Consideration of Forest Management Values During Escaped Fire Priority Setting

Karl Peck

Senior Resource Analyst

Resource Analysis Section, Forest Management Branch

Forestry Division, Alberta Sustainable Resource Development

Government of Alberta ■

Sustainable Resource Development

October 6, 2010

Outline

- Forest Management Values
- Forest Management Policy Effects
- Evaluation of Fire Impacts
- Incorporation of Predicted Fire Perimeter
- Recommendation of Priority from a Forest Management Perspective

Government
of Alberta ■

Forest Management Values

- A Forest Management Plan is used to outline higher level objectives, sustainability and assumptions

- Selected management strategies reflect a balance of ecological, socio-economic and cultural values that will produce a desired future forest condition

  – Water (quality and quantity), caribou, grizzly bear, oil & gas, recreation, timber, grazing

    - What are the states of the values today

    - Where and how will they be met in the future

Alberta
Freedom To Create. Spirit To Achieve.

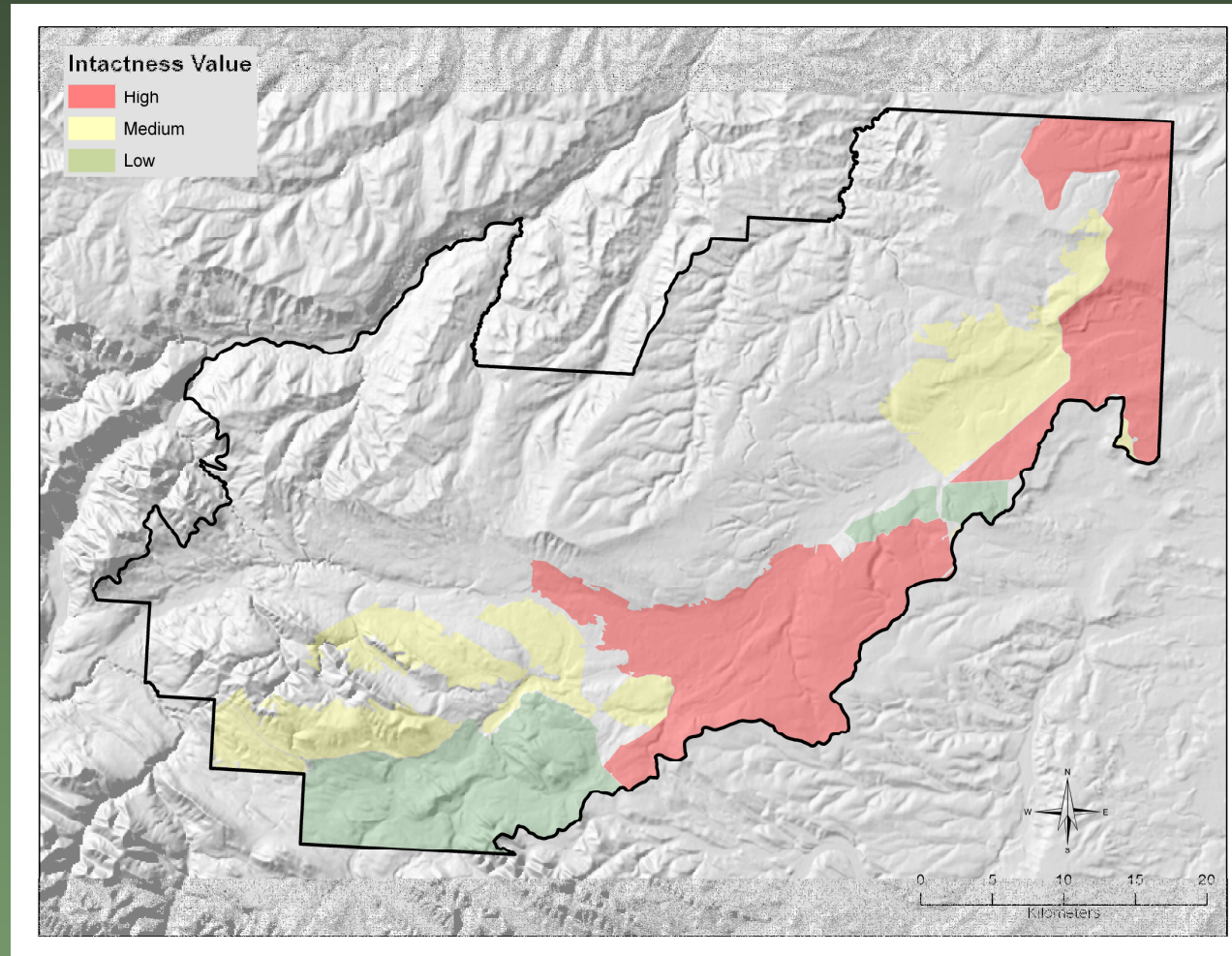**Government of Alberta** ■

FM Values and Models

- The desired future forest is a reflection of the values and the ways and means to achieve the balance of sustainable;
  - Harvest levels, biodiversity, habitat, ecological function and community prosperity
  - Essentially a "Social Licence" to conduct business
- A model is a strategic simplification of the "real world" that gives us insight and understanding into the significance of man and natural interactions on a landscape
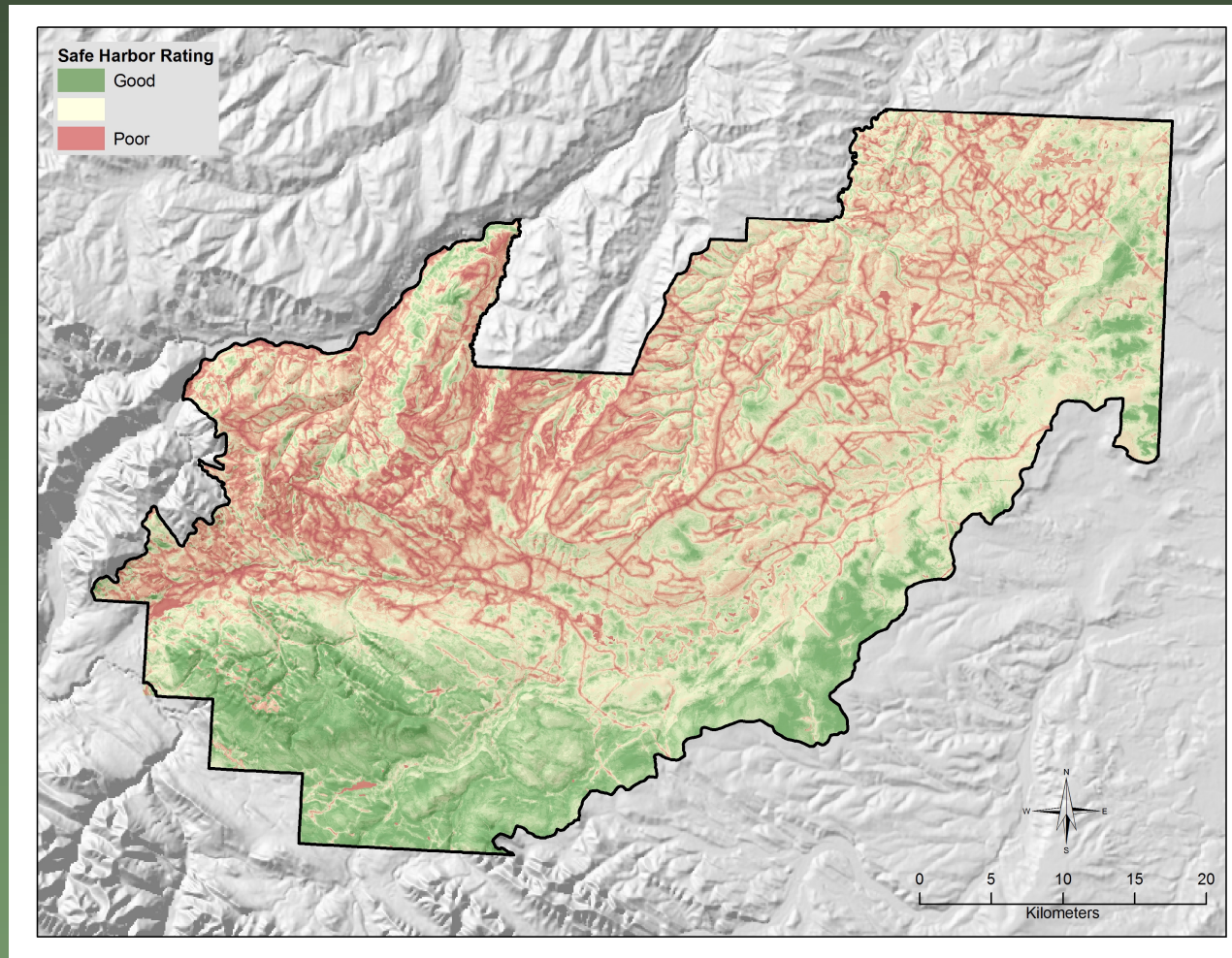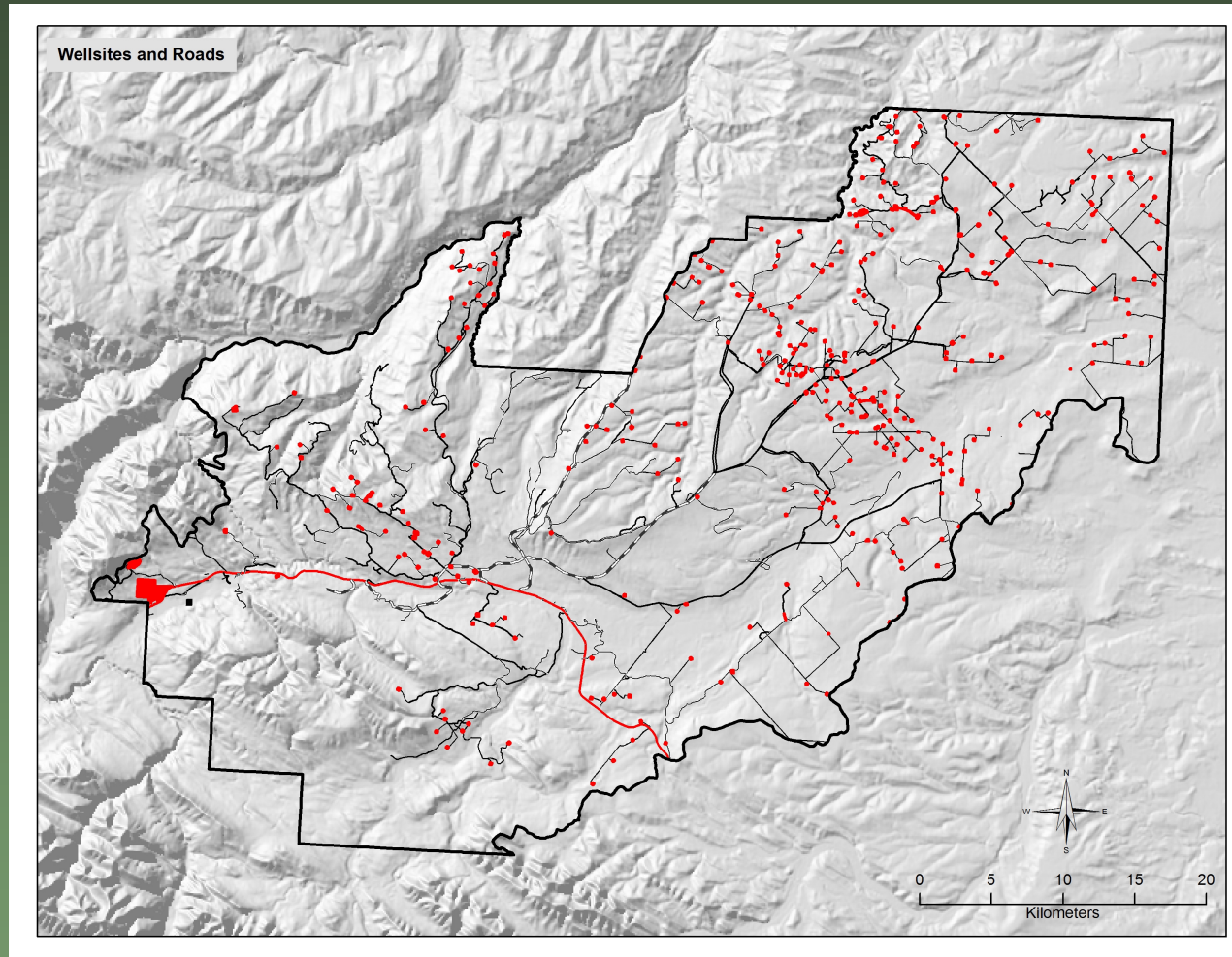
Alberta
Freedom To Create. Spirit To Achieve.

