Review of the Cumulative Effects Assessment undertaken by Manitoba Hydro for the Bipole III Project

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1. Introduction

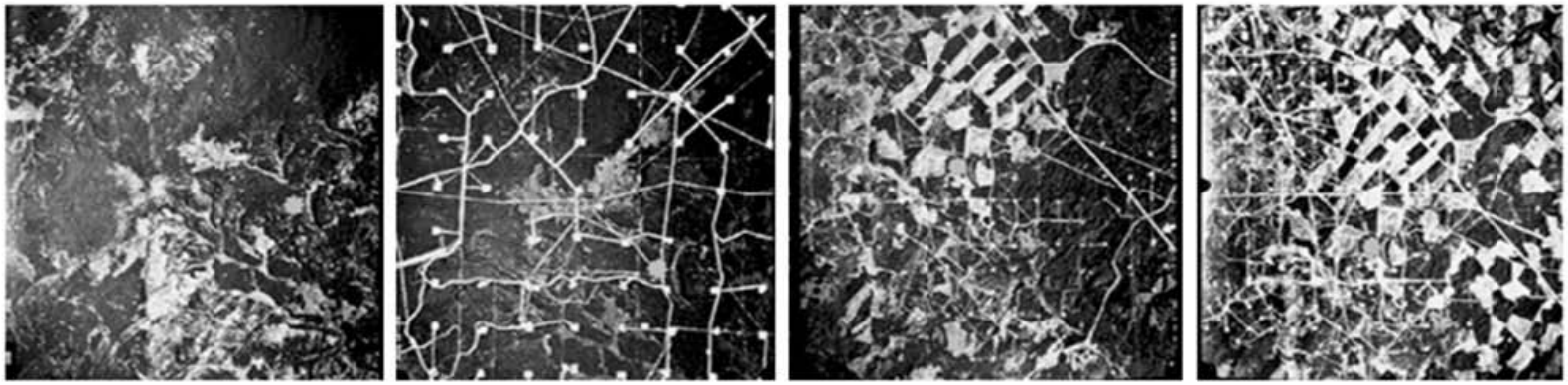
Cumulative environmental effects

"…changes to the environment that are caused by an action in combination with other past, present and future human actions."

CEA Practitioner Guide, adopted by Bipole III EIS

Cumulative environmental effects

- ‘progressive nibbling’
- ‘death by a thousand cuts’
- ‘tyranny of small decisions’



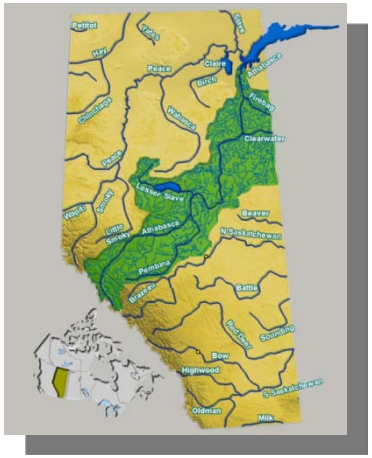
Source: Alberta Sustainable Resource Development

The point?

- Cumulative effects are often ‘unintentional’
- It is <u>easy</u> to dismiss the significance of any <u>single</u> action
- It is <u>impossible</u> to deny the <u>cumulative significance</u> of environmental change

Example: Athabasca River, AB

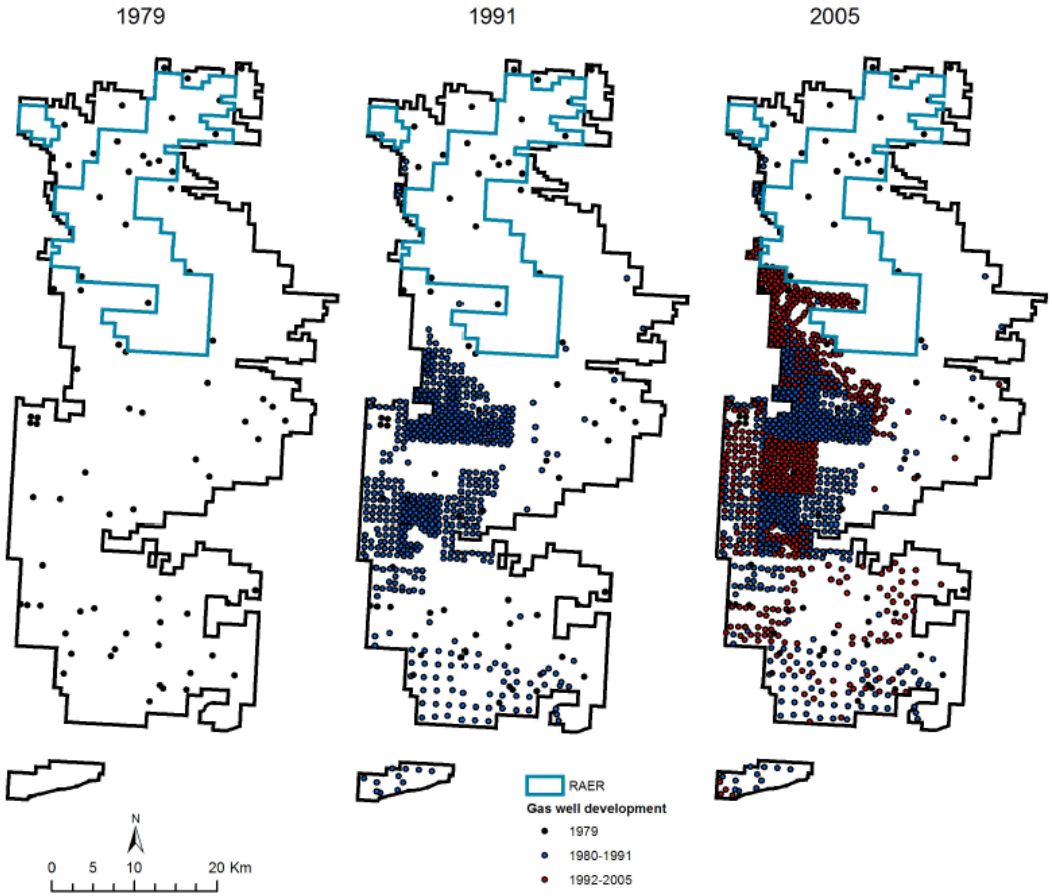
Land-Use	1966-1976	1996-2006
Pulp mills discharging	1	5
Agricultural area (acres)	47,218,170 (1981)	52,058,898 (2001)
Water withdrawal (m^3/year)	12,069,340	595,580,497
Operating oil sands leases	2	3,360



- **Headwater low flow:** 10% decrease over the time period
- **Mouth low flow:** 30% decrease over the time period
- **Temperature:** 1.4C warmer
- **Significant changes:** chloride, sulphate, sodium, dissolved oxygen

Squires A, Westbrook C, and Dubé M 2010. An approach for assessing cumulative effects in a model river, the Athabasca River Basin. *Integrated Environmental Assessment and Management* 6(1): 119-134.

Example: Great Sand Hills, SK



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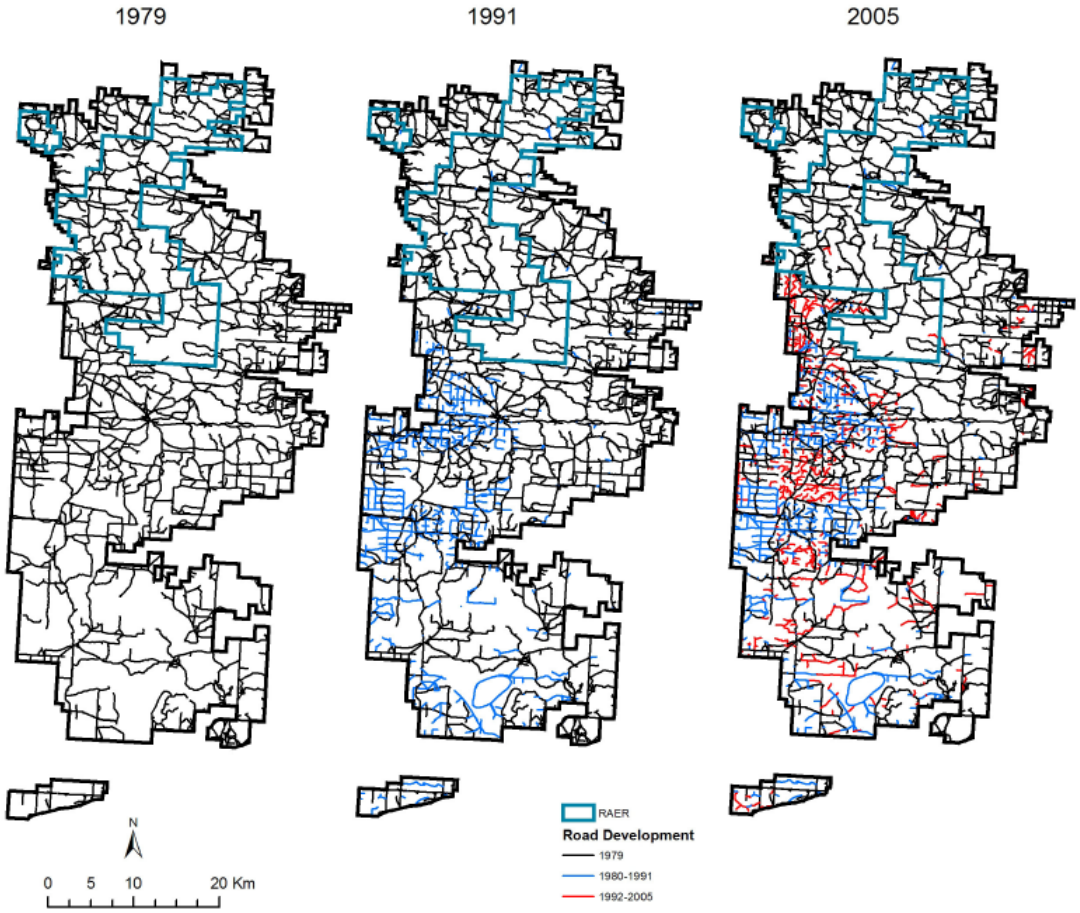


Great Sand Hills Scientific Advisory Committee 2007. Great Sand Hills Regional Environmental Study. Canadian Plains Research Centre, Regina, SK

How does this happen?

