

Climate change adaptation in the Harrop – Procter Community Forest

Forestry Adaptation Community of Practice

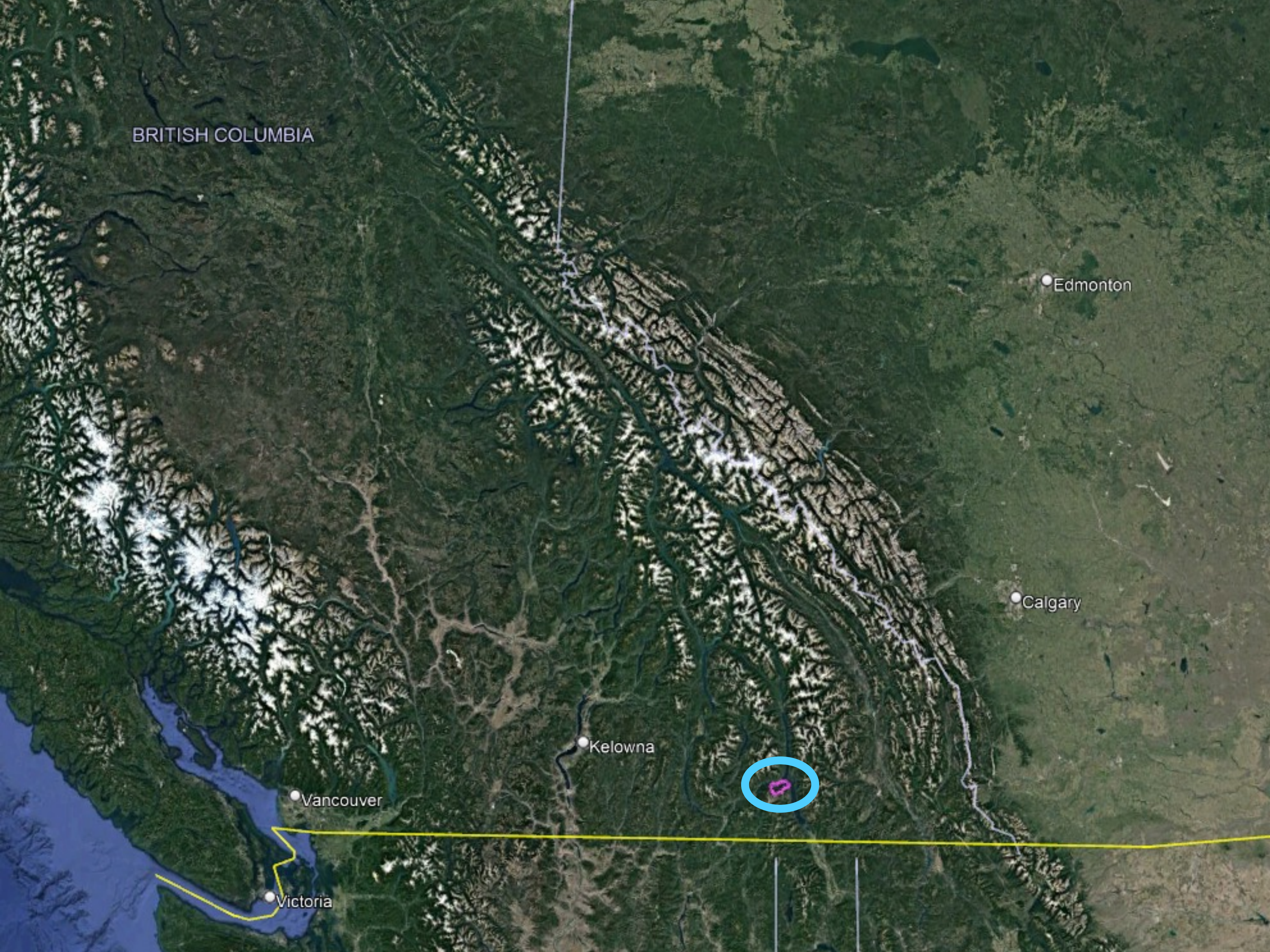
November 10, 2022

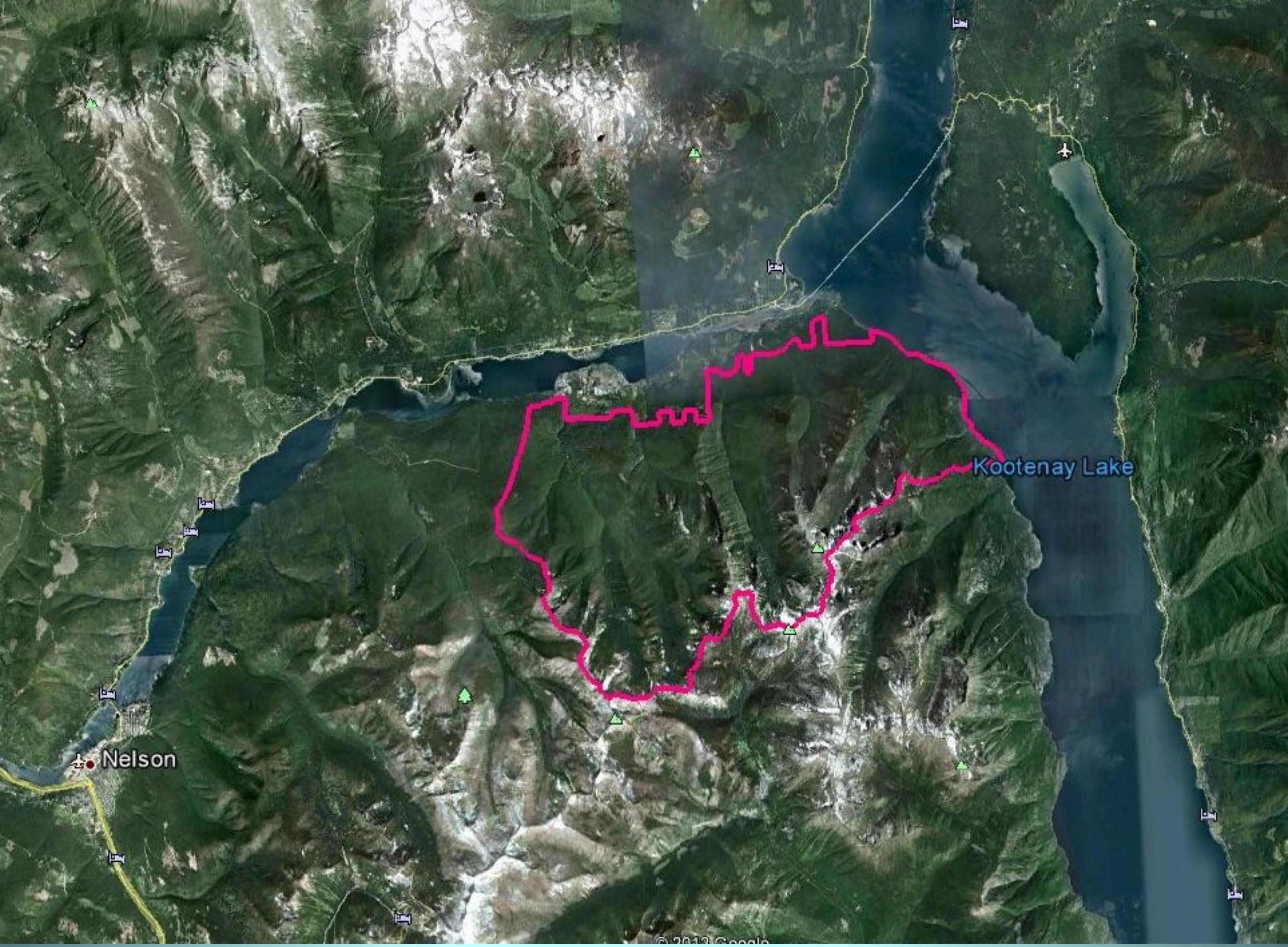
Erik Leslie, RPF

Forest Manager, Harrop-Procter Community Co-op

Harrop Procter Community Co-Op

Columbia Basin trust


BRITISH COLUMBIA
Edmonton
Calgary
Kelowna
Vancouver
Victoria


Kootenay Lake
Nelson

Harrop-Procter Community Forest

- 11,300 hectares
- 600 m to 2300 m elevation
- Whole watersheds
- 110-year old mixed coniferous stands
- 70+ years of fire exclusion


2017 wildfire
2003 wildfire
Harrop Creek

Harrop-Procter Community Co-op

- Community Forest since 1999
- Not-for-profit co-op, 200+ members
- Objectives:
  - Ecosystem-based forestry, water protection
  - Local employment
  - *Community wildfire protection (since 2003)*
  - *Climate change adaptation (since 2010)*


WHY THIS PROJECT?
Lots of talk, not enough action

