Landscape Ecology and EA in Ontario:

Bridging Gaps in Biodiversity Assessment

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Biodiversity and EA

- "Biodiversity loss – which is caused by development and habitat destruction, climate change, invasive species, hunting and pollution – is one of the most critical environmental problems facing the planet." (Environmental Commissioner of Ontario)
- "As our ability improves to inventory, describe and understand the components of biodiversity, better information will be available to enhance the effectiveness of environmental assessments." (Canadian Biodiversity Strategy, 1995)

Landscape Ecology

- Landscape ecology studies the relationships between pattern and processes, of how habitat structure and function change in response to changes in land use, and of the corresponding response of biodiversity.

Landscape Ecology in EA

Are EAs missing information that could enhance their effectiveness with respect to biodiversity?

- To what extent is landscape ecology expressed in EA in Ontario?
- How are landscape ecology concepts represented?
- Where are there gaps between the science of landscape ecology and the practice of EA?

Indicators Framework

Landscape Ecology Theme	Potential Key Concepts in EA
1. Habitat amount The primary driver of biodiversity	• Total habitat area • Patch sizes • Habitat targets and thresholds
2. Composition Landscape composition and diversity are important biodiversity determinants	• Habitat types • Distribution (abundance, evenness) of habitat types • Unique landscape features

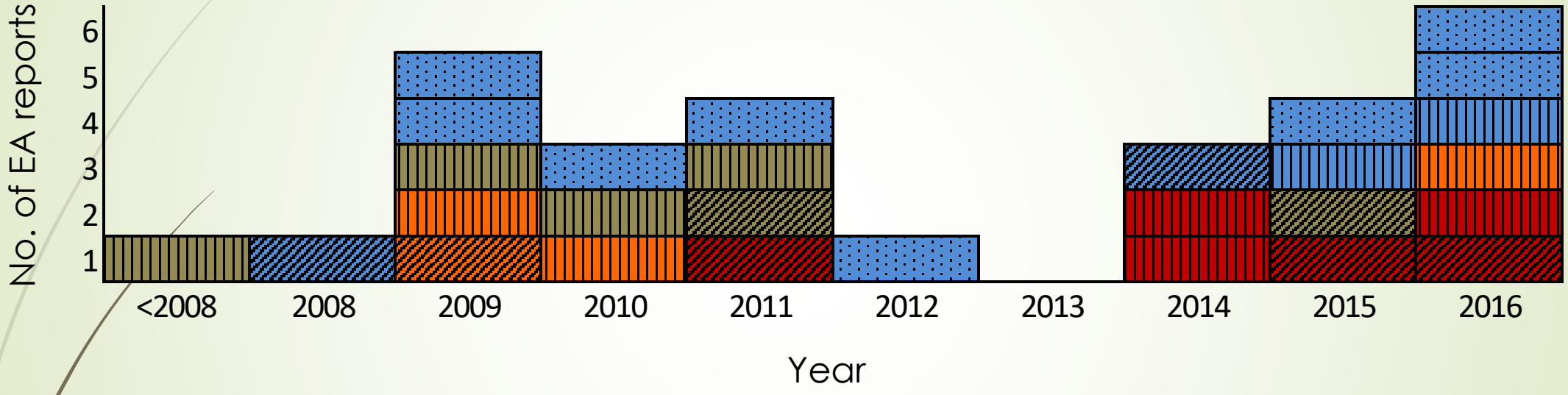
Indicators Framework

Landscape Ecology Theme	Potential Key Concepts in EA
3. Context Influences local habitat quality and ability to maintain biodiversity	• Matrix quality • Landscape permeability • Linear feature density
4. Configuration The spatial organization of habitats in a landscape can be important to maintaining biodiversity in highly altered landscapes	• Habitat connectivity • Fragmentation • Spatial arrangement of habitat types