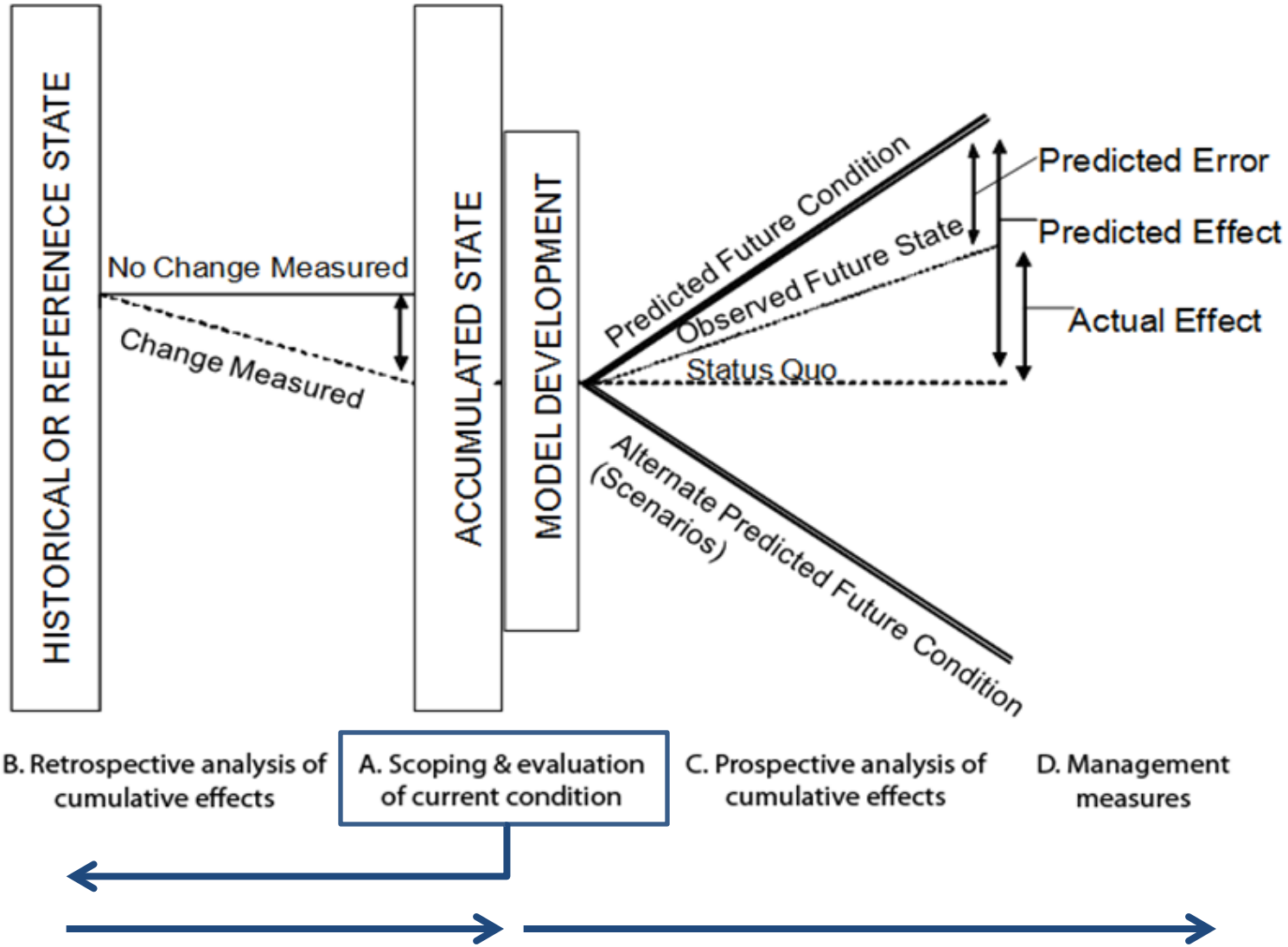
- For each action, the effects are deemed ‘marginal’ or ‘relatively insignificant’ when compared to other types or magnitudes of change or disturbances – i.e. ‘my project is a small drop in the bucket’

- The magnitude of a project’s impacts are erroneously ‘measured against’ or ‘compared to’ the effects of other projects, versus focusing foremost on the TOTAL environmental effects.

- It’s argued to be the responsibility or other, future project proponents - i.e. ‘they will also have to do an assessment and mitigate, so there will be no cumulative effects’

Environmental assessment without good CEA misses the point!

Assessing cumulative environmental effects



Approach to our review of the Bipole III CEA

Section 4.2.1 of the EIS 'Objectives and Process Overview'

- "The environmental assessment process for the Project is consistent with provincial and federal environmental assessment legislation, guidelines and procedures, as well as best practices."

Section 9.1 of the EIS

- "The cumulative effects assessment for the Project was conducted with consideration of the guidance provided by the following: The Bipole III Transmission Project Environmental Assessment Scoping Document (Manitoba Hydro June 2010); The *Canadian Environmental Assessment Act* (1992); and Review of other guidance documents for cumulative effects assessment (e.g., Cumulative Effects Assessment Practitioners Guide Hegmann et al. 1999)."

Scoping Document for the EIS (Section 8.0)

- "The cumulative effects assessment framework will be defined in the EIS and will be based on CEAA guidance as well as best and current practices including the consideration of regional and strategic environmental assessment approaches"

Approach to Our Review of the Bipole III CEA

What is ‘reasonable’ or ‘good’ practice

- Does the Bipole III CEA meet a minimum standard?

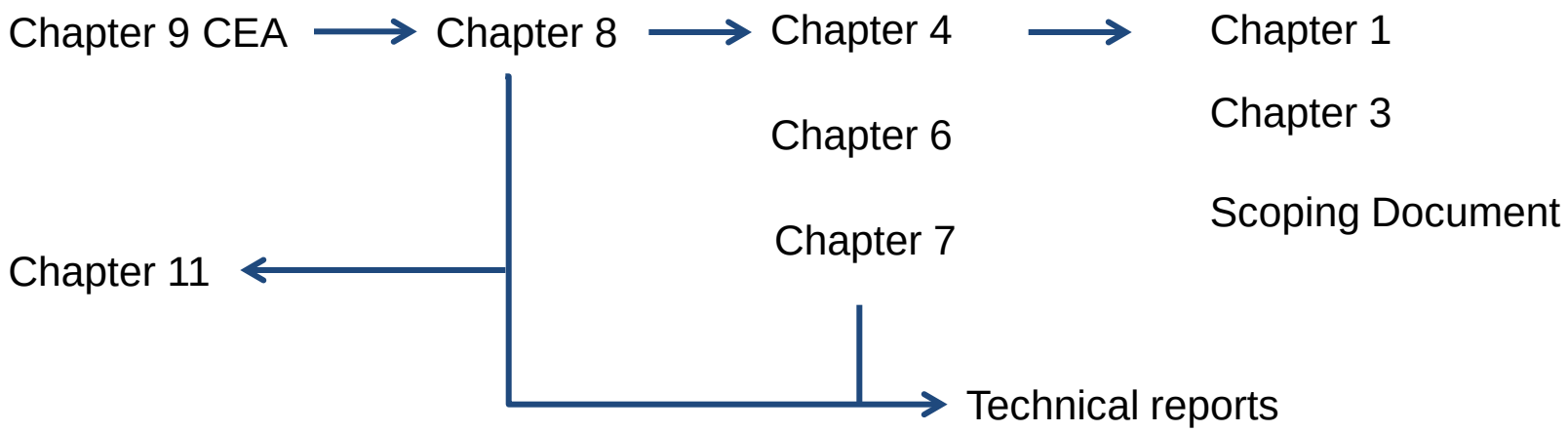
Four components of CEA, each defined by a set of questions to guide our review:

- Scoping practices for cumulative effects assessment
- Retrospective analysis of cumulative effects
- Prospective analysis of cumulative effects
- Cumulative effects management measures

CEA Component	Criteria/ review questions
A. Scoping practices for cumulative effects	i. Is the CEA methodology distinct from the project impact assessment? ii. Does the CEA consider all types of activities and stresses that may interact with the project's effects on VECs? iii. Does the CEA adopt 'ambitious', ecologically-based scoping? iv. Is an explicit rationale for VEC selection documented? v. Do the spatial boundaries reflect the natural distribution patterns (present and historic) of VECs selected for CEA? vi. Does the CEA adopt 'pre-disturbance' conditions as the historic temporal limit and capture other certain and reasonably foreseeable future projects and activities?
B. Retrospective analysis of cumulative effects	i. Does the baseline analysis delineate past and present cumulative effects (i.e. VEC condition and condition change) in the study area? ii. Does the baseline analysis establish trends in VEC conditions (spatial or temporal) and known or suspected relationships between changes in VEC conditions and the primary drivers of change? iii. Are thresholds specified against which cumulative change and the significance of effects can be assessed?