Disconnect between climate change adaptation theory and management actions on the ground

Need real-world management examples

Adaptation: generalities → specifics

- 'Promote resilient species'
- 'Enhance landscape diversity'
- 'Partial cut dry sites'

- Which species? Where?
- Species and age targets?
- Where? How?

Project advisory committee (1)

Rachel Holt, PhD, RPBio—Veridian Ecological Consulting, Nelson

Cindy Pearce, RPF—Mountain Labyrinths Consulting, Revelstoke

Brendan Wilson, PhD, RPBio—Chair, School of Environment & Geomatics, Selkirk College

Mike Drinkwater, RPF—Vice President, Harrop-Procter Community Cooperative, Procter

Tim Hicks/ Brianna Burley—CBT Manager, Water and Environment, Castlegar

Project advisory committee (2)

Deb MacKillop, RPF—FLNRORD Regional Ecologist, Kootenay-Boundary Region

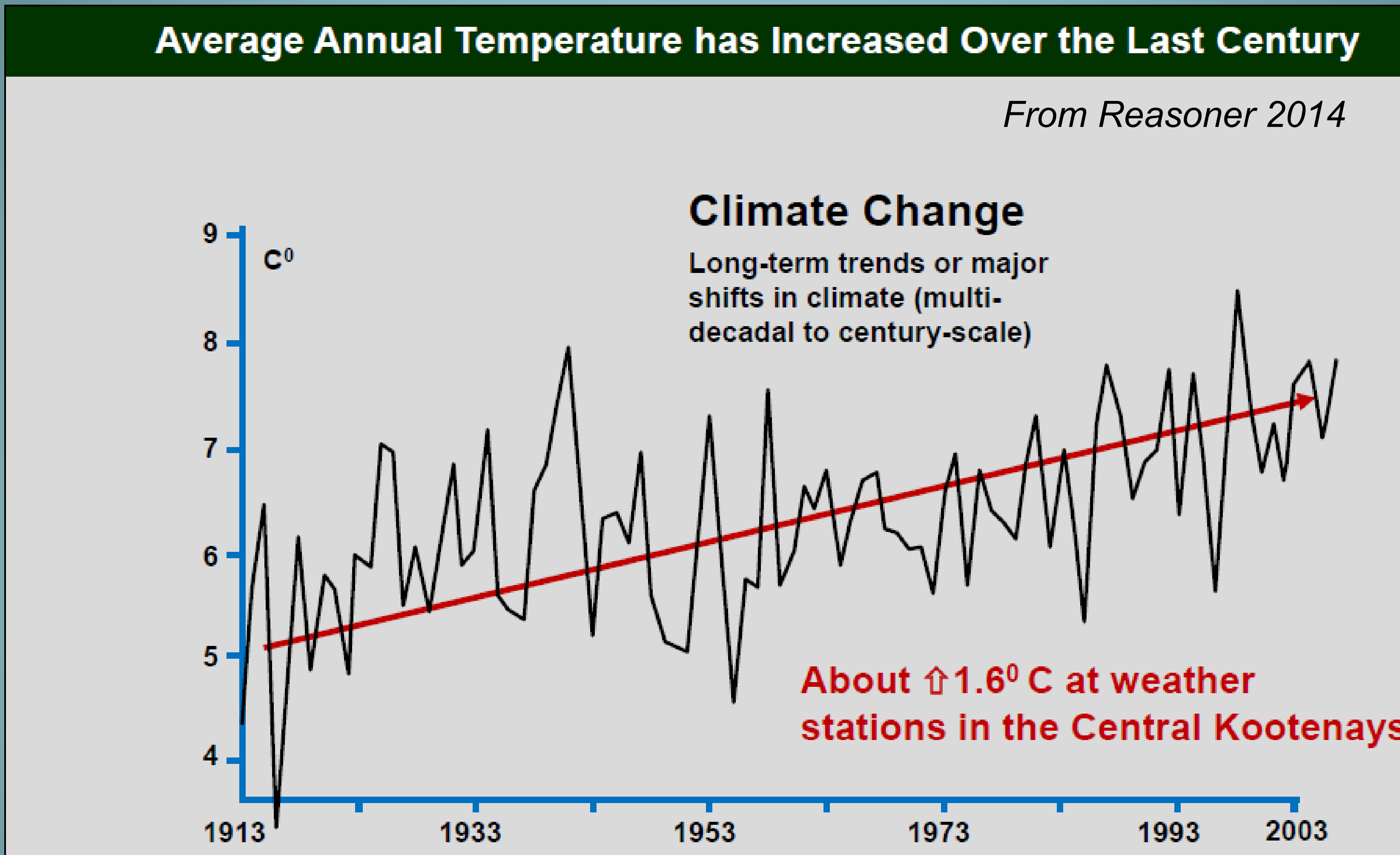
Ian Wiles, RPF—FLNRORD District Stewardship Officer, Selkirk Resource District