Government
of Alberta ■

Caribou Intactness Values
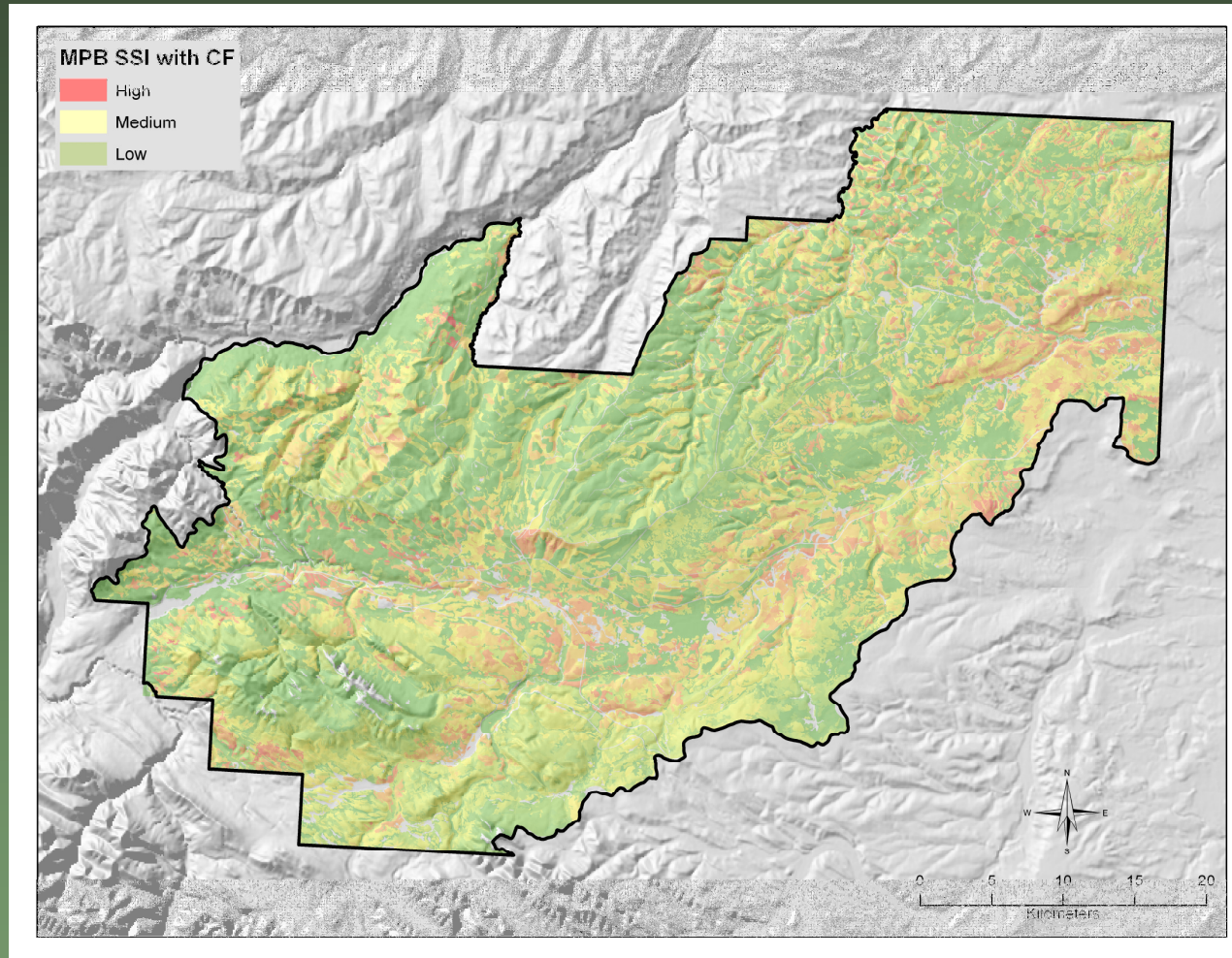
Grizzly Bear Safe Harbor

Wellsites and Roads

Wellsites and Roads

Timber Supply Landbase

Contributing Landbase
- Active Landbase
- Passive Landbase
- Water Features

Government of Alberta ■

Alberta

Freedom To Create. Spirit To Achieve.
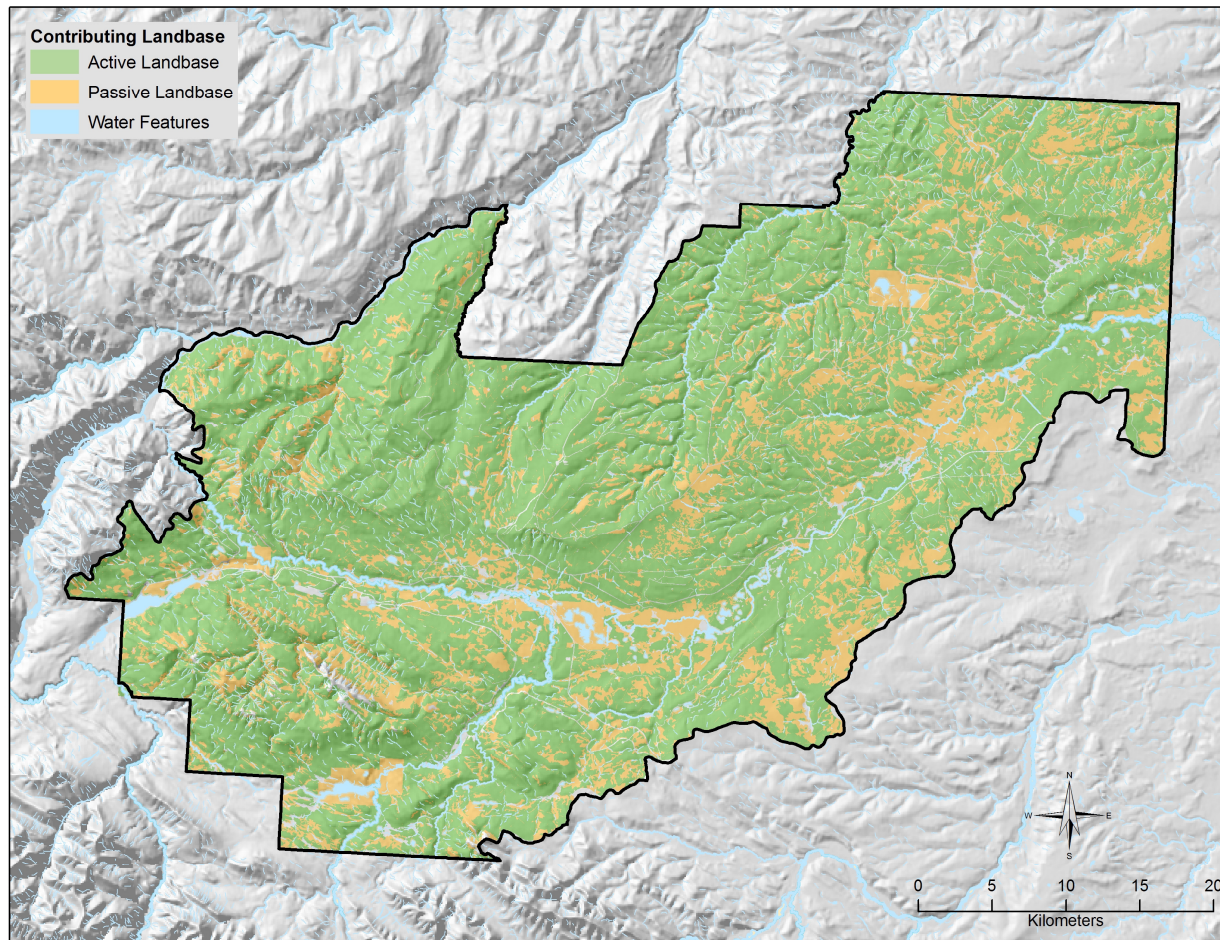
Mountain Pine Beetle Susceptibility

Wildfire Threat Rating

Fall Wildfire Threat Rating
- Extreme
- High
- Medium
- Low

Government of Alberta ■
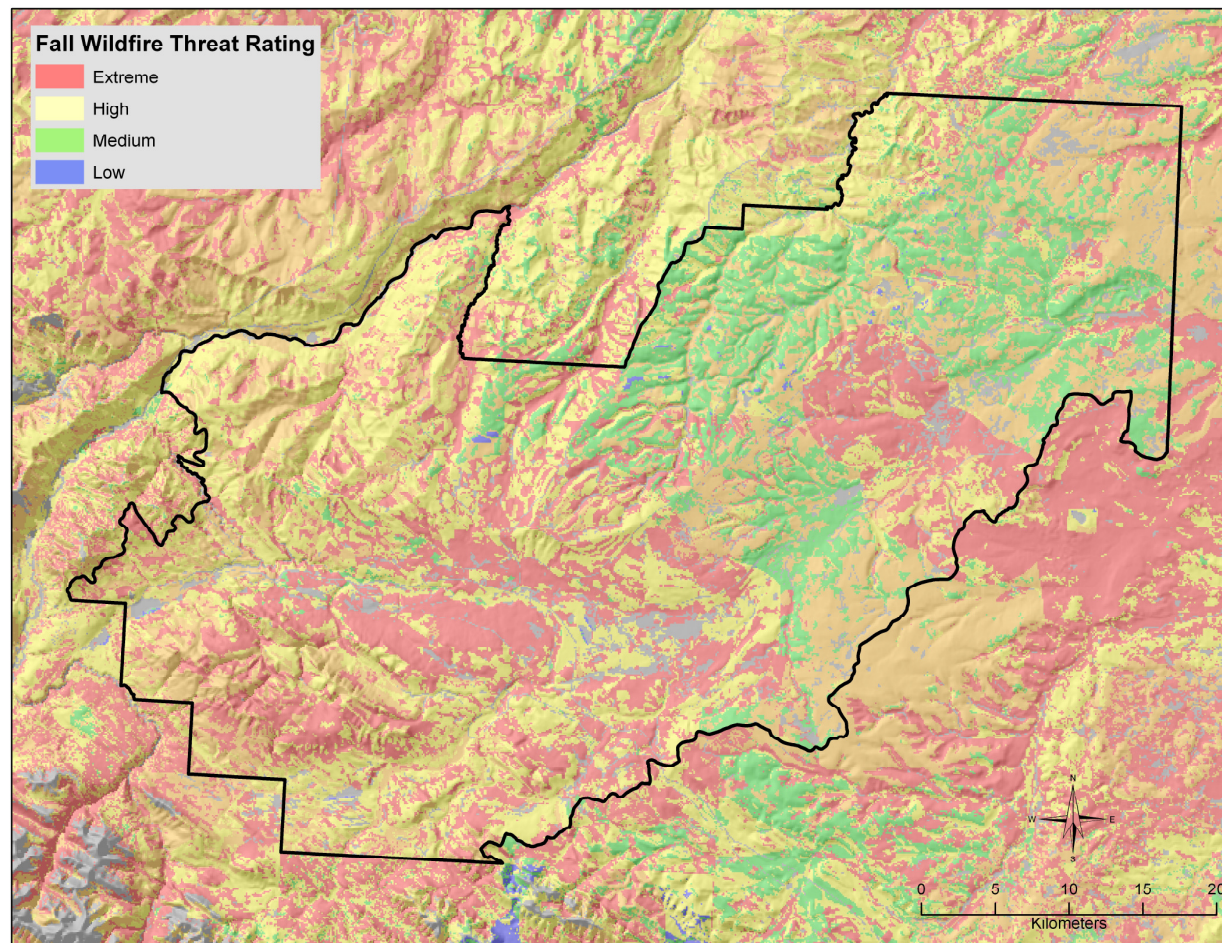
Alberta
Freedom To Create. Spirit To Achieve.
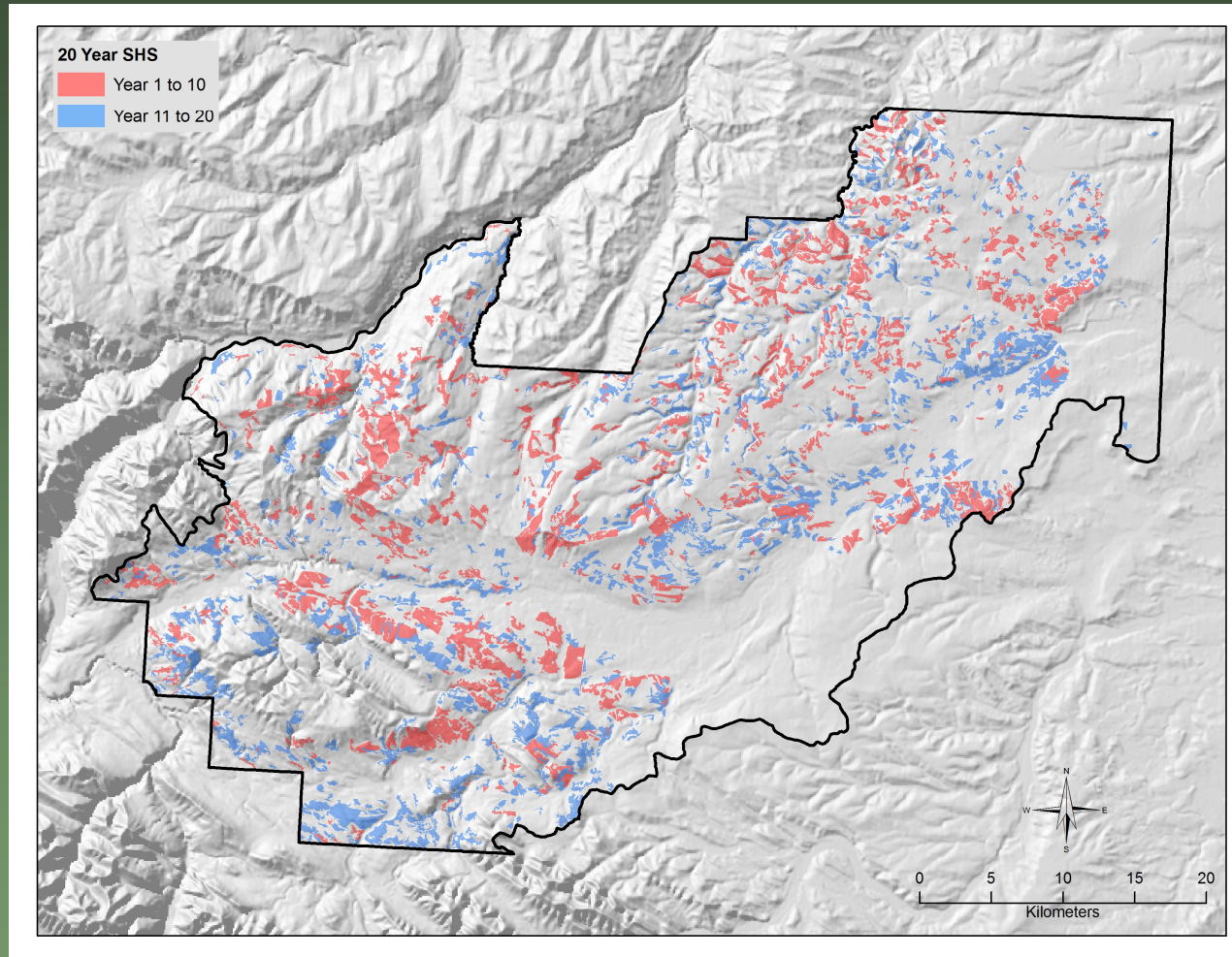
Alberta Flow Policy

