

CEAMF STUDY: VOLUME 1

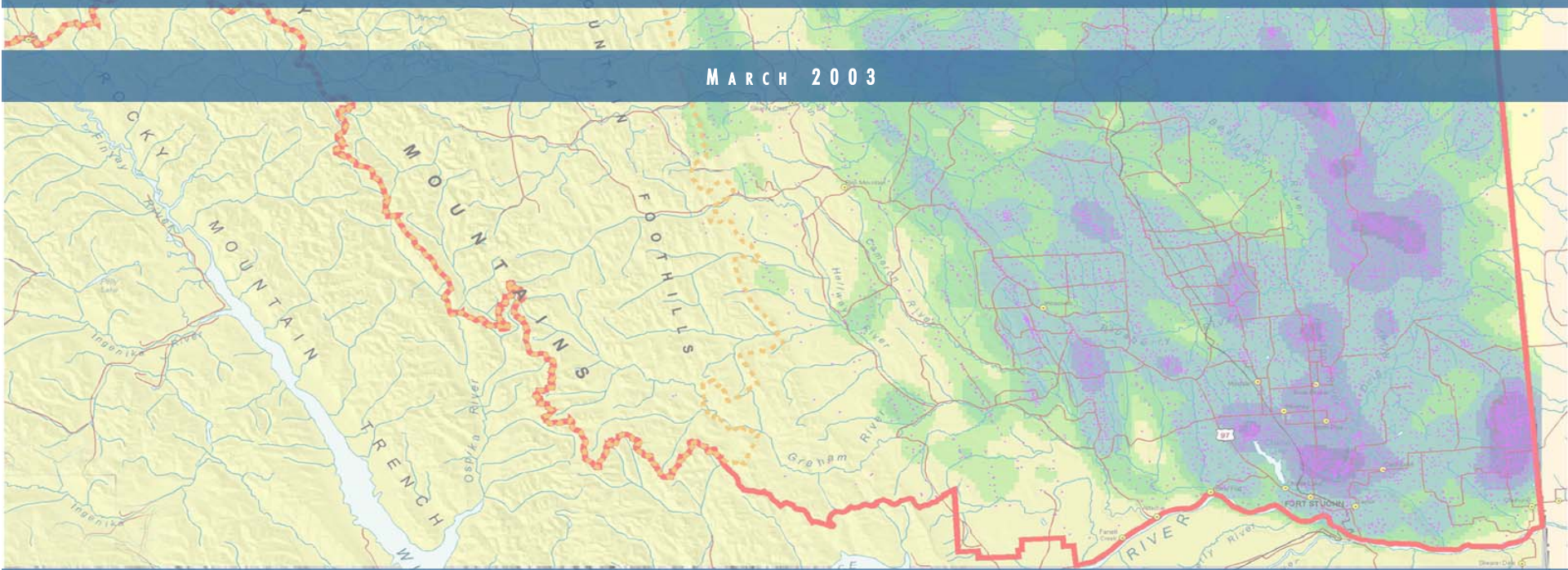
A CUMULATIVE EFFECTS ASSESSMENT
AND MANAGEMENT FRAMEWORK (CEAMF)
FOR NORTHEAST BRITISH COLUMBIA

FINAL



PREPARED BY AXYS ENVIRONMENTAL CONSULTING LTD.

IN ASSOCIATION WITH:
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THERE'S MORE TO FORESTS POLICY ADVISORY AND ECOLOGICAL SERVICES



MARCH 2003

PREPARED FOR: THE BC OIL AND GAS COMMISSION - THE MUSKWA-KECHIKA ADVISORY BOARD

**A CUMULATIVE EFFECTS ASSESSMENT AND
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FINAL REPORT

**Prepared for:
The BC Oil and Gas Commission
The Muskwa-Kechika Advisory Board**

**Prepared by:
AXYS Environmental Consulting Ltd.
Sidney, British Columbia**

**In Association with:
Salmo Consulting Inc.
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Limnotek Research and Development
RWDI West Inc.
'There's More to Forests' Policy Advisory and Ecological Services**

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Executive Summary

Report Design and History

<i>What is the purpose of this report?</i>	The purpose of this report is to describe a framework to both assess and manage cumulative effects in the study area. The product of this is referred to as a Cumulative Effects Assessment and Management Framework (CEAMF).
<i>What is the study area?</i>	The study area is the portion of northeast BC that is bordered by the Peace River to the south, the Muskwa-Kechika Management Area (MKMA) to the west, the Alberta provincial border to the east, and the NWT territorial border to the north.
<i>Why was this report done?</i>	This report was done as a response to concerns in the region about the possibility of worsening environmental effects due to multiple land and resource use activities. Some mechanism was needed to address these concerns; (specifically, those related to the potential contributions of oil and gas projects to the cumulative effects), and the Oil and Gas Commission's (OGC) process that reviews project applications.
<i>Objectives of this Report</i>	The objectives of the report are to: <ol style="list-style-type: none">1. define a CEAMF, describe its attributes, and explain how it may be implemented;2. assist project reviewers, specifically the OGC, in addressing cumulative effects as part of their regulatory mandate; and3. assist land and resource managers in addressing cumulative effects throughout the study area.
<i>For whom was this report written?</i>	This report was written for the OGC and the Muskwa-Kechika Advisory Board (MKAB).
<i>For whom is the framework intended?</i>	The framework is designed, principally, to meet the needs of the OGC. The framework is also intended to meet the needs of advisory and administrative bodies that are responsible for managing the MKMA; specifically, the MKAB and the provincial government. However, all or many aspects of the framework may also be adopted by government ministries that are responsible for lands outside of the MKMA, by First Nations, and by other organizations and public groups in the region.
<i>Who funded this report?</i>	The report was funded by the OGC's Environmental Fund, with partial contributing funding from the Muskwa-Kechika Trust Fund.
<i>Who did the report?</i>	Development and production of this volume of the study was led by AXYS Environmental Consulting Ltd., located in Sidney, BC. Other consultants contributed specific material within the report.
<i>Who else has been consulted?</i>	Team members have consulted with representatives of the OGC, MKAB, and various government ministries. Furthermore, a two-day workshop was held in Fort St. John in January 2002, in which the aforementioned representatives and First Nations were invited to discuss the proposed work.