CEA Component	Criteria/ review questions
C. Prospective analysis of cumulative effects	i. Is the time scale of prediction/analysis sufficient to capture the scope of impacts associated with the project's life cycle? ii. Is there sufficient analysis/evidence to support the conclusions? iii. Are the tools and techniques used capable of capturing the complexities of cumulative effects? iv. Are trends and linkages established between VEC conditions and disturbances to inform predictions about cumulative impacts? v. Is the cumulative effects analysis centred on the total effects on VECs in the project's regional environment?
D. Cumulative effects management measures	i. Is the significance of cumulative effects measured against a past reference condition? ii. Is the significance of cumulative effects adequately described and based on VEC sustainability? iii. Are the incremental impacts of the project 'traded off' against the significance of other disturbances? iv. Are mitigation measures identified that help offset significant cumulative environmental effects? v. Is adaptive management for cumulative effects contingent upon future and uncertain developments and impact interactions?

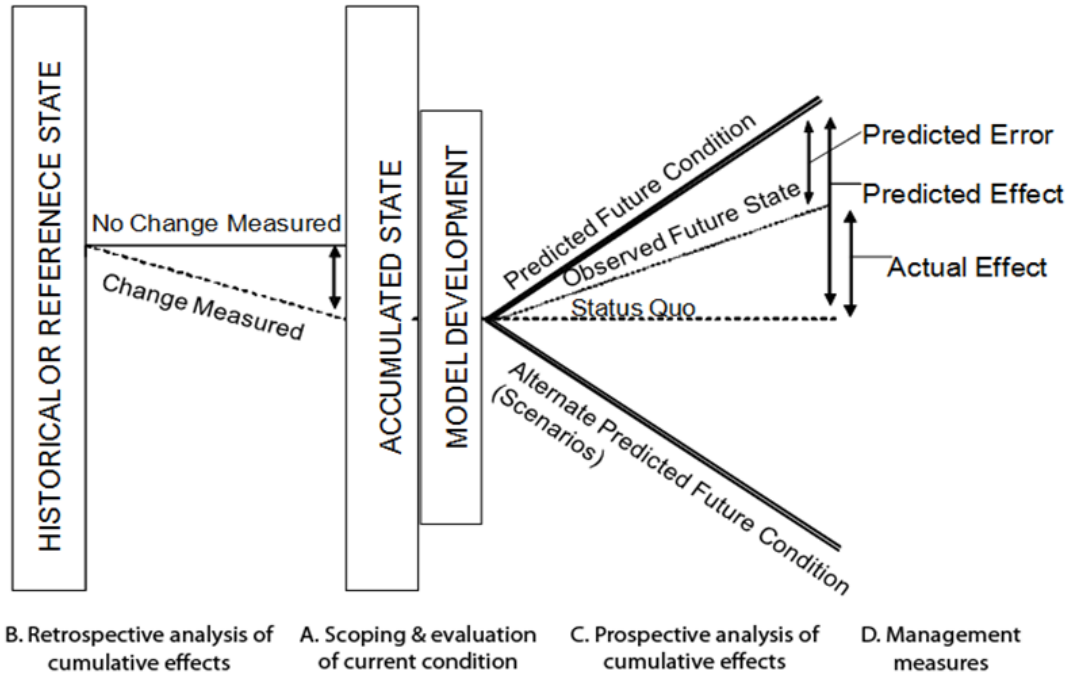
Approach to Our Review of the Bipole III CEA



Environmental Impact Statement Chapters	Additional EIS Supporting Documentation and Reports
▪ EIS Executive Summary ▪ Chapter 1 – Introduction ▪ Chapter 3 – Project Description ▪ Chapter 4 – Environmental Assessment Approach ▪ Chapter 6 – Existing Environment ▪ Chapter 7 – Identification and Evaluation of Alternative Routes and Sites ▪ Chapter 8 – Effects Assessment and Mitigation ▪ Chapter 9 – Cumulative Effects Assessment ▪ Chapter 11 – Environmental Protection, Follow-up and Monitoring	▪ EIS Scoping Document ▪ Aquatic Environment Technical Report (November 2011) ▪ Caribou Technical Report (November 2011) ▪ Environmental Impact Statement – Supplemental Material (July 2012) ▪ Forestry Technical Report (November 2011) ▪ Habitat Fragmentation Technical Report (November 2011) ▪ Mammals Technical Report (November 2011) ▪ Socio-economic Baseline Report (November 2011) ▪ Supplemental Caribou Technical Report (August 2012) ▪ Terrestrial Ecosystem and Vegetation Technical Report (November 2011) ▪ Terrain and Soils Technical Report (2011)

2. Analysis

A. Scoping for cumulative effects assessment



i) Is the CEA methodology distinct from the project impact assessment?

Good CEA is founded on an effects analysis methodology—i.e. *a scientifically-based, systematic, step-wise procedure*. This is undetectable in the Bipole III CEA.

Chapter 9 provides two 'high-level screening assessments': short checklists that briefly screen for direct and immediate coincidence of project effects with a short list of environmental subcomponents.

i. Both Checklists rely on analysis provided in Chapters 6 and 8
ii. Enmeshed with, and indistinct from direct effects assessment
iii. No explanation of how decisions for the Checklists were taken
iv. 'Checking' for effects is not the same as <u>analyzing</u> effects

ii) Does the CEA consider all types of activities and stresses (human-induced and natural disturbances) that may interact with the project's effects on VECs?

Cumulative effects are the result of combined threats to VECs via multiple environmental or pathways—biological, chemical, physical, and psycho-social—over time.

Past projects - 6 considered, none included in CEA (Bipole I & II ROW is missed)

Future projects – 4 included in CEA (3 are proponents' own)

Prospective future projects - 4 included (Conawapa and 3 sectors)

Natural disturbances are not considered (other than natural fires – Caribou Tech Report)

"Events that could be predicted with some accuracy include 50- and 100-year flood events, if there is a long term Water Survey of Canada stream gauge nearby such as exists for the Nelson River. It would be correct to say that in the next 25-50 years, it is roughly equally likely that floods and droughts would occur in northern Manitoba and thus be of concern for Manitoba Hydro."

– Dr. Cherie Westbook, Hydrologist

Other types of human-induced stress are not considered, particularly related to operation and maintenance of the Bipole III ROW.

Example 1

Vegetation management (fragmentation effects)

Example 2

Designation of wildlife management area; closure of other areas to moose hunting

iii) Does the CEA adopt 'ambitious', ecologically-based scoping?

'Ambitious' scoping means adopting a liberal interpretation of mandate in EA.

"The CEA framework will be…based on CEAA guidance as well as best and current practices **including the consideration of regional and strategic environmental approaches**" (EIS Scoping Document, p. 21). **But:**

Example 1

"The CEA only includes VECs with an adverse effect of the Project that overlaps both spatially and temporally with the effects of other identified projects and human activities" (Chapter 9, p. 9-2).

Example 2

The CEA addresses its own significant adverse residual effects "only if on-going effects from such other projects are expected to change over time to the extent that there would be a measurable effect on the existing environment that was not already addressed in Chapter 8" (Chapter 9, p. 9-2).

Ecologically-based scoping is that which adopts ecological health and functioning as a core determinant of VEC selection, boundary setting, and other aspects of the CEA analysis.

Scoping in the Bipole III CEA is clearly project-led, not VEC-led.

Example 1

Reliance on results of residual effects analysis (Chapter 8) to designate effects of interest for the CEA. Ecology is not a factor.

Example 2

Projects and environmental sub-components considered, are not scoped expansively enough to detect and analyze trends related to healthy or unhealthy ecosystem functioning, and the proposed project's possible contributions to those dynamics.

iv) Is an explicit rationale for valued ecosystem component selection documented?

Multiple rationales can be used to designate VECs for CEA:

- regulatory concerns
- ecological function or integrity
- conservation or biodiversity value
- social or recreational value
- economic or cultural value (human health)
- traditional aboriginal use value
- educational or scientific interest

The only documented rationale for VEC selection in the Bipole III CEA is the presence of significant adverse residual effects (regulatory compliance is assumed).

