

A Component of British Columbia's
Land Use Strategy

Kamloops Land and Resource Management Plan



Monitoring Report 1999

Foreword

The Kamloops LRMP Monitoring Report (1999) provides an assessment of the LRMP's implementation progress and effectiveness. The assessment process is consistent with the approach described in the *Kamloops Land and Resource Management Plan Monitoring Framework* (August 1999). The report was written by Stuart Gale and Associates Ltd. in collaboration with Gary Reay, Process Coordinator for the Kamloops LRMP.

The report could not have been written without the advice and direction provided by the Kamloops LRMP Monitoring Table (see list of members in appendix 1) and the following government agency representatives: Phil Whitfield (Program Manager, Thompson Okanagan Inter-agency Management Committee), Sandy McDonald, Phil Holman and Ernie Maynard (Ministry of Environment, Lands and Parks), Graham Strachan (Ministry of Agriculture and Food), Jim Britton (Ministry of Energy and Mines), Peter Lishman, Max Tanner, Judy Steves, Wendy Pepper and Ron Vanderzwan (Ministry of Forests), Mike Hanry (BC Parks), and Gord Kosakoski (Fisheries and Oceans Canada). Appreciation is also extended to the many additional people who provided information and data used to produce this report.

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Executive Summary

The Kamloops LRMP provides the provincial government and other resource users with direction on resource management. To ensure that the LRMP is implemented in accordance with its management direction and intent, it is important to monitor implementation progress and effectiveness on a regular basis.

This report includes an implementation assessment (section 2) and an effectiveness assessment (section 3). It also includes recommendations for improvements or changes to the LRMP based on the assessment results (section 4). The process for conducting implementation and effectiveness assessments is based on procedures outlined in the *Kamloops Land and Resource Management Plan Monitoring Framework* (August 1999).

Implementation Assessment

The implementation assessment summarizes the completion status of all LRMP projects. Projects combine several related LRMP strategies¹ together into a set of specified tasks and activities. Responsibility for the implementation of each project has been assigned to a lead agency.

Work plans have been prepared for each project which include expected outcomes, lead agency and other participants, and tasks and activities that need to be undertaken to achieve completion. Each year, the lead agency for each project is responsible for preparing a project summary, which reviews the progress made on tasks and activities over the previous year, and outlines priorities for the year ahead.

The implementation assessment is based upon the project summaries provided by the lead agencies. Projects have been assessed in terms of:

- work completed relative to the previous year's commitments
- cumulative progress (i.e., achievement of major project milestones)
- achievement of expected outcomes for completed projects
- implementation issues and/or constraints.

A summary of the implementation progress for each of the twelve projects in the Kamloops LRMP (as of June 1999) is presented in the following table. Progress for each project has been reported relative to one of the five following categories:

¹ In the *Kamloops Land and Resource Management Plan Monitoring Framework* strategies have been sorted as either "base" activities or "incremental" activities. Strategies identified as base activities will be implemented through existing agency programs (e.g., water management, forest development plans, mine development review process, etc.). Monitoring of these activities will occur through other processes such as the Forest Practices Board, and the Environmental Appeal Board. Strategies that have been identified as incremental activities have been grouped together into specific LRMP projects and will be monitored as part of the implementation assessment in this report.

Executive Summary

1. **Not Started (NS):** Projects where no work has been done to date. (0-5% complete)
2. **Initiated (I):** Projects where work commenced on at least one of the activities identified in project tasks. (6-30% complete)
3. **Midway (M):** Projects where work has been initiated and is underway on most activities. Some activities may be substantially complete or complete. (31-65% complete)
4. **Substantially Complete (SC):** Projects where work is underway on most activities and where many activities are substantially complete. (66-95% complete)
5. **Complete (C):** Projects where all activities have been implemented in accordance with the direction set out in the LRMP. (96-100% complete)

Kamloops LRMP Implementation Assessment Summary					
	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
A. Watershed Management (BCE)					
B. Fisheries Management (BCE)					
C. Ecosystem Management Strategies (BCE)					
D. Commercial Recreation Plans (BCE)					
E. Protected Area Management Plans (BCP)					
F. Grazing Enhancement Fund (MAF)					
G. Mineral Strategies (MEM)					
H. Watershed Management (BCFS)					
I. Biodiversity Emphasis Analysis (BCFS)					
J. Landscape Unit Plans (BCFS)					
K. Strategies for Grazing in Protected Areas(BCFS)					
L. Recreation and Tourism Management Plans (BCFS)					

Key to Acronyms:

BCE = BC Environment, Ministry of Environment Lands and Parks

BCP = BC Parks, Ministry of Environment, Lands and Parks

MAF = BC Ministry of Agriculture and Food

MEM = BC Ministry of Energy and Mines

BCFS= BC Forest Service (Ministry of Forests)

The assessment indicates that all twelve of the LRMP projects have been initiated. One project is substantially complete, nine projects are midway and two projects are still at the initiated stage.

The projects that are still at the initiated stage are Project D (Commercial Recreation Plans) and Project I (Biodiversity Emphasis Analysis).

The reason commercial recreation plans have not been developed is because of a reorganization within the Ministry of Environment, Lands and Parks that resulted in many of the Crown land management functions being transferred to a new Crown Corporation: British Columbia Assets and Lands Corporation (BCALC). BCALC is now working with the Ministry of Environment, Lands and Parks to develop Commercial Recreation Plans for the Kamloops LRMP.

The reason the biodiversity emphasis analysis has not yet been undertaken is because it is dependent on the biodiversity timber impacts, which will be included in the Timber Supply Review Analysis Report due for release in Spring 2000. The LRMP Monitoring Table will review this report in 2000. Another key component of the biodiversity emphasis analysis is the assessment of natural disturbance types. The Ministry of Forests is currently developing analysis and assessment tools for dry forest and grassland natural disturbance types (NDT4). These tasks will be completed in 2000 and will advance the project to midway complete.

Effectiveness Assessment

The effectiveness assessment determines whether the goals and objectives of the LRMP have been achieved by evaluating performance against a set of desired outcomes². The desired outcomes have been grouped into two categories—environmental and human activities—that reflect the key resource values addressed in the LRMP. Effectiveness is measured against a set of one or more indicators selected for each desired outcome.

The effectiveness assessment provides an indication of whether the implementation process has resulted in a positive, negative or neutral effect on environmental, economic and social values in the plan area. A summary of the assessment results for each of the desired outcomes is shown in the table on the following page.

The assessment indicates that 25 of the 30 desired outcomes are generally being met. This would suggest that the implementation of LRMP strategies over the past four years has contributed positively to the achievement of the goals and objectives in the Kamloops LRMP.

Two of the 30 desired outcomes are being partially met:

- A diversity and abundance of naturally occurring wildlife and their habitats
- A prosperous mining industry with access to Crown land for exploration and development.

Three of the 30 desired outcomes are generally not being met are:

- Healthy grassland ecosystems with representation of grassland dependent species
- A diversity and abundance of native fish populations and habitats
- Clean drinking water and a stable community water supply.

² Desired outcomes specify measurable targets that reflect the intent of the LRMP goals and objectives. See the *Kamloops Land and Resource Management Plan Monitoring Framework* (August 1999) for a description of the process for developing desired outcomes.

<i>Kamloops LRMP Effectiveness Assessment Summary</i>		
CATEGORY	DESIRED OUTCOMES	ASSESSMENT
1. Ecosystems	<ul style="list-style-type: none"> ▪ Healthy ecosystems with a diversity and abundance of native species and habitats 	Desired outcome <u>is generally being met</u> (may take several years to achieve results).
2. Soils	<ul style="list-style-type: none"> ▪ Productive soils with minimal soil disturbance 	Desired outcome <u>is generally being met</u> .
3. Forests	<ul style="list-style-type: none"> ▪ Healthy forest ecosystems with representation of natural attributes and forest dependent species ▪ Sustainable and productive forests with a natural mosaic of age classes 	Desired outcomes <u>are generally being met</u> (note epidemic infestation of pine bark beetle).
4. Grasslands	<ul style="list-style-type: none"> ▪ Healthy grassland ecosystems with representation of grassland dependent species 	Desired outcome <u>is generally not being met</u> (decrease in the total area of grasslands and increase in noxious weeds).
5. Riparian	<ul style="list-style-type: none"> ▪ Properly functioning riparian systems 	Desired outcome <u>is generally being met</u> .
6. Water	<ul style="list-style-type: none"> ▪ Healthy watersheds and stream-flow regimes 	Desired outcome <u>is generally being met</u> (note concerns relating to water allocation in drier areas).
7. Wildlife	<ul style="list-style-type: none"> ▪ A diversity and abundance of naturally occurring wildlife and their habitats 	Desired outcome <u>is being partially met</u> (note species with population and habitat concerns).
8. Fish	<ul style="list-style-type: none"> ▪ A diversity and abundance of wild fish populations and habitats 	Desired outcome <u>is generally not being met</u> . (decrease in salmon and steelhead populations).
9. Protected Areas	<ul style="list-style-type: none"> ▪ Protection of representative examples of BC's natural diversity, recreational opportunities, cultural/heritage and special features 	Desired outcome <u>is generally being met</u> .
10. Agriculture	<ul style="list-style-type: none"> ▪ A prosperous agriculture industry with access to Crown resources especially land, water and range land to support development ▪ Sustainable and productive agricultural and range lands 	Desired outcomes <u>are generally being met</u> .
11. Minerals	<ul style="list-style-type: none"> ▪ A prosperous mining industry with access to Crown land for exploration and development 	Desired outcome <u>is being partially met</u> (access to Crown land is being met; prosperous mining industry is not).
12. Timber	<ul style="list-style-type: none"> ▪ A prosperous forest industry with a sustainable supply of timber 	Desired outcome <u>is generally being met</u>

CATEGORY	DESIRED OUTCOMES	ASSESSMENT
13. Tourism	<ul style="list-style-type: none"> ▪ A prosperous tourism industry offering high quality, natural tourism experiences ▪ A diverse range of tourism opportunities and uses across the landscape 	Desired outcomes <u>are generally being met</u> .
14. Recreation	<ul style="list-style-type: none"> ▪ A diverse range of recreation opportunities and uses across landscapes ▪ Preservation and management of high quality recreation resources 	Desired outcomes <u>are generally being met</u>
15. Visually Sensitive Areas	<ul style="list-style-type: none"> ▪ Landscapes managed in accordance with visual quality objectives 	Desired outcome <u>is generally being met</u> .
16. Communities	<ul style="list-style-type: none"> ▪ Social and economic stability ▪ Healthy and prosperous communities ▪ Stable or increasing employment ▪ Access to Crown land for community and industrial development ▪ Clean, safe drinking water and a stable community water supply ▪ Minimal risks to lives and property from flooding and erosion 	Five desired outcomes <u>are generally being met</u> and one desired outcome <u>is generally not being met</u> (clean drinking water and a stable community water supply).
17. Cultural Heritage	<ul style="list-style-type: none"> ▪ Protection of important archeological sites ▪ Completion of First Nation Traditional Use Studies ▪ Designation and management of historic trails 	Desired outcomes <u>are generally being met</u> .
18. Public Involvement	<ul style="list-style-type: none"> ▪ Meaningful public involvement in local level planning ▪ Educated and informed public with respect to LRMP goals and outcomes 	Desired outcomes <u>are generally being met</u> .

Recommendations

The recommendations in this report are based on the results from the implementation and effectiveness assessments. The recommendations—which have been provided by the LRMP Monitoring Table—include suggestions for improving the implementation process and the effectiveness monitoring process as well as overall recommendations for improving the quality of the Kamloops LRMP. A complete list of recommendations is included in section 4.

Implementation recommendations include suggestions for:

- increasing the level of effort on specific projects
- revisions to the implementation process including
 - additional implementation detail for each project
 - more comprehensive reporting requirements for each project.

Effectiveness recommendations include suggestions for:

- developing new indicators
- improving existing indicators
- adding or revising tasks and activities for individual projects

General LRMP recommendations include suggestions for:

- clarifying the role of the LRMP Monitoring Table in relation to water quality work being undertaken by the City of Kamloops
- reviewing Environment Canada climatic data to determine whether it can be used to improve the accuracy of weather related indicators
- clarifying the process for making changes/amendments to the LRMP.

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1. Introduction

The Kamloops Land and Resource Management Plan (LRMP) is a sub-regional plan that covers approximately 2.7 million hectares in south central British Columbia. It was developed through a two-year public process with approximately forty-five participants. The Kamloops LRMP was approved by the provincial government on July 28, 1995.

The land use goals, resource management zones, objectives and strategies in the LRMP provide the provincial government and other resource users with direction on resource management. Goals and objectives describe the management intent of the LRMP in terms of the desired future to be achieved through its implementation. Resource management zones and strategies provide strategic direction by defining activities and conditions that need to be achieved in the implementation process. Implementation and monitoring procedures help to ensure that the strategic direction and management intent in the LRMP are carried through in the implementation of projects and related agency programs.

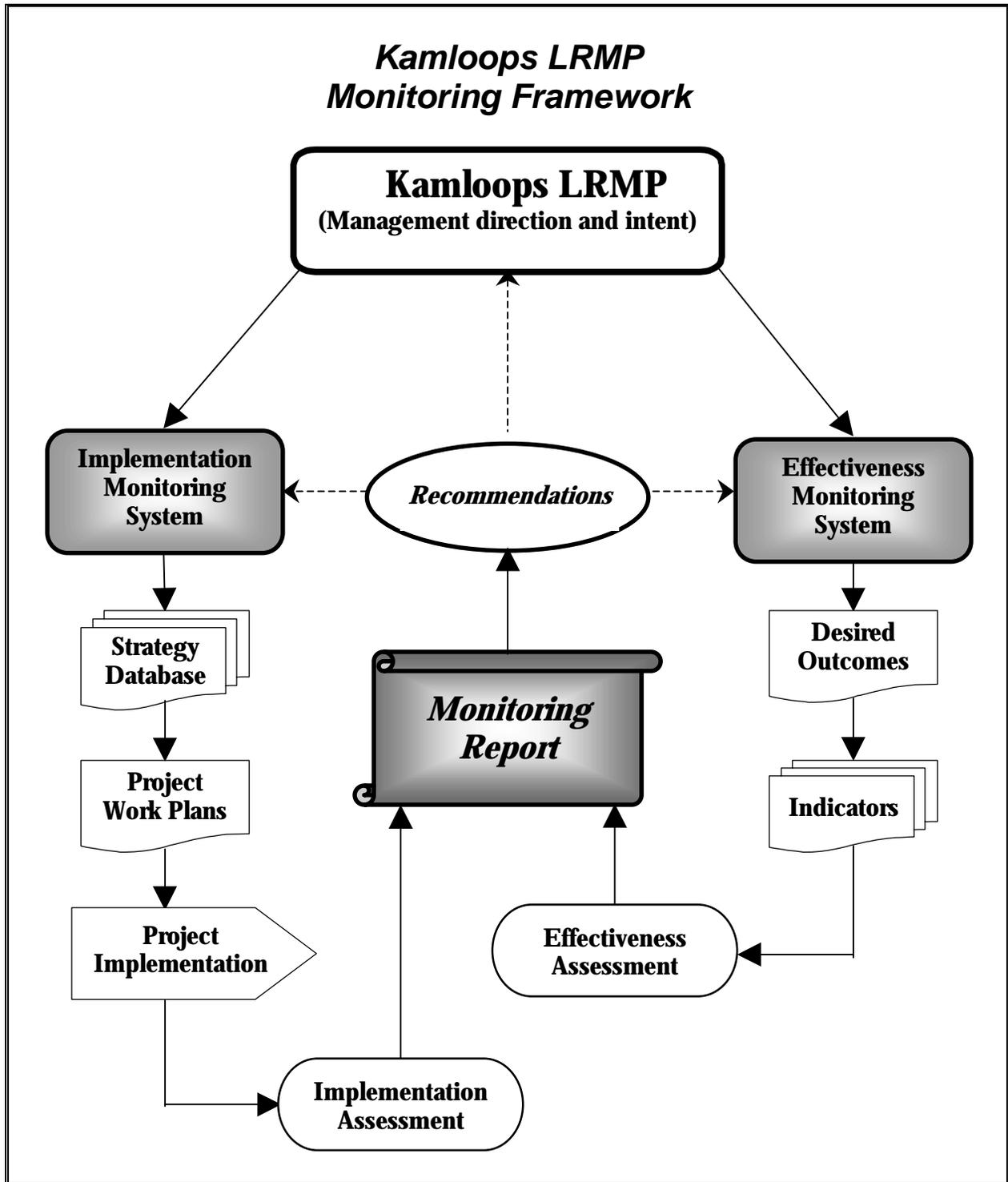
The process for conducting implementation and effectiveness assessments is based on procedures outlined in the *Kamloops Land and Resource Management Plan Monitoring Framework* (August 1999). The key components of the monitoring framework are shown in the diagram on the following page.

This report provides an assessment of progress on the implementation activities for the Kamloops LRMP (section 2) and an assessment of effectiveness relative to the achievement of its goals and objectives (section 3). The report also includes recommendations for improvements based on the results of the implementation and effectiveness assessments (section 4).

Implementation Assessment

The implementation monitoring system identifies the strategies that need to be implemented in a LRMP, assigns agency responsibility for implementation, outlines procedures for assessing and publicly reporting progress on implementation, and for making recommendations to improve the implementation and monitoring process.

Once strategies have been identified, they are sorted as either “base” or “incremental” activities. Strategies identified as base activities will be implemented through existing agency programs (e.g., water management, forest development plans, mine development review process, etc.). Strategies identified as incremental activities have been grouped together as appropriate into specific LRMP projects (see list on page 6). Work plans, which identify the lead agency, participating organizations, expected outcomes, and project tasks and activities, have been developed for each project.



Project work plans will updated each year. For each project, lead agencies will provide a summary of accomplishments for the year and an outline of project implementation priorities for the year ahead. Project summaries will be used as a basis for conducting the annual implementation assessment. The assessment will gauge the extent to which tasks and

activities for each project have been completed and further determine whether a project is achieving its expected results.

Effectiveness Assessment

The effectiveness monitoring system outlines the procedures for determining whether the LRMP is meeting its goals and objectives. It includes desired outcomes and indicators for measuring performance and procedures for assessing and reporting on effectiveness

A set of desired outcomes has been developed that captures the intent of the LRMP goals and objectives and provides an efficient and consistent framework for assessing effectiveness. Desired outcomes have been grouped into two categories—environmental and human activities—which reflect the key resource values addressed in the LRMP. A list of the 18 resource categories and 30 desired outcomes for the Kamloops LRMP is included at the beginning of section 3.

To assess effectiveness, one or more indicators have been selected for each desired outcome. An indicator is a tool for measuring performance relative to a defined target or goal. The performance of each indicator will be tracked over time—relative to baseline³ data—to determine whether the LRMP is meeting its goals and objectives. The results of the effectiveness assessment will show whether the implementation of the objectives and strategies in the LRMP has produced a positive, negative or neutral effect on environmental, economic and social values in the plan area.

When reviewing indicators, it is important to determine whether performance is attributable to LRMP implementation or to other external factors. For example, forest sector employment may be affected by a declining wood supply or by external factors such as a decline in world lumber prices or export trade barriers.

Recommendations

This report includes recommendations for improving the LRMP based on the results of the implementation and effectiveness assessments. Where performance targets and desired outcomes have not been met, recommendations for improvement will be provided. Improvements may include revisions to projects in the Project Work Plan, the addition of new strategies and/or projects or the deletion of strategies and/or projects that are no longer considered relevant.

³ A baseline is a reference year used to compare subsequent performance. Baselines will generally be established just prior to the commencement of LRMP implementation. In some cases where there is a long period of historic data, baselines will be established as an historic trend and subsequent performance will be assessed to determine if it is consistent with the trend.

2. Implementation Assessment

An implementation assessment will be carried out each year. The purpose of the assessment is to review progress on the completion of the strategies identified in the LRMP. Strategies may be implemented as base activities under agency programs or as incremental activities⁴. Base activities are typically delivered through more detailed (operational) levels of planning (e.g., forest development plans, water management plans, etc.). Incremental activities—which are not covered under agency programs—will be implemented as specific LRMP projects. The implementation assessment in this report focuses on incremental activities and does not assess progress on base activities.

Base activities are generally assessed through a variety of other mechanisms including reports by the Ombudsman, the Auditor General, the Forest Practices Board, and the Environmental Appeal Board. The assessment of LRMP effectiveness provided in chapter 3 also gives an indication of the implementation progress of base activities.

The incremental activities identified in the LRMP have been grouped into projects with a project work plan that identifies the lead agency responsible for implementation, project description (expected outcomes), participants (government and public), and tasks and activities that need to be undertaken to complete the project. Each year, lead agencies for each project will prepare a project work plan that summarizes progress over the previous year and provides an indication of work planned for the year ahead.

Project Implementation Summary

The implementation progress for each of the twelve LRMP projects is summarized in the following table. The detailed implementation status of the tasks and activities for each project is provided in the agency work plan assessments in the remainder of this section.

Each project has been assessed in terms of:

- work completed relative to the previous year's commitments
- cumulative progress (i.e., achievement of major project milestones)

The assessment identifies the level of completion of tasks and activities for each project. A summary analysis and recommendations concerning the implementation is provided in chapter 4.

⁴ Appendix 1 in the *Kamloops Land and Resource Management Plan Monitoring Framework* includes a complete list of all the strategies in the Kamloops LRMP sorted as either base or incremental activities.

2. Implementation Assessment

Kamloops LRMP Project Implementation Status					
	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
A. Watershed Management (BCE)					
B. Fisheries Management (BCE)					
C. Ecosystem Management Strategies (BCE)					
D. Commercial Recreation Plans (BCE)					
E. Protected Area Management Plans (BCP)					
F. Grazing Enhancement Fund (MAF)					
G. Mineral Strategies (MEM)					
H. Watershed Management (BCFS)					
I. Biodiversity Emphasis Analysis (BCFS)					
J. Landscape Unit Plans (BCFS)					
K. Strategies for Grazing in Protected Areas (BCFS)					
L. Recreation and Tourism Management Plans (BCFS)					

Key to Acronyms:

BCE = BC Environment, Ministry of Environment Lands and Parks.

BCP = BC Parks, Ministry of Environment, Lands and Parks.

MAF = BC Ministry of Agriculture and Food

MEM = BC Ministry of Energy and Mines

BCFS= BC Forest Service (Ministry of Forests)

Progress for each project has been reported relative to one of five categories:

1. **Not Started (NS):** Projects where no work has been done to date. (0-5% complete)
2. **Initiated (I):** Projects where work commenced on at least one of the activities identified in project tasks. (6-30% complete)
3. **Midway (M):** Projects where work has been initiated and is underway on most activities. Some activities may be substantially complete or complete. (31-65% complete)
4. **Substantially Complete (SC):** Projects where work is underway on most activities and where many activities are substantially complete. (66-95% complete)
5. **Complete (C):** Projects where all activities have been implemented in accordance with the direction set out in the LRMP. (96-100% complete)

Assessment Summary

As of June 30, 1999, all 12 LRMP projects have been initiated. One project is substantially complete, 9 projects are midway and two projects—Project D Commercial Recreation Plans and Project I Biodiversity Emphasis Analysis—are at the initiated stage. A summary of each of the individual projects is as follows.

A. Watershed Management

This project is *midway complete*. Under Community Watershed Management Strategies, watershed assessments and rehabilitation work is substantially complete. Monitoring procedures are midway and floodplain management has not been initiated. Under Water Management Strategies, watershed rehabilitation, water quality monitoring and stream flow monitoring are substantially complete. Work on ground water monitoring and floodplain management has been initiated and no work has been done on tenure opportunities.

B. Fisheries Management

The Fisheries Management project is *substantially complete*. For the inland fishery, an inventory of wild fish stocks has been completed and a management plan is being implemented. For the anadromous fishery, degraded stream habitat has been identified and restoration work is underway. As well, an inventory of steelhead stocks has been completed.

C. Ecosystem Management Strategies

The Ecosystem Management Strategies Project is *midway complete*. Work on baseline data and analytical tools has been initiated and the development of objectives for biodiversity and red and blue listed species is midway complete. The development of ecosystem networks for each landscape unit is substantially complete and the incorporation of ecosystem management strategies into landscape unit plans has been initiated. Wildlife management strategies are midway complete with the exception of habitat improvement which is still at the initiated stage.

D. Commercial Recreation Plans

Commercial Recreation Plans are at the *initiated* stage indicating that very little work has been done. The reason commercial recreation plans have not been developed is because of a reorganization within the Ministry of Environment, Lands and Parks that resulted in many of the Crown land management functions being transferred to a new Crown Corporation: British Columbia Assets and Lands Corporation (BCALC). BCALC is now working with the Ministry of Environment, Lands and Parks to develop Commercial Recreation Plans for the Kamloops LRMP.

E. Protected Area Management Plans

This project is *midway complete*. All work on Management Direction Statements is substantially complete. All work on Detailed Management Plans is at the initiated stage, with the exception of preparation work which is midway complete.

F. Grazing Enhancement Fund

The Grazing Enhancement project is *midway complete*. Objectives have been completed and implementation is midway.

G. Mineral Strategies

The Mineral Strategies project is *midway complete*. The Review of Areas Closed to Claim Staking has been initiated and Research and Analysis activities range from initiated to

substantially complete. With the announcement of the Premier's Mining Initiative and the proclamation of the Mining Rights Amendment Act, the Promotion of Exploration Activities throughout the province is substantially complete.

H. Watershed Management

This project is related to project A, however, the BC Forest Service is the lead agency rather than BC Environment. The project is **midway complete**. Under Community Watershed Strategies, designations are substantially complete, assessments have been completed, road rehabilitation is substantially complete and watershed rehabilitation is midway. Activities under Water Management Strategies are substantially complete with the exception of watershed rehabilitation which is midway. Work under Anadromous fish Strategies is midway.

I. Biodiversity Emphasis Analysis

The Biodiversity Emphasis Analysis project is at the **initiated stage** indicating that very little work has been done. The reason the biodiversity emphasis analysis has not yet been undertaken is because it is dependent on the biodiversity timber impacts, which will be included in the Timber Supply Review Analysis Report due for release in Spring 2000. The LRMP Monitoring Table will review this report in 2000. Another key component of the biodiversity emphasis analysis is the assessment of natural disturbance types. The Ministry of Forests is currently developing analysis and assessment tools for dry forest and grassland natural disturbance types (NDT4). These tasks will be completed in 2000 and will advance the project to midway complete.

J. Landscape Unit Plans

Landscape Unit Plans are **midway complete**. Under Biodiversity Objectives, preparation work is complete and about half of the work on developing objectives has been completed. Completion is expected in 2000. Work on developing Objectives for other resource values has been initiated and Grassland Management Strategies and Timber Strategies are midway.

K. Strategies for Grazing in Protected Areas

Strategies for Grazing in Protected Areas is **midway complete**. Standard range use plan objectives and strategies have been completed. Operational strategies will be developed to address protected area values in 1999. Benchmark sites for ungrazed areas have been established at Lac du Bois, Tunkwa and Cornwall. Baseline vegetation monitoring has been completed at Lac du Bois and Tunkwa.

Recreation and Tourism Management Plans

Recreation and Tourism Management Plans are **midway complete**. Baseline data has been assembled and a template of objectives has been developed. Public review and completion of the final plan are at the initiated stage.

Base Activity Highlights

LRMP strategies that are defined as base activities are implemented under ongoing agency programs and are typically monitored through other processes (e.g., Forest Practices Review Board). In general, there has been a high level of compliance with the management direction provided for base activities in the Kamloops LRMP. Examples of base activities that have been, or will be reviewed for compliance include:

2. Implementation Assessment

- Forest Practices Board review of Riverside Forest Products Ltd. timber harvesting and road construction, maintenance, and deactivation practices⁵
- Small Business Forest Enterprise Program Quality Assurance carried out by the Kamloops Forest Region⁶
- Specialists in the Kamloops Forest Region are carrying out monitoring of stream crossings, silviculture activities, road construction and road deactivation and a report is expected in Spring 2000
- In conjunction with the Ministry of Environment, Lands and Parks, the Kamloops Forest District has set up a continuous monitoring program for activities such as harvesting operations, road construction and deactivation, silvicultural activities, and riparian management to determine whether these operations are meeting the objectives of the Forest Practices Code.

⁵ Forest Practices Board review concluded that all timber harvesting activities examined in the audit were in compliance with the Forest Practices Code. The few instances of non-compliance found in construction, maintenance and deactivation of roads were minor in nature. (See Audit of Timber Harvesting and Road Construction, Maintenance and Deactivation, FPB/ARC/12, December 1998)

⁶ Through the inspection and monitoring activities, it was found that operations in the field were consistently good, but with some relatively minor administrative and record keeping problems that caused technical non-compliance.

Agency Work Plan Assessment

BC Environment

Project A: Watershed Management (BCE)

Project Status: Midway

Complete watershed assessments and rehabilitation (as required) for all identified watersheds in Appendix 1 of the Kamloops LRMP and all community watersheds as defined and designated in the *Forest Practices Code of BC Act*. BC Environment will work with BC Forest Service to oversee the watershed management strategies identified in the KLRMP (See Project H). BC Environment will primarily responsible for developing monitoring procedures and managing water activities.