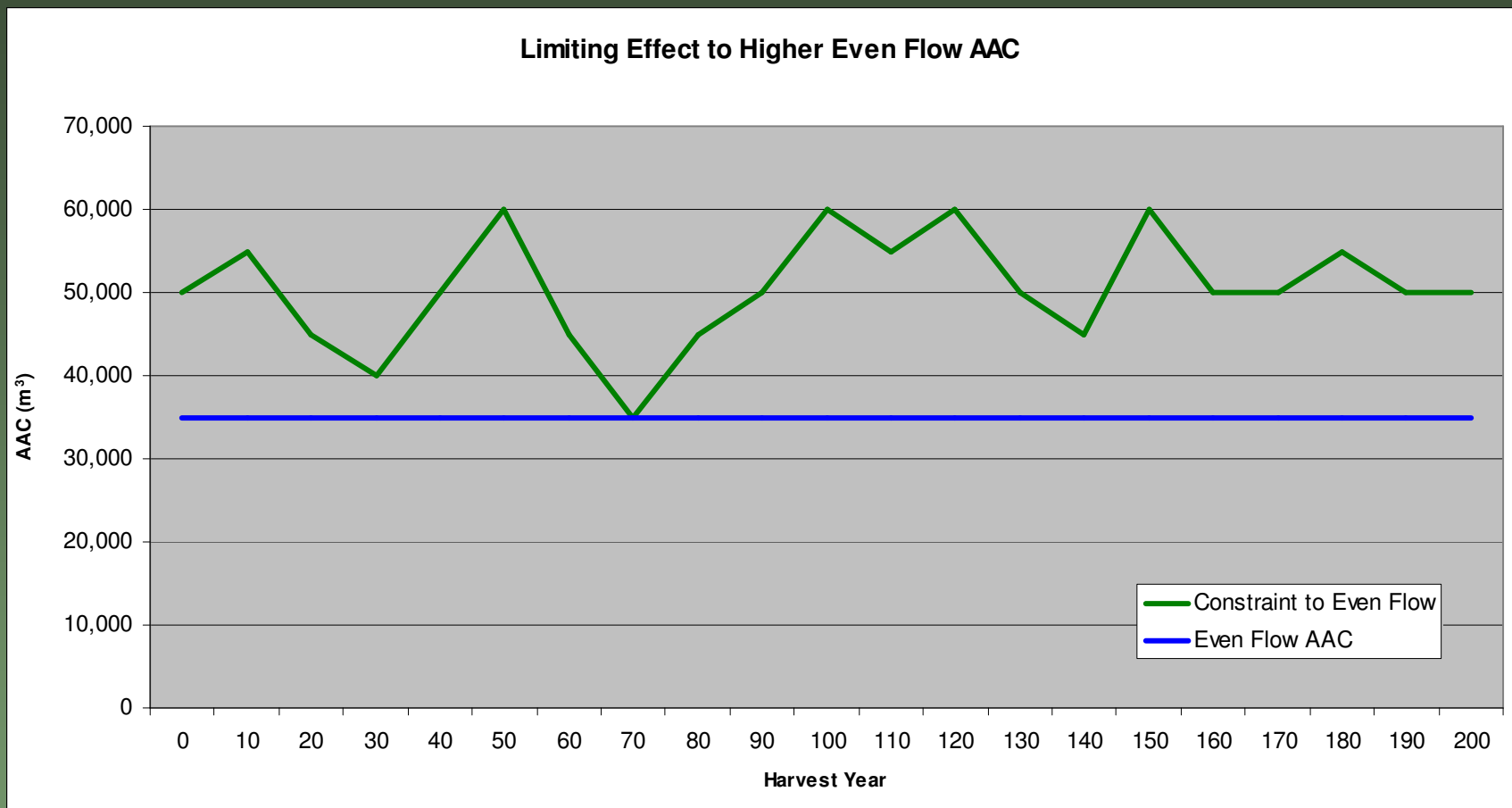- In most Alberta Forest Management Plans, the timber supply component is constrained to an even flow over a 200 year planning horizon.

  - This policy makes the Annual Allowable Cut (AAC) forecast sensitive/limited to the most constraining "bottleneck" of the current forest state

Limiting Effect to Higher Even Flow AAC

Landbase

- ## Net Landbase
  - Productive land contributing towards timber harvesting landbase
  - Excludes passive landbase (including potentially productive and non-productive lands), but the passive landbase is valuable in meeting other forest management objectives

- ## Under current policy when land is burned it is considered as potentially productive
  - Land is not re-classified as productive until it carries a productive forest vegetation type,
  - Or unless a company has accepted the legal obligation to reforest the salvaged or previously harvested sites

Alberta
Freedom To Create. Spirit To Achieve.

Government of Alberta ■

Landbase

- Land in transition - pot of potentially productive land that moves around on the landscape as land burns and subsequently revegetates into productive forested land

  – Periodic forest vegetation inventory updates will re-classify burnt over polygons into re-vegetated states/inventory attributes

Alberta
Freedom To Create. Spirit To Achieve.

Government of Alberta ■

Fire Loss

- Alberta's Policy is not to plan an annual fire loss, but to recalculate when catastrophic loss occurs, or through periodic re-planning exercises
  - Previously we calculated an annual loss (max 10%) as well as recalculating the AAC when catastrophic loss occurred - essentially a double accounting
    - Expert Panel recommendation 1990 to remove annual loss

Alberta

Freedom To Create. Spirit To Achieve.

Government of Alberta ■

Fire Loss

- Current Alberta policy is to evaluate AAC impact when,

  – 2.5% cumulative loss of the net landbase since the last planning exercise (typically within the 10 years of a forest management planning cycle)

  – Evaluated on a net area basis

Alberta
Freedom To Create. Spirit To Achieve.

Government of Alberta ■

Principles

- **General Principles**
  - A cubic meter burnt isn't a cubic meter of Annual Allowable Cut (AAC) lost, while a hectare burnt is not necessarily a hectare of habitat lost
  - Current forest state plays a large role in the impact of fire on the sustainable AAC and other management values
    - Age class distribution
      - Forest age structure, age class gaps
    - Net landbase
    - Growth & Yield of productive stands

Alberta
Freedom To Create. Spirit To Achieve.

Government of Alberta ■

Principles

- **General Principles (cont.)**
  - Fuels that will be consumed by fire will alter the current forest state
    - Productive land vs. potentially & non-productive land
    - Age classes in fire path
    - Critical age classes
    - Critical habitat
    - Critical watersheds

Alberta

Freedom To Create. Spirit To Achieve.
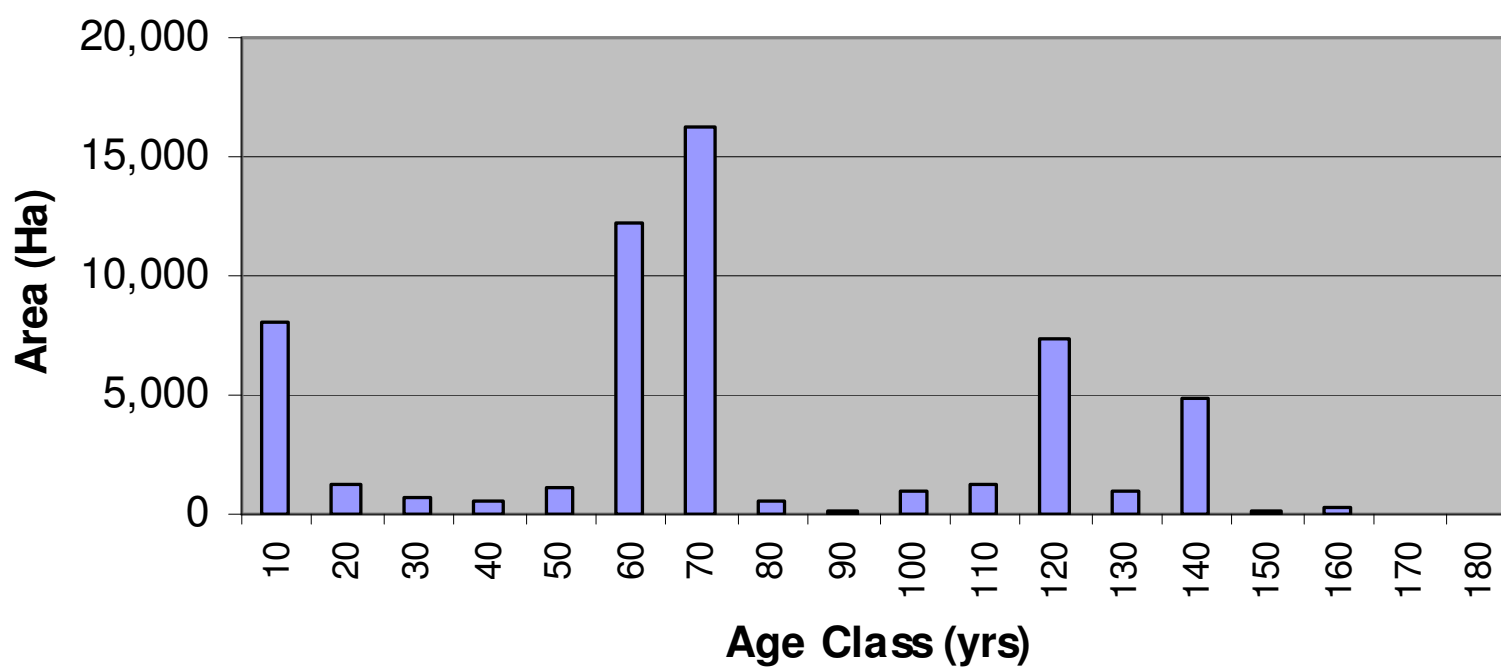
Government of Alberta ■

Fire Impact

- AAC impact occurs at the sustained yield unit level
  - Forest Management Agreement level
  - Forest Management Unit level
- Why Analyze?
  - Easy to visualize forest today
  - Difficult to visualize the future forest on spatial and temporal scales
  - Modelling allows us to have an insight into the effect of today's interactions on future forest states – evaluation of potential of, or risks to achieving objectives