<i>How is this report organized?</i>	<p>This report represents Volume 1 of a two-volume set. Volume 1 <i>A Cumulative Effects Assessment and Management Framework (CEAMF) for Northeast British Columbia</i>, is organized into the following main sections:</p> <ul style="list-style-type: none"> • Introduction (describes the purpose, scope and context for the work); • Land Administration (describes government land and resource use management in the region); • Regional Assessment (describes the land use setting and the state of selected environmental features); • Regional Framework (describes the framework); and • Summary and Recommendations (outlines key finding, contributions to science and decision making, and a series of recommendations).
<i>What are the other volumes in this report series?</i>	<p>There is one other volume in this series: Volume 2 <i>Cumulative Effects Indicators, Thresholds, and Case Studies</i>, which proposes cumulative effects indicators and thresholds for the region based on the detailed analysis of cumulative effects in two case study areas. Volumes 1 and 2 are interconnected, and each provides a specific contribution to the framework.</p>

Report Discussion and Results

<i>What are cumulative effects?</i>	<p>Cumulative effects are changes to the environment that are caused by an action in combination with other past, present, and future human actions. These changes are typically evaluated under some form of regulatory requirement for specific project applications through a Cumulative Effects Assessment (CEA).</p>
<i>What is a framework?</i>	<p>A Regional Cumulative Effects Assessment and Management Framework (CEAMF) is an administrative structure that combines various initiatives that assist decision makers in assessing and managing the effects of human use on the land.</p>
<i>What types of effects does the framework address?</i>	<p>The report focuses on cumulative effects on the natural environment; however, the framework may readily be expanded to include effects on wilderness values, First Nations traditional values, and other social, cultural, economic and land use issues.</p>
<i>What are the parts of the framework?</i>	<p>The framework comprises the following main parts:</p> <ul style="list-style-type: none"> • Regional assessment; • Regional planning and research studies; • Effects management; • Project assessment matrices; • Project screener; • Thresholds; and • Monitoring. <p>This are tied together by what is referred to here as the Sustainable Resource Management Strategy (SRMS), which is a CEAMF customized for Northeast BC.</p>

<i>What is the regional assessment?</i>	The regional assessment is a characterization of the state of land and resource use and various environmental features (air quality, soils and terrain, aquatic resources, vegetation and wildlife) in the study area. A description of each environmental feature includes a discussion of issues, effects, valued components, and specific areas of possible concern (referred to as hot spots). The regional assessment provides, at a coarse scale over a large geographic area, information of use to both project-specific reviewers and regional planners. This section includes a series of 30 maps illustrating key concepts.
<i>What are the regional planning and research studies?</i>	The regional planning and research studies are various initiatives that improve and add to existing information that is useful and necessary to decision makers. These studies focus on applied landscape ecology, ecological response studies, future scenario forecasting, and effects monitoring.
<i>What is effects management?</i>	Effects management includes any measures needed to minimize or eliminate effects from human disturbances. These measures may be the responsibility of a single project proponent, of multiple project proponents, or of government. As such, these measures are either project-specific or regional in nature. The report describes 29 measures, and recognizes those already being implemented or considered in northeast BC and elsewhere.
<i>What are the project assessment matrices?</i>	The project assessment matrices provide generic and specific information that is useful in the review of individual oil and gas project applications. The information provided in the matrices is based on the five conventional steps in project assessment, including scoping, analysis, mitigation, significance evaluation, and follow-up.
<i>What is the project screener?</i>	The project screener is a step-by-step process for OGC staff to follow when reviewing project applications for possible cumulative effects issues. The process has two options: one is a simple series of questions that can readily be answered with available information; and the other is based on thresholds to be used when they become available. An expanded review process is also described for situations warranting more detailed review of an application as a result of certain environmental concerns. This OGC-customized screening tool is called the Application Cumulative Effects Screener, or ACES.
<i>What are thresholds?</i>	Thresholds are measures of limits of acceptable change. Four types of thresholds are proposed based on access density in broad landscapes, access density within watersheds, core habitat security, and species-specific thresholds. In the framework, contribution to the threshold by each project is compared to three levels of thresholds (cautionary, target, and critical). The thresholds are introduced and summarized in this report, and are fully detailed in Volume 2.
<i>What is monitoring?</i>	Monitoring is the on-going determination of environmental conditions, the verification of predicted effects, and the verification of the effectiveness of applied effects management measures. It is a critical aspect of the framework – one that is directly linked to the principles of adaptive management.
<i>What is the fundamental approach on which the framework is based?</i>	The framework is based on the following principles: <ul style="list-style-type: none">• a response to assessing and managing cumulative effects within a regulatory review process for individual project applications must not be onerous to the majority of applicants or to the reviewers;

- in the absence of thresholds, cumulative effects can only reasonably and practically be addressed through the implementation of measures that successfully reduce environmental effects. Some of these measures may be specific to individual projects, while others require joint coordination and involvement among the various parties involved. The result of these efforts is to slow down the pace of negative environmental change, not necessarily to eliminate cumulative effects;
- cumulative effects, ultimately, can only be managed through the implementation of thresholds. The collective contributions of human activities are compared to thresholds, which if exceeded, result in adjustments to projects, implementation of regional initiatives, and possibly, the temporary or indefinite rejection of projects;
- with or without thresholds, various regional initiatives should be implemented that provide the necessary information to land and resource managers to assist their decision-making. These initiatives may be supported either by government or jointly with industry; and
- in recognition of the above, a ‘dual-track’ approach is proposed that includes addressing cumulative effects at the project level while at the same time addressing cumulative effects at the regional level.

How would the framework be implemented?

The framework is practically implemented in a process referred to as the Sustainable Resource Management Strategy (SRMS). Based on the ‘dual-track’ approach, it includes parts that are immediately implementable and some parts that may be incorporated as administrative resources, information, and financial support become available. The SRMS introduces the concept of a Steering Committee to advise on regional initiatives and to assist in the review of contentious project applications. A regional database of information is also introduced as part of the SRMS, based on the lead of the Regional Assessment in this report, and on existing provincial data sources.

Who would be involved in the implementation?

The report describes the roles and responsibilities of government, land and resource managers and planners, regulatory reviewers, project proponents, the proposed Steering Committee, the MKAB, the Oil and Gas Advisory Committee, First Nations, the public, and non-government organizations.

How would thresholds be implemented?

In Volume 2, thresholds were developed and demonstrated within two case study areas, one being a sub-set of this report’s study area. To implement these thresholds broadly throughout northeast BC, initiation of a pilot program is recommended. The program would be used to demonstrate practical application of thresholds within a regulatory review and provincial planning process. Following a successful pilot, thresholds would be incorporated within the OGC’s and other review processes.

Are there priorities for implementation of the framework?

It is expected that the OGC and MKAB, in consultation with other ministries and stakeholders, and in consideration of available resources and current priorities, would determine which of this report’s recommendations they have the capacity to immediately implement. Notwithstanding this expectation, four of the recommendations are key: adopting a ‘dual-track’ approach to assessing and managing cumulative effects; creating a SRMS Steering Committee; maintaining a regional database; and implementing ACES.

Does the framework solve all cumulative effects problems?