Task and Activity Status

A.1 Community Watershed Strategies

Task Status: Midway

Activity Status	NS	I	M	SC	C
1. Watershed assessment and rehabilitation: <ul style="list-style-type: none"> assessments completed for all 17 community watersheds (1998) road rehabilitation required for 14 watersheds (1998) 				✓	
2. Monitoring procedures: <ul style="list-style-type: none"> water quality/flow completed (1998) ground water mapping initiated (1998) 			✓		
3. Floodplain management: <ul style="list-style-type: none"> no work completed to date (1999) 	✓				

A.2 Water Management Strategies

Task Status: Midway

Activity Status	NS	I	M	SC	C
1. Watershed rehabilitation: <ul style="list-style-type: none"> 202 out of 220 assessments completed (1998) rehabilitation underway in 80 of 118 watersheds (1998) 				✓	
2. Monitor water quality: <ul style="list-style-type: none"> water quality monitoring procedures completed (1998) common database completed. 				✓	
3. Stream flow: <ul style="list-style-type: none"> stream flow monitoring procedures completed (1999) 				✓	
4. Ground water monitoring: <ul style="list-style-type: none"> ground water mapping “aquifer vulnerability” initiated (1999) 		✓			
5. Floodplain management <ul style="list-style-type: none"> responding to development applications as received (1999) regional districts and local governments encouraged to develop floodplain management bylaws—no response to date (1999) 		✓			
6. Tenure opportunities <ul style="list-style-type: none"> no work done to date (1999) 	✓				

2. Implementation Assessment

Project B: Fisheries Management (BCE)					
<i>Project Status: <u>Substantial Completion</u></i>					
<p>The LRMP provides strategic direction for managing anadromous and inland fisheries. BC Environment will catalogue wild fish stocks to be protected and will develop management strategies for key fisheries habitats that (including monitoring systems to ensure adequate stream flows and restoration of degraded stream habitats). In addition, BC Environment will undertake inland fish stocking in lakes identified as suitable candidates.</p>					
Task and Activity Status					
B.1 Inland Fisheries Strategies	<i>Task Status: <u>Substantial Completion</u></i>				
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Catalogue fish stocks and habitats: <ul style="list-style-type: none"> • <i>inventory of wild fish stocks completed (1998)</i> • <i>management plan for lakes underway (1999)</i> • <i>streams not associated with wild fish lakes will have plans developed at a later date (1999)</i> 				✓	
2. Fish stocking: <ul style="list-style-type: none"> • <i>10 barren lakes stocked (no additional barren lakes will be stocked prior to completion of an environmental inventory) (1999)</i> 				✓	
B.2 Anadromous Fisheries Strategies	<i>Task Status: <u>Substantial Completion</u></i>				
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Identify degraded stream habitat: <ul style="list-style-type: none"> • <i>no specific inventory of anadromous streams taking place (degraded stream habitat identified as part of watershed assessment process) (1999)</i> • <i>individual complaints will be reviewed and included in watershed restoration work (1999)</i> 				✓	
2. Restore stream habitat: <ul style="list-style-type: none"> • <i>streams identified under watershed assessments as needing restoration are being actively restored (1999)</i> 				✓	
3. Catalogue fish stocks: <ul style="list-style-type: none"> • <i>steelhead stream cataloguing completed—no report done (1998)</i> 				✓	
4. Monitor stream flows: <ul style="list-style-type: none"> • <i>BCE biologist assigned to develop monitoring procedures for steelhead streams (1999)</i> • <i>DFO is responsible for monitoring of salmon streams (1999)</i> 		✓			

2. Implementation Assessment

Project C: Ecosystem Management Strategies (BCE)					
<i>Project Status: <u>Midway</u></i>					
BC Environment will develop ecosystem management strategies as part of the Landscape unit planning process conducted by the BC Forest Service. These strategies will identify key habitat elements in each landscape unit to support wildlife migration and habitat. Ecosystem monitoring strategies will also include objectives for managing red and blue-listed species.					
Task and Activity Status					
C.1 Ecosystem Management Strategies	Task Status: <u>Midway</u>				
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Prepare baseline data, analytical tools and public involvement process: <ul style="list-style-type: none"> • <i>seral stage distribution maps completed (1997)</i> 		✓			
2. Biodiversity objectives: <ul style="list-style-type: none"> • <i>old growth management areas identified (1998)</i> • <i>connectivity strategies developed (1998)</i> • <i>mapping of rare forest types underway (1999)</i> 			✓		
3. Management objectives for red and blue-listed species: <ul style="list-style-type: none"> • <i>the Identified Wildlife Management Strategy provides some operational direction; the results from Okanagan/Shuswap and Lillooet LRMPs will be reviewed as reference for the Kamloops LRMP (1999)</i> 			✓		
4. Develop ecosystem networks for each landscape unit: <ul style="list-style-type: none"> • <i>connectivity strategies completed (1998)</i> 				✓	
5. Incorporate ecosystem management strategies in landscape unit plans: <ul style="list-style-type: none"> • <i>managing caribou, goat and grizzly as indicators of ecosystem health (1999)</i> • <i>key species will be identified in each landscape unit as indicators of ecosystem health (1999)</i> 		✓			
C.2 Wildlife Strategies	Task Status: <u>Midway</u>				
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Wildlife management strategies: <ul style="list-style-type: none"> • <i>management plan for Skull Mountain completed (1998)</i> • <i>draft management plan for Battle Bluffs and Dew Drop Mountain completed (1998)</i> • <i>draft interim management statement prepared for Skwilatin (1999)</i> 			✓		
2. North Thompson caribou strategy: <ul style="list-style-type: none"> • <i>tracking caribou movement through radio collars (1999)</i> • <i>interim report is being produced (1999)</i> 			✓		
3. Habitat improvement: <ul style="list-style-type: none"> • <i>strategy developed for habitat improvement in IDF zone (1998)</i> • <i>additional work planned—subject to FRBC funding (1999)</i> 		✓			

2. Implementation Assessment

Project D: Commercial Recreation Plans (BCE)					
<i>Project Status:</i> <u>Initiated</u>					
<p>Commercial recreation plans will be developed for areas offering high potential for commercial recreation development (i.e., Recreation Tourism Management Zones). These plans will identify where opportunities exist and where there is potential for conflict between activities or between recreation use and other resource values (e.g., sensitive wildlife habitat). The plans will include strategies for achieving commercial recreation potential and for mitigating conflicts.</p>					
Task and Activity Status					
D.1 Commercial Recreation Plans	Task Status: <u>Initiated</u>				
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Preparation: <ul style="list-style-type: none"> • <i>plan areas identified in the LRMP, other areas may be identified based on capability/suitability analysis (1999)</i> 			✓		
2. Draft recreation plan: <ul style="list-style-type: none"> • <i>no work completed to date (1999)</i> 	✓				
3. Review: <ul style="list-style-type: none"> • <i>no work completed to date (1999)</i> 	✓				
4. Approve and implement: <ul style="list-style-type: none"> • <i>no work completed to date (1999)</i> 	✓				

2. Implementation Assessment

BC Parks

Project E: Protected Area Management Plans (BCP)

Project Status: Midway

Develop management direction statements for each of the 58 new protected areas. Protected areas requiring detailed management plans (approximately 12) will be identified in management direction statements based on the size of an area, level of use and number of issues to be addressed. Management direction statements will outline broad management objectives for each new protected area. Detailed management plans will provide management guidelines for achieving objectives including permitted uses, areas where special management may be required (e.g., sensitive habitat, concentrations of wildlife, areas of high risk, etc.) areas where access restrictions may apply (e.g., ecological reserves), and procedures for acquiring commercial use permits. Management planning processes will encourage the involvement of all parties with a key interest or stake in the outcome of the plan as per criteria in section 3.2 of the KLRMP.

Task and Activity Status

E.1 Management Direction Statements *Task Status:* Substantially Complete

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Management direction statements: <ul style="list-style-type: none"> • Goal 1 completed (1998) • 25 Goal 2 management statement revisions completed (1998) • 6 draft management statements to be prepared (1999) 				✓	
2. Public review: <ul style="list-style-type: none"> • Goal 1 statements completed (1998) • Goal 2 statements reviewed by LRMP Monitoring Table (1998) 				✓	
3. Final direction statement: <ul style="list-style-type: none"> • Goal 1 management statements approved (1999) • 25 Goal 2 statements to be reviewed for approval (1999) 				✓	

E.2 Detailed Management Plans *Task Status:* Initiated

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Preparation (total number of plans required is 12): <ul style="list-style-type: none"> • Background documents for Tunkwa and Bonaparte completed using Lac du Bois LRUP information (1998) • Roche Lake to be completed (1999) 			✓		
2. Draft management plan: <ul style="list-style-type: none"> • Tunkwa completed—Lac du Bois LRUP to serve as management direction (1998) • Bonaparte initiated (1998) 		✓			
3. Public review: <ul style="list-style-type: none"> • Tunkwa completed (1998) • Bonaparte planning committee established (1998) 		✓			
4. Final plan: <ul style="list-style-type: none"> • Tunkwa completed (1998) • Bonaparte plan to be completed in 2000 (1999) 		✓			

2. Implementation Assessment

Ministry of Agriculture and Food

Project F: Grazing Enhancement Fund (MAF)

Project Status: Midway

Establish and manage Grazing Enhancement Fund to maintain and/or enhance cattle grazing and range management opportunities and to meet conservation needs.

Task and Activity Status

F.1 Grazing Enhancement Fund

Task Status: Midway

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Objectives: <ul style="list-style-type: none"> • <i>established Range Enhancement Advisory Committee (1997)</i> • <i>program objectives and funding guidelines completed (1997)</i> 					✓
2. Implementation: <ul style="list-style-type: none"> • <i>18 projects valued at \$450,000 (e.g., fence construction, hydrology studies, establishment of four ungrazed areas, water developments and landscape inventories) completed (1997)</i> • <i>26 projects valued at \$520,000 (e.g., fence construction, water development, pasture monitoring, corral construction and forest thinning) approved for funding (1998)</i> 			✓		

Ministry of Energy and Mines

Project G: Mineral Strategies (MEM)

Project Status: Midway

The Ministry of Energy and Mines will develop mineral strategies that include a review of lands closed to claim staking, research or surveys to improve the geoscientific database and, promotion of mineral exploration and development.

Task and Activity Status

G.1 Review Areas Closed to Claim Staking

Task Status: Initiated

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Review lands closed to claim staking: <ul style="list-style-type: none"> three areas have had no staking reserves lifted (Dewdrop - Rousseau SRMZ; McAndrew Lake; Stake Lake) (1998) remainder of the LRMP awaits resolution of Protected Area boundaries and ministry resources (1999) a province-wide review of mineral reserves has received preliminary approval for 1999/2000 fiscal year with Kamloops LRMP identified as a priority area (1999) 		✓			
2. Recommendations: <ul style="list-style-type: none"> LRMP Monitoring Table will continue to be advised of changes in no-staking reserves and is encouraged to make recommendations for a review of specific areas (1999) 		✓			

G.2 Conduct Research and Analysis

Task Status: Midway

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1A. Research and analysis: <ul style="list-style-type: none"> Eagle Bay multidisciplinary project conducted surveys during 1996, 1997 and 1998 field seasons (1999) 				✓	
1B. Research and analysis: <ul style="list-style-type: none"> multi-year, bedrock and mineral deposit study in Adams Lake-Shuswap Lake area to commence in field season (1999) 		✓			
2. Public communication strategy: <ul style="list-style-type: none"> maps and reports released annually at Cordilleran Roundup and Kamloops Exploration Group geological conventions (1999) 			✓		

G.3 Promote Exploration

Task Status: Substantial Completion

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Promote Exploration and Mine Development: <ul style="list-style-type: none"> Premier's Mining Initiative including Mineral Exploration Code, ten-year extension (until January 2010) of BC's new-mine allowance, and new tax credit for mineral exploration (1998) proclamation of Mining Rights Amendment Act, new compensation rules for expropriated mineral tenures and appointment of BC's first Mining Advocate (1999) 				✓	

BC Forest Service

Project H: Watershed Management (BCFS)

Project Status: Midway

Complete watershed assessments and rehabilitation (as required) for all identified watersheds in Appendix 1 of the Kamloops LRMP and all community watersheds as defined and designated in the *Forest Practices Code of BC Act*. BC Forest Service will work with BC Environment to oversee the watershed management strategies identified in the KLRMP (See Project A). BC Forest Service will be primarily responsible for ensuring that watershed assessments are completed and rehabilitation work is undertaken.

Task and Activity Status

H.1 Community Watershed Strategies

Task Status: Midway

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Complete community watershed designations: • <i>designations reviewed and incorporated in LRMP amendment (1997)</i>				✓	
2. Complete community watershed assessments: • <i>all 17 community watershed assessments completed (1998)</i>					✓
3. Assessment review • <i>road rehabilitation plans required for 14 watersheds (1998)</i>				✓	
4. Watershed rehabilitation: • <i>rehabilitation work completed on 3 watersheds (1998)</i> • <i>rehabilitation underway in 11 watersheds (1998)</i>			✓		

H.2 Water Management Strategies

Task Status: Substantial Completion

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Complete required watershed assessments: • <i>202 out of 220 assessments completed (does not include 17 community watersheds described in Task 1 above) (1998)</i>				✓	
2. Assessment review: • <i>118 watersheds identified as needing some rehabilitation (mainly for roads including 22 that require road deactivation only) (1998)</i>				✓	
3. Watershed rehabilitation: • <i>rehabilitation completed or underway on 80 watersheds (1998)</i>			✓		

H.3 Anadromous Fish Strategies

Task Status: Midway

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Identify degraded stream habitat: • <i>10 streams identified as requiring work (1999)</i>			✓		
2. Restore stream habitat: • <i>restoration work has been completed in 4 streams and planning for restoration is underway in the remaining 6 streams (1999)</i>			✓		

2. Implementation Assessment

Project I: Biodiversity Emphasis Analysis (BCFS)					
<i>Project Status: <u>Initiated</u></i>					
<p>The KLRMP (appendix 7) provides direction for managing biodiversity by assigning a biodiversity emphasis option to each landscape unit. This project includes the following components:</p> <ul style="list-style-type: none"> • implement biodiversity emphasis options • develop assessment tools and indicators • review impact of biodiversity emphasis options on other sectors • review the outcome of the analysis with the LRMP Monitoring Table 					
Task and Activity Status					
I.1 Biodiversity Emphasis Options	Task Status: <u>Initiated</u>				
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Timber impact analysis: <ul style="list-style-type: none"> • <i>Timber Supply Review information report and data package released (November 1998)</i> • <i>Analysis Report to be released Spring 2000 (1999)</i> 			✓		
2. Assessment tools: <ul style="list-style-type: none"> • <i>work initiated on NDT 4 (dry forest and grasslands) (1999)</i> 		✓			
3. Analysis: <ul style="list-style-type: none"> • <i>work initiated on NDT 4 (dry forest and grasslands) (1999)</i> 		✓			
4. Review and recommendation: <ul style="list-style-type: none"> • <i>review of biodiversity analysis in Timber Supply Review to be conducted with LRMP Monitoring Table in 2000 (1999)</i> 		✓			

2. Implementation Assessment

Project J: Landscape Unit Plans (BCFS)					
Project Status: <u>Midway</u>					
<p>Develop landscape unit plans to integrate the management of a wide variety of resource and ecological values at a landscape or watershed scale through the identification of objectives and strategies. Landscape unit planning is a level of planning that was introduced with the Forest Practices Code as a tool for managing forests from an “ecosystem approach” and for integrating the management of a wide variety of resource and ecological values at a landscape or watershed scale through the identification of objectives and strategies. Landscape unit plans will identify objectives and strategies for other resource management interests such as fisheries, water management (including floodplain), forest composition, grasslands and understory grasses, access management, forest health, red and blue listed species, wildlife habitat, coarse woody debris, recreation, prescribed fire and First Nation values.</p>					
Task and Activity Status					
J.1 Biodiversity Objectives			Task Status: <u>Midway</u>		
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Preparation: <ul style="list-style-type: none"> • seral stage distribution maps completed (1998) 					✓
2. Biodiversity objectives: <ul style="list-style-type: none"> • old growth management areas identified subject to LRMP timber impact analysis (1998) • connectivity strategies developed (1998) • mapping of rare forest types underway (1999) • rare wildlife features are being digitally mapped where discovered and historic wildlife data for Clearwater has been digitally mapped (1999) • Forest Development Plans prepared in 1997 and 1998 reflect the above objectives as directed by the higher level plan (1999) 			✓		
3. Establish objectives: <ul style="list-style-type: none"> • process initiated with completion expected 2000 (1999) 		✓			

2. Implementation Assessment

Project J: Landscape Unit Plans (BCFS)					
Project Status: <u>Midway</u>					
J.2 Objectives for Other Resource Values			<i>Task Status: <u>Initiated</u></i>		
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Landscape unit analysis: <ul style="list-style-type: none"> • issues have been identified at the operational level and are being addressed through Forest Development Plan approval (1999) • Thunder-Blue Landscape Unit Plan conducted as a provincial pilot (1998) 			✓		
2. Preparation: <ul style="list-style-type: none"> • public involvement process established for Thunder-Blue (1998) 		✓			
3. Objectives: <ul style="list-style-type: none"> • draft objectives established for Thunder-Blue (some amendments required based on analytical review) (1998) 		✓			
4. Public review: <ul style="list-style-type: none"> • planned for 1999/2000 for Thunder Blue (1999) 		✓			
5. Establish objectives: <ul style="list-style-type: none"> • to be undertaken following public review (1999) 	✓				
J.3 Grassland Management Strategies			<i>Task Status: <u>Midway</u></i>		
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Special habitat areas: <ul style="list-style-type: none"> • standard objectives exist in range use plans for some special habitats (1998) • strategies will be developed and incorporated into range use plans for other special habitats as identified (1999) 			✓		
2. Forest encroachment: <ul style="list-style-type: none"> • 50 hectares identified each year with site treatment carried out (1999) 			✓		
J.4 Timber Strategies			<i>Task Status: <u>Midway</u></i>		
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Identify and rehabilitate disturbed forest land: <ul style="list-style-type: none"> • 46 landings (18.4 hectares) in 1995, 136 landings (41.1 hectares) in 1996, 54 landings (18.2 hectares) in 1997, 144 landings (63.4 hectares) in 1998 • 3.1 kilometres (3.8 hectares) road rehabilitation in 1995; 15.5 kilometres (15.5 hectares) road rehabilitation in 1996, 35.5 kilometres (46.0 hectares) road rehabilitation in 1997, 8.8 kilometres (17.6 hectares) road rehabilitation in 1998 • NSR land has been substantially reduced (1999) 			✓		

2. Implementation Assessment

Project K: Strategies for Grazing in Protected Areas (BCFS)					
<i>Project Status: <u>Midway</u></i>					
Provide specific direction for managing grazing for domestic livestock grazing in protected areas as per appendix 9 in the KLRMP.					
Task and Activity Status					
K.1 Grazing Strategies in Protected Areas			<i>Task Status: <u>Midway</u></i>		
<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. Range strategies: <ul style="list-style-type: none"> • <i>standard range use plan objectives and strategies exist (1998)</i> • <i>as park plans and adjacent logging proceeds, operational strategies will be developed to address protected area values (1999)</i> 			✓		
2. Benchmark sites: <ul style="list-style-type: none"> • <i>ungrazed areas built in Lac du Bois and Tunkwa in 1997 and Cornwall in 1999</i> • <i>baseline vegetation monitoring in Lac du Bois and Tunkwa completed (1998)</i> • <i>negotiations underway for additional ungrazed areas as identified in the LRMP (1999)</i> 			✓		

Project L: Recreation and Tourism Management Plans (BCFS)

Project Status: Midway

Develop local level plans to maintain and enhance opportunities for a diverse range of recreational and tourism activities for all Recreation and Tourism Resource Management Zones. These zones are areas where there are significant opportunities for recreation and tourism development and where management will be based on the following categories of use described in the KLRMP:

- higher use
- natural environment
- backcountry
- remote.

Recreation and Tourism Management Plans will be developed based on the output of Project D (Commercial Recreation Plans) in will be carried out in conjunction with Project J (Landscape Unit Plans).

Task and Activity Status

L.1 Recreation and Tourism Plans

Task Status: Midway

<i>Activity Status</i>	<i>NS</i>	<i>I</i>	<i>M</i>	<i>SC</i>	<i>C</i>
1. <i>Preparation:</i> <ul style="list-style-type: none"> • required baseline data (e.g., visual quality objectives and access management objectives) complete (1998) 				✓	
2. <i>Draft plan:</i> <ul style="list-style-type: none"> • objectives template complete (1998) 			✓		
3. <i>Public review:</i> <ul style="list-style-type: none"> • public review scheduled for 1999 		✓			
4. <i>Final plan:</i> <ul style="list-style-type: none"> • see Project J (Landscape Unit Plans) (1999) 		✓			

3. Effectiveness Assessment

An effectiveness assessment will be conducted every three to five years to determine whether the goals and intent of the Kamloops LRMP are being met. The goals and objectives of the LRMP have been translated into an effectiveness monitoring framework consisting of 18 resource categories and 30 desired outcomes. Resource categories capture the key environmental values and human resource use activities addressed in the LRMP. Desired outcomes define management intent or targets for each of these categories. Effectiveness is measured against a set of indicators selected for each of the desired outcomes. A list of each of the 18 resource categories (9 environment and 9 human activities) and corresponding desired outcomes is provided in the table on the following page. A table listing the indicators for the environment and human activity desired outcomes is provided at the beginning of the effectiveness assessments that follow for each of these two areas.

An indicator is a tool for monitoring performance (i.e., change) relative to a stated objective or target. Indicators can be quantitative or qualitative. To be effective, they must be:

- informative
- measurable on a consistent and comparable basis over time
- relevant
- accurate
- supported by readily available and affordable data.

Most of the indicator data used to monitor implementation effectiveness in the Kamloops LRMP was provided by provincial agencies. Some data sets were readily available from ongoing program monitoring and reporting activities and others had to be assembled from a variety of information sources.

Many of the data sets have been recorded for a number of years and provide a time series or performance trend for the indicator. Some of the data that was assembled for the first time does not contain historic records and as such does not offer a comparison with past performance. These data will provide a baseline that can be compared with data collected in future years.

The data shown for the indicators is derived from a number of different administrative units including the Kamloops LRMP, the Thompson-Nicola Regional District, the Thompson-Okanagan Development Region, Kamloops Timber Supply Area, Kamloops Forest Region, Kamloops Forest District, Clearwater Forest District, and South Central Mineral Region.

3. Effectiveness Assessment

CATEGORY	DESIRED OUTCOMES
1. Ecosystems	<ul style="list-style-type: none"> ▪ Healthy ecosystems with a diversity and abundance of native species and habitats
2. Soils	<ul style="list-style-type: none"> ▪ Productive soils with minimal soil disturbance
3. Forests	<ul style="list-style-type: none"> ▪ Healthy forest ecosystems with representation of natural attributes and forest dependent species ▪ Sustainable and productive forests with a natural mosaic of age classes
4. Grasslands	<ul style="list-style-type: none"> ▪ Healthy grassland ecosystems with representation of grassland dependent species
5. Riparian	<ul style="list-style-type: none"> ▪ Properly functioning riparian systems
6. Water	<ul style="list-style-type: none"> ▪ Healthy watersheds and stream-flow regimes
7. Wildlife	<ul style="list-style-type: none"> ▪ A diversity and abundance of naturally occurring wildlife and their habitats
8. Fish	<ul style="list-style-type: none"> ▪ A diversity and abundance of wild fish populations and habitats
9. Protected Areas	<ul style="list-style-type: none"> ▪ Protection of representative examples of BC's natural diversity, recreational opportunities, cultural/heritage and special features
10. Agriculture	<ul style="list-style-type: none"> ▪ A prosperous agriculture industry with access to Crown resources especially land, water and range land to support development ▪ Sustainable and productive agricultural and range lands
11. Minerals	<ul style="list-style-type: none"> ▪ A prosperous mining industry with access to Crown land for exploration and development
12. Timber	<ul style="list-style-type: none"> ▪ A prosperous forest industry with a sustainable supply of timber
13. Tourism	<ul style="list-style-type: none"> ▪ A prosperous tourism industry offering high quality, natural tourism experiences ▪ A diverse range of tourism opportunities and uses across the landscape
14. Recreation	<ul style="list-style-type: none"> ▪ A diverse range of recreation opportunities and uses across landscapes ▪ Preservation and management of high quality recreation resources
15. Visually Sensitive Areas	<ul style="list-style-type: none"> ▪ Landscapes managed in accordance with visual quality objectives
16. Communities	<ul style="list-style-type: none"> ▪ Social and economic stability ▪ Healthy and prosperous communities ▪ Stable or increasing employment ▪ Access to Crown land for community and industrial development ▪ Clean, safe drinking water and a stable community water supply ▪ Minimal risks to lives and property from flooding and erosion
17. Cultural Heritage	<ul style="list-style-type: none"> ▪ Protection of important archeological sites ▪ Completion of First Nation Traditional Use Studies ▪ Designation and management of historic trails
18. Public Involvement	<ul style="list-style-type: none"> ▪ Meaningful public involvement in local level planning ▪ Educated and informed public with respect to LRMP goals and outcomes

Indicators for the Environment (Category 1-9)

Environment indicators have been developed for 10 desired outcomes in the Kamloops LRMP. A list of the resource categories, desired outcomes and corresponding environmental indicators is presented in the following table.

Indicators for the Environment		
Category	Desired Outcome	Indicators
1. Ecosystems	➤ Healthy ecosystems with a diversity and abundance of native species and habitats	<ul style="list-style-type: none"> ▪ Biogeoclimatic zone representation in protected areas ▪ Old forest management targets by biogeoclimatic zone ▪ Animal species at risk ▪ Plants and plant communities at risk
2. Soils	➤ Productive soils with minimal soil disturbance	<ul style="list-style-type: none"> ▪ Achievement of site disturbance limits for timber harvesting ▪ Construction of new forest roads ▪ Landslides
3. Forests	<ul style="list-style-type: none"> ➤ Healthy forest ecosystems with representation of natural attributes and forest dependent species ➤ Sustainable and productive forests with a natural mosaic of age classes 	<ul style="list-style-type: none"> ▪ Age class distribution ▪ Incidence of insect infestation ▪ Fire disturbance ▪ Forest dependent species at risk
4. Grasslands	➤ Healthy grassland ecosystems with representation of grassland dependent species	<ul style="list-style-type: none"> ▪ Area of grasslands and other openings ▪ Noxious weed infestation ▪ Grassland associated species at risk ▪ Range and grassland condition
5. Riparian	➤ Properly functioning riparian systems	<ul style="list-style-type: none"> ▪ Forest Practices Code compliance related to riparian areas ▪ Audits indicating riparian concerns
6. Water	➤ Healthy watersheds and stream-flow regimes	<ul style="list-style-type: none"> ▪ Roads deactivated for water management control ▪ Turbidity ▪ Water flows ▪ Watershed assessments ▪ Fully allocated streams ▪ Ground water quality/quantity
7. Wildlife	➤ A diversity and abundance of naturally occurring wildlife and their habitats	<ul style="list-style-type: none"> ▪ Wildlife populations
8. Fish	➤ A diversity and abundance of wild fish populations and habitats	<ul style="list-style-type: none"> ▪ Resident fish species and stocks at risk ▪ Anadromous fish species (salmon and steelhead) escapement ▪ Streams and lakes with flow or water quality concerns
9. Protected Areas	➤ Protection and management of representative examples of BC's natural diversity, recreational opportunities, cultural/heritage and special features	<ul style="list-style-type: none"> ▪ Significant environmental occurrences in protected areas

1. Ecosystems

Ecosystems are functional units consisting of all living organisms (plants, animals and microbes) and all the non-living physical and chemical factors of their environment linked together through nutrient cycling and energy flow. Ecosystems are commonly described according to the major type of vegetation. One commonly used system of classification is biogeoclimatic zones (e.g., Interior Douglas-fir, Montane Spruce, Bunchgrass, etc.)

Ecosystem management is a strategy or plan to manage ecosystems to provide for all associated organisms as opposed to a strategy or plan for managing individual species. Biological diversity is the diversity of plants animals and other living organisms in all their forms and levels of organization including genes, species and ecosystems and the evolutionary and functional processes that link them.

Ecosystem management is carried out through a number of provincial initiatives. Two key initiatives that are relevant to the implementation of the Kamloops LRMP are the Protected Areas Strategy⁷ and the Forest Practices Code⁸.

Desired Outcome

- Healthy ecosystems with a diversity and abundance of native species and habitats

Assessment

In the Kamloops LRMP 6 percent or more of the total area of all biogeoclimatic zones with the exception of Interior Douglas-fir and Sub-Boreal Pine-Spruce are protected. On a provincial scale, the LRMP contributes significant amounts of the total protected area for Bunchgrass, Interior Cedar-Hemlock, Interior Douglas-fir and Ponderosa Pine. In addition to the ecosystem representation provided by protected areas, the biodiversity in the Kamloops LRMP is also maintained through the retention of old growth forests based on management targets for each of the biogeoclimatic zones.

In the Kamloops LRMP area, there are 15 red-listed and 39 blue-listed animal species out of a total of 341 recorded animal species. In addition there 35 red-listed and 37 blue-listed plant and plant communities. This is baseline data and it is not possible to assess the relative significance of the numbers. This data will be tracked over time to provide an indication of trends relating to the number rare and endangered species.

The application of Forest Practices Code guidelines (Biodiversity Guidelines, Riparian Management Area Guidebook, Lakeshore Management Strategy and the Identified Wildlife Management Strategy) should help to ensure that the desired outcome for ecosystems is met. However, it may be many years before the impacts of these initiatives are fully realized.

⁷ The Protected Areas Strategy was established to create new protected areas to ensure the province's diverse ecosystems are adequately represented. The strategy provides a target for protection of 12 percent of British Columbia's land base by the year 2000.

⁸ The conservation of biological diversity is one of the goals of the *Forest Practices Code of British Columbia Act*. Two Forest Practices Code guidebooks—Biodiversity and Riparian Area Management—address the requirements of the majority of species and plant communities on a broad scale. These guidebooks are referred to as the “coarse filter” as they should maintain habitat for the majority of species, plant communities and ecosystem processes. The Identified Wildlife Management Strategy (Volume 1 released February 1999) is designed to be the “fine filter,” addressing habitat requirements of wildlife that require additional management attention. (Volume 2 of the Identified Wildlife Management Strategy is currently being prepared.)

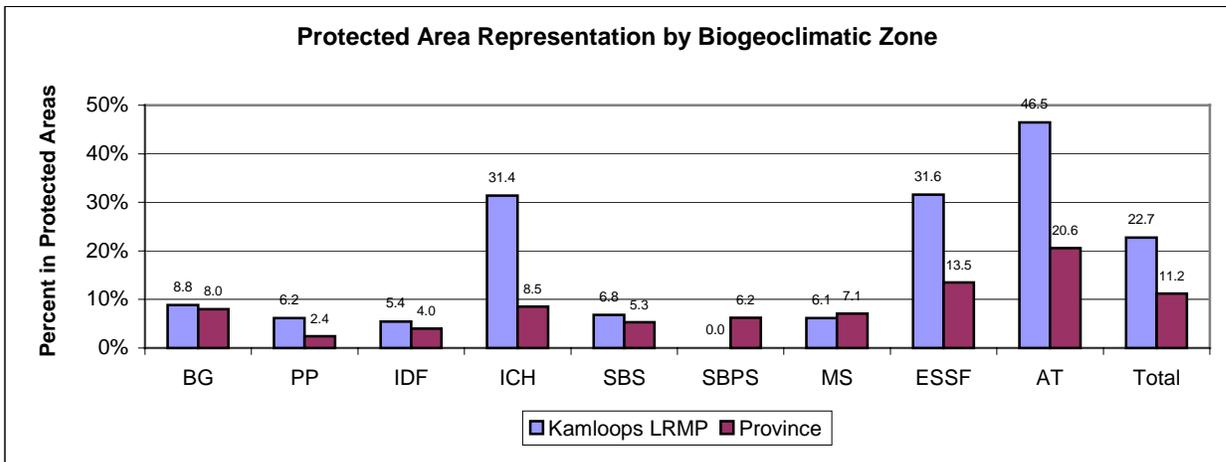
The desired outcome for ecosystems is generally being met, however concern is noted with respect to number of red and blue listed species.

Indicators

1.1 Biogeoclimatic (BEC) zone representation in protected areas

The following charts show the amount of protected area represented in each of the biogeoclimatic zones located in the Kamloops LRMP.

The first chart indicates that 6 percent or more of the total area of each of the biogeoclimatic zones in the Kamloops LRMP is represented in protected areas with the exception of IDF (5.4%) and SBPS (0 %)⁹. At the provincial level, all biogeoclimatic zones are represented at 6 percent or more with the exception of IDF (4.0%), PP (2.4%) and SBS (5.3%). At present a total of 11.2 percent of the provincial land base is in protected areas which compares to 22.7 percent for the Kamloops LRMP. Although the Kamloops LRMP represents 2.9 percent of the provincial land base, it contributes 5.9 percent of the total provincial protected area (equivalent to 0.7 percent of the provincial land base).



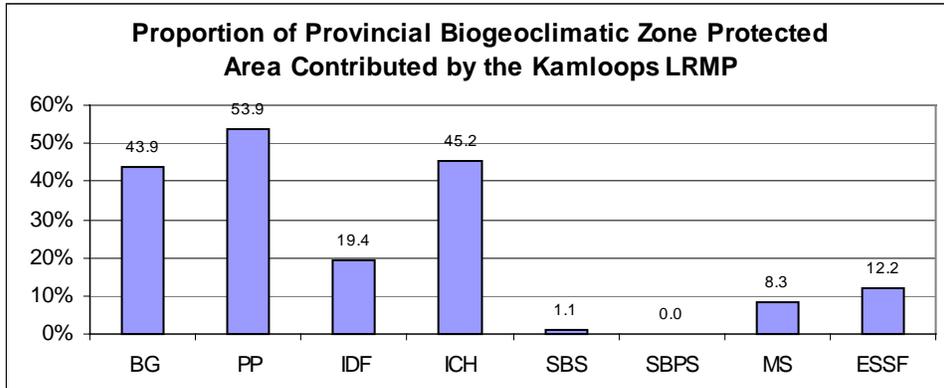
* BG – Bunchgrass, PP – Ponderosa Pine, IDF - Interior Douglas-fir, ICH – Interior Cedar-Hemlock, SBS – Sub-Boreal Spruce, SBPS – Sub-Boreal Pine-Spruce, MS – Montane Spruce, ESSF – Englemann Spruce-Sub-Alpine fir, AT - Alpine Tundra

Source: BC Parks, Ministry of Forests Timber Supply Review (1998 data)

The chart that follows shows how much of the provincial total of protected area for each biogeoclimatic zone was contributed by the Kamloops LRMP. As can be seen, the Kamloops LRMP contributed a significant proportion to the provincial total for Bunchgrass (43.9%), Interior Douglas-fir (19.4%) and Ponderosa Pine (53.9 %). As well, a significant portion of the provincial total for Interior Cedar-Hemlock zone (45.2%) was already represented in Wells Gray Park.

