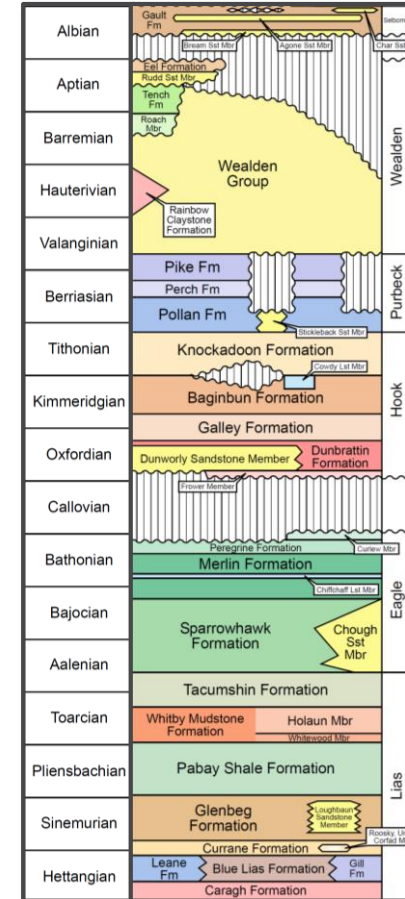


# A new standard lithostratigraphic framework for offshore Ireland

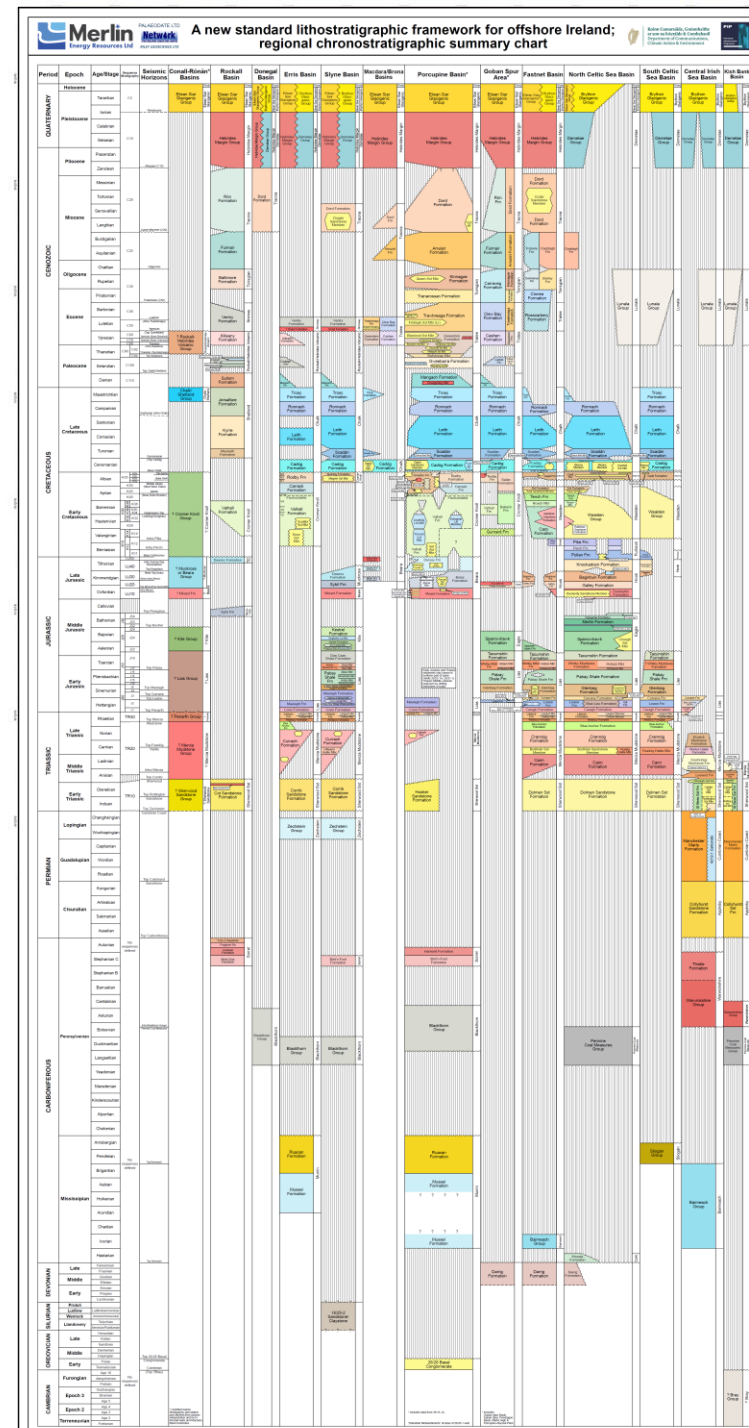
Copestake, P.<sup>1</sup>, Ainsworth, N. R.<sup>2</sup>, Bailey, H. W.<sup>3</sup>, Gallagher, L. T.<sup>3</sup>, Gueinn, K.<sup>4</sup>, Hampton, M.<sup>3</sup>, Lavis, O. M.<sup>1</sup>, Loy, T.<sup>1</sup>, Riley, L. A.<sup>4</sup>, Wright, T. D.<sup>1</sup>

<sup>1</sup> Merlin Energy Resources Ltd, <sup>2</sup> Palaeodate Ltd, <sup>3</sup> Network Stratigraphic Consulting Ltd, <sup>4</sup> Riley Geoscience Ltd



# Background

- The efficient exploration of the Irish offshore region requires a standard stratigraphic scheme that all companies, researchers and regulators can use
- Despite the long history of hydrocarbon exploration in offshore Ireland (the first offshore well was drilled in 1970), no standard lithostratigraphy scheme has ever been previously defined
- Today we present an overview of the new lithostratigraphic scheme which has been developed via PIP project IS16/04
  - By Merlin led stratigraphic consortium (incorporating Palaeodate, Network Stratigraphic Consulting and Riley Geoscience)
  - In association with a specially established Stratigraphy Committee (which includes staff from the PAD), chaired by Prof. P. Shannon
- The new scheme is approved by the PAD for use as a standard across the Ireland offshore area
  - Covers the whole drilled stratigraphic interval from Lower Palaeozoic to Quaternary
- Illustrated in poster at the conference, is available on the PAD stand (memory stick) and is displayed on PAD and Merlin Energy stands
  - Tops provided from 167 conventional wells, 10 shallow boreholes and 20 DSDP/ODP/IODP boreholes.