Randy Waterous, RFT—Forestry and Land Use Superintendent, Interfor Grand Forks

Craig Stemmler, RPF—Woodlands Manager, Atco Wood Products, Fruitvale

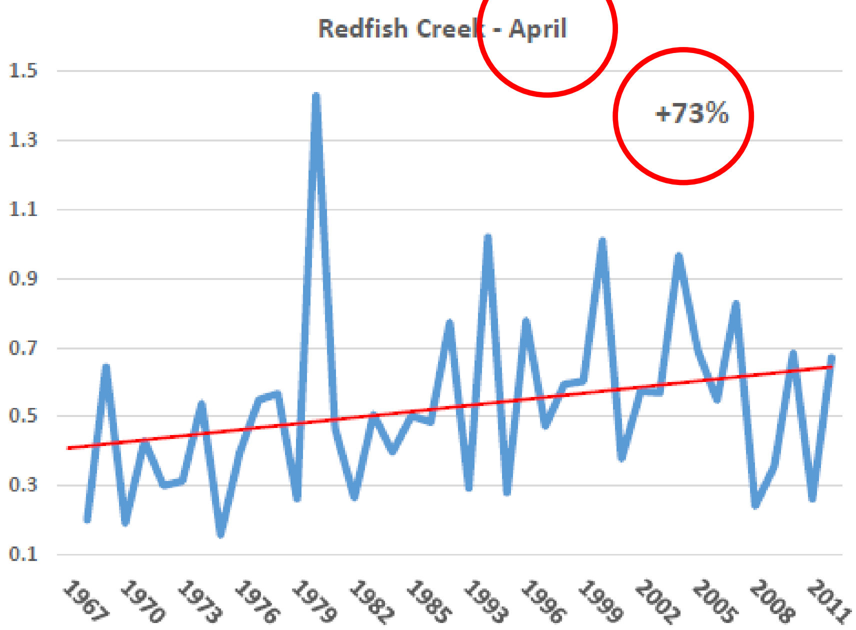
Stephan Martineau, Manager—Slocan Integral Forestry Cooperative, Winlaw

Premise 1: sufficient science to act

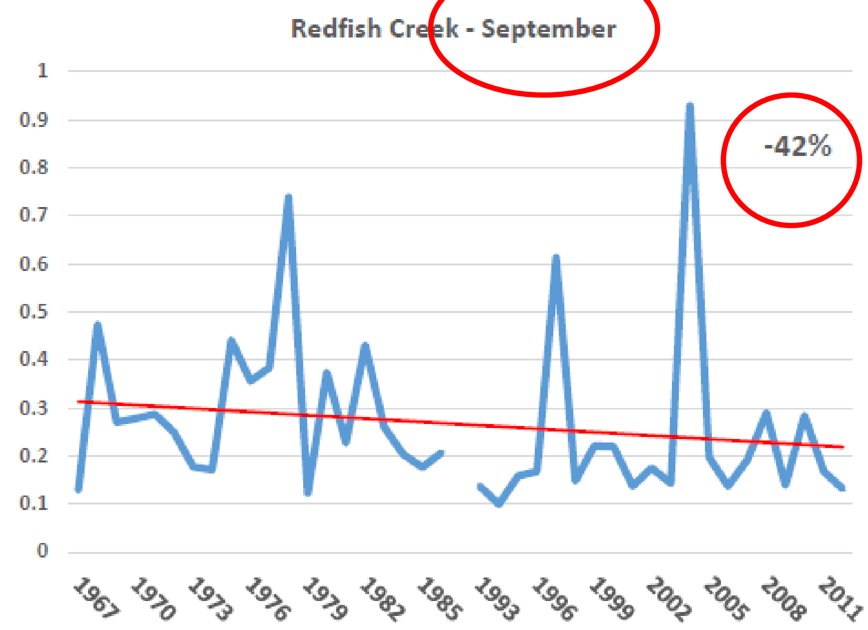


Significant changes over past 40 years

Climate Change Impacts Streamflows and Snowpack



Trend Analysis (Zhang, 1999)
Mann Kendall p = 3.8E-2



Trend Analysis (Zhang, 1999)
Mann Kendall p = 3.7E-2

Monthly Mean Discharge (m^3/s)

Columbia Basin trust

Climate models: simplified summary

Over the next 30 to 60 years:

- ***Fall/ winter/ spring* 2 - 5° warmer and 10 - 25% wetter**
- ***Summer* 3 - 7° warmer and up to 30% drier**
- **~5 to 15+ times more average annual area burned**
- **Increased frequency and magnitude of extreme precipitation events**

Good enough to get started…

Premise 2: sufficient high-level direction

Climate Change Strategy (2013 – 2018)
Ministry of Forests, Lands and Natural Resource Operations

