C5 FMU
FIRE REGIME ANALYSIS

foothills MODEL FOREST
research growing into practice.

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Wildland Disturbance Consulting

PRESENTATION OUTLINE

- Study area
- Research objectives
- Overview of methods Used
- Recent fire regime (1950 – 2003)
- Historical fire regime
- Recent fire mapping
- Fire regime modeling
- Field results from K. Country

RESEARCH OBJECTIVES

- To identify the number of fire regimes on the landscape (how homogeneous the fire regime really is)
- To determine the age-class distribution & NRV
- To determine fire size distribution
- To determine the spatial NRV of the fire cycle

OVERVIEW OF METHODS USED

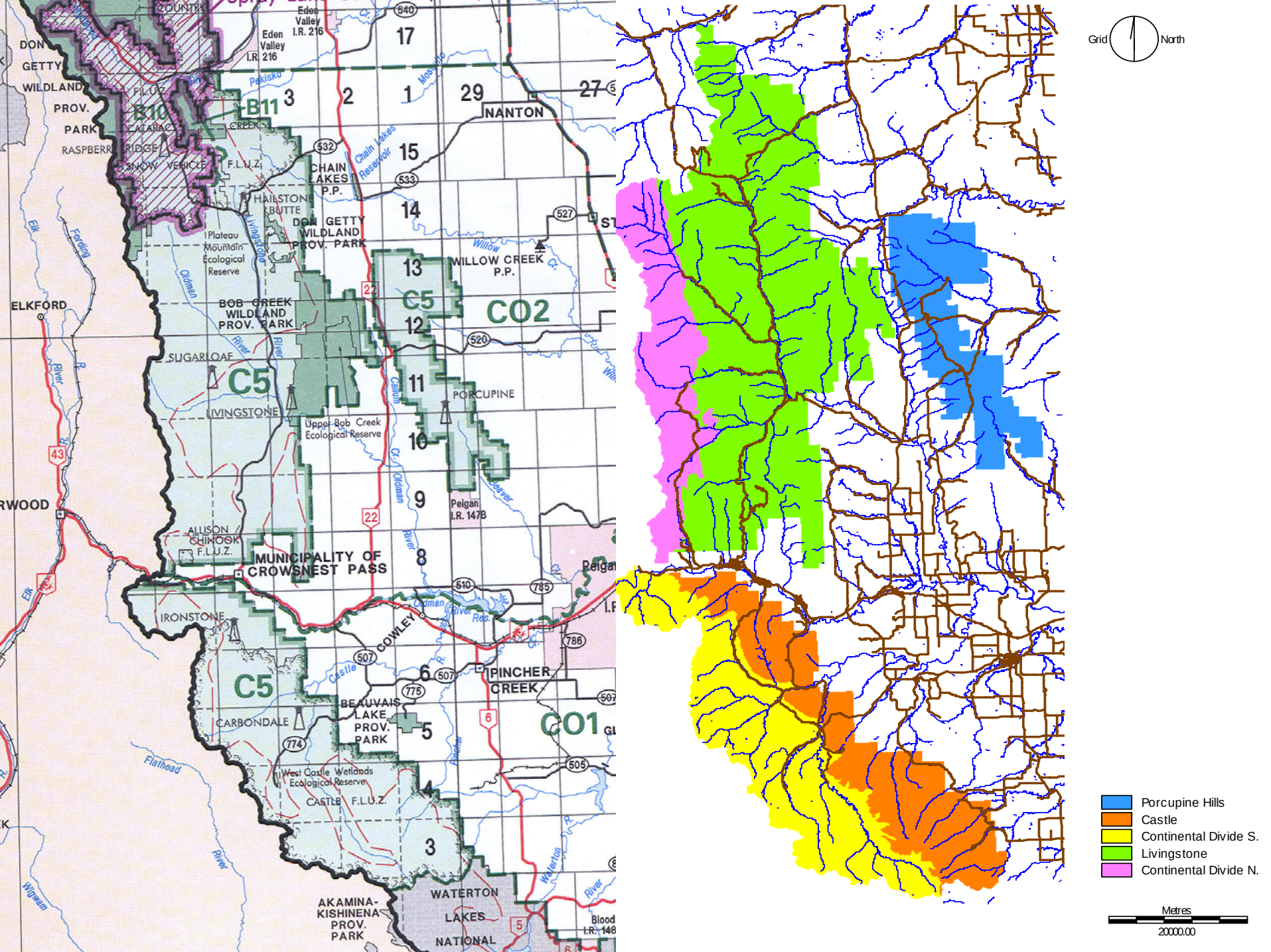
- **Recent fire regime approach**
  - Fire occurrence database: 1950 – 2003
  - Lightning strike database: 1990 – 2003
  - Probability of ignition model

- **Historical fire regime approach**
  - 1950 aerial photography screening by watershed of several fire regime parameters such as: veg. complexity, no. of fires, TSF, max. forest age

- **Recent fire mapping**

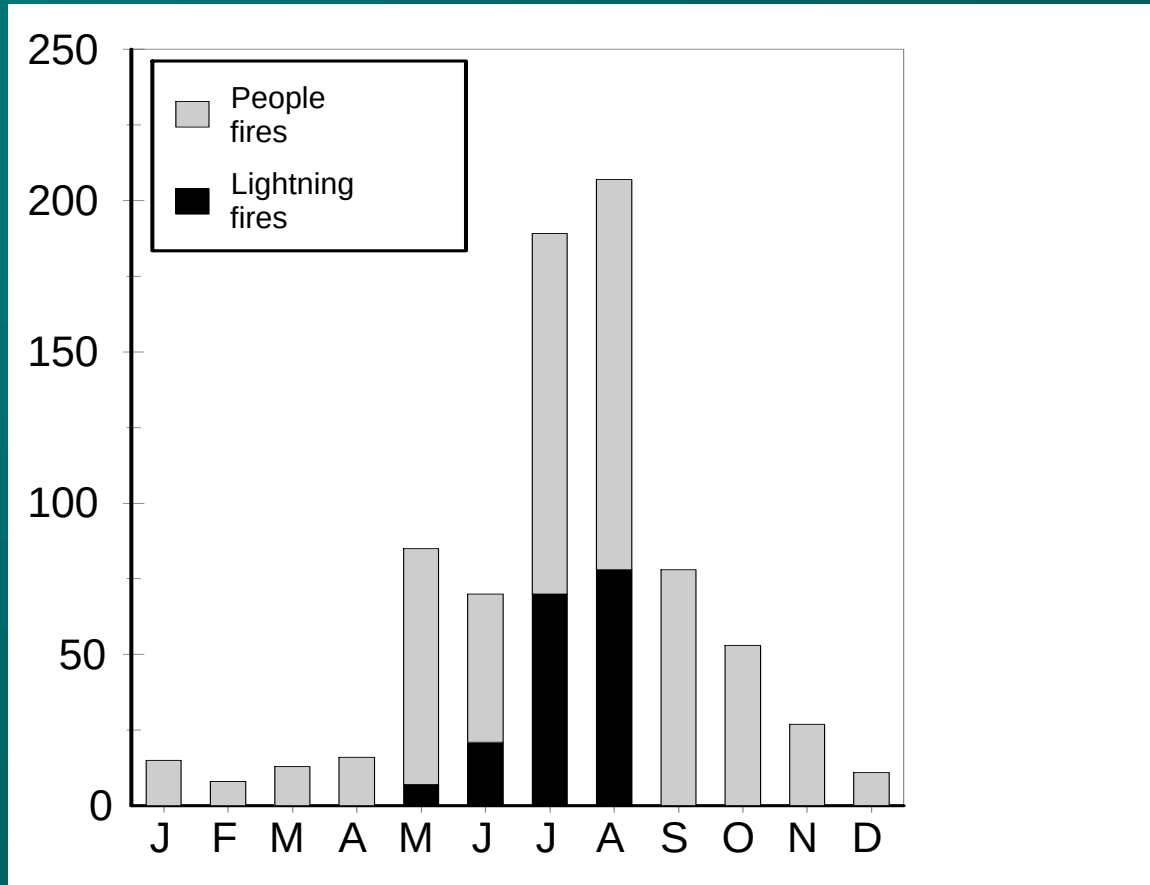
  1950 photographs to map fires from 1930-1950

- **Fire regime modeling approach**
  - Fire regime knowledge, FBP fuel map, real fire weather data, p. of ignition map, p. of burning map


Grid
North
Porcupine Hills
Castle
Continental Divide S.
Livingstone
Continental Divide N.
Metres
20000.00
B10
B11
C5
CO2
CO1
MUNICIPALITY OF CROWSNEST PASS
PINCHER CREEK
BLAIRMORE
COWLEY
IRONSTONE
CARBONDALE
ELKFORD
SUGARLOAF
LIVINGSTONE
PORCUPINE
NANTON
CHAIN LAKES P.P.
WILLOW CREEK P.P.
DON GETTY WILDLAND PROV. PARK
BOB CREEK WILDLAND PROV. PARK
Plateau Mountain Ecological Reserve
Upper Bob Creek Ecological Reserve
West Castle Wetlands Ecological Reserve
BEAUVAIS LAKE PROV. PARK
AKAMINA-KISHINENA PROV. PARK
WATERTON LAKES NATIONAL
ALLISON / CHINOOK F.L.U.Z.
CASTLE F.L.U.Z.
SNOW VEHICLE F.L.U.Z.
Eden Valley I.R. 216
Peigan I.R. 147B
Chain Lakes Reservoir
Oldman River Res.

RECENT FIRE REGIME

- 25% lightning
- 75% anthropogenic
- 53% from recreational users
- Greatest number of ha burned are in July and August
- Fire cycle between 1950 and 2002: 1,887 years or 144 ha/yr
- Fire cycle with 2003 fires: 402 years or 676 ha/yr (0.25% of forested area)

