

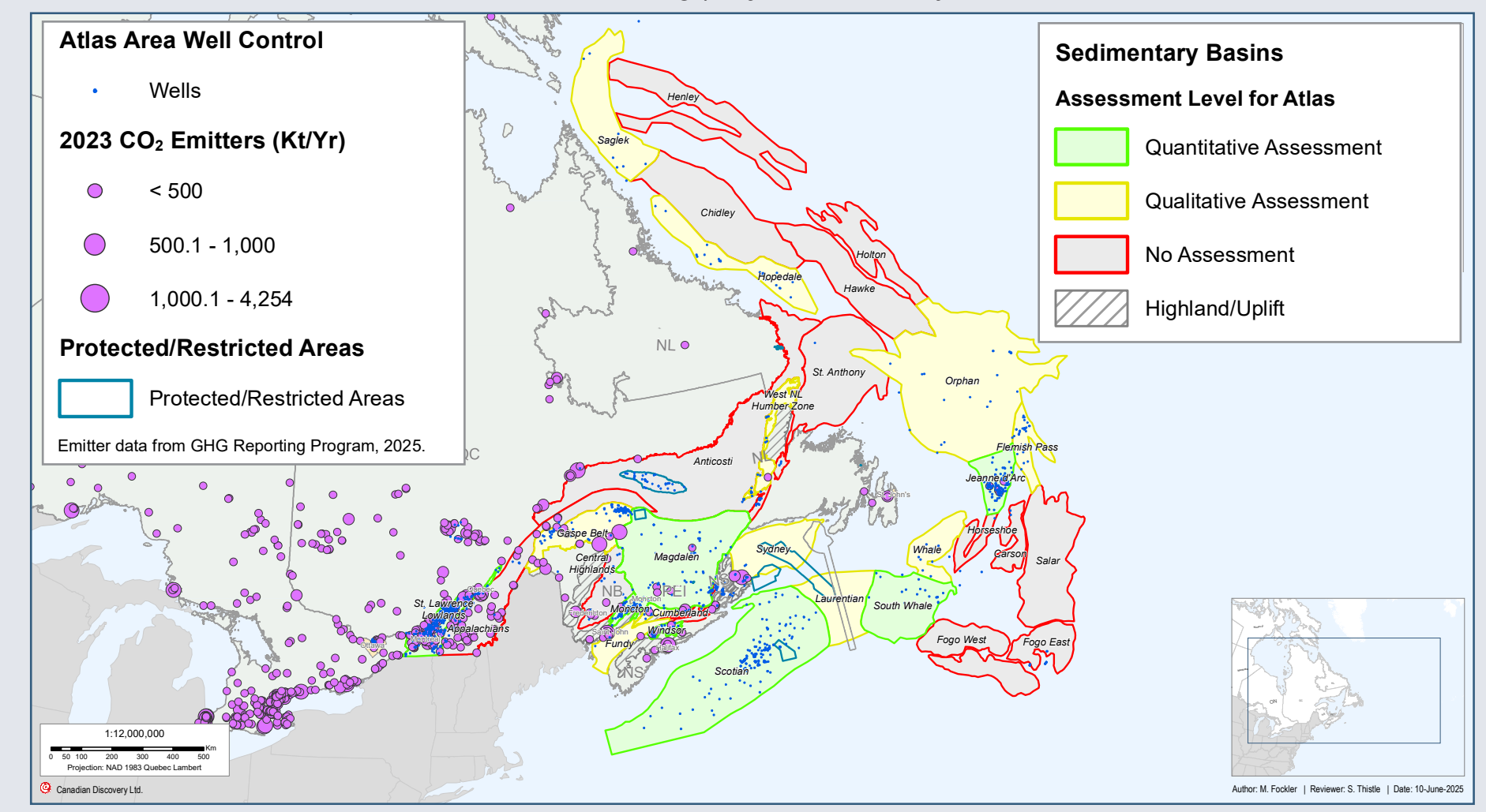
1 Purpose and Scope

Purpose & Scope: Provide a regional evaluation of Geological Carbon Storage (GCS) potential (storage volumes, risks, & costs) across deep saline aquifers and depleted reservoirs in Eastern Canada (Quebec and Atlantic Canada), and offer a unified comprehensive reference to support transparent, informed decision-making.