2013

September 10, 2013

Adapting Forest Management in the Kamloops TSA to Address Climate Change

The Kamloops Future Forest Strategy

2009

FINAL REPORT

By the KFFS TSA Team

West Kootenay Climate Vulnerability and Resilience Project

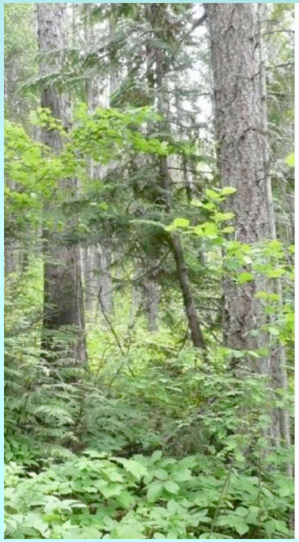
Report #9:

Moving Towards Adaptation Strategies in Forest Management - a Starting Place for the West Kootenays

H. Pinnell, R.P.F, R.F. Holt, R.P.Bio., C. Pearce, R.P.F. and G. Utzig, P.Ag.

2012

Other project reports available at: www.kootenayresilience.org



BC Ministry of Forests Lands and Natural Resource Operations

Forest Stewardship Action Plan
for
Climate Change Adaptation

Seminar
March 1, 2012

Kathy Hopkins - Technical Advisor – Climate Change

2012

British Columbia

1

Premise 3: Consistent community values

- Protect domestic water
- Create sustainable jobs in the community
- Maintain/ enhance biodiversity
- Protect community from wildfire



Overview of project

Risk assessment—***Where*** do we prioritize management actions?

Operations strategy—***How*** do we manage differently?

Management Plan & AAC—***How fast*** do we adapt?

Risk Assessment

Objective: Prioritize areas for adaptive actions

- *Focus on next 20 to 40 years*

RISK = Probability X Consequence

***Probability of*:**

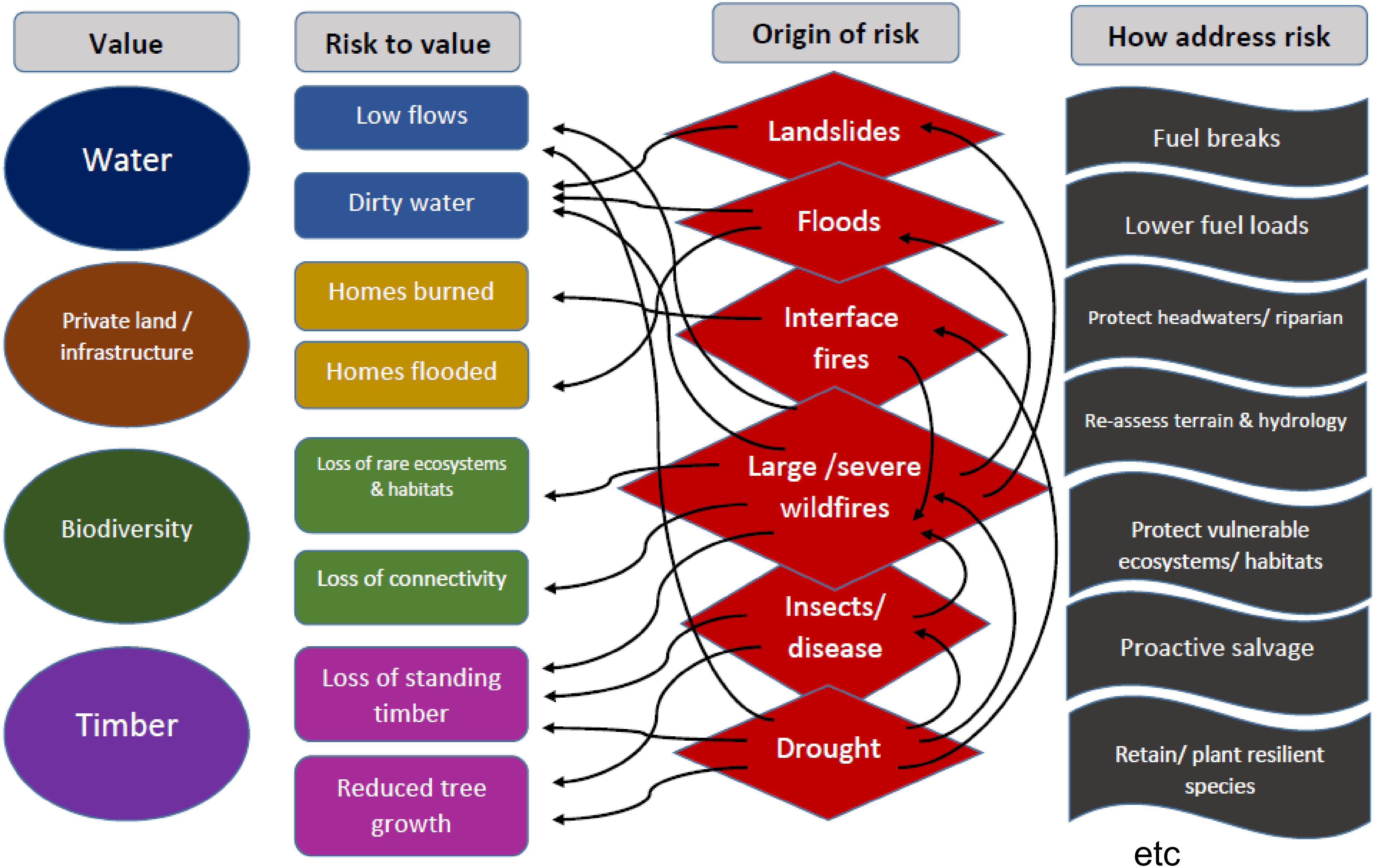
- Fire
- Drought

***Consequence to*:**

- Homes
- Water
- Biodiversity
- Timber

RISK MATRIX

		Fire Consequence			
		High	Moderate	Low	Very_low
Fire Probability	Extreme	Extreme	High	High	Low
	High	High	High	Moderate	Low
	Moderate	High	Moderate	Moderate	Low
	Low	Moderate	Moderate	Low	Low
	Very Low	Moderate	Low	Low	Low