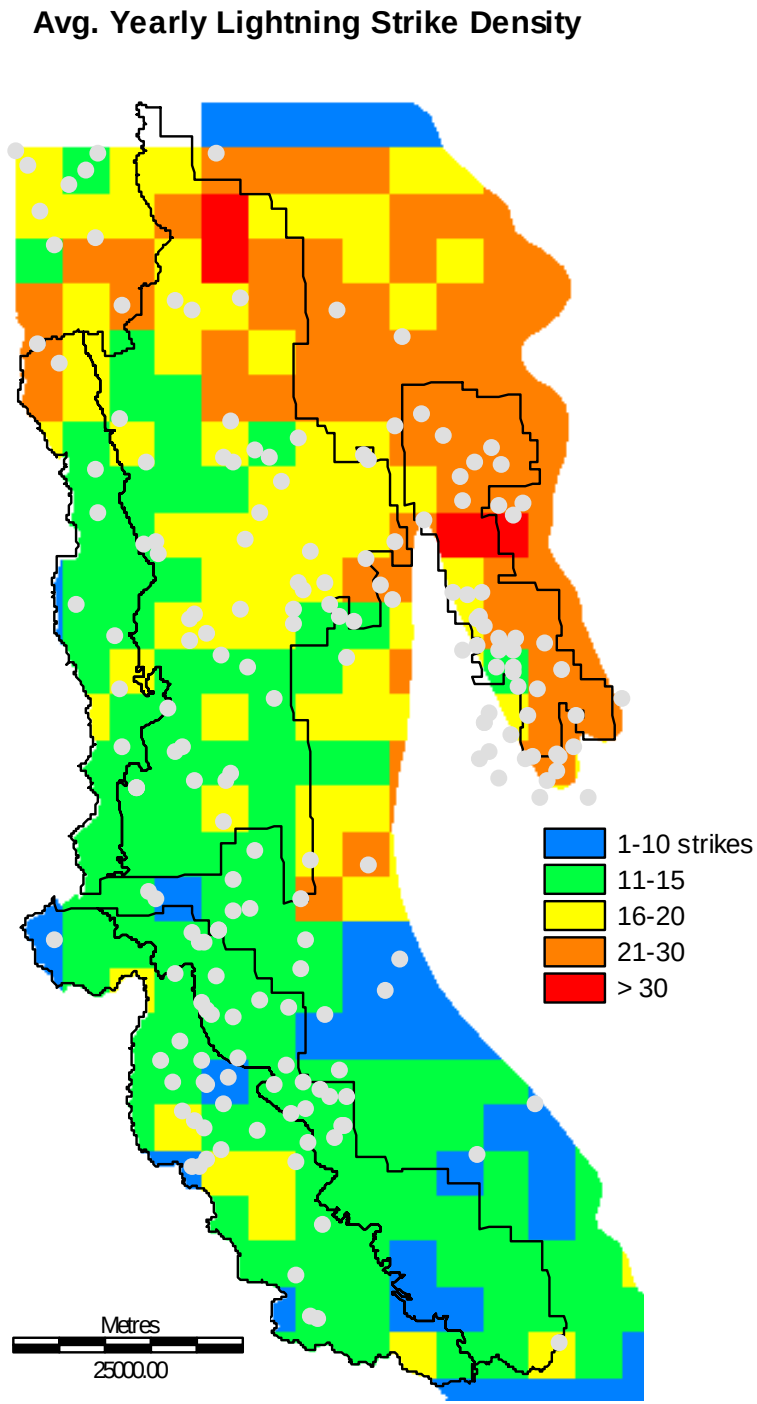


RECENT FIRE REGIME

Ignition type	P. Hills	Castle	C.D.S	Living.	C.D.N
Lightning	36.94	20.67	17.56	15.25	9.89
People	23.16	20.52	20.65	20.63	15.50
All	27.42	20.57	19.69	18.96	13.76
%Area of C5	11.20	15.35	18.85	43.43	11.16

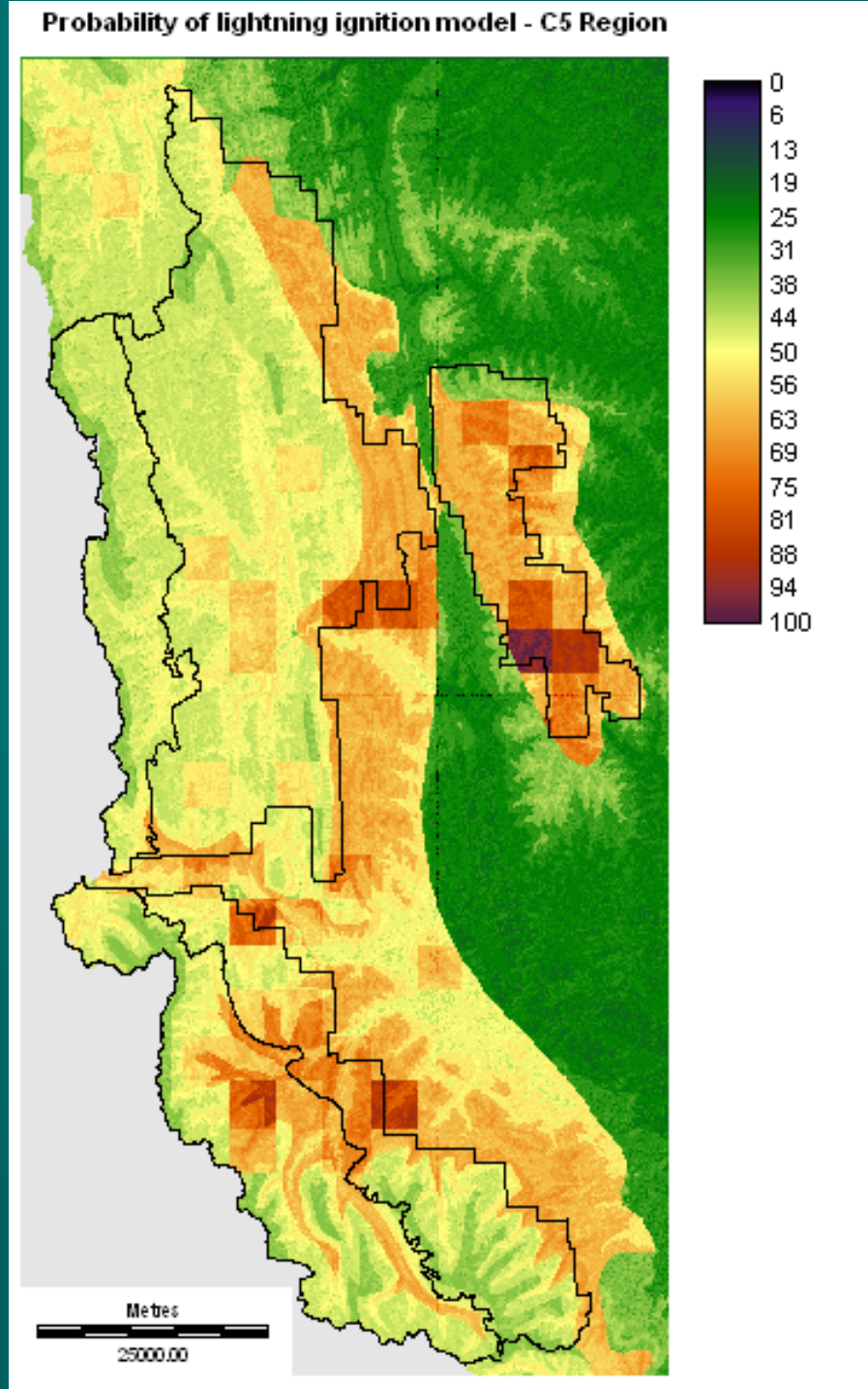
RECENT FIRE REGIME

- Cross-tabulation results show that lightning strike density is a poor indicator of lightning fire occurrence.
- This map was not included in the p. of ignition model.



RECENT FIRE REGIME

- Density of lightning caused fires (40%).
- Natural subregions (30%).
- Elevation (20%)
  - 70% of fires between 1400m and 1800m
- Aspect (10%)
  - Very little variation among aspect classes

