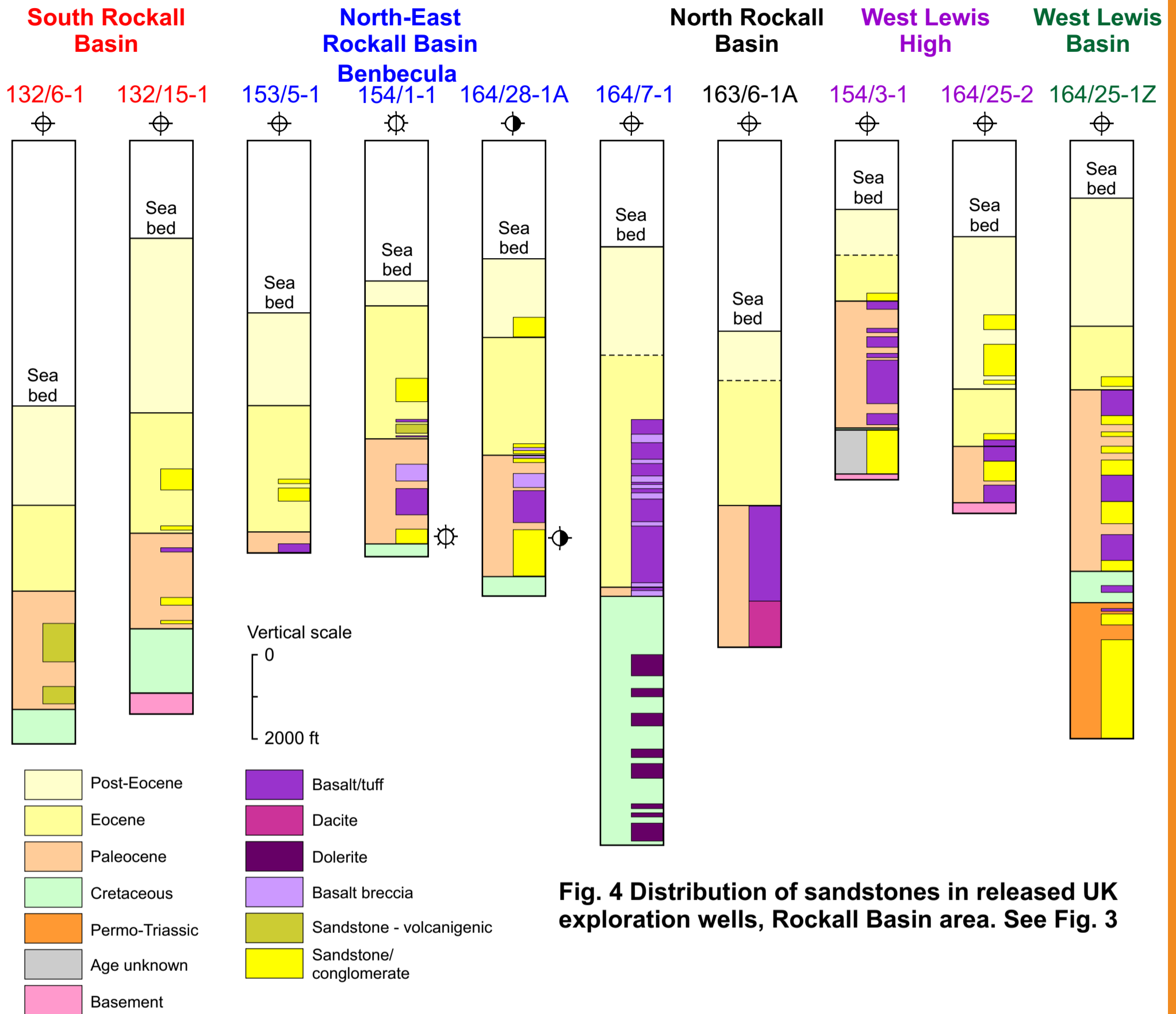


Fig. 4 Distribution of sandstones in released UK exploration wells, Rockall Basin area. See Fig. 3

3. Rockall Basin area wells

Seven released hydrocarbon exploration wells have been drilled in the UK Rockall Basin, with two in the South Rockall Basin, four in the North-East Rockall Basin, and one in the North Rockall Basin. Two further wells were drilled on the adjacent West Lewis High and one in the West Lewis Basin.