Theoretically, implementation of any framework would solve all cumulative effects problems, as by definition a framework is an all-encompassing approach to addressing cumulative effects through the use of a complete and inter-related set of initiatives. In practice, however, any framework is subject to various real-world limitations that are common to matters affecting regulatory process, public land administration, and industry and public interest. As such, the framework, as proposed in this report in the form of the SRMS, recognizes a phased and modular approach (i.e., users of the framework select appropriate initiatives over time, as required), and the need for time and broad participation to develop the various initiatives as described. Only in this way can a framework be accommodating, rather than intrusive.

Where does the framework start and end?

The framework, as described in this report, is a beginning, that with the involvement and support of the various parties recognized, would assist decision-makers in best fulfilling their mandates, and assisting the public and industry in becoming effectively involved in the decision-making process. With the incorporation of monitoring and adaptive, on-going evaluation of framework objectives and procedures, the framework can continually evolve to meet the mandate of government, and the interests of northern BC communities and resource users.

Contributions to Science and Decision-making

Overall, what does the framework contribute to science and decision-making?

Although other regions have attempted to develop and implement frameworks for addressing cumulative effects, the proposed SRMS for northeast BC is unique in comparison to many other frameworks as listed below.

- It could be immediately and practically applied as it builds on existing tools and requires limited changes to the current administrative and management structures in place for the region (the only change being the addition of the proposed SRMS Steering Committee).
- It recognizes and is consistent with both local and strategic level planning for the region and its implementation does not require that land use objectives be re-visited in the short term – it provides a ‘bridge’ between various levels of planning and on-the-ground project operations.
- It builds on and supports scientific research and provides a mechanism (in the form of the regional, publicly-accessible database) that can be used to continually update the state of knowledge for the region and feed that information back into decision-making processes.
- While focused on the environmental effects of oil and gas activities, the concepts presented here are readily adaptable for use by other land management agencies and for use in the assessment and management of social, cultural, recreational and economic effects.
- It provides realistic options for assessing, managing, and mitigating cumulative effects resulting from oil and gas activities, at both the local and regional scale, based on knowledge of what is appropriate to the region and what has been proven successful elsewhere.

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- It breaks new ground in its identification of scientifically-based indicators and thresholds, which are customized for use in the region to which they would be applied, and which are implementable at a pilot scale in the short term (in conjunction with the recommended project screener).
 - It recommends a workable and non-onerous approach to incorporating cumulative effects into the day-to-day application review procedures currently in place by the OGC, while requiring only minimal changes to those procedures for the majority of application reviews;
 - It relies not on one management agency to solve the problems of cumulative effects but rather provides an ‘umbrella’ under which all cumulative effects management decisions could be made, by any agency or organisation, at any time – the concept of a multi-sector steering committee devoted to addressing cumulative effects issues is unique within the region.
 - In general, it provides reference points, guidance and options which support decision-making, which are adaptable to a variety of situations, and which are linked to other planning and management processes at the local, sub-regional, and regional scales.

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Volumes

- Volume 1: A Cumulative Effects Assessment and Management Framework (CEAMF) for Northeast British Columbia
- Volume 2: Cumulative Effects Indicators, Thresholds, and Case Studies

Table of Contents

Executive Summary	i
Acknowledgements	vii
Volumes	ix
Table of Contents	xi
List of Tables.....	xv
List of Figures	xvii
List of Abbreviations.....	xix
1 Introduction	1-Error! Bookmark not defined.
1.1 Background.....	1-Error! Bookmark not defined.
1.2 Study Area	1-Error! Bookmark not defined.
1.3 Objectives.....	1-Error! Bookmark not defined.
1.4 Definition of a Framework	1-Error! Bookmark not defined.
1.5 Associated Project Components.....	1-Error! Bookmark not defined.
1.5.1 Cumulative Effects Assessment and Management Framework.....	1-Error! Bookmark not defined.
Bookmark not defined.	
1.5.2 Project Screener.....	1-Error! Bookmark not defined.
1.5.3 Indicators, Thresholds and Case Studies.....	1-Error! Bookmark not defined.
1.6 Use and Structure of the Report	1-Error! Bookmark not defined.
1.7 Evolving Nature of the CEAMF	1-Error! Bookmark not defined.
2 Land Administration	2-Error! Bookmark not defined.
2.1 Regulatory Framework for Land Management.....	2-Error! Bookmark not defined.
2.1.1 Roles and Responsibilities	2-Error! Bookmark not defined.
2.1.2 Oil and Gas Commission.....	2-Error! Bookmark not defined.
2.2 Regulatory Requirements for Cumulative Effects Assessment .	2-Error! Bookmark not defined.
defined.	
2.3 Land Use Planning	2-Error! Bookmark not defined.
2.4 Muskwa-Kechika Management Area.....	2-Error! Bookmark not defined.
2.4.1 Muskwa-Kechika Advisory Board.....	2-Error! Bookmark not defined.
2.4.2 Local Level Planning in the MKMA.....	2-Error! Bookmark not defined.
2.4.3 Research and Projects in the MKMA.....	2-Error! Bookmark not defined.
3 Regional Assessment	3-Error! Bookmark not defined.
3.1 Overview	3-Error! Bookmark not defined.
3.1.1 Products.....	3-Error! Bookmark not defined.
3.1.2 Types of Effects	3-Error! Bookmark not defined.
3.1.3 Mapping	3-Error! Bookmark not defined.
3.2 Land and Resource Use	3-Error! Bookmark not defined.
3.2.1 Setting	3-Error! Bookmark not defined.
3.2.1.1 Residential Settlement.....	3-Error! Bookmark not defined.
3.2.1.2 Transportation	3-Error! Bookmark not defined.
3.2.1.3 Industrial Activities	3-Error! Bookmark not defined.
3.2.1.4 Non-industrial Activities.....	3-Error! Bookmark not defined.