PALAEODATE LTD

**Network**  
STRATIGRAPHIC CONSULTING LIMITED

**Merlin**  
Energy Resources Ltd

# Outline of new lithostratigraphy

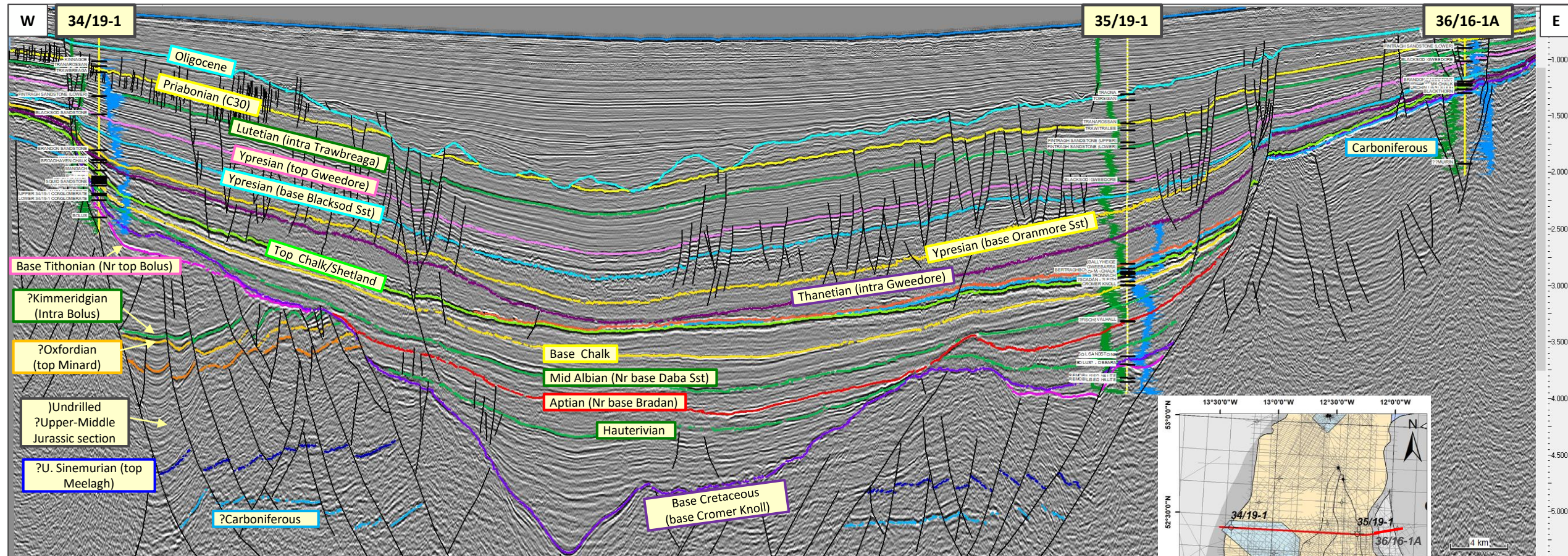
- Around 260 lithostratigraphic units are defined for offshore Ireland, of which around 200 are newly named
  - Naming themes include Irish
    - geographic features (headlands, lakes, bays)
    - fauna & flora (fish, birds, plants, seashells)
    - archaeological features
    - musical instruments
- Existing names are used for units considered contiguous with offshore UK, onshore Ireland and onshore UK.

Note the large number of unconformities (time gaps)