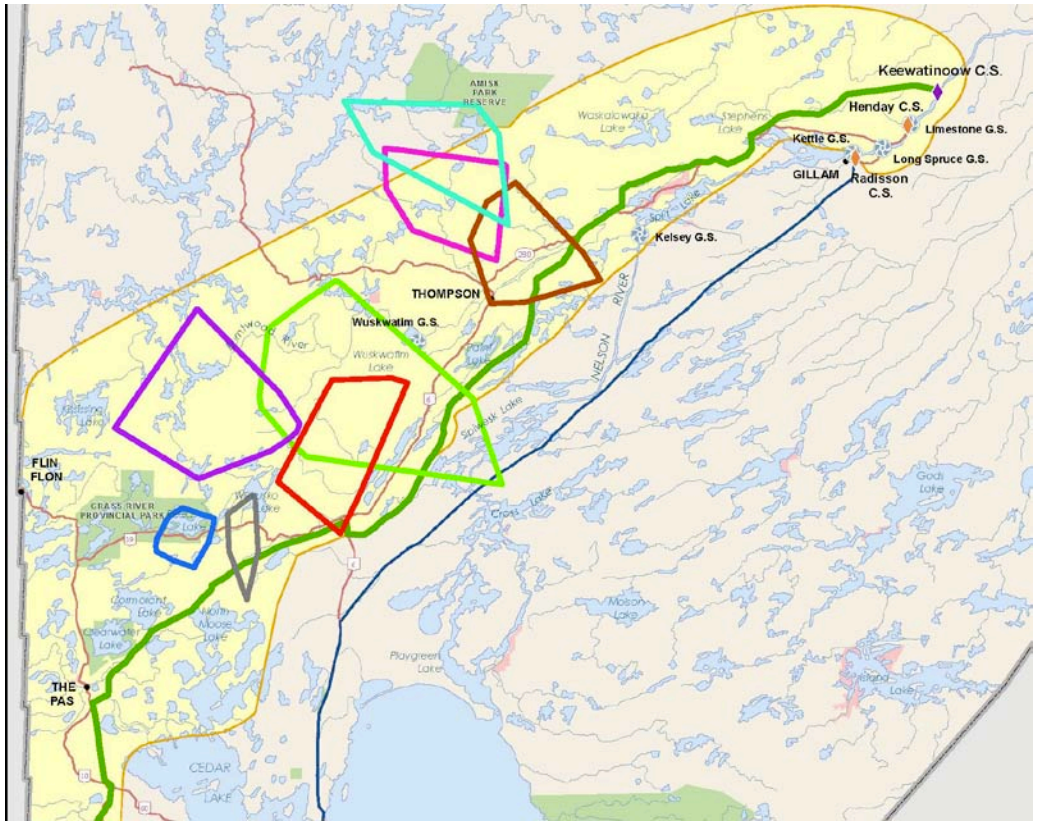
Bipole III CEA should—but does not—rationalize that some 'insignificant' Project effects may need to be elevated to the status of 'significant, adverse' when considered in combination with the effects of other projects (Hegmann 1999: 43).

Example

Wolf pack habitat ranges (see Map 6-21, Chapter 6)

Reconsider project effects from the perspective of cumulative habitat fragmentation caused by multiple linear corridor developments (highways, Bipole I&II ROW).

Concern for the additional incremental effects of the Project may have elevated wolf pack habitat as a VEC of concern in the CEA.



Source: Map 6-21, Chapter 6

v) Do the spatial boundaries reflect the natural distribution patterns (present and historic) of valued ecosystem components selected for the CEA?

Good CEA focuses on the receiving environment and considers all effects on ecologically significant receptors, including those of the proposed Project. For this reason, the spatial boundaries used in CEA must be sensitive to the natural distribution patterns of VECs.

-Spatial boundaries are clearly focused on the Project itself

Example 1

"As potential routing sites (for the Project's HVdc transmission line) were narrowed, Local Study Areas were identified. These consisted on three mile wide bands, down the center of which ran potential routes for the HVdc powerline" (Executive Summary, p. iii).

Example 2

"Included in the Local Study Area were the areas immediately surrounding the other Project components, namely the two converter stations, the electrode sites and connecting electrode lines and the northern ac collector lines" (Executive Summary, p. iii).

Example 3

"Residual adverse effects considered for some biophysical VECs are effectively limited to the immediate rights-of-way and Footprint area sites and as such the only real prospect of a related cumulative biophysical effect would occur where there is a further development on or adjacent to the rights-of-way for the HVdc transmission line, 230 kV ac northern collector lines, the northern converter station or ground electrode site and line" (Chapter 9, p. 9-15).

Further, the Project study areas was compartmentalized into 13 segments to ease analysis

i. 'problem isolation paradigm' (Charland 1996)
ii. common mistake in natural resources management

vi) Does the CEA adopt 'pre-disturbance' conditions as the historic temporal limit and capture other certain and reasonably foreseeable future projects and activities?

The appropriate baseline for considering the significance of biophysical cumulative effects is that time in the past when a VEC was most abundant, but no attempt is made to pinpoint historical periods of pre-VEC disturbance.

Past & Existing Projects/Acitvities	Temporal Reference	Notes
Wuskwatim Generation Station Project	"completion expected in 2012"	considered but not included in the CEA
Wuskwatim Trasmission Project	"has been completed or is expected to be completed in 2011"	included in the CEA, but "primarily addressed as part of the earlier baseline and effects assessment"
Dorsey-Forbes 500 kV Transmission Line	no temporal bounds delineated	considered but not included in the CEA
Riel Sectionalization Project	"is being implemented", "it will be implemented"	included in the CEA, but "primarily addressed as part of the earlier baseline and effects assessment"
Floodway Exansion Project	no temporal bounds delineated	considered but not included in the CEA
St. Joseph's Wind Farm Project	no temporal bounds delineated	considered but not included in the CEA
Mineral and mining developments	no temporal bounds delineated	included in the CEA, but "primarily addressed as part of the earlier baseline and effects assessment"

No specific historic temporal limit is set for socio-economic effects either because they are effectively excluded from the CEA.

Example

"It is expected that (through the Project) there will be additions to…recent signs of improvement and that the Project will not result in a cumulative adverse effect to the particular socio-economic VECs identified (in Table 9.3-2) as potentially of concern" (i.e. land use, resource use, economy, services, personal, family and community life, and culture and heritage) (Chapter 9, p. 9-24).

Although there is no standard future temporal limit in CEA, it is generally accepted that CEA utilizes long-term boundaries in its analysis.

i. no specific time horizon is adopted for the CEA (e.g. 10, 50, 100 years, etc.) although a project lifetime of 50 years is anticipated (Chapter 9, p. 9-28)

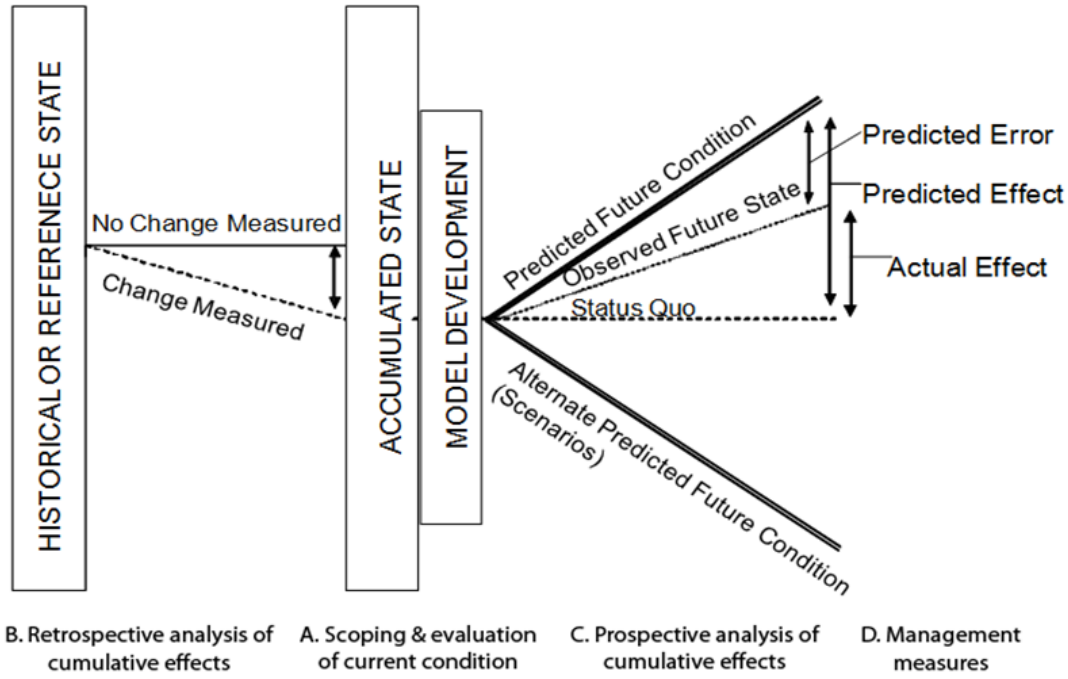
ii. based on lists of future and 'prospective future projects', the maximum future temporal limit for the CEA is approximately 12 years, to 2024.