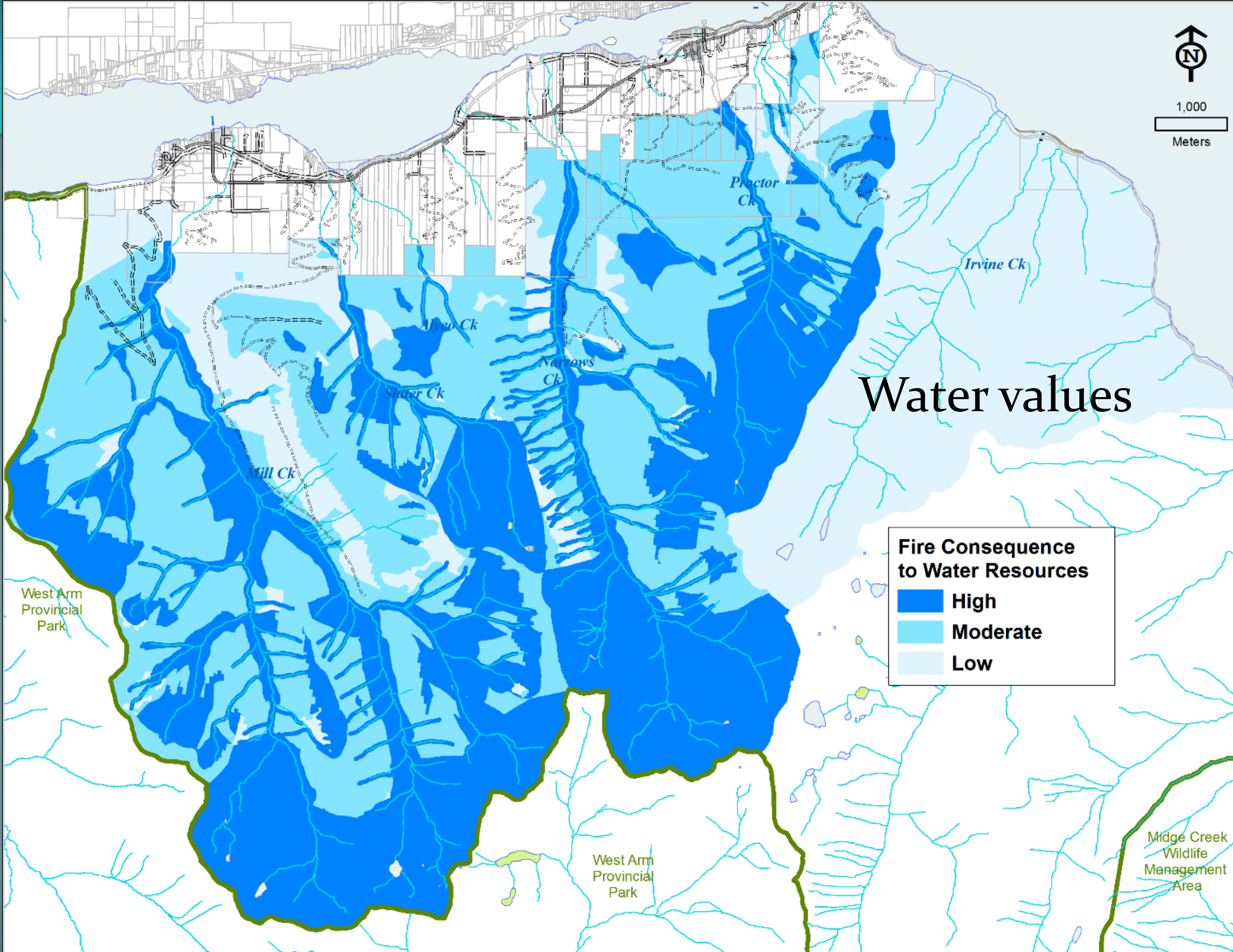


Value
Risk to value
Origin of risk
How address risk
Water
Private land / infrastructure
Biodiversity
Timber
Low flows
Dirty water
Homes burned
Homes flooded
Loss of rare ecosystems & habitats
Loss of connectivity
Loss of standing timber
Reduced tree growth
Landslides
Floods
Interface fires
Large /severe wildfires
Insects/ disease
Drought
Fuel breaks
Lower fuel loads
Protect headwaters/ riparian
Re-assess terrain & hydrology
Protect vulnerable ecosystems/ habitats
Proactive salvage
Retain/ plant resilient species
etc