3.2.1.5	Protected Areas	3-Error! Bookmark not defined.
3.2.1.6	Muskwa-Kechika Management Area.....	3-Error! Bookmark not defined.
3.2.1.7	Land Use Plans.....	3-Error! Bookmark not defined.
3.2.2	Issues	3-Error! Bookmark not defined.
3.2.2.1	Interior Plateau	3-Error! Bookmark not defined.
3.2.2.2	Muskwa-Kechika Management Area.....	3-Error! Bookmark not defined.
3.2.3	Hot Spots.....	3-Error! Bookmark not defined.
3.3	Air Quality	3-Error! Bookmark not defined.
3.4	Soils and Terrain	3-Error! Bookmark not defined.
3.4.1	Setting and Issues.....	3-Error! Bookmark not defined.
3.4.1.1	Soil Acidification	3-Error! Bookmark not defined.
3.4.1.2	Soil Quality/Capability.....	3-Error! Bookmark not defined.
3.4.1.3	Permafrost Areas.....	3-Error! Bookmark not defined.
3.4.2	Hot Spots.....	3-Error! Bookmark not defined.
3.4.2.1	Acid Sensitivity.....	3-Error! Bookmark not defined.
3.4.2.2	Erosion Risk.....	3-Error! Bookmark not defined.
3.5	Aquatic Ecosystems.....	3-Error! Bookmark not defined.
3.5.1	Setting	3-Error! Bookmark not defined.
3.5.1.1	Physical Environment	3-Error! Bookmark not defined.
3.5.1.2	Fisheries Resources.....	3-Error! Bookmark not defined.
3.5.2	Issues	3-Error! Bookmark not defined.
3.5.2.1	Overview	3-Error! Bookmark not defined.
3.5.2.2	Interior Plateau	3-Error! Bookmark not defined.
3.5.2.3	Muskwa-Kechika Management Area.....	3-Error! Bookmark not defined.
3.5.3	Valued Components	3-Error! Bookmark not defined.
3.5.4	Hot Spots.....	3-Error! Bookmark not defined.
3.6	Vegetation	3-Error! Bookmark not defined.
3.6.1	Setting	3-Error! Bookmark not defined.
3.6.2	Issues.....	3-Error! Bookmark not defined.
3.6.3	Valued Components.....	3-Error! Bookmark not defined.
3.6.4	Hot Spots.....	3-Error! Bookmark not defined.
3.7	Wildlife.....	3-Error! Bookmark not defined.
3.7.1	Setting	3-Error! Bookmark not defined.
3.7.2	Issues.....	3-Error! Bookmark not defined.
3.7.2.1	Ungulates.....	3-Error! Bookmark not defined.
3.7.2.2	Large Carnivores.....	3-Error! Bookmark not defined.
3.7.2.3	Furbearers.....	3-Error! Bookmark not defined.
3.7.2.4	Small Mammals	3-Error! Bookmark not defined.
3.7.2.5	Birds	3-Error! Bookmark not defined.
3.7.3	Valued Components.....	3-Error! Bookmark not defined.
3.7.4	Hot Spots.....	3-Error! Bookmark not defined.
3.7.4.1	Grizzly Bear	3-Error! Bookmark not defined.
3.7.4.2	Moose and Marten.....	3-Error! Bookmark not defined.
3.7.4.3	Warbler.....	3-Error! Bookmark not defined.
3.7.4.4	Caribou.....	3-Error! Bookmark not defined.
3.7.5	Summary	3-Error! Bookmark not defined.

4	Regional Framework.....	4-Error! Bookmark not defined.
4.1	Solving the Cumulative Effects Problem	4-Error! Bookmark not defined.
4.1.1	What is the Problem?	4-Error! Bookmark not defined.
4.1.2	What is the Solution?	4-Error! Bookmark not defined.
4.1.2.1	The Sustainable Resource Management Strategy	4-Error! Bookmark not defined.
4.2	Role of Individual Project Application Assessments	4-Error! Bookmark not defined.
4.2.1	Environmental Impact Assessment	4-Error! Bookmark not defined.
4.2.1.1	What is an EIA and How to Do One	4-Error! Bookmark not defined.
4.2.1.2	What Projects are Subject to EIAs?	4-Error! Bookmark not defined.
4.2.2	The OGC's Current Review Process.....	4-Error! Bookmark not defined.
4.2.3	A Modified OGC Review Process	4-Error! Bookmark not defined.
4.2.3.1	Basis of Approach	4-Error! Bookmark not defined.
4.2.3.2	Levels of Review.....	4-Error! Bookmark not defined.
4.2.3.3	What Additionally is Required?.....	4-Error! Bookmark not defined.
4.2.3.4	Information Requirements.....	4-Error! Bookmark not defined.
4.2.3.5	Roles and Responsibilities	4-Error! Bookmark not defined.
4.3	Role of the Regional Assessment.....	4-Error! Bookmark not defined.
4.4	Role of Regional Planning and Research Studies.....	4-Error! Bookmark not defined.
4.4.1	Overview	4-Error! Bookmark not defined.
4.4.2	Regional Planning	4-Error! Bookmark not defined.
4.4.3	Research	4-Error! Bookmark not defined.
4.4.3.1	Applied Landscape Ecology.....	4-Error! Bookmark not defined.
4.4.3.2	Ecological Response Studies.....	4-Error! Bookmark not defined.
4.4.3.3	Future Scenario Forecasting.....	4-Error! Bookmark not defined.
4.4.3.4	Effects Monitoring	4-Error! Bookmark not defined.
4.5	Role of Effects Management.....	4-Error! Bookmark not defined.
4.5.1	Overview	4-Error! Bookmark not defined.
4.5.2	Types of Effects Management Measures	4-Error! Bookmark not defined.
4.5.2.1	Broadening the Collaboration	4-Error! Bookmark not defined.
4.5.3	Description of Effects Management Measures ..	4-Error! Bookmark not defined.
4.5.3.1	Project.....	4-Error! Bookmark not defined.
4.5.3.2	Joint Project.....	4-Error! Bookmark not defined.
4.5.3.3	Regional	4-Error! Bookmark not defined.
4.5.4	Details for Selected Regional Techniques	4-Error! Bookmark not defined.
4.5.4.1	Integrated Landscape Management.....	4-Error! Bookmark not defined.
4.5.4.2	Access Management.....	4-Error! Bookmark not defined.
4.5.4.3	Development Plans.....	4-Error! Bookmark not defined.
4.6	Role of Thresholds.....	4-Error! Bookmark not defined.
4.6.1	Regional Vision and Objectives.....	4-Error! Bookmark not defined.
4.6.2	Implementing Thresholds.....	4-Error! Bookmark not defined.
4.6.2.1	Challenges to Implementation.....	4-Error! Bookmark not defined.
4.6.2.2	Decision Options.....	4-Error! Bookmark not defined.