Future Project/Activity	Temporal Reference	Notes
Keewatinoow Wastewater Management Project	temporal limit for assessment is not delineated	included in the CEA (spatial and temporal overlap with the proposed Project is explicitly acknowledged)
Keeyask Generating Station and Transmission Projects	construction of northern camps, roads and work areas begins in 2011. Subsequent construction of the generating station and related transmission corridors will begin in 2013 and last approximately eight years (until 2021). Contradictorily, in Chapter 9, p. 9-24, it is stated that major work on the Keeyask project is expected to begin in 2014 and be completed in 2017	included in the CEA
Urban residential development in the town of Gillam	no temporal limits regarding the development are discussed	included in the CEA, but "expected to follow municipal and/or provincial development guidelines which would serve to limit interactions with other projects and mitigate any project-related effects
Dorsey to Potage 230 kV Trasmission Line Project	expected to be in service by 2013 at the earliest	not included in the CEA due to no spatial overlap
Floodway Expansion Project	temporal limits are not delineated	Not included due to negligible and localized effect and no anticipated overlap of effects with Project
Provincial Road 280 Improvement Project	completion date of 2010	not included in the CEA because it's effects are expected to be within the existing roadway profile and beneficial rather than adverse

Prospective Project/Activity	Temporal Reference	Notes
Conawapa Generating Station Projects (generating station, work camps, transmission corridor)	construction would be begin in 2015 at the earliest and take approximately eight or eight and half years (to 2023 or 2024)	included in the CEA
Foresty Operations and Road Development	temporal limits for these projects are not delineated	included in the CEA
Minerals and Mining Exploration, Leases, Projects	temporal limits for these projects are not delineated because "future mine developments are difficult to predict"	included in the CEA
Current and future agriculture activities	temporal limits for these projects are not delineated	included in the CEA
New International Transmission Line Project	temporal limits for this project are not delineated	not included in the CEA due to "minimal spatial overlap of effects with proposed Project
Transmission Lines Projects in southern Manitoba	"service date is uncertain"	not included in the CEA due to "no spatial overlap of effects with effects of Project
Wind Energy Developments	"uncertain timeframe"	not included in the CEA

2. Analysis

B. Retrospective analysis of cumulative effects



i) Does the baseline analysis delineate past and present cumulative effects (i.e. VEC condition and condition change) in the study area?

Section 9.2 of the EIS

"The effects of past and current projects and activities form an integral part of, and have been incorporated into, the description of the existing environment (Chapter 6). Accordingly, effects that are likely to result from the Project in combination with other projects or activities that have been carried out have generally been assessed in Chapter 8."

CEA establishes a '**new normal**'

- current conditions are adopted as the baseline rather than considering current conditions relative to past conditions and evaluating the nature and significance of cumulative change in VECs in the study area

Example 1

- wetland area in study area is ~ 137,701 ha; 1,456 ha along preferred route
- current threats (e.g. agriculture, drainage, forestry, ROW activities) are examined against 'current' conditions (Terrestrial Ecosystem & Veg Tech Report (s 3.2.2.5)

There is no characterization of past wetland area (e.g. % wetland cover or area) and comparison to current conditions in order to:

i. understand the cumulative loss of wetlands over space and time

ii. understand the significance of any additional cumulative effect of the Project.

Example 2

- cumulative effects to plants of conservation concern and Aboriginal use
- residual effects identified in the ROW (Terrestrial Ecosystem & Veg Tech Report, Table 36)
- > 80 plant species that have traditional value, some found in limited supply

Losses due to other, past disturbances are neither quantified nor qualified in the baseline against which

i. the status of current terrestrial and vegetation conditions can be assessed

ii. the significance of the Project's additional effects appropriately determined

At a minimum, past effects of the Manitoba Hydro's own projects (Bipole I and II) should be considered in order to understand what plant communities have <u>already</u> been lost/ affected.

Report on Public Hearings: Wuskwatim Generation and Transmission Projects (2004)

Section 7.4 'Improving the Process'

"Absorbing the adverse effects of the CRD [Churchill River Diversion] and AFP [Augmented Flow Program] in any future project's baseline conditions would have the effect of accepting the adverse effects and precluding possible remediation, restoration and other mitigative actions. As a result, opportunities to rehabilitate areas damaged by the CRD and AFP will not be fully explored"

(sec. 7.4.6 Cumulative Effects Assessment)

ii) Does the baseline analysis establish trends in VEC conditions (spatial or temporal) and known or suspected relationships between changes in VEC conditions and the primary drivers of change?

- Baseline provides "a description of the existing environment..." (Ch 6)
- "..inventories and data summaries…provide information for the identification of potential effects on VECs…." (S. 8.2.5 Terrestrial Ecosystems & Veg. Tech. Report)

Analysis of baseline trends is fundamental to CEA, but largely absent:

i. CEA requires an analysis of trends or changes in baseline conditions and characterization of the significance of that change
ii. the EIS is descriptive and not explanatory of changes in VEC conditions

Example 1

- 317 water courses intersected by HVdc line (Ch. 8 & Aquatic Env. Tech. Report)
- aquatic study components: surface water quality & fish habitat

No relationship established between numbers of river crossings & water quality parameters over river reach and time:

i. relationship between the potential effect (changes in water quality parameters, nutrients, sediments, etc) and the potential stressor (river crossings)?

ii. relationship between the number of river crossings over time and the fragmentation of riparian habitat?

Cumulative Effects Indicators, Thresholds and Case Studies (2003 report)

Salmo Consulting Inc; Diversified Environmental Services; Gaia Consultants Inc; Forex technologies Ltd; Axys Environmental Consulting Ltd

‘Stream crossing index – land-use indicator’

“The stream-crossing index is an easily calculated measure of sediment and mortality sources and stream habitat fragmentation in a watershed. It is expressed as the number of road, trail, utility corridor, and cutline crossings per kilometer of stream. A watercourse that is repeatedly crossed is more likely to suffer increased erosion and water temperature…”

Example 2

- Terrestrial Ecosystems & Veg Tech Report describes current wetland area & current threats to wetlands

Baseline does not provide the information needed for a temporal analysis and understanding of cumulative effects to wetlands:

i. How have wetlands have changed over time in the area and due to what types of disturbances?

ii. What are decline and recovery rates for wetland habitat in the study area (esp. in agricultural areas)?

iii. Basic metrics for wetlands (e.g. % wetland cover, rates of conversion) have not been addressed

iii) Are thresholds specified against which cumulative change and the significance of effects can be assessed?

Assessment data must be evaluated against some threshold

- ecological threshold
- benchmark or limit of change from pre- or prior-disturbance condition
- stress/ disturbance limits

Some VECs may already be at or beyond a threshold of sustainability; any additional impact would be deemed significant.

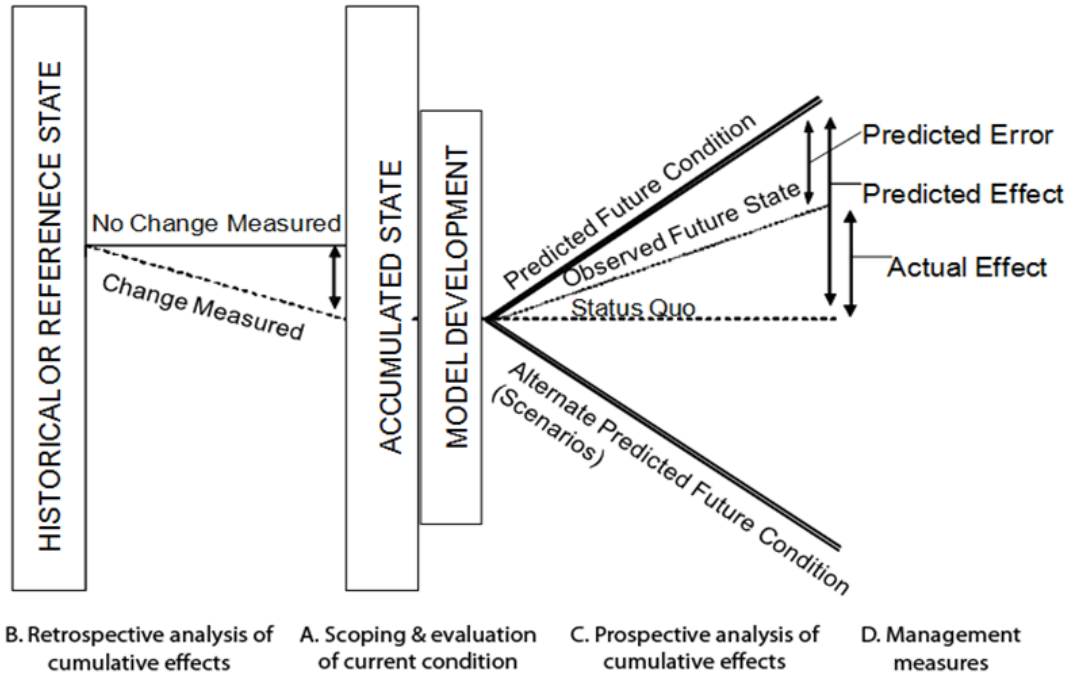
Section 7.5 of the EIS Scoping Document: “adversity of environmental effects will be determined based on predetermined factors and criteria”

i. few “predetermined factors and criteria” in the EIS against which to evaluate the adversity of cumulative effects

ii. exception was caribou & habitat (but limited to a 5-year future)

Analysis

C. Prospective analysis of cumulative effects



i) Is the time scale of cumulative effects predictions/analysis sufficient to capture the scope of impacts associated with the project's life cycle?

