Interpretive Bulletin
Planning Mountain Pine Beetle Response Operations

1.0 *Preamble*

This Interpretive Bulletin applies to the working forest land category on Alberta Public land (see *MPB Action Plan for Alberta, section 3.1*). Mountain pine beetle (MPB) poses a significant immediate and on-going threat to the pine forests of Alberta. Co-ordinated and effective forest management planning and operations are needed to control the current infestation and reduce the risk of future MPB infestations.

2.0 Area of Primary Concern

The area of primary concern is the Upper and Lower Foothills Natural Sub-regions as shown on Map 1. Regions of the province outside of this area will continue to be monitored for MPB activity but there are currently no plans to require additional strategies or tactics in these areas.

3.0 Levels of Importance/Urgency for MPB Management Strategies

The first three objectives in the MPB Action Plan describe strategies for addressing MPB, and each of these strategies have different levels of importance and urgency for implementation as follows:

i. **Control (Beetle) Strategy** *(Highly Important and Highly Urgent)*
When MPB infestations are detected, the goal is 100% control before the mature adults fly.

ii. **Prevention (Pine) Strategy** *(Highly Important and Very Urgent)*
The objective is to modify the age class structure of pine forests to reduce the long-term susceptibility to MPB attack. The planning for prevention strategies is comprehensive and execution will take 5 to 20 years. It is very important to complete satisfactory planning throughout the area of primary concern by May 1, 2009.

iii. **Salvage Strategy** *(Very Important and Urgent)*
In the event there is a MPB outbreak in all or part of the area of primary concern that is not manageable with either the control or prevention strategies, salvage activities directed at maximizing the economic recovery within affected areas will be initiated.

4.0 Predictive Models

The stand susceptibility index (SSI) is a measure of a stand's capacity to produce beetles (i.e. new populations of MPB in the next year) in the event it is attacked, however it does not serve as an indicator of the probability that the stand will be attacked. The index will be used to set priorities for MPB control and prevention activities. Alberta's basic assumption is that all pine is susceptible to MPB infestation and is under serious threat.

The Canadian Forest Service Shore/Safranyik Stand Susceptibility Index (SSI) Model has been adapted by Forest Management Branch (FMB) for use with Alberta Vegetation Inventory (AVI) data. This adaptation of the model (Alberta Stand Susceptibility Index, ASSI) is available from FMB upon request. The susceptibility index for a given stand is based on four variables: relative abundance of susceptible pine basal area in the stand, age of dominant and co-dominant live pine, density of the stand, and the climatic suitability of the stand.

Stand susceptibility index (SSI) is calculated using the following formula:

SSI = P x A x D x CF

where:

P = percentage of susceptible pine basal area
A = age factor
D = density factor
CF = climatic factor

The SSI value without Climatic Factor (SSI) identifies susceptible stands based exclusively on stand characteristics and in conjunction with the climatic factor will be used to prioritize MPB control and prevention activities. In addition, compartments will be prioritized based on the anticipated risk of infestation (see Table 1).

Credible use of current MPB susceptibility models is essential. The model outputs will rank MPB susceptible stands, however, pragmatic logistical considerations (e.g. economics, use of wood, debris disposal, access) will affect harvest plans and schedules.

5.0 Control (Beetle) Strategy

If MPB is present Alberta will authorize one of two levels of treatment as described in the Action Plan as follows:

i. Level I – single tree treatments
ii. Level II – stand level treatments

Level I treatments will be executed by the Forestry Division; Level II treatments will be executed by the forest industry, pursuant to approvals by the Area Manager. Generally, infestations on the active landbase (see *Alberta Forest Management Planning Standard, Annex 1, section 3.2*) will be addressed using Level II treatments, except where special habitat considerations may require use of Level I treatments. Generally, infestations on the passive landbase will be addressed using Level I treatments. Logistical issues will be resolved annually through the operational planning process.

6.0 Criteria for Implementing Level II Treatments

If any level of active MPB infestations are confirmed by a FHO or Regulated Forestry Professional (RFP), Level II treatments should be engaged, subject to the resolution of pragmatic logistical issues for the upcoming operating year.

Key operating strategies will be:

i. Harvest complete stands – experience elsewhere has shown multiple entries has been ineffective and inefficient.
ii. Utilized timber will be AAC chargeable.
iii. Surveys acceptable to the Forestry Manager are required to determine the extent of the infestation:
    a. To resolve the extent of the Level II treatment
    b. To determine the eligibility for dues relief.
    c. To address residue management
iv. Treatments should be completed before adult MPB fly.
v. Operations will follow the Ground Rules Addendum for Mountain Pine Beetle.
vi. All pheromone use must be approved by the Forestry Manager.