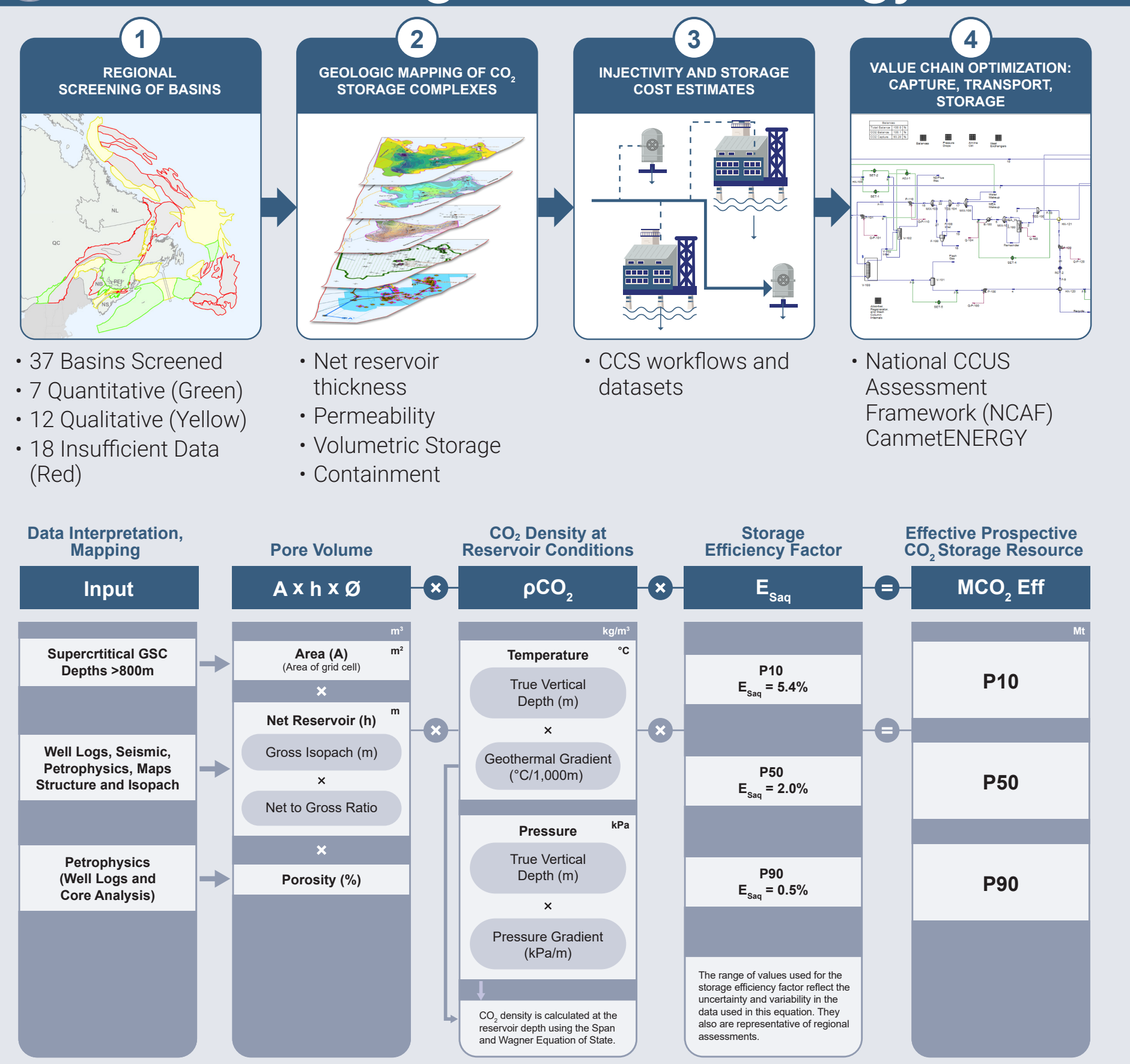
Approach: The Atlas consolidates and utilizes existing subsurface data and publications to create high-quality maps, datasets, and geological interpretations to help stakeholders rapidly identify the most favourable, highest-quality storage reservoirs.