Alberta
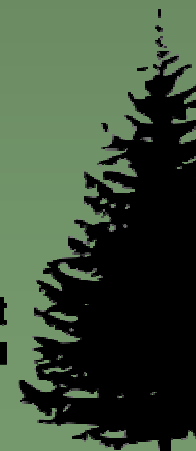
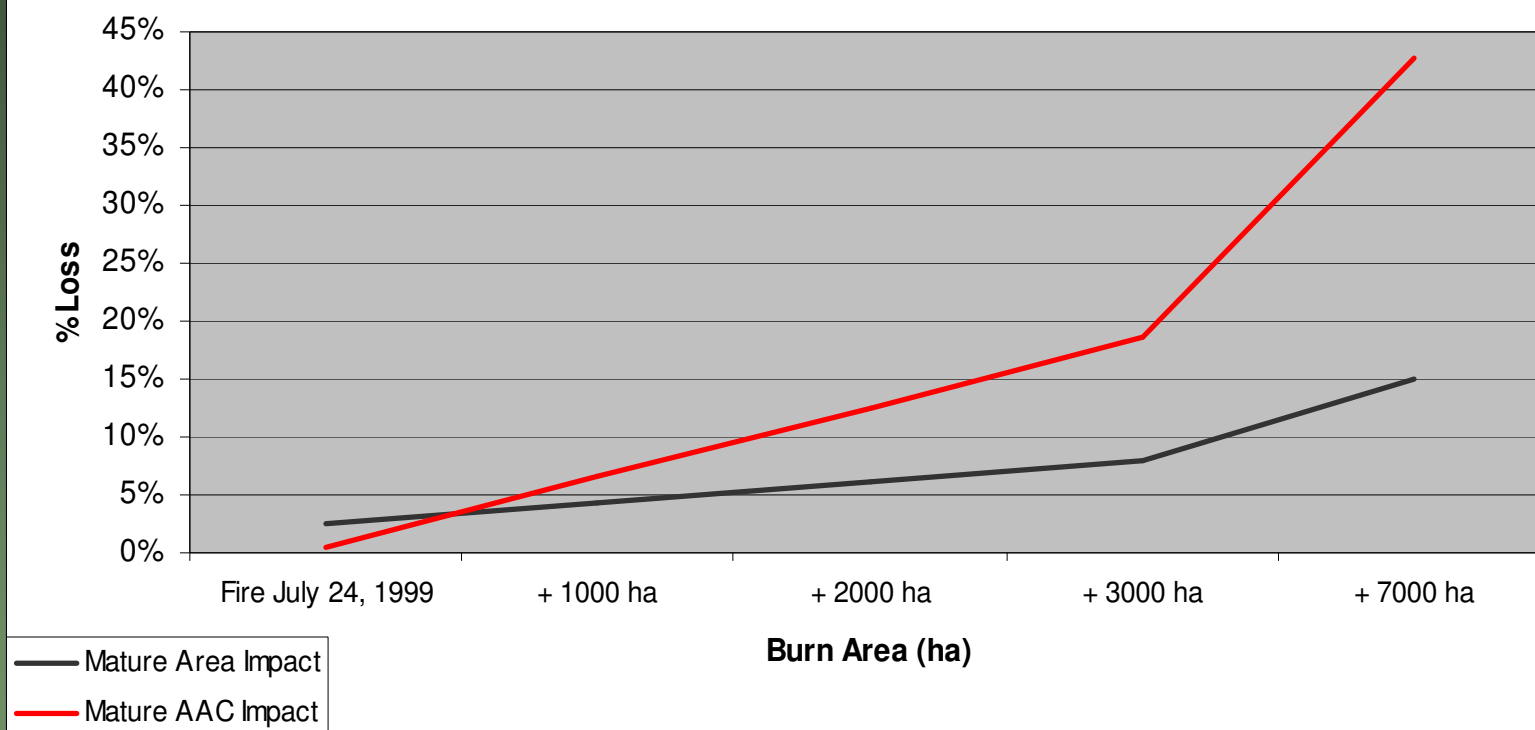Freedom To Create. Spirit To Achieve.

Government of Alberta ∎

**Conifer Age Class Distribution
Impact of E02-107-99 & E02-91-99**
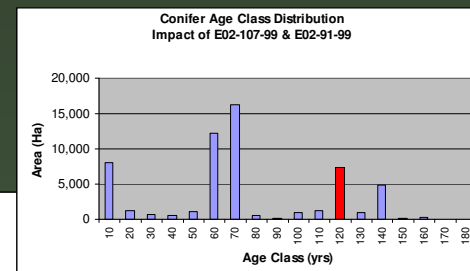
Conifer Age Class Distribution
Impact of E02-107-99 & E02-91-99

L1 Conifer AAC & Area Impact - 70 Year Age Class Burns

- Immature Area Impact
- Immature AAC Impact

Government
of Alberta ■

Alberta
Freedom To Create. Spirit To Achieve.
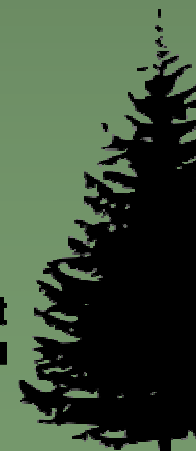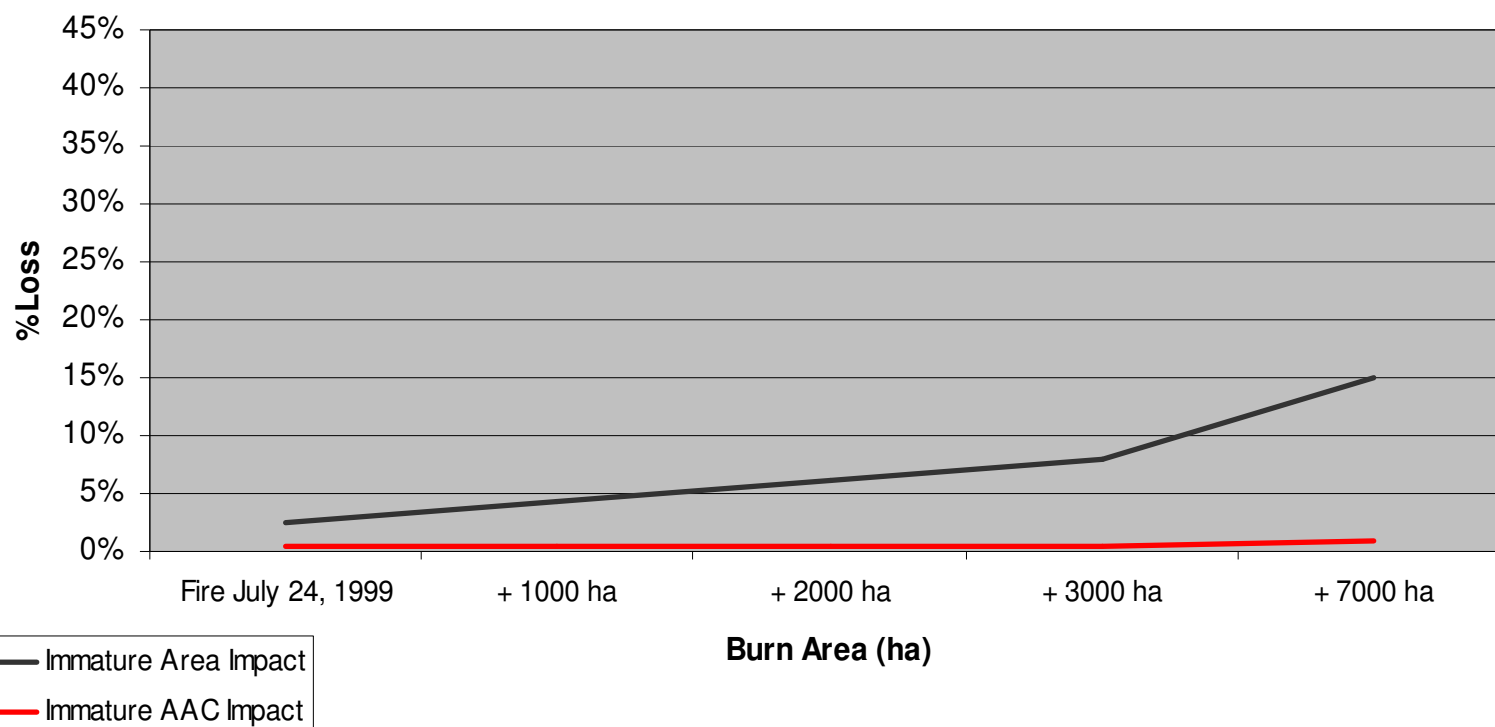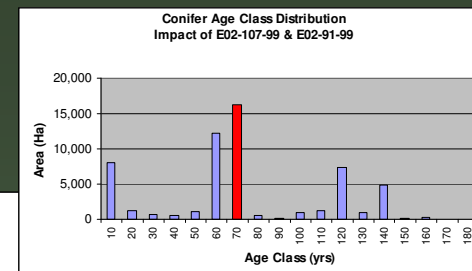
L1 Mature Net Conifer Landbase
Age Class Distribution

11 - 149.9
149.9 - 303.8
303.8 - 504.8
504.8 - 980
980 - 1596.4

E02-107-99
E02-091-99
E02-111-99

Alberta
Freedom To Create. Spirit To Achieve.

Government
of Alberta ■
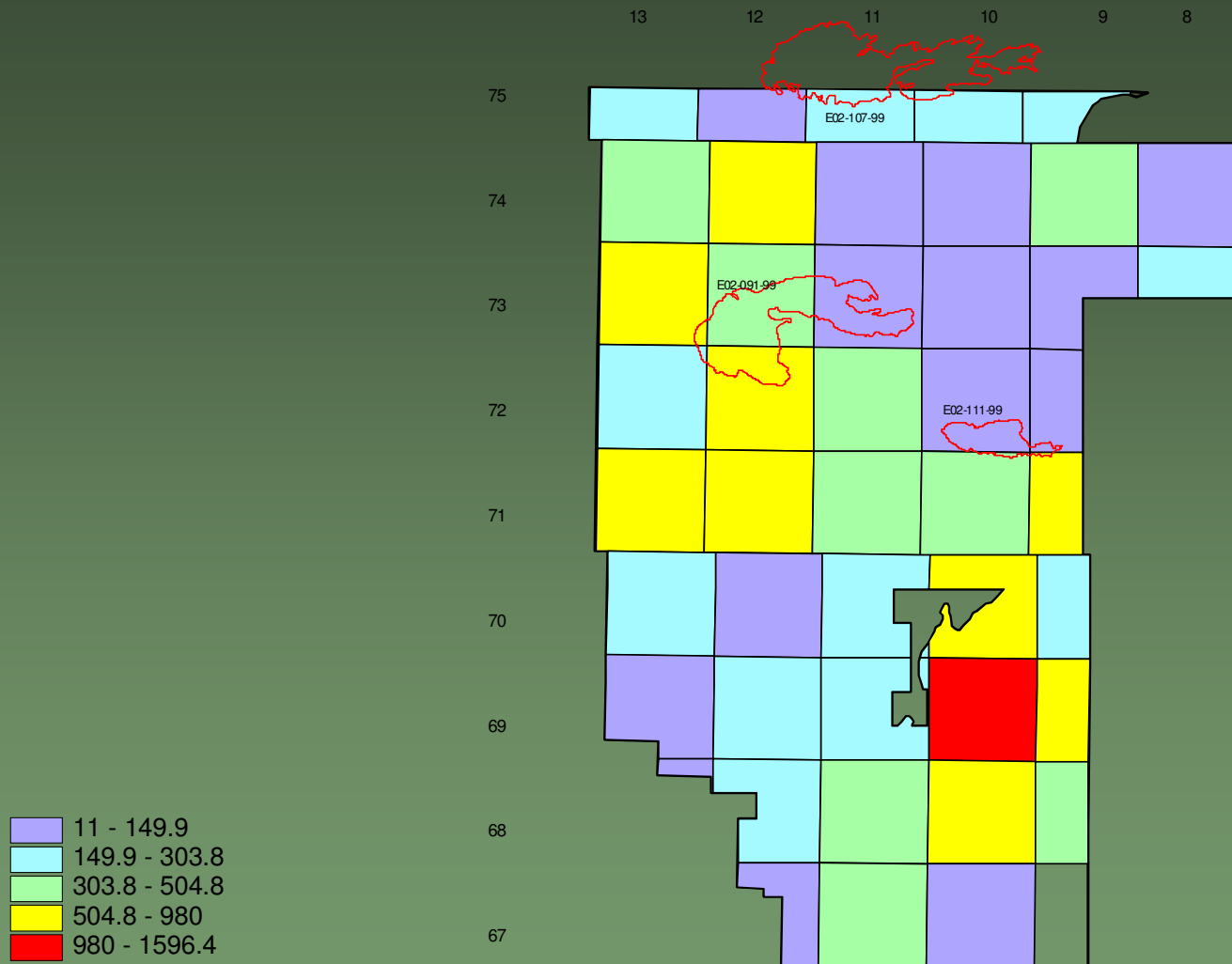
Inclusion of Fire Boundaries into Forest Management Models

- With existing forest management model formulations on hand, it becomes possible to fairly quickly incorporate predicted fire boundaries into a forest management landbase for impact analysis and assessment

- Predicted fire boundaries can be as simple as an on-screen, heads up digitized representation, or as sophisticated as a Prometheus modeled predicted fire progression series

[FBP Fuel: Scenario1] Project: zigzag16_27.fgm

[Component View] Project: zigzag16_27...