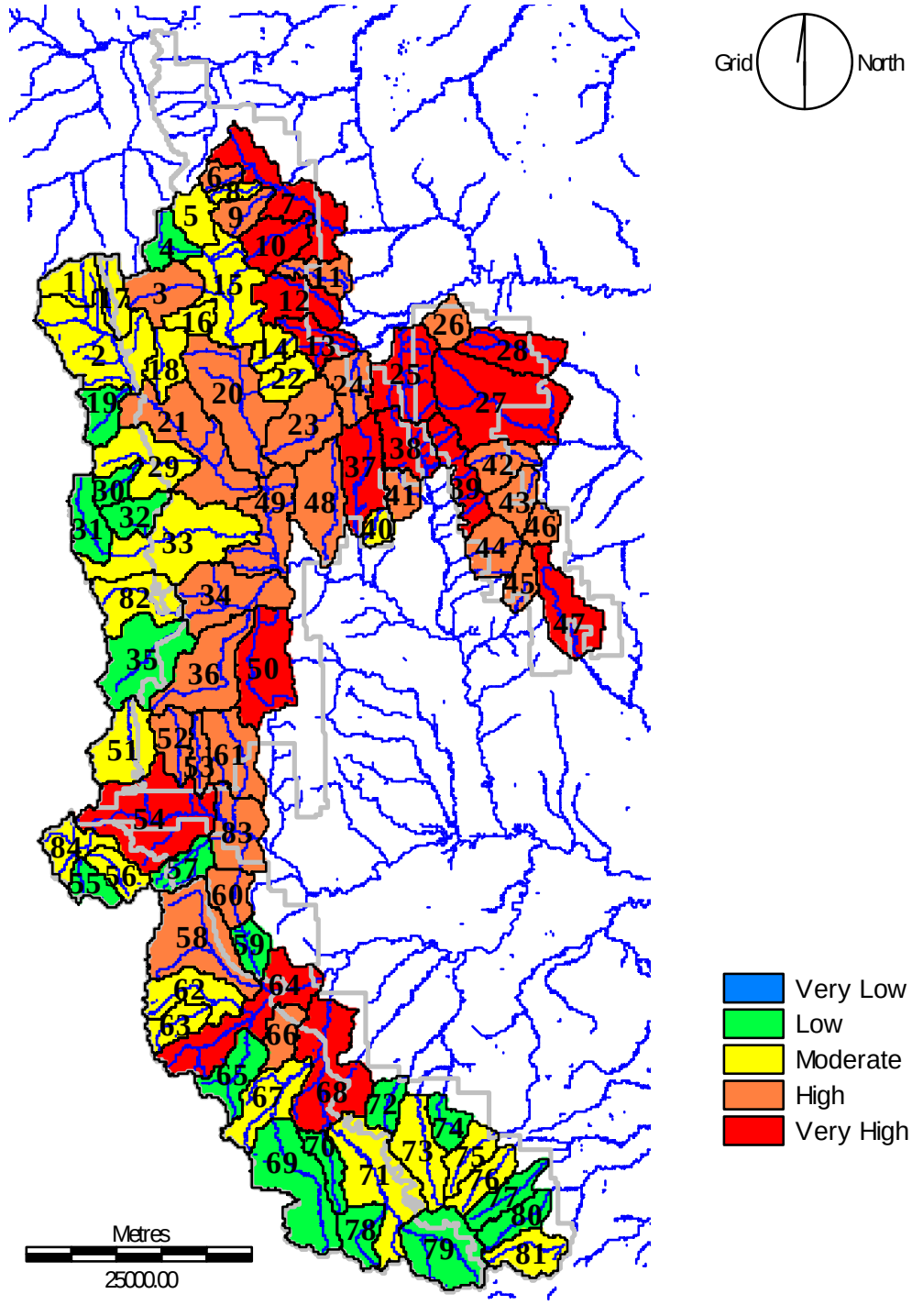


HISTORICAL FIRE REGIME

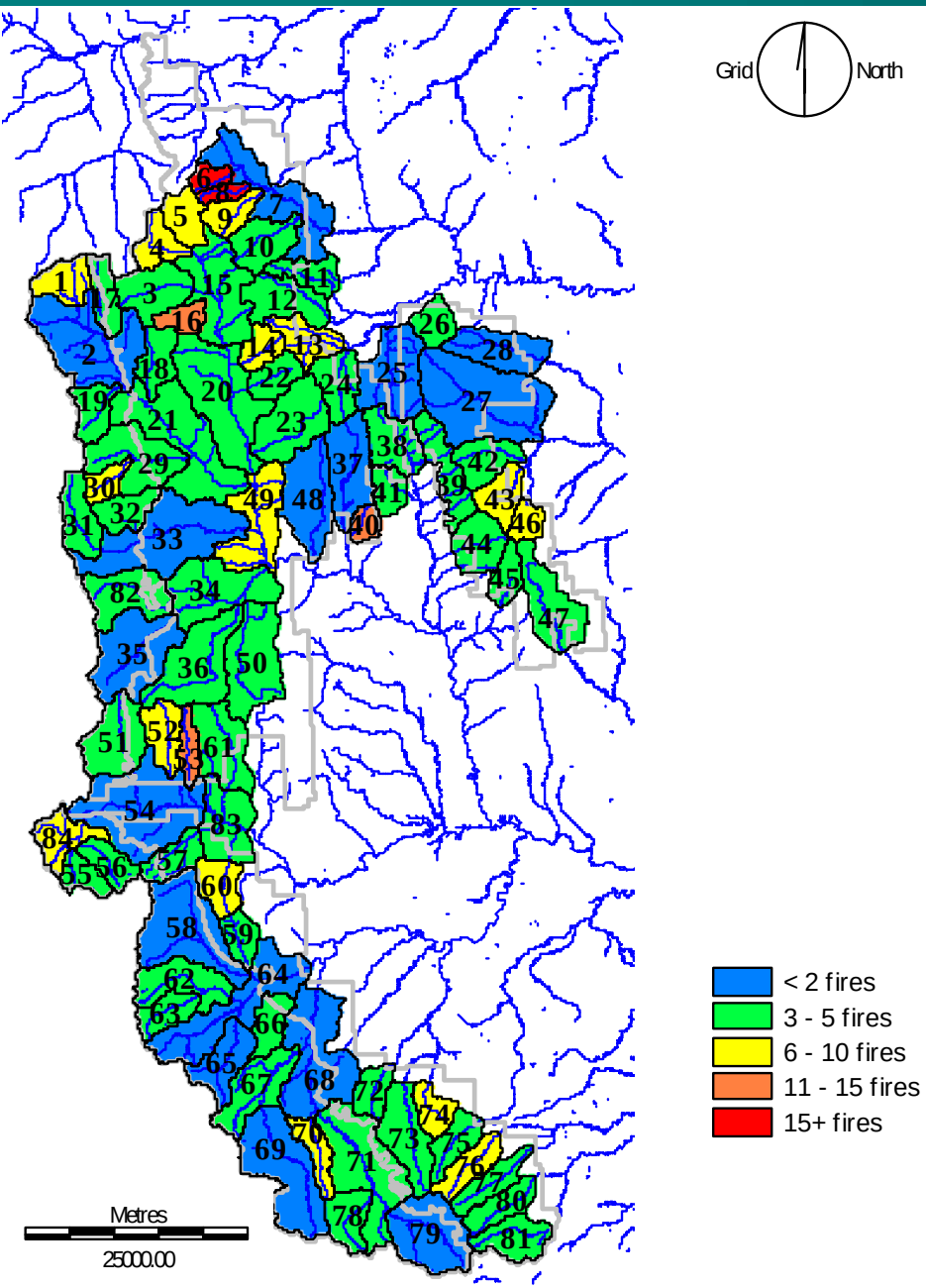
- Air photo screening by watershed (84)
  - Vegetation complexity
  - Total number of fires
  - Number of fires since 1900
  - Estimate of T-S-F
  - Estimate of oldest age
  - MFRI
  - Valley orientation
  - Fuel continuity (continuous/broken)