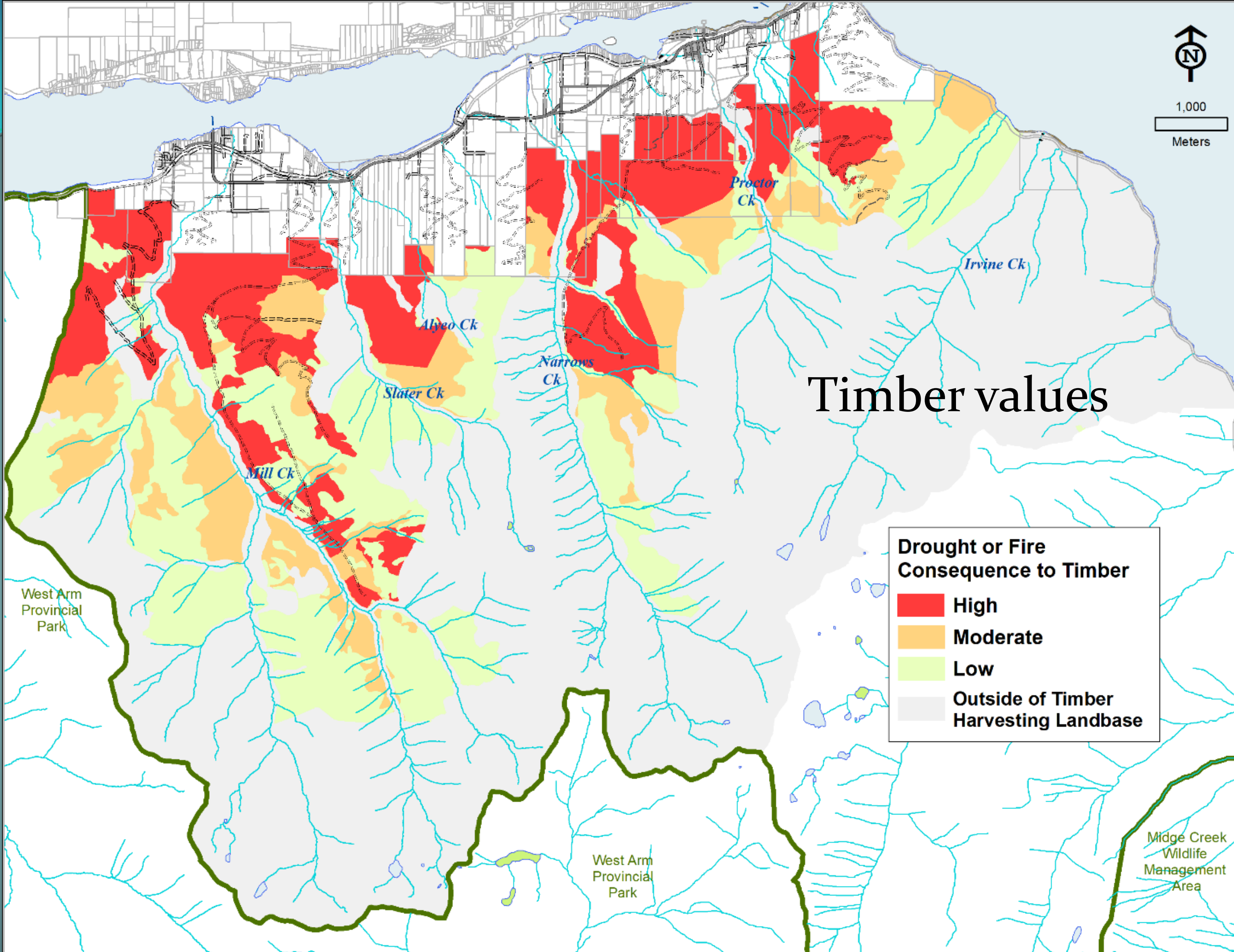
Consequence mapping: Values

- Homes
- Water
- Biodiversity
- Timber

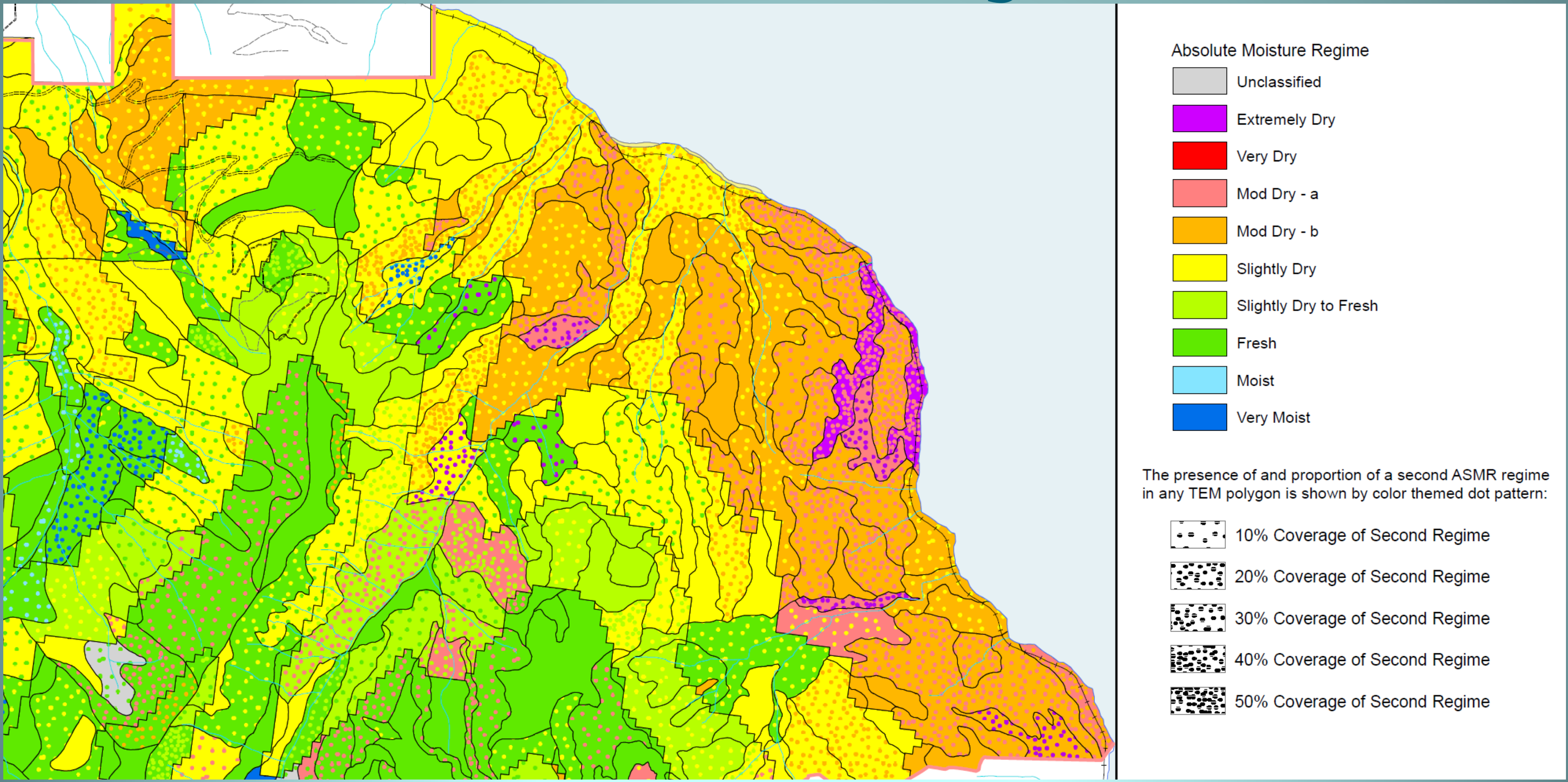
Water values



Timber values



Probability of fire and drought: *Actual Soil Moisture Regime (ASMR)*

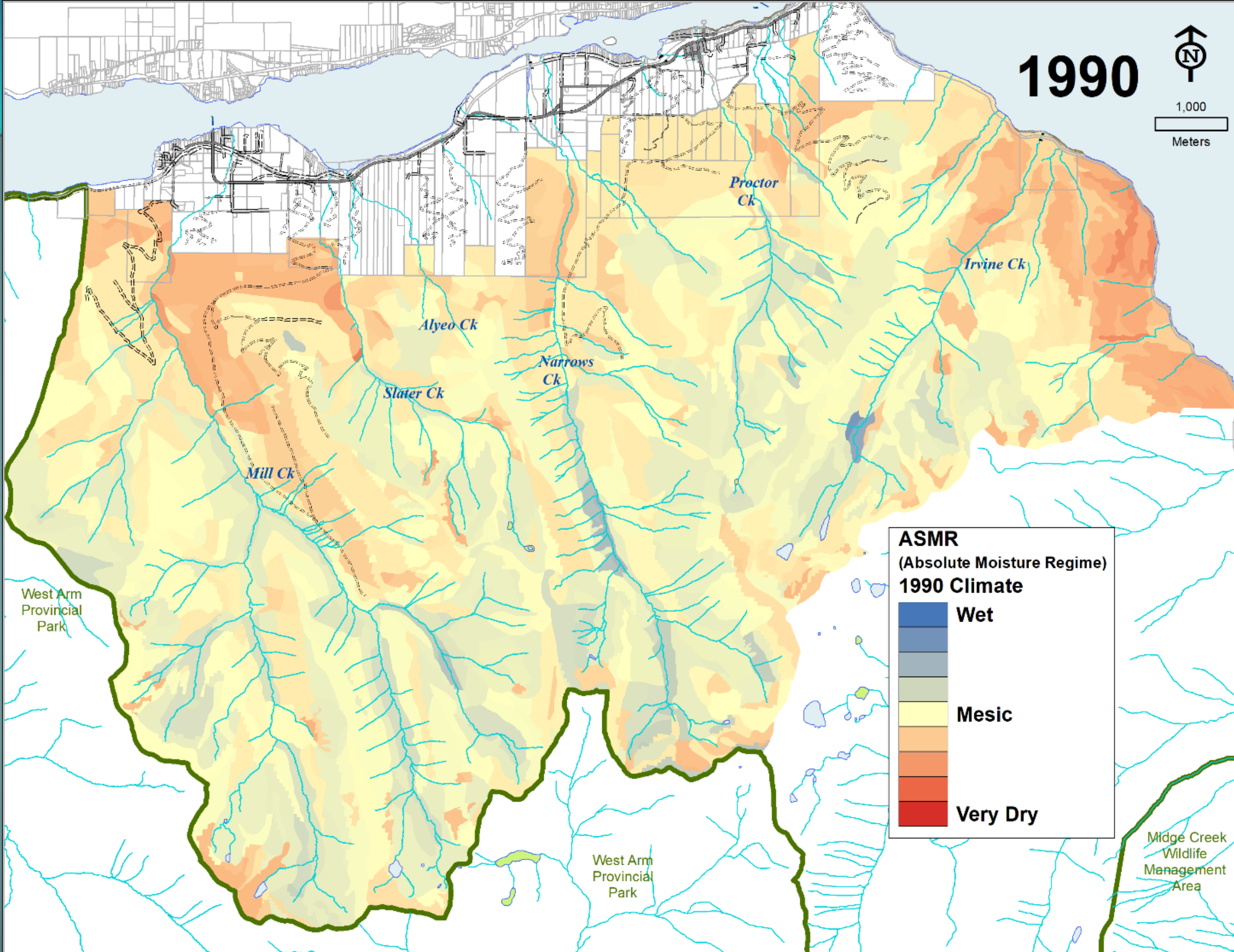


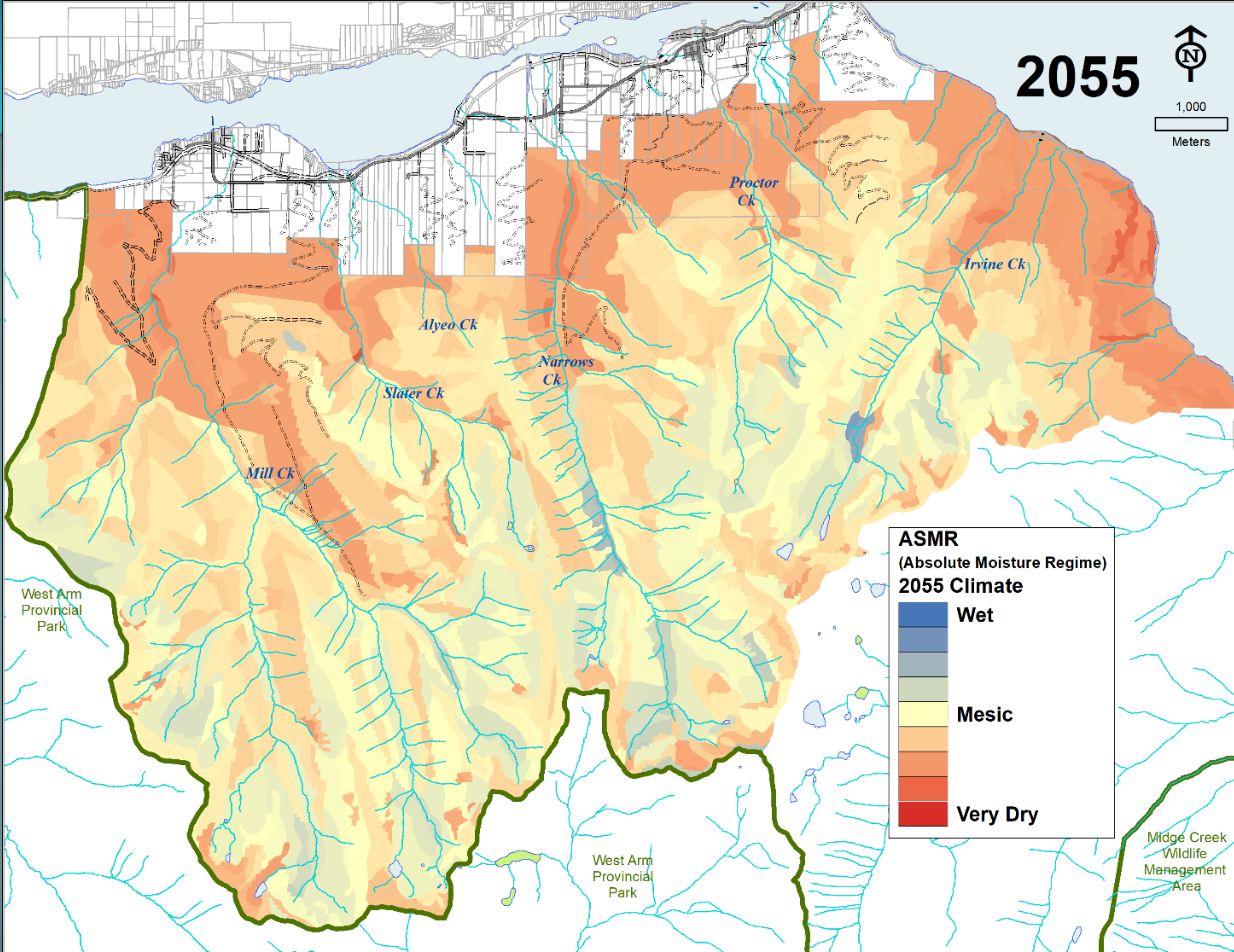
Shifts in Actual Soil Moisture Regime

Future Period	rSMR / BGC	SMR0	SMR1	SMR2	SMR 3	SMR4	SMR5	SMR6	SMR7