4.6.2.3 A Threshold Implementation Strategy 4-**Error! Bookmark not defined.**

4.7 Implementation..... 4-Error! Bookmark not defined.

4.7.1 Dual Tracks 4-**Error! Bookmark not defined.**

4.7.2 Common Elements 4-**Error! Bookmark not defined.**

4.7.2.1 Steering Committee..... 4-**Error! Bookmark not defined.**

4.7.2.2 Regional Database..... 4-**Error! Bookmark not defined.**

4.7.2.3 Regional Monitoring 4-**Error! Bookmark not defined.**

4.7.3 Roles and Responsibilities 4-**Error! Bookmark not defined.**

4.7.3.1 Government (Resource Managers and Planners).....4-**Error! Bookmark not defined.**

4.7.3.2 Application Reviewers 4-**Error! Bookmark not defined.**

4.7.3.3 Project Proponents..... 4-**Error! Bookmark not defined.**

4.7.3.4 Steering Committee..... 4-**Error! Bookmark not defined.**

4.7.3.5 First Nations 4-**Error! Bookmark not defined.**

4.7.3.6 Muskwa-Kechika Advisory Board..... 4-**Error! Bookmark not defined.**

4.7.3.7 Public and Non-Government Organizations .. 4-**Error! Bookmark not defined.**

4.7.4 Decision and Information Flow..... 4-**Error! Bookmark not defined.**

5 Summary and Recommendations 5-Error! Bookmark not defined.

5.1 Summary of Key Framework Components..... 5-Error! Bookmark not defined.

5.2 Contributions of the SRMS to Science and Decision-making5-Error! Bookmark not defined.

5.3 Recommendations 5-Error! Bookmark not defined.

6 References 6-1

Appendix A: Project Terms of Reference..... A-1

Appendix B: Cumulative Effects Frameworks in Other Areas..... B-1

Appendix C: Workshop Notes C-1

Appendix D: Database Description D-1

Appendix E: Hotspot Derivation E-1

Appendix F: Oil and Gas Project Assessment Matrices F-1

Appendix G: OGC Application Cumulative Effects Screener (ACES)..... G-1

Appendix H: Oversize Maps H-1

List of Tables

Table 3-1. List of Baseline and Hot Spot Maps	3-Error! Bookmark not defined.
Table 3-2. Attributes of Aquatic VECs	3-Error! Bookmark not defined.
Table 3-3. Key Wildlife (Mammals).....	3-Error! Bookmark not defined.
Table 3-4. Key Wildlife (Breeding Birds)	3-Error! Bookmark not defined.
Table 3-5. Selection of Wildlife VECs	3-Error! Bookmark not defined.
Table 3-6. Hot Spot Map Summary	3-Error! Bookmark not defined.
Table 4-1. Effects Management Measures.....	4-Error! Bookmark not defined.
Table 4-2. Managing Effects as Single Applications and Under Development Plans.....	4-Error! Bookmark not defined.
Table 4-3. Examples of SRMS Implementation Scenarios.....	4-Error! Bookmark not defined.

List of Figures

Figure 1-1. Study Area	1-3
Figure 1-2. Elements of a CEAMF	1-8
Figure 4-1. Framework Overview	4-Error! Bookmark not defined.
Figure 4-2. Existing OGC Application Review Process	4-Error! Bookmark not defined.
Figure 4-3. Relationship of ACES to Existing OGC Review Process	4-Error! Bookmark not defined.
Figure 4-4. Application Cumulative Effects Screener Details ..	4-Error! Bookmark not defined.
Figure 4-5. Regional Planning and Research Studies	4-Error! Bookmark not defined.
Figure 4-6. Implications of Effects Management on Pace of Environmental Change	4-Error! Bookmark not defined.
Figure 4-7. Levels of Effects Management Measures	4-Error! Bookmark not defined.
Figure 4-8. Sustainable Resource Management Strategy	4-Error! Bookmark not defined.
Figure 4-9. Pulling it all Together: SRMS Decision and Information Flow ..	4-Error! Bookmark not defined.

List of Abbreviations

AAC	Annual Allowable Cut
ACES	Application Cumulative Effects Screener
ALCES	A Landscape Cumulative Effects Simulator
ALR	Agricultural Land Reserve
AMA	Access Management Area
ATV	All-terrain Vehicle
AXYS	AXYS Environmental Consulting Ltd.
BC	British Columbia
BCEAA	BC Environmental Assessment Act
BEC	Biogeoclimatic Classification
BEI	Broad Ecosystem Inventory
BEU	Broad Ecosystem Unit
BPPTP	Besa-Prophet Pre-Tenure Plan
BTM	Baseline Thematic Mapping
BWBS	Boreal White and Black Spruce
CAD	Conservation Area Design
CAPP	Canadian Association of Petroleum Producers
CCME	Canadian Council of Ministers of Environment
CEA	Cumulative Effects Assessment
CEAA	Canadian Environmental Assessment Act
CEAMF	Cumulative Effects Assessment and Management Framework
CEC	Cation Exchange Capacity
CEMA	Cumulative Effects Management Association
CWS	Canadian Wildlife Service
DEM	Digital Elevation Model
DFO	Fisheries and Oceans Canada
DIAND	Department of Indian Affairs and Northern Development (Federal)
DOE	Department of the Environment (Federal)
EEP	Environmental Protection Plan
EFP	Environmental Field Report
EFR	Environmental Field Report
EIA	Environmental Impact Assessment
ELC	Ecological Land Classification
EMM	Effects Management Measures
ER	Ecological Reserve
ERDZ	Enhanced Resource Development Zone
ESSF	Engelman Spruce- Subalpine Fir
EUB	Energy and Utility Board

FRBC	Forest Renewal BC
GDP	General Development Permit
GIS	Geographic Information System
GLOBIO	Global Methodology for Mapping Human Impacts on the Biosphere
GOAT	GIS Oracle Access Tool
IL	Information Letter
ILM	Integrated Landscape Management
IMP	Integrity Management Plan
LIS	Low Impact Seismic
LRMP	Land and Resource Management Plan
LWBC	Land and Water BC Inc.
MDRC	Maximum Disturbance Review Criteria
MEM	Ministry of Energy and Mines
MKAB	Muskwa-Kechika Advisory Board
MKMA	Muskwa-Kechika Management Area
MOE	Ministry of Environment
MOF	Ministry of Forests
MSRM	Ministry of Sustainable Resource Management
MWLAP	Ministry of Water, Land and Air Protection
NEB	National Energy Board
NES	Northern East Slopes
Nox	Nitrous Oxides
NWT	Northwest Territories
OGC	Oil and Gas Commission
PAI	Potential Acid Input
PAS	Protected Areas Strategy
PM	Particulate Matter
PTP	Pre-tenure Plans
RDP	Resource Development Permit
RLUP	Regional Land Use Plan
RMZ	Resource Management Zone
RoW	Right-of-Way
SMZ	Special Management Zone
SOE	State of the Environment
SO _x	Sulphur Oxides
SRMP	Sustainable Resource Management Plan
SRMS	Sustainable Resource Management Strategy
SWB	Spruce-Willow-Birch
TCU	True Colours Unit
TEK	Traditional Ecological Knowledge (or Indigenous Knowledge)
TIS	Threshold Implementation Strategy

TP	Total Phosphorous
TRIM	Terrain Resource Inventory Mapping
TSA	Timber Supply Area
UNBC	University of Northern British Columbia
USEPA	United States Environmental Protection Agency
VEC	Valued Ecosystem Component
VSC	Valued Social Component
WMA	Wildlife Management Area
ZOI	Zone of Influence

CHAPTER 1 : INTRODUCTION

CUMULATIVE EFFECTS ASSESSMENT AND MANAGEMENT FRAMEWORK (CEAMF) STUDY



1 Introduction

1.1 Background

As part of the British Columbia (BC) Oil and Gas Commission's (OGC) initiative to address environmental effects associated with oil and gas development, an environmental fund was established in 1998 to support research projects over a five-year period. During 2001, three research areas were considered: air emissions; cumulative effects; and ecosystem health and integrity. With regard to cumulative effects, AXYS Environmental Consulting Ltd., Diversified Environmental Services, and Salmo Consulting Inc. proposed to develop a Cumulative Effects Assessment and Management Framework (CEAMF) for northeast British Columbia, including the Muskwa-Kechika Management Area (MKMA). The proposal was accepted by the OGC, and complementary funding was provided through the Muskwa-Kechika Trust Fund, a fund created through the *Muskwa-Kechika Management Area Act* to promote research aimed at addressing ecological sustainability and maintenance of wilderness characteristics in the MKMA by providing information to support planning processes.