Content Analysis

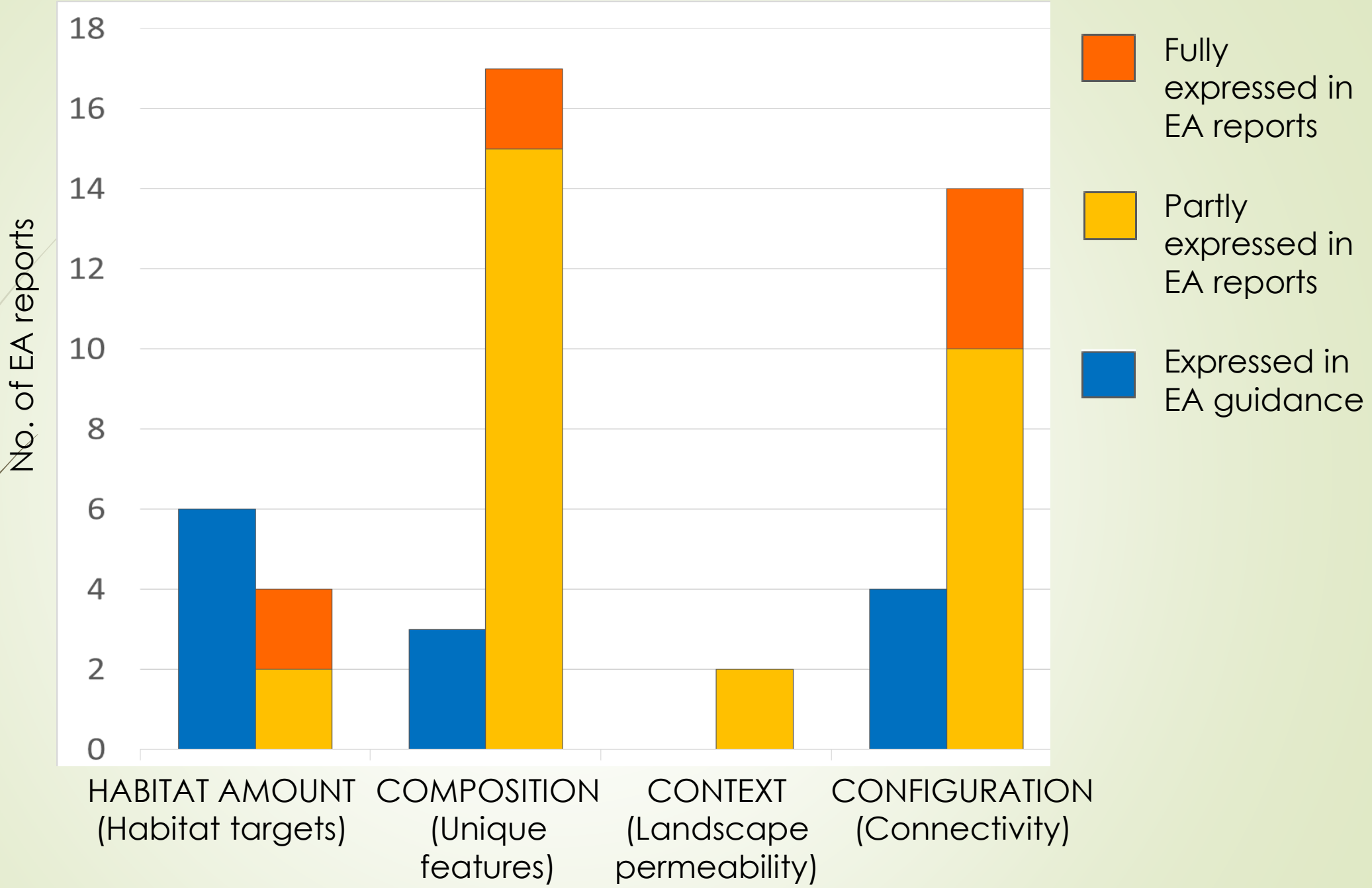
- 14 EA policy and guidance documents
- 28 EA reports for projects located in Ontario (2007-2016)
  - Federal, provincial, and municipal (City of Ottawa) reports
  - Mining, hydro and transmission, transportation, municipal development and infrastructure
  - Evaluated the expression of key concepts

Content Analysis



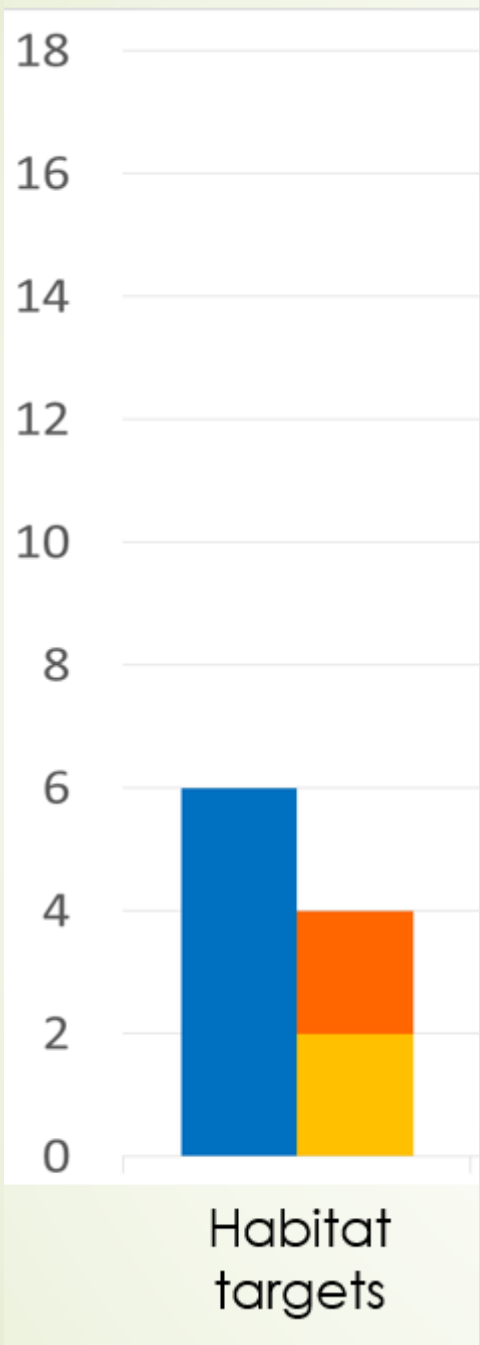
Responsible Jurisdiction
Federal (8)
Provincial (12)
Municipal (City of Ottawa) (8)