HISTORICAL FIRE REGIME

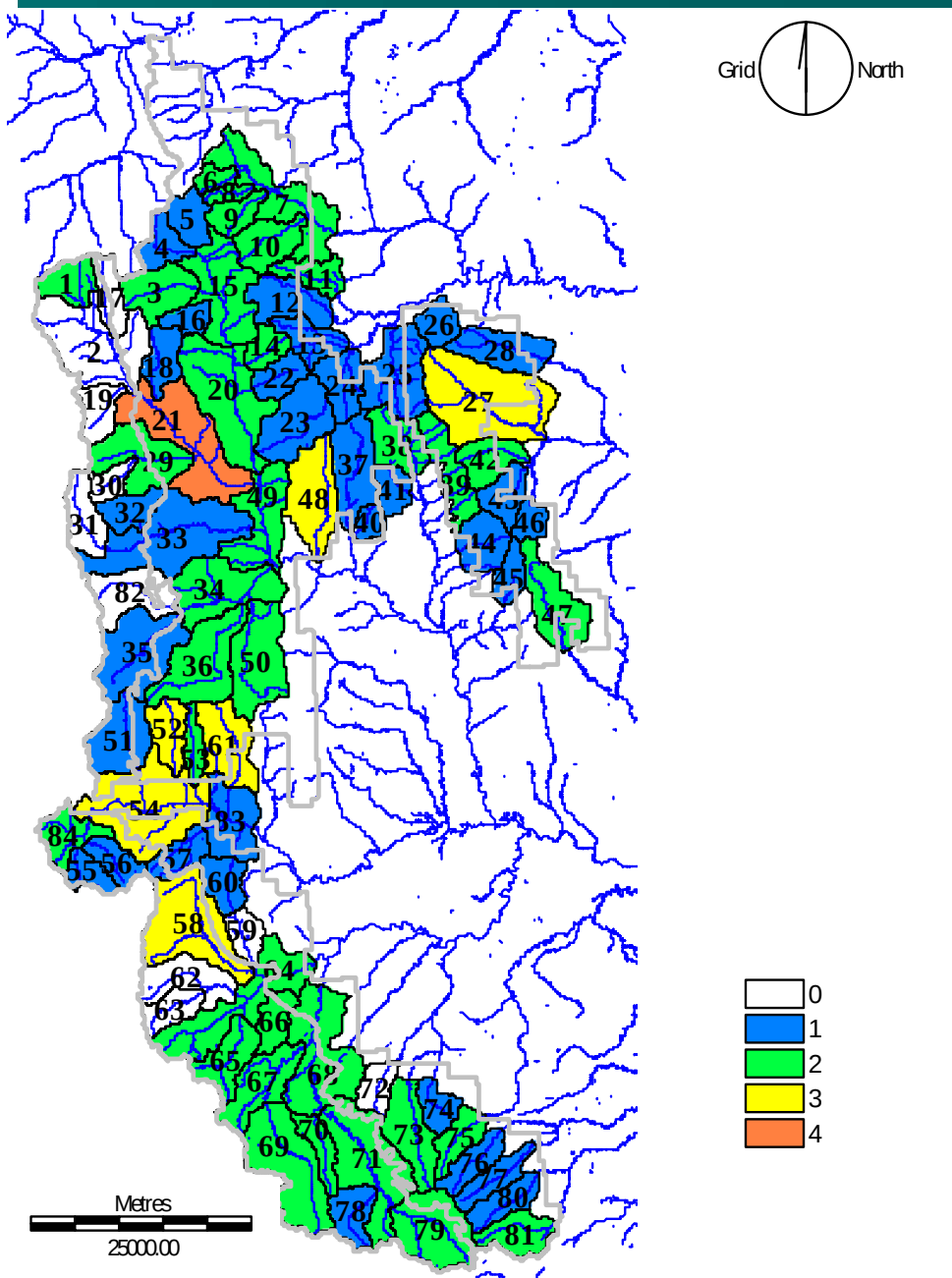
Vegetation complexity



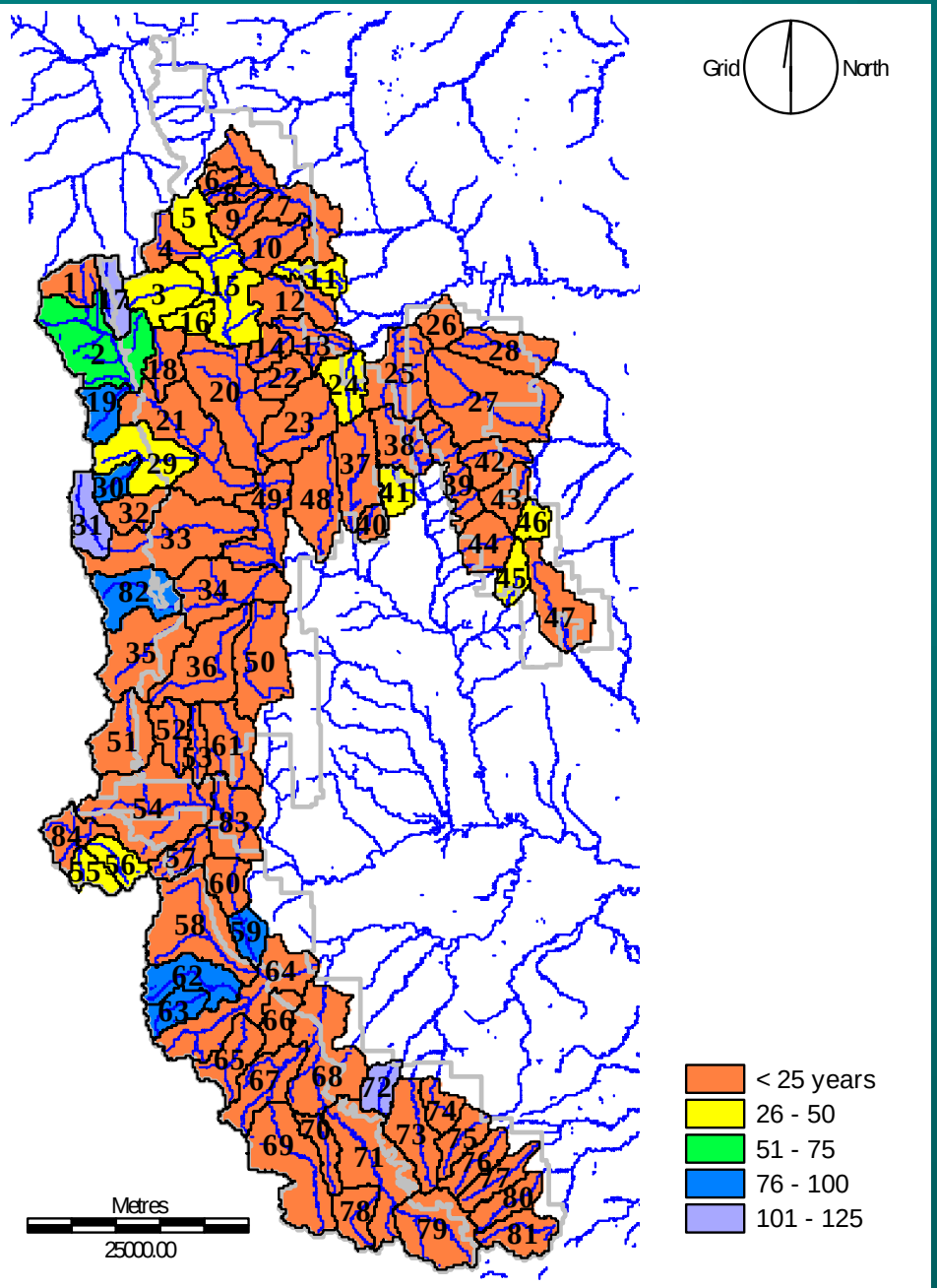
Total no. of fires



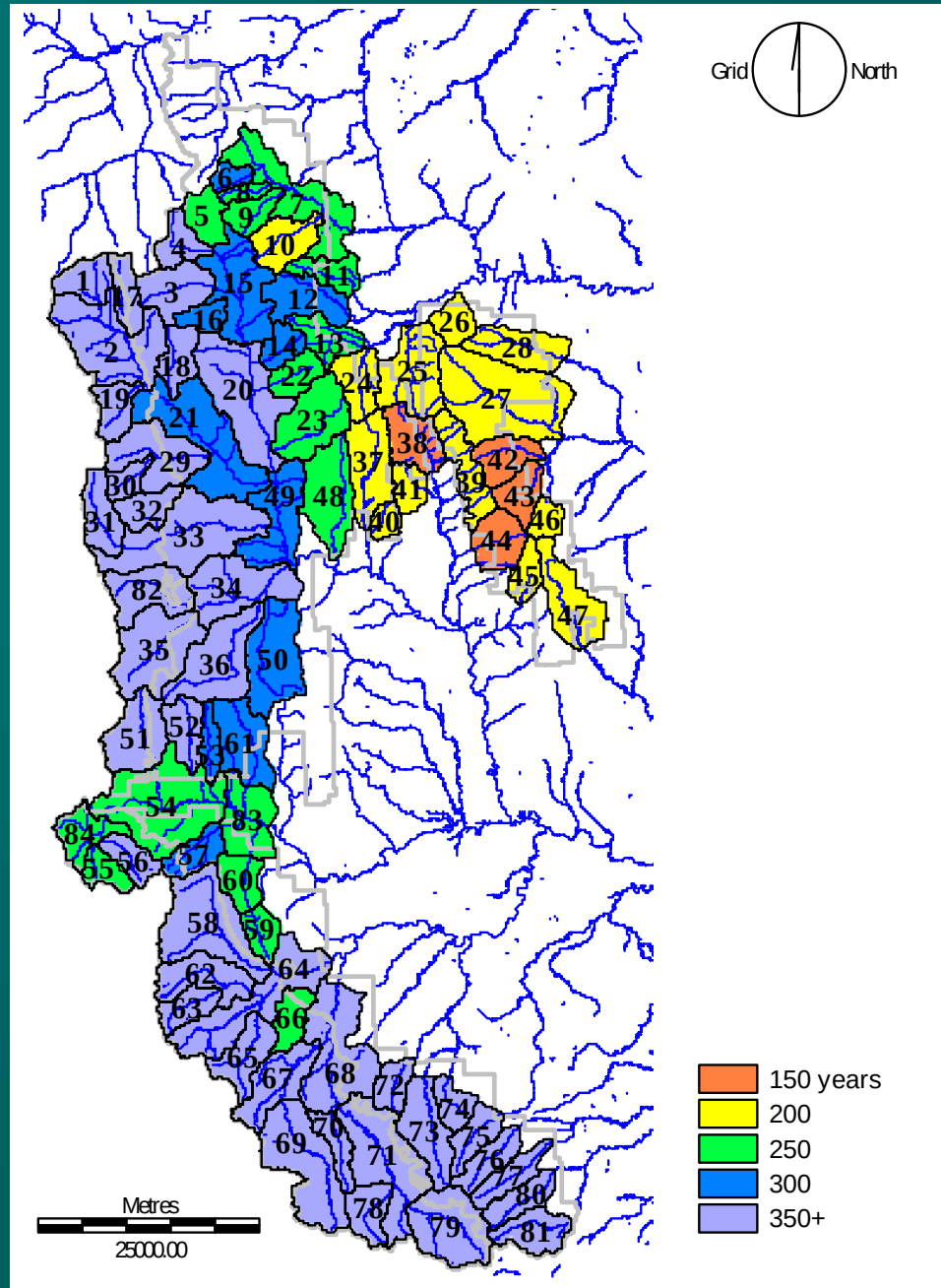
Recent fires



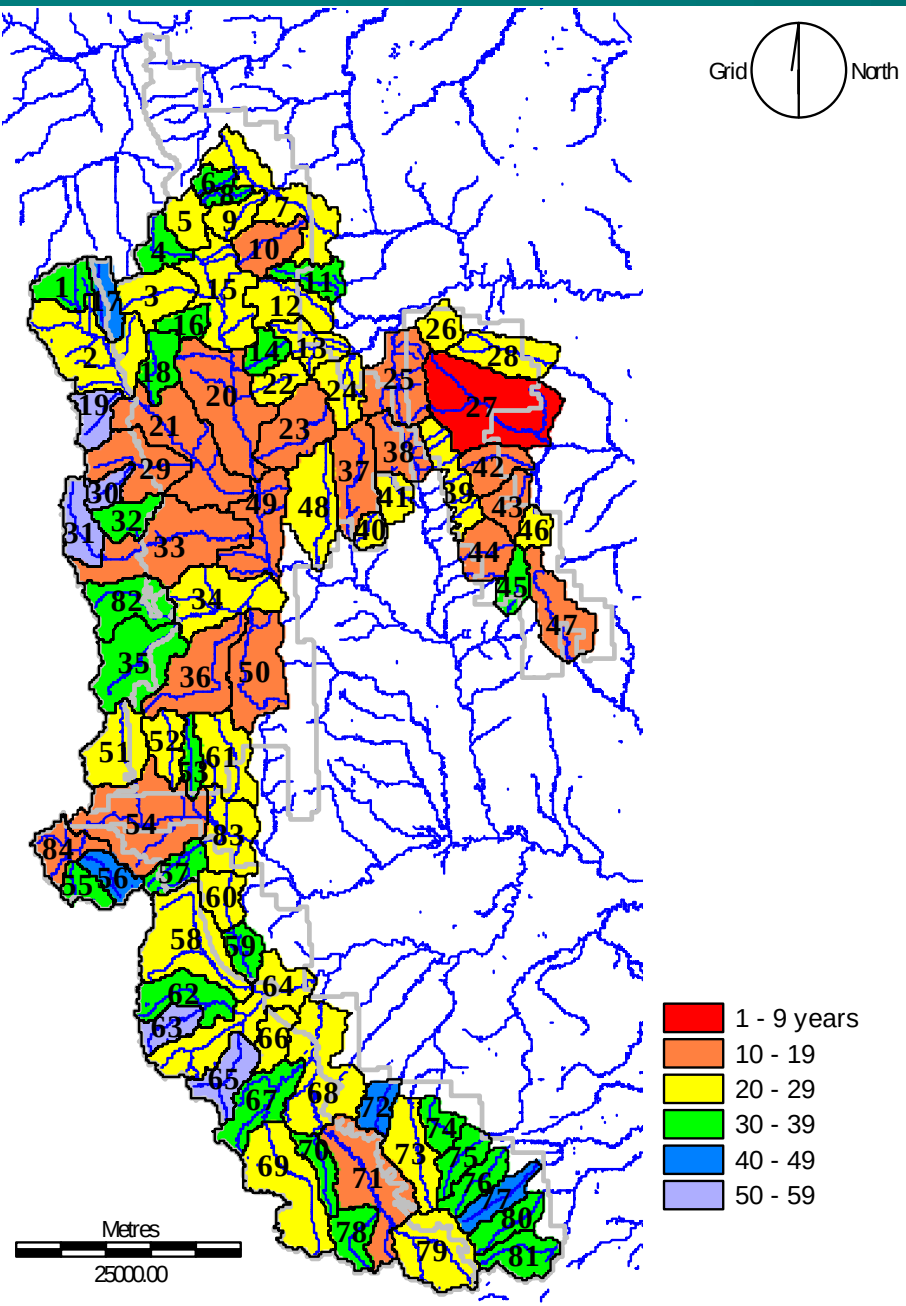
Time-since-fire



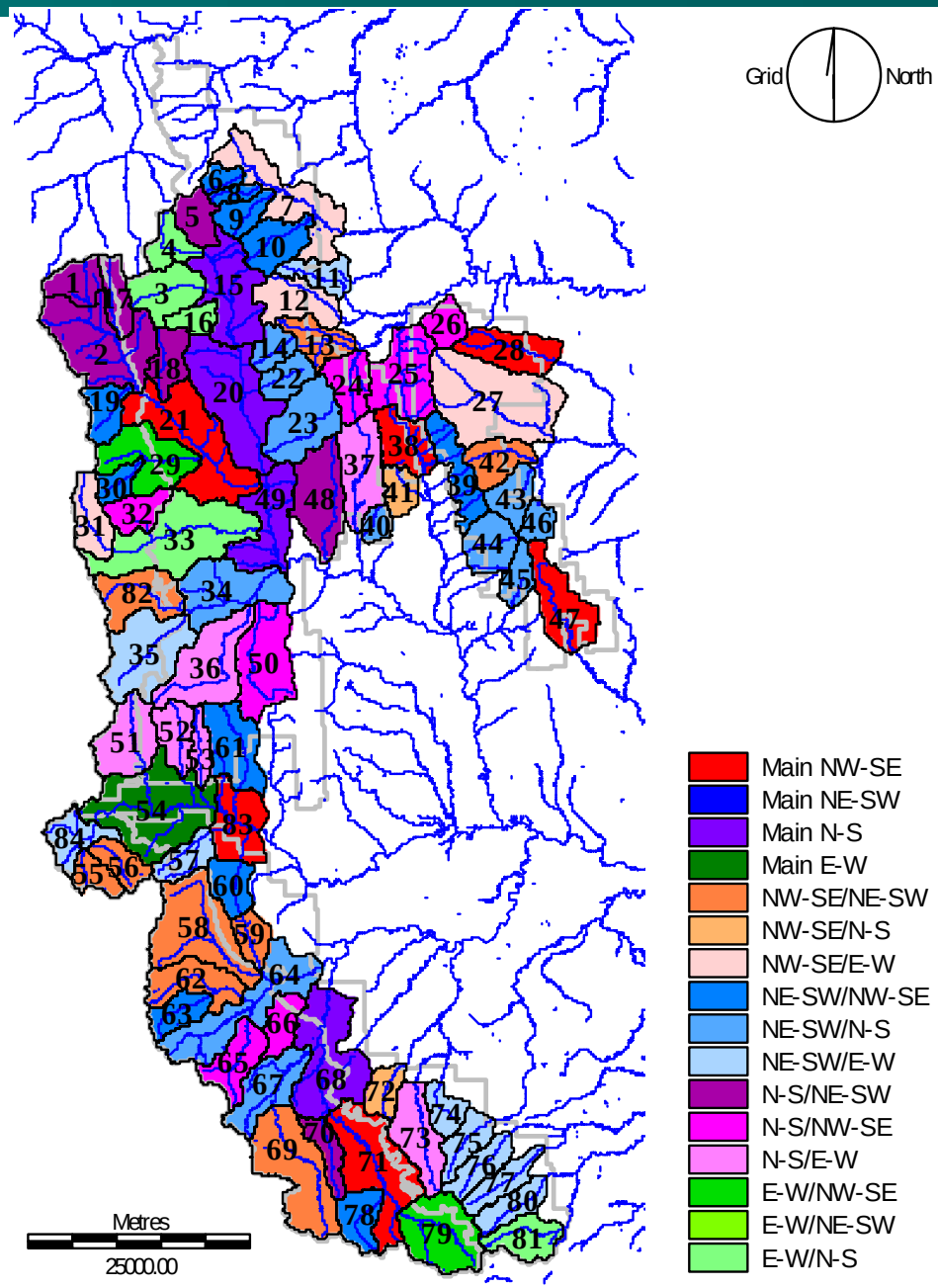
Max. age



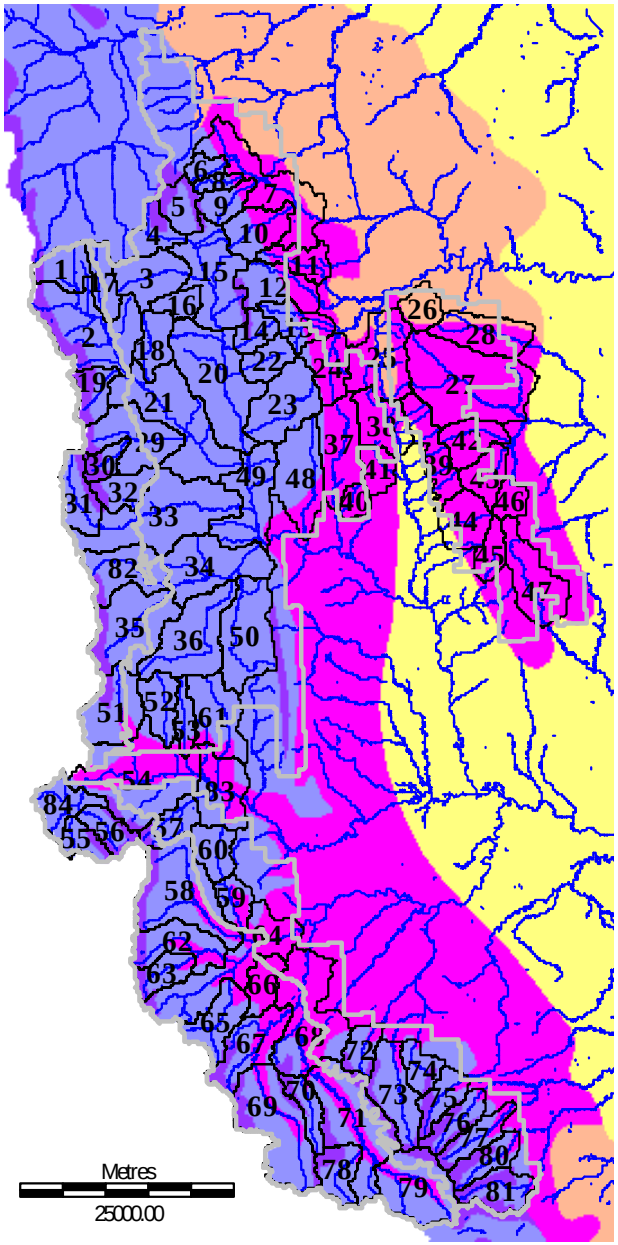
MFRI

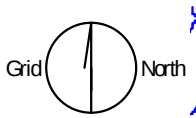


Valley Orientation

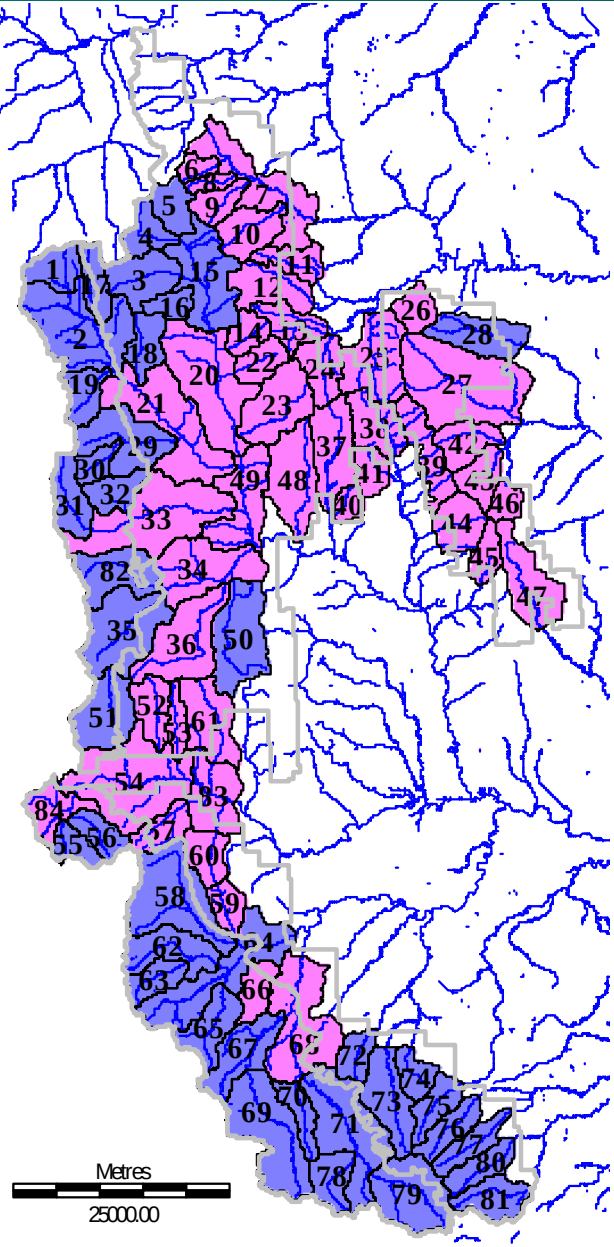


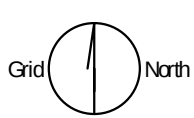
NSR vs FUEL CONTINUITY





RM - Alpine
RM - Sub-Alpine
RM - Montane
Parkland - Foothills
Grassland - Foot. Fescu





Broken fuel
Continuous fuel

NSR vs FUEL CONTINUITY

Fire Variable	NSR	Fuel Continuity
Complexity	0.49	0.86
Total fires	0.43	0.71
TSF	0.43	0.75
MFRI	0.45	0.8
Max age	0.52	0.84

Cramer's V measure of association

PRELIMINARY CONCLUSIONS