- ⊞ 🔥 FBP Fuel Types
- ▦ FBP Fuel Type Patches
- ⊞ ▦ Landscape Grids
- ▦ Weather Grids
- ▦ Weather Patches
- ⇄ Geographic Data
- ⊟ 🔥 Ignitions
  - 🌲 Ignition 1 (Polygon) (June 16, 2010 10:01)   ■
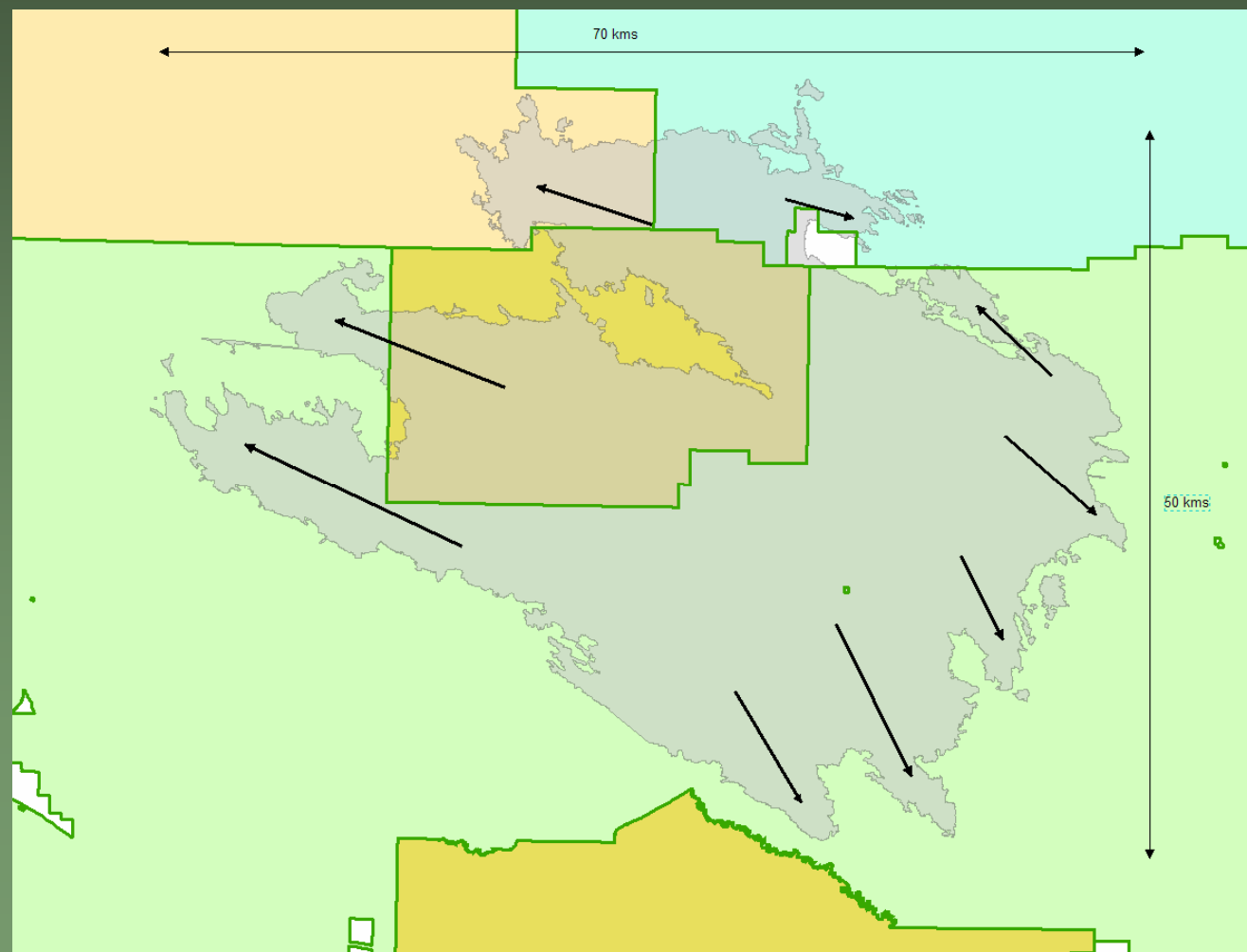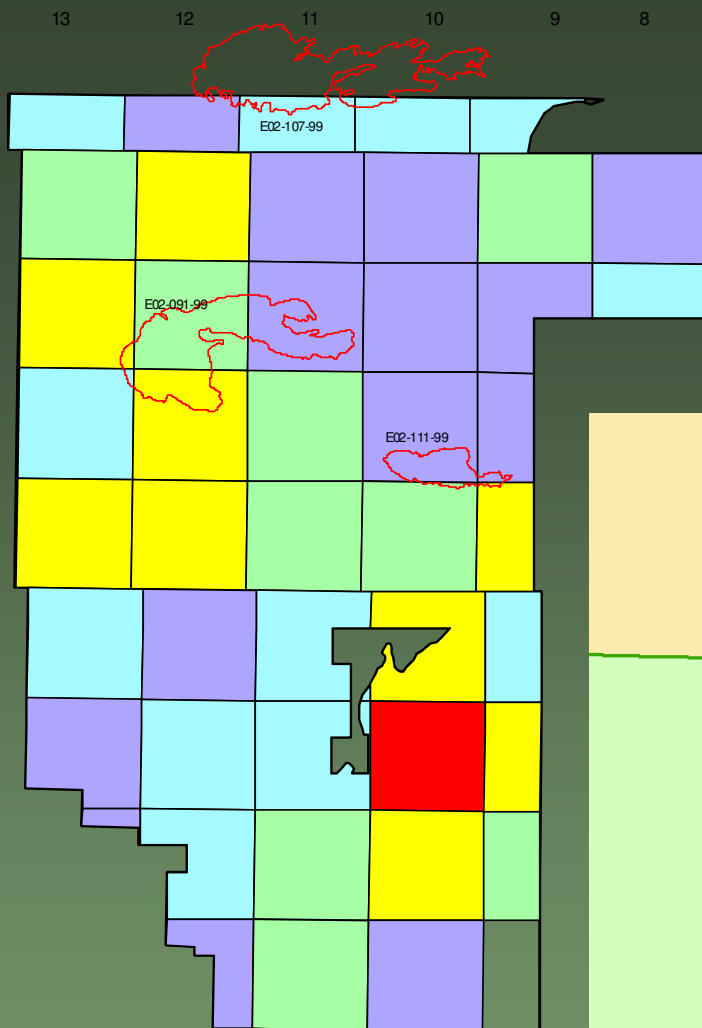 - 🌲 Ignition 2 (Polygon) (June 17, 2010 21:30)   ■
- ⊟ ✸ Weather Stations
  - ⊟ 🗇 Loon (57.144300°, 115.078900°)
    - 👒 Loon2 (June 16, 2010 - June 27, 2010) [Van Wagner]
- ⊟ 🔥 Scenarios
  - ⊟ 🔥 Scenario1 (June 16, 2010 09:59 - June 27, 2010 10:00)
    - 🌲 Ignition 2 (Polygon) (June 17, 2010 21:30)   ■
    - 👒 Loon2 [Loon] (June 16, 2010 - June 27, 2010) [Van Wagn

[Stats: Scenario1] Project: zigzag16_27.fgm

Time Step	Date and Time	Elapsed Time	Time to Completion	Temp (°C)	RH (%)	WD (°)	WS (km/h)	Precip (mm)	HFFMC	HISI	HFWI	tFFMC	tISI	tFWI	FFMC	DMC	DC	BUI	Time Step Area (ha)	Total Area (ha)	Active Perimeter (km)	Active Perimeter Growth Rate (km/h)	Perimeter (km)	Perimeter Rate (km
34	June 27, 2010 09:59:00	11 days 00:00:00	00:01:00	19.0	74.0	135	4.0	0.0	48.7	0.2	0.2	48.7	0.2	0.2	38.2	15.2	157.6	24.5	25.57	80436.00	134.57	0.00	2144.68	
35	June 27, 2010 10:00:00	11 days 00:01:00	00:00:00	21.0	65.0	135	7.0	0.0	51.7	0.3	0.3	51.7	0.3	0.3	38.2	15.2	157.6	24.5	0.11	80436.12	134.56	-0.54	2144.67	

FARSITE: Fire Area Simulator

File Input Output Model Simulate Attack View Help

LANDSCAPE: C:\FARSITE3\examples\chagoop...

42000

41000

40000

39000

38000

3000

4000

Elapsed Time

01 08:00

Current Time

07/17 23:00

Area Graph

80

64

48

32

16

Area (ha)

Topologic

Horizontal

6   12   18   24   30   36

Time (hrs)

Fire Characteristics Chart

33.5

27.9

22.4

16.8

11.2

5.6

Spread Rate (m/m)

5m

3m

2m

1m

3785   7570   11355   15141   18926   22711

Heat/Area (kJ/m2)

CHAGOOPA.LCP   CHAGOOPA.WTR   CHAGOOPA.WND   SIMULATION SUSPENDED   NULL MODE

Escaped Fire

- **Evaluate multiple fires**
  - Which fires have critical resources/age classes in their path? What's impact of changing forest structure
    - age class
    - vegetation composition

- **Single large fire**
  - Is one flank more critical than another based on forecasted fire growth?
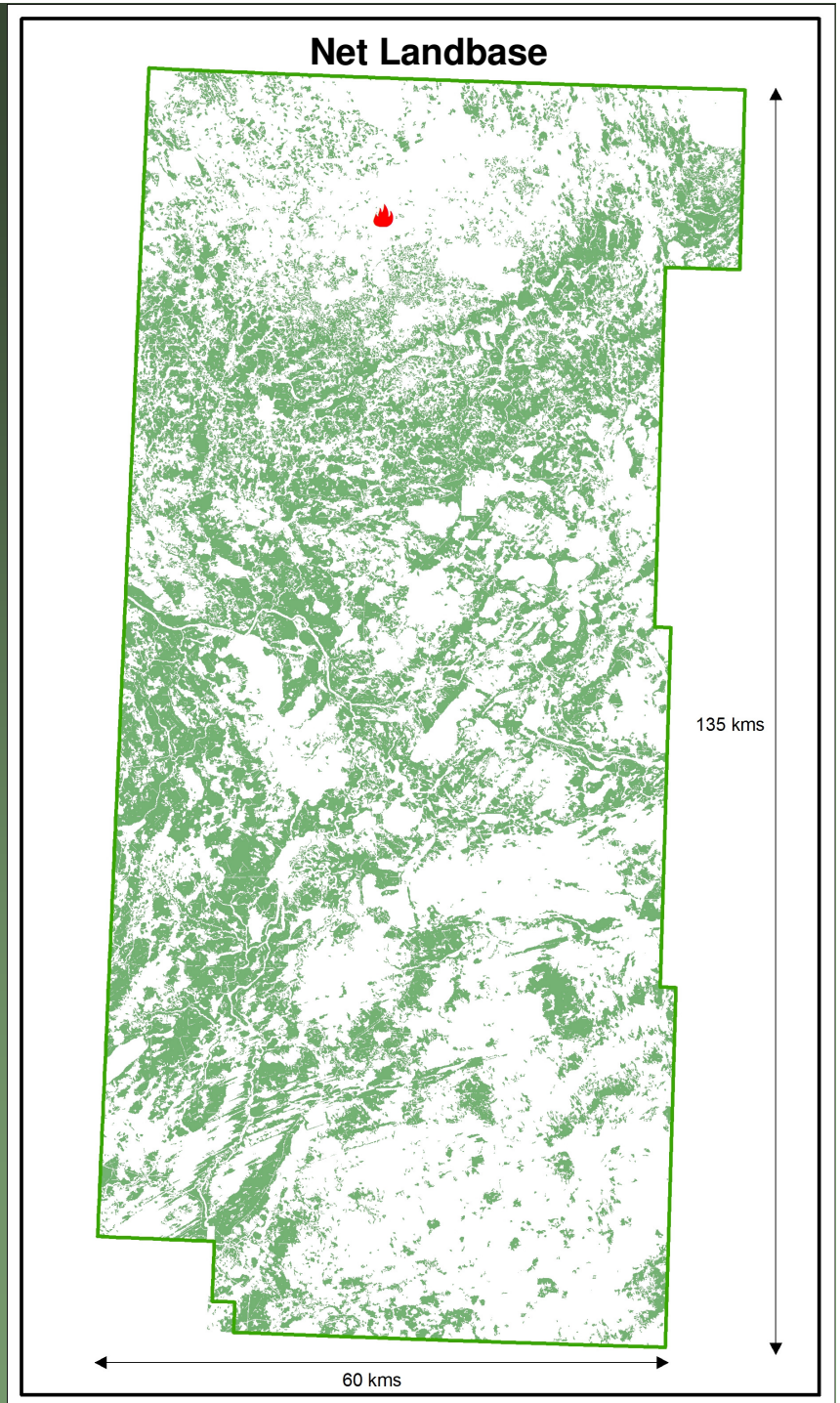 - Opportunities to steer fire into less critical forest components/age classes?

Alberta
Freedom To Create. Spirit To Achieve.