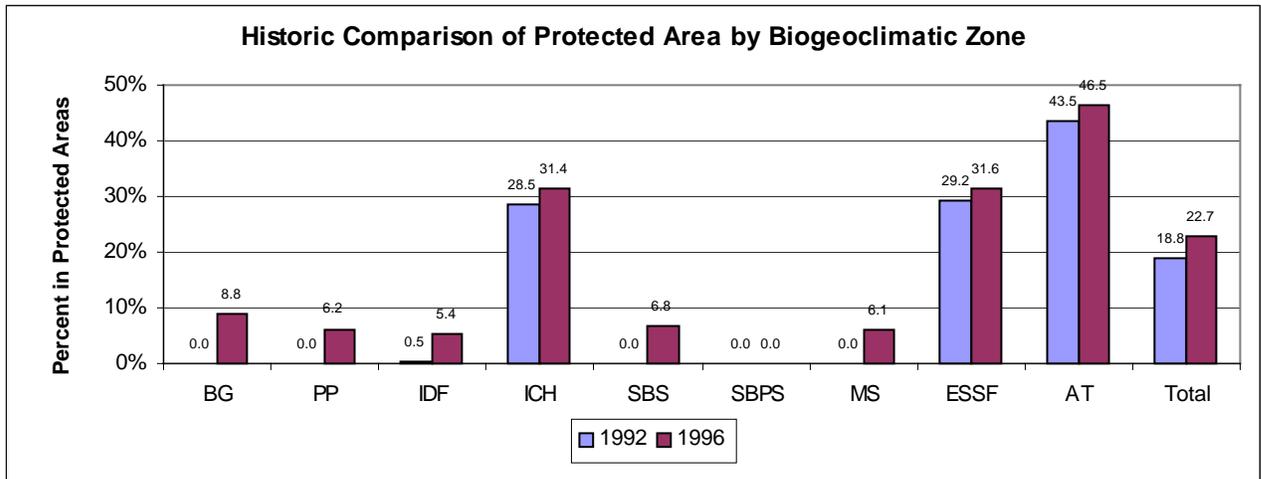
⁹The total area of SBPS in the Kamloops LRMP is an extremely small.

3. Effectiveness Assessment



Source: Ministry of Forests Timber Supply Review (1998 data)

The chart below provides a historical comparison of the amount of protected area in each zone between 1992 and 1996. In 1992, before the LRMP was initiated, 18.8% of the area was protected mostly within Wells Gray Park. As an outcome of the LRMP, an additional 3.9 percent of the land base was protected resulting in a total of 22.7 percent. In developing the Kamloops LRMP it was recognized that the Alpine Tundra, Englemann Spruce-Sub-Alpine fir and Interior Cedar-Hemlock biogeoclimatic zones were already well represented in Wells Gray Park, so an emphasis was placed on increasing representation of Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Montane Spruce and Sub-Boreal Spruce.

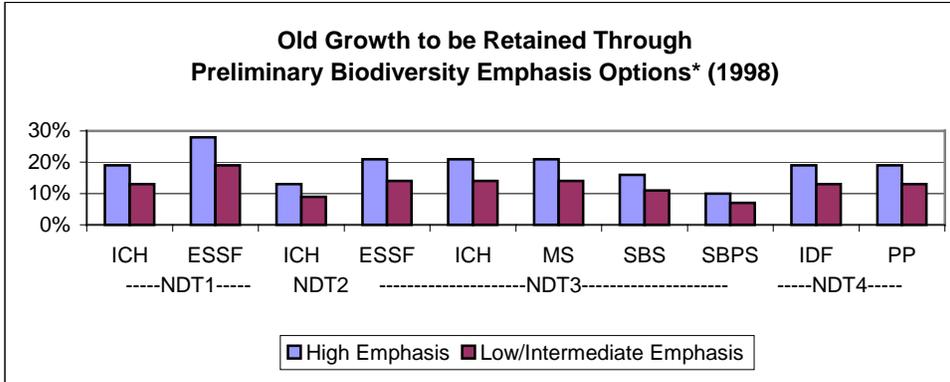


Source: Ministry of Forests Timber Supply Review (1998 data)

1.2 Old Forest Management Targets by Biogeoclimatic Zone

Application of the Biodiversity Guidebook requires a minimum amount of old forest retention as shown in the following chart. A draft strategy is in place to ensure that these targets are implemented in the Kamloops LRMP. Based on LRMP direction, high, intermediate and low emphasis targets have been assigned to each the of the 33 landscape units in the Kamloops LRMP (see appendix 5).

3. Effectiveness Assessment



*NDT refers to Natural Disturbance Types
Source: Forest Practices Code Biodiversity Guidebook

1.3 Animal species at risk

The Forest Practices Code provides direction for achieving biodiversity in British Columbia's forests through Biodiversity Guidelines, Riparian Management Area Guidebook and the Identified Wildlife Management Strategy (IWMS). The IWMS provides procedures and measures for managing 17 red and blue listed species in the Kamloops LRMP. Volume 2 of IWMS will provide procedures and measures for additional species. Operational plans are addressing the management requirements of some of the other species. The data shown in the following table will serve as baseline data for comparing performance in future reporting periods.

Animal Species at Risk (1999)*			
Species Type	Red Listed	Blue Listed	Total Number of Species in LRMP
Mammals	2	12	70
Birds	12	18	224
Amphibians	0	2	7
Reptiles	1	5	10
Fish	0	2	30
Total Species	15	39	341
Forest associated species	2	13	
Grassland associated species	11	21	

*See appendix 2 for a listing of the individual species
Source: Ministry of Environment, Lands and Parks (Conservation Data Centre)

In the Kamloops LRMP, there are 15 endangered species (red-listed) and 39 vulnerable species (blue listed) out of a total of 341 recorded species. Some of the species listed for the LRMP may not currently inhabit Crown forest or range lands, but have been seen in the area in the past. (Red listed species are either legally designated as endangered or threatened or are candidates for designation and Blue listed species are considered to be vulnerable or sensitive.)

Since the system for recording red and blue listed species was first developed in 1990 the number of species listed has changed, not necessarily because of changes in species

population and/or management, but from improvements in inventory. Most listings have been reclassified from red to blue with this change. One exception is badger, which has been reclassified from blue to red.

1.4 Plants and plant communities at risk

Plant and Plant Communities at Risk (1999)*	
Red Listed	Blue Listed
35	37

*See appendix 2 for a listing of the individual species.

Source: Ministry of Environment, Lands and Parks (Conservation Data Centre)

The above data will serve as baseline data for comparing performance in future reporting periods. It is believed that standard Forest Practices Code provisions (Riparian Management and Biodiversity Guidebooks) will provide interim management for red and blue listed plants and plant communities. Volume 1 of the IWMS does not list plant and plant communities in the LRMP area. Volume two of IWMS may identify plant and plant communities at risk in the area.

2. Soils

Soil conservation is the implementation of measures designed to ensure that the physical, chemical and biological properties necessary for maintaining the long-term productivity of soils are protected, maintained or enhanced. The Soil Conservation Guidebook (Forest Practices Code) provides guidance to forest workers on acceptable levels of soil disturbance. Specific limits must be recorded in silviculture prescriptions or stand management prescriptions.

Desired Outcome

- Productive soils with minimal soil disturbance

Assessment

Soil guidelines are generally being adhered to. Soil degradation is being kept to a minimum and soil quality and slope stability is being preserved through improved road construction techniques. Forest practices with respect to landslide prevention have improved.

The desired outcome for soils is generally being met.

Indicators

2.1 Achievement of site disturbance limits for timber harvesting

In 1997/98 forest companies achieved one hundred percent compliance with site disturbance limits identified in silviculture plans for timber harvesting in the Kamloops LRMP area. Minor incidents involving failure to rehabilitate trails in the Clearwater Forest District have been rectified through enforcement actions.

2.2 Construction of new forest roads

The Kamloops LRMP area has an estimated 35,000 to 40,000 kilometres of forest roads. In 1998, 566 kilometres of new roads were constructed. To help preserve soil quality and slope stability, the Forest Practices Code requires all roads to be either maintained or deactivated. In 1998, 81 kilometres of roads were rehabilitated and 696 kilometres were deactivated. (See section 6.1)

New Permanent Road Construction (kilometres)*		
	1997	1998
Kamloops Forest District	No data	303
Clearwater Forest District	199	263
Total		566

*Permanent roads include all permanent mainline and on-block roads for future industrial use.
Source: Ministry of Forests

Total Rehabilitated Roads (kilometres)				
	1995	1996	1997	1998
Kamloops Forest District	3	15	36	70
Clearwater Forest District	No data	No data	12	11
Total			48	81

Source: Ministry of Forests

2.3 Landslides

Landslides are defined as a movement of soil or other debris over an area larger than one tenth of a hectare in size. Human caused landslides—resulting mainly from road construction and maintenance—occurred primarily on roads built prior to the introduction of the Forest Practices Code. The road construction and maintenance standards under the Forest Practices Code should help to reduce the number of human-caused landslides. In 1997 there were a total of 48 human caused landslides dropping to 5 in 1998. (Severe local rain storms in 1997 and drought conditions in 1998 likely had an impact on the occurrence of landslides.)

Landslide Occurrences				
	1997		1998	
	Number	Area (ha)	Number	Area (ha)
Natural	10	2.8	1	.3
Human Caused	48	15.5	4	1.9
Total	58	18.3	5	2.2

Source: Ministry of Forests

3. Forests

Forests dominate most of the Kamloops LRMP area. The variety of these forests is a reflection of the broad ranges of climate, geology, topography and soil present in the area. To help maintain biodiversity it is important to manage human activities occurring in forests in a manner that replicates natural systems. All native species and ecological processes are

more likely to be maintained if managed forests are made to resemble forests created by natural activities such as fire, wind, insects, disease and age. By providing suitable habitat for all native species, biodiversity can be conserved while practicing forest management. Special efforts may be needed to protect the habitat of species at risk.

An essential premise of the Biodiversity Guidebook is that the more managed forests resemble those created by nature, the greater the chance that biodiversity will be maintained. One of the key recommendations for biodiversity management is the retention of important stand structural attributes that are present in unmanaged forests, including wildlife trees, coarse woody debris, tree species diversity and horizontal and vertical structures.

Desired Outcome

- Healthy forest ecosystems with representation of natural attributes and forest dependent species
- Sustainable and productive forests with a natural mosaic of age classes

Assessment

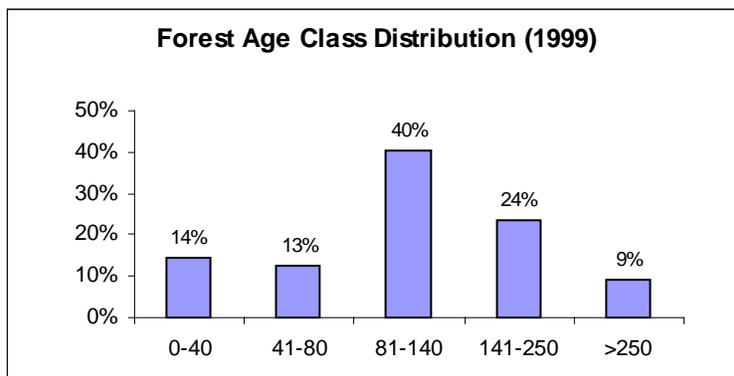
The information for forest age class is baseline data that will be monitored in future reports to provide an indication of age class trends. The Biodiversity guidebook includes targets for older age class trees, which should lead to a stable age class distribution. Insect infestations have remained at endemic levels except for an epidemic infestation of pine bark beetle in 1998. The incidence of forest fires has not fluctuated beyond historic cyclical levels, however, the significant number of human-caused fires indicates a need for greater public awareness and education. Two forest-associated species are red-listed and 13 are blue-listed.

The desired outcomes for forests are generally being met with the exception of an epidemic outbreak of mountain pine bark beetle in 1998.

Indicators

3.1 Age class distribution

The following chart shows forest age class distribution for the Crown forest land base. This is baseline data that will be used to compare changes in age class distribution in the future.



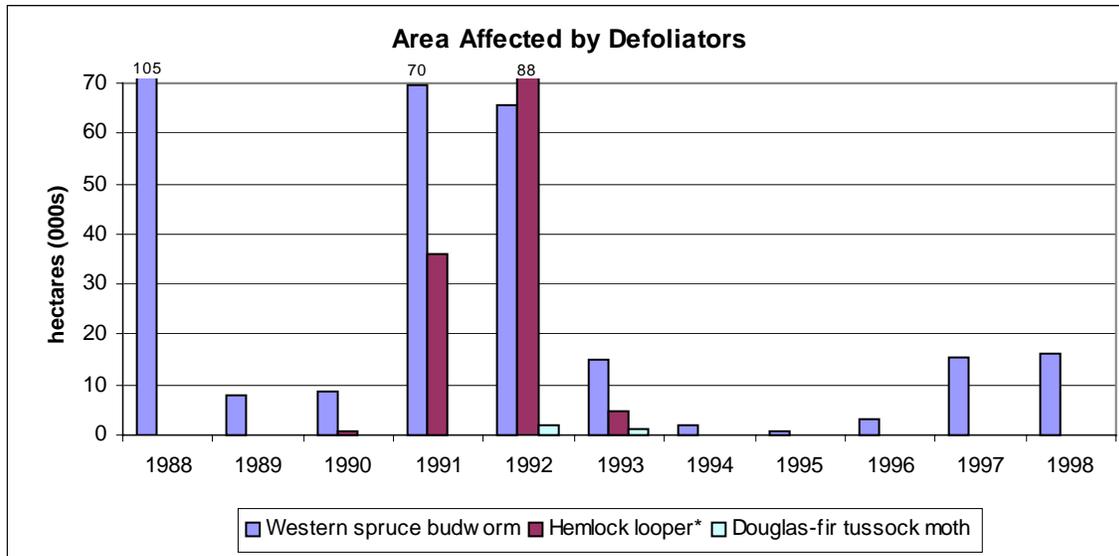
*Refers to the total forested area of the Crown land base.
Source: Ministry of Forests (Timber Supply Review Analysis Reports)

Provisions of the Biodiversity guidebook will set a minimum target for older age class trees (i.e., 140 years or older, see section 1.2).

3.2 Incidence of insect infestation

Two categories of insects are common in forest ecosystems—defoliators and bark beetles. These insects are an integral part of the forest ecosystem and may be beneficial or detrimental to the health and productivity of forests.

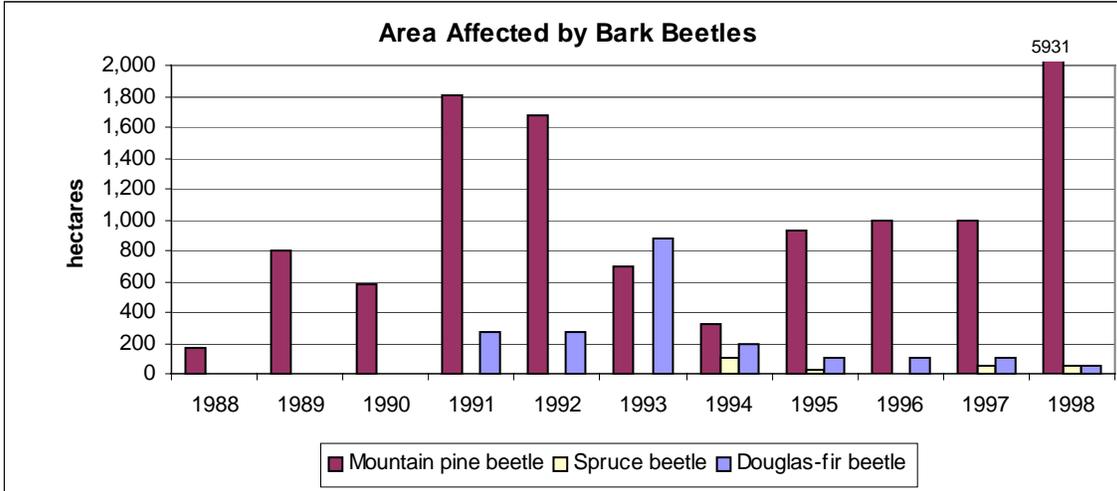
Defoliators commonly feed on coniferous and deciduous hosts. Depending on the duration and the severity of defoliation, tree growth may be negatively affected leading to top kill and eventual tree mortality. The following chart shows that the area affected by defoliators has remained at natural fluctuating levels, with the exception of a major outbreak of Hemlock looper in 1991. This outbreak has since been reduced to a naturally occurring level.



*Includes affected areas in Wells Gray Park
Source: Ministry of Forests (Forest Health Program)

Bark beetles attack and kill large diameter, mature and over-mature coniferous trees. Bark beetles are prone to epidemic outbreaks, which have historically caused significant damage to provincial forests. The area affected by Mountain Pine Beetle has increased significantly in recent years. In 1998, approximately 6,000 hectares of forest land was affected by mountain pine beetle, representing a significant increase (567 percent) over the 10-year average of 900 hectares. A plan has been developed to manage this outbreak. Other bark beetles remain at naturally fluctuating levels.

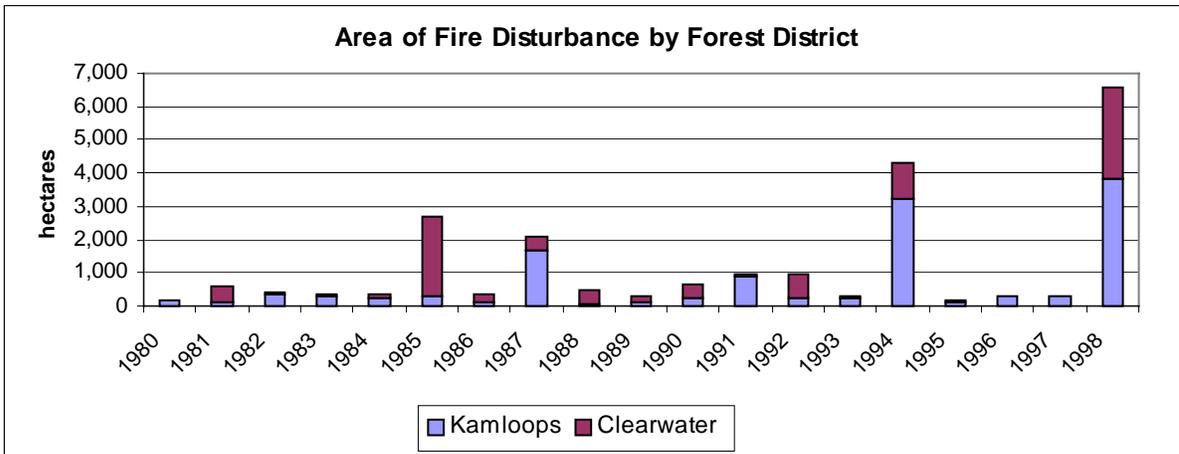
3. Effectiveness Assessment



Source: Ministry of Forests (Forest Health Program)

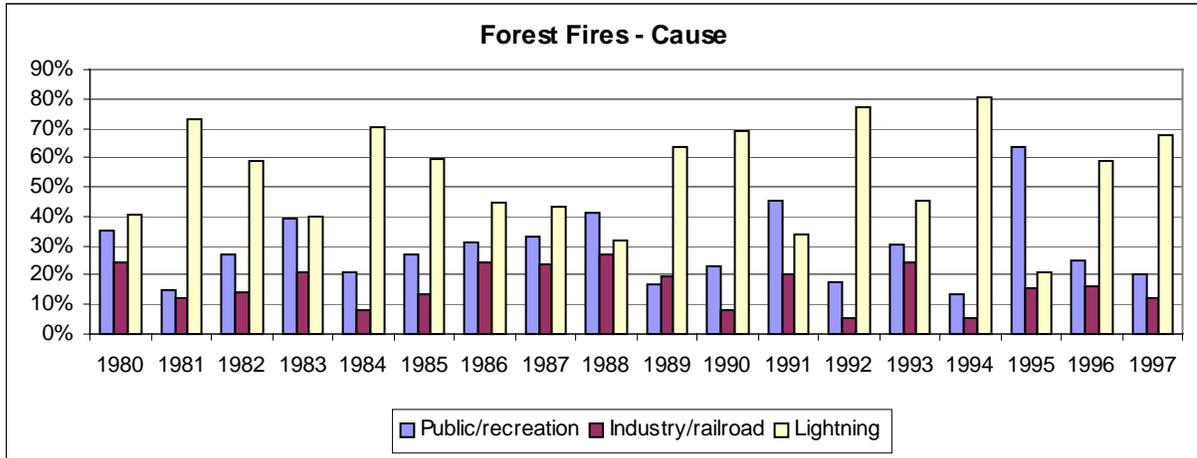
3.3 Fire disturbance (natural and human-caused)

The following charts indicate that fire disturbance is cyclical in nature, typically increasing during years with hot, dry summers. The majority of fires in the Kamloops LRMP are caused by lightning. However, the proportion of human-caused fires is significant, indicating a need for greater public awareness and education.



Source: Ministry of Forests (Protection Branch)

3. Effectiveness Assessment



Source: Ministry of Forests (Protection Branch)

3.4 Forest dependent species at risk

Forest dependent species at risk provides baseline data for comparing performance in future reporting periods. (A summary of all animal species at risk is provided in section 1.3. See appendix 2 for a listing of the individual species.)

Forest Associated Species at Risk (1999)	
Red Listed	Blue Listed
2	13

Source: Ministry of Environment, Lands and Parks (Conservation Data Centre)

It is believed that standard Forest Practices Code provisions (Riparian Management and Biodiversity Guidebooks) will provide interim management for red and blue listed forest dependent species at risk. The IWMS (volume 1) contains resource management strategies for dealing with 5 forest dependent species in the Kamloops LRMP.

4. Grasslands

Natural grassland ecosystems are rare in British Columbia. Native grasslands occur primarily in broad, arid, low elevation basins, such as the Thompson River. Throughout the southern interior plateaus, small areas of grassland occur as isolated openings in the forest at mid to high elevations on warm, steep, southern slopes (e.g., Greenstone Mountain Park)

The Kamloops LRMP contains a significant portion of the grassland that exists within the province. Grassland ecosystems are home to a variety of plant and animal species (some rare and/or unique) and face increasing pressure from human settlement, agriculture and recreation.

Desired Outcome

- Healthy grassland ecosystems with representation of grassland dependent species

Assessment

The following indicators provide baseline data, which will be assessed in the future to provide a clearer indication of the health of grassland ecosystems. As well, a more accurate noxious weed inventory is being developed.

Professional judgment indicates an apparent decrease in the total area of Crown grasslands due to conversion of these lands to private land. Professional judgment also indicates an increase in the amount of noxious weed infestation.

The desired outcome for grasslands is generally not being met.

Indicators

4.1 *Area of grasslands and other openings*

The following information provides baseline data for comparing performance in future reporting periods.

Of the 122,959 hectares of 'open range' (grasslands), 44% is Crown; 44% is private; and 12% is Indian Reserve. Concern has been expressed about the rate of conversion of Crown grasslands to private land and forest encroachment resulting from current fire suppression practices.

Area of grasslands and other openings (1998)				
Classification	Crown	Private	Indian Reserve	Total
Open Range	54,423	54,371	14,165	122,959
Alpine	175,209	3	0	175,212
Meadow	1630	472	5	2,107
Swamp	17,687	1,232	51	18,970
Hayfield	1355	19,479	2,241	23,075
Clearing	2,136	10,051	874	13,061
Urban	12,913	13,600	1010	27,523

The data for this table is from digital information provided by the 1998 Forest Cover maps. 'Open range' is assumed to equal 'grassland' area. 'Urban' area also includes mines, such as the Highland Valley Mine.

Source: Ministry of Forests

4.2 *Noxious weed infestation*

Noxious weeds are non-indigenous plants from Eurasia that are spreading in Kamloops LRMP forest and grassland ecosystems. In general, it is believed that noxious weeds are on the increase.

The following table indicates that 40,000 hectares of land currently has some level of weed infestation. The dominant weed types are Knapweed (60 percent) and Houndstoungue (30 percent). Currently 41 percent of the open range (Crown land plus Indian Reserve) in the Kamloops LRMP is infested by weeds. Infestations range from a light scattering of weeds to heavy, dense stands.

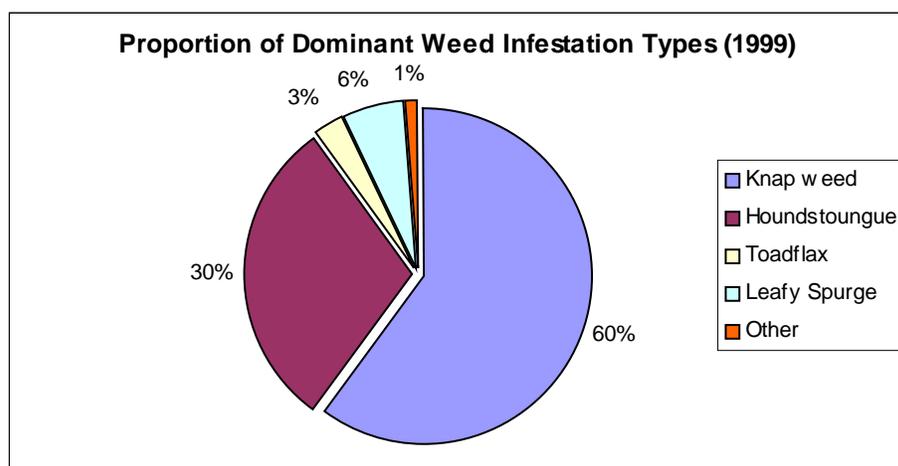
3. Effectiveness Assessment

The increase in noxious weed infestation could have negative impacts on grasslands and forest ecosystems. Biological weed control agents have shown some weed control success on selected sites. It is thought that biological control may take 20 to 30 years before success in controlling weeds is achieved.

The data shown in the following table and chart is baseline data that will be used to compare relative levels of weed infestation in the future.

Area of Crown Land Weed Infestation (1999)			
<i>Category</i>	<i>Infested Area</i>	<i>Total Grassland Area</i>	<i>Percent of Total</i>
Grassland area	28,000 ha	69,000	41
Forest area	12,000 ha	1,441,000	1

Source: Ministry of Forests (professional estimate)



Source: Ministry of Forests (professional estimate)

4.3 *Grassland associated species at risk*

Grassland associated species at risk provides baseline data for comparing performance in future reporting periods. (A summary of all animal species at risk is provided in section 1.3.) (See appendix 2 for a listing of the individual species.) The IWMS (Volume 1) has identified livestock management strategies to deal with 6 grassland-associated species in the Kamloops LRMP. Volume 2 of the IWMS may identify strategies for other grassland species at risk.

Grassland Associated Species at Risk (1999)	
Red Listed	Blue Listed
11	21

Source: Ministry of Environment, Lands and Parks (Conservation Data Centre)

4.4 *Range and grassland condition*

Baseline information on existing plant communities has been gathered and hand-mapped in the field, for specific grassland areas in Landscape Unit #3, Tunkwa and Lac du Bois Parks

(including the recently established ungrazed areas). Throughout these areas, photo-points have been permanently staked on the ground, and photos have been taken to document the plant communities. The intent is to re-assess the photo-points and plant community maps in 5 to 10 years as funding permits, to view trends in plant community changes.

Concern has been expressed about negative impacts on grasslands and grassland associated species as a result of off-road vehicle use. This issue will be reviewed in a future monitoring report.

5. Riparian

Riparian areas are areas of land adjacent to wetlands or bodies of water such as swamps, streams, rivers or lakes. Riparian areas frequently contain the highest number of plant and animal species found in forests, and provide critical habitats, home ranges, and travel corridors for wildlife. The Forest Practices Code requires classification of streams, wetlands, and lakes, and the application of riparian reserve and management zones to address water quality, fish and wildlife management concerns.

Desired Outcome

- Properly functioning riparian systems

Assessment

The following indicators show that there has been a high level of compliance between timber harvesting activities and riparian guidelines. An auditing system is being developed to provide ongoing evaluation of riparian management. Increased levels of auditing are planned for the future to provide a more comprehensive assessment of riparian management.

The desired outcome for riparian areas is generally being met.

Indicators

5.1 Forest Practices Code compliance related to riparian areas

This indicator provides a measure of the pressure being applied to riparian systems through forest practices. Each year the Ministry of Forests inspects harvest cut-blocks to ensure compliance with the riparian objectives approved in Forest Development Plans. When infractions are identified remedial measures are undertaken. Monitoring of range management in riparian areas will be reported in the future.

The number of timber harvesting infractions per total number of cutblock inspections for 1998 was very low, indicating a high level of compliance with Forest Practices Code guidelines.

Forest Practices Code Timber Harvesting Inspections				
	Kamloops Forest District		Clearwater Forest District	
Year	Inspections	Riparian Infractions	Inspections	Riparian Infractions
1996	885	1	236	6
1997	1760	2	343	5
1998	1398	2	227	6

Source: Ministry of Forests (Compliance and Enforcement program)

5.2 Audits indicating riparian concerns

The condition of the riparian ecosystem is measured in terms of the activities that can be managed (i.e., timber and range). One regional audit of riparian management related to timber harvesting was conducted in 1998 showing compliance with the Forest Practices Code. The level of auditing for range and timber is expected to increase in the future.

6. Water

Protection of drinking water quality and maintenance of the integrity of aquatic ecosystems are important environmental issues for British Columbia. BC has 25 percent of the flowing fresh water in Canada. Ongoing monitoring, protection and careful management of these water resources are of critical importance.

Groundwater provides 22 percent of the province's population with drinking water. It comprises 9 percent of total water consumption in the province and represents 25 percent of the groundwater use in the nation.

In the Kamloops LRMP, there is a limited amount of water in a dry belt area with ever-increasing demands for consumption.

Water is in great demand in the Southern Interior. It is used for drinking, irrigation, livestock watering, recreation and various industries. These uses affect both water quantity and water quality. Declines in water quantity and water quality, in turn affect both human uses and wildlife. There is the potential for serious water use conflicts as well as concern for long term fisheries and water management.

Desired Outcome

- Healthy watersheds and stream-flow regimes

Assessment

The amount of road deactivation in the Kamloops LRMP increased by 16 percent between 1997 and 1998, which should help to reduce the amount of turbidity and sedimentation in the surface water. Turbidity levels at several monitoring sites show no detectable adverse trends with the exception of the Kamloops main drinking water intake in the South Thompson River. Water flows at several monitoring sites show no detectable adverse trends in peak and low flows. Watershed assessments have been carried out in 92 percent of the watersheds of the Kamloops LRMP and rehabilitation is now underway or complete in the majority of those requiring work. Eight of twelve community watersheds and one major basin in the area are fully allocated. One of 39 ground water aquifers has been identified as having local quality concerns.

A new comprehensive approach to water quality management has recently been initiated which includes the recently passed Fish Protection Act, as well as changes to the Municipal Act. It may be several years before the results of these new water management initiatives are fully realized. In the future, water allocation will need to reconcile resource conflicts in the drier areas to balance resource development with conservation needs (e.g., fish, wildlife, etc.).

Enhancements are also being made in groundwater mapping, which should lead to improvements in resource management including the development of well and aquifer protection plans.

The desired outcome for water is generally being met with the exception of concerns relating to water allocation in drier areas in the Kamloops LRMP and high turbidity levels at the Kamloops main drinking water intake in the South Thompson River.

Indicators

6.1 Roads deactivated for water management control

Road deactivation includes measures to stabilize roads and trails during periods of inactivity. Measures include control of drainage, removal of sidecast where necessary and the re-establishment of vegetation on permanently deactivated areas¹⁰.

The two-year trend in the following table shows a 16 percent increase in total kilometres of road deactivation. This baseline data will be used to assess and track road deactivation over time. Approximately 10 percent of roads are permanently deactivated. The rest are temporary and semi-permanent.

Road Deactivation (kilometres)			
Year	Kamloops District	Clearwater District	Total
1997	400	189	589
1998	412	284	696

Source: Ministry of Forests

6.2 Turbidity

Turbidity and sedimentation are closely related. Turbidity is suspended clay, silt and organic matter contained in water, usually caused as a result of soil erosion. It is measured by the level of impedance of a light beam projected through a sample of water. Sedimentation is the settling of particles from the water to the stream or lake bed.