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present, and future human actions (Hegmann *et al.* 1999). These environmental changes are typically evaluated under some form of regulatory requirement for specific project applications through a Cumulative Effects Assessment (CEA). CEAs build on what has been learned and applied in Environmental Impact Assessments (EIA); however, CEAs display some marked differences to EIAs that must be clearly understood by assessment practitioners and project proponents. To achieve the overall objective of mitigating and addressing environmental effects of oil and gas activities, it is necessary to have agreed-upon standards and guidelines for assessing and managing the cumulative impacts of these activities – i.e., a 'framework' (defined in more detail in Section 1.4).

The CEAMF presented in this report describes a practical approach, specific to northeast BC, for assessing and managing project-specific and regional cumulative effects. The framework includes and is supported by a database of regional information and a baseline assessment that identifies cumulative effects issues and 'hot spots' in the region. The framework also provides direction for other research on cumulative effects that will be undertaken under the OGC Environmental Fund or the Muskwa-Kechika Trust Fund, or by academia and industry. Finally, the framework provides an 'umbrella' under which environmental and cumulative effects assessment and management tools (e.g., application screening, modelling, land use planning, etc.) can be employed and updated.

The CEAMF is the overarching component of a broader body of work that will assist the OGC and Muskwa-Kechika Advisory Board (MKAB) in proactively addressing land use and resource management issues in northeast BC. The key elements of the CEAMF, including the regional assessment and a proposed application screening tool, are described in detail in this volume (Volume 1). Cumulative effects indicators, thresholds, and case studies are described in Volume 2.

While the proposed framework focuses on cumulative effects associated with oil and gas activities, and what can be done by the OGC to assess and manage such effects, it is recognized that you cannot manage cumulative effects for one sector in isolation of other influences. In the case of northeast BC, various land use activities will potentially contribute to cumulative effects. These activities include, but are not limited to, forestry, mining, hunting, trapping, fishing, hydroelectric development, transportation and utility development, agriculture, recreation, and human settlement. As a result, although the recommendations presented in both volumes of this study are aimed at the OGC and MKAB, specific components of the framework rely heavily on the involvement of other ministries, First Nations, industry, and stakeholders.

The development of a CEAMF for northeast BC is an ambitious and complex undertaking requiring broad-level support from regulators, resource users, and other stakeholders. To ensure that the CEAMF meets the needs of the OGC, the MKAB, and other stakeholders in northeast BC, input was received from government ministries, First Nations, the oil and gas industry, non-government organizations, and other interest groups through a series of meetings, workshops, and presentations. The CEAMF also recognizes and builds upon other planning activities in the region, including Land and Resource Management Plans (LRMPs), Sustainable Resource Management Plans (SRMP), local-level plans, and other initiatives that set land management objectives. As such, it provides a 'bridge' between regional-scale land planning and management and site-specific (i.e., project-level) activities.

1.2 Study Area

The CEAMF and baseline regional assessment presented in this report are specific to the northeast British Columbia region (Figure 1-1). The study area includes the Fort Nelson and Fort St. John Forest Districts, a portion of the Mackenzie Forest District, and the whole of the Muskwa-Kechika Management Area (MKMA). The study area covers approximately 16.4 million hectares.

The Fort Nelson, Fort St. John and Mackenzie LRMPs guide land use activities in the study area (see also Section 2.3). Sixty per cent of the study area falls within the Fort Nelson LRMP area, 28.5% falls within the Fort St. John LRMP area, and 11.5% falls within the Mackenzie LRMP area. About 9% of the study area is classified as protected area, and is managed as part of the BC Protected Areas System.

The MKMA covers approximately 6.3 million hectares of the study area, and encompasses the eastern foothills of the Muskwa range of the Rocky Mountains (north of the Peace River), the Kechika range of the Cassiar Mountains, and the northern portion of the northern Rocky Mountain Trench. The MKMA comprises one of the largest remnants of untouched wilderness in North America, south of 60° latitude. As such, it provides critical habitat and movement corridors for an abundant and diverse group of large mammals, and supports the continent's largest intact predator-prey system (Gailus 2000). Although the MKMA contains numerous provincial parks and protected areas, it is neither a park nor an ecological reserve.

Figure 1-1. Study Area

The MKMA is a unique management concept, envisioned and designed as a special management area that will allow resource development to continue while the principles of conservation biology are applied to protect important wildlife and wilderness values. Within the MKMA, 11 protected areas have been established where resource extraction activities are not permitted. These core protected areas are connected by transition areas and buffer zones that allow for a number of sustainable human activities. Elsewhere in the MKMA, extractive resource development is permitted where it is consistent with local level plans and zoning¹ (e.g., pre-tenure plans and wildlife management plans – see also Section 2.4.2).

Northeast BC contains some of the richest oil and gas reserves in the province. In recent years, total oil and gas revenues have exceeded \$200 million annually, and permanent employment in the oil and gas sector has accounted for almost 20% of the local economy (Gailus 2000). Other industries important to the region's economy include forestry, mining of metallic and non-metallic resources, tourism, and localized agriculture.

The rapid rate of growth of oil and gas exploration and development in northeast BC has raised concerns about cumulative impacts from oil and gas-related activities alone, and in combination with other land uses. Further, the region, and the MKMA in particular, contains considerable non-industry values such as wilderness, public and commercial recreation, hunting, trapping, fishing, and First Nations' traditional and cultural values. Thus, this area is a good candidate for the development of a regional CEAMF.

Land use and administration in the study area are discussed in more detail in Section 2.

1.3 Objectives

The principal objective of Volume 1 is to present a CEAMF for conducting single-project assessments and managing regional cumulative effects in northeast BC. This objective will be achieved by:

- identifying preferred tools and approaches for cumulative effects assessment and management at the project-specific (i.e., local) and regional levels. This will help the OGC, proponents, and other stakeholders to better understand cumulative effects and to develop and implement methods to minimize these effects before they occur;
- initiating the development of a regional, spatially-referenced database and map series which contain information on biophysical attributes and development disturbances. The database and maps provide an overview of existing cumulative effects in the region so that potential areas of concern (i.e., hot spots) can be identified and significant data gaps noted. This will support project-specific assessments and will aid in applying proactive effects management; and

¹ For example, Special Wildland Zones are included in the Mackenzie LRMP portion of the MKMA. In these zones, forestry is excluded by other development activities are permitted.