7.0 Prevention (Pine) Strategy

Alberta's goal is to alter the current age-class structure of susceptible pine forests to increase their long-term resistance to MPB infestations. This Pine Strategy requires that Forest Management Plans (FMP) be prepared/amended to address this issue.

Key targets for these Pine Strategy FMPs are:

i. New or amended Pine Strategy FMPs must be completed by May 1, 2009.
ii. The goal is to reduce the area of susceptible pine stands in the Rank 1 and Rank 2 categories in the Sustained Yield Unit (SYU) to 25% of that projected in the currently approved FMP at a point twenty years into the future.

The 25% target may not be attainable if the forecast effects on other resource values or other stakeholders is too significant. However, given the high impacts of a MPB outbreak, Alberta is prepared to accept increased impacts on other resource values/stakeholders to reduce the risk of an outbreak.

Pine Strategy FMPs may have significant impacts on resource values and stakeholders in the FMA/FMU. Consequently it is necessary to follow the planning processes described in the *Alberta Forest Management Planning Standard* for new plans, or as described in this interpretive bulletin for amendments. Although expediency is needed, planning activities must be thorough and diligent while not creating unnecessary extra work

To fully appreciate the range of potential future forest conditions, each Pine Strategy FMP shall compare key outcomes (see section 8.1 below) in three management scenarios,

i. The current approved FMP;
ii. The proposed Pine Strategy FMP; and
iii. The MPB Outbreak. Alberta will provide guidance for model inputs for this scenario.

8.0 Amendments to Approved FMPs

Amendments are expected where new FMPs are not scheduled to be completed prior to May 1, 2009. An amended FMP uses many of the same inputs and assumptions as the approved FMP (i.e. net landbase, yield projections, regeneration transitions), however, generates modified AACs, flow regimes or spatial harvest sequences to implement pine management strategies.

Each FMP amendment submission shall fully document any changes to inputs and assumptions that were used in the approved FMP.

8.1 FMP Amendment Submission Requirements

Companies shall describe how the amendment affects the requirements of the *Forest Management Planning Standard, Annex 1, standard 5.6i, (a – e).*

Guidelines to address this standard are as follows:

a) Alberta recognizes that significant changes to approved harvest sequences will be necessary to reduce the susceptibility of pine forests to MPB attacks. It is essential to create an acceptable spatial harvest sequence to implement the Pine Strategy, however it is recognized that Level II

activities will take priority in the approved harvest sequence (*see Forest Management Planning Standard, Annex I, section 5.7*).

b) Changes to forestry access development may be the most environmentally significant result of implementing Pine Strategies. As much as possible, new roads shall be approved in an access management (corridor) plan. In the event that new roads are not addressed in an approved access plan, they shall be built to the minimum practical standard and left open for the shortest possible time.

c) Tactics to address habitat requirements for species of special management concern are discussed in section 9.0 below.

d) Alberta will accept substantial modifications to the FMP projected targets for age-class, opening size and cover type distribution in order to reduce pine forest susceptibility to MPB attacks.

e) It is anticipated that MPB response planning will contribute to reducing wildfire threat. Further modeling for wildfire threat is not required.

9.0 Habitat Considerations for Species of Special Concern

The urgency of planning MPB control and prevention must give due consideration to the impacts these measures may have on other values. Habitat considerations for species of special concern must be assessed and managed appropriately throughout the MPB priority area.

9.1 Woodland Caribou Habitat

Woodland Caribou in Alberta are designated as 'threatened' under the *Alberta Wildlife Act* (1991). Population levels and distribution of Woodland Caribou in Alberta have been reduced, but the number of caribou in the province remains largely unknown. The Woodland Caribou's primary winter food source is lichen and this is largely responsible for its preference for mature to old forests. Such forests are very susceptible to MPB attack. In order to protect such habitat, it is necessary to aggressively manage pine stands and any MPB infestations that appear. If MPB are found within a caribou zone, prompt action with minimal disturbance will be undertaken. Any existing policies regarding timing of entry, season of operation, access management or harvest area configuration will be adopted unless they conflict with the need to manage MPB.

9.2 Grizzly Bear Habitat

Report on grizzly bear impacts using the most current knowledge available.