Two of these wells found hydrocarbons. The Paleocene post-rift play was proven by the discovery of gas in the Vaila Formation at well 154/1-1 (Benbecula discovery), and oil shows were found within the Vaila Formation in well 164/28-1A. However, the remaining five released Rockall Basin wells were dry holes.

In the Irish sector of the South Rockall Basin, the Dooish gas condensate discovery (see Fig. 2) is reported to comprise Permian reservoir sandstones (Shannon *et al.* 2005). Thick Permo-Triassic sandstones were proven in the West Lewis Basin, and equivalent beds are likely to be present locally in the Rockall Basin, at least along its eastern margin.

Quartzose sandstones were penetrated in the Paleocene sections of 5 of the UK Rockall area wells (Fig. 4). Volcanigenic sandstones with poorer reservoir potential make up the clastic component of the Paleocene at well 132/15-1. Wells 163/6-1A and 164/7-1 drilled through very thick Palaeogene volcanic sections, although this is probably due to their proximity to the Darwin igneous centre (Fig. 3).

Eocene sandstones were penetrated in 7 of the 10 Rockall area wells.

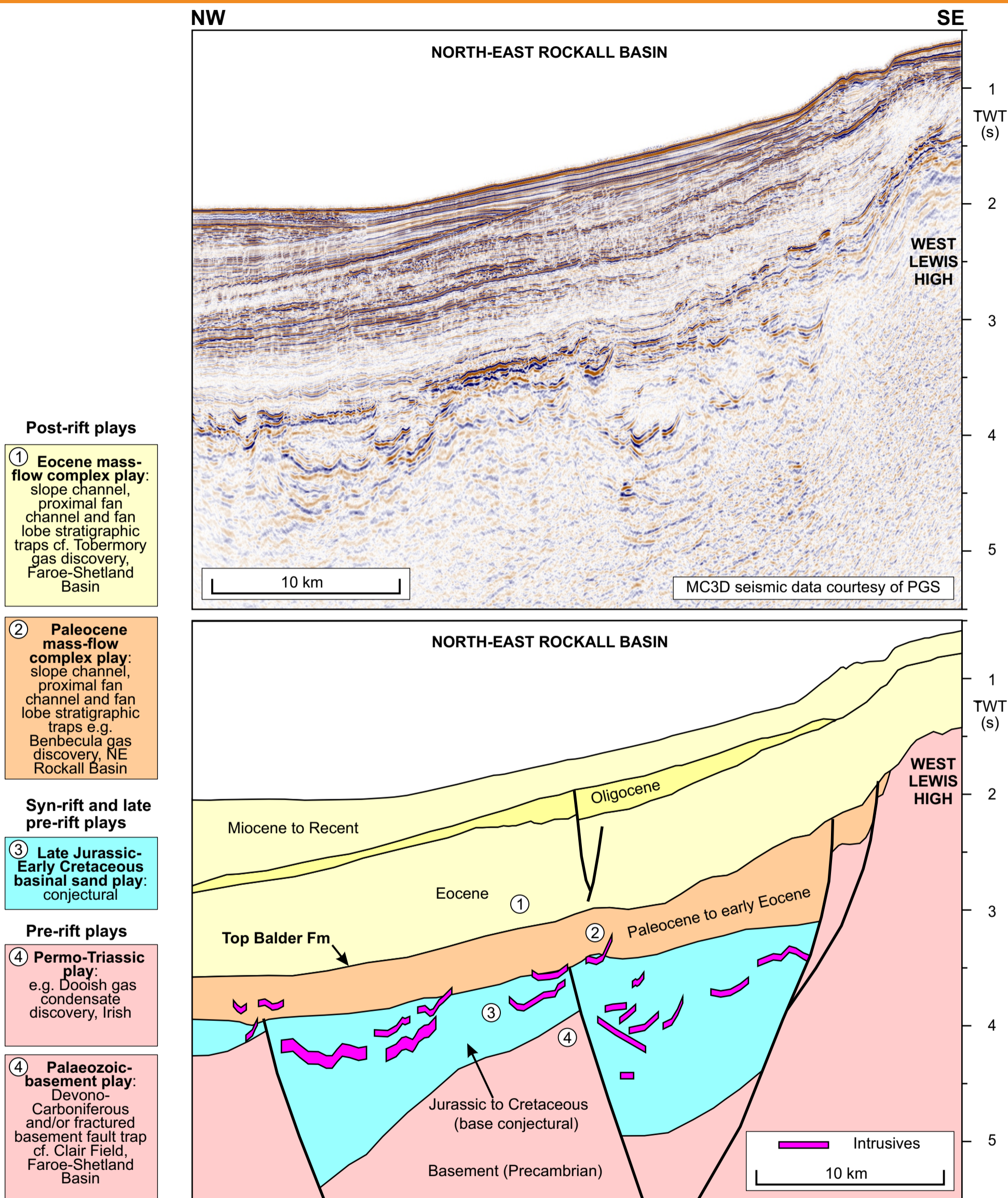


Fig. 5 Seismic section and geoseismic interpretation across the North-East Rockall Basin. See Fig. 3 for location of section.

4. North-East Rockall Basin

A range of pre-, syn- and post-rift plays are envisaged in the North-East Rockall Basin. Five hydrocarbon exploration wells have been drilled on the eastern margin of the basin (Fig. 3). The Paleocene post-rift play was proven by the discovery of gas in the Vaila Formation at well 154/1-1 (Benbecula discovery), and the occurrence of oil shows within the Vaila Formation in well 164/28-1A. However, wells 153/5-1 and 164/27-1 were dry holes. The remaining well has not been released into the public domain.

5. Hebridean Margin Plays (North east)

Seismic data across the North eastern Rockall Basin reveals the potential for various styles of play along the basin margins. Four wells have been drilled to data, proving the presence of Palaeocene- and Cretaceous-aged successions within the basin. Well 154/1-1, which made the Benbecula gas discovery proved the existence of a working petroleum system, with the subsequent well 165/28-1A encountering hydrocarbon stained sandstones within the Paleocene- and Eocene-aged succession. As of yet, the source rock for these hydrocarbons has not been encountered in any wells within the basin. However, the presence of a working petroleum system suggests that Jurassic- or Carboniferous-aged source rocks occur at depth. Although intrusive igneous activity is pervasive within the basin, sills