- guiding future research priorities by identifying important data gaps regarding analytical methods, mitigation activities, and significance determinations. This will help with incorporating results from other research projects into practical applications for analyzing, evaluating, and managing cumulative effects (e.g., the development of new mitigation measures).

The framework can eventually be used by the OGC and industry as:

- a baseline for future assessments;
- a means of flagging regional hot spots and areas that require management or remedial action;
- a project screening tool to aid in the review of future applications and management initiatives;
- a guide to available effects assessment and management tools;
- a practical application for incorporating results from other research projects; and
- a means of identifying important data gaps and setting priorities for follow-up and monitoring.

Although the CEAMF was developed for the OGC and MKAB, it will have direct application to, and broad implications for, the oil and gas industry in the region. The CEAMF will aid the industry by raising awareness of cumulative impacts; providing increased understanding of how CEAs can be conducted as part of standard EIA processes; presenting a means for the consistent application of CEA methods; and providing greater consideration of cumulative effects and mitigation measures as part of oil and gas activities in the region.

While the proposed CEAMF presently focuses on assessing and managing cumulative effects relating to oil and gas activities, the framework has been developed with future expansion in mind. For example, the framework can be adapted to address other industrial impacts (e.g., forestry and mining), as well as non-industrial values (e.g., wilderness recreation). This future expansion of the framework will be particularly important within the context of the MKMA, in which only a small portion of the area has high oil and gas potential.

The Terms of Reference for this project are provided in Appendix A.

1.4 Definition of a Framework

Traditionally, cumulative effects have been assessed and managed on a project-by-project basis. Cumulative effects, however, can also be assessed and managed on a regional basis through a jointly coordinated and jointly funded approach that involves governments, proponents, and the public. A regional CEAMF is an administrative structure that can help decision makers assess and manage the effects of human use of the land.

A CEAMF, typically, is developed when concerns are raised about the long-term environmental effects of many land uses over a large geographic region (usually defined by jurisdictional, ecological, physiographic, or resource borders). This is especially true for relatively undisturbed areas facing rapid and extensive resource development from known and potential future projects.

A CEAMF is useful because it provides a 'one-window' approach to addressing cumulative effects over large geographic areas. As such, the various elements of the framework (discussed below) are coordinated to complement each other, and to ensure that effects of concern are identified, addressed, and monitored. Information on environmental and land use conditions is shared, stakeholders become involved, and a useful product is developed that can be used either to assist in the review of individual project applications, or to understand longer-term trends at a regional scale. Without a coordinated approach, information would likely remain unavailable or would not focus on regional issues of greatest concern. Project proponents, regulatory reviewers, and land administrators would likely be hampered by inadequate information, and would continue to make decisions in isolation.

A CEAMF, therefore, ties together the various initiatives that individually or collectively provide the information on which decisions are based. The CEAMF may also provide a means of interpreting information that will help land managers answer fundamental questions such as:

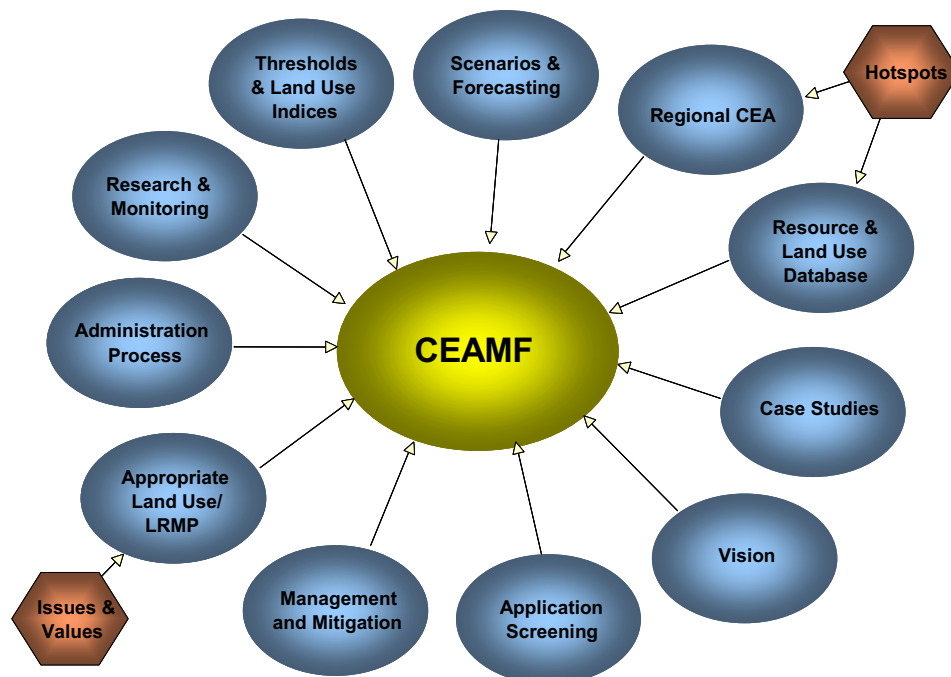
- Could a single proposed project cause a problem? If so, what can be done to mitigate that problem?
- Is there an environmental problem now as the result of many human disturbances? If so, what can be done to mitigate that problem?
- Could there be an environmental problem sometime in the future? If so, how soon, and what can be done to avoid that problem?

A CEAMF may include any combination of the following basic elements (Figure 1-2):

- ecological monitoring (e.g., of water quality; movements of far-ranging species);
- ecological research (e.g., on species responses to human disturbances);
- assessment methods (e.g., for quantitative assessment of sediment loading on streams);
- administrative review process (e.g., incorporating information for consideration during review of project applications);
- administrative coordination (e.g., a central body to coordinate information and initiatives relevant to cumulative effects);
- mechanisms of administrative compliance (e.g., enforcement or voluntary compliance);

- databases and mapping (e.g., mapping of existing ecological features through use of a Geographic Information System (GIS));
- land use plans (e.g., zonation of a region to various levels of allowable land use);
- protected area planning (e.g., exclusion of human disturbances from certain areas);
- management techniques (e.g., definition of best practices for mitigating industrial projects; identification of opportunities for regionally coordinated mitigation);
- stakeholder consultations (e.g., ongoing involvement of affected communities);
- scoping (e.g., establishment of a vision for desired land use; identification of issues of concern, or environmental and land use features of importance);
- limits to growth (e.g., identification of ecological and land use thresholds);
- application review (e.g., implementation of a project application screening process);
- future scenario forecasting (e.g., predicted effects for different levels of future development);
- project-specific cumulative effects assessments (i.e., assessment of the contribution of a specific project to overall cumulative effects); and
- regional cumulative effects assessment (i.e., assessment of the effects of all land uses).