9.3 Trumpeter Swan Breeding Habitat

Trumpeter Swans breed on lakes, beaver ponds and marshes. Human activity in breeding areas may decrease survival of eggs or cygnets. MPB control operations within identified Trumpeter Swan breeding areas will:

i. Strive to avoid activities between April 1 and September 30.

ii. Avoid direct flights over identified lakes or water bodies unless it is imperative to land survey or control crews.

iii. Rely primarily on Level I treatments within 200 meters of high water marks.

9.4 Riparian Areas

Riparian areas are defined as land within the buffer area as defined in the Timber Harvest Planning and Operating Ground Rules applicable to the area. If MPB are detected in riparian areas, Level I tactics will be used whenever possible to treat all infested trees before the population has a chance to grow and infest more trees. In the event that Level I resources are not available, harvests will be conducted to control the infestation. At all response levels adhering to the following principles will minimize the impact to the riparian area:

i. Harvesting will be done in a manner that will minimize the potential for soil erosion and soil damage.

ii. Soil, logging debris or deleterious materials shall not be deposited into the water or onto the ice of any watercourse or water body during road construction, harvest, reclamation or reforestation operations. Such material unavoidably deposited onto the ice surface must be removed immediately.

iii. Operations will be completed as quickly as possible.

9.5 Whitebark and Limber Pine Stands

Whitebark and limber pine are suitable hosts for MPB. These tree species are rare in Alberta and management of MPB in these stands requires special attention. MPB will be managed in limber and whitebark pine stands in a manner that strives to maintain the integrity of the stand. Non-infested trees will not be harvested. If a stand is infested, only the infested trees may be harvested. If pheromone baits are to be used in the control plan, baits will not be placed on whitebark or limber pines. The “peel bark standing” technique will be used to save any trees with strip attacks.

10.0 Operating Ground Rules

A ground rule amendment template for MPB control activities is available at: http://www.srd.gov.ab.ca/forests/fmd/manuals/index.html. Each set of ground rules will be addressed individually.

11.0 MPB Infested Timber and Residue Management

Protocols for transporting attacked timber, scaling, manufacturing, residue management and stump treatments will be published periodically by Alberta.

12.0 Reconciliation Volumes

In the event that un-even flow harvests are proposed, additional reconciliation volumes will not be approved.

13.0 Reforestation

Reforestation of areas harvested is required as per the *Alberta Regeneration Survey Manual*. Reforestation liability rests with the forest industry operator as in any normally scheduled and harvested area.

Stand conversions to non-pine species is not a requirement. Regenerating pine forests have documented low susceptibility to MPB infestation, except in cases of extreme population levels.

14.0 Annual Allowable Cut Sharing

Changes to annual allowable cuts will be shared in proportion to timber allocations for all operators affected by the harvest re-planning. The process for making adjustments to harvest levels is described in the *Alberta Forest Management Planning Standard, Annex 1, Appendix A.*

15.0 Public Review of Plans

The forest industry will provide meaningful opportunities for the public and stakeholders to review and comment on MPB plans. This will be accomplished through an approved public involvement process in each FMA/FMU that meets the requirements of the *Alberta Forest Management Planning Standard*.

16.0 Approvals

Amendments shall be RFP validated and submitted to the Senior Manager, Forest Planning Section for department review and approval. The timelines for development, review and approval will be detailed in the ToR.

The Area Manager and the Senior Manager, Forest Planning Section will comprise the Approval Review Committee (ARC) and jointly chair the PDT. The ARC will resolve current and outstanding issues from the PDT, and shall monitor the progress of the PDT. The ARC shall review completed MPB proposals (plans) and provide approval recommendations to the Executive Director, Forest Management Branch.

Plan Development Teams (PDT) for amendments will provide technical advice to the Company during the development of the Pine Strategy FMP. Resource management issues will be resolved without undue delay. The PDT will be comprised of the FMA representative, Provincial Pine Beetle Coordinator, Forestry Program, and Fish and Wildlife Program leads for the Area, and the Forest Management Branch Planning Forester.

17.0 Susceptibility Rating and Priority Setting in the Pine Strategy

17.1 Pine Rating[1]

Definition: The physical characteristics of the stand, without considering the climate, or location of the particular stand.

The Pine Rating is a factor of the percentage of susceptible pine basal area, stand age, and a stand density factor. All stands are rated between 0 and 100 where stands rated as 100 having conditions most conducive for MPB brood development. It is a relative measure of the attributes of the stand and its suitability as MPB habitat without considering the location of the stand or the climate the stand experiences. It is derived from the formula described in "Susceptibility and risk rating systems for the mountain pine beetle in lodgepole pine stands. 1992". The following formula is used to calculate the Pine Rating:

Pine Rating = Stand Age Factor x Stand Density Factor x Percentage of susceptible pine

[1] The Pine Rating is fixed for each AVI polygon and is calculated using the MPB stand susceptibility module in ASSI.