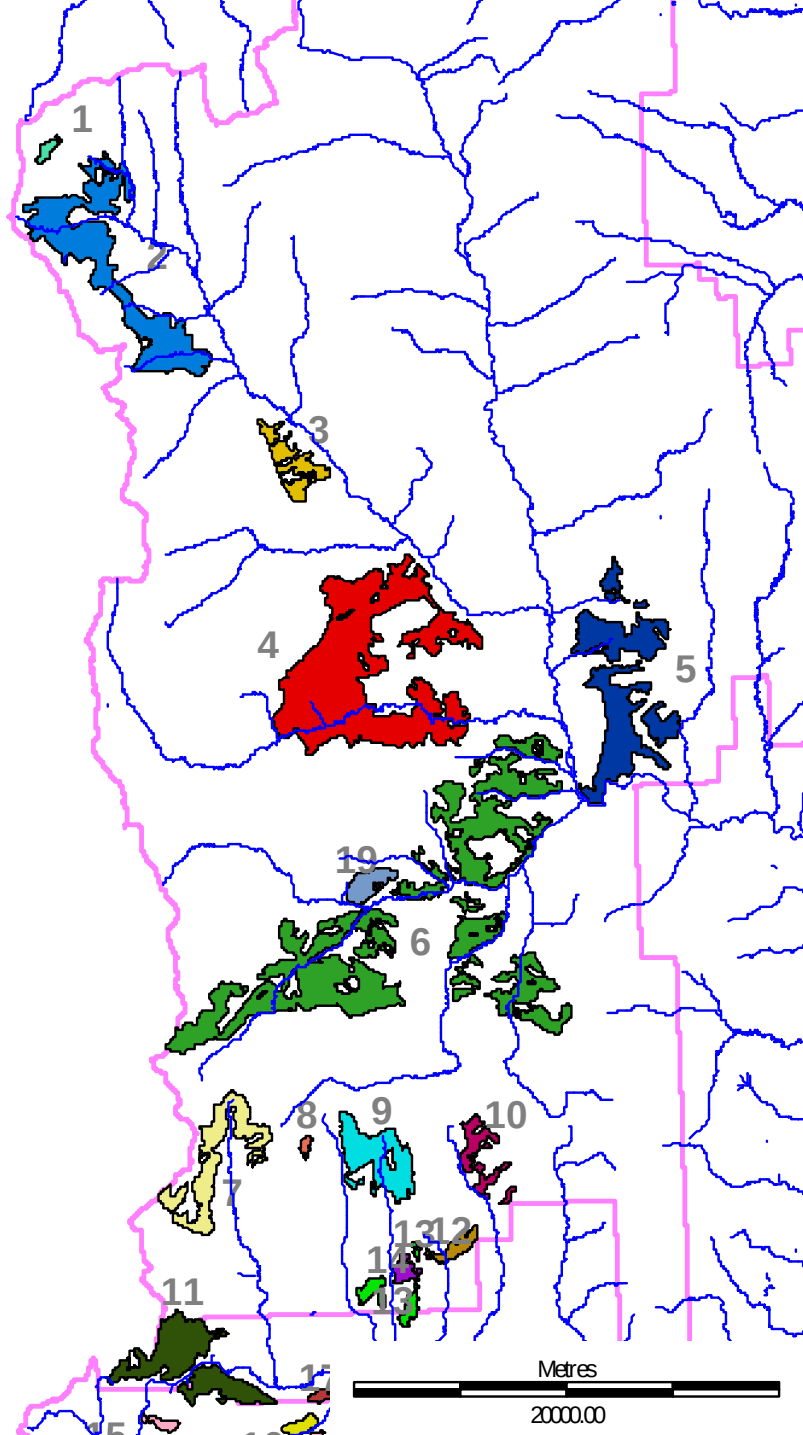
- Fire regime is not spatially homogeneous
- Veg. complexity linked to fuel continuity and not an E. to W. elevation gradient as observed in K. Country
- Fuel continuity map a good surrogate to map fire regimes rather than NSR
- 5 mngt subregions map is a good substitute to map fire regimes in greater details

PRELIMINARY CONCLUSIONS

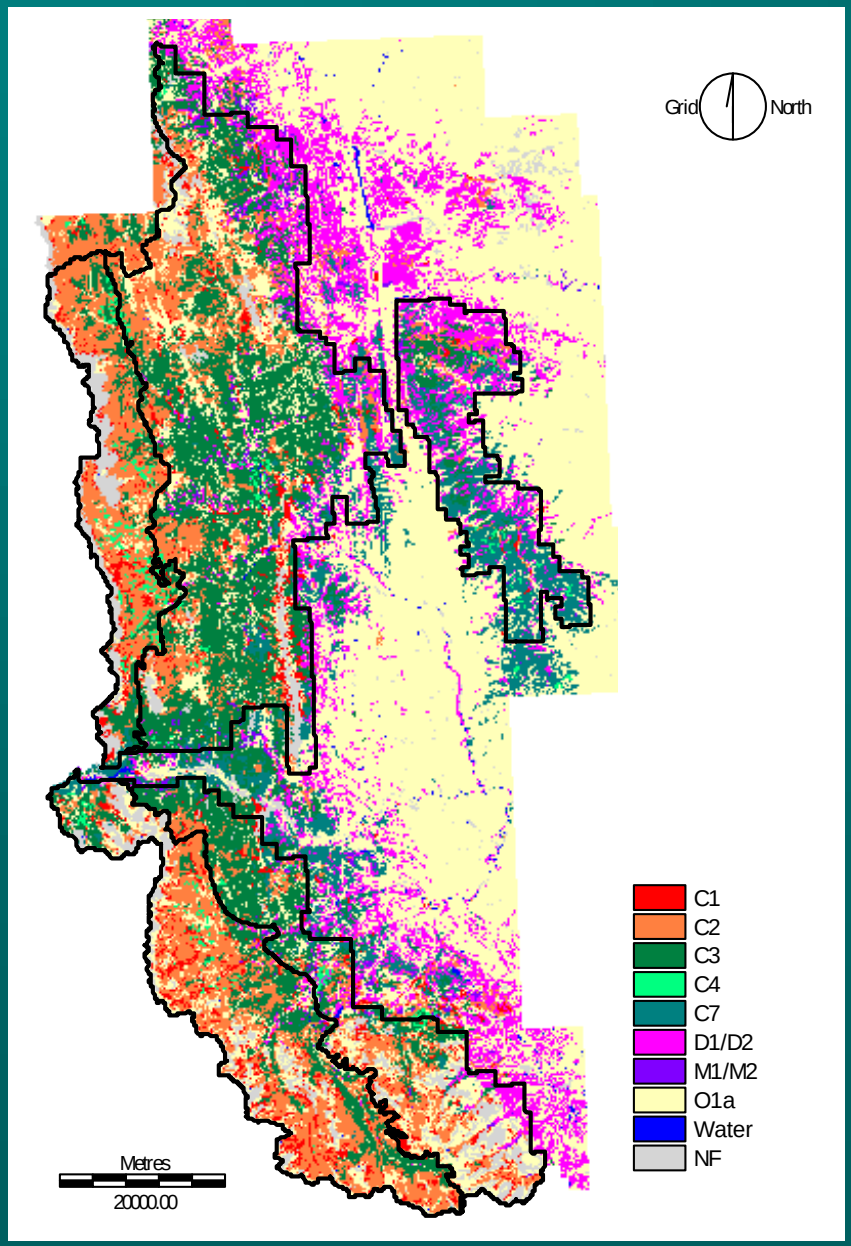
- P. Hills has the most unique fire regime followed by the CDN
- Both Castle and the CDS are similar enough to be treated equally
- Livingstone shares similar fire regime elements with all other subregions, which makes it unique
- Regions of high to very high veg. complexity and high number of fires tend to coincide with regions of low probabilities of lightning ignition. This means that the historical fire regime had to be driven by anthropogenic sources of fire