Government
of Alberta ■

Multiple Fires
and
Single Fire Evaluation

E02-107-99

E02-091-99

E02-111-99

13   12   11   10   9   8

70 kms

50 kms

Alberta
Freedom To Create. Spirit To Achieve.

Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
Zig Zag Fire Complex

Fire Assessment
June 15

Alberta
Freedom To Create. Spirit To Achieve.
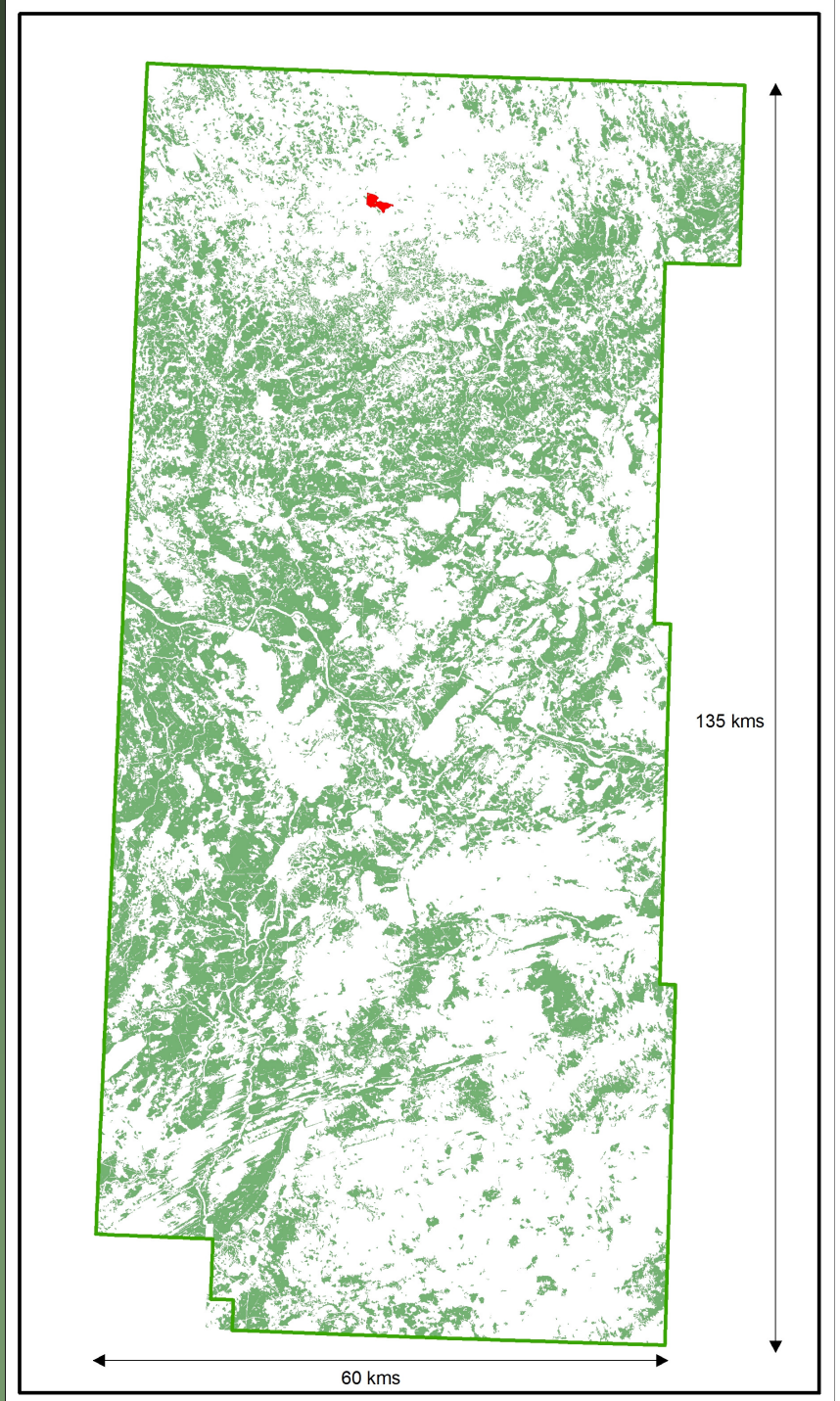
Net Landbase

135 kms

60 kms

Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
Zig Zag Fire Complex

June 16

Alberta
Freedom To Create. Spirit To Achieve.
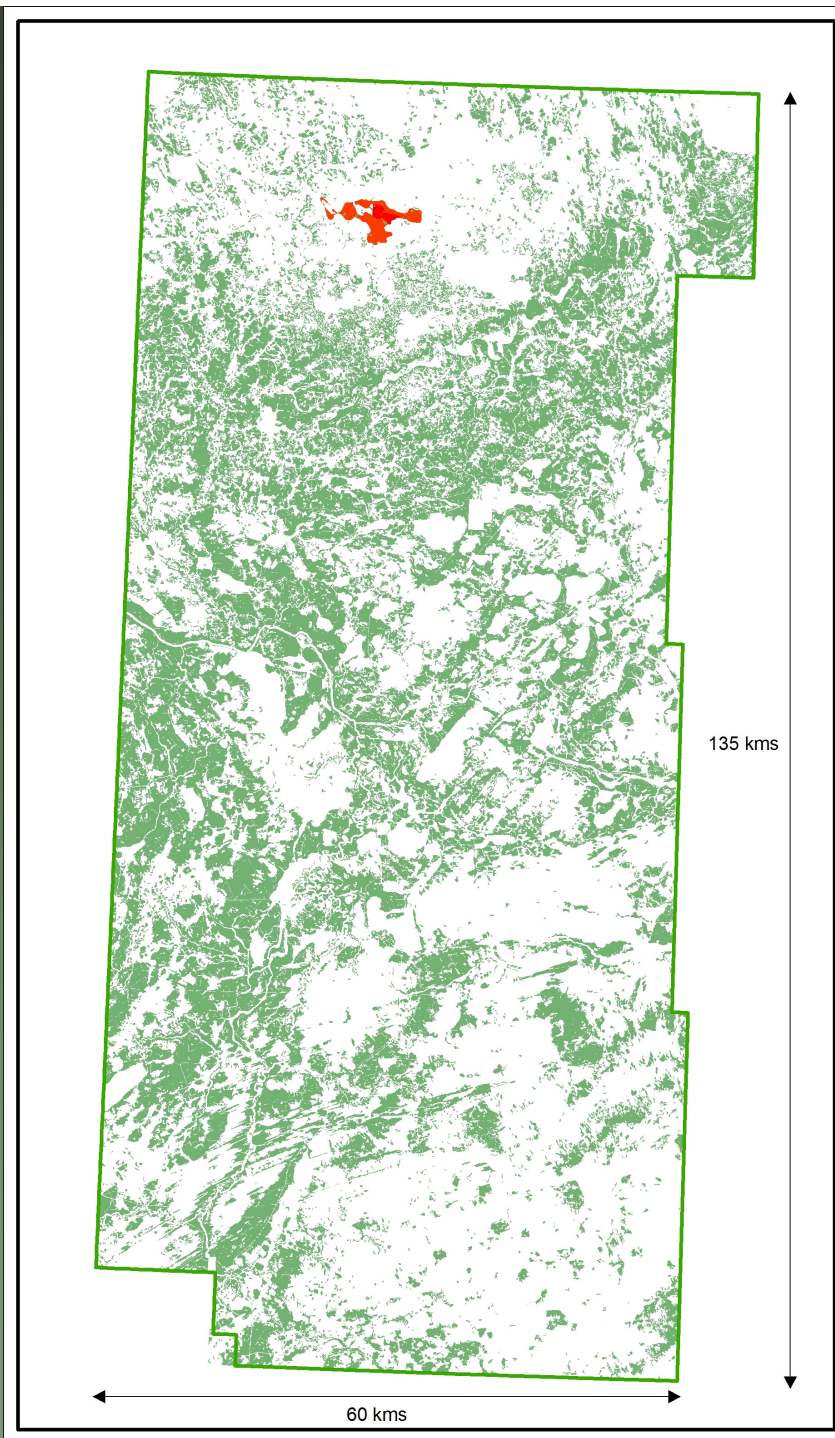
135 kms

60 kms

Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
Zig Zag Fire Complex

Alberta
Freedom To Create. Spirit To Achieve.

135 kms

60 kms

Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
Zig Zag Fire Complex

Alberta
Freedom To Create. Spirit To Achieve.

135 kms

60 kms

Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
Zig Zag Fire Complex

Alberta
Freedom To Create. Spirit To Achieve.

135 kms

60 kms

Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
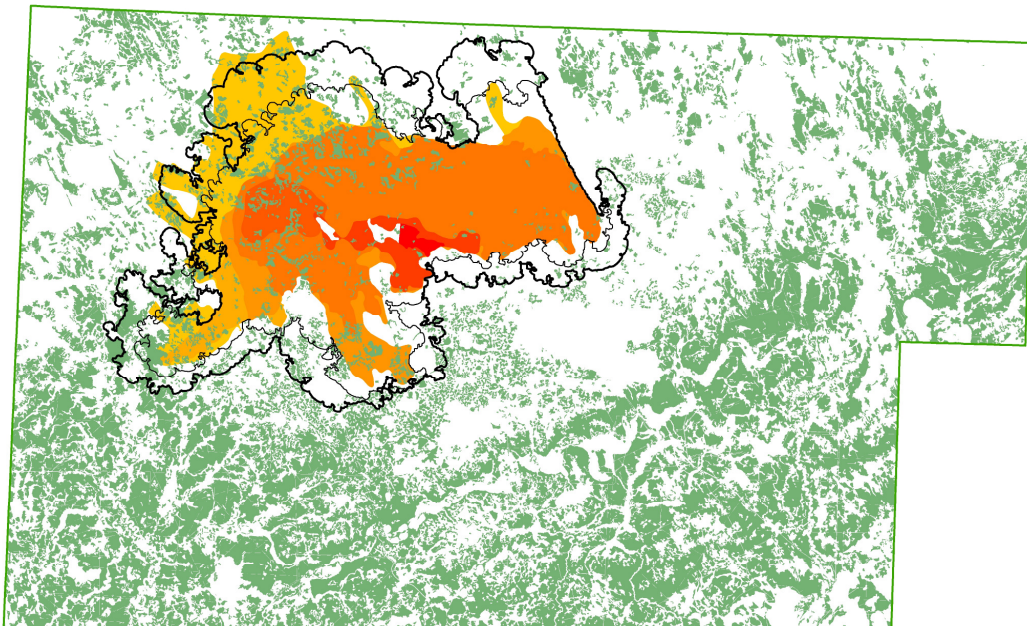**Zig Zag Fire Complex**