Intended Users:

- CO₂ emitters and storage project developers seeking viable storage sites.
- Regulators, governments, Indigenous groups, municipalities, NGOs, and the public evaluating CCS proposals.
- Investors or financial institutions assessing project feasibility and risk.



2 Screening and Methodology



4 Quantitative Basin Summary Table

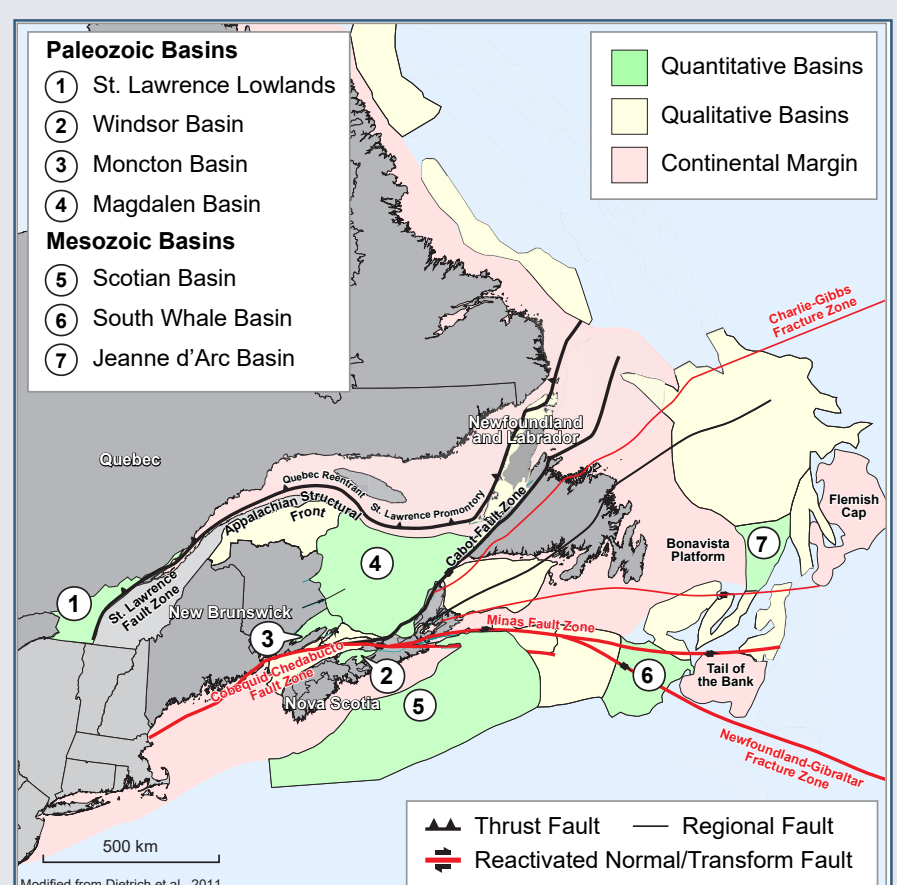
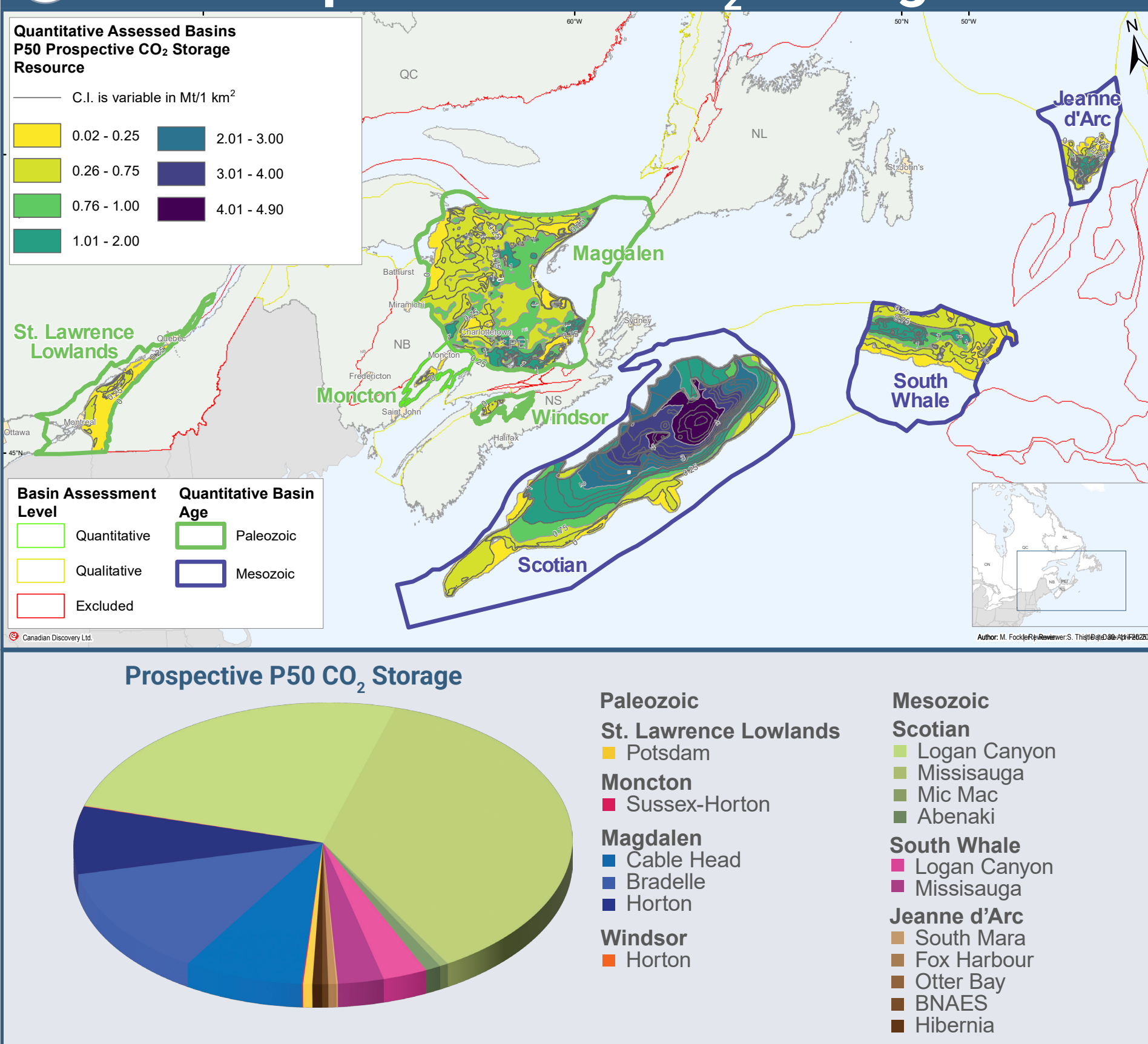
Basin	Storage Target	(M)			Regional Seal Potential	Porosity (%)		Permeability (mD)		Depth (m)	Net Sand Thickness (m)	
		P10 (E _{sec} = 5.4%)	P50 (E _{sec} = 2.0%)	P90 (E _{sec} = 0.5%)		Range	Average	Range	Geomean		Range	Average