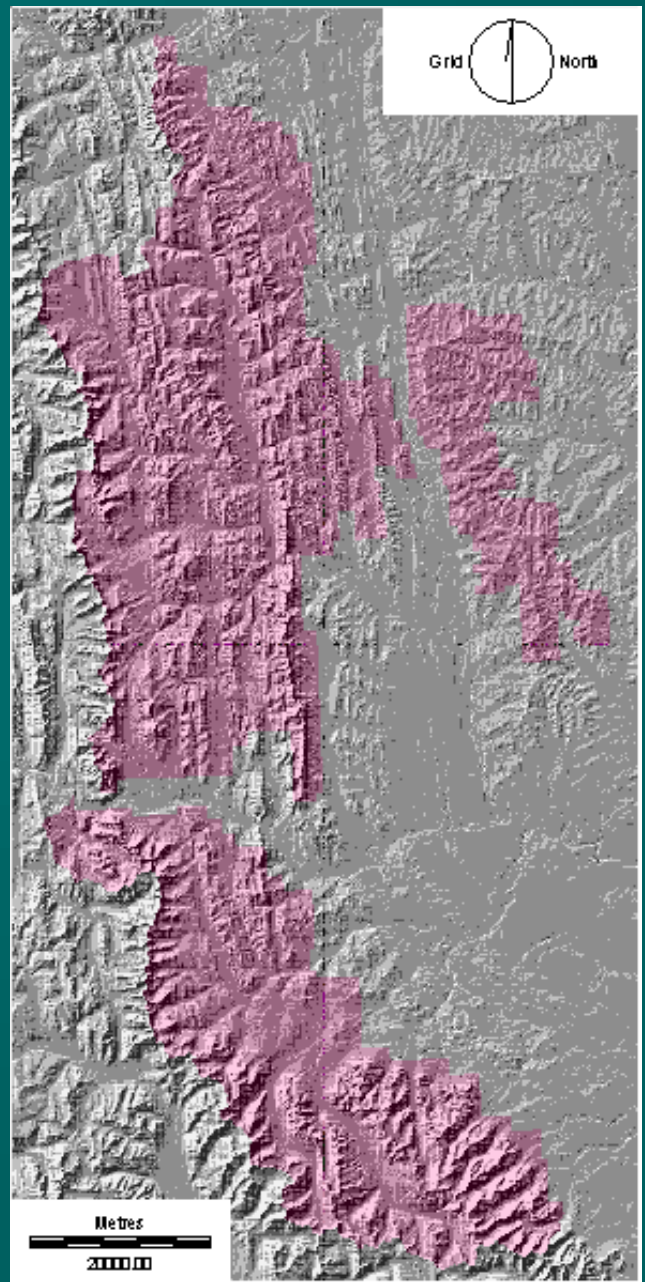
RECENT FIRE MAPPING

- Calculation of fire cycle for a period that was less impacted by fire suppression: 1930-1950.
- Fires mapped for the subalpine nsr.
- Fire cycle of 85 years or 2,400 ha/yr or 1.18% of forested area



FIRE REGIME MODELING: DATA INPUTS





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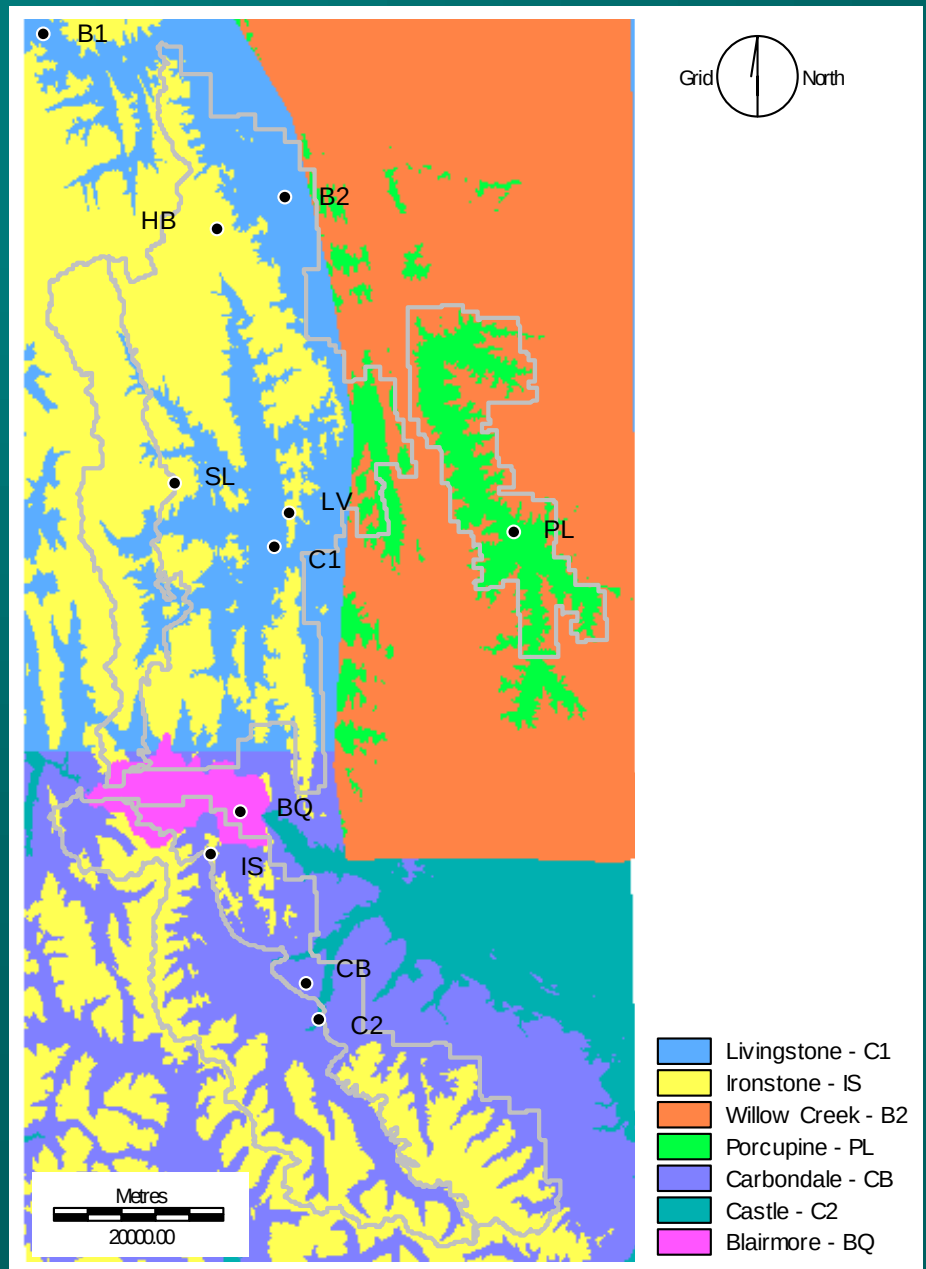