# Integration of new lithostratigraphy with seismic; Porcupine Basin example



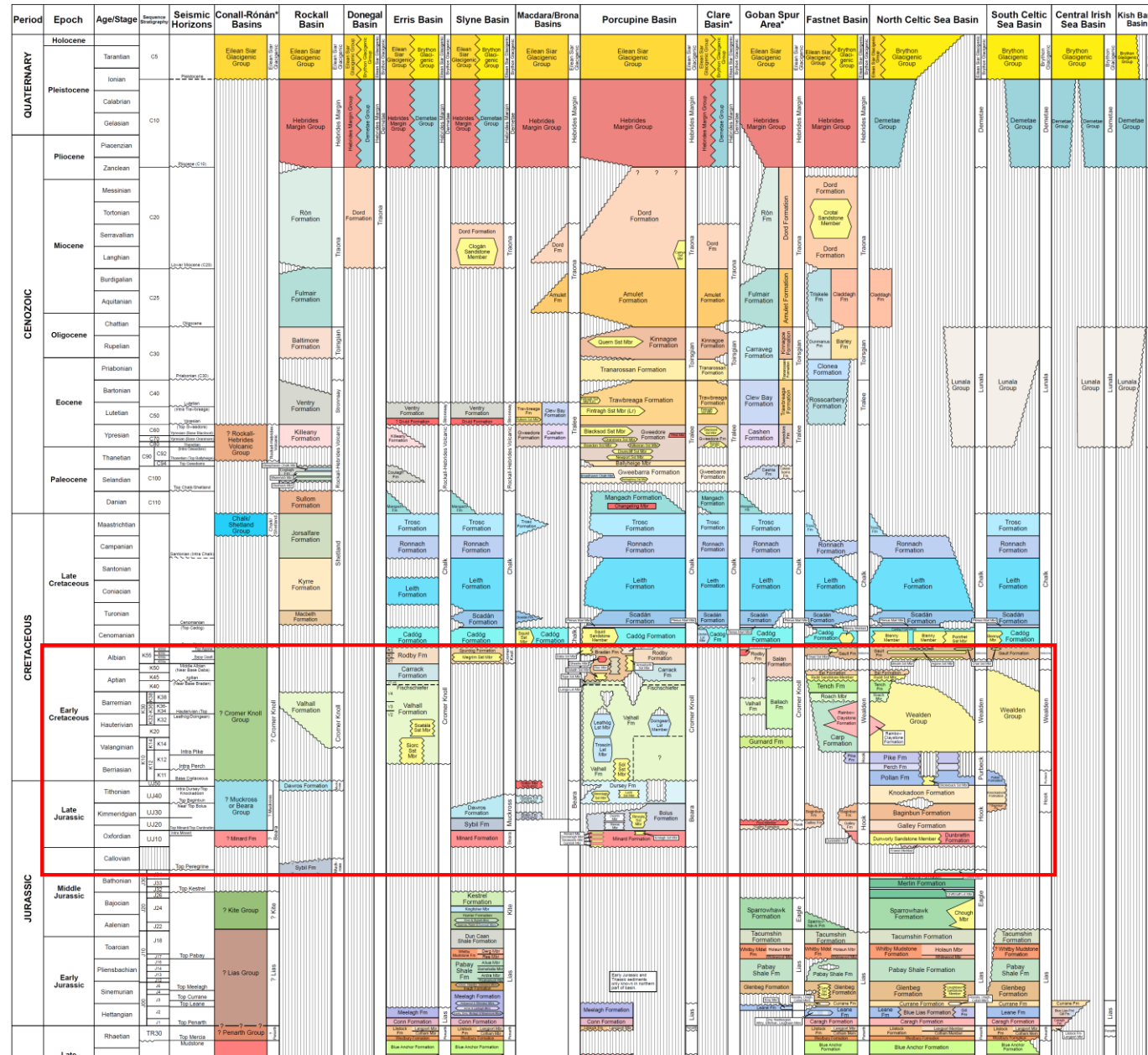
2D seismic line; PW93-304

- New lithostratigraphy has been tied to an extensive seismic database
- 60 seismic horizons interpreted and tied chronostratigraphically



# Take a closer look at two key intervals for hydrocarbon exploration

- Upper Jurassic
- Lower Cretaceous

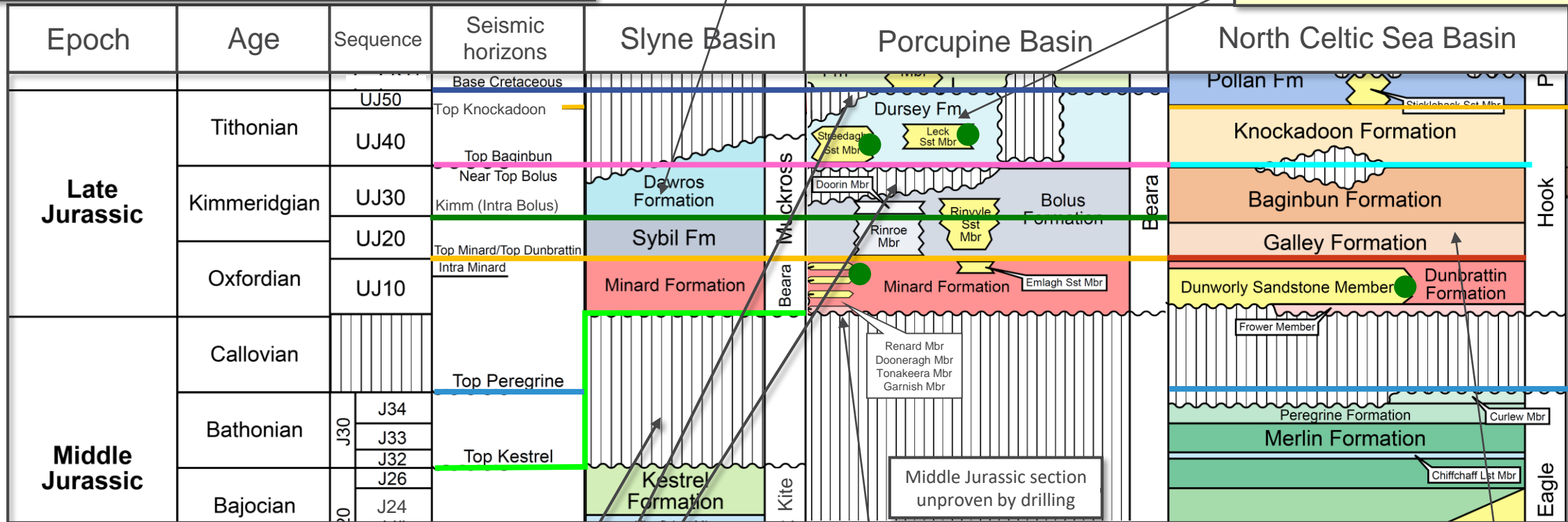


# Summary of new lithostratigraphic scheme for Upper Jurassic of offshore Ireland

- 3 main proven Upper Jurassic depositional areas; Slyne, Porcupine & North Celtic Sea basins
- Completely new nomenclature applied, with variation by basin
- New names based on headlands in S & SW Ireland

- Kimmeridgian-Tithonian marine claystones in Slyne & Rockall basins referred to Muckross Group (Dawros & Sybil Fms).
- Very similar to North Sea Kimmeridge Clay & Heather Fms

- Porcupine Basin; two new formations, Bolus, Dursey
- Tithonian sandstones in northern Porcupine - Streedagh & Leck Sandstone members
- Oil & gas bearing in Connemara & Spanish Point discoveries



● Proven hydrocarbons

5 main seismic horizons west of Ireland

5 seismic horizons Fastnet-North Celtic Sea basins

Seismic horizons form basis of new sequence stratigraphy.