Project Sector
Hydro / Transmission (4)
Mining (6)
Municipal Dev't / Infrastructure (12)
Transportation (6)


No. of EA reports
18
16
14
12
10
8
6
4
2
0
HABITAT AMOUNT (Habitat targets)
COMPOSITION (Unique features)
CONTEXT (Landscape permeability)
CONFIGURATION (Connectivity)
Fully expressed in EA reports
Partly expressed in EA reports
Expressed in EA guidance

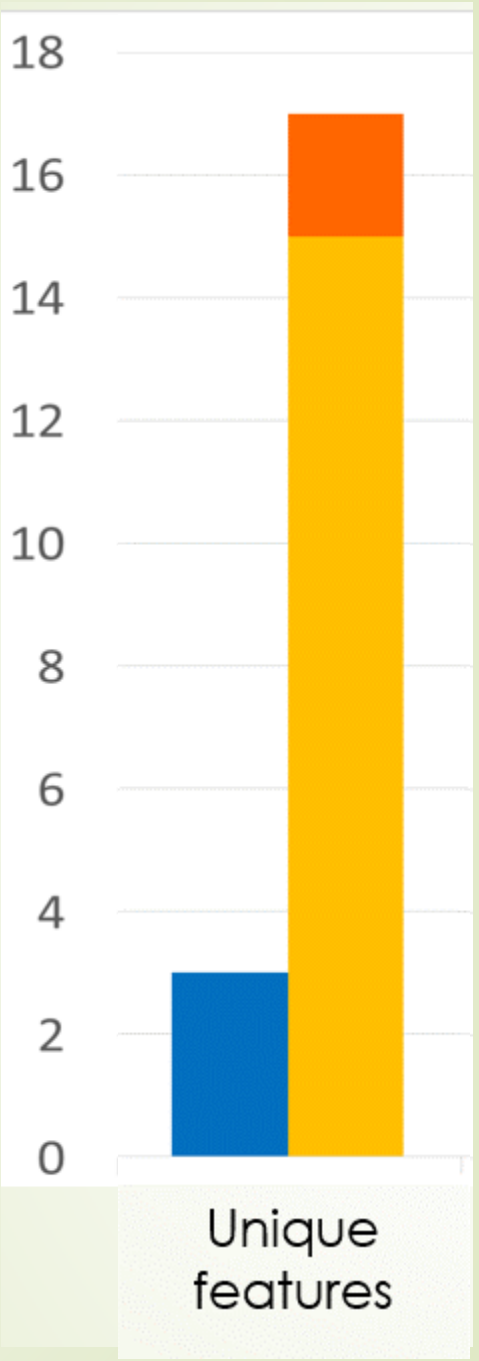
1. Habitat Amount

- A critical variable in biodiversity conservation
- Habitat targets and thresholds
  - Represented in 6 of 14 EA guidance documents, but only 4 of 28 EA reports
- Lack of knowledge of regional targets and thresholds for habitat amounts in these areas?