Report on Public Hearings: Wuskwatim Generation and Transmission Projects (2004)

Sec 7.2.2.8.3: CEC criticized Manitoba Hydro for its narrow interpretation of cumulative effects, including its "decision not to extend cumulative-effects assessment beyond a ten-year period."

The current CEA is even more temporally restrictive, with a 5-year temporal boundary for certain VECs, with any consideration beyond this time frame for other VECs largely descriptive and with limited supporting analysis.

Example 1

Effects analysis for caribou and habitat fragmentation: 5-year future for effects analysis as recommended by MB Hydro (Ch8, Caribou Tech Report, Habitat Tech Report):

i. not possible to capture the future cumulative effects associated with other activities in Table 9.2-2 & 9.2-3 that may also affect critical habitat

- e.g. Keeysak is not expected to start until 2013 and last until 2021

ii. conclusions cannot be made about cumulative effects on caribou and habitat 10, 15, 20 or 50 years into the future if the analysis extended only 5 years

Example 2

Terrain and soils; groundwater; aquatic environment adopt a 20-year future:

i. there is no *analysis* of cumulative effects over the 20-year future

ii. the EIS reports a 50-year Project lifetime.

ii) Is there sufficient analysis/evidence to support conclusions about potential cumulative effects?

Section 8.0 of EIS Scoping Document:

- "The methods, assumptions, analysis and conclusions of the assessment will be documented in the EIS."

We were unable to find sufficient documentation of cumulative effects methods or analysis to support the conclusions in Chapter 9

i. CEA is referred to as a "high level screening assessment"(s. 9.3.1 and 9.3.3)

ii. no attempt to undertake an **analysis** of cumulative effects for future and prospective projects (except caribou & habitat)

Example 1

Ch 9 indicates no adverse cumulative effects on terrestrial ecosystems and vegetation (Table 9.3.1) or on culture and heritage (Table 9.3-2)

i. missing analysis of effects to support the conclusions

ii. missing mapped disturbance patters for other projects, future and prospective, and disturbed area to provide evidence in support of the conclusions

Example 2

Dorsey-Forbes project is excluded from CEA due to “no overlap of effects with effects of the project”

Noted in Table 9.2-1 that the Dorsey-Forbes 500 kV Transmission Line is addressed in the baseline (Chapter 6) and earlier effects assessment (Chapter 8):

i.there is no mention of the Dorsey-Forbes project in Ch 6

ii.only reference in Ch 8 is with regard to noise levels during construction

Example 3

No adverse cumulative effects identified on the aquatic environment for the Project in coincidence with Wuskwatim, Keeyask and Conawapa (Ch 9)

i. no evidence of cumulative effects analysis of these future projects, interacting individually with the Project and in combination, on the aquatic environment.

ii. crossings for future projects, cumulative effects on aquatic habitat, are not mapped/ analyzed

iii) Are the tools and techniques used capable of capturing the complexities (e.g. non-linear relationships, critical thresholds) of cumulative effects pathways and uncertainties of future developments?

Scoping Document s.7.5: “Effects will be identified using checklist, matrices, linkage diagrams, map overlays,...and will employ GIS...and other computer-based systems....Effects will be assessed by different methods...modeling, data analysis, and professional judgement.”

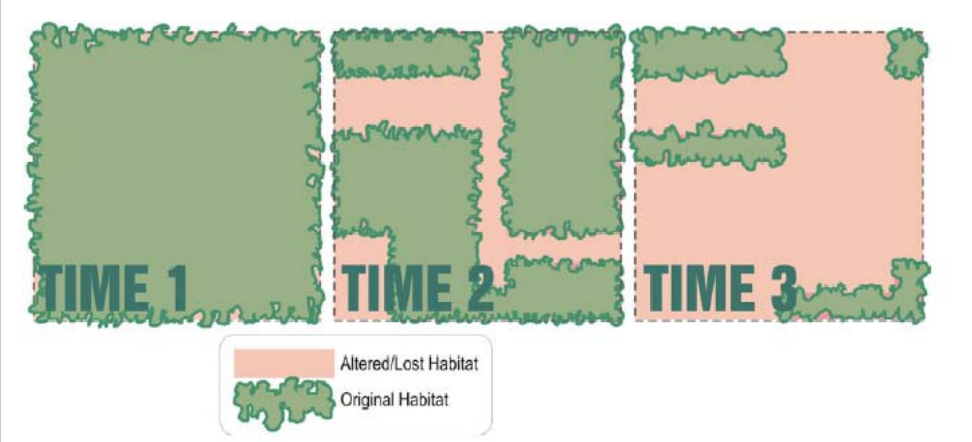
Tools and techniques expected to see in a CEA or linear development are absent:

i. simple regression analysis to advanced simulation (e.g. ALCES)

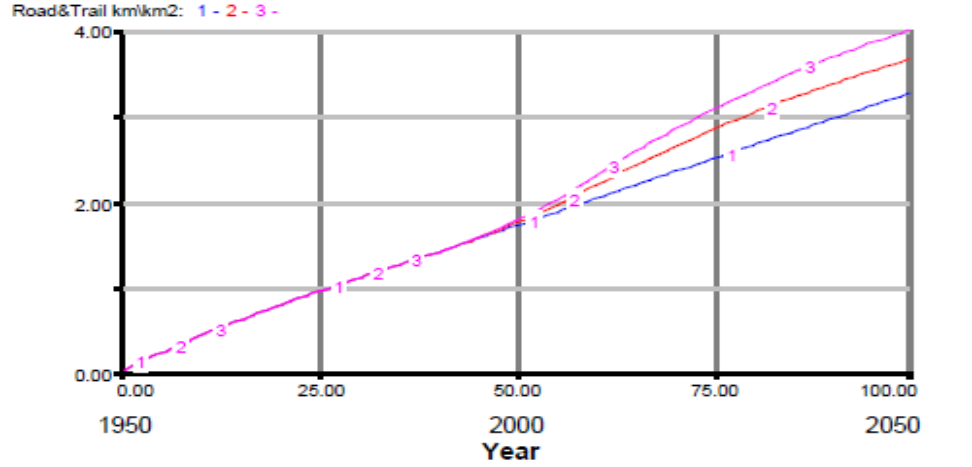
ii. limited modeling of potential cumulative effects in the EIS, either statistical or spatial, aside from caribou and caribou habitat

iii. cumulative effects predictions about future and prospective developments in Ch 9 are qualitative and with limited supporting analytical evidence

Example: fragmentation metrics; patch size; linear features



Example: road and trail density; density of linear features (indicators of stress to VEC – e.g wildlife habitat; cumulative risk of erosion, etc.)



Source: Salmo Consulting Ltd. Et al. 2003. Cumulative effects indicators, thresholds, and case studies. Report prepared for the BC Oil and gas Commission

Example 1

s. 9.3.2: “As the operation phase of the Project extends up to the lifetime of the Project at 50 years, there is only limited ability to predict projects and activities within that time frame for consideration in cumulative effects assessment.”

Scenario-based approaches are widely promoted to address this uncertainty and particularly well-suited to landscape effects, such as fragmentation

i. scenario-based approach using metrics of landscape disturbance is a ‘low hanging fruit’ for CEA for a linear development project

ii. metrics were adopted for caribou and habitat (modeled only for 5-yrs), and not adopted for other disturbances (e.g. river crossings)

iii. no attempt to model future disturbance and response scenarios for the stated 50-year lifetime of the project

iv) Are trends and linkages established between VEC conditions and disturbances in the baseline analysis used to inform predictions about cumulative impacts?

Baseline trends (linkages between disturbance and VEC conditions) are important to predicting (quantitatively or qualitatively) future conditions and understanding cumulative change:

i. there limited modeling of baseline trends or relationships between VEC conditions and disturbances

ii. few trends or relationships are established to carry forward to aid in cumulative effects predictions

v) Is the cumulative effects analysis centred on the total effects on VECs in the project's regional environment?

The first problem...

Cumulative effects must be approached from the perspective of the **TOTAL** effects on a VEC.

i. EIS does not address the **total** or cumulative effects on each VEC

ii. does not adequately consider the cumulative effects of all interactions and additions on each VEC

Example 1

Coincidence effects of the project with each other, individual projects or activities

TOTAL effect on VECs?