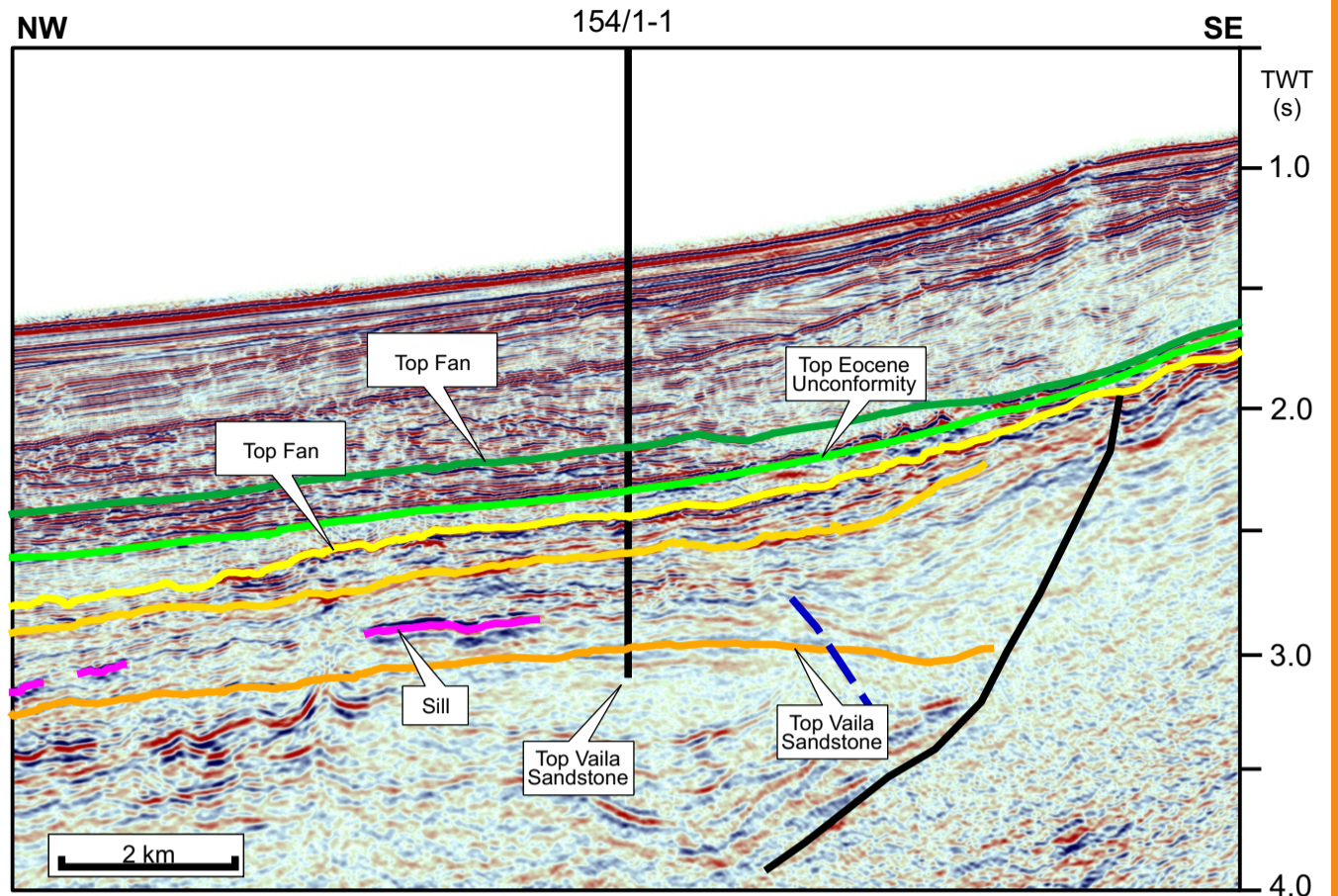