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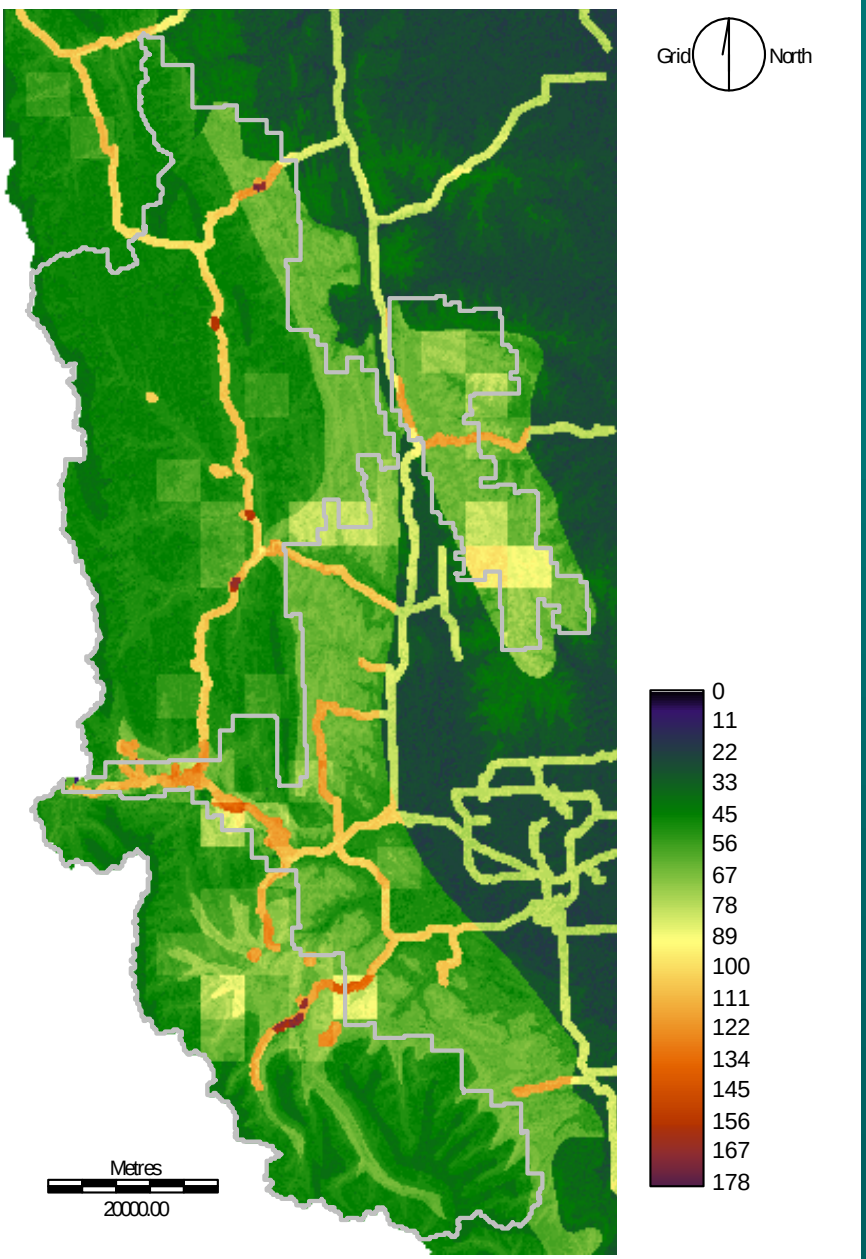
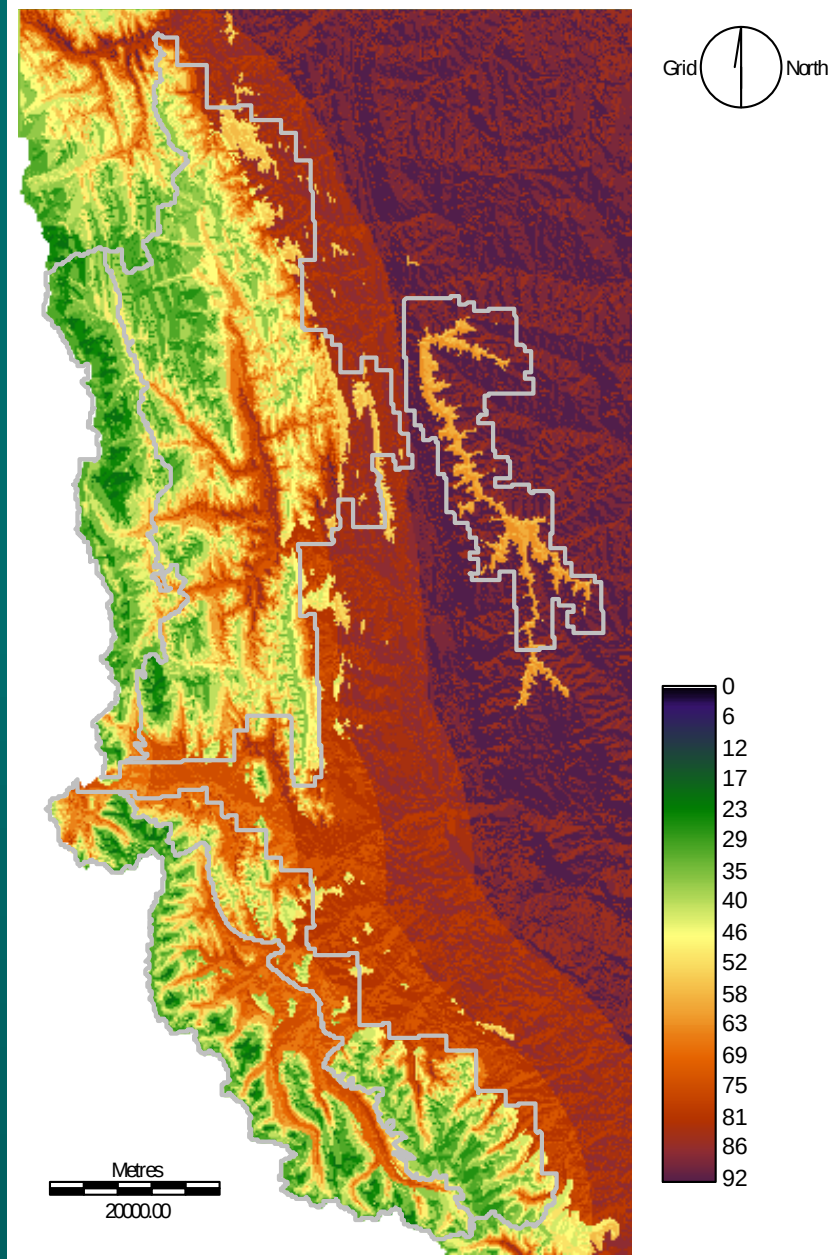


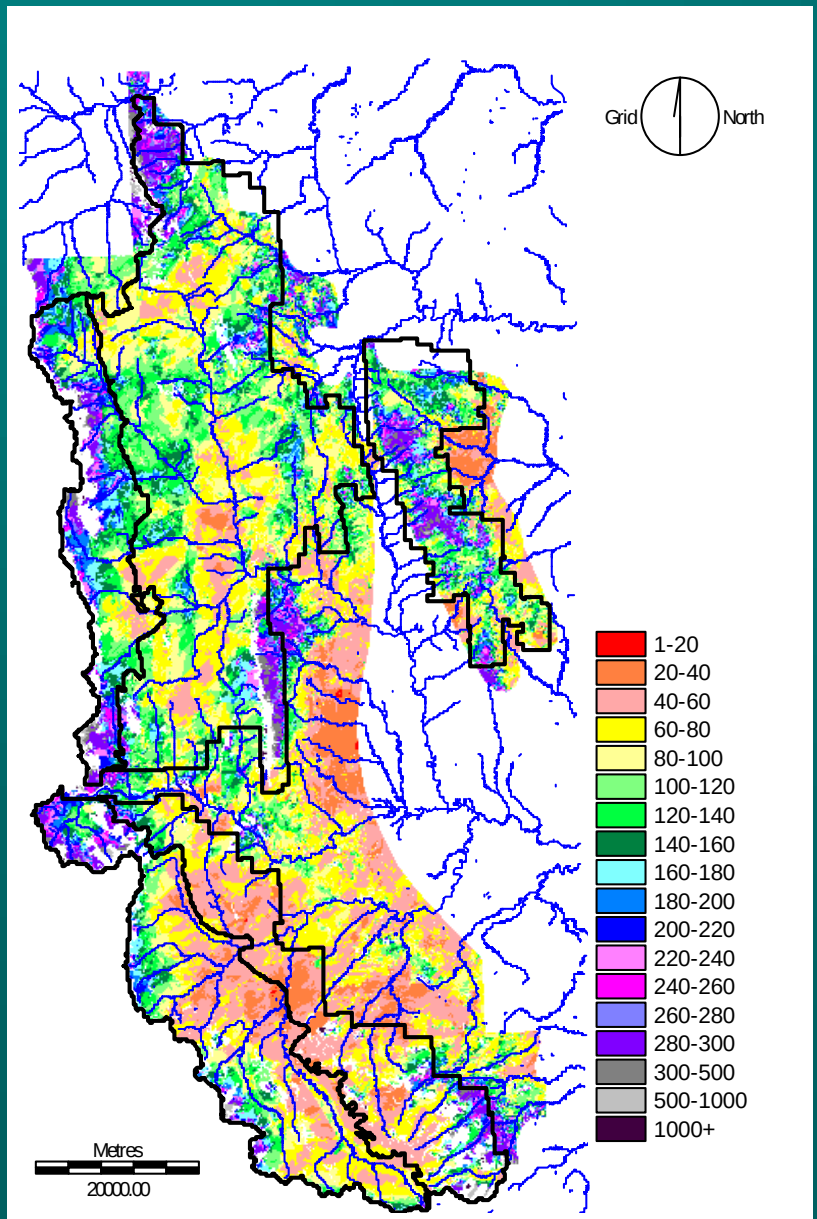


FIRE REGIME MODELING: DATA OUTPUTS

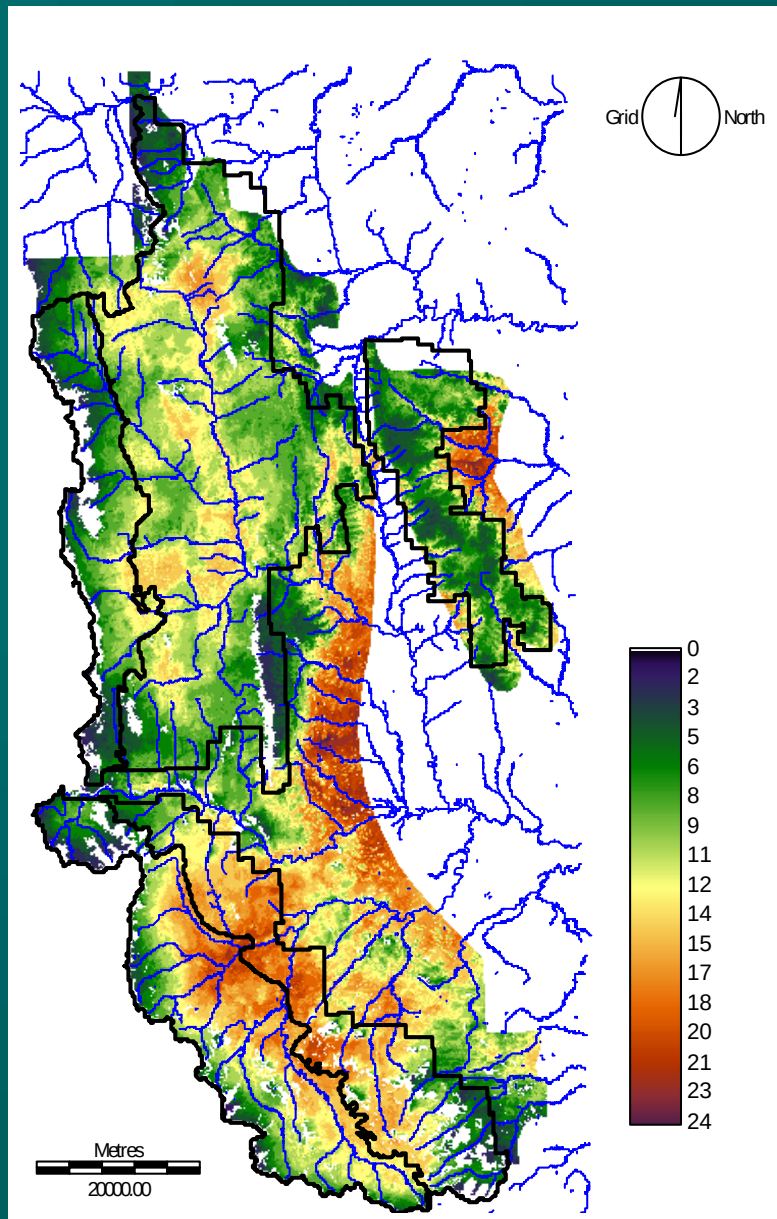
- Stand origin map
- Fire count map
- Age-class distribution + NRV
- Accurate fire cycle + NRV
- Fire size distribution