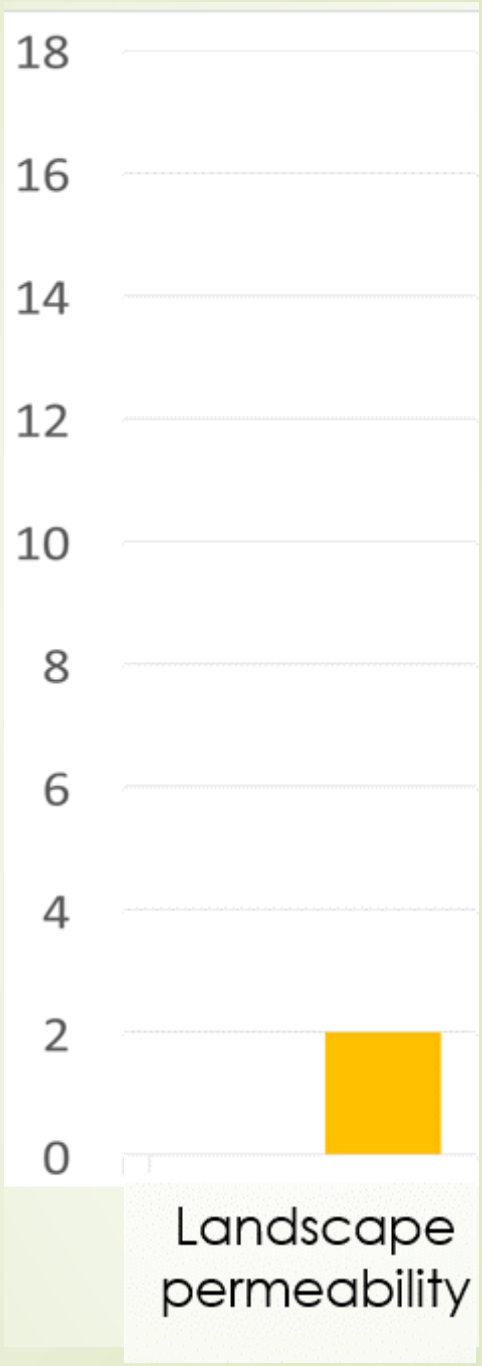
2. Composition

- Unique landscape features
  - Represented in 3 of 14 EA guidance documents, and at least partly in 17 of 28 EA reports
- Information on these areas is often easily available
- One part of the picture of landscape and habitat diversity
  - Yes – very important!
  - But also – is 'common' habitat eroding to the point where area-sensitive species may be lost?



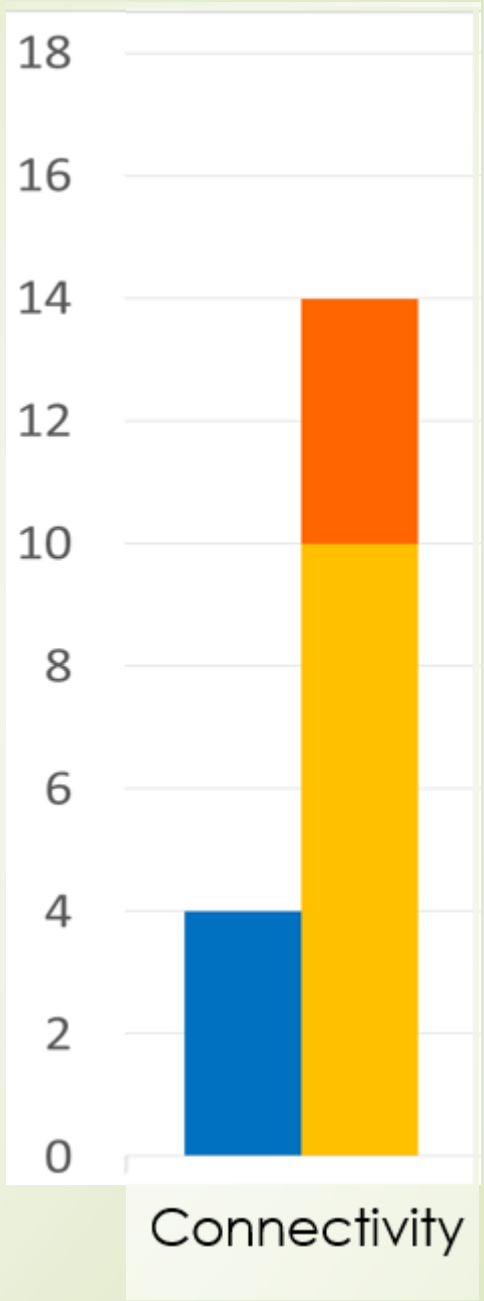
3. Context

- Landscape permeability
  - Not expressed in the EA guidance and rarely in the EA reports
- Permeability focuses on the ability of the landscape as a whole – including the dominant land use type (the matrix) – to facilitate or impede flows
- The quality of habitat patches depends on their context!



4. Configuration

- Connectivity
  - Relatively well represented in the EA guidance and EA reports
- Quantitative approaches and spatially-explicit analysis are developing, but still rare in the EA reports analyzed



Conclusions

Current capacity of landscape ecology to enhance biodiversity assessment in EA?

1. Context – Role of landscape permeability
2. Habitat amount – Linking to habitat targets
   - Opportunities to link EAs to regional initiatives
3. Configuration – Quantitative expression and spatially-explicit analysis
4. Composition – Representation of unique features within a whole-landscape approach

Open Questions & Future Work

- Strategic questions - Role of landscape ecology in cumulative effects vs. project-specific assessments
- Operational questions – How to assess the contribution of a project to changes in landscape context and permeability
- Practical questions – What are the challenges and opportunities for integrating landscape ecology understanding into EA? And what might landscape ecology learn from EA practice?

Thank you!

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