- Several unconformities recognised
- Major unconformity between Upper & Middle Jurassic
- Tithonian/Kimm. boundary
- Base Cretaceous

- Oldest Upper Jurassic represented by fluvial "red beds" in all basins, Oxfordian age
  - Minard Formation west of Ireland
  - Dunbrattin Formation in Celtic Sea
- Contains reservoirs in Connemara Field (Porcupine Basin) & Helvick Discovery (Celtic Sea)
- Lower part of Minard Fm previously allocated to Middle Jurassic

- North Celtic Sea & Fastnet basins; Hook Group, including three new formations above Dunbrattin Formation, Galley, Baginbun & Knockadoon
- Overlain by Purbeck Group (mainly Early Cretaceous)



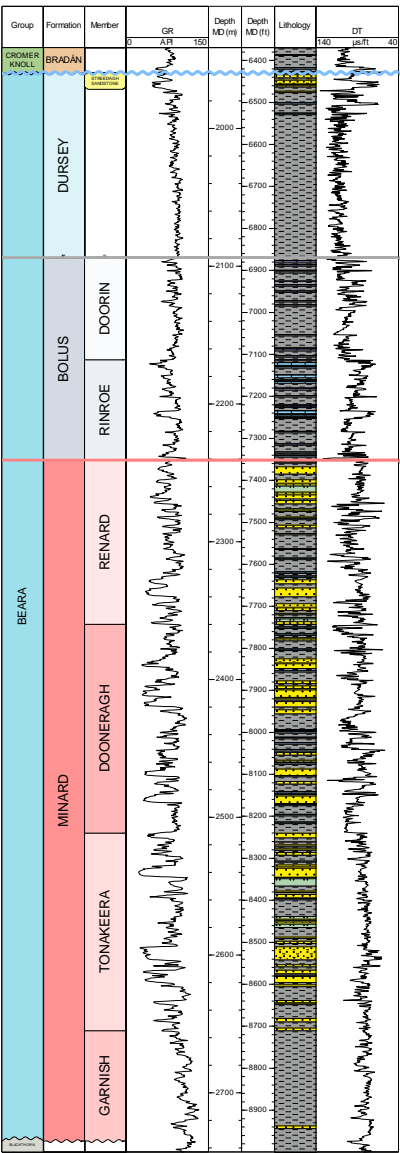
# Upper Jurassic reservoir nomenclature; Connemara & Spanish Point discoveries

Connemara Discovery  
★ 26/28-1

Spanish Point Discovery  
★ 35/8-2

Dursey Fm,  
Streedagh  
Sandstone  
Member

Minard Fm,  
Renard,  
Dooneragh,  
Tonakeera  
members



BEARA GP, DURSEY FM

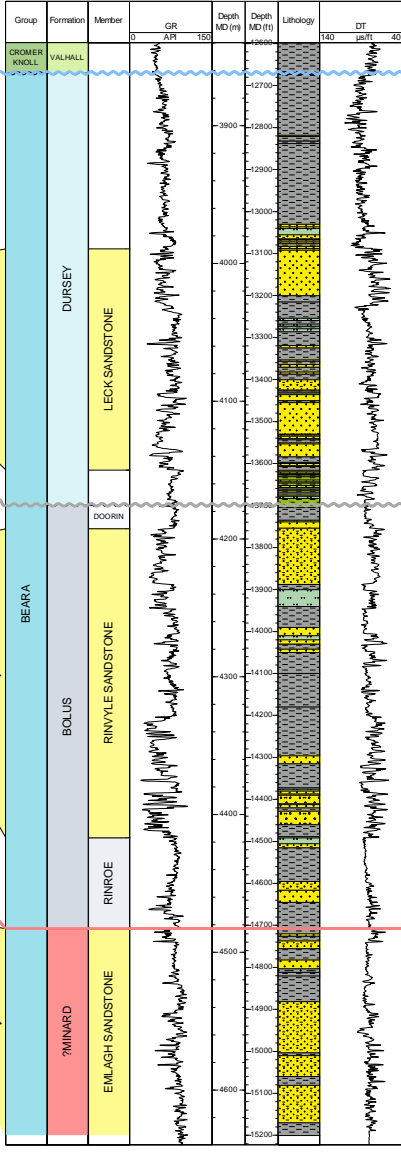
BOLUS FM

MINARD FM

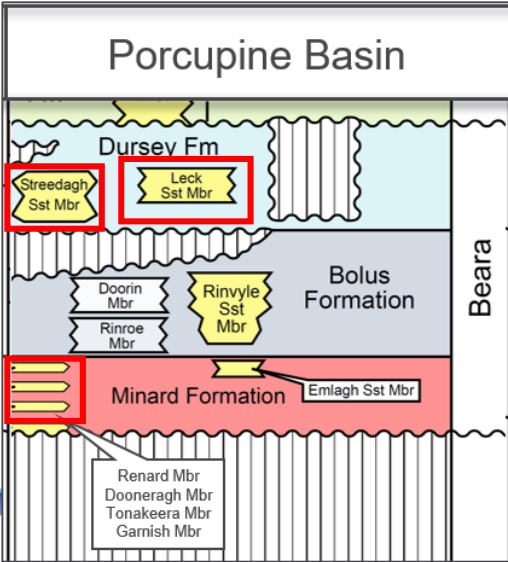
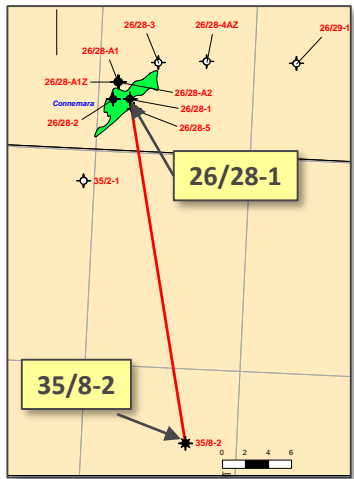
LECK SANDSTONE