Appendix 3-1 shows historic levels of turbidity at several selected monitoring sites. Streams were chosen to reflect forest streams of different sizes. These data indicate no detectable adverse trends. Localized high levels of turbidity are the result of storm events and subsequent flooding. However, turbidity levels at the Kamloops main drinking water intake in the South Thompson River have risen steadily since 1985 (See indicator for domestic water supply, section 16.9).

6.3 Water flows

Stream flow regimes indicate whether water is available during the high use season and whether the system is becoming “flashy” (i.e., high and low water volume occurrence and duration exceeds historic average).

¹⁰ Road deactivation is an important tool for wildlife and water management. Through access management planning under Forest Development Plans, issues related to road deactivation (e.g., impact on access for other users) can be reconciled.

3. Effectiveness Assessment

Historic annual records of peak and low flows at several selected sites are provided in appendix 3-2 and 3-3. Streams were chosen in areas where conditions of forest harvesting and community watersheds could potentially affect water flows. These data show no detectable adverse trends. Localized high water flows in 1997 resulted from storm events and similarly, the low water levels in 1998 were due to hot summer weather conditions.

6.4 Watershed assessments

Watershed assessment is a procedure used by forest managers to gauge the type and extent of current water-related problems and the possible hydrologic implications of proposed forestry-related activities. Typically watershed assessments focus on potential changes to peak flows, landslides and accelerated surface erosion, and to the channel stability.

Watersheds are assessed on a basis of priority related to community watersheds, fish values and domestic use. Of the 132 watersheds requiring rehabilitation, less than 10 percent required major work. The remainder required minor rehabilitation such as road and ditch maintenance. To date, rehabilitation work has been completed or is underway in 94 of the 132 watersheds requiring rehabilitation.

Watershed Assessments – Status			
Total Watersheds	Number Assessed	Rehabilitation Required	Rehabilitation Complete/Underway
237	219	132	94

Source: Ministry of Forests

6.5 Fully allocated streams

In the Kamloops LRMP 376 water supply systems are fully allocated and 103 (mostly smaller) additional systems are facing possible water shortages for licensing purposes. In the very driest areas most systems are fully allocated. Eight of twelve community watersheds and one major basin—the Deadman River—are fully allocated. Although the number of fully allocated creeks, brooks and lakes appears high, this number is really a small percentage of the thousands of creeks, brooks and lakes that exist in the Kamloops LRMP.

In the future, water allocation will need to account for potential resource conflicts in the drier areas of the LRMP. For example, in areas where there is a limited water supply with increasing demands, water allocation procedures will need to balance resource development with conservation needs (e.g., fish, wildlife, etc.). The *Fish Protection Act* provides tools to deal with these issues. (Regulations and policy are still under development.)

Constraints on Water Supply for Kamloops TSA*	
System Scale	Fully Allocated Systems
Community Watersheds	8
Major Basin	1
Creeks, Brooks & Lakes	212
Springs, Ponds & Gulches	155

*Many of the systems in the above table extend beyond the boundaries of the KLRMP.

Source: Ministry of Environment, Lands and Parks (Water Management branch)

6.6 Streams and lakes with quantity and quality concerns

Detailed data on streams and lakes with water quality concerns is not currently available. Water flow data (see section 6.3) shows no detectable adverse trends for streams where historic monitoring has occurred.

6.7 Ground water quality/quantity

Groundwater often maintains base flows in rivers and streams during periods of drought and is critical to fisheries habitat and spawning areas. With increasing demand and reliance on groundwater from a growing population comes the need to increase efforts to protect and manage the resource.

Aquifer classification mapping has been carried out in two thirds of Kamloops LRMP area where aquifer use occurs to provide as a means of optimizing water resources, water use decisions and resource protection. (Mapping is still required in the Ashcroft area and in the area north of Little Fort.) Of the 39 aquifers identified to date in the Kamloops LRMP, one has been identified as having local quality concerns and five are identified as being highly vulnerable (see appendix 4).

7. Wildlife

The Kamloops LRMP contains a rich diversity of habitat which supports a wide variety of wildlife species. However, as human settlement and corresponding resource development activities increase, wildlife habitat is under continuing pressure. Habitats such as Bunchgrass and Ponderosa Pine and habitat elements such as old growth forests, young successional forests, riparian areas and wetlands are prone to impacts from urban development, forestry, agriculture, livestock grazing and access development. As well, wildlife populations and habitats may be threatened from a variety of human activities ranging from settlement to industrial development.

Desired Outcome

- A diversity and abundance of naturally occurring wildlife and their habitats

Assessment

Most species in the Kamloops LRMP show healthy populations; however, there are several species with management concerns (population and habitat) including:

- Caribou
- grizzly bear
- badger
- furbearer
- Sharp-tailed grouse
- Woodland birds
- Grassland birds

It is difficult to provide an accurate assessment of wildlife populations and habitat for the Kamloops LRMP based on currently available data and professional opinion.

Based on the above results, the desired outcome for wildlife is being partially met (note species with management concerns).

Indicators

7.1 Wildlife populations

Mule deer – Stable population with a slow decline possible as is seen across North America. Other interior areas have declines.

White-tailed deer – Still expanding their range, partially at the expense of mule deer where habitat needs overlap.

Cougar – Population relatively high due to a recent history of high deer numbers.

Bighorn sheep – Increasing to near carrying capacity. Other regions show some decline.

Moose – Recovering from previous low, increase likely due to timber harvest regulations.

Caribou – British Columbia contains approximately 90 percent (2500 animals) of the remaining world population of Mountain Caribou. The population in the Kamloops LRMP is stable to decreasing with viable herd populations holding steady. Caribou populations are likely affected by a number of factors including habitat loss and alteration and human impacts such as road construction, settlement patterns and resource development activities. The strategic direction for Caribou management in the Kamloops LRMP is being implemented under project C (Ecosystem Management Strategies).

Goat – Stable to increasing in Kamloops LRMP (Trend less certain outside the area).

Wolf – Anecdotal reports show an increasing population on the Bonaparte plateau.

Badger – Anecdotal reports appear to show more badgers than previous very low numbers. Badger habitat and prey species may be affected by agricultural pest control.

Furbearers – No good measure available yet to assess changing abundance. Marten numbers were down significantly in 1997 from the previous 10-year average (no explanation provided to date).

Grizzly Bear – British Columbia contains 25 percent of the North American Grizzly Bear population. These animals range over vast territories, which makes them susceptible to habitat fragmentation resulting from human settlement and resource development.

Black Bear – Stable populations, somewhat affected by drought in 1998.

Waterfowl – Populations have increased in recent years.

Flammulated Owl – Surveys in recent years indicate a good, well-distributed population in the dry Douglas fir - yellow pine zone. A report on distribution is expected in 1999.

Northern Goshawk – Six nest-sites have been protected by placement of Wildlife Tree Patches and by scheduling industrial activity outside the nesting/fledgling season. More sites are expected to be found and managed for, as are eagle and osprey nest sites

Grassland birds – Data on grassland birds are not available for the Kamloops LRMP area, however, grassland birds show the most consistent decline of any group of North American birds monitored by the Breeding Bird Surveys (BBS). Declines prevail throughout North

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America. Areas with increasing trends are generally small and localized. Increasing populations are evident in fewer than 30 percent of the species.

Grouse – British Columbia has the largest remaining distribution of Sharp-tailed grouse of any jurisdiction in North America. In the Kamloops LRMP, a resurgence of various grouse species occurred in 1998 from very low previous populations. Sharp-tailed grouse are subject to habitat loss due to forest encroachment on grasslands, over-grazing, loss of riparian habitat and urban expansion.

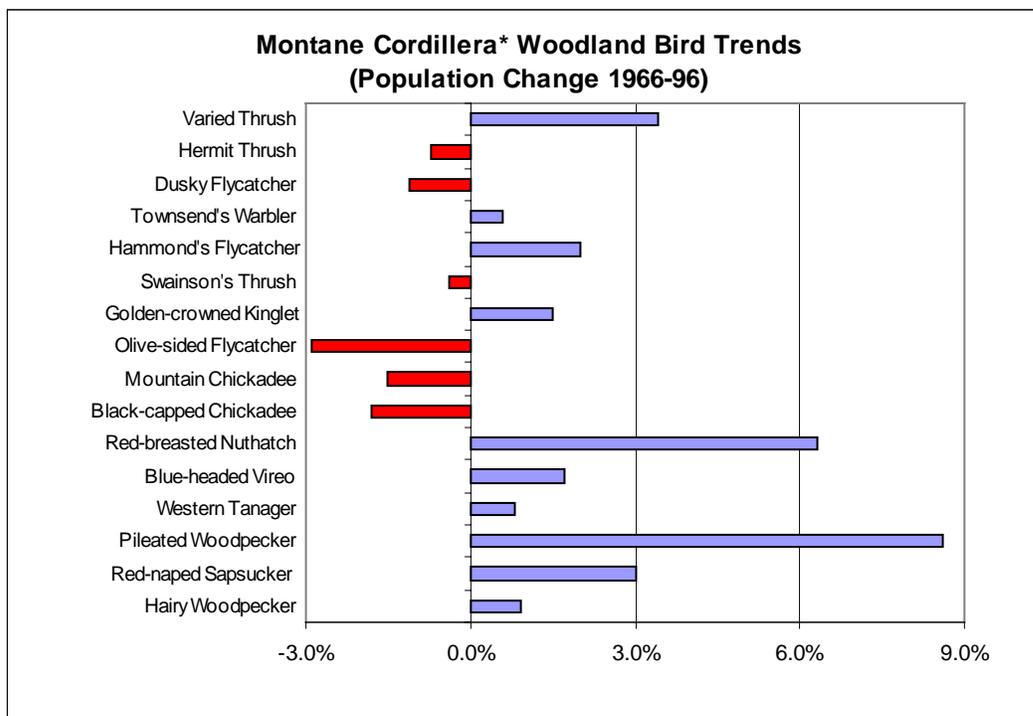
Data on Sharptail Grouse in KLRMP (1998)			
Name	Maximum Count	General Condition of Habitat	
		Nest/brood	Winter
Long Lake West	15	moderate/high	moderate-low
Coal Hill	9	moderate	moderate
Makaoo Lake	13	moderate	low
Long Lake North	6	moderate-high	moderate
Blue Ravine	6	moderate-high	moderate

Numbers are derived from maximum counts from at least two visits. Lek counts of 2 individuals or more were used. Trend includes Douglas Lake area, which is outside of the KLRMP. (1986-1997 data provided by MELP.)

Woodland Birds – The following chart shows population changes for selected woodland birds in the Montane Cordillera region (south/central interior of BC) that are most dependent on forest habitat. The chart shows that populations increased for 10 of the sixteen species and decreased for the remaining six between 1966 and 1996. Monitoring of woodland birds should improve in the future as data collection improves and more specific research is undertaken in the Kamloops LRMP area.

In addition to results for the Montane Cordillera region, North American Breeding Bird Surveys (BBS) for Woodland bird populations show a mosaic of increases and declines. The Olive-sided Flycatcher is highlighted as a cross-Canada issue. Three other species—the Blue Grouse, Lewis Woodpecker (blue-listed) and the American Dipper (all of which are known to exist in the Kamloops LRMP area)—are also highlighted as a concern.

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*Montane Cordillera includes all of the south and central interior of British Columbia

Source: All of the above wildlife data was provided by the Ministry of Environment, Lands and Parks (Wildlife branch)

8. Fish

The large number of lakes and streams in the Kamloops LRMP provides important habitat for both freshwater and anadromous fish species.

The *Fish Protection Act* passed in 1997 provides for the protection and enhancement fish habitat, enables local governments to include fish protection in local planning, and offers incentives for fish protection. Highlights of the legislation include:

- no new dams (bank-to-bank) on provincially significant rivers including the Adams, Clearwater, North Thompson, South Thompson and Thompson rivers
- better protection of water flows for all fish in BC by improving the water licensing process
- designation of “sensitive streams” where fish are in danger.

The Forest Practices Code specifies planning and operational guidelines for each phase of timber harvesting operations around streams, lakes and wetlands. The Fish-stream Identification Guidebook in conjunction with others (i.e., Riparian Management Area Guidebook) provides direction for effective fish habitat management including identification of streams where fish are present. These guidelines are intended to ensure the protection of fish populations and habitats.

Desired Outcome

- A diversity and abundance of wild fish populations and habitats

Assessment

The following indicators highlight population and habitat concerns for coho salmon, bull trout and mountain sucker. (Since 1988, Thompson coho populations have declined to very low levels and remain at risk.) Data on individual lakes and streams with natural stocks at risk is needed. Existing water flow data show no detectable adverse trends (see section 6.3). Lake classification has been substantially completed and more data is required on lakes and streams with water level, quantity and quality concerns.

The desired outcome for fish is generally not being met.

Indicators

8.1 Resident fish species and stocks at risk

Two blue-listed species — Bull Trout and Mountain Sucker are found in North Thompson. The main threat to Bull Trout is habitat loss caused by logging, grazing, mining, road building and dam construction. Strategies for maintaining and enhancing Bull trout habitat are included in the Identified Wildlife Management Strategy (volume 1).

For much of the northern part of the Kamloops LRMP there is a need to maintain genetic diversity and natural diversity for wild rainbow trout stocks. Data on individual lakes and streams with natural stocks at risk is not currently available. Additional research is needed to determine condition of lakes and streams that support these stocks.

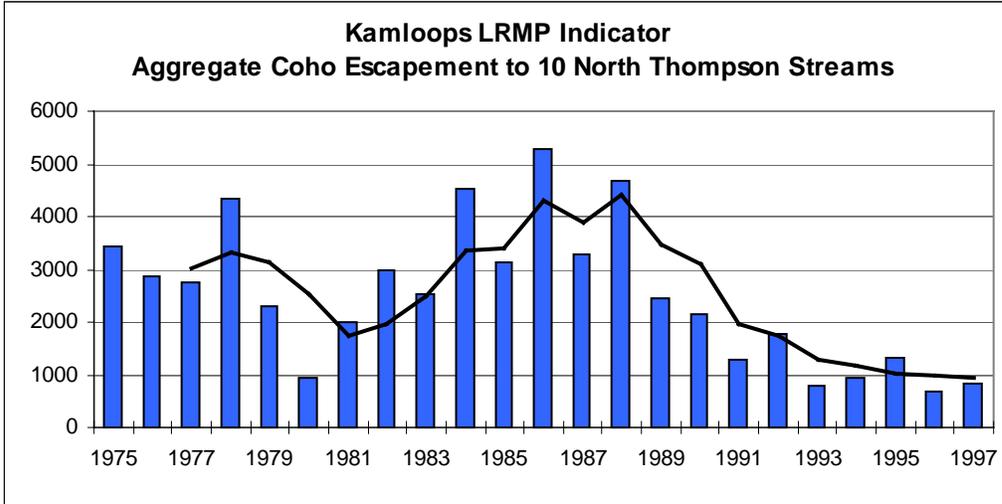
Aquatic Species at Risk (1999)	
Red Listed	Blue Listed
	Bull trout
	Mountain sucker

Source: Ministry of Environment, Lands and Parks (Conservation Data Centre)

8.2 Anadromous fish species (salmon and steelhead) escapement

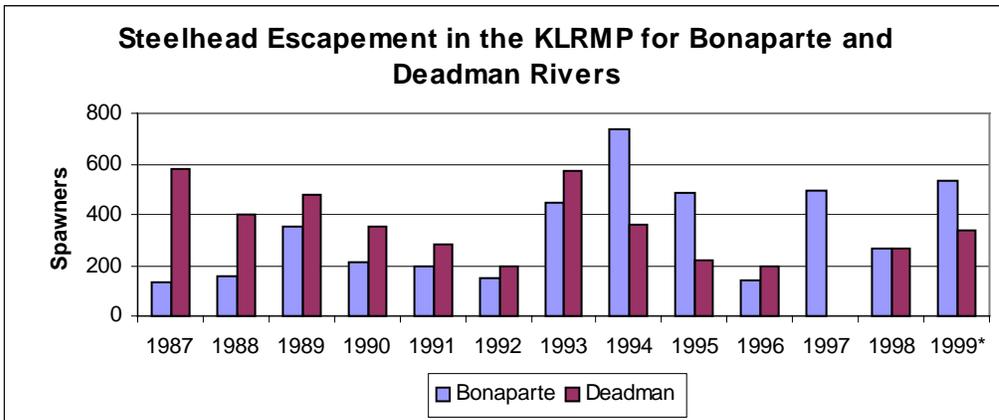
The following two charts provide a historic record of the annual numbers of steelhead and coho salmon that have returned to spawn in rivers and streams in the Kamloops LRMP area. Although influenced by external factors such as ocean conditions and harvesting, escapement provides a useful indicator of the health of salmon-bearing watersheds in the region because coho spawn and rear in both large and small streams throughout the area. In addition, coho are particularly sensitive to watershed disturbance because juvenile fish spend a full year in the stream environment. Since 1988, Thompson coho populations have declined to very low levels and remain at risk. As a result, Fisheries and Oceans Canada has curtailed fishing on these stocks.

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*The 10 streams used to gather data on coho escapement are: Barriere River, Blue River, Cook Creek, E. Barriere River, Fennel Creek, Lion Creek, N. Thompson River, Raft River, Reg Christie Creek and Tumtum Creek.
Source: Fisheries and Oceans Canada

Steelhead, which also use small streams are affected by habitat alteration and water allocation. Steelhead escapement numbers were much higher prior to 1987. Subsequent declines are the result of the ocean fishery by-catch and habitat deterioration. The Bonaparte River shows an increase in steelhead populations starting in 1993 which can be attributed to the removal of a barrier resulting in access to additional habitat.



* Projected
Source: Ministry of Environment, Lands and Parks (Fisheries branch)

8.3 Lake classification

The Forest Service lake classification system provides guidance for forest harvesting and road development around lakes. The system provides variable strategies for managing lakeshore values such as recreation and fish outside of protected areas. Strategies include harvesting guidelines and road deactivation. Under the classification system, Class A is the most restrictive and Class E is the least restrictive.

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The Thompson-Nicola Regional District is currently updating its lakes study. Results will be provided in the next monitoring report.

The following table indicates that the majority of required lakes have been classified. Although this data does not show a trend, it does indicate that lakes are being managed for values such as fish and recreation.

Lake Classification (1998)					
Forest District	Class A	Class B	Class C	Class D	Class E
Clearwater	6	33	79	37	4
Kamloops	21	24	320	187	22
Total	27	57	399	224	26

Source: Ministry of Forests

9. Protected Areas

The Protected Areas Strategy—introduced in 1992—is designed to protect the province’s biological and cultural heritage and to ensure that ecosystems are adequately represented in protected areas. The Kamloops LRMP has played a key role in achieving the objectives of the Protected Area Strategy by providing representation of key biogeoclimatic zones such as Bunchgrass, Ponderosa Pine and Interior Douglas fir (see section 1.1). As an outcome of the LRMP the total amount of protected area increased from 18.9 percent in 1992 to 22.7 percent in 1996 (includes Wells Gray Park).

Desired Outcome

- Protection and management of representative examples of BC’s natural diversity, recreational opportunities, cultural/heritage and special features

Assessment

Protected areas in the Kamloops LRMP protect viable, representative examples of natural diversity recreational and tourism opportunities and special natural, cultural heritage and recreational features.

To maintain ecological integrity, protected area management plans will include strategies for fire management, weed management and other natural processes. BC Parks will implement these strategies in partnership with other agencies.

Protected areas will continue to be assessed in future reports to monitor the occurrence of significant events (outside the scope of park management plans), which may affect biological, cultural and recreational objectives of the Kamloops LRMP.

The desired outcome for protected areas is generally being met.

9.1 Significant environmental occurrences in protected areas

Fire management, insect, disease and weed strategies are being initiated in protected areas as required. Additional significant environment occurrences (outside of the scope of park management plans) will be monitored in future reports.

Human System Indicators (Category 10-18)

Human system indicators have been developed for 20 desired outcomes in the Kamloops LRMP. A list of the resource categories, desired outcomes, and corresponding human activity indicators is presented in the following table.

Indicators for Human Activities		
Category	Desired Outcome	Indicators
10. Agriculture	<ul style="list-style-type: none"> ➤ A prosperous agriculture industry with access to Crown resources especially land, water and range land to support development ➤ Sustainable and productive agricultural and range lands 	<ul style="list-style-type: none"> ▪ Agricultural Land Reserve ▪ Grazing tenures ▪ Grazing tenures that overlap protected areas ▪ Irrigation water licenses ▪ Rangeland ▪ Farms ▪ Gross Domestic Product (GDP) ▪ Employment
11. Minerals	<ul style="list-style-type: none"> ➤ A prosperous mining industry with access to Crown land for exploration and development 	<ul style="list-style-type: none"> ▪ Investment ▪ GDP and annual metal prices ▪ Employment
12. Timber	<ul style="list-style-type: none"> ➤ A prosperous forest industry with a sustainable supply of timber 	<ul style="list-style-type: none"> ▪ Timber harvesting land base ▪ Timber supply ▪ Harvest volume ▪ Backlog of Non-sufficiently Restocked (NSR) land ▪ Provincial government revenues ▪ GDP and annual lumber prices ▪ Employment
13. Tourism	<ul style="list-style-type: none"> ➤ A prosperous tourism industry offering high quality, natural tourism experiences ➤ A diverse range of tourism opportunities and uses across the landscape 	<ul style="list-style-type: none"> ▪ Room revenue ▪ Visitor volume ▪ Commercial recreation tenures ▪ Resource-based tourism operations ▪ GDP ▪ Employment
14. Recreation	<ul style="list-style-type: none"> ➤ A diverse range of recreation opportunities and uses across landscapes ➤ Preservation and management of high quality recreation resources 	<ul style="list-style-type: none"> ▪ Recreation resources ▪ Recreation amenities ▪ Recreation use
15. Visually Sensitive Areas	<ul style="list-style-type: none"> ➤ Landscapes managed in accordance with visual quality objectives 	<ul style="list-style-type: none"> ▪ Achievement of visual quality objectives

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16. Communities	<ul style="list-style-type: none"> ➤ Social and economic stability ➤ Healthy and prosperous communities ➤ Stable or increasing employment ➤ Access to Crown land for community and industrial development ➤ Clean, safe drinking water and a stable community water supply ➤ Minimal risks to lives and property from flooding and erosion 	<ul style="list-style-type: none"> ▪ Population ▪ Education level ▪ Crime rate ▪ Labour force and employment ▪ Employment income ▪ Economic diversity ▪ Business start-ups and failures ▪ Portion of land base in settlement use ▪ Domestic Water Supply ▪ Flooding occurrences
17. Cultural Heritage	<ul style="list-style-type: none"> ➤ Protection of important archeological sites ➤ Completion of First Nation Traditional Use Studies ➤ Designation and management of historic trails 	<ul style="list-style-type: none"> ▪ Archaeological sites ▪ Traditional Use Studies ▪ Designated historic trails
18. Public Involvement	<ul style="list-style-type: none"> ➤ Meaningful public involvement in local level planning ➤ Educated and informed public with respect to LRMP goals and outcomes 	<ul style="list-style-type: none"> ▪ Public involvement in resource use planning processes

10. Agriculture

Agriculture has long been an important component of the economy in the Kamloops LRMP. The agriculture sector is recognized as providing a stabilizing influence on the economy through the provision of employment opportunities that are not affected by the cyclical downturns experienced by other resource-based sectors.

In the Kamloops LRMP area, agricultural activity has traditionally involved forage and livestock operations including sheep, beef, dairy and horses. Recently crops such as ginseng and seed crops have been introduced and expansion has occurred in potato growing and game farming (i.e., fallow deer and bison).

Agriculture holdings are distributed throughout the area and include Crown and private land with most of the activity occurring on private land. The primary activity occurring on Crown land is livestock production.

Desired Outcome

- A prosperous agriculture industry with access to Crown resources especially land, water and range land to support development
- Sustainable and productive agricultural and range lands

Assessment

The overall health of the agriculture sector appears to be sound. The number of farms and the total area of farmland have increased since 1991 (mainly as a result of increases in farming activity on private land). Employment levels have risen and economic growth (at a provincial level) in 1996 outpaced the growth rate of the provincial economy. Although

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there has been a slight decline in the number of animal unit months (AUMs) for grazing tenures, this is consistent with fluctuations at the provincial level.

There is not sufficient historic data to assess trends relating to access to Crown resources (i.e., land and water). However constraints on water allocation in drier areas of the LRMP may affect future expansion of agriculture in these areas. Future assessments will provide more information on access to Crown resources and productivity of the land base.

The desired outcomes for agriculture are generally being met.

Indicators

10.1 *Agricultural Land Reserve*

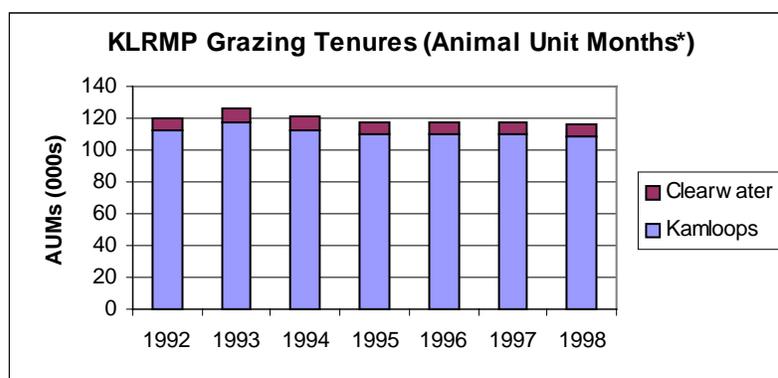
The following information provides baseline data to be used for comparing results in future reporting periods.

Area of Agricultural Land Reserve (1998)		
Category	Area	Percent
Crown Land	122,230 ha.	45.9
Private Land	144,216 ha.	54.1
Total	266,446 ha.	100

Source: Ministry of Forests (Timber Supply Review)

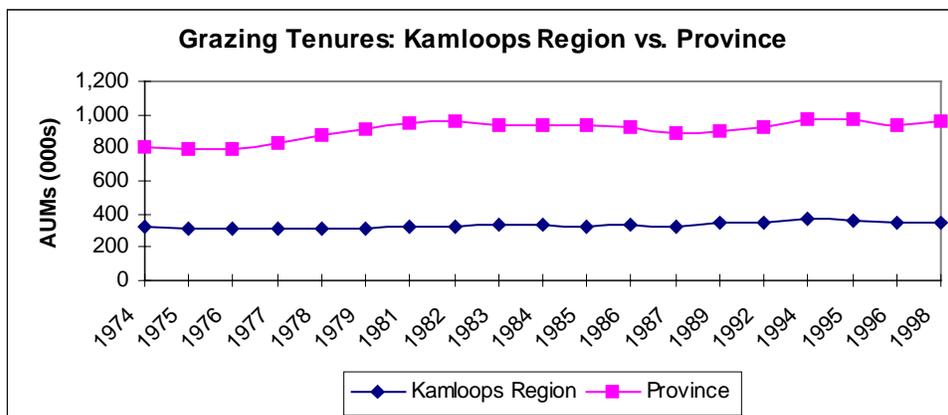
10.2 *Grazing Tenures*

There has been a marginal decline in the number of AUMs (animal unit months) since 1993. When compared to the relative change in AUMs at a provincial level, the degree of fluctuation in the Kamloops region has been quite stable.



*One Animal Unit Month (AUM) is equivalent to one cow and calf for one month on Crown land
Source: Ministry of Forests

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*Data from 1980, 1988, 1990, 1991, 1993 and 1997 are not available.
Source: Ministry of Forests

10.3 Grazing Tenures That Overlap Protected Areas

In 1998 there were 161 grazing tenures in the Kamloops LRMP (a decline of 2 from 1995). The number of grazing tenures that overlap protected areas decreased from 55 in 1995 to 52 in 1998 (a decline of 5.5 percent). This compares to a reduction of 1.2 percent in grazing tenures for the entire Kamloops LRMP area. The number of AUMs included in tenures that overlap protected areas decreased by 1,355 (2.1%). The reduction in tenures and AUMs is due to a voluntary relinquishment of 3 grazing licenses.

Grazing Tenures That Include Protected Areas (1998)			
	1995	1998	Percent Change
Total Grazing Tenures in KLRMP	163	161	-1.2
Grazing Tenures that overlap Protected Areas	55	52	-5.5
AUMs of grazing Tenures that overlap Protected Areas	63,424	62,069	-2.1
Total AUMs in the KLRMP	118,558	116,018	-2.1

Source: Ministry of Forests

10.4 Rangeland (includes grassland, open forest and early seral forest)

The following table indicates that 37.4 percent of Crown land or 40.7 percent of the total land base has high potential for livestock grazing¹¹. This information provides baseline data, which will be used for comparing results in future reporting periods.

¹¹ This does not include the high potential area located in cutblocks in wet/cold forests.

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Availability of Rangeland in the KLRMP (1998)						
Land Classification	Crown (ha)	Crown (%)	Livestock Potential	Private (ha)	Indian Reserve (ha)	Total (ha)
Open Range	54,423	2.3	High	54,371	14,165	122,959
Cutblocks (1-20 years)	129,880	5.5	High	637	2	130,519
Dry Forest	477,857	20.2	High	47,474	16,030	541,361
Aspen	44,104	1.9	High	8,502	883	53,489
Moist Forest	689,923	29.1	Medium	34,693	2,960	727,576
Wet/Cold Forest	687,012	29.0	Low (high in cutblocks)	5,696	1,074	693,782
Alpine	175,209	7.4	High	3	0	175,212
Alpine Forest	29,162	1.2	Low	0	0	29,162
Meadow	1630	0.1	High	472	5	2107
Swamp	17,687	0.7	Low	1,232	51	18,970
Non-Productive	45,971	1.9	unknown	2,013	434	48,418
Hayfield	1355	0.1	High	19,479	2,241	23,075
Clearing	2,136	0.1	High	10,051	874	13,061
Urban*	12,913	0.5	Low	13,600	1010	27,523
Totals	2,369,262	100.0		198,223	39,729	2,607,214

*Urban also includes mine sites (e.g., Highland Valley Mine: with the pending mine closure, this huge area may be termed 'Open Range' or 'Clearing').

Source: Ministry of Forests (data is from the digital information provided by 1998 Forest Cover Maps.)

10.5 Irrigation Water Licensing

Currently there are 1758 irrigation licenses issued in the Kamloops LRMP (see indicator for domestic water supply, section 16.9). In the drier areas of the LRMP most available water is already allocated. This may lead to conflicts over future allocation priorities, which could affect future expansion potential for agriculture (see indicator for fully allocated streams, section 6.5).

10.6 Farms

The number of farms in the Kamloops LRMP area increased by 126 (14 percent) between 1991 and 1996. This increase may be due to the subdivision of larger farms into smaller units or the development of new farms. New farms are typically developed from existing private lands that were not previously assessed as farmland. It is likely that much of the newly assessed farmland is for pasturing livestock, since the area in crops has remained about the same, and the numbers of beef cattle and horses has increased. A minimal amount of Crown land (approximately 10 hectares) is transferred into private farmland each year. The change in the number of farms relates mainly to private land.

The increased amount of land under irrigation is primarily for forage and pasturelands, however, recent trends have shown an increase in horticultural crops including ginseng.

KLRMP Area Farm Statistics		
	<i>1991</i>	<i>1996</i>
<i>Number of Farms</i>	871	997
<i>Total hectares</i>	226,632	252,963
<i>Average Farm Size</i>	260	253
<i>Area in Crops</i>	22,143	22,507
<i>Area under Irrigation</i>	16,022	18,801

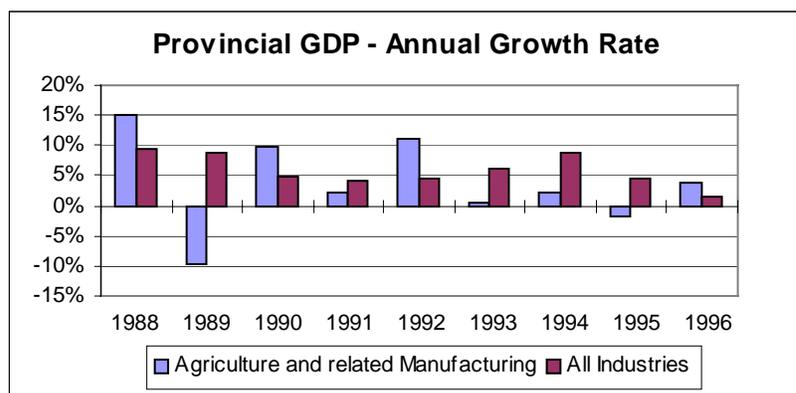
Source: estimate based on BC Stats census data

Additional data showing the change in agriculture on Crown land (i.e., livestock production) is not currently available and will be produced for the next monitoring report.