135 kms

60 kms

Alberta

Freedom To Create. Spirit To Achieve.
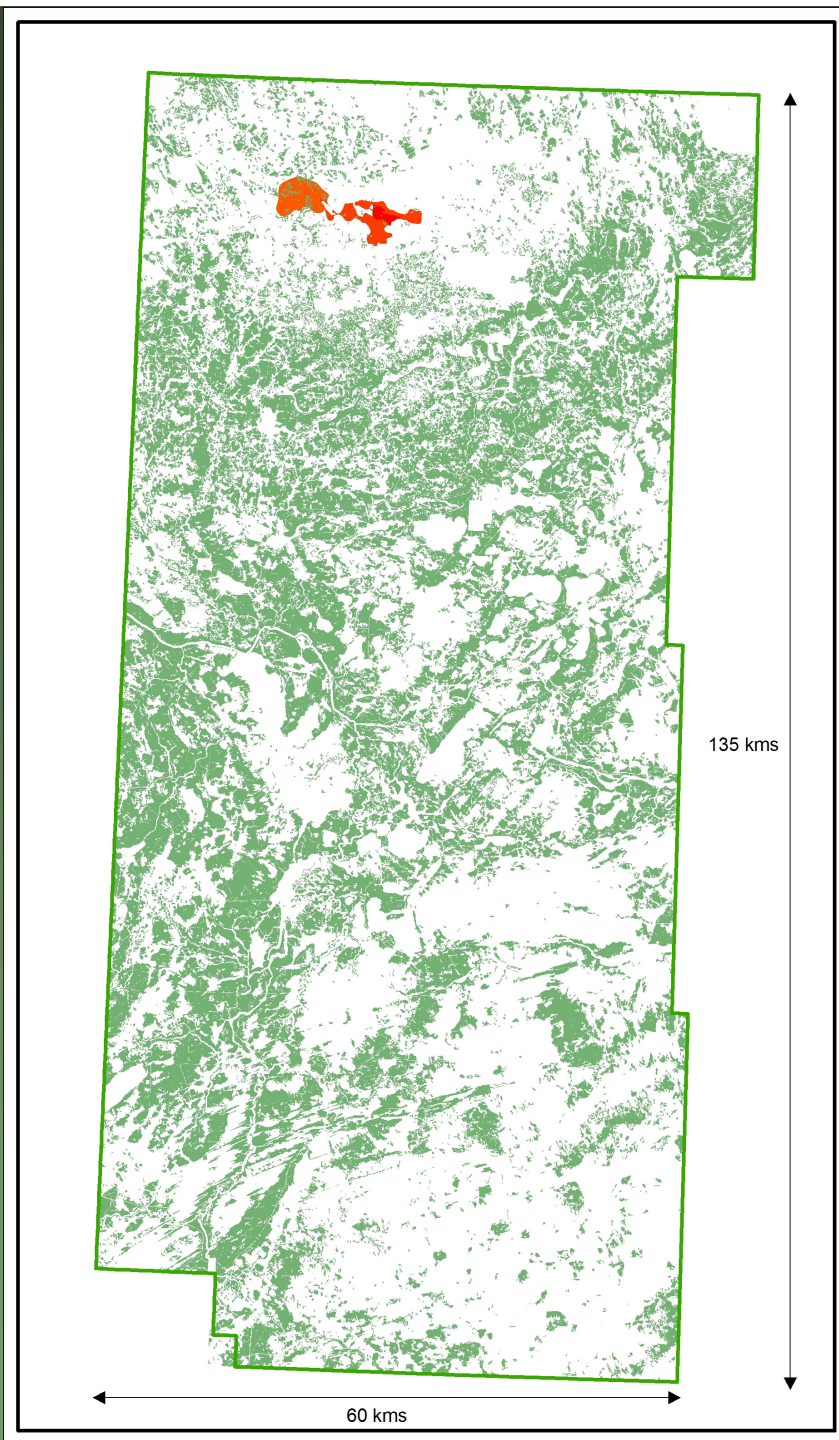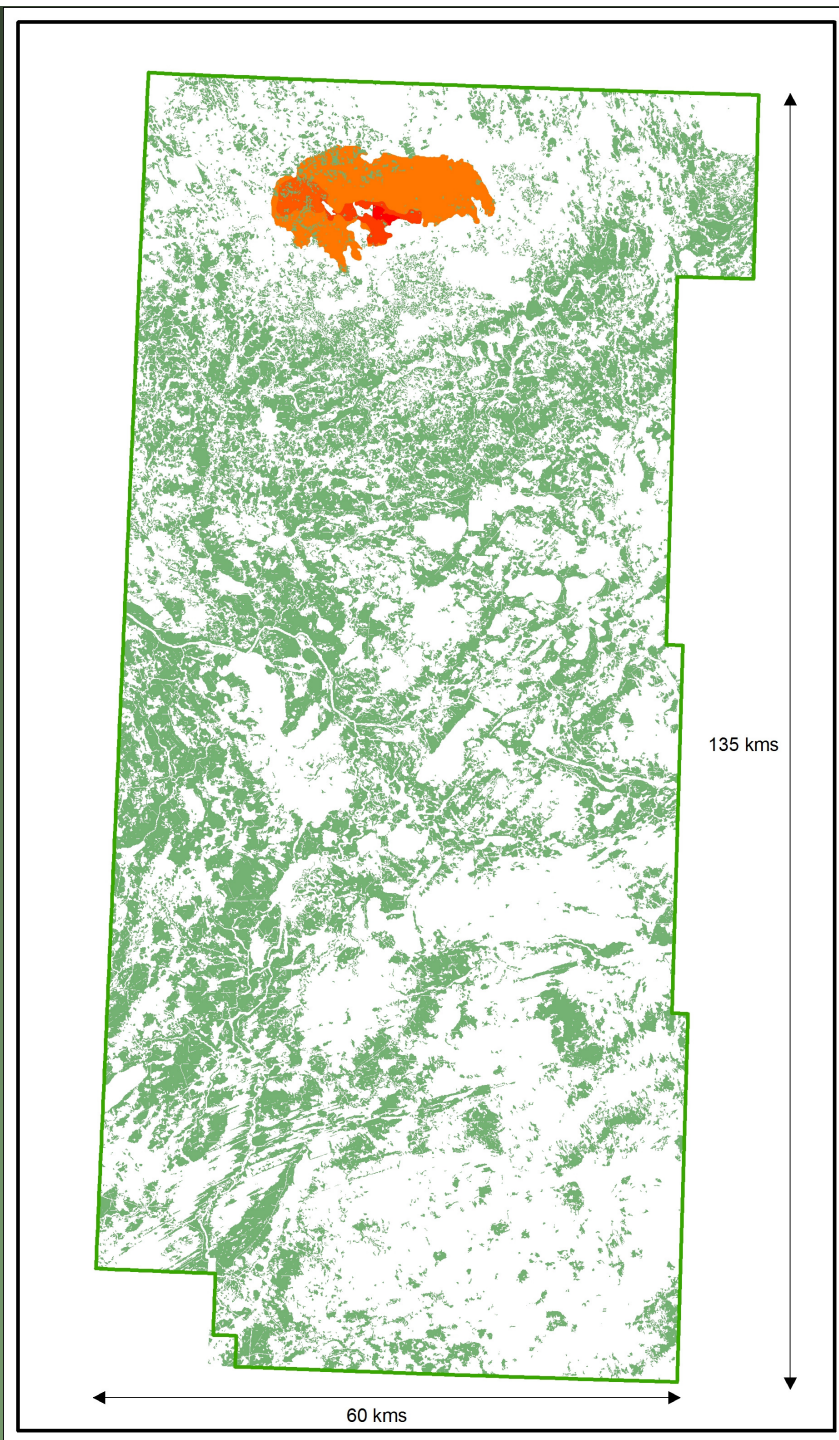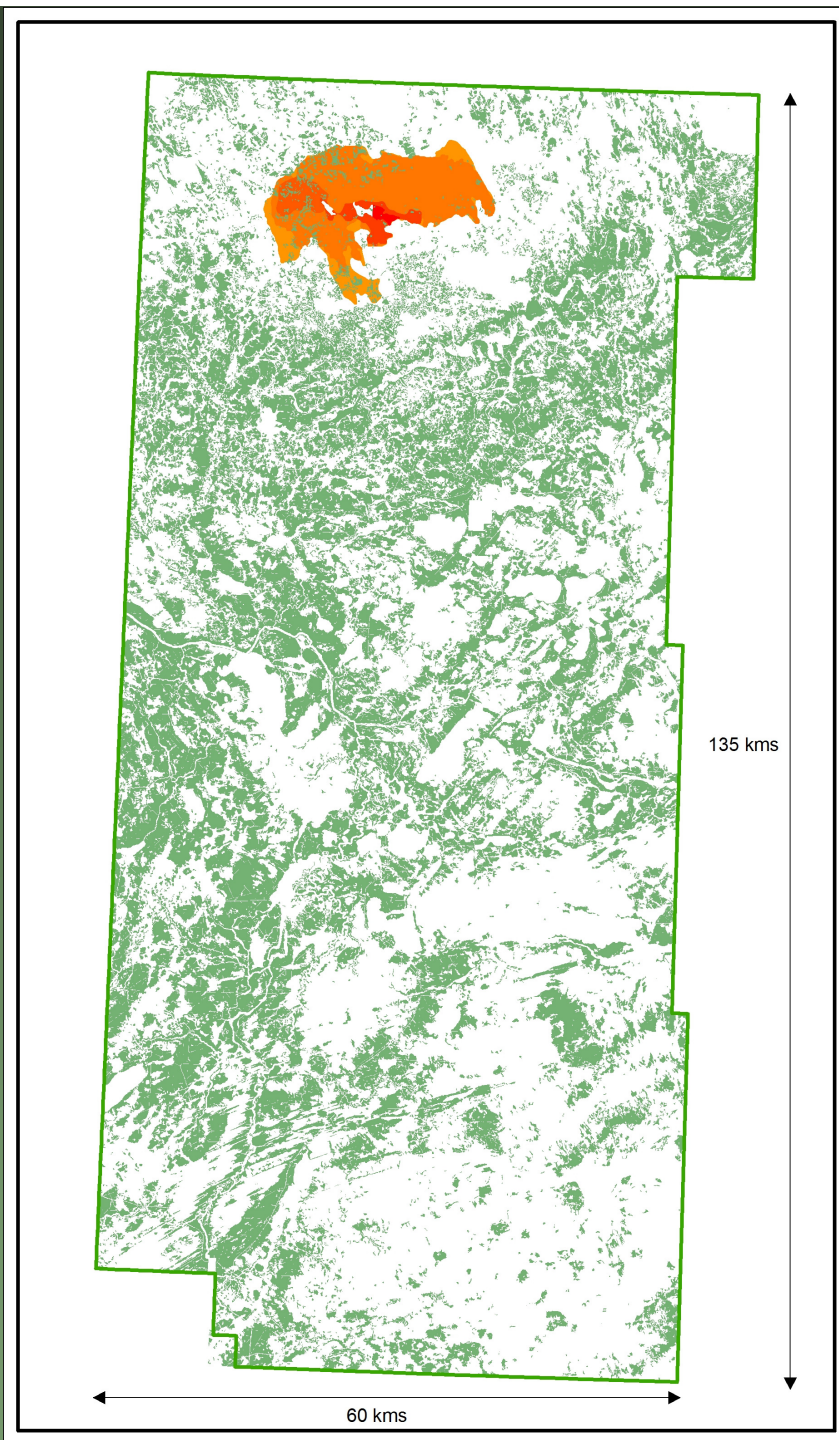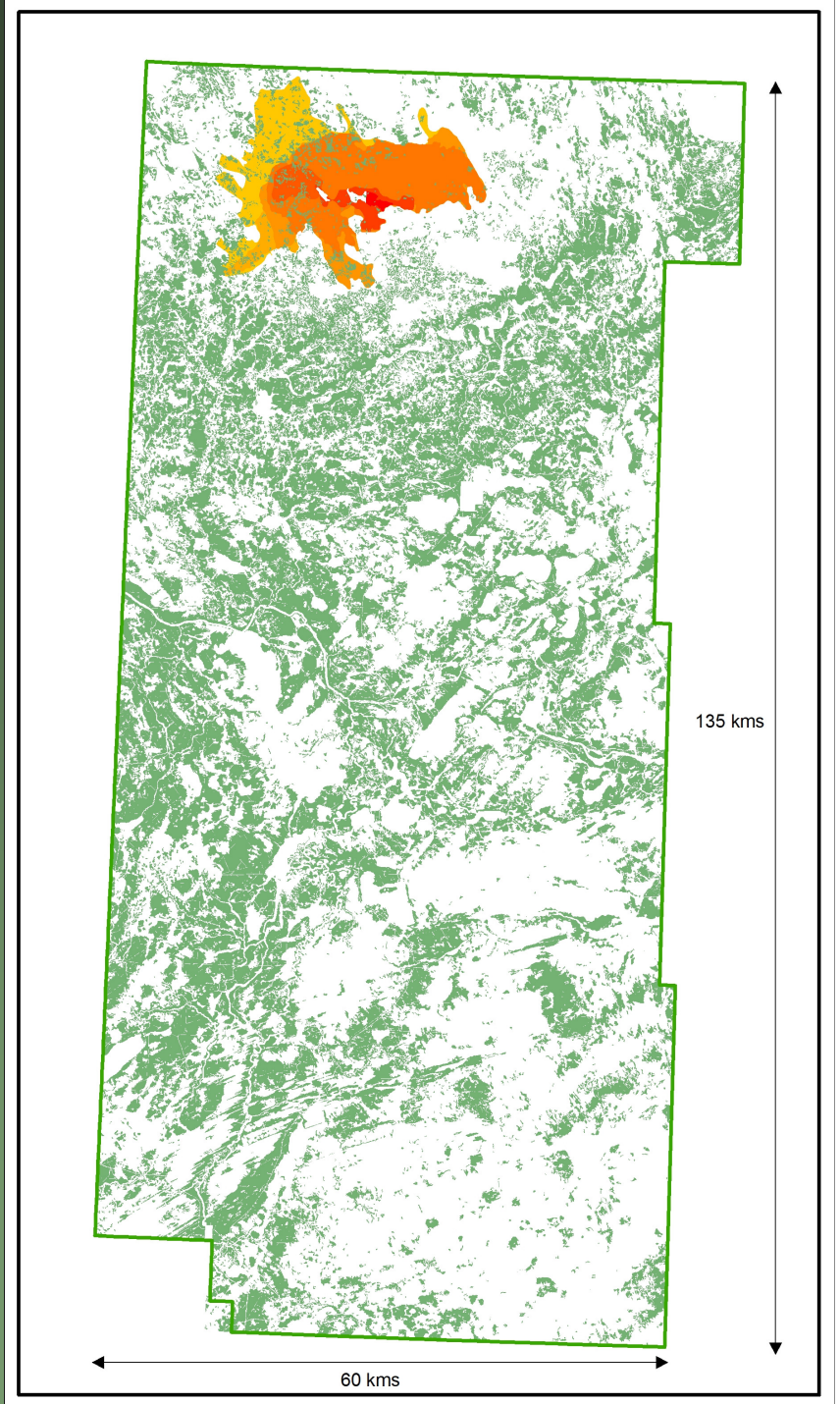
Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
Zig Zag Fire Complex
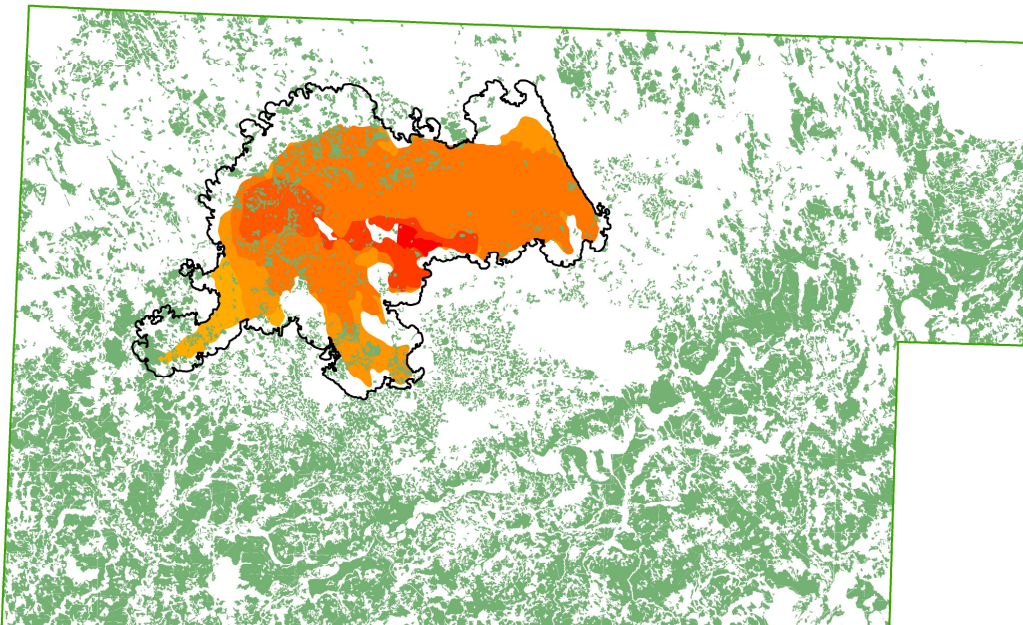
June 23 Prometheus Predictive Forecast