Paleozoic Basins	St. Lawrence Lowlands	3,798	1,407	352	Moderate (Potential faulting)	1-8	5	0.1-0.4	0.2	800-4,085	1-1,383	300
	Moncton	439	163	41	Moderate (Potential faulting)	3-7	5	< 0.1-0.2	0.1	805-2,759	3-1,554	423
	Cable Head	50,012	18,523	4,631	Low (Sandy)	4-14	10	< 0.1-3.8	0.4	800-3,772	1-773	250
	Magdalen	82,215	30,450	7,613	Moderate	2-13	7	< 0.1-3.1	0.1	800-3,995	30-1,742	510
	Horton	38,142	18,612	3,532	Moderate	2-15	8	< 0.1-8.5	0.1	800-3,998	1-1,249	372
Mesozoic Basins	Windsor	469	185	46	Good	2-5	3	< 0.1-0.1	0.1	800-1,893	304-748	515
	Logan Canyon	162,222	60,082	15,020	Good	9-30	23	0.2-424	46	800-4,200	4-913	335
	Mississauga	238,977	88,510	22,127	Moderate	13-19	17	1.3-20	9	1,012-5,070	77-966	488
	Mic Mac	3,612	1,337	334	Moderate	10-12	11	0.3-1.2	0.6	2,804-4,242	1-224	101
	Abenaki	6,409	2,373	539	Good	6-28	10	0.4-50	1.1	1,028-3,610	4-510	92
	Logan Canyon	18,454	6,835	1,709	Good	7-24	16	0.1-59.8	4.1	1,350-5,089	1-237	123
	Mississauga	19,111	7,078	1,769	Moderate to Good	7-19	13	0.1-15.7	1.1	1,958-6,800	1-1,030	249
	South Mara	580	215	54	Good	15-28	21	29-712	216	1,333-2,718	1-204	58
	Fox Harbour	1,055	391	98	Good	23-33	29	208-2,543	2,168	800-1,890	0-136	58
	Otter Bay	2,285	846	212	Good	21-33	29	141-2,463	1,446	800-2,060	14-225	95
Jeanne d'Arc	BNAES	2,533	938	235	Good	6-26	16	0.1-1,005	9.4	1,065-4,922	1-923	203
	Hibernia	4,028	1,492	373	Good	6-21	14	0.1-1,163	42	949-5,454	3-552	240