10.7 Gross Domestic Product (GDP)

Data showing GDP¹² for the Kamloops LRMP is not available, therefore provincial data has been used to indicate past performance of the agriculture sector at a provincial scale.

Agriculture shows moderate fluctuations from overall trends in the provincial economy. In 1996 agriculture grew at a rate of 4 percent compared to a rate of 1.6 percent for the total provincial economy.



Source: BC Stats

10.8 Employment

Employment in the agriculture sector increased by 28.6 percent between 1991 and 1996, attributable mainly to an increase in the number of ginseng farms.¹³

Agriculture Labour Force (TNRD)		
<i>1991</i>	<i>1996</i>	<i>Change</i>
1,905	2,450	28.6%

Source: BC Stats

¹² GDP (gross domestic product) is a measure of the total value of goods and services produced in a defined economic unit (i.e., province) in one year. GDP can also be reported by economic sector (e.g., forestry, agriculture, mining, etc.)

¹³ Ginseng farms operate primarily on private land.

11. Minerals

The mining industry has long been of importance to the economy of the Kamloops LRMP. Much of the area is highly mineralized and additional mining activity is probable under favourable market conditions. Copper is the leading mineral produced followed by gold and silver.

The mineral sector includes exploration, evaluation, development, operations and mine reclamation activities. Operations are the largest segment of the sector, although exploration activity is also important.

To help ensure a viable mining industry over the long term, the British Columbia government introduced the BC Mining Initiative in 1998, which is designed to encourage and assist exploration and to improve the climate for secure mining investment in the province. This initiative includes the Mining Rights Amendment Act, which assures access to mineral tenures and establishes a process of fair compensation for tenures expropriated by park creation. It also includes a new Mineral Exploration Code, intended to create a one-window approach to permitting. A Mining Exploration Tax Credit was introduced, effective August 1, 1998, which provides a refundable tax credit of 20% on qualified exploration expenditures. Thresholds for review under the Environmental Assessment Act were raised and streamlined in order to simplify and accelerate development approvals of new mine projects

The future of economic activity in the mining sector in the Kamloops LRMP is dependent upon a number of economic factors including metal prices, exchange rate, taxation and regulatory climate and land use zoning.

Desired Outcome

- A prosperous mining industry with access to Crown land for exploration and development

Assessment

The mineral sector in the Kamloops LRMP has experienced a downturn in investment and employment. This is likely attributable to external factors (e.g., low metal prices and weak demand).

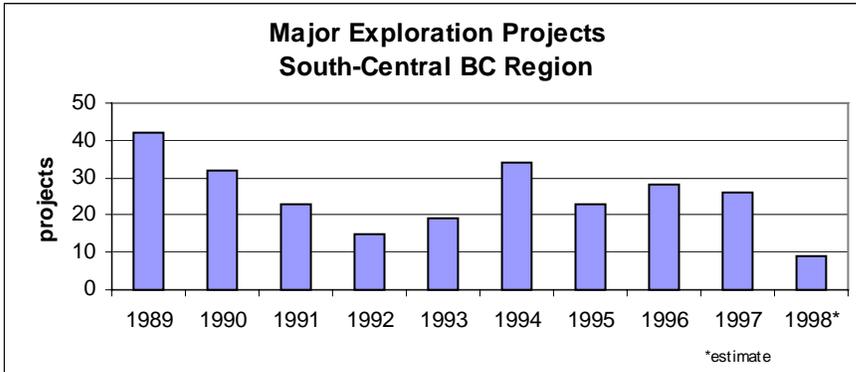
Assured access for mineral exploration and development has been provided through the *Mining Rights Amendment Act*, however the environmental standards in the legislation may have contributed to an increase in costs for access approval and development.

The desired outcome for minerals is being partially met. It has been met in terms of providing access to Crown land for exploration and development. The desired outcome has generally not been met in terms of achieving prosperity. This is due to low levels of investment tied to external factors such as low metal prices and weak demand and is not attributable to implementation of the LRMP.

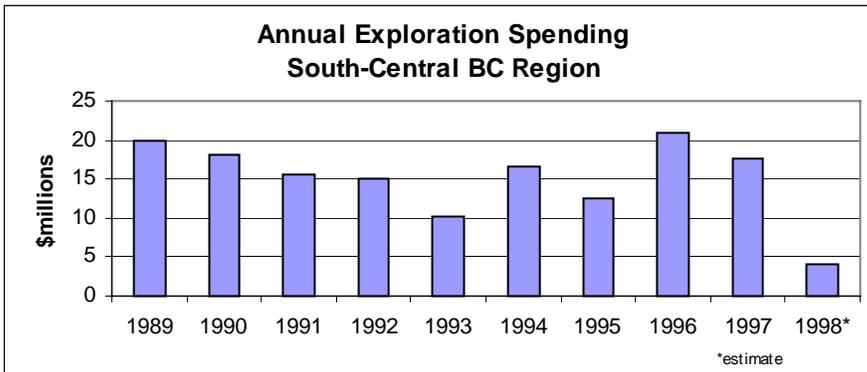
Indicators

11.1 Investment

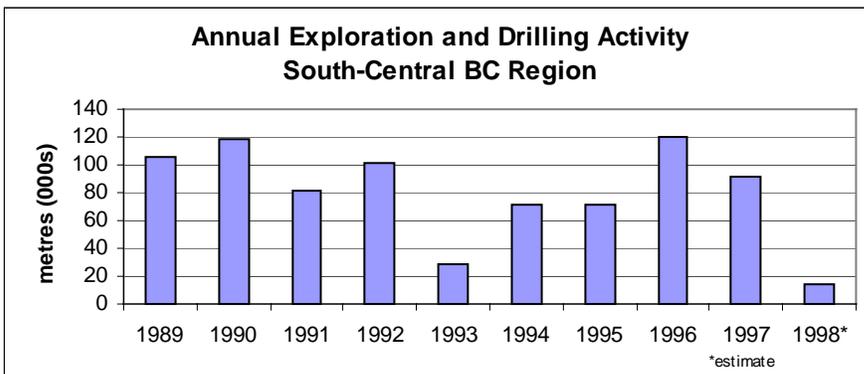
Data for exploration, spending, drilling activity, number of major projects and changes in mineral tenures were used to reflect investment in the mining industry. Most of the data is derived from the Ministry of Energy and Mines South-Central Region, of which the Kamloops LRMP is about one sixth. The data show that 1993 and 1998 have been the two lowest years for investment over the past decade. It is also noteworthy that the number of claims staked in the Kamloops Division exceeded the number of claims forfeited for the first time in the decade during 1996 and 1997.



Source: Ministry of Energy and Mines

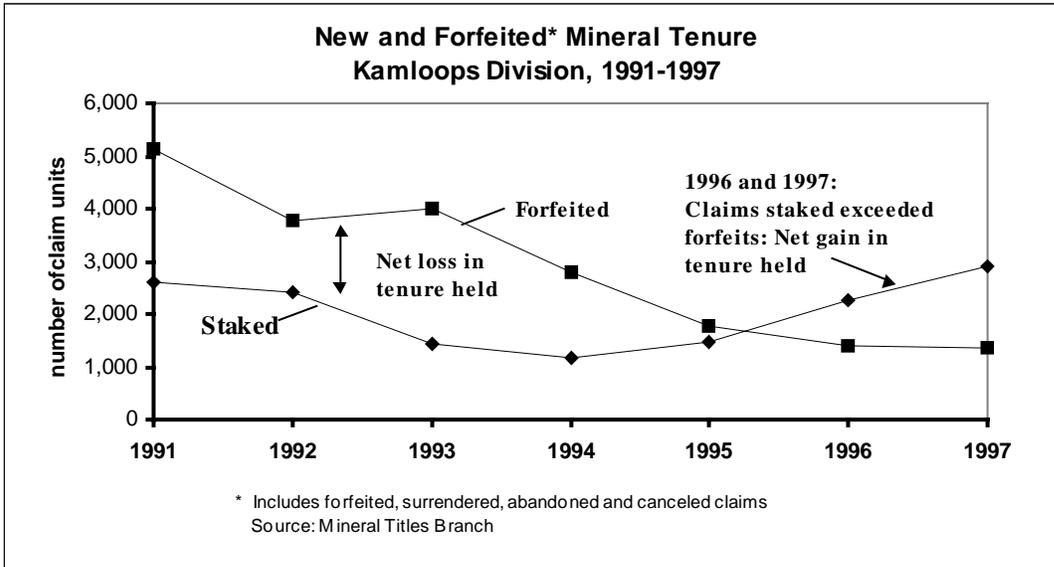


Source: Ministry of Energy and Mines



Source: Ministry of Energy and Mines

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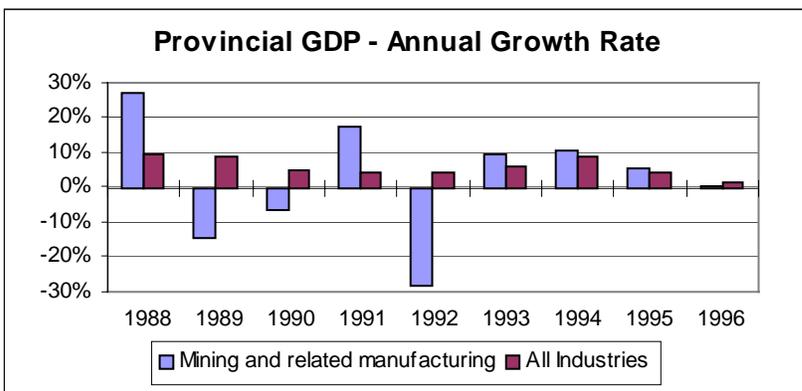
* Includes forfeited, surrendered, abandoned and canceled claims
Source: Ministry of Energy and Mines (Mineral Titles Branch)

11.2 Gross Domestic Product (GDP) and Annual Metal Prices

Data showing GDP for the Kamloops LRMP is not available, therefore provincial data has been used to indicate past performance of the mining sector at a provincial scale.

GDP for the mining sector has grown at an average rate of 2.4 percent over the past 9 years, which compares to an average growth rate of 5.9 percent for the provincial economy for the same period. Since 1993, the mining industry has shown economic growth comparable to the provincial average.

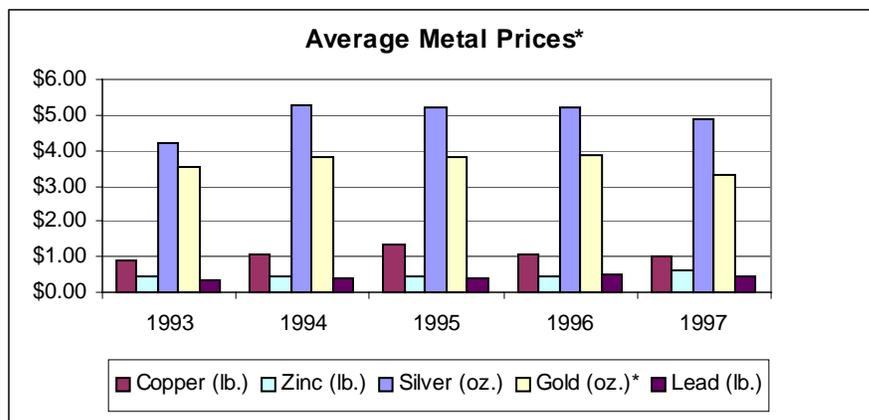
Metal prices weakened in 1997 due to low inflation, relatively bullish North American stock markets and downturns in the Asian economy. The adverse effect of metal prices for BC producers was partially offset by the low value of the Canadian dollar.¹⁴



Source: BC Stats

¹⁴"The Mining Industry in British Columbia", Price Waterhouse, 1997;

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*Gold prices shown in hundreds of dollars

Source: "The Mining Industry in British Columbia", Price Waterhouse, 1997

11.3 Employment

Employment in the mining industry for the Thompson Okanagan Regional District decreased by 18.4 percent between 1991 and 1996 due mainly to the closure of the Samatosum and Afton mines.

Mining Labour Force (TNRD)		
1991	1996	Change
2,095	1,710	-18.4%

Source: BC Stats

12. Timber

The forest sector plays a major role in the economy of the Kamloops LRMP. Forest workers and contractors contribute directly to the labour force of every community in the LRMP. Communities to the north (Barriere, Clearwater) rely more heavily on the forest industry than communities to the south. The timber that is harvested in the LRMP also provides employment for forest workers in communities outside the plan area.

The forest industry includes harvesting, log hauling, road building, timber processing, silviculture, administration and woodchip transportation. Within the Kamloops LRMP, there are seven major sawmills, one pulp mill and approximately 15 smaller processing operations. The land base of the Kamloops LRMP is comprised of three major management units: 1) Kamloops timber supply area; 2) Tree Farm License 18; and 3) Tree Farm License 35.

The future of the forest industry in the Kamloops LRMP may be affected by a number of external factors including lumber prices, exchange rates, government regulations and taxes, Canada-US Softwood Lumber Agreement, the determination of the allowable annual cut (AAC) for the area, First Nation land claims and forest certification.

Desired Outcome

- A prosperous forest industry with a sustainable supply of timber

Assessment

The timber harvesting land base declined slightly between 1981 and 1998, however during the same period the allowable annual cut (AAC) increased by approximately 10 percent. The volume of timber harvested remained relatively stable between 1988 and 1998. The area of non-sufficiently restocked land (NSR) declined dramatically between 1995 and 1998.

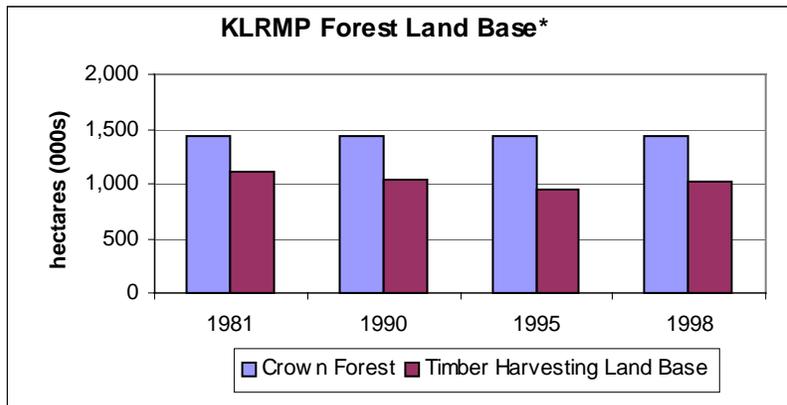
Government revenues generated by the forest industry have increased significantly since the early 1990s. The GDP for forestry and related manufacturing grew at an annual rate of 10 percent or more (substantially above provincial average) between 1992 and 1995 and then declined by 8.8 percent in 1996. (Changes in GDP are likely due to factors that are external to the LRMP.) The forest industry labour force grew by 5.4 percent between 1991 and 1996.

The desired outcome for timber is generally being met.

Indicators

12.1 Timber Harvesting Land Base

The Crown forest land base remained relatively stable between 1981 and 1998. The timber harvesting land base decreased between 1981 and 1995 due to improved mapping procedures that provided a better indication of environmentally sensitive areas and low productivity sites. The timber harvesting land base increased between 1995 and 1998 due to the addition of cedar and hemlock stands that were determined to be merchantable.



*Refers to Timber Supply Area only
Source: Ministry of Forests (Timber Supply Review)

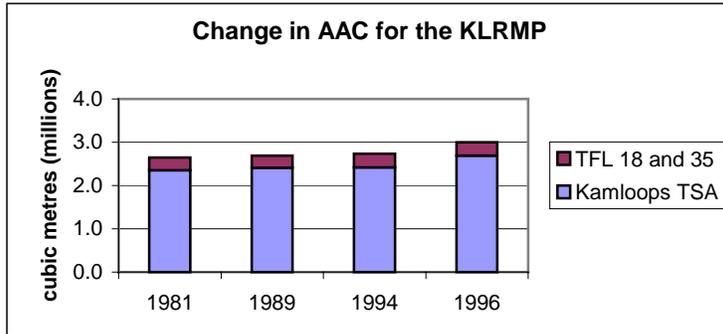
12.2 Timber Supply

The allowable annual cut (AAC) is the allowable rate of timber harvest for a specified area of land. The AAC is set every five years as an outcome of timber supply reviews conducted by the province's chief forester.

In the Kamloops LRMP the AAC remained relatively stable between 1981 and 1994. Between 1994 and 1996, the AAC for the Kamloops timber supply area (TSA) increased by

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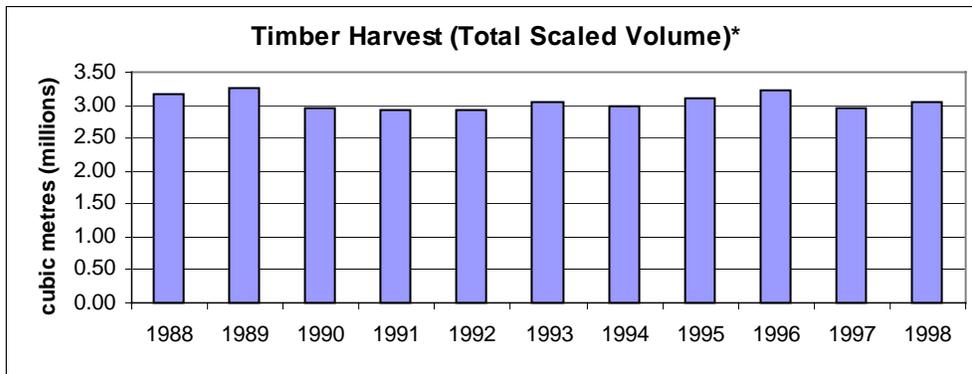
approximately 300,000 cubic metres (10%) as a result of additional harvesting areas for cedar, hemlock and pulpwood stands (Pulpwood Agreement 16).



Source: Ministry of Forests (Timber Supply Review)

12.3 Harvest Volume

Timber harvest volume in the Kamloops LRMP has remained relatively stable (less than 10 percent fluctuation) over a 10-year period.



*Includes timber harvested on Crown land (TSA and TFL) and private land.

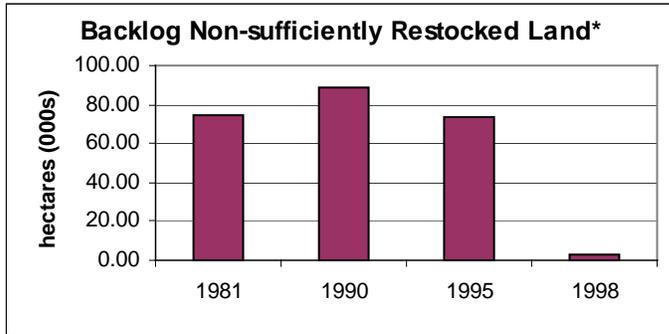
Source: Ministry of Forests

12.4 Backlog Non-sufficiently Restocked (NSR) Land

The backlog of non-sufficiently restocked land (NSR) is a measure of the area of productive forest land where timber has been removed (either through harvesting or natural disturbance) and regeneration (either naturally or by planting or seeding) has not reached free-growing standards for the site.

The area of NSR increased from approximately 74,600 hectares in 1981 to 88,300 hectares in 1990. Beginning in 1992, more intensive silvicultural practices were implemented. The area of NSR decreased from more than 80,000 hectares in 1990 to approximately 3,100 hectares in 1998. This decrease is mainly due to funding from Forest Renewal BC to support reforestation guided by government and LRMP direction. Additionally some dry-belt fir stands were reclassified as stocked.

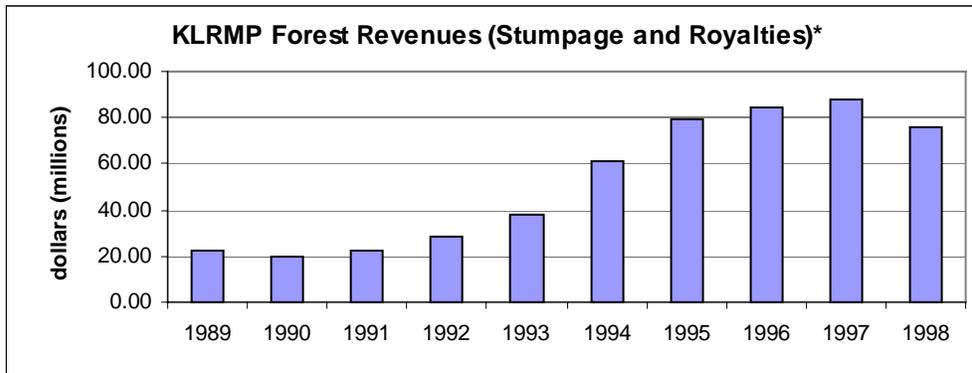
3. Effectiveness Assessment



*Refers to TSA only
Source: Ministry of Forests

12.5 Provincial Government Revenues

Revenue to the Crown increased significantly between 1992 and 1995. This increase was due to changes in the stumpage system and the development of the Forest Renewal BC account in response to US/Canada softwood lumber dispute.



*Includes timber harvested on Crown land (TSA and TFL) and private land.
Source: Ministry of Forests

12.6 Gross Domestic Product (GDP) and Annual Lumber Prices

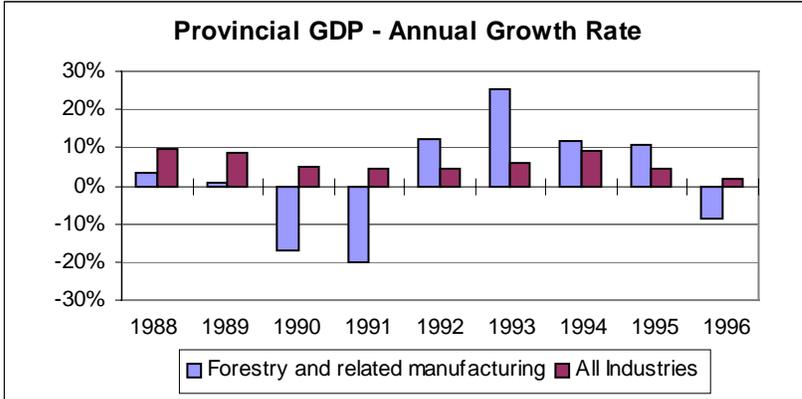
Data showing GDP for the Kamloops LRMP is not available, therefore provincial data has been used to indicate past performance of the forest sector at a provincial scale.

Between 1988 and 1996 the GDP for forestry and related manufacturing showed a significant fluctuation from the GDP for the provincial economy as a whole. Given that the forest sector is a significant component of the provincial economy, it tends to pull the provincial GDP in the same direction it is moving.

Economic performance in the forest industry experienced a decline beginning in 1988 that culminated in negative growth in 1990 and 1991. A recovery began in 1992 peaking in 1993 with annual growth exceeding 25 percent. In 1994 economic growth began a gradual slowing trend culminating in a decline of 8.8 percent in 1996.

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The chart showing average yearly lumber prices indicates a broad correlation between price and economic growth (e.g., low growth and low prices 1988 to 1991 and 1995). Economic growth is also affected by other factors such as production costs (e.g., stumpage, labour costs, government regulation, etc.), exchange rates and world demand.



Source: BC Stats



Source: Ministry of Forests (Research branch)

12.7 Employment

Employment in the forest sector in the Thompson-Nicola Regional District increased by 5.4 percent between 1991 and 1996 which compares to an increase of 2.4 percent for the province as a whole during the same period. These figures indicate that the forest industry in the TNRD has remained healthy relative to the rest of the province.

Forest Sector Labour Force (TNRD)*		
1991	1996	Change
5,230	5,510	5.4%

*Includes logging and forestry, wood manufacturing and paper and allied products manufacturing.

Source: BC Stats

13. Tourism

The Kamloops LRMP supports a diverse tourism industry based on a wide range of activities and outdoor recreation resources¹⁵ (see also section 14). Key segments of the industry include the touring sector and the outdoor adventure sector.

The Kamloops area is strategically located at the junction of the Trans-Canada Highway, the Yellowhead Highway, the Coquihalla Highway and Highway 97. It also serves as an overnight stop for the Rocky Mountaineer tourist train, which runs between Vancouver and the Rocky Mountains. The weather in Kamloops is among the warmest and driest in the province with less than 25 centimetres of precipitation and more than 2000 hours of sunshine per year. The area also supports a number of destination businesses associated with fishing, hunting, river rafting and guest ranches. Winter tourism has been growing significantly in the recent past with the expansion of Sun Peaks resort near Kamloops.

Tourism in the North Thompson area includes touring traffic travelling on the Yellowhead Highway from Kamloops to Jasper as well as outdoor adventure tourism related to Wells Gray Park and other recreation features in the area (e.g., fishing, hunting, hiking, river-rafting, horseback riding, heli-skiing, heli-hiking, etc.).

Desired Outcome

- A prosperous tourism industry offering high quality, natural tourism experiences
- A diverse range of tourism opportunities and uses across the landscape

Assessment

Economic growth (GDP) in the tourism industry has been positive since 1988 and has exceeded the provincial average since 1994. Tourism room revenue for the City of Kamloops and the Thompson/Okanagan Region has grown at a rate similar to the provincial average since 1992. This would suggest that the tourism industry in the Kamloops LRMP has been performing at a level comparable to that for the province as a whole.

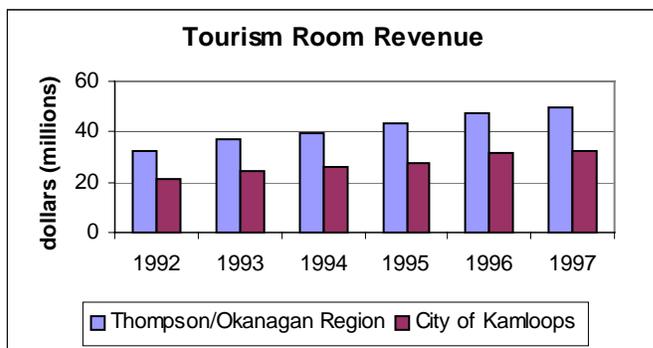
The desired outcome for achieving a prosperous tourism industry is generally being met. It is felt (based on professional judgment) that the desired outcome for a diversity of tourism opportunities is also generally being met. (Data to substantiate this assertion will be provided in the next monitoring report.)

Indicators

13.1 Room Revenue

Accommodation revenue has grown steadily since 1992 in both the City of Kamloops and the Thompson/Okanagan Region. The average annual growth rate for Kamloops was 11.1 percent, which compares to 10.7 percent for the Thompson/Okanagan Region and 10.9 percent for the province during the same period.

¹⁵ Tourism and outdoor recreation generally utilize the same natural resources. The difference between the two is that tourism generally involves a commercial transaction between an operator and a client (i.e., tourist).



Source: BC Stats

13.2 Visitor volume

The following table indicates that almost 5 million tourists (approximately 16 percent of the provincial total) visited the northern portion of the Thompson-Okanagan region in 1995. This information will serve as baseline data for comparison with visitor volumes in future reporting periods.

Tourism Visitor Volume* (1995)			
	<i>Non-resident (000s)</i>	<i>BC Resident (000s)</i>	<i>Total (000s)</i>
Thompson-Okanagan North	2,968	1,992	4,960
Provincial Total	11,946	18,655	30,602

*Includes both day and overnight visitors.

Source: BC Stats

13.3 Commercial Recreation Tenures

The Province's Commercial Recreation Policy was introduced in May 1998. To date 10 applications have been received and are currently being processed. The rate of application submission and review is expected to increase as existing tenures are converted to the new tenure system and as new applications for tenure are received.

13.4 Resource-based Tourism Operations

Data showing annual rates of growth for facilities and visitors for various kinds of resource-based tourism operations (skiing, sport fishing, fishing resorts, guide outfitters, etc.) will be provided in the next monitoring report.

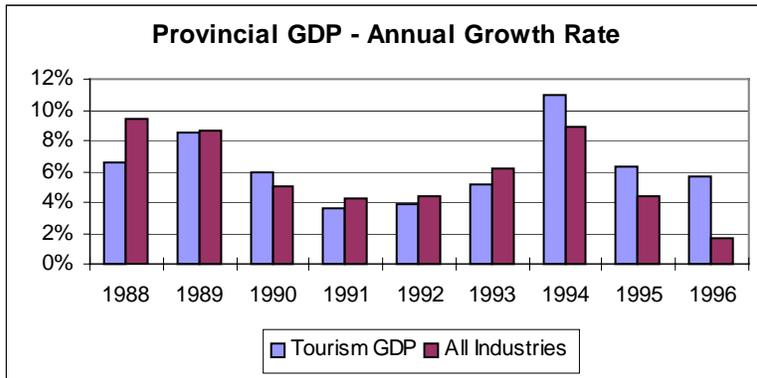
13.5 Gross Domestic Product

Data showing GDP for the Kamloops LRMP is not available, therefore provincial data has been used to indicate past performance of the tourism industry at a provincial scale.

Tourism GDP remained closely aligned to the GDP for the provincial economy as a whole between 1988 and 1996. Beginning in 1994, the tourism industry began to outperform the provincial economy. The tourism industry has been buoyed by favourable exchange rates

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with the US dollar and by growing market recognition of the range and quality of tourism experiences that BC has to offer.

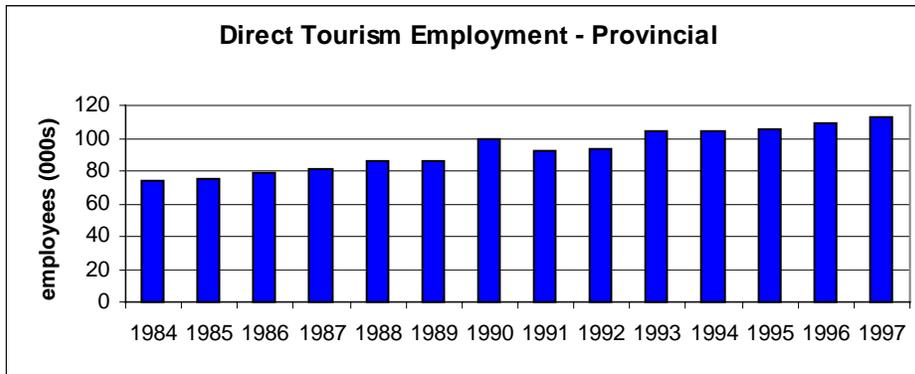


Source: BC Stats

13.6 Employment

Data showing tourism employment for the Kamloops LRMP is not available, thus provincial data is shown to indicate historic performance of tourism sector at a provincial scale.

Direct employment in the tourism industry increased by 53.1 percent between 1984 and 1997, which works out to an average annual growth rate of approximately 4.4 percent.



Source: BC Stats

14. Recreation

Outdoor recreation refers to the use and appreciation of the outdoor environment. Crown lands provide opportunities for the public to experience and enjoy nature and open spaces. Much of the recreational activity in the Kamloops LRMP is associated with lake and river based activities. Parks, recreation sites and other suitable Crown lands provide a setting for a range of activities including camping, hiking, boating, water-skiing, wildlife and scenic viewing, photography, fishing, hunting, backpacking, picnicking, hang-gliding, kayaking, river rafting, canoeing, downhill skiing, cross-county-skiing, mountain biking, four wheel drive and offroad vehicle exploring, motor biking, and snowmobiling.

Recreation management involves the inventory, planning, allocation and stewardship of recreation resources, including scenic landscapes, wilderness areas, trails and facilities throughout the LRMP.

Desired Outcome

- A diverse range of recreation opportunities and uses across landscapes
- Preservation and management of high quality recreation resources

Assessment

The number of recreation sites and trails in the Kamloops LRMP area has increased steadily over the past 10 years with the development and designation of additional trail systems and with the addition of new protected areas and special management zones for recreation and tourism. Based on professional judgment, it appears that the amount of land classed as Primitive and Semi-primitive Non-motorized appears to be decreasing as more areas are accessed for timber harvesting. Based on the demand for various types of recreation use the amount of land in each of the recreation opportunity spectrum (ROS) classifications may be adjusted over time.