RINYLE SANDSTONE

EMLAGH SANDSTONE



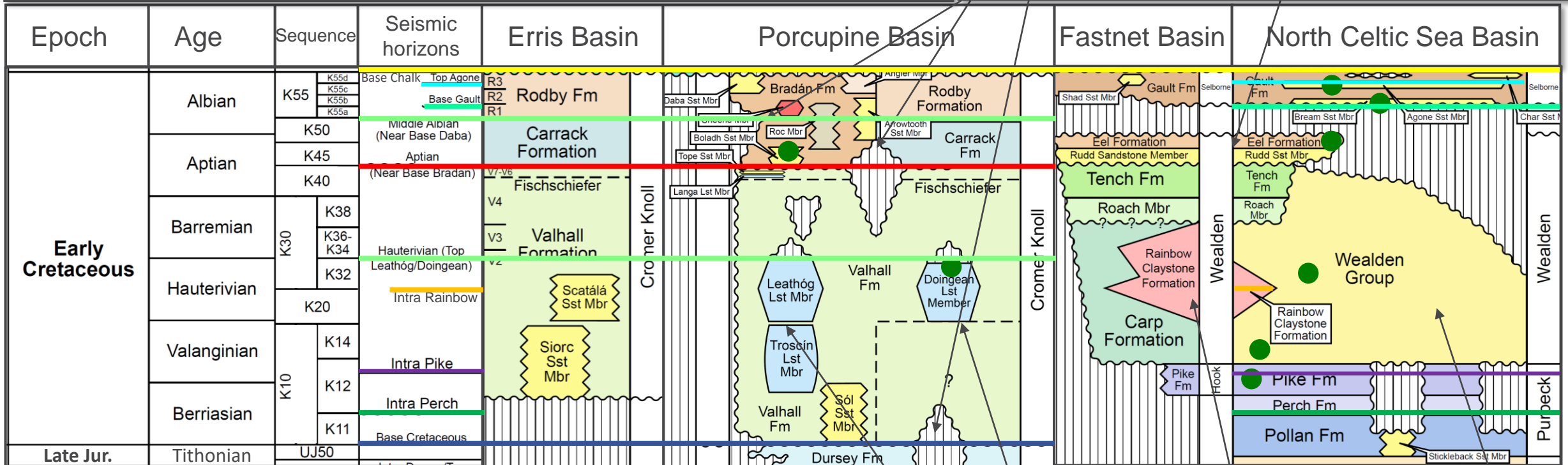
Dursey Fm, Leck  
Sandstone  
Member



# Summary of new lithostratigraphic scheme for the Lower Cretaceous of offshore Ireland

- 4 main proven Lower Cretaceous depositional areas; Erris, Porcupine, Fastnet & Celtic Sea basins
- UKCS names partially applied west of Ireland (group & fms); e.g. Cromer Knoll Gp, Valhall Fm
  - New names applied to members (sandstones, limestones, lavas, tuffs)
- UK onshore nomenclature applied in Fastnet & Celtic Sea basins (group & fms); new member names
- New units are named after fish native to Irish waters

- Several unconformities identified
- “Base Cretaceous” west of Ireland slightly different age to “Berriasian (Intra Perch)” in NCSB/Fastnet
- Aptian sequence boundary (base K45) in all areas
- Middle/Late Albian major unconformity, particularly in Celtic Sea



● Proven hydrocarbons

5 main seismic horizons west of Ireland

5 seismic horizons Fastnet-North Celtic Sea basins

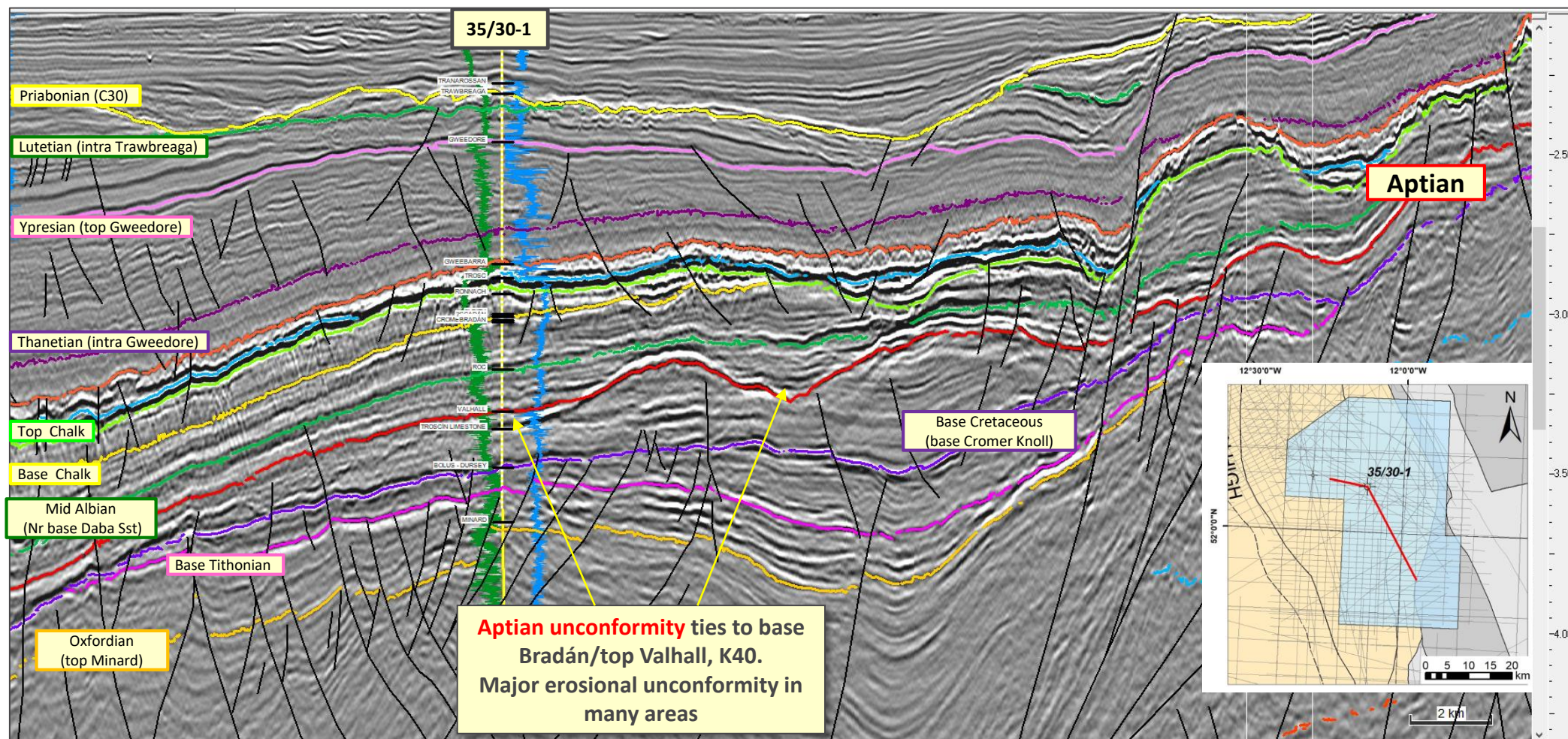
- 5 main phases of sandstone deposition west of Ireland
- Most common is Late Albian shallow marine sandstone (Daba Sandstone Member) in Porcupine Basin
- Aptian Boladh Sandstone Member oil bearing in Burren Discovery