- mammals & habitat VECs
- aquatic VECs
- etc

These are the 'cumulative effects' that matter

See also Table 9.3-2 for socio-economic cumulative effects

Table 9.3-1: Potential Coincidence of Effects on Biophysical Environment

Other Projects & Activities	Bio-physical Environment Sub-components								
Adverse Project Effects on VECs (Not Significant as discussed in Chapter 8) ◊ / No Adverse Cumulative Effects ✓ / Negligible Cumulative Effects (beyond assessment discussed in Chapter 8) □ / Potentially Non-negligible Cumulative Effects □	Soils & Terrain	Air Quality and Climate	Groundwater	Aquatic Environment	Terrestrial Ecosystems & Vegetation	Mammals & Habitat	Birds & Habitat	Amphibians & Reptiles	Terrestrial Invertebrates
Bipole III Project	◊	◊	◊	◊	◊	◊	◊	◊	◊
Wuskwatim Transmission Project (230 kV transmission lines, Thompson-Birchtree Station)	✓	□	□	✓	✓	□	✓	✓	✓
Riel Sectionalization Project - The Riel Reliability Improvement Initiative	□	□	□	✓	✓	✓	✓	✓	✓
Multiple existing (utility) corridors, such as water pipelines, fibre optics line, that serve local and regional needs	□	□	□	□	✓	□	✓	✓	✓
Forestry operations and road development (Tolko, Louisiana Pacific)	✓	✓	□	✓	✓	□	✓	✓	✓
Mineral licence area exploration, mineral lease, mining claim, and quarry lease developments	✓	✓	□	✓	✓	□	✓	✓	✓
Provincial Highways and Roads, Winter road development	□	□	□	✓	✓	□	✓	✓	✓
Keewatinoow wastewater management	✓	□	✓	✓	✓	✓	✓	✓	□
Keeyask Generation/Transmission	□	□	□	✓	□	□	✓	✓	✓
Kettle Generating Station Upgrades	□	□	□	□	□	□	□	□	□
Urban residential development (potential for new housing stock within the Town of Gillam)	□	□	□	□	□	□	□	□	□
Conawapa Generating Station Projects	□	□	✓	✓	□	□	✓	✓	□
Forestry operations including road development (Tolko, Louisiana Pacific)	✓	✓	□	✓	✓	□	✓	✓	✓
Mineral licence area exploration, mineral lease, mining claims, and quarry lease developments	✓	✓	□	✓	✓	□	✓	✓	✓
Current and future agricultural activities	✓	✓	□	✓	✓	✓	✓	✓	✓

The second problem...

The cumulative effects of the Project are deemed negligible based on the **magnitude of the Project's effects as measured against the effects of other projects and activities**.

i. misinterpretation (or misrepresentation) of a 'cumulative effect'

ii. the project's effects are viewed as 'relatively less significant' and therefore non-cumulative'.

Significance of a cumulative effect is to be measured based on the significance of the **TOTAL** effect of **ALL** actions on the VEC

- a project could add very little incremental stress to a VEC, but the cumulative effect could be significant.

Example 1

"Residual adverse effects considered for some biophysical VECs are effectively limited to the immediate rights-of-way and Footprint area studies and as such the only real prospect of a related cumulative biophysical effect would occur where there is a further development on or adjacent to the rights-of-way for the HVdc transmission line, 230 kV ac northern collector lines, the northern converter station or ground electrode site and line." (sec. 9.3.2)

Example 2

"From a landscape perspective, the amount of area occupied by transmission lines in Manitoba's boreal woodland caribou range is small in comparison to other human activities...Indirect ecological impacts from transmission lines are also expected to be minor compared to those associated with other human caused or natural landscape disturbances." (sec. 9.3.2.2)

Example 3:

Chapter 9 (Table 9.3-1) identifies ‘no adverse cumulative effects’ associated with roads on the aquatic environment

Section 6.4.4 of the Aquatic Environment Technical Report notes that past and future road developments do have the potential to effect water quality and fish habitat in streams that are crossed, but notes:

“there are numerous roads throughout the study area that include stream crossings. However, in contrast to permanent road crossings, the Bipole III transmission line stream crossings have a negligible effect.”

The third problem...

Sec. 9.3.2 of the EIS: “Larger landscape scale projects and activities in forestry and mineral exploration and mining will, by the Project operating stage, have a potentially greater influence on bio-physical and socio-economic components in the Project Study Area....It is expected that during the operation phase the residual effects of Bipole III will be fully managed and small in their magnitude...”

Some future and prospective projects are **EXCLUDED** from CEA due to their small impacts or perceived limited spatial overlap

i. flawed CEA not to include (at least) other hydroelectric generating and transmission projects that will generate similar types of effects

Example 1

Table 9.2-2: CEA does **not** include the Dorsey to Portage 230 KV Transmission Line project due to “no spatial overlap of effects with Project.” It is also noted that the line will require additional easements and water crossings. The impact of this project on the same VECs affected by the Project (e.g., vegetation, aquatic habitat, and wetlands) is completely dismissed without proper cumulative effects analysis.

Example 2

Keeyask is not addressed in the analysis of habitat fragmentation. But Keeysak is identified in the Terrestrial Ecosystems and Veg. Report as having an effect on plant species of concern and a cumulative effect is identified. In the EIS, the potential for a cumulative effect on ‘Terrestrial Ecosystems and Vegetation’ (Table 9.3-1) is considered ‘negligible’; the potential for a cumulative effect on ‘Culture and Heritage’ and ‘Resource Use’ (Table 9.3-2) is considered nil.

i. Consideration is not given to total effects on the VECs of concern from all sources of stress in the region.

Example 3

Table 9.2.3: New International Transmission Line is not included in the CEA because of 'minimal spatial overlap' and only incremental effects.

i. 'incremental effects' **are** cumulative effects

ii. that there will be 'minimal spatial overlap' is a misinterpretation of cumulative effects (must be viewed from the VEC's perspective)

iii. new transmission lines in southern Manitoba will affect the same VECs as the Bipole III project – namely agricultural lands and wetlands. There will be cumulative effects; the question is how significant.

Example 4

Sec. 4.0 Habitat Technical Report: "When considering large-scale corridor projects, such as the Project, fragmentation is frequently an inevitable consequence.... potential negative effects on individuals and populations of mammal species at varying degrees."

i. no prospective analysis as to whether or how the effects of the Project will interact with the potential effects of the Conawapa project.

The fourth problem...

CEA ‘passes the buck’ for responsibility for assessment and management

Example 1

Sec. 7.6.2 of the Terrestrial Ecosystem and Veg. Tech.l Report: “Past, existing and future hydroelectric, mining, forestry and infrastructure projects usually require environmental or due diligence assessments...These assessments are conducted to evaluate the potential effects of the development on VECs including similar vegetation VECs identified in this cumulative effects assessment...It is assumed that the information gathered would be utilized to develop appropriate mitigation measures to minimize impacts to VECs resulting in no or minimal residual effects, similar to those determined for the Bipole III Project.”

“As a result of the mitigation measures identified for the Bipole III VEC’s, there are minimal resultant cumulative effects from past, existing, and future hydroelectric, mining, forestry and infrastructure projects.”

This undermines the purpose of CEA:

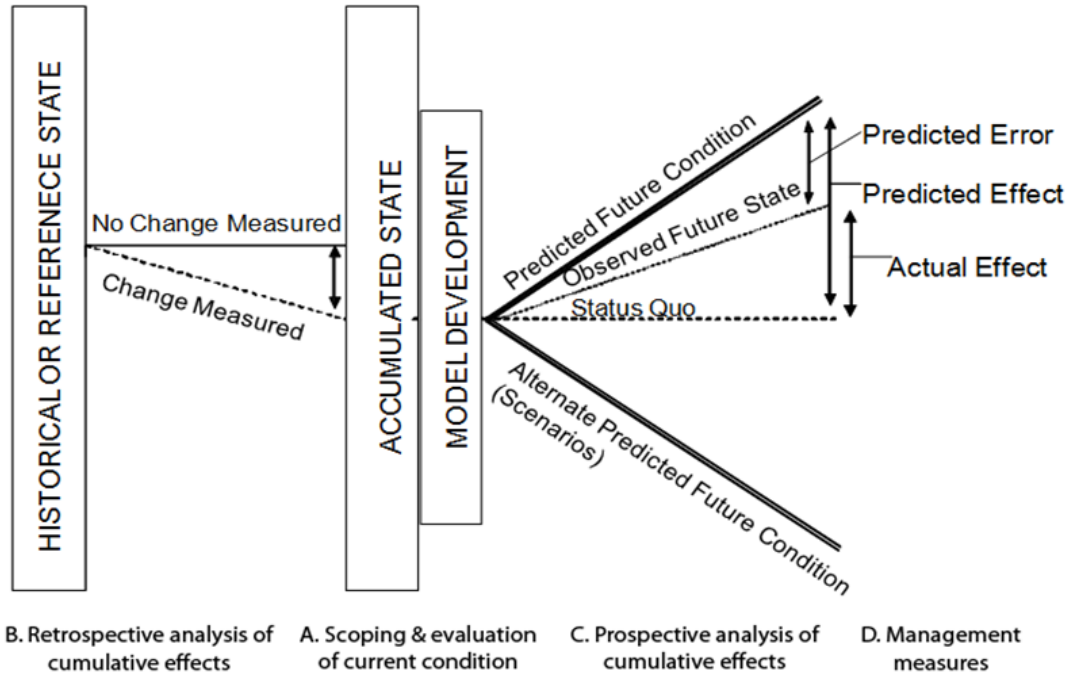
i. that other projects may or may not undergo EIS and implement mitigation measures does not mean that the Project will not result in cumulative effects

ii. neither should it relinquish the proponent from the responsibility of assessing those effects.

If it is deemed acceptable practice that a proponent can identify a project as unlikely to cause cumulative environmental effects based on the argument that 'other' projects in the region, including future projects, will also undergo an EIS and implement mitigation measures, then there is no point in requiring that a CEA be done in the first place.