Recreation use in the Kamloops LRMP for parks has shown a steady increase since 1988. Use of Forest Service recreation sites is expected to gradually increase as the population increases and the demand for recreational experiences continues to grow. Hunting activity has declined from its peak in the late 1980s, but has nevertheless remained stable throughout the 1990s. Fishing effort fluctuated moderately throughout the 1980s and 90s, but is expected to remain strong over time as long as freshwater fish stocks remains healthy.

The desired outcomes for recreation are generally being met.

Indicators

14.1 Recreation Resources

The following data gives an indication of the availability of recreation resources based on the Ministry of Forest Recreation Opportunity Spectrum (ROS) and the number of rainbow trout stocked in the North Thompson watershed.

a) Recreation Opportunity Spectrum

The recreation opportunity spectrum is used to classify areas in terms of types of recreational experiences, physical settings, structures and services, access, management settings and social settings. The five classes shown in the following table are based on criteria of remoteness, area size and evidence of human use. The table indicates that a much higher proportion of the land base in the Clearwater forest district is classed as Primitive and Semi-primitive Non-motorized than in the Kamloops forest district. Conversely, the Kamloops forest district has a much higher proportion of its land classed as Roaded Resource Land and Rural.

Professional judgment indicates that the amount of Primitive, Semi-primitive Non-motorized area has declined over time as a result of changes in timber harvesting operability. At the same time the amount of Roaded Resource Land and Rural areas have shown an increase. The intent is to set targets to provide a spectrum of opportunities across the

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Kamloops LRMP area and to increase the amount of Semi-primitive Non-motorized and Semi-primitive Motorized.

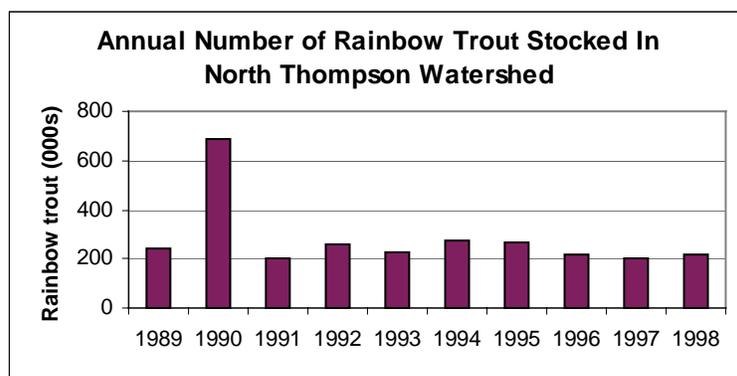
The information in the following table will serve as baseline data for comparison with ROS data in future reporting periods.

Recreation Opportunity Spectrum (1999)* (hectares)					
<i>Forest District</i>	<i>Primitive</i>	<i>Semi-primitive Non-motorized</i>	<i>Semi-primitive Motorized</i>	<i>Roaded Resource Land</i>	<i>Rural</i>
Clearwater	127,180	195,557	30,222	560,851	2,686
Kamloops	500	29,252	46,931	1,113,841	101,541
Total	127,680	224,809	49,953	1,674,692	104,227

*Does not include Wells Gray Park
Source: Ministry of Forests

b) Rainbow Trout

BC Environment undertakes a rainbow trout restocking program for several lakes in the Kamloops LRMP. The program is intended to support lakes with little or no natural reproduction where there is good recreational fishing potential. With the exception of the year 1990, the number of rainbow trout stocked in the North Thompson watershed has averaged approximately 200,000 per year. The large stocking effort in 1990 was the result of an extraordinary accumulation of hatchery stock.



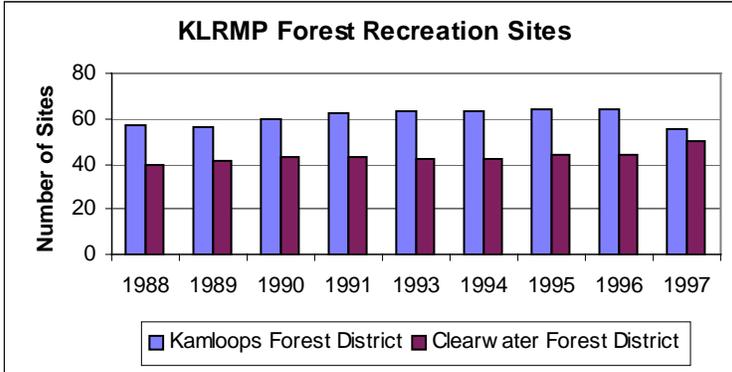
Source: Ministry of Environment, Lands and Parks (Fisheries Branch)

14.2 Recreation Amenities

The following data show the number of recreation sites and kilometres of designated trails in the Kamloops LRMP.

The number of recreation sites in the Kamloops Forest District increased from 57 in 1988 to 64 in 1995. In 1997, the number of sites dropped by 9 as a result of new protected areas created under the Kamloops LRMP which encompassed these sites. In the Clearwater Forest District the number of sites has grown steadily from 40 in 1988 to 50 in 1997.

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Source: Ministry of Forests (Recreation Program)

In 1998 there were 632 kilometres of designated trails in the Kamloops LRMP area. This is baseline data to be used for comparing results in future reporting periods.

KLRMP Designated Trails (kilometres)	
<i>1998</i>	
632*	

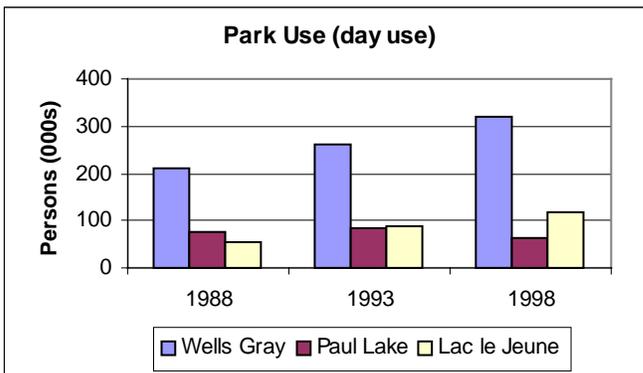
*Established, non-established and historic trails
Source: Ministry of Forests (Recreation Program)

14.3 Recreation Use

The following data provide an indication of recreation use in the Kamloops LRMP based on park use, recreation site use and fishing and hunting activity.

a) Park Use

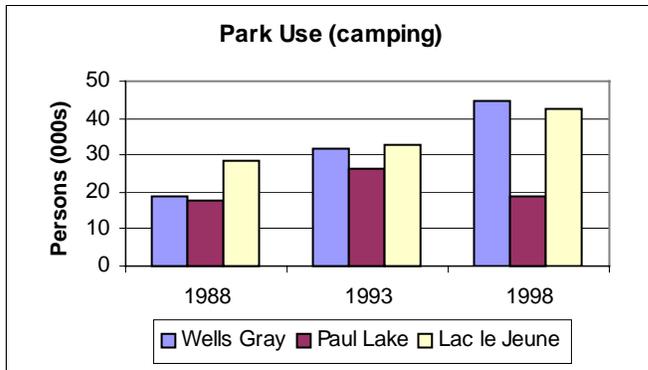
Park use (both day use and camping) increased steadily between 1988 and 1998 with the exception of Paul Lake where use declined between 1993 and 1998. The decline in use at



Source: BC Parks

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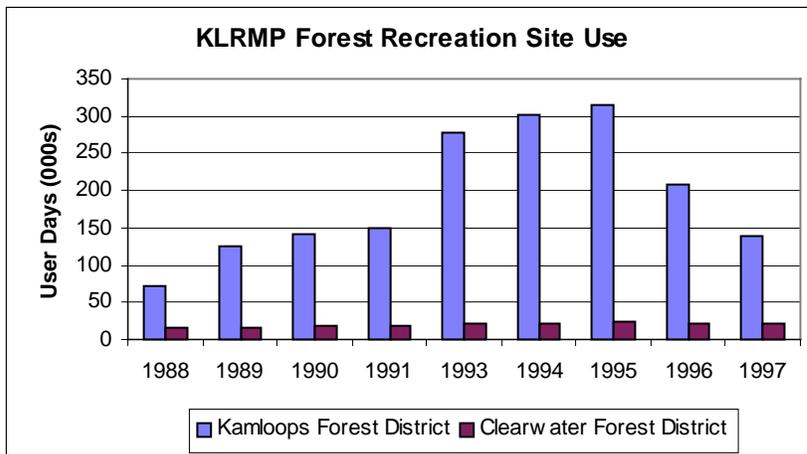
Paul Lake resulted from an extreme forest fire hazard in 1998, which led to a campfire ban and a subsequent forest fire in Kamloops. These events discouraged visitors from coming to the area and encouraged local users to travel to park facilities outside of the area.



Source: BC Parks

b) Recreation Site Use

In the Kamloops Forest District the number of forest recreation site user days per year increased by more than 300 percent between 1988 and 1995 (from 71,800 to 316,500). This dramatic growth was followed by a sharp decline to 138,800 user days (-56%) between 1995 and 1997. The rapid increase in recreation site use beginning in 1993 is attributable to an increased awareness of the Kamloops area as a result of the completion of the Coquihalla Highway, as well as from increased numbers of visitors from Alberta. The subsequent decline between 1995 and 1996 is due to the Kamloops LRMP conversion of heavier use recreation sites to protected areas (e.g., Tunkwa and Roche) and the decline from 1996 to 1997 is due to extremely wet weather in 1997. Recreation site use in the Clearwater Forest District has increased gradually from 16,200 user days per year in 1988 to 21,800 in 1997.



Source: Ministry of Forests (Recreation Program)

c) Angler Use

Angling effort in the TNRD, based on license sales, peaked at close to one million angler days in 1985. The total number of angler days dropped significantly in 1990, only to show a

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recovery again by 1995. In 1985 and 1990, the TNRD had the highest angling effort among all regions in the province. The trends for angling effort based on license sales generally reflect angler use estimates for small lakes shown in the following table.

Summary of Angling Effort based on License Sales				
	<i>1980</i>	<i>1985</i>	<i>1990</i>	<i>1995</i>
TNRD effort	881,300*	987,700**	835,662**	934,294***
Provincial effort	5,213,800	4,754,000	4,552,411	5,618,651
TNRD/Provincial	16.9%	20.7%	18.3%	16.6%

*Second highest regional effort

**Highest regional effort in province

***Tied with L. Mainland for highest regional effort T/N effort close to 27,000 more anglers.

Source: Ministry of Environment, Lands and Parks (Fisheries Branch)

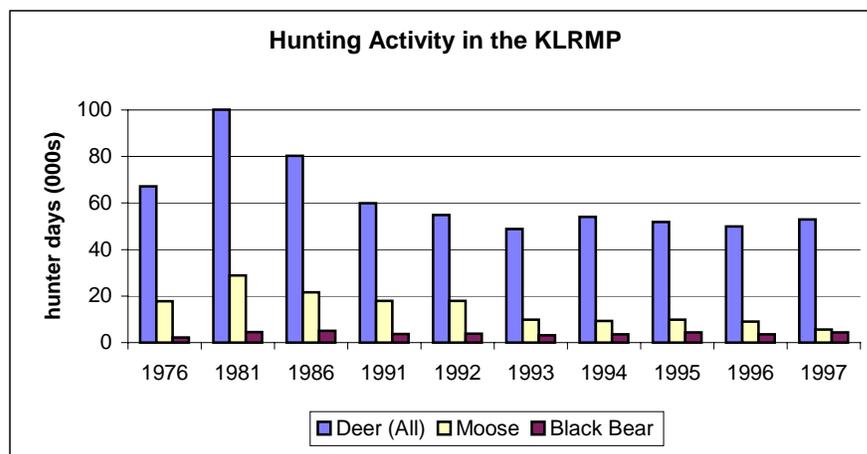
KLRMP Angler Use Estimates for Small Lakes							
<i>Lake</i>	<i>1989</i>	<i>1991</i>	<i>1993</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>
Roche	12,273	25,124	25,025	N/A	23,250	16,079*	16,300
Tunkwa	11,780	14,744	20,500	26,356	N/A	N/A	N/A
Badger	3,565	N/A	6,150	N/A	N/A	N/A	N/A
Heffley	6,948	11,304	N/A	N/A	N/A	N/A	N/A
Pass	2320	N/A	1749	N/A	2750	N/A	N/A

*In 1997 there was a regulation change from a daily limit of 6 to 2 rainbow trout on Roche Lake.

Source: Ministry of Environment, Lands and Parks (Fisheries Branch) based National Sport Fishery Survey results

d) Hunting Activity

The following chart shows a decline in deer hunter days from a peak of approximately 100,000 in 1981 to a low of approximately 49,000 in 1993 and an annual average of about 50,000 per year thereafter. The pattern for moose hunter days is similar to that for



Source: Ministry of Environment, Lands and Parks (Wildlife Branch)

deer. The decline in the hunting activity for deer is attributable to a decreasing trend in the overall number of hunters throughout the 1980s. The decline in the hunting activity for moose is due to a significant change in regulations for moose hunting. Bear hunting activity has shown a gradual increase since 1993.

15. Visually Sensitive Areas

In the Kamloops LRMP scenic beauty (natural and managed landscapes) are highly valued by both residents and visitors. Scenic viewing is an important component of virtually all recreation activities. Scenic landscapes provide one of the primary resource bases for province's growing tourism industry.

Visual landscape management (VLM) is a term the Ministry of Forests uses for the identification, assessment and management of visual resources on public forest lands. The implementation of VLM is carried out through the establishment of visual quality objectives, which guide the management of visual resources on the land base. The Forest Practices Code requires that a visual impact assessment be submitted with forest development plans when timber harvesting, road construction or other operations are proposed in a scenic area with visual quality objectives.

Desired Outcome

- Landscapes managed in accordance with visual quality objectives

Assessment

Visual quality objectives are being achieved on 99 percent of the cutblocks in Forest Development Plans.

The desired outcome for visually sensitive areas is generally being met.

Indicators

15.1 Achievement of Visual Quality Objectives

Once harvesting has been completed, final inspections are conducted to ensure that timber harvesting was conducted according to operational plans and strategies to meet visual quality objectives.

In 1998, the visual quality index resulted in 100 percent compliance based on 13 visual units in the Kamloops Forest District. In the remaining visual units there was 99 percent compliance.¹⁶

The Clearwater Forest District reported no contravention to established visual quality objectives, however formal viewpoint assessments were not conducted in the Clearwater Forest District. Future concern regarding achievement of visual management objectives relates to areas that are prone to blow down—e.g., Elevator fire, Shannon Creek, Bill Creek—and areas with mountain pine beetle outbreaks. Periodic assessments will be performed in these areas.

¹⁶ Professional opinion provided by the landscape technician for the Kamloops Forest District.

The above results are baseline data that will be used as a basis for comparing performance in future years.

16. Communities

The Kamloops LRMP consists of two distinct areas with different economic, social and environmental characteristics—the Kamloops area and the North Thompson area. The Kamloops area refers to the area south of Louis Creek and includes the City of Kamloops and the communities of Logan Lake, Savona, Cache Creek and Ashcroft. The North Thompson area is north of Louis Creek and includes the communities of Clearwater, Barriere, Blue River and Vavenby.

The economy in the Kamloops area was traditionally based on agriculture and transportation. In the 1960s, growth in the forest and mining industries led to these two sectors becoming the main economic drivers. In addition to forestry and mining, the Kamloops area's strategic location and proximity to transportation corridors have been major generators of growth. The Trans Canada Highway to Calgary, the Yellowhead Highway to Jasper and Edmonton, and the Coquihalla Highway to Vancouver have all helped to strengthen the area's economic base.

The economy in the North Thompson area is primarily based on forestry. The Yellowhead highway also generates considerable revenue, as does a growing tourism industry based on the popularity of outdoor adventure activities connected to Wells Gray Park.

Desired Outcome

- Social and economic stability
- Healthy and prosperous communities
- Stable or increasing employment
- Clean, safe drinking water and a stable community water supply
- Minimal risks to lives and property from flooding and erosion
- Access Crown land for community and industrial development

Assessment

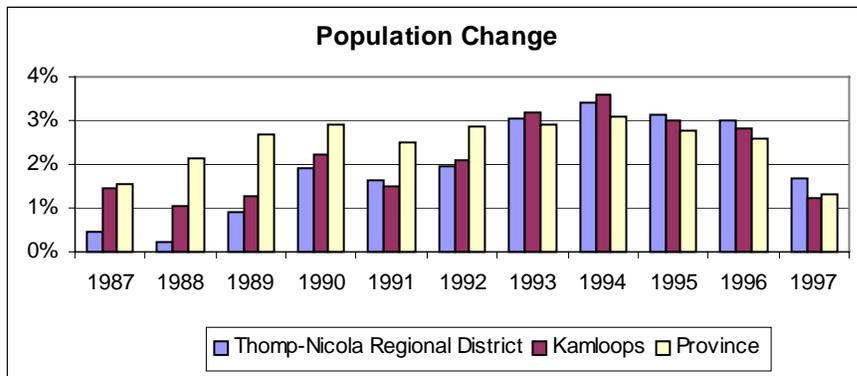
Since 1992, population in the Kamloops LRMP area has been growing at a rate slightly above the provincial average. The crime rate has remained below the provincial average and has declined since 1991. The unemployment rate (City of Kamloops), although higher than the provincial average has shown a steady decline since 1994, and between 1991 and 1996, the size of the labour force (TNRD) grew by 12.2 percent. During the same period, employment income (TNRD) grew by 3.9 percent, which was higher than the provincial average. Economic diversity in both the Kamloops and North Thompson areas is relatively high and remained stable between 1991 and 1996. The number of business bankruptcies peaked in 1996 and began to decline in 1997. The number of business incorporations has declined moderately since 1994. Drinking water for the City of Kamloops has not met Canadian Drinking Water Guidelines for turbidity since 1991 and water borne parasites were present in the water for 8 out of 10 test months in 1997. Flood occurrences have shown no detectable adverse trends outside of normal storm events.

Five of the six desired outcomes for communities are generally being met. The desired outcome for clean, safe drinking water is generally not being met (note domestic water quality for the City of Kamloops).

Indicators

16.1 Population

The population in the Thompson-Nicola Regional District (TNRD) grew at an average annual rate of 2.1 percent between 1987 and 1996 which compares to 2.3 percent for the City of Kamloops and 2.7 percent for the province during the same period. Starting in 1993, the annual growth rate for both the TNRD and the City of Kamloops exceeded the provincial average. As well, by 1995 the population growth rate for the TNRD began to exceed the rate for the City of Kamloops, indicating that many of the smaller communities in the LRMP area were experiencing high rates of growth.

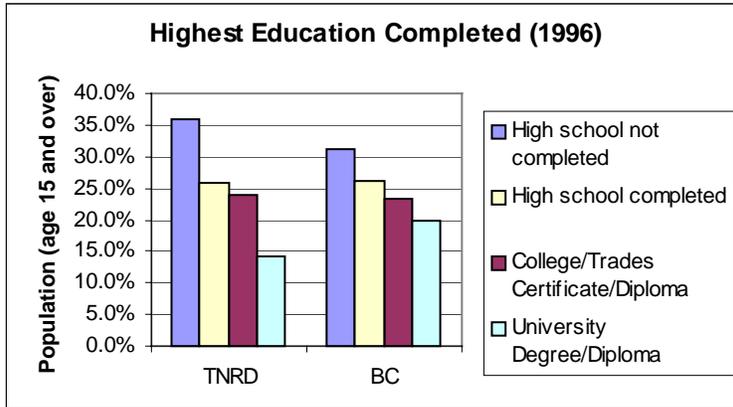


Source: BC Stats

16.2 Education Level

The proportion of the population in the TNRD without a high school diploma is higher than the provincial average (36% versus 31%). However, the completion rate for the TNRD has increased since 1991. The proportion of the population with a university degree or diploma is also below the provincial average (14% versus 20%). The number of university graduates in the area is expected to increase with the advent of a university degree program at the University College of the Cariboo. The information in the following table is baseline data for comparing performance in future years.

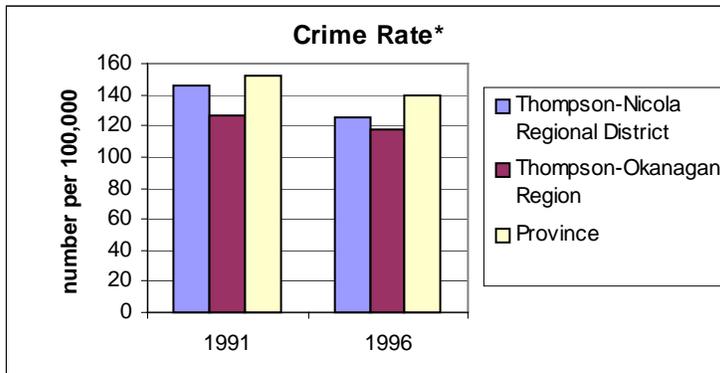
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Source: BC Stats

16.3 Crime Rate

The crime rate in the Thompson-Nicola Regional District has declined since 1991. The crime rate for the area is lower than the provincial average and the rate of decline has also been greater than the provincial average.



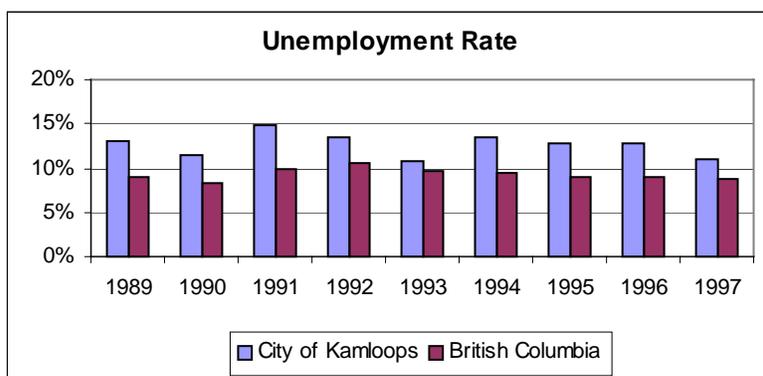
*number of criminal code offences per 1000 population

Source: BC Stats

16.4 Labour Force and Employment

The unemployment rate in the City of Kamloops has remained steadily above the provincial average between 1989 and 1997. The unemployment rate has shown a steady decline each year since 1994.

3. Effectiveness Assessment



Source: BC Stats

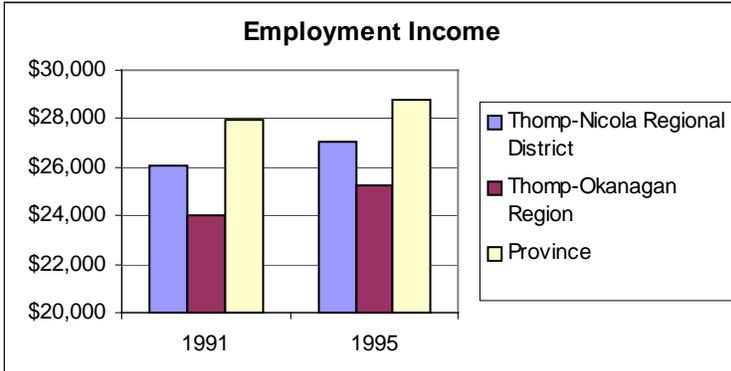
The following table indicates a 12.2 percent increase in the labour force between 1991 and 1996. Sectors that have shown significant growth (i.e., greater than 20 percent) include agriculture, fishing and trapping, construction, business services, health and social services, accommodation, food and beverage service and other services. Sectors showing a significant decline (i.e., greater than 10 percent) during the same period include mining and food and beverage manufacturing.

Experienced Labour Force By Industry (TNRD)			
Industry	1991	1996	Change
Agriculture	1,905	2,450	28.6%
Fishing & Trapping	45	70	55.6%
Logging & Forestry	2,060	2,140	3.9%
Mining	2,095	1,710	-18.4%
Manufacturing	4,820	5,275	9.4%
Food & Beverage	155	135	-12.9%
Wood	2,340	2,390	2.1%
Paper & Allied	830	980	18.1%
Other Manufacturing	1,495	1,770	18.4%
Construction	3,745	4,650	24.2%
Transportation & Storage	3,380	3,130	-7.4%
Communication & Other Utilities	1,605	1,455	-9.3%
Wholesale Trade	1,970	2,180	10.7%
Retail Trade	7,785	8,090	3.9%
Finance & Insurance	1,155	1,065	-7.8%
Real Estate & Insurance Agents	820	980	19.5%
Business Services	1,635	2,340	43.1%
Government Services	3,445	3,475	0.9%
Educational Services	3,680	4,315	17.3%
Health & Social Services	4,505	5,815	29.1%
Accommodation, Food & Beverage Services	5,080	6,165	21.4%
Other Services	3,760	4,735	25.9%
Total	53,490	60,040	12.2%

Source: BC Stats

16.5 Employment Income

Average employment income in the Thompson-Nicola Regional District and in the Thompson-Okanagan Development Region is lower than the provincial average. However, the growth rate between 1991 and 1995 for the TNRD (3.9%) and the Thompson-Okanagan Region (5.2%) exceeded the provincial growth in employment income (3.0%) during the same period.

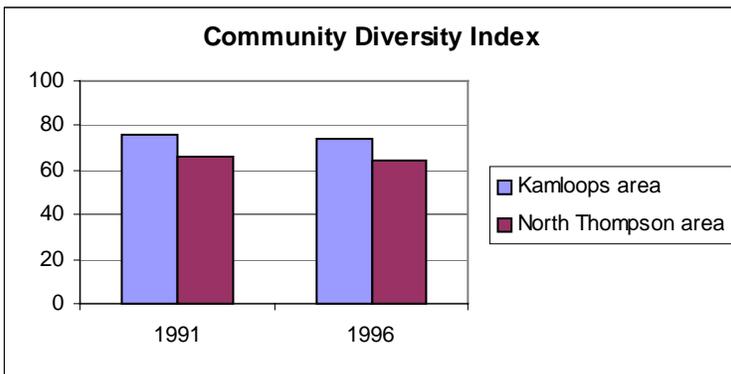


Source: BC Stats

16.6 Economic Diversity

The diversity index is a scale that determines the degree of economic diversity in a defined local economy. Results at the lower end of the scale indicate a high degree of dependence on a single sector. Numbers at the higher end of the scale indicate that the economy is balanced across a range of sectors.

The following chart indicates that the level of diversity is somewhat higher in the Kamloops area than in the North Thompson (74 versus 64 in 1996) and that there has been a modest decline in diversity in each area between 1991 and 1996).



Source: BC Stats

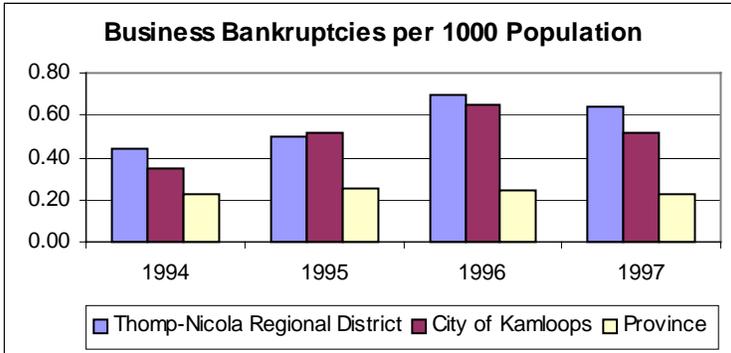
16.7 Business Start-ups and Failures

The number of business bankruptcies for the province as a whole has remained steady at approximately 0.20 per 1000 population between 1994 and 1997. By comparison, the

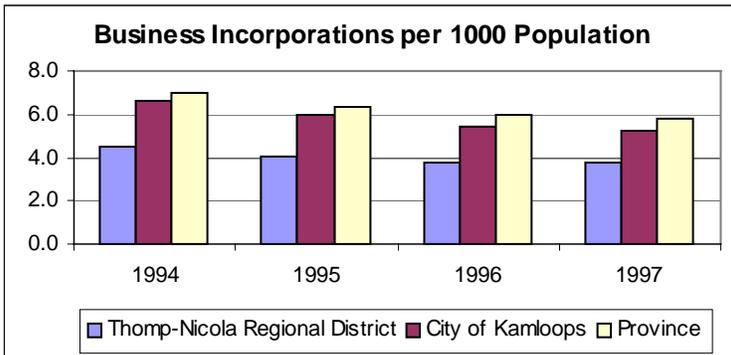
3. Effectiveness Assessment

number of bankruptcies in the Thompson-Nicola Regional District and the City of Kamloops has remained consistently higher than the provincial number during same period, rising steadily to peak at approximately 0.6 per 1000 population in 1996.

The number of business incorporations per 1000 population is higher for the City of Kamloops than for the Thompson-Nicola Regional District as a whole, although the rate for both areas remained consistently below the provincial number during the period 1994 to 1997. For all three areas, the rate has shown a steady decline over the period.



Source: BC Stats



Source: BC Stats

16.8 Portion of Land Base in Settlement Use

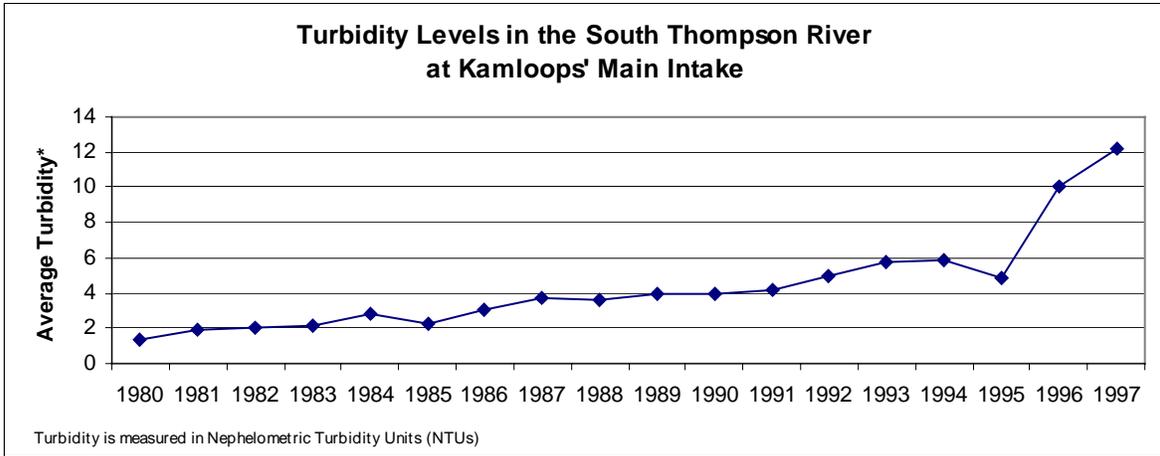
The following table indicates that in 1998, 20,295 hectares or 0.9 percent of the land base was used for settlement purposes. This information provides baseline data for comparing results in future reporting periods.

Portion of Land Base in Settlement Use (1998)	
Area	Percent of Total*
20,295 ha.	0.9%

*Does not include Wells Gray Park
Source: Ministry of Forests

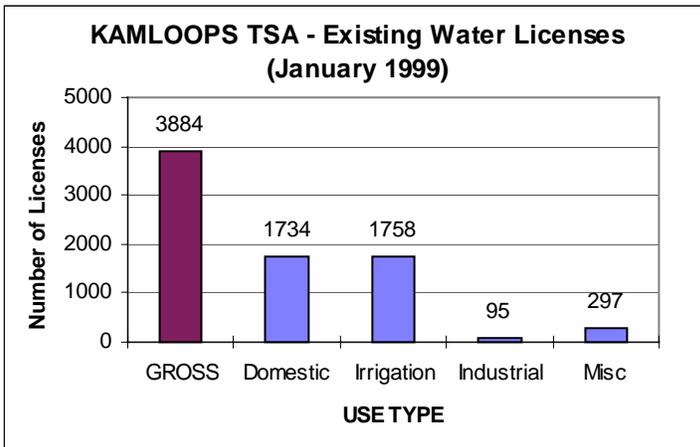
16.9 Domestic Water Supply (Quality and Quantity)

Turbidity levels and the presence of water borne parasites (e.g., giardia and cryptosporidium) are used to measure drinking water quality. In the Kamloops water system, average annual turbidity levels have been steadily increasing above the Canadian Drinking Water Guidelines of 1 NTU (Nephelometric Turbidity Unit) since 1981 (see also indicator for turbidity in section 6.2). As well, giardia was detected in the water supply 8 out of 10 test months and cryptosporidium was detected 5 out of 10 test months in 1997.