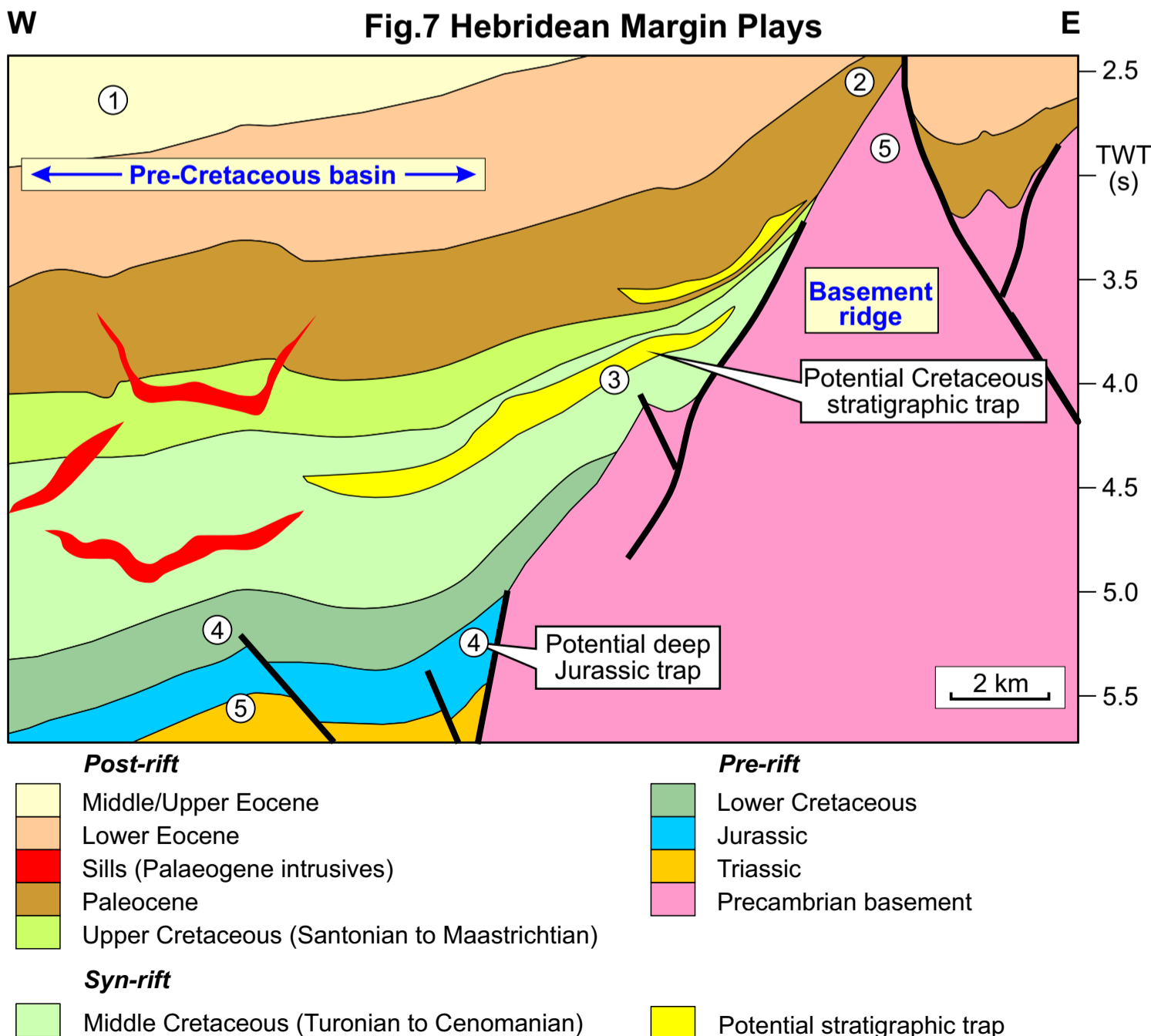