Alberta
Freedom To Create. Spirit To Achieve.

135 kms

60 kms
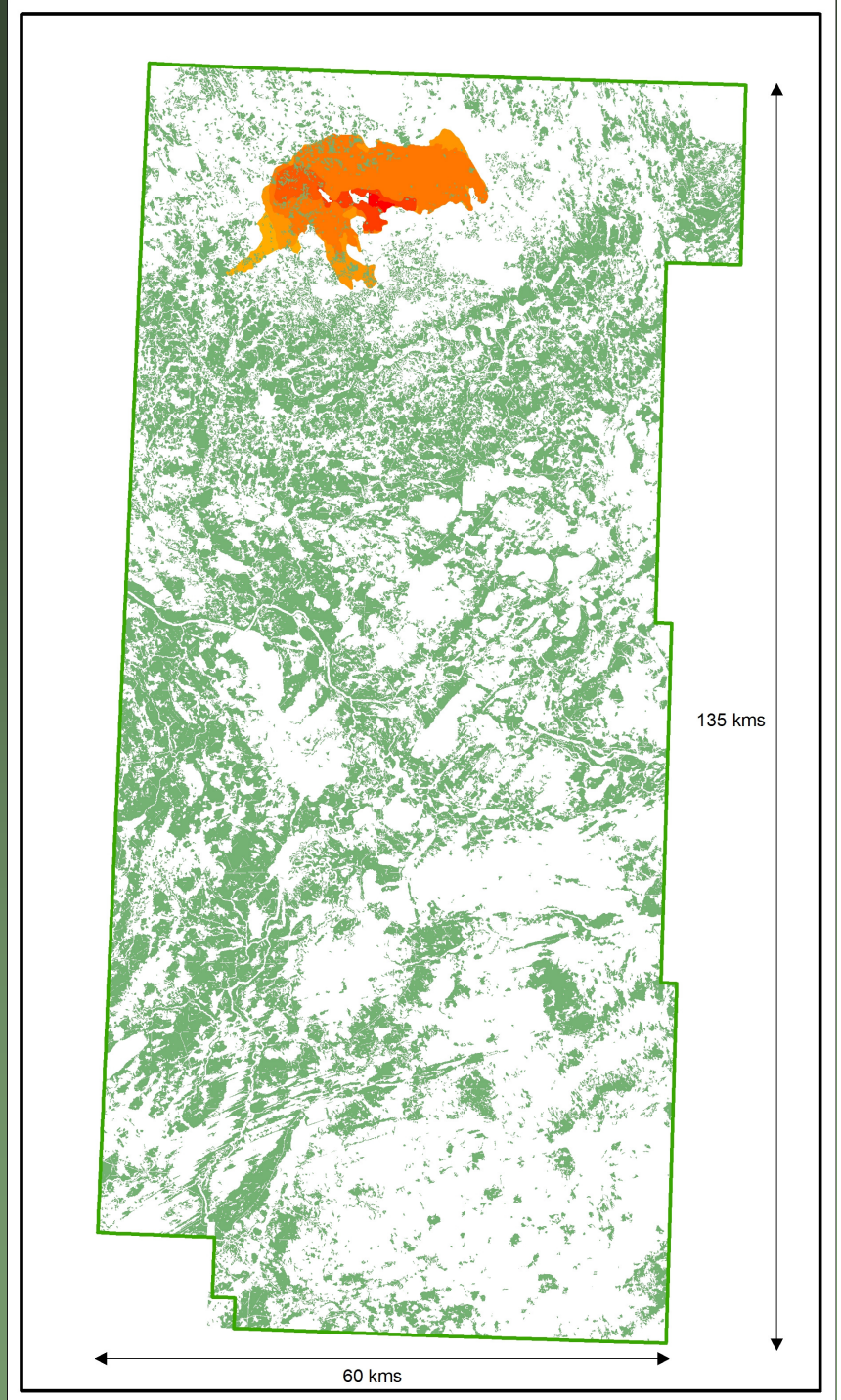
Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
Zig Zag Fire Complex

June 24 Prometheus Predictive Forecast

Alberta
Freedom To Create. Spirit To Achieve.

135 kms

60 kms

Alberta Pacific FMA
FMU S22
Fire SWF-120-2010
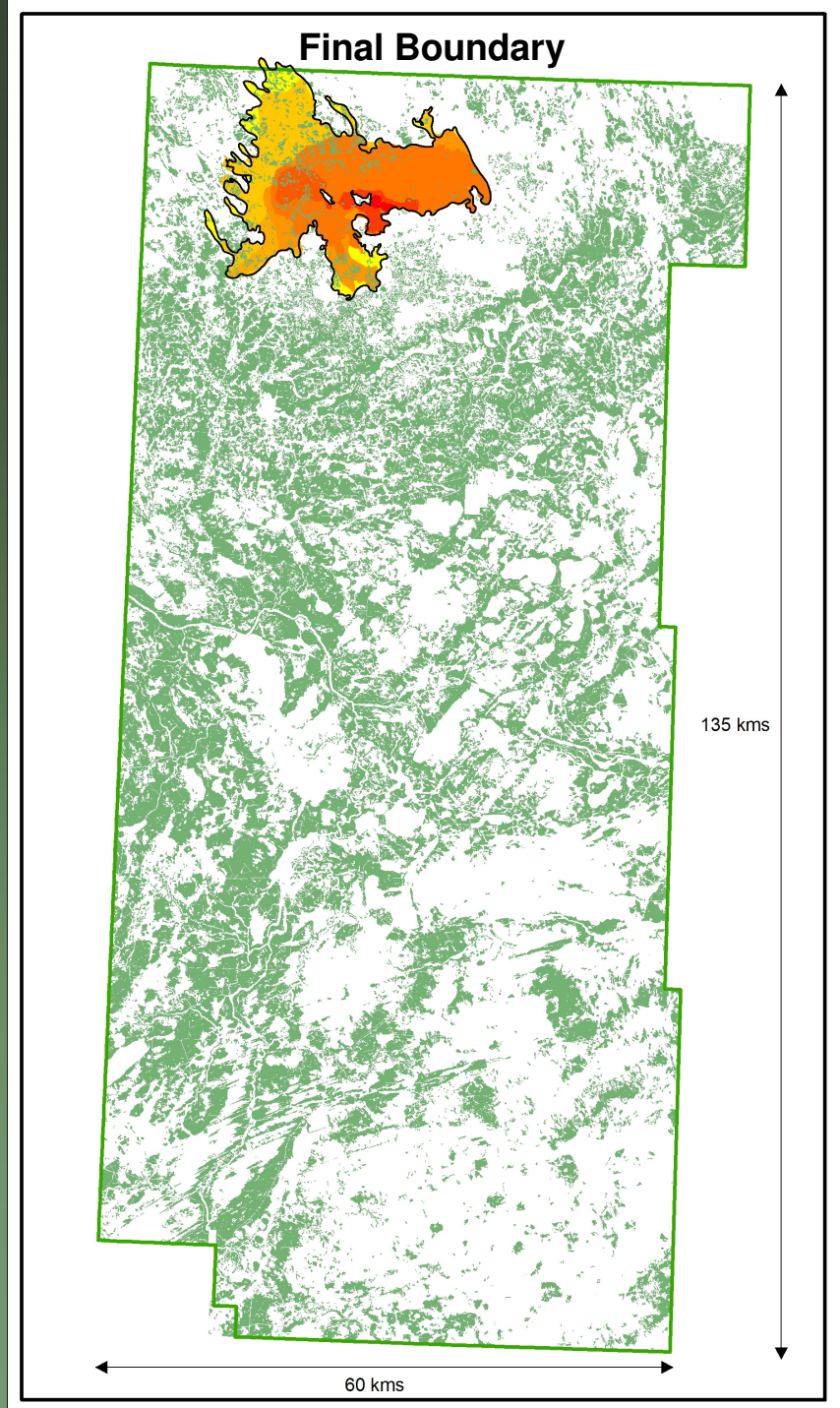Zig Zag Fire Complex
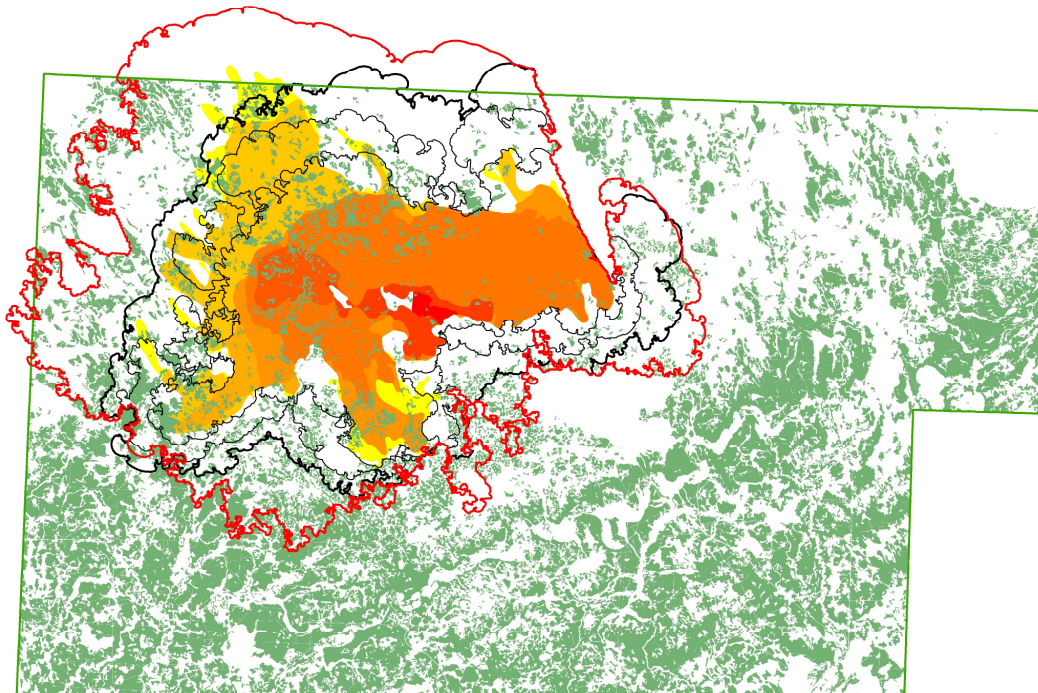
June 25 Prometheus Predictive Forecast
June 16 to 27 Prometheus Historical Forecast

Alberta
Freedom To Create. Spirit To Achieve.

Final Boundary

135 kms

60 kms

Parting Thoughts

- With existing fire models and forest management models it is possible to incorporate fire growth predictions into forest management models to determine significant pinch points and high priority values

- With this information, forest management value based decisions making can be included into the overall fire suppression/resource allocation decision making process

Alberta
Freedom To Create. Spirit To Achieve.

Government of Alberta ◼