- Carbonates on intra basinal highs; Hauterivian-Berriasian
- Oil bearing in Dunquin (44/23-1)

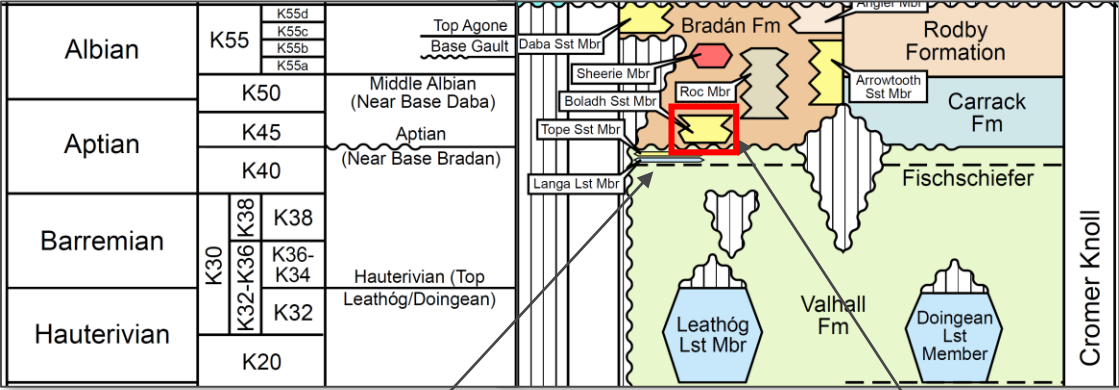
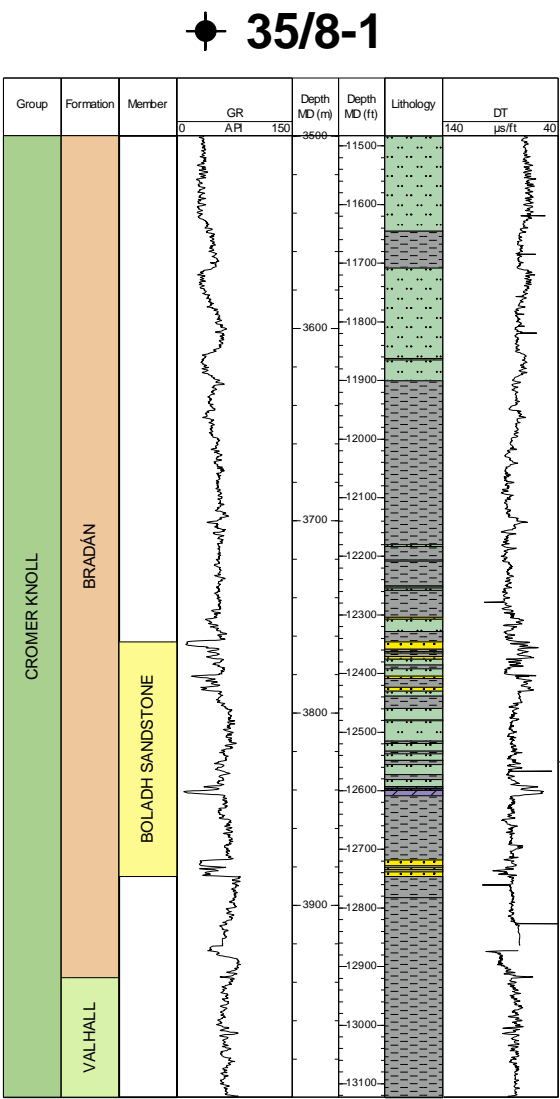
- North Celtic Sea & Fastnet basins; Purbeck Group, Wealden Group & Selborne Group
- Subdivisions of Wealden into formations possible in Fastnet and southern part of NCSB, but not further north
- Wealden is hydrocarbon bearing at several levels
- Selborne Group (Gault Fm) contains reservoirs in several fields in NCSB, in Bream & Agone Sandstone Members
- Purbeck Group subdivided into three new formations