Figure 1-2. Elements of a CEAMF



Typically, a jointly-funded, independent group of government, industry, non-government, and First Nations representatives is formed and called upon to define issues of concern (e.g., increased hunting pressure due to increased access; degraded air and water quality; loss of wildlife habitat), and to identify initiatives that may be implemented to solve those problems. These initiatives are then incorporated into the CEAMF.

Usually, the next step involves collecting and mapping information that describes existing conditions. This is normally based on the monitoring of certain ecological indicators. The results are then used to identify priority areas that require management of existing and potential future effects. Individual projects submitted to authorities for approval may then be reviewed in the context of the CEAMF. Land use planners and other decision-makers may then develop policies or other administrative mechanisms to manage land use so as to best meet identified objectives. Finally, and over time, new information and data are added to the CEAMF so that decisions can be made in an adaptive management fashion.

Many of these components and steps are described in more detail and with specific reference to northeast BC in subsequent sections of this report. Cumulative effects frameworks in place in other areas are described in Appendix B.

1.5 Associated Project Components

This project includes a number of separate but integrated components (described below), which, when combined, will provide an approach for identifying, scoping, assessing, and managing cumulative effects in northeast BC. This approach will help the OGC and industry ensure that cumulative effects are addressed in the project approval process. It will also provide a basis for which the MKAB, First Nations, and stakeholders can participate in and monitor progress towards managing regional cumulative effects.

1.5.1 Cumulative Effects Assessment and Management Framework

This report (Volume 1) describes an overall approach, specific to northeast BC, for conducting project-specific assessments and for managing cumulative effects on a regional scale. Volume 1 describes:

- land use setting and planning context in northeast BC;
- identification of important regional issues;
- selection of indicators for assessing ecosystem and socio-economic effects (i.e., Valued Ecosystem Components (VEC) and Valued Social Components (VSC));
- identification of hot spots or areas of potential concerns for specific VECs or VSCs;
- a dual-track approach (project-specific or regional) for addressing cumulative effects;
- effects management measures (e.g., thresholds, modelling, coordinated land planning); and
- recommendations for implementing the CEAMF and its components, including roles and responsibilities of key players.

1.5.2 Project Screener

Imbedding within the CEAMF are recommendations to implement an OGC Application Cumulative Effects Screener (ACES), a key component of the overall CEAMF. Section 4.2.3 of Volume 1 outlines the development and testing of an application screening process to assist the OGC in making decisions on petroleum exploration, development, and production proposals, and in managing cumulative effects. The screener provides a systematic method for reviewing project applications, and allows for consistent and accountable decision-making. The screener is designed to fit within the existing OGC application review process. Implementation of the screener would require processes for establishing, managing, and updating regional databases, as well as staff training, all of which are discussed in Section 4.2.3.

1.5.3 Indicators, Thresholds and Case Studies

Volume 2: Indicators, Thresholds and Case Studies describes candidate cumulative effects thresholds and a scheme for implementing those thresholds. Candidate thresholds are based on a literature review and specific evaluations of cumulative effects on fish and wildlife in two representative areas of northeast British Columbia. The case studies test and develop approaches for assessing and managing cumulative effects on fish and wildlife resources, and evaluate the suitability of available data. Volume 2 includes:

- a literature review on appropriate ecological indicators and thresholds for fish and wildlife management;
- a spatial database of existing biophysical and land use features for each representative area;
- a review of development and renewable resource trends for each representative area;
- the application of various methods and indicators to assess cumulative effects;
- the identification of candidate thresholds for northeast British Columbia;
- recommendations on the use of these thresholds for cumulative effects assessment and management; and
- the identification of implementation and data needs.

1.6 Use and Structure of the Report

This report should be used as a guide for assessing and managing cumulative effects at the project-specific and regional scales. The main audience for the CEAMF is the OGC; however, this report will also be of interest to other land management agencies, the MKAB, First Nations, proponents of industrial activities, residents of local communities, and other stakeholders.

This report consists of the following sections:

- **Section 1: Introduction** – provides a background to the history and structure of the report, defines the meaning of Cumulative Effects Assessment and Management Framework, and introduces the companion parts of the framework;
- **Section 2: Land Administration** – describes the administrative context for land management in British Columbia, and the study area, specifically;
- **Section 3: Regional Assessment** – describes the development of a database of environmental and land use information for the study area, summarizes existing environmental and land use features, identifies cumulative effects issues, and provides examples of how the database can be used to identify potential cumulative effects hot spots;
- **Section 4: Regional Framework** – describes a process for assessing and managing cumulative effects at the project-specific and regional level, and presents an approach for implementing the CEAMF, including respective roles and responsibilities of various players;
- **Section 5: Summary and Recommendations** – presents a set of broad recommendations for using the CEAMF and integrating it with existing plans and tools, and for monitoring and managing cumulative effects; and
- **Section 6: References** – documents information sources used during the preparation of the report.

Volume 1 also includes a number of appendices that provide background and technical information on the CEAMF and its components.

1.7 Evolving Nature of the CEAMF

The CEAMF presented in this Volume has evolved using input from various stakeholders. Consultations took place at interim stages of the project. In August 2002, a series of meetings with government ministry staff were held in Fort St. John. These meetings provided opportunities for discussing ministry-specific issues and matters of regional cumulative effects management that are outside the jurisdiction of any one ministry. In October 2002, a presentation was made to the MKAB in Mackenzie. The purpose of the presentation was to update board members on progress in the development of the CEAMF, and to seek feedback on the framework and its use.

During the project scoping stage, a two-day workshop was held in Fort St. John, at the end of January 2002. The workshop was attended by representatives from government ministries, industry, First Nations, academia, and non-government organizations, and was used to introduce the project and the concept of the CEAMF. Preliminary issues, valued ecosystem and social components, and methodologies for deriving environmental and land use hot spots were presented. A summary of this workshop is provided in Appendix C.

Preceding the workshop, a one-day facilitated session was held with First Nations groups, which have traditional territories in northeast BC. The purpose of the session was to identify cumulative effects issues associated with First Nations use of the land, and to discuss referrals to First Nations regarding project applications for proposed oil and gas development.

It is fully anticipated that this work will continue to evolve, especially through implementation of the CEAMF and its components. Ultimately, Volume 1 does not represent the final solution to cumulative effect management. Rather, it presents a framework within which various effects assessment and management strategies may coexist in a complementary and adaptive manner. To be effective, the CEAMF should have the support of all stakeholders who have an interest in managing cumulative effects in the region.

CHAPTER 2: LAND ADMINISTRATION

CUMULATIVE EFFECTS ASSESSMENT AND MANAGEMENT FRAMEWORK (CEAMF) STUDY