Analysis

D. Cumulative effects management



i) Is the significance of a project's cumulative effects measured against a past reference condition and not simply the current, cumulative or disturbed condition?

Determination of significance in CEA involves finding out how much further effect or pressure can be sustained by a VEC before it suffers changes in condition or state that cannot be reversed

i. One cannot tell if a cumulative effect is significant if one only looks at the incremental change a project causes to a VEC *in isolation* of other activities
ii. Standard practice involves comparing the nature of the predicted effect on VEC conditions against those in a 'pre-disturbance' state, and understanding how much disturbance has already been created over time

As stated earlier, in the Bipole III CEA, all previous disturbances on the landscape are collectively and erroneously absorbed into the description of 'baseline conditions' for the project (Chapter 6).

ii) Is the significance of cumulative effects adequately described and justified (e.g. based on regulatory thresholds, environmental policies, expert evaluation, public concerns, etc.) and based on VEC sustainability, defined by a desired healthy condition or threshold as opposed to the magnitude of the individual project stress on that VEC?

Given the Project's significant effects were judged as small in magnitude, short in duration (no more than five years), and confined to the Project Footprint or the study area, and taking into account proposed mitigation, monitoring, and adaptive management programs, they were deemed insignificant from a regulatory perspective (Executive Summary, p. iv and v).

The same reasoning is applied to the significance determination for cumulative effects.

Example 1

The CEA states:

"In conclusion, Local Study Area incremental cumulative effects of the Project during construction and operation on mammals and mammal habitat (with the exception of caribou) and other biophysical components and VECs due to factors discussed above (plans for monitoring, harvest management strategies, regional planning initiatives) were considered to the extent feasible in Chapter 8 assessment and are not considered to be significant" (Chapter 9, p. 9-17).

As a class, the cumulative effects of the project are simply (dis)missed.

iii) Are the incremental impacts of the proposed initiative 'traded off' against the significance of all other disturbances of activities in the region (i.e. minimized or masked)?

Yes.

Example 1

"It would not make sense from a methodological perspective to assess CEs for VECs when there are no residual adverse effects" (CEC/MH-III-104, p. 118).

Example 2

"Manitoba Hydro is participating in several future projects considered in the CEA. This facilitates Manitoba Hydro management and/or reduction of potential cumulative effects. As part of the licensing process for these other projects, Manitoba Hydro will be required to develop sufficient mitigation measures, monitoring and follow-up programs to ensure there will not be significant residual adverse effects for these projects" (Chapter 9, p. 9-7).

Example 3

"The above future projects identified in Table 9.2-3 (including the Conawapa Generation project) will, if and when they proceed, be subject to their own review process and as part of that review process would need to satisfy regulators that there would be no significant adverse effects (including cumulative effects). Given that these projects and activities are prospective, and the timing and spatial extent of the effects are not well understood at this time, they are addressed only to a limited extent in this CEA, i.e., to note prospective overlap issues to be addressed in the future when and if these projects are subject to regulatory review" (Chapter 9, p. 9-12).

i. The practice of displacing responsibility for cumulative effects from one project to the next is unacceptable and almost ensures that cumulative effects will never be adequately addressed in any of the projects, or for the projects cumulatively.

iv) Are mitigation measures identified that help offset significant cumulative effects, and if so, is consideration given to multi-stakeholder collaboration to develop joint management measures?

Significant adverse cumulative effects of the Project are not anticipated.

Curiously, Chapter 9 still specifies that a range of management initiatives and partnerships are in place to absorb any emergent cumulative effects of the project.

Example 1 - Biophysical VECs

Manitoba Conservation expected to play a key role in monitoring mammal populations (Chapter 9, p. 9-16 and 9-17). Province of Manitoba also expected to support adaptive management initiatives related to caribou (Wabowden Range).

Example 2 – Socio-economic VECs

“Chapter 8 has identified and described a robust…approach…to address project effects related to public safety and worker interactions in Gillam” (Chapter 9, p.9-25).

v) Is adaptive management identified for significant cumulative effects contingent upon future and uncertain developments and impact interactions?

Adaptive management:

i. Is an iterative process whereby current conditions are used to determine subsequent management actions

ii. Used especially when uncertainty about future conditions is high

iii. Establishes a regular feedback loop that links project effects to VEC responses to changes in mitigative strategies

Despite that the Bipole III CEA did not find any significant adverse cumulative effects of the Project (other than for caribou), adaptive management is still proposed as a means to address incremental cumulative adverse effects emerging from the Project over time, both for biophysical and socio-economic VECs (caribou; public safety and worker interactions in Gillam).

3. Conclusions & Recommendations

1. Shifting baseline

The baseline against which cumulative effects are assessed largely ignores the cumulative effects on VECs of past actions and changing VEC conditions over time.

2. Assertions without analyses

There is a lack of supporting evidence/analysis of cumulative effects to support many of the conclusions. Statements about the Project's cumulative effects are often vague, qualitative and inadequately evidenced. The baseline is descriptive in nature; few trends or condition changes are identified and analyzed and thus there is little means to predict or model cumulative effects into the future.

3. Temporally restrictive

The temporal scope of analysis is insufficient and inconsistent with the lifetime of the project (stated to be 50 years, but more likely 100 years+). Analyses of cumulative effects does not extend beyond 5 yrs (caribout & habitat); all other future assessment are descriptive, with no planned activities beyond 2024 considered

4. Spatially and ecologically restrictive

The majority of VEC conditions are not examined with the context of regional ecological health, and is largely restricted to the ROW; with the exception of caribou habitat, few thresholds are utilized in significance determination.

5. Passing the buck

Responsibility for future cumulative effects of the project are either displaced or dismissed by suggesting they will be absorbed through prior established mitigation and compensatory programs, or addressed in future environmental assessments

6. Misrepresentation (or misunderstanding) of cumulative effects

The CEA assesses the magnitude of the Project's impacts 'compared to' the effects of other actions, versus 'in addition to' past changes in VEC conditions and 'in addition to' the effects of other current and future actions. The TOTAL or cumulative effects of the Project on VECs are not properly considered.

Recommendations specific to the Bipole III Project EIS cumulative effects assessment

1. That the cumulative effects analysis consider, at a minimum, all other hydroelectric generating and transmission projects – including the effects of past projects and future and prospective projects.

2. Given the noted uncertainty in the EIS of the nature and types of prospective developments in the region, that the cumulative effects analysis adopt a scenario-based approach to modeling the effects of future surface disturbances, such as those associated with linear features, habitat fragmentation, and river crossings and use appropriate analytical methods and tools to do so.

3. That the significance of the Project's cumulative effects are re-examined based on the TOTAL effects of all activities on the VECs of concern, rather than examining the coincidence effects with each individual future or prospective project.

4. That an analysis of cumulative effects be undertaken (e.g., modeling, simulation, trends, extrapolation), and the evidence provided in the EIS to support the assertions about cumulative effects.

5. That the Project not proceed until a cumulative effects assessment is completed that sufficiently addresses the above recommendations.

6. That the baseline assessment examine trends or changes in VEC conditions from pre- or previous-disturbance conditions (at a minimum pre-Bipole I and II) to current conditions, and examine the health of VECs against ecological thresholds, regulatory thresholds, or desirable conditions.

7. That the baseline assessment examine trends or changes in disturbance conditions (e.g., river crossings, linear features, fragmentation, etc.) in the study area.

8. That the temporal scope of the cumulative effects assessment consider in its analysis the full range of future and prospective projects and activities identified in Chapter 9 of the EIS.

9. That the analysis of cumulative effects extend beyond the limited 5, 10 and 20-year horizons identified in the EIS to be consistent with: i) the temporal scope of future and prospective projects and activities identified in Chapter 9 of the EIS, and ii) the lifecycle of the Project.

10. That the predictive component of the cumulative effects assessment identify maximum allowable disturbances or potential thresholds (e.g. density of linear features, fragmentation, number or density of river crossings), that can be used to evaluate the risks to VEC sustainability under future development or disturbance conditions.

Recommendations for ensuring good-practice CEA

1. That the *Environment Act* be updated to clearly express requirements for the analysis of the cumulative effects of land-use projects in order that a more realistic assessment of the impacts of human activities can be determined.

2. That the *Environment Act* be updated to disallow phased-in approval processes that coincide with project planning and development. Although attractive to developers planning large projects, it serves to fragment a development and potentially limits the effectiveness of efforts to assess cumulative environmental effects.

3. The EIS Scoping Document refers to regional and strategic approaches to cumulative effects assessment. We recommend that the Government of Manitoba undertake immediately a regional-strategic environmental assessment of the cumulative effects of current and future land uses, particularly in the northern portion of the Bipole III study area.

4. That the Government of Manitoba implement regional monitoring program for watershed health, focused on monitoring river system condition and landscape change (e.g., linear disturbances, riparian habitat, fragmentation) in order to provide project proponents with a reliable dataset on which to base their cumulative effects assessments and to identify thresholds of ecological change or disturbance for the region.

Review of the Cumulative Effects Assessment undertaken by Manitoba Hydro for the Bipole III Project

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