Fig. 6 The Benbecula gas discovery was made in Upper Palaeocene-aged Vaila-equivalent sandstones, slightly down dip from the crest of a foot-wall syncline exhibiting four-way dip closure. The overlying Kettla Member-equivalent acts as the reservoir seal (Seismic data courtesy of PGS).

are typically confined to depths between 3000 – 10,000 ft (1 – 3 km), potentially sparing any deeper source rocks from undue heating.



Post-rift plays

① **Eocene mass-flow complex play:** slope channel, proximal fan channel and fan lobe stratigraphic traps cf. Tobermory oil discovery, Faroe-Shetland Basin

② **Paleocene mass-flow complex play:** slope channel, proximal fan channel and fan lobe stratigraphic traps cf. Benbecula gas discovery, NE

③ **Turonian sandstone play:** basin-floor fan traps in hanging wall of basin-margin faults cf. well 206/3-1, Faroe-
[See Upper Cretaceous sandstone play, Atlantic Margin \(click here\)](#)

Syn-rift and late pre-rift plays

④ **Late Jurassic-Early Cretaceous basinal sand play:** conjectural

Pre-rift plays

⑤ **Permo-Triassic play:** e.g. Dooish gas condensate discovery, Irish Rockall Basin

⑤ **Palaeozoic-basement play:** Devonian-Carboniferous and/or fractured basement fault trap cf. Clair Field, Faroe-Shetland Basin