17.2 Climate Factor[2]

Definition: The climate factor ranks the potential for successful MPB development. Any sites that are predicted to result in MPB producing one-generation per year are rated high to extreme.

The Climate Factor is a relative measure of the likelihood of MPB undergoing a one-generation per year life cycle. Higher ranked stands are those where MPB populations will grow rapidly if not controlled.

17.3 Compartment Risk

Definition: An assessment by the FHO of the probability that a compartment will be attacked based on existing MPB populations.

It is necessary to create an initial compartment ranking for Pine Strategy FMPs, however, depending on the spread of MPB in Alberta, the compartment risk rating may change annually and will affect the scheduling of operations. Control and prevention activities should be scheduled to address the highest risk compartments.

General criteria for risk assessment are as follows:

i. **High:** compartments adjacent to existing MPB populations or in the direct pathway of logical MPB corridors.

ii. **Moderate:** compartments that are not in the direct path of current MPB flight patterns, but are likely to experience MPB populations in the next 5-7 years.

iii. **Low:** compartments not expected to experience significant MPB pressure for the next 7 years or compartments that have already experienced a MPB outbreak and there is limited opportunity for prevention.

Table 1 presents a stand ranking system for Pine Strategy FMP planning and implementation.

[2] The Climate Factor is fixed for each AVI polygon and is calculated using the MPB stand susceptibility module in ASSI.

Table 1: Pine Stand Ranking

Climate Factor (per stand)						Compartment Risk
Very Suitable	1.0	Rank 1	Rank 1	Rank 1	Rank 1	High
		Rank 2	Rank 1	Rank 1	Rank 1	Moderate
		Rank 2	Rank 2	Rank 1	Rank 1	Low
Highly Suitable	0.8	Rank 1	Rank 1	Rank 1	Rank 1	High
		Rank 2	Rank 2	Rank 1	Rank 1	Moderate
		Rank 2	Rank 2	Rank 2	Rank 1	Low
Moderately Suitable	0.5	Rank 2	Rank 1	Rank 1	Rank 1	High
		Rank 2	Rank 2	Rank 2	Rank 1	Moderate
		Rank 3	Rank 2	Rank 2	Rank 2	Low
Low Suitability	0.2	Rank 2	Rank 1	Rank 1	Rank 1	High
		Rank 3	Rank 2	Rank 2	Rank 2	Moderate
		Rank 3	Rank 2	Rank 2	Rank 2	Low
Very Low Suitability	0.1	Rank 3	Rank 2	Rank 2	Rank 2	High
		Rank 3	Rank 3	Rank 2	Rank 2	Moderate
		Rank 3	Rank 3	Rank 3	Rank 3	Low
		0 to 30	**31to 50**	**51to 80**	**81to 100**	
		Pine Rating				

As previously described, the target of the Prevention Strategy is to reduce the area of Rank 1 and Rank 2 stands to 25% of that in the currently approved FMP at a point 20 years in the future. The ASSI will assign and climate and pine ratings to each AVI polygon to establish the target stands and area. By applying the ASSI companies can determine the area to be considered in developing the Pine Strategy FMP.

18.0 Pine Strategy Stand Ranking

The Forestry Manager, will convene meetings annually with the FHO and industry representatives to review risk ratings for each compartment and make adjustments as necessary based on current MPB surveys.