Colour-coded storage favourability: green generally favourable conditions, yellow highlights areas of uncertainty requiring further evaluation, and red marks zones unsuitable for storage due to significant risks such as very low permeability. Mt = megaton = million tonnes

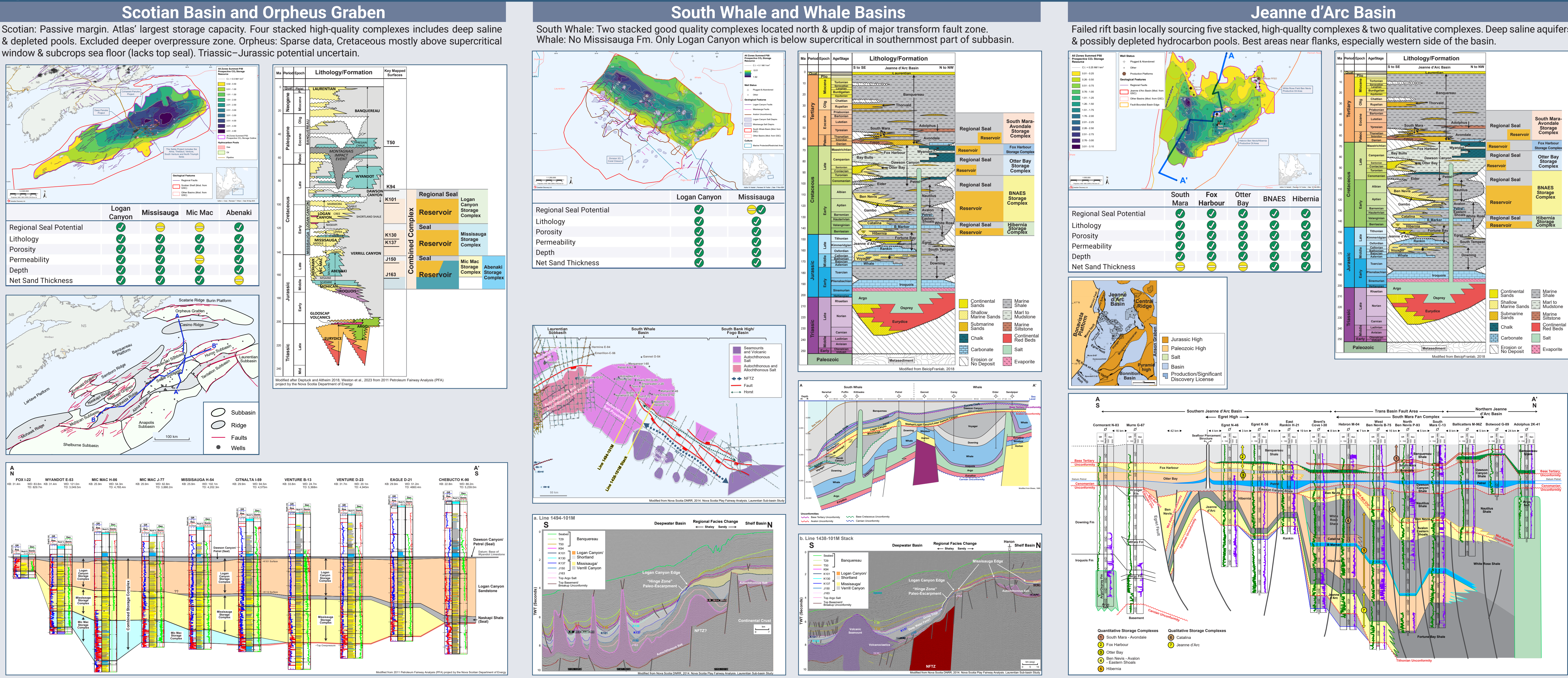
3 Geological Overview

Paleozoic basins evolved through the opening and closure of the Iapetus Ocean and successive Appalachian orogenies, transitioning from early passive margins to foreland, rift, and sag basins (Magdalen, Moncton, Windsor, Cumberland, Sydney), characterized by thick sedimentary successions, evaporites, coal deposits, and complex fault-controlled basin geometries.

Mesozoic basins formed during the break-up of Pangaea and northward opening of the Atlantic Ocean, beginning with passive margin development on the Scotian Shelf, widespread Argo Salt deposition, and extensive provenance and paleo-drainage systems supplying thick sedimentary successions across the Scotian to South Whale basins. Major Transform Fault Zones (e.g., Newfoundland-Gibraltar, Charlie-Gibbs) and failed rifting on the Grand Banks (Jeanne d'Arc, Flemish Pass, Orphan) were followed by Late-Early Cretaceous uplift that sourced sediments from localized highs, while Cenozoic rifting opened the Labrador Sea, forming the Saglé and Hopedale passive-margin basins.