Source: Thompson Health Region

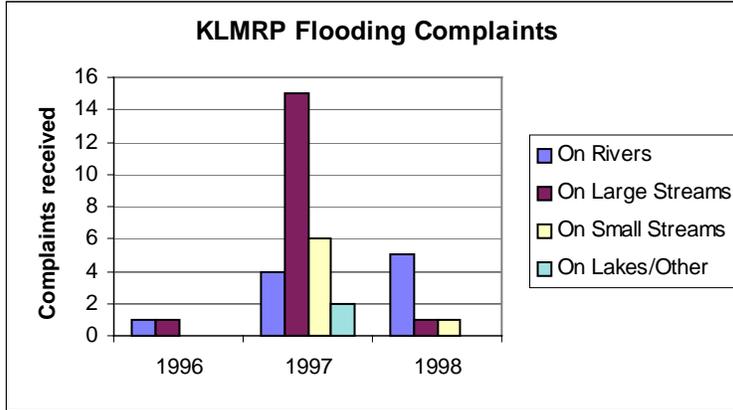
The following chart shows demand on water quantity from human consumption based on the number of water licenses issued for a variety of uses in 1999. This information provides baseline data that will be used for comparing results in future reporting periods. If possible, future data will be reported on the basis of volume rather than number of licenses.



Source: Ministry of Environment, Lands and Parks (Water Management Branch)

16.10 Flooding Occurrences

The following chart shows the number of flooding complaints in the Kamloops LRMP between 1996 and 1998. The high number of complaints in 1997 is the result of the high number of local storm events during the year (See high water flow data in appendix 3-2).



Source: Ministry of Environment, Lands and Parks (Water Management Branch)

17. Cultural Heritage

Cultural heritage relates to the existence of First Nations cultural and heritage sites and places of spiritual importance as well as to the existence of post-contact sites in accordance with representative themes (e.g., early settlement, mining, forestry, transportation, etc.) and the existence of special cultural/heritage features (e.g., historic trails).

Desired Outcome

- Protection of important archeological sites
- Completion of First Nation Traditional Use Studies
- Designation and management of historic trails

Assessment

Cultural heritage sites and trails are being protected and managed through Forest Development Plans. Traditional Use Studies should help to increase the capacity of First Nations to participate in land and resource management planning processes. When the Traditional Use Studies currently underway are completed, approximately 75 percent of the Kamloops LRMP area will have been covered by these studies. The biggest remaining gap in traditional use information is in the southwestern portion of the LRMP.

The desired outcomes for culture heritage are generally being met.

Indicators

17.1 Archaeological Sites

An archaeological site is a geographic place containing physical evidence of past human activity, which can best be studied using the archaeological methods of investigation. Examples of archaeological remains include food, storage and cooking pits, artifact scatters, trails, pit houses, human burials, fish traps, rock art and bark-stripped trees.

3. Effectiveness Assessment

The following table indicates that the number of archaeological sites with a map notation increased by 149 (9.2%) between 1994 and 1998.

Archaeological Sites		
1994	1998	Percent change
1,620	1,769	9.2

Source: Ministry of Forests

17.2 Traditional Use Studies

A traditional use site is a geographic place where aboriginal people undertook one or more traditional activities. Some traditional sites contain physical evidence of those activities, but some traditional activities (e.g., berry-picking, medicine collecting, and spiritual practices) leave little or no physical evidence. Traditional use studies, which rely on interviews and archival research are best suited to address the nature and location of those traditional use sites that do not contain archaeological evidence.

The following table shows the completion status of Traditional Use Studies for First Nations with a community presence in the Kamloops LRMP. Among the eight Shuswap Nation bands, the North Thompson Indian Band has completed a Traditional Use Study and the remaining seven have them underway.

When the Traditional Use Studies currently underway are completed, approximately 75 percent of the Kamloops LRMP area will have been covered by these studies.

Completion Status of Traditional Use Studies in the KLRMP Area			
<i>First Nations With a Presence in the LRMP area.</i>	<i>TUS not started</i>	<i>TUS in Process</i>	<i>TUS Completed</i>
Shuswap Nation			
North Thompson Indian Band			✓
Skeetchestn Band		✓	
Bonaparte Band		✓	
Kamloops Indian Band		✓	
Little Shuswap Band		✓	
Neskainlith Band		✓	
Adams Lake Band		✓	
Whispering Pines Band	✓		
Nlaka'pamux Nation			
Ashcroft Indian Band	✓		
Oregon Jack Band	✓		

Source: Ministry of Forests

17.3 Designated Historic Trails

In 1998 there were 21.7 km of historic trails in the Kamloops LRMP, which included Hudson Bay Company Main Trail, the Hudson Bay Company Criss Creek Trail and the Hudson Bay Company Tobacco Trail.

18. Public Involvement

Land use planning in British Columbia has evolved to a new era of openness where all interests and values are recognized. This has led to the development of highly interactive public processes, which often seek to build consensus among a wide range of affected stakeholders.

The Kamloops LRMP was developed based on consensus among forty public and government representatives. Much of the implementation of the LRMP will occur through local level plans, which will also involve public participation.

First Nation involvement in the Kamloops LRMP occurred through government-to-government consultation with the Shuswap Nation Tribal Council (SNTC). The SNTC was involved as one of the levels of government on the Interagency Planning Team and sat at the LRMP Table in a consultative role without participating in negotiations.

Desired Outcome

- Meaningful public involvement in local level planning
- Educated and informed public with respect to LRMP goals and outcomes

Assessment

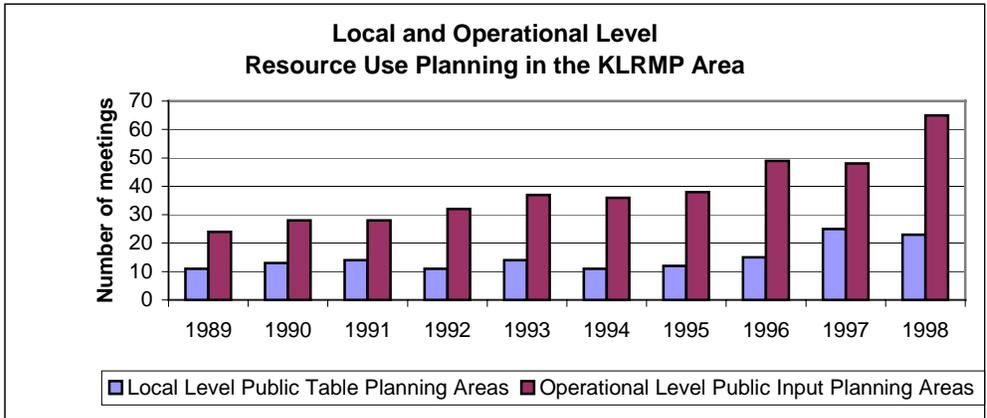
The number of local and operational level planning processes with public involvement has increased significantly since the completion of the Kamloops LRMP in 1995.

The desired outcome of meaningful public involvement in local level planning is generally being met. As a result of this increased public involvement, it is felt that the desired outcome for an educated and informed public with respect to LRMP goals and outcomes is also generally being met.

Indicators

18.1 Public Involvement in Resource Use Planning Processes

The following chart shows the number of public meetings held in conjunction with local¹⁷ and operational¹⁸ level planning processes. The number of public meetings for operational planning processes has risen steadily between 1989 and 1998. The number of public meetings for local level planning processes remained fairly constant between 1989 and 1996 and has shown a slight increase in 1997 and 1998.



Note: The numbers of meetings indicated are for the areas where public planning is occurring and do not reflect the total number of public planning meetings held in the KLRMP area.

Source: Ministry of Forests

¹⁷ Local level planning processes usually include public participation with public meetings one or more times per year. These processes are generally consensus-based and usually. Examples include Local Resource Use Plans, Park Plans (e.g., Tunkwa), Wildlife Habitat Plans (e.g., Skull), Landscape Unit Plans (e.g., ThunderBlue), Ungrazed Area Plans (e.g., LacduBois and Tunkwa).

¹⁸ Operational level planning processes often provide opportunities for members of the public to offer advice or input on the development of operational plans. These processes are generally information sharing rather than consensus based. Examples include Watershed assessments, Access Management Plans, Forest Development Plans, Forest Health consultation processes (e.g., Mountain Pine Beetle management); Recreation management (e.g., motorized and non-motorized use conflicts), and community planning for visual quality objectives.

4. Recommendations

The recommendations in this report are based on the results from the implementation and effectiveness assessments. The recommendations—which have been provided by the LRMP Monitoring Table—include suggestions for improving the implementation process and the effectiveness monitoring process as well as overall recommendations for improving the quality of the Kamloops LRMP.

Implementation Recommendations

The implementation assessment (section 2) indicates that all twelve of the LRMP projects have been initiated. One project is substantially complete, nine projects are midway and two projects are still at the initiated stage.

In its review of the implementation assessment, the Monitoring Table provided the following recommendations.

1. Increase the level of effort on Project D (Commercial Recreation Plans) to advance it from an “initiated” to a “midway” stage
2. Increase the level of effort on Project I (Biodiversity Emphasis Analysis) to advance it from an “initiated” to a “midway” stage
3. Continue work on all projects currently listed as “midway” complete in order to advance them toward “substantially complete”
4. Revise the implementation process by having agencies provide additional detail for each of the 12 LRMP projects including:
 - an indication of the intent and key objectives in the project description
 - additional descriptive detail for each activity
 - annual completion targets for each project/activity
5. Revise the implementation process by having agencies prepare a report that summarizes accomplishments and results for each project and/or activity completed during the year.

Effectiveness Recommendations

The effectiveness assessment (section 3) indicates that 25 of the 30 desired outcomes have generally been met, two have been partially met and three have generally not been met. These findings would suggest that the implementation of LRMP strategies over the past four years has contributed positively to the achievement of the goals and objectives in the Kamloops LRMP.

In its review of the effectiveness assessment, the Monitoring Table provided the following recommendations.

Ecosystems

6. Improve the accuracy of Indicator 1.3 (Animal Species at Risk) by undertaking research to provide a more accurate assessment of population and habitat concerns for red and blue listed species

4. Recommendations

Forests

7. Request that the Ministry of Forests provide additional public awareness and education on the risks and costs associated with human-caused forest fires

Grasslands

8. Add a new activity under Project J3 (Grassland Management Strategies) to develop and implement a noxious weed management plan which includes:
 - more accurate inventory of areas affected by noxious weeds
 - increased levels of noxious weed control
 - improved coordination of noxious weed control activities between provincial and local governments
9. Revise Activity 2 under Project J3 (Grassland Management Strategies) by developing a grasslands management plan which includes:
 - improved inventory techniques
 - measures to address forest encroachment (including fire management)
 - a strategy to address the conversion of Crown grassland to urban development

Riparian

10. Develop a new task under Project H (Watershed Management) to apply monitoring and audit procedures to determine impact of range use on riparian areas

Water

11. Improve the accuracy of Indicator 6.2 (Turbidity) and Indicator 6.3 (Water Flows) by including sampling data from upstream sites outside the LRMP that are connected to watersheds in the LRMP

Wildlife

12. Add a new activity under Project C2 (Wildlife Strategies) to improve management for species of concern identified under Indicator 7.1 (Wildlife Population) which includes:
 - research and monitoring to improve scientific knowledge
 - identification and conservation of critical habitat
 - regulation and management of human activities
13. Develop a new indicator for Resource Category 7 (Wildlife) to monitor critical habitat (e.g., changes in area and condition); improve the accuracy of indicator 7.1 (Wildlife Populations) by including new species and regional data
14. Request that the Ministry of Environment, Lands and Parks provide additional public awareness and understanding about wildlife management

Fish

15. Add a new activity under Project B1 (Inland Fisheries Strategies) to conduct research and monitoring activities to improve scientific knowledge about wild fish populations and habitats
16. Add a new activity under Project B1 (Inland Fisheries Strategies) and Project B2 (Anadromous Fisheries Strategies) to identify, maintain and enhance critical fish habitat

4. Recommendations

17. Improve the accuracy of Indicator 8.2 (Anadromous Fish Species) by including population statistics on sockeye (especially for the Adams River)

Protected Areas

18. Develop a new indicator for Resource Category 9 (Protected Areas) to measure and monitor the effectiveness of park management plans in meeting LRMP desired outcomes

Agriculture

19. Improve the relevance of Indicator 10.6 (Farms) by providing data that relates specifically to agriculture on Crown land (e.g., ranching sector)

Minerals

20. Develop a new indicator for Resource Category 11 (Minerals) to measure the economic health of the mining industry in the Kamloops LRMP (especially costs associated with access approval); improve the accuracy of Indicator 11.1 (Investment) by providing data that measures investment activity for the LMRP area

Tourism

21. Conduct research to gather data for Indicator 13.4 (Resource-based Tourism Operations)—e.g., sport fishing, guest ranches, river rafting etc.— using data standards similar to those used for the ski industry
22. Add a new activity under Project L1 (Recreation and Tourism Plans) to conduct a gap analysis between demand and supply for resource based tourism opportunities (mid and back country) in the Kamloops LRMP area¹⁹

Recreation

23. Improve the accuracy of Indicator 14.3 (Recreation Use) by providing additional data on visitor use and the number of park campsites for other parks (e.g., Tunkwa and Roche)
24. Improve the accuracy of Indicator 14.3 (Recreation Use) by reporting hunting data according to user type (e.g., guided, unguided and aboriginal)
25. Add a new activity under Project L1 (Recreation and Tourism Plans) to identify future demand for recreation use in each of the Recreation Opportunity Spectrum (ROS) land classifications based on the dependence between outdoor recreation activities and ROS classifications and future demand projections for each activity
26. Add a new activity under Project L1 (Recreation and Tourism Plans) to conduct research to determine whether there is a correlation between changes in demographics and recreation use patterns²⁰

¹⁹ Even though the Ministry of Forests is identified as the lead agency for this project, this activity falls under the mandate of the Ministry of Small Business, Tourism and Culture and could be addressed by regional tourism opportunity analyses being undertaken by the ministry.

²⁰ As per previous footnote.

Communities

27. Improve the relevance of Indicator 16.9 (Domestic Water Supply) by reporting water quantity on the basis of volume as opposed to the number of licenses

General LRMP Recommendations

28. Revise the monitoring process by clarifying the role of the LRMP Monitoring Table relative the work being undertaken by the City of Kamloops to address local water quality concerns
29. Review climatic data available through Environment Canada to determine whether it can be used to improve the accuracy of weather related indicators (e.g., water flow, forest fires, fish populations, etc.)
30. Revise the monitoring process by clarifying the process for making changes to the LRMP based on new information becoming available (e.g., changes in legislation and policy, research, etc.)

Appendix 1 – Kamloops LRMP Monitoring Table Participants

1. LRMP PLANNING TEAM	
Name	Role
Gary Reay	LRMP Coordinator
Judy Steves	LRMP Assistant Coordinator
Dorli Duffy	Facilitator
Stuart Gale	Planning Consultant
2. AGENCY MEMBERS:	
Table Members	
Representative	Organization
Andrew Tucker	City of Kamloops
Bob Finley	Thompson Nicola Regional District
Ernie Maynard	Ministry Of Environment Lands And Parks
Gordon Kosakoski	Fisheries and Oceans Canada
Graham Strachan	Ministry of Agriculture & Food
Jim Britton	Ministry of Energy and Mines
Max Tanner	Clearwater Forest District
Mike Henry	BC Parks
Peter Lishman	Kamloops Forest District
Phil Holman	Ministry Of Environment Lands And Parks
Phil Whitfield	Thompson Okanagan IAMC
Sandy MacDonald	Ministry Of Environment Lands And Parks
Consultative Members or Alternates	
Arthur Manuel	Chairman, Shuswap Nation Tribal Council
Bernie Ivanco	RPAT, Kamloops Forest Region
Charlene Higgins	Shuswap Nation Tribal Council
Charles Porter	Ministry Of Environment Lands And Parks
Dave Monture	Shuswap Nation Tribal Council
David Tudhope	RPAT, Vernon Forest District
Dennis Lloyd	RPAT, Kamloops Forest Region
Des Anderson	Ministry Of Environment Lands And Parks
Mike Dedels	Kamloops Forest District: Range
Monty Downs	BC Parks
Phil Bellevue	Ministry Of Environment Lands And Parks
Rolf Schmitt	Ministry of Energy and Mines
Ron van der Zwan	Clearwater Forest District
Warren Mitchell	Land Use Coordination Office

3. PUBLIC MEMBERS	
Table Members	
Representative	Organization
Arne Raven	BC Cattleman's Association
Bert Parke	Shuswap Environmental Action Society
Bob Helfrich	Kamloops TSA Group
Charles Forest	BC Fishing Resort Owners Association
Dick McMaster	Guide Outfitters Association of B.C.
John Foster	Yellowhead Ecological Association
Joyce Shannon	BC Cattleman's Association
Larry Lutjen	Independent Prospectors
Neil Ridenour	Pulp & Paper Woodworkers of Canada
Nels Vollo	Kamloops Exploration Group
Norm Fennell	Share the Thompson
Phil Hallinan	BC Wildlife Federation
Rick Sommer	Kamloops TSA Group
Ruth Madsen	Thompson Institute of Environmental Studies
Tay Briggs	Clearwater Tourism Consortium
Tom Dickinson	Kamloops Naturalists
Consultative Members or Alternates	
Arthur Devick	BC Cattleman's Association
Bill Gilmour	Kamloops Exploration Group
Chuck Emery	North Thompson Silviculture Contractors
Glen McNeil	Clearwater Logging Association
Jay Butcher	BC Trappers Association
Jim Cooperman	Shuswap Environmental Action Society
June & Terry Benesh	BC Fishing Resorts & Outfitters Association
Ken Darwin	Kamloops Snowmobile Club
Lorne McNeilly	Kamloops TSA Group
Ray Frolek	BC Cattleman's Association
Warren MacLennan	Clearwater Public Advisory Committee
Warren Oja	Interior Woodworkers Association
Wilf Kipp	BC Wildlife Federation; Kamloops Fish & Game

Appendix 2 – Red and Blue-listed Species

Appendix 2.1: Wildlife Species at Risk

For the Kamloops LRMP, there are 15 endangered species (red-listed) and 39 vulnerable species (blue listed). Some of the species listed for the LRMP may not be present in Crown forest or on rangelands, but have been seen in the area in the past.

Red listed: species either legally designated as endangered or threatened or are candidates.

Blue listed: species considered vulnerable or sensitive.

In the Kamloops LRMP, 4 species are dependant on old growth forest (1 red and 3 blue listed). An additional 8 species are associated with old growth, 1 red and 7 blue listed. Other listed species depend on the presence of suitable large wildlife trees dispersed in suitable ecosystems. Seven listed species are dependant on the correct distribution and sizes of Coarse Woody Debris (CWD).

In the Kamloops LRMP, 32 listed species are associated with grasslands and/or open forest (21 blue and 11 red listed).

Forest Wildlife Species	Status	Grassland Wildlife Species	Status
<i>Tailed frog</i> (rare or not present)	Blue/Red	Western screech owl (<i>macfarlanei</i>)	Red
Rubber boa	Blue	Western grebe (rare or not present)	Red
Sharp-tailed snake (rare or not present)	Red	Swainson's hawk (rare)	Red
Sandhill crane	Blue	Ferruginous hawk (rare or not present)	Red
Flammulated owl	Blue	Prairie falcon	Red
<i>Western screech owl (macfarlanei)</i>	Red	Upland sandpiper (rare)	Red
Lewis' woodpecker	Blue	Burrowing owl	Red
Williamson's sapsucker (<i>thyroideus</i>)	Blue	Sage thrasher (rare or not present)	Red
Western small-footed myotis	Blue	Brewer's sparrow subsp. <i>breweri</i>	Red
Northern long-eared myotis	Blue	Lark sparrow	Red
Fringed myotis	Blue	Badger	Red
Wolverine (<i>luscus</i>)	Blue	Great basin spadefoot toad	Blue
Mountain caribou (southern pop.)	Blue	Painted turtle	Blue
Fisher	Blue	Gr. Basin. Gopher snake (<i>deserticola</i>)	Blue
Grizzly bear	Blue	Western Rattlesnake (<i>oreganus</i>)	Blue
	Total 15 species	American avocet	Blue
		Bobolink (rare)	Blue
		Great basin pocket mouse	Blue
		Bighorn sheep (<i>canadensis</i>)	Blue
		Bighorn sheep (<i>californiana</i>)	Blue
		Total 32 species	

The following table provides additional data on habitat issues for animal species in the Kamloops LRMP area.

LEGEND

IDENTIFIED WILDLIFE = listed or proposed in the Identified Wildlife Management Strategy, Nov.27,1998

? = Occurrence on crown land or in District at all needs confirmation

Red listed = species either legally designated as endangered or threatened or are candidates

Blue listed = species considered to be vulnerable or sensitive

RI = Species deemed Regionally Important by BC Environment

Yellow listed = species not at risk that are managed to meet specific public demands

Yg = yellow listed species with significant global representation & responsibility in BC

LRMP = Priority for management assigned by Kamloops LRMP, a Higher Level Plan

LRMP = ? = HLP priority question

W/G = Combined WHA & GWM strategy in Identified Wildlife Mgmt Strategy, Nov.27, 1998

WHA = Wildlife Habitat Area strategy

GWM = General Wildlife Measure strategy

future = proposed for inclusion in future Volume 2 of IWMS, may or may not happen

i = introduced species

Phenology - species left blank migrate out of KFD

resid. = resident in KFD year round, may still migrate within

non-W = does not winter in KFD, present other seasons

W only = appears in KFD only in winter, and transient

v.rare = very rarely seen in KFD

Appendix 2 – Red and Blue-listed Species

COMMON NAME	Red/Blue Status	Riparian Issue											Associated	Dependent	Permanent	Details	COMMENT			
		Riparian Issue			Open forest	Dry forest	Wet forest	Interior forest	Deciduous	CWD critical	Wildlife Tree	Use						Spp	Old Growth	Range
		S	W	L	Forest Biodiversity															
Amphibians																				
Great basin spadefoot toad	Blue		◆		◆												◆	open, sandy wetland logs and rocks; trampling		
Tailed frog	Blue/Red	◆						◆	◆								◆	Steep, cold streams surrounded by old forest. Presence uncertain		
Reptiles																				
Painted turtle	Blue		◆	◆														wetland and pond edges, resting logs, loose soils		
Rubber boa	Blue				◆	◆				◆								Open forest, logs and rocky ground, sandy soils		
Racer	Blue				◆	◆												grassland and open forest, climbs		
Sharp-tailed snake	Red					◆							◆					rare, IDF forest		
G.B. Gopher snake (deserticola)	Blue				◆					◆								grassland and open forest, protect dens in talus		
Western Rattlesnake (oreganus)	Blue				◆					◆								grassland and open forest, protect dens in rock & talus		
Western grebe	Red		◆	◆													◆	emerg. lakes, very rare in winter		
Double-crested cormorant	Blue			◆														emerg. open water, rare summer & migrant		
American bittern	Blue		◆	◆													◆	emerg. shallow water with bulrushes, cattails - trampling		
Great blue heron	Blue	◆	◆	◆					◆	VE T.	Ct, Df			◆		◆		cottonwood nesting sites, shallow water feeding		
Trumpeter swan	Blue	◆															◆	S Thompson wintering site, bank protection		
Swainson's hawk	Red				◆				◆	VE T.	A, Ct						◆	open ground feeding, nests on deciduous trees		
Ferruginous hawk	Red				◆				◆	VE T.	A, Ct, P						◆	grassland migrant, big tree tops, rare		
Peregrine falcon (anatum)	Red									◆								future IWMS entry: cliffs, small mammal, bird prey		
Gyrfalcon	Blue									◆								forest		
Prairie falcon	Red				◆					◆							◆	future IWMS entry: cliffs, grassland & prey species		

Appendix 2 – Red and Blue-listed Species

COMMON NAME	Red/Blue Status	Riparian Issue											Associated	Dependent	Permanent	Details	COMMENT				
		Riparian Issue			Open forest	Dry forest	Wet forest	Interior forest	Deciduous	CWD critical	Wildlife Tree	Use						Spp	Old Growth	Range	Habitat and distribution notes
		S	W	L	Forest Biodiversity																
Sharp-tailed grouse (columbianus)	Blue																◆	grdnest	grassland user, protect deciduous & dancing site		
Sandhill crane	Blue		◆	◆	◆	◆													shore	small wetlands on plateau, trampling disturbs	
American avocet	Blue		◆															◆	shore	wetland	
Upland sandpiper	Red		◆															◆		pristine grassland; trampling of nests, rare	
Long-billed curlew	Blue																	◆	spring	short grass near Kamloops, disturbance in spring	
Red-necked phalarope	Blue		◆	◆																wetland	
California gull	Blue				◆															open water, breeds	
Caspian tern	Blue				◆															riparian, migrant	
Flammulated owl	Blue					◆	◆				2C AV.	Py,D f	◆							Old growth dry fir and P. pine	
Western screech owl (macfarlanei)	Red	◆	◆	◆	◆	◆		◆	◆		2C AV.	Ct					◆			cottonwood riparian, mixed forest edges	
Burrowing owl	Red																	◆	grdnest	specific grassland sites, insects, mice & vole prey	
Short-eared owl	Blue				◆													◆		grassland hunter, needs brushy areas	
White-throated swift	Blue																			cliffs & close open ground	
Lewis' woodpecker	Blue	◆	◆		◆				◆		2C AV.	Py,Ct		◆			◆			use P. pine snags, hawk for insects	
Williamson's sapsucker (thyroideus)	Blue				◆	◆			◆		1C AV.	Df, Py,A	◆							Use aspen for nesting and feeding	
Sage thrasher	Red																	◆		tall sage BG, no recent records	
Yellow breasted chat	Red		◆						◆											shrub, riparian	
Brewer's sparrow subsp. breweri	Red																	◆	Grdnest	grassland with larger sage, ground nesting, Lac du Bois	
Lark sparrow	Red																	◆	Grdnest	Grassland	

Appendix 2 – Red and Blue-listed Species

COMMON NAME	Red/Blue Status	Riparian Issue			Open forest	Dry forest	Wet forest	Interior forest	Deciduous	CWD critical	Wildlife Tree	Associated	Dependent	Permanent	Details	COMMENT						
		R or B	S	W													L	Forest Biodiversity	Use	Spp	Old Growth	Range
Bobolink	Blue													◆	Grdnest	groundnests in grassland, trampling, rare BGxh2						
Mammals																						
Pallid bat	Red	◆	◆	◆							SNAG						future IWMS entry: cliffs-Lions Head and open ground for hunting					
Spotted bat	Blue		◆		◆						2C AV.			◆		nest cliffs, snags & forages over grassland & open forest						
Western small-footed myotis	Blue		◆							◆	BA RK		◆			nest cliffs, snags & forages over grassland & open forest						
Northern long-eared myotis	Blue					◆	◆				BA RK					nest bark, caves						
Fringed myotis	Blue				◆						VE T.		◆	◆		nest cliffs, snags & forages over grassland & open forest						
Townsend's big-eared bat	Blue													◆		a generalist bat, protect cave & mine sites						
Great basin pocket mouse	Blue													◆		a grassland dweller, trampling						
Wolverine (luscus)	Blue									◆		◆				wide ranging, upper forest & alpine						
Fisher	Blue	◆	◆	◆		◆					VE T.	Ct,S	◆			mid-elevation older forest, snags and witchesbroom						
Badger	Red				◆									◆	prey	open forest & grassland types, protect prey and burrows						
Grizzly bear	Blue		◆				◆	◆	◆	◆		◆			prey	avoid stocking calves, carrion mgmt.						
Mountain caribou (southern pop.)	Blue				◆	◆	◆	◆					◆			migrates elevationally, key food arboreal lichen						
Bighorn sheep (canadensis)	Blue				◆									◆		grassland, open forest grazer -protect winter feed						
Bighorn sheep (californiana)	Blue				◆									◆		grassland, open forest grazer -protect winter feed						
Fish																						
Bull trout	Blue	◆														a colder, steeper stream fish, largely further north, protect banks						
Mountain sucker	Blue	◆														In North Thompson River						