18.1 Rank 1 Stands

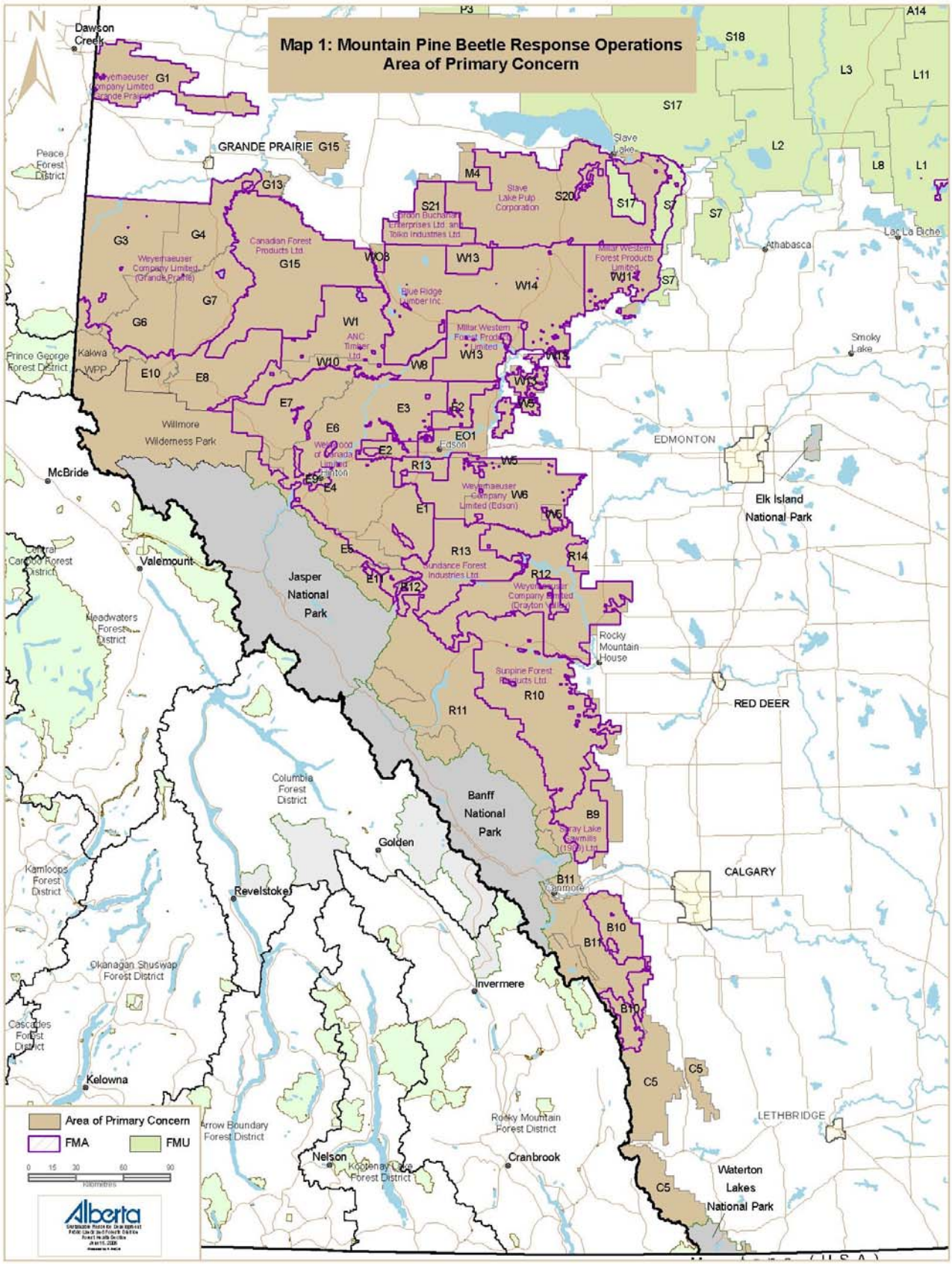
Rank 1 stands are the highest priority for susceptibility reduction. These stands provide the best habitat for MPB to produce brood and spread MPB to other stands. Rank 1 stands have the following general characteristics, comprised of large old pine, are close to existing MPB populations and/or are in areas that are very climatically suitable for beetle development.

18.2 Rank 2 Stands

Rank 2 stands are also important, but, because of their lower pine component, lower climate suitability, and/or greater distance from existing MPB populations, they are a lower priority.

18.3 Rank 3 Stands

Rank 3 stands can be attacked and MPB can survive in these stands. However, the brood produced from these areas, at least right now, is significantly lower than that produced in Rank 1 and Rank 2 stands.


Map 1: Mountain Pine Beetle Response Operations
Area of Primary Concern
Dawson Creek
GRANDE PRAIRIE G15
Peace Forest District
Prince George Forest District
Kakwa WPP
Willmore Wilderness Park
McBride
Valemount
Jasper National Park
Headwaters Forest District
Central Cariboo Forest District
Kamloops Forest District
Okanagan Shuswap Forest District
Cascades Forest District
Kelowna
Revelstoke
Golden
Columbia Forest District
Banff National Park
Invermere
Rocky Mountain Forest District
Cranbrook
Kootenay Lake Forest District
Nelson
Arrow Boundary Forest District
Slave Lake
Athabasca
Lac La Biche
Smoky Lake
EDMONTON
Elk Island National Park
Rocky Mountain House
RED DEER
CALGARY
LETHBRIDGE
Waterton Lakes National Park
Area of Primary Concern
FMA
FMU
Alberta