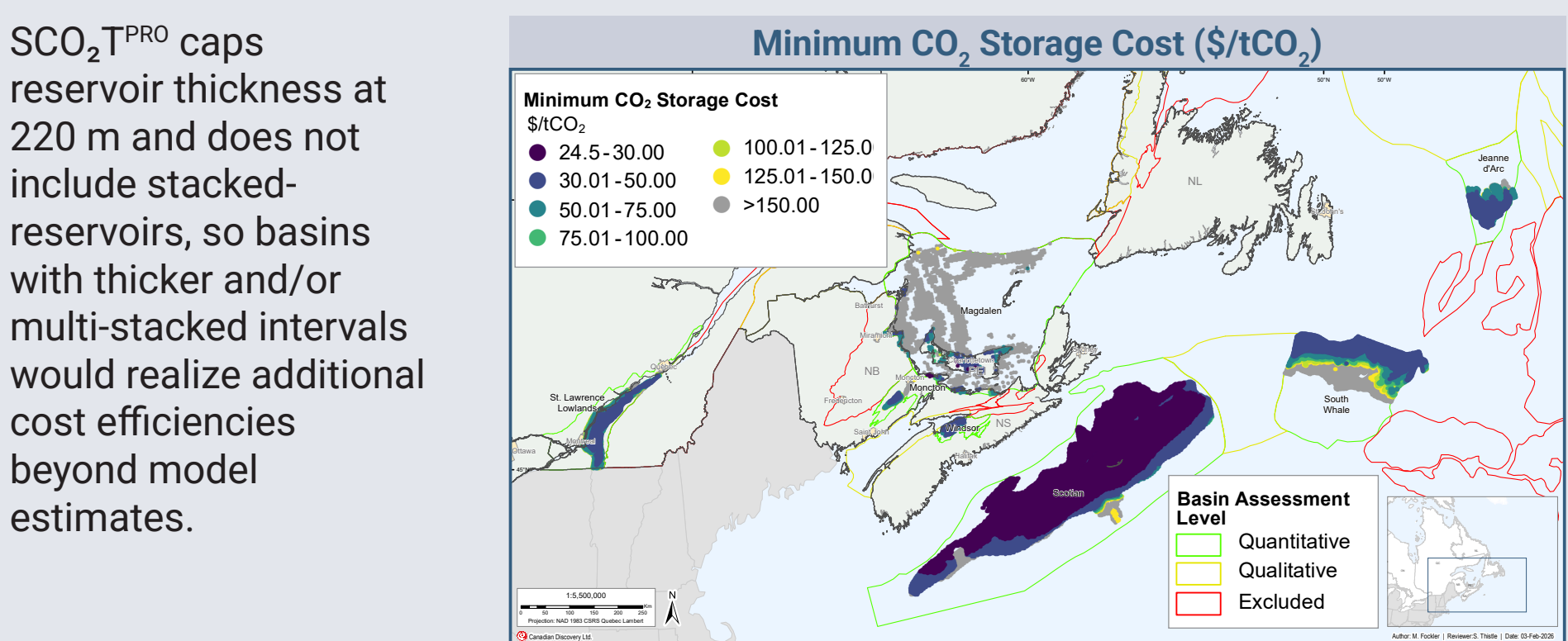
5 Prospective P50 CO₂ Storage

6 Mesozoic Basin Summaries



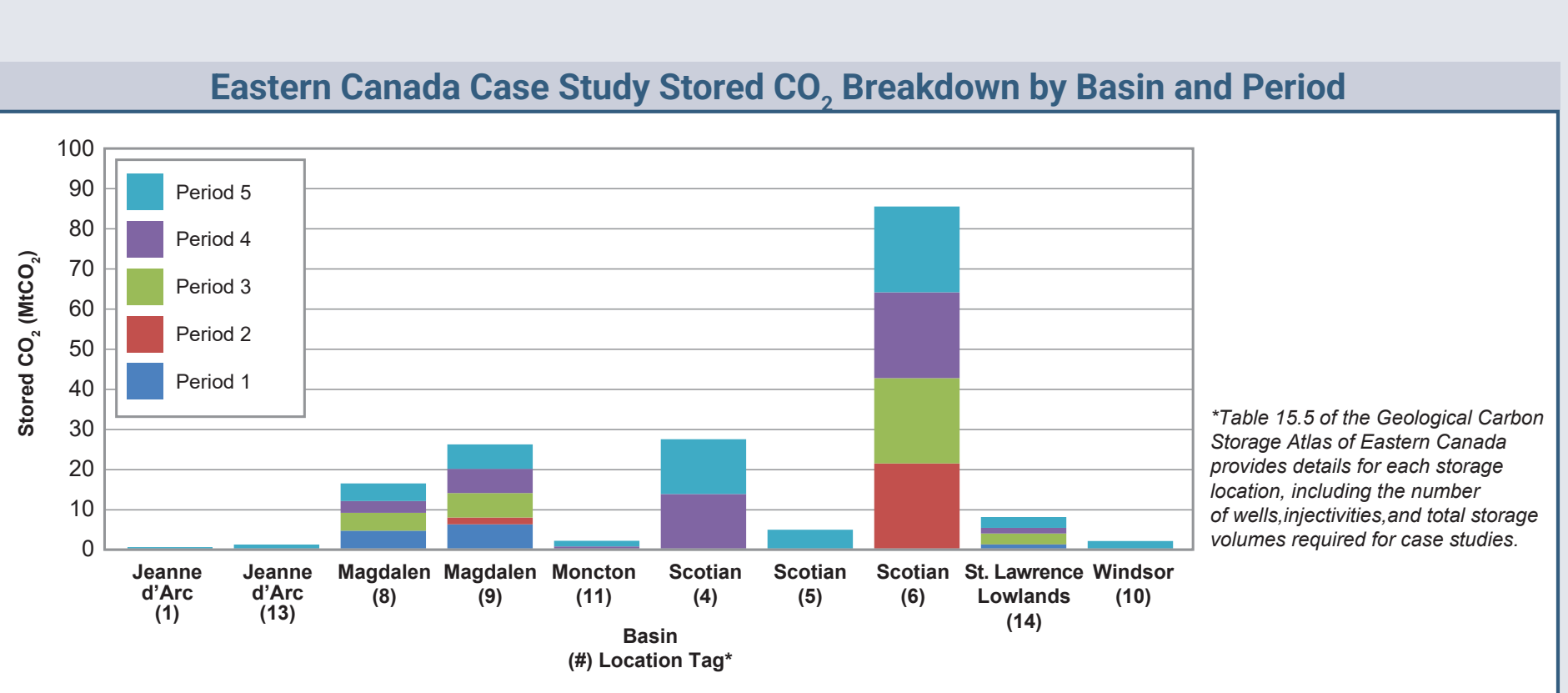
7 Cost Summary

CO₂ storage costs were estimated using SCO₂T^{PRO}, which integrates geological maps and prospective storage resource data to calculate both capital and operating costs per tonne of injected CO₂. Costs are lowest in basins with thick, high-quality reservoir intervals, particularly the Scotian, South Whale, and Jeanne d'Arc basins, while deeper, thinner, or lower-permeability formations (e.g., Lowlands, Windsor, & Moncton basins) drive costs upward. Most viable storage opportunities fall within the \$20-50/tCO₂ range, with costs above \$150/tCO₂ considered uneconomic. The Scotian Basin stands out for combining the highest storage resource per km² with the lowest estimated costs. For offshore Newfoundland, well & facility costs were increased by 50% to reflect historically higher development costs associated with the region's more challenging offshore environment.



8 Economic Case Study Summary

The Atlas's geological, storage-resource, and cost data were integrated into NRC's CanmetENERGY National CCUS Assessment Framework (NCAF) to model end-to-end CCS system costs and infrastructure pathways. Two case studies ("Nova Scotia" and "Eastern Canada") evaluated multi-modal CO₂ transport (pipeline, rail, and ship) over a 30-year project life, optimizing capture, transport, and storage costs across five six-year time periods. Results show how CCS networks may evolve over time, with capture representing ~70% of total costs, and transport/storage choices strongly influenced by project phasing; slower CO₂ ramp-up favours rail and onshore storage, while larger volumes shift toward pipeline networks and offshore sites.



9 The Path Forward

The findings of this Atlas demonstrate that Eastern Canada possesses meaningful and geologically credible CO₂ storage potential. While variability exists across the assessed basins, the region presents a viable foundation for CCS development. From smaller, lower quality onshore Paleozoic basins with lower operating costs to larger, high quality offshore Mesozoic basins with thick stacked storage complexes and higher operating costs. Translating this potential into operational projects will require action on several fronts:

- The development of provincial and federal regulatory frameworks for permitting, monitoring, and long term stewardship of CO₂ storage operations
- Collaborations that unlock economies of scale making CCS cost-competitive, shared infrastructure such as pipelines, intermodal transport corridors, and offshore storage hubs that can aggregate emissions across multiple sources.
- Targeted appraisal programs to advance the most prospective storage complexes to site-level characterization.
- Sustained, transparent, and genuinely inclusive engagement with Indigenous communities, local governments, environmental stakeholders, and the broader public to develop CCS's social license.

Download the Atlas

<http://cdl.canadiandiscovery.com/atlas-csec>

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