Appendix 2.2: Plant Communities at Risk

Red-listed Species

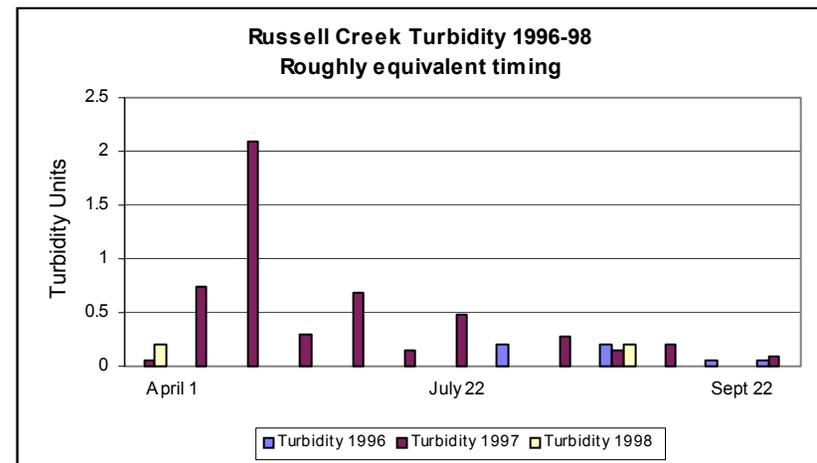
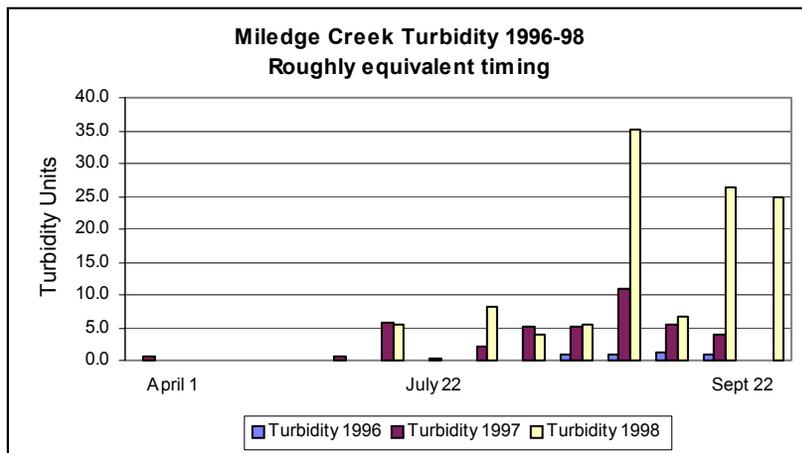
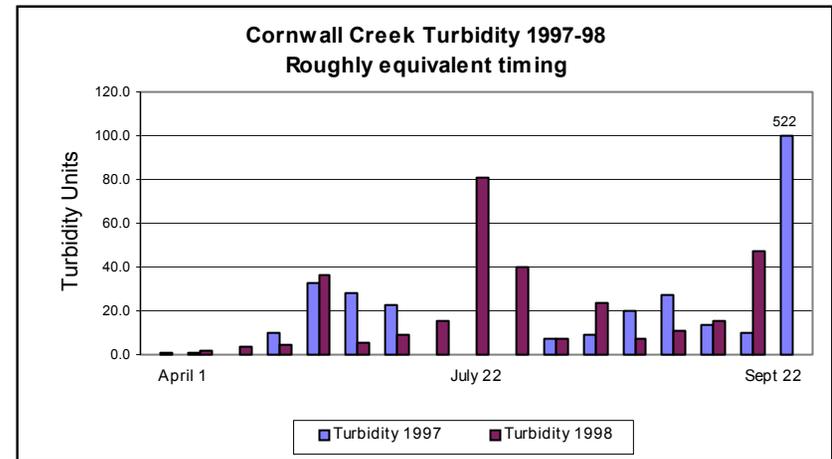
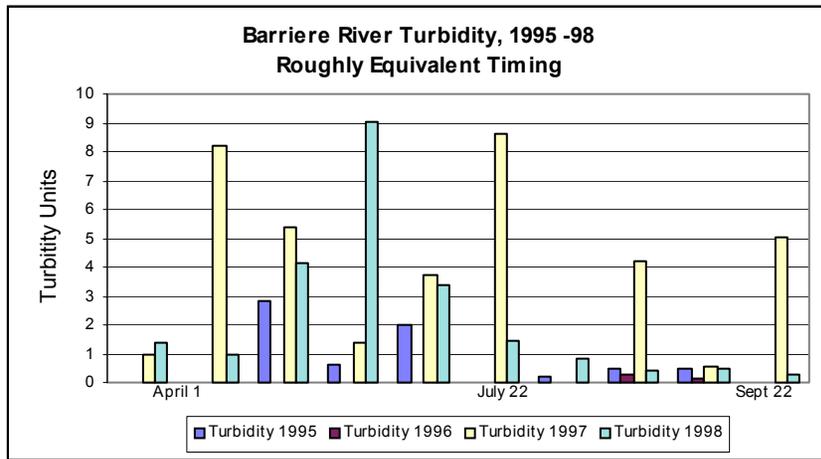
Scientific Name	Common Name	Status
<i>Allium Geyeri</i> Var <i>Geyeri</i>	Geyer's Onion	Red
<i>Allium Geyeri</i> Var <i>Tenerum</i>	Geyer's Onion	Red
<i>Arabis Sparsiflora</i>	Sickle-Pod Rockcress	Red
<i>Artemisia Cana</i> Ssp <i>Cana</i>	Silver Sagebrush	Red
<i>Astragalus Lentiginosus</i>	Freckled Milk-Vetch	Red
<i>Atriplex Argentea</i> Ssp <i>Argentea</i>	Silvery Orache	Red
<i>Bidens Vulgata</i>	Tall Beggarticks	Red
<i>Botrychium Boreale</i>	Boreal Moonwort	Red
<i>Chenopodium Desiccatum</i>	Narrow-Leaved Goosefoot	Red
<i>Crepis Modocensis</i> Ssp <i>Rostrata</i>	Low Hawksbeard	Red
<i>Cyperus Squarrosus</i>	Awned Cyperus	Red
<i>Gaura Coccinea</i>	Scarlet Gaura	Red
<i>Hedeoma Hispida</i>	Rough Pennyroyal	Red
<i>Helianthus Nuttallii</i> Var <i>Nuttallii</i>	Nuttall's Sunflower	Red
<i>Hutchinsia Procumbens</i>	Hutchinsia	Red
<i>Ipomopsis Minutiflora</i>	Small-Flowered Ipomopsis	Red
<i>Isoetes Howellii</i>	Howell's Quillwort	Red
<i>Iva Axillaris</i> Ssp <i>Robustior</i>	Poverty-Weed	Red
<i>Linanthus Harknessii</i>	Harkness' Linanthus	Red
<i>Linanthus Septentrionalis</i>	Northern Linanthus	Red
<i>Lindernia Dubia</i> Var <i>Anagallidea</i>	False-Pimpernel	Red
<i>Lupinus Argenteus</i> Ssp <i>Argenteus</i>	Silvery Lupine	Red
<i>Lupinus Bingenensis</i> Var <i>Subsaccatus</i>	Sulphur Lupine	Red
<i>Marsilea Vestita</i>	Hairy Water-Clover	Red
<i>Navarretia Intertexta</i>	Needle-Leaved Navarretia	Red
<i>Olsynium Douglasii</i> Var <i>Inflatum</i>	Purple Blue-Eyed Grass	Red
<i>Ophioglossum Pusillum</i>	Northern Adder's-Tongue	Red
<i>Poa Fendleriana</i> Ssp <i>Fendleriana</i>	Fendler Bluegrass	Red
<i>Rotala Ramosior</i>	Toothcup Meadow-Foam	Red
<i>Sidalcea Oregana</i> Var <i>Procera</i>	Oregon Checker-Mallow	Red
<i>Sphaeralcea Coccinea</i>	Scarlet Globe-Mallow	Red
<i>Sphenopholis Intermedia</i>	Prairie Wedgegrass	Red
<i>Sphenopholis Obtusata</i> Var <i>Obtusata</i>	Prairie Wedgegrass	Red
<i>Sporobolus Compositus</i> Var <i>Compositus</i>	Rough Dropseed	Red
<i>Stipa Spartea</i>	Porcupine-Grass	Red
Total Red Listed		35

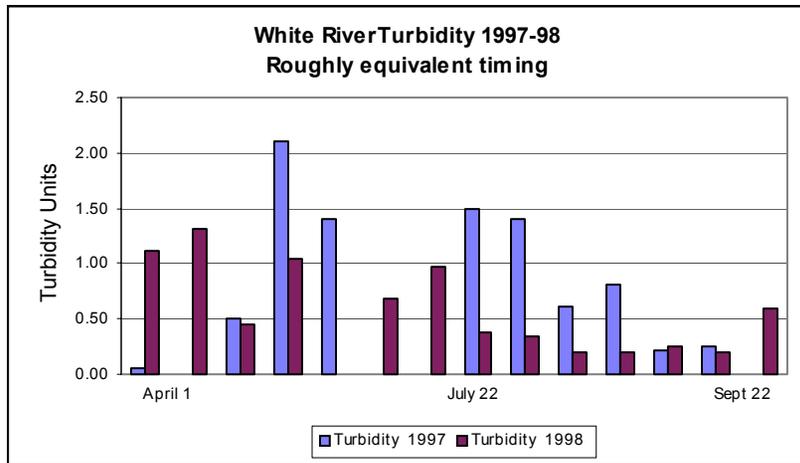
Blue-listed Species

Scientific Name	Common Name	Status
<i>Apocynum Medium</i>	Western Dogbane	Blue
<i>Apocynum Sibiricum</i> Var <i>Salignum</i>	Clasping-Leaved Dogbane	Blue
<i>Arabis Lignifera</i>	Woody-Branched Rockcress	Blue
<i>Astragalus Filipes</i>	Threadstalk Milk-Vetch	Blue
<i>Carex Comosa</i>	Bearded Sedge	Blue
<i>Carex Heleonastes</i>	Hudson Bay Sedge	Blue
<i>Carex Vulpinoidea</i>	Fox Sedge	Blue
<i>Carex Xerantica</i>	Dry-Land Sedge	Blue
<i>Chamaerhodos Erecta</i> Ssp <i>Nuttallii</i>	American Chamaerhodos	Blue
<i>Delphinium Bicolor</i>	Montana Larkspur	Blue
<i>Draba Ruaxes</i>	Coast Mountain Draba	Blue
<i>Dryopteris Cristata</i>	Crested Wood Fern	Blue
<i>Eleocharis Tenuis</i>	Slender Spike-Rush	Blue
<i>Epilobium Ciliatum</i> Ssp <i>Watsonii</i>	Purple-Leaved Willowherb	Blue
<i>Epilobium Glaberrimum</i> Ssp <i>Fastigiatum</i>	Smooth Willowherb	Blue
<i>Epilobium Halleanium</i>	Hall's Willowherb	Blue
<i>Epilobium Leptocarpum</i>	Small-Flowered Willowherb	Blue
<i>Epilobium Oregonense</i>	Oregon Willowherb	Blue
<i>Galium Trifidum</i> Ssp <i>Trifidum</i>	Small Bedstraw	Blue
<i>Glyceria Pulchella</i>	Slender Mannagrass	Blue
<i>Hackelia Diffusa</i>	Spreading Stickseed	Blue
<i>Helenium Autumnale</i> Var <i>Grandiflorum</i>	Mountain Sneezeweed	Blue
<i>Hypericum Majus</i>	Canadian St. John's-Wort	Blue
<i>Hypericum Scouleri</i> Ssp <i>Nortoniae</i>	Western St. John's-Wort	Blue
<i>Impatiens Capensis</i>	Spotted Touch-Me-Not	Blue
<i>Juncus Stygius</i>	Bog Rush	Blue
<i>Melica Spectabilis</i>	Purple Oniongrass	Blue
<i>Myriophyllum Ussuriense</i>	Ussurian Water-Milfoil	Blue
<i>Nemophila Breviflora</i>	Great Basin Nemophila	Blue
<i>Phlox Hoodii</i>	Hood's Phlox	Blue
<i>Polygonum Hydropiperoides</i>	Water-Pepper	Blue
<i>Polygonum Punctatum</i>	Dotted Smartweed	Blue
<i>Salix Boothii</i>	Booth's Willow	Blue
<i>Scolochloa Festucacea</i>	Sprangle-Top	Blue
<i>Scrophularia Lanceolata</i>	Lance-Leaved Figwort	Blue
<i>Senecio Plattensis</i>	Plains Butterweed	Blue
<i>Talinum Sediforme</i>	Okanogan Fameflower	Blue
Total Blue Listed		37

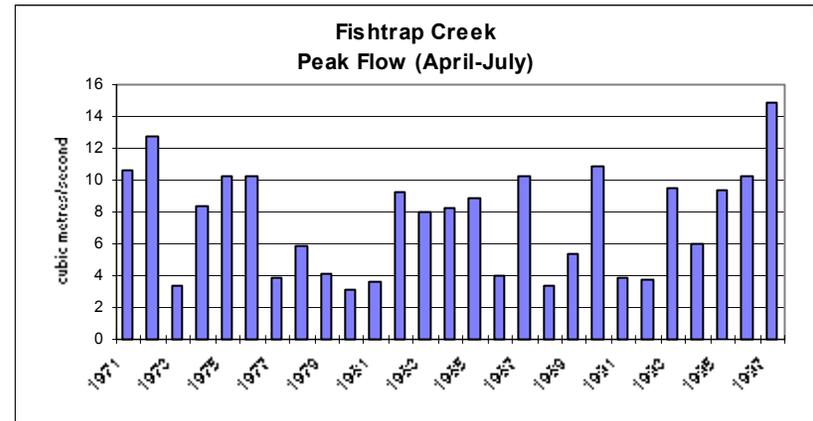
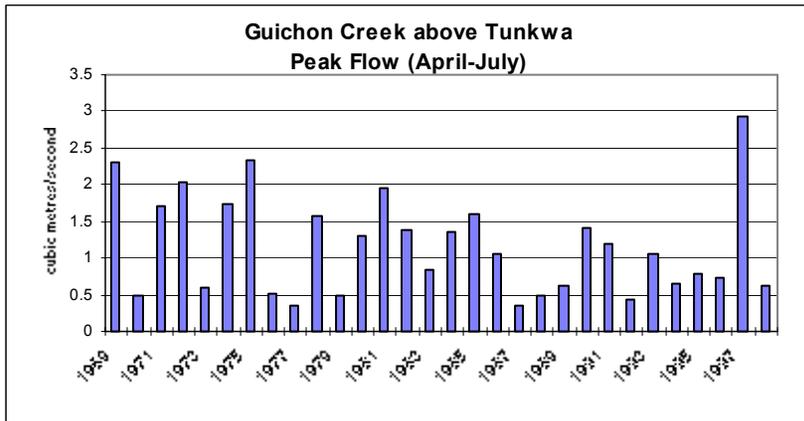
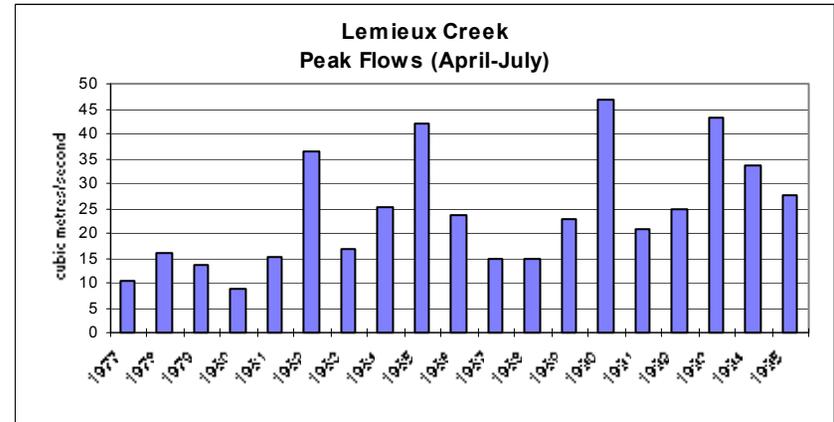
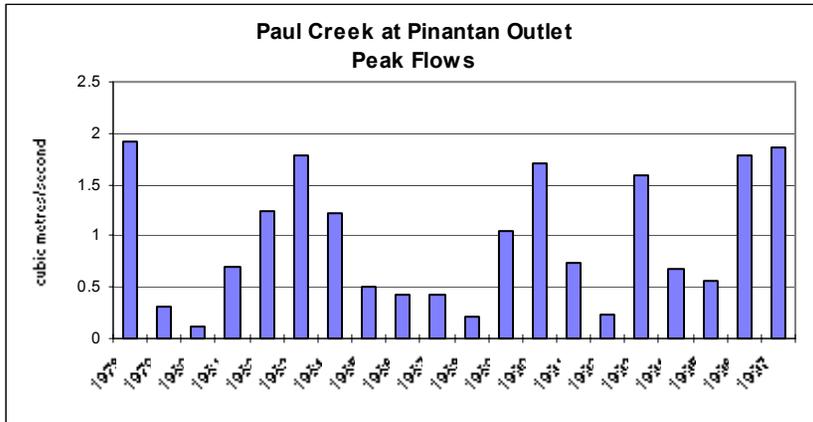
Appendix 3 – Water Quality and Flow Data

Appendix 3-1: Seasonal turbidity measurements at selected monitoring sites

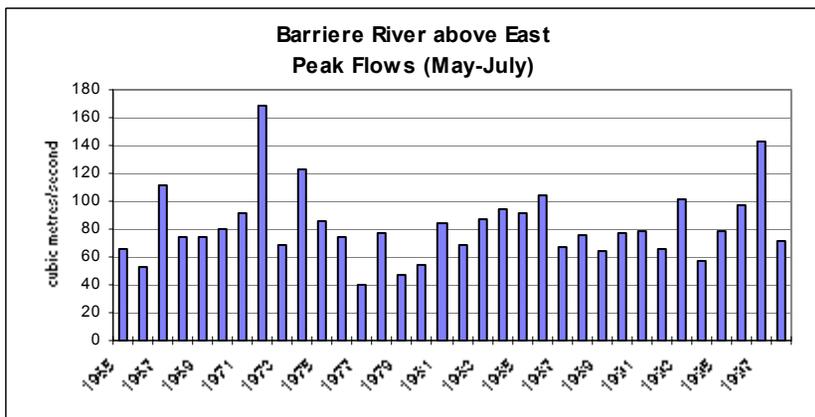
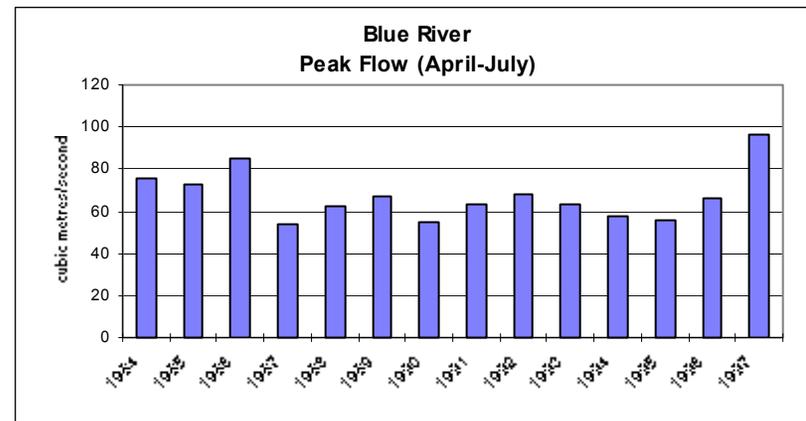
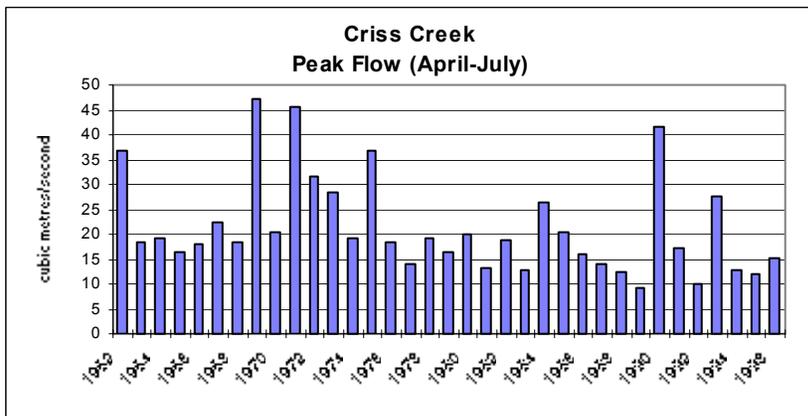




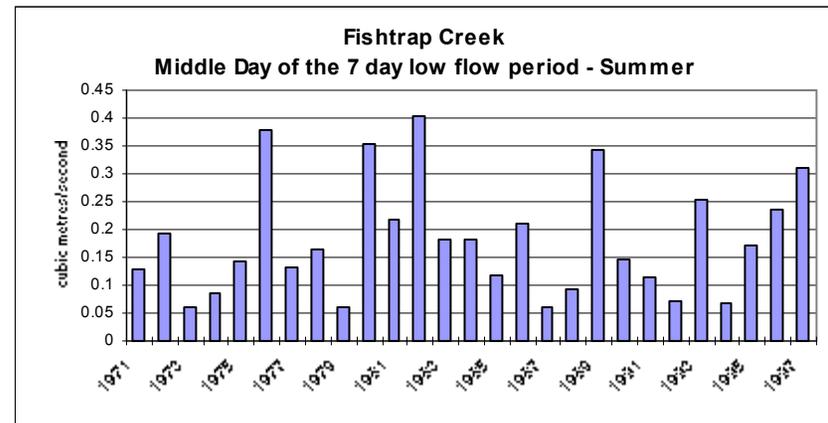
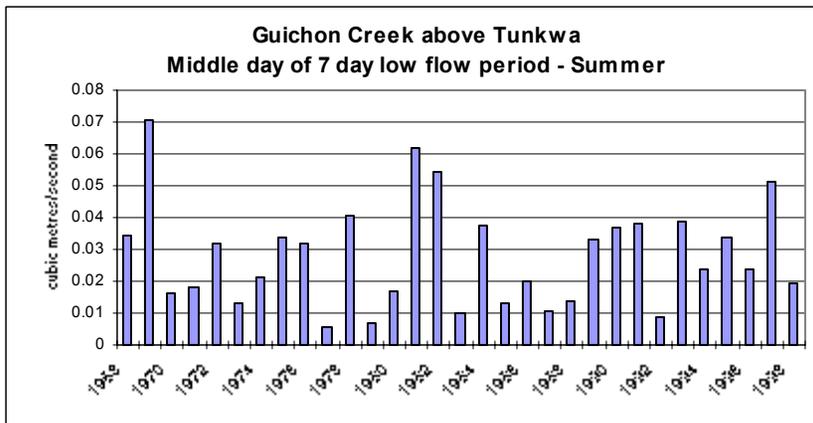
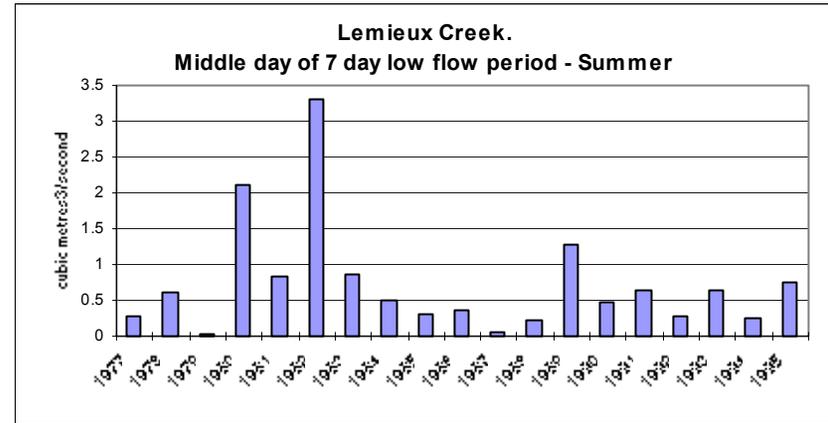
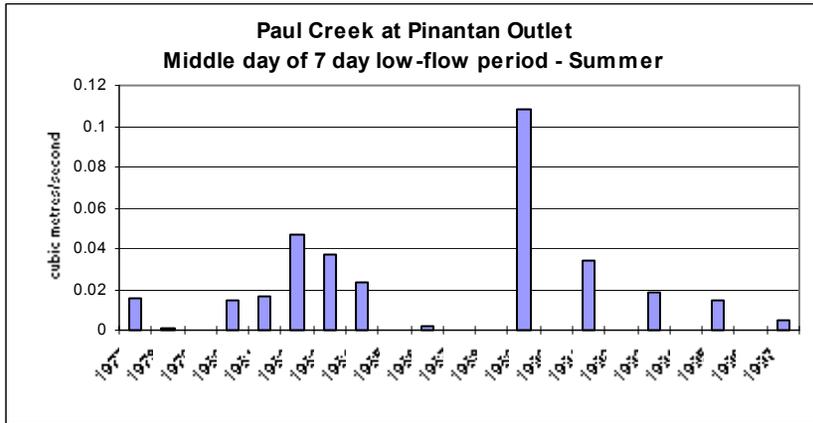
Appendix 3-2: Annual peak flow volume measurements at selected monitoring sites



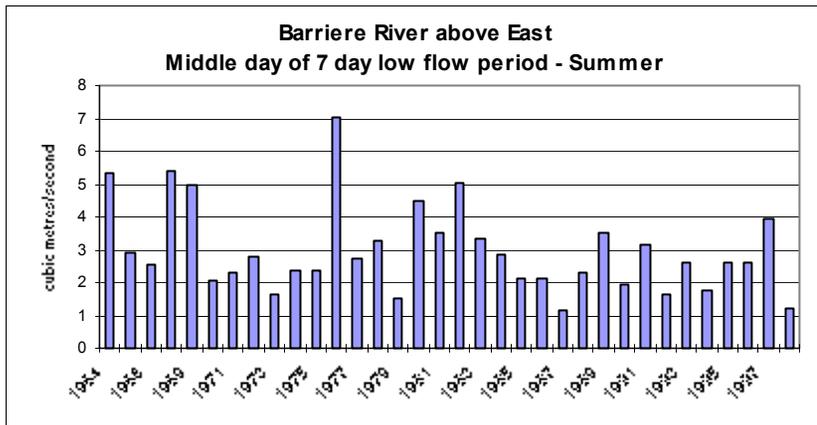
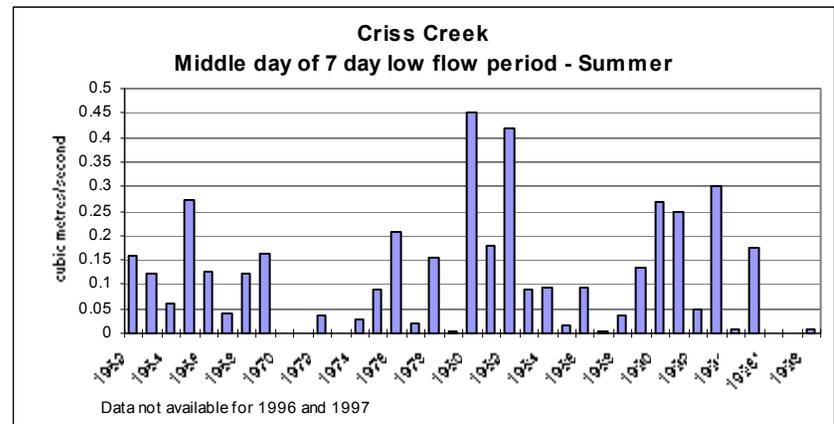
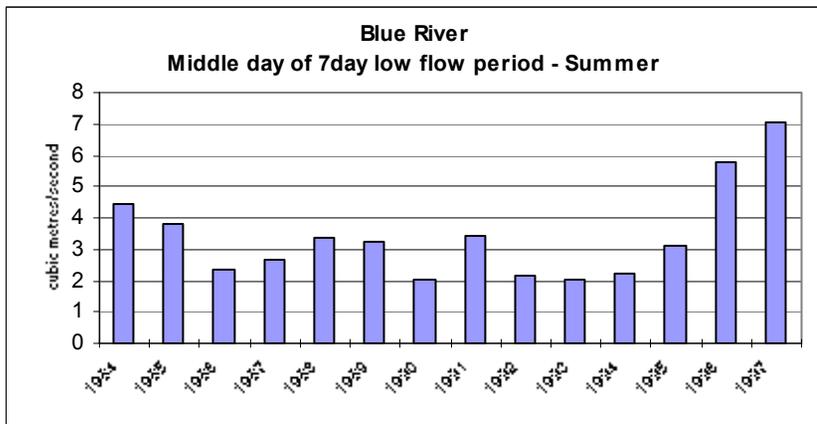
Appendix 3 – Water Quality and Flow Data



Appendix 3-3: Annual low flow volume measurements at selected monitoring sites



Appendix 3 – Water Quality and Flow Data



Appendix 4 – Groundwater Data

Aquifers in the Kamloops LRMP

Location	Aquifer Materials	Size (km ²)	Productivity	Vulnerability	Demand	Type of Water Use	Quantity Concerns
Cache Creek to Scottie Creek	sand and gravel	16.0	high	low	high	multiple	
Cache Creek to north of Maiden Creek	sand and gravel	16.0	high	high	high	multiple	
Semlin Valley	sand and gravel	9.0	high	low	high	multiple	local
Mauvais Rocher IR#5	sand and gravel	3.0	high	low	moderate	industrial	
Squilax	sand and gravel	21.2	high	high	low	multiple	
Squilax	sand and gravel	21.2	high	high	low	multiple	
Whitcroft	sand and gravel	2.3	moderate	low	low	multiple	
Chase	sand and gravel	12.3	moderate	moderate	low	multiple	
Chase	sand and gravel	12.3	moderate	moderate	low	multiple	
Chase	sand and gravel	7.7	moderate	low	low	multiple	
Duck Range	bedrock	410.0	low	moderate	low	multiple	
Duck Range	bedrock	410.0	low	moderate	low	multiple	
Pinantan Lake	bedrock	135.0	low	moderate	moderate	multiple	
Pinantan Lake	bedrock	135.0	low	moderate	moderate	multiple	
Pritchard	sand and gravel	13.0	moderate	low	low	multiple	
Monte Creek	sand and gravel	4.5	moderate	low	moderate	multiple	
Monte Creek	sand and gravel	4.5	moderate	low	moderate	multiple	
Monte Lake	sand and gravel	3.0	moderate	moderate	low	multiple	
N. Thompson R. floodplain; between Little Fort and northwards 8 km.	sand and gravel	7	high	high	low	drinking	

Appendix 4 – Groundwater Data

Location	Aquifer Materials	Size (km ²)	Productivity	Vulnerability	Demand	Type of Water Use	Quantity Concerns
50 km N. of the S. Thompson R. and 20 km E. of the N. Thompson R.	bedrock	700.0	low	moderate	low	drinking	
50 km N. of the S. Thompson R. and 20 km E. of the N. Thompson R.	bedrock	10.0	moderate	moderate	low	drinking	
50 km N. of the S. Thompson R. and 20 km E. of the N. Thompson R.	bedrock	10.0	moderate	moderate	low	drinking	
Rose Hill/ Barnhartvale/ Shumway Lake	bedrock	160.0	low	moderate	low	multiple	
Brigade Lake	bedrock	80.0	low	moderate	low	drinking	
Knutsford	bedrock	1.1	low	low	moderate	drinking	
Sugarloaf Hill	bedrock	65.0	low	moderate	low	multiple	
Davidson Creek	sand and gravel	1.0	moderate	moderate	moderate	drinking	
Peterson Creek	sand and gravel	2.2	moderate	high	low	drinking	
Buse Lake	sand and gravel	9.9	moderate	low	low	drinking	
2 km. W. of Barnhartvale	sand and gravel	1.2	moderate	low	moderate	drinking	
Paul Lake	sand and gravel	1.2	moderate	low	moderate	drinking	
Kamloops Airport	sand and gravel	19.5	moderate	high	low	multiple	
N. Thompson R. from S. Thompson R. to Fishtrap C8k.	sand and gravel	77.0	moderate	moderate	low	multiple	
N. Thompson R. from S. Thompson R. to Fishtrap Ck.	sand and gravel	77.0	moderate	moderate	low	multiple	
N. Thompson R. from S. Thompson R. to Fishtrap Ck.	sand and gravel	77.0	moderate	moderate	low	multiple	
Pulp Mill in S.W. Kamloops	sand and gravel	2.0	moderate	high	moderate	multiple	
Campbell Creek	sand and gravel	3.0	moderate	moderate	moderate	multiple	
Lower S. Thompson R.	sand and gravel	30.0	high	moderate	moderate	multiple	
Lower S. Thompson R.	sand and gravel	30.0	high	moderate	moderate	multiple	

Appendix 4 – Groundwater Data

Location	Aquifer Materials	Size (km ²)	Productivity	Vulnerability	Demand	Type of Water Use	Quantity Concerns
Heffley and Edward Creeks confluence	sand and gravel	0.6	moderate	low	moderate	drinking	
Upper Louis Creek Valley	sand and gravel	81.0	moderate	low	low	drinking	
Upper Louis Creek Valley	sand and gravel	81.0	moderate	low	low	drinking	
Upper Louis Creek Valley	sand and gravel	81.0	moderate	low	low	drinking	
Salmon River Valley, Westwold	sand and gravel	31.5	moderate	moderate	moderate	multiple	
Part of the Dixon and Sargent Creek Valleys	sand and gravel	4.5	moderate	low	low	drinking	
Parts of Dixon, Sargent and Jet Creek watersheds	bedrock	55.0	low	moderate	low	drinking	
Louis Creek and N.Thompson River confluence area	sand and gravel	2.1	moderate	moderate	moderate	multiple	
N. Thompson R. floodplain from Barriere to Little Fort	sand and gravel	55.0	moderate	moderate	low	multiple	
N. Thompson R. floodplain from Barriere to Little Fort	sand and gravel	55.0	moderate	moderate	low	multiple	
Lower Barriere River Valley	sand and gravel	7.0	moderate	moderate	low	multiple	
Christian Creek Valley	sand and gravel	5.3	high	moderate	moderate	multiple	
Christian Creek Valley	sand and gravel	5.3	high	moderate	moderate	multiple	
Little Fort area	sand and gravel	5.6	moderate	moderate	low	multiple	

Appendix 5 – Kamloops LRMP Landscape Units

Number	Name	Biodiversity Emphasis Option (BEO)	Forest District
1	Hat Creek	Intermediate	Kamloops
2	Lower Bonaparte	Intermediate	Kamloops
3	Ashcroft	High	Kamloops
4	Deadman	Intermediate	Kamloops
5	Dewdrop	High	Kamloops
30	South Kamloops	Intermediate	Kamloops
6	Upper Guichon	Low	Kamloops
31	Stump Lake	Intermediate	Kamloops
32	Lac Du Bois	High	Kamloops
7	Tranquille	Intermediate	Kamloops
8	Heffley	Intermediate	Kamloops
9	Campbell	Intermediate	Kamloops
10	Louis Creek	High	Kamloops
11	Barriere	Low	Kamloops
12	Adams Lake	Low	Kamloops/Clearwater
13	Lower Adams	Intermediate	Kamloops
14	Skull	Low	Kamloops
33	Dunn	High	Kamloops/Clearwater
15	Darfield	Intermediate	Kamloops
16	Bonaparte	Low	Kamloops
17	Nehalliston	Intermediate	Kamloops
18	Clearwater	Low	Clearwater
19	Vavenby	Low	Clearwater
20	Raft	Low	Clearwater
21	Mad	Low	Clearwater
22	Mica	Low	Clearwater
23	Cayenne	Intermediate	Clearwater
24	Tum Tum	Intermediate	Clearwater
25	Avola	Low	Clearwater
26	Thunder Blue	Low	Clearwater
27	Mud	Intermediate	Clearwater
28	Albreda	Low	Clearwater
29	Upper N. Thompson	Intermediate	Clearwater