# Aptian unconformity in Porcupine Basin, 35/30-1 area

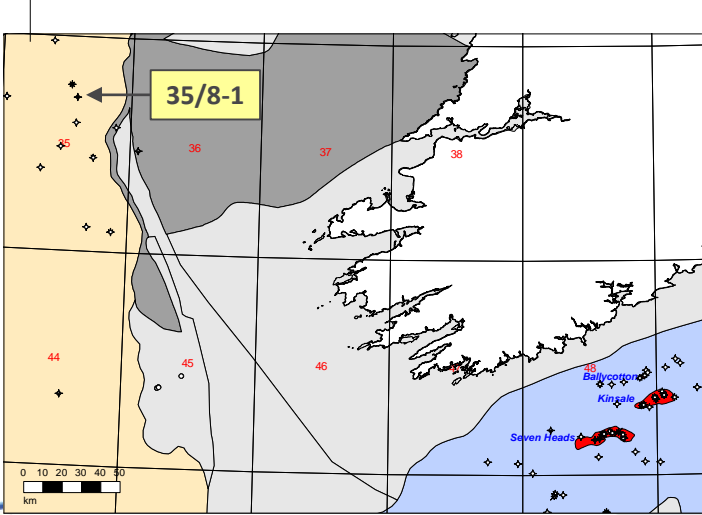


# Lower Cretaceous reservoir nomenclature; Burren Discovery



Boladh Sandstone in 35/8-1 is the only sandstones seen at this level to date

Boladh Sandstone Member, Bradán Formation Age; Late Aptian-Early Albian

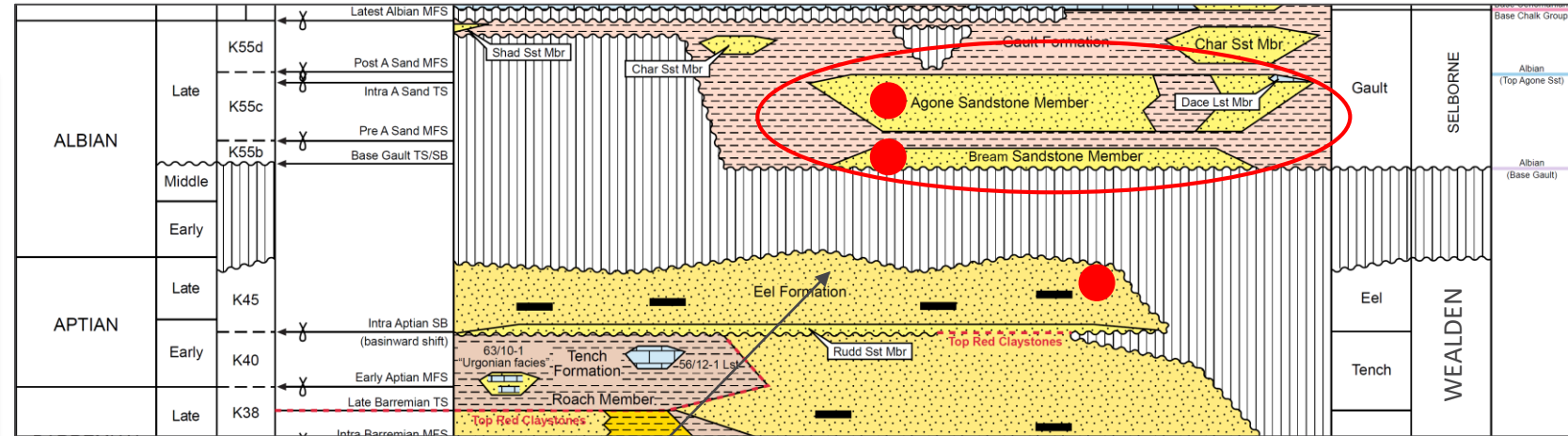
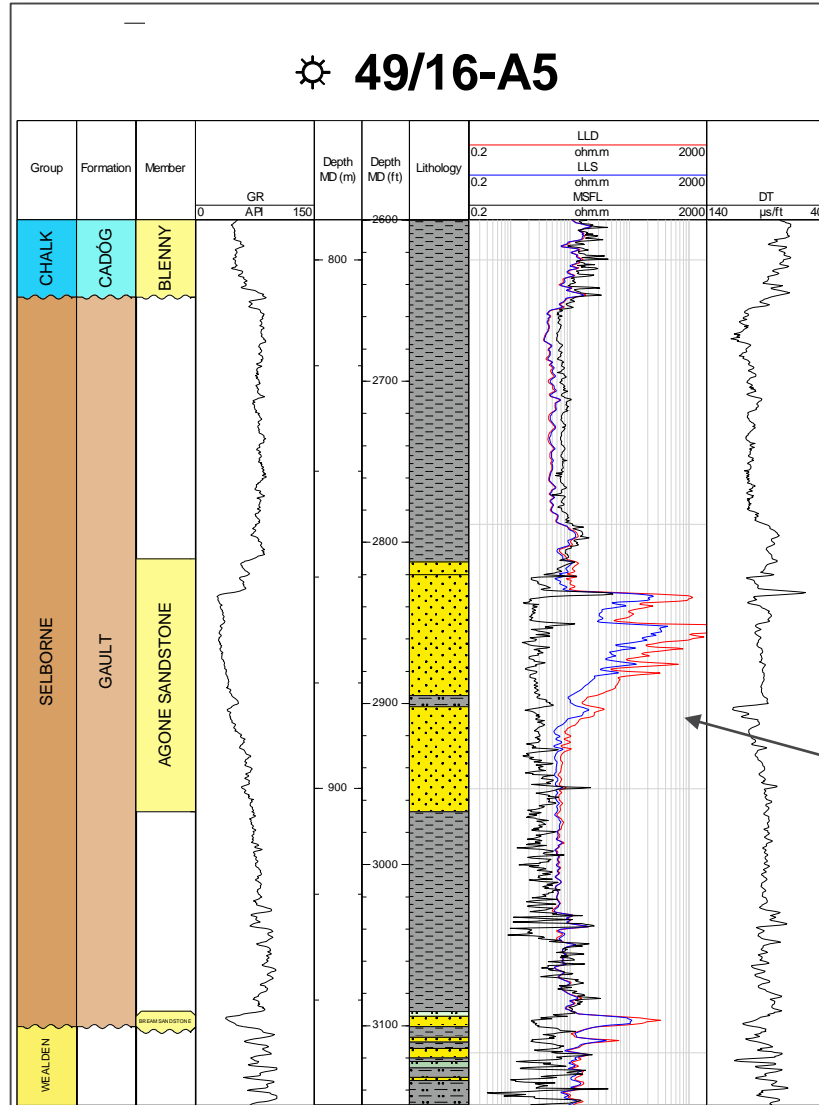




# Lower Cretaceous reservoir nomenclature, North Celtic Sea Basin; Kinsale Field

## Kinsale Field

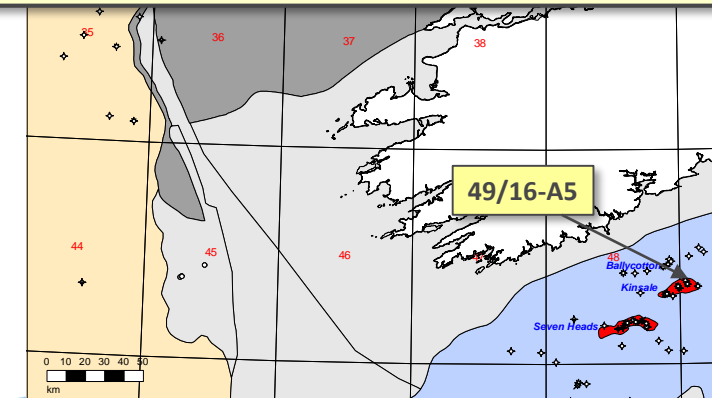
☀ 49/16-A5



Proven hydrocarbons

Agone Sandstone & Bream Sandstone members, Gault Formation. Formerly known as A Sand and B Sand Age; Late Albian