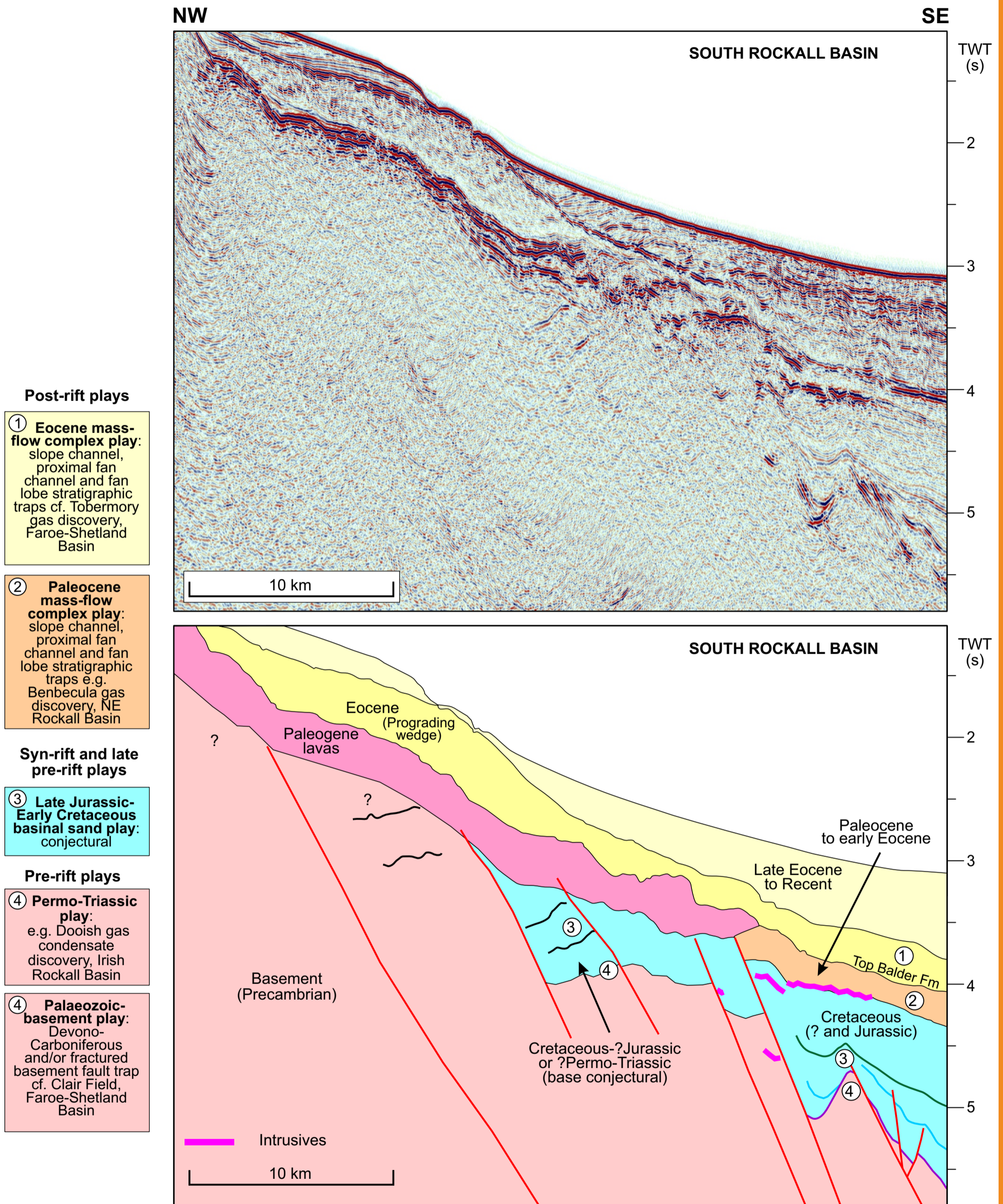


Fig. 8 Seismic section and geoseismic interpretation across the western margin of the South Rockall Basin. See Fig. 3 for location of section.

6. Western margin of Rockall Basin

No hydrocarbon exploration wells have been drilled as yet along the western margin of the Rockall Basin, and there is limited seismic data available. However, a range of pre-, syn- and post-rift plays is envisaged on the western margin of the Rockall Basin, similar to those identified along its eastern margin.