FIRE REGIME MODELING: DATA OUTPUTS

Stand Origin



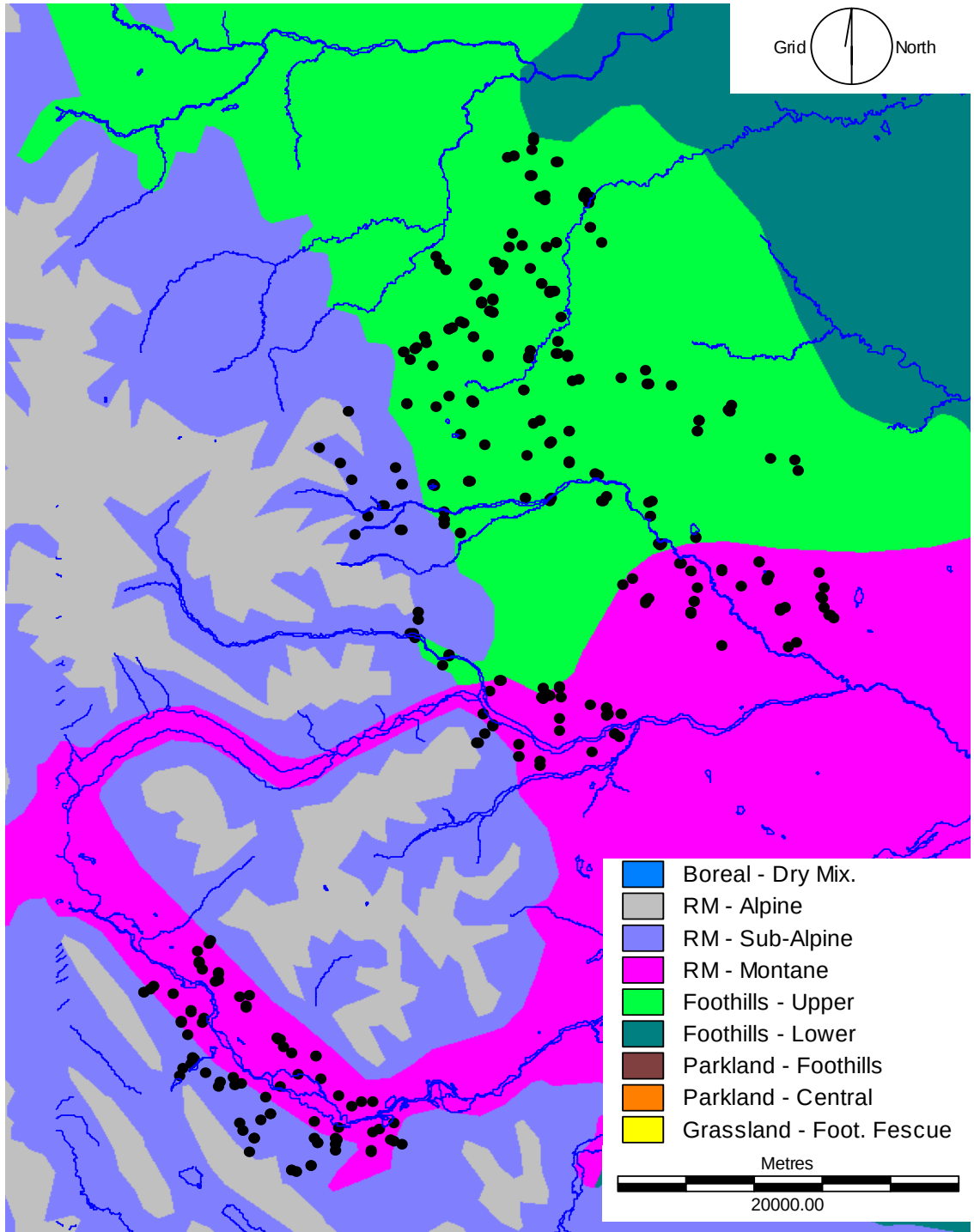
Fire Count



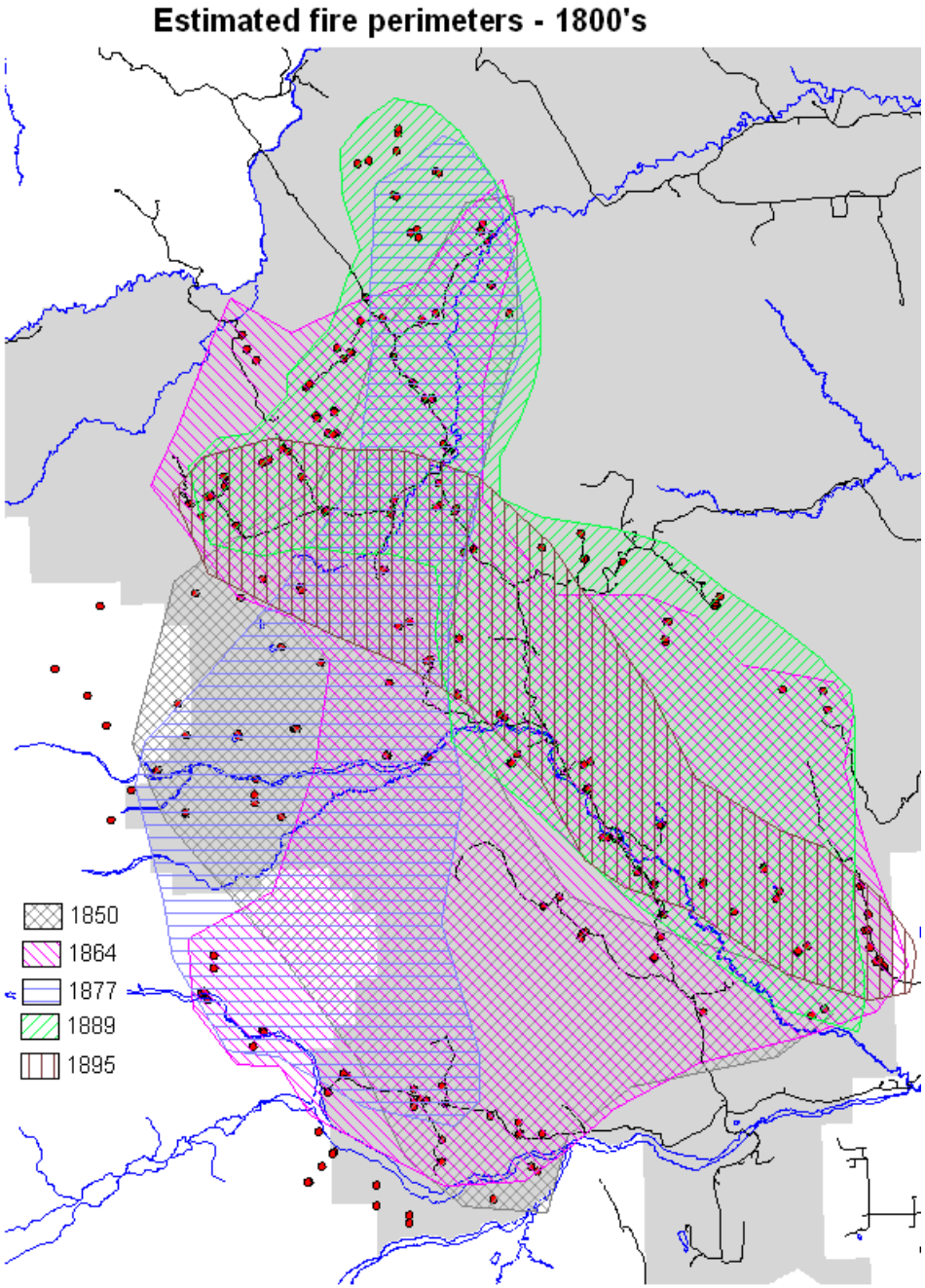
FIRE CYCLE MODEL RESULTS

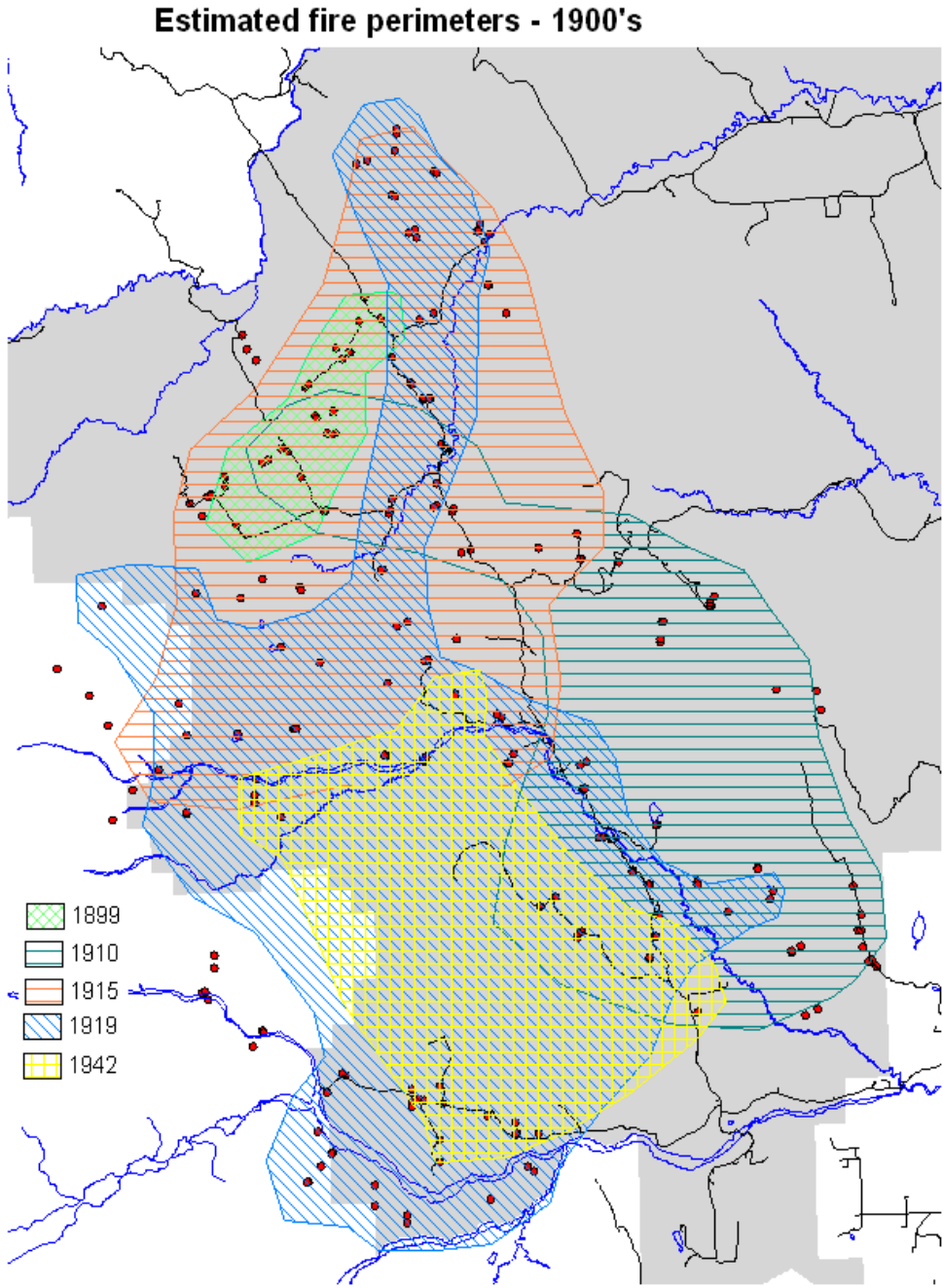
	Sub	Montane	CDN	Living.	CDS	Castle	P.Hills
Avg FC	116	92	145	115	64	84	n/a
Std Dev	23	16	38	22	16	25	
NRV FC	93-139	76-108	107-183	93-137	48-80	59-109	
Shortest FC	70	60	80	70	40	40	
Longest FC	190	150	270	170	110	160	
Forested area	269,425	222,959	33,067	147,225	59,758	47,582	39,414
Annual area (ha/yr)	2,320	2,433	229	1,280	935	564	
Avg dist. rate (%/yr)	0.86	1.09	0.69	0.87	1.56	1.19	
NRV dist rate (ha)	1,938-2,827	2,064-2,937	181-309	1,075-1,583	747-1,245	437-807	
Min dist. rate (ha)	1,418	1,486	123	866	543	297	
Max dist. rate (ha)	3,849	3,716	413	2,103	1,494	1,190	

FIELD RESULTS
K. COUNTRY



FIELD RESULTS K. COUNTRY





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  - Kevin Quintilio
  - Dave Coish
  - Bev Wilson

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