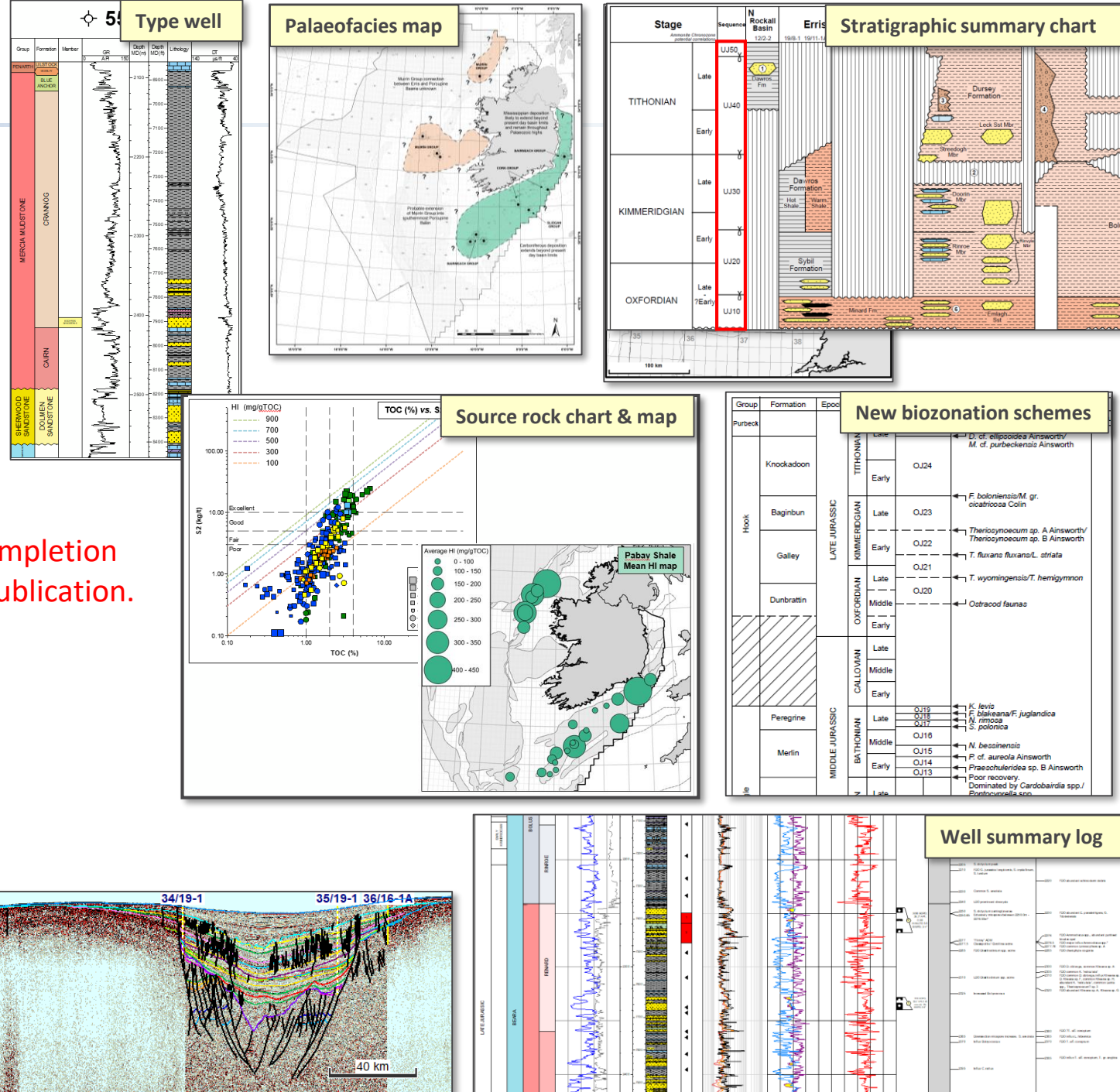
- Agone & Bream sandstones are reservoirs in several fields & discoveries in the basin, e.g. Kinsale, SW Kinsale, Old Head of Kinsale, Midleton, Carrigaline, Galley Head, Schull & Ballycotton
- Eel Formation is hydrocarbon reservoir in Seven Heads (48/24), 57/9-1 Discovery
- In addition to several reservoir levels within undifferentiated Wealden Group in several other accumulations
- Lowermost Cretaceous, Purbeck Group is also hydrocarbon bearing e.g. in Ram Head Discovery (49/13-1)



# Documentation of the new scheme

- Will be described in the the IS16/04 project report/atlas, which is currently being compiled and will contain:-
  - Descriptions of all the offshore Ireland lithostratigraphic units illustrated with type & reference wells, distribution maps, palaeofacies maps
  - Stratigraphic summary charts
  - Regional seismic lines
  - Well summary logs for each well and borehole with new stratigraphy
  - New biozonation schemes
  - Source rock intervals & maps (tied to the new stratigraphy)

The main volume of the atlas will be publicly released on completion and the new scheme will be documented in a PAD Special Publication.



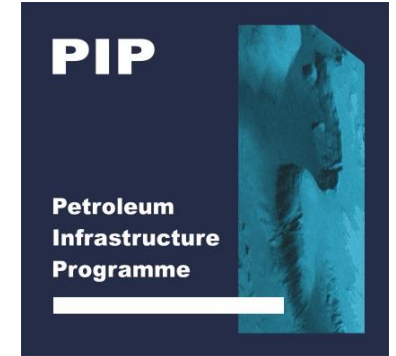


# Acknowledgements

- We thank the Petroleum Affairs Division (PAD) (of the Department of Communications, Climate Action & Environment), and PIP for support and permission to present the project



**Roinn Cumarsáide, Gníomhaithe  
ar son na hAeráide & Comhshaoil**  
Department of Communications,  
Climate Action & Environment



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# Thank you for listening