7. Leads and discoveries in the Rockall Basin

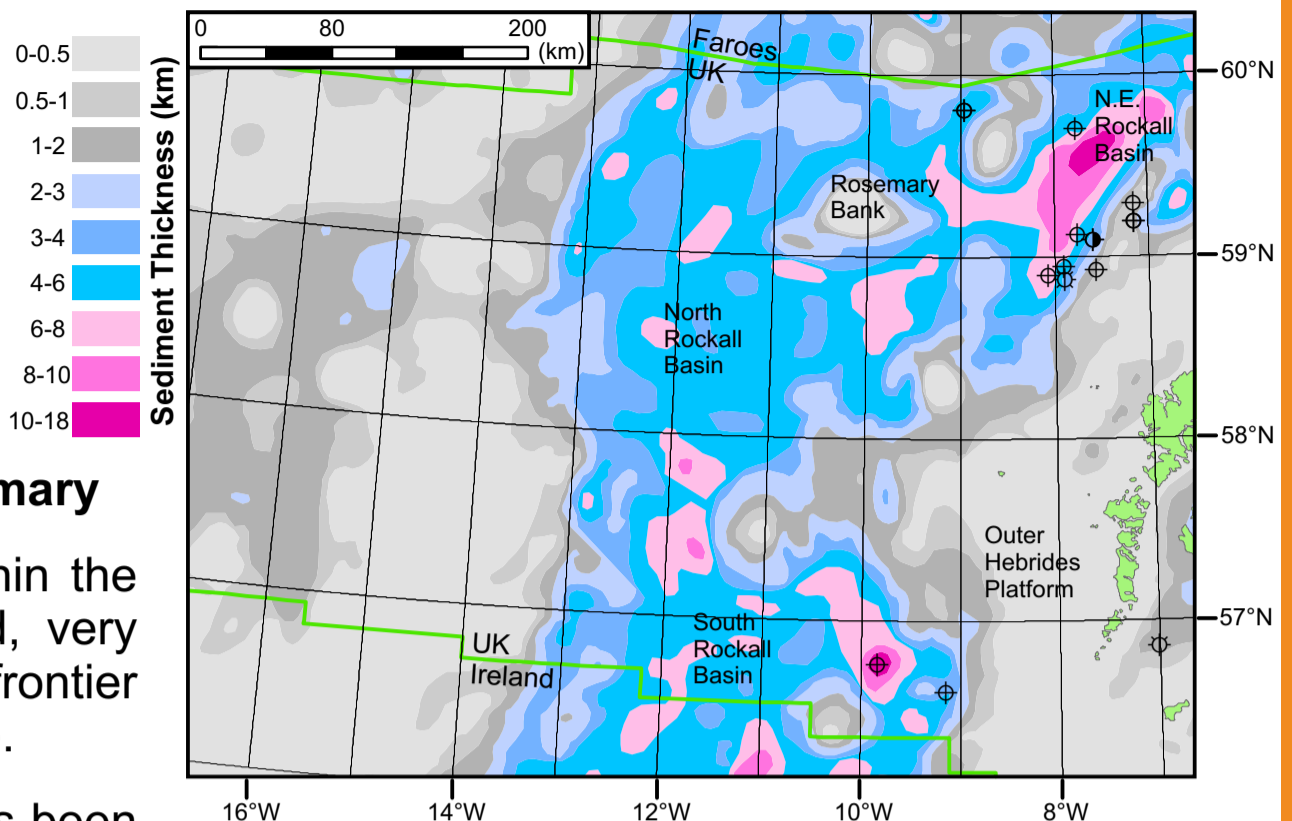
Examples of discoveries and undrilled leads in the Rockall Basin are shown in:

West of Britain opportunities

[Click here for link](#)

8. Future Challenges and Summary

- The Rockall Basins situated within the SEA7 area is a lightly explored, very challenging, mainly deep-water, frontier area with no existing infrastructure.
- A range of hydrocarbon plays has been identified in the pre-, syn- and post-rift sections.
- The Benbecula gas discovery and oil shows observed in 154/1-1 demonstrate the existence of a working hydrocarbon charge system in the North-East Rockall Basin. Additionally, the Dooish discovery in the Irish sector demonstrates the potential of a working hydrocarbon system within the south Rockall Basin of the UK sector.
- Gravity and magnetic modelling of the Rockall Basin suggests that 4-6 km of sediment has accumulated across most of the Rockall Basin, with potentially more than 10 km of sediment at the centre of the North-East Rockall Basin.
- From reconnaissance mapping, one Upper Cretaceous sandstone lead and three Eocene channel/fan complex leads have been recognised. Migration of hydrocarbons into the reservoir is likely to be the principal risk for the Eocene play due to the uncertainty of distribution of source rocks, and the localised presence of thick Paleogene volcanics.
- Successful sub-basalt imaging is a key enabling technology for exploration of all Paleocene and sub-Paleocene Rockall Basin plays.



**Fig. 8 Thicknesses of sediments accumulated
across the Rockall Basins**
(Kimbell *et al.*, 2005)

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