1961-1990	ICH dw 1	1.5	2	2.5	3	4	5.5	6.5	7.5
2085	ICH dw 1	0	1	1.5	2	2.5	4.5	5.5	7.5
1961-1990	ICH mw 4	2.5	2.5	3.5	4	5	6	7	8
2085	ICH mw 4	1.5	2	2.5	3	4	5.5	6.5	7.5

	rSMR	SMR0	SMR1	SMR2	SMR 3	SMR4	SMR5	SMR6	SMR7
1961-1990	ESSFwh 3	2.5	3.5	4	4.5	5	6	7.5	8
2085	ESSFwh 3	2	2.5	2.5	3.5	4	6	6.5	8
1961-1990	ESSFwm 3	3	4	4.5	5	5	6	7.5	8
2085	ESSFwm 3	2.5	2.5	3.5	4	5	6	7	8

From Will MacKenzie and Deb MacKillop, FLNRORD


1990
N
1,000
Meters
Proctor Ck
Irvine Ck
Alyeo Ck
Narrows Ck
Slater Ck
Mill Ck
West Arm Provincial Park
West Arm Provincial Park
Midge Creek Wildlife Management Area
ASMR
(Absolute Moisture Regime)
1990 Climate
Wet
Mesic
Very Dry



2055
N
1,000
Meters
Proctor Ck
Irvine Ck
Alyeo Ck
Narrows Ck
Slater Ck
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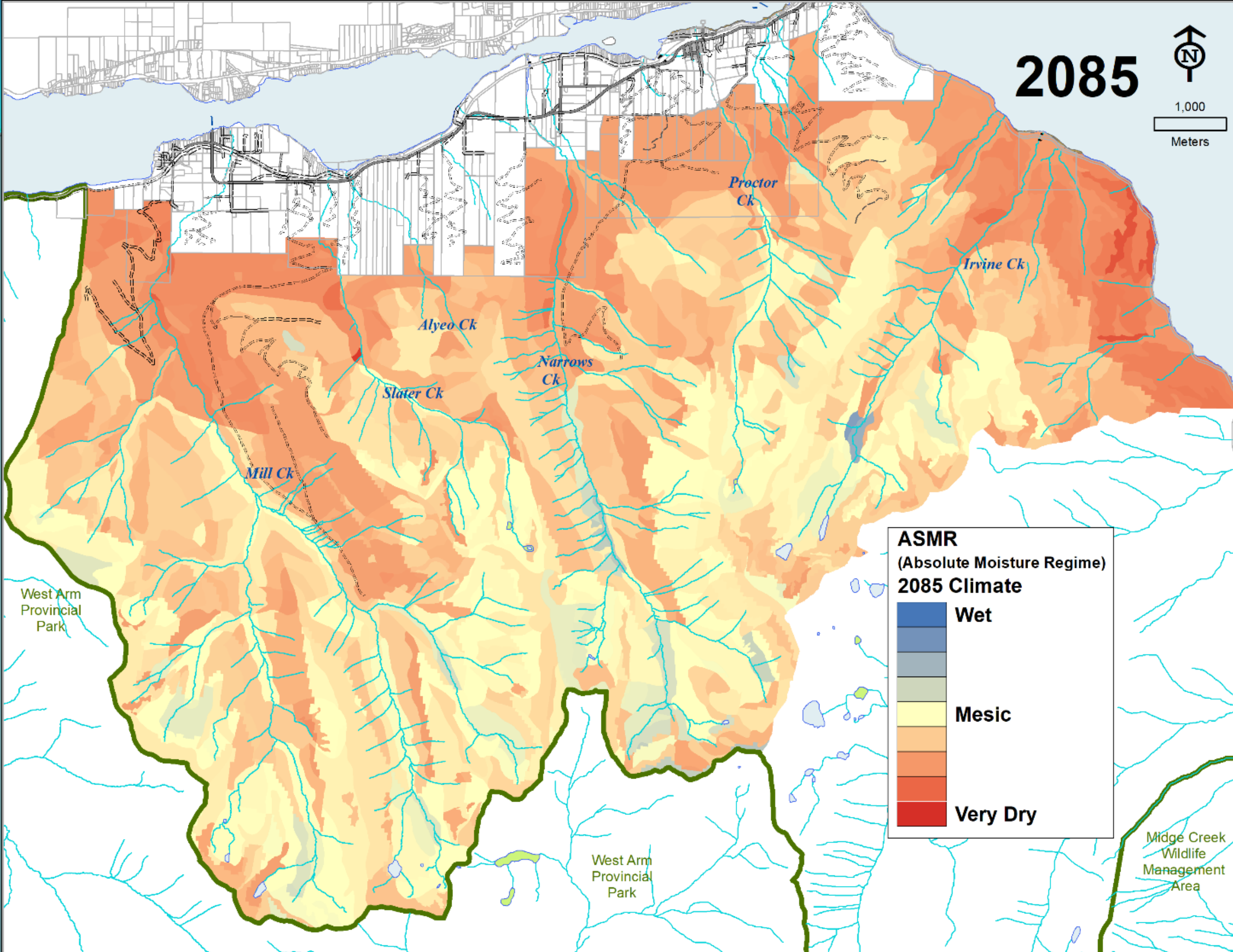

2085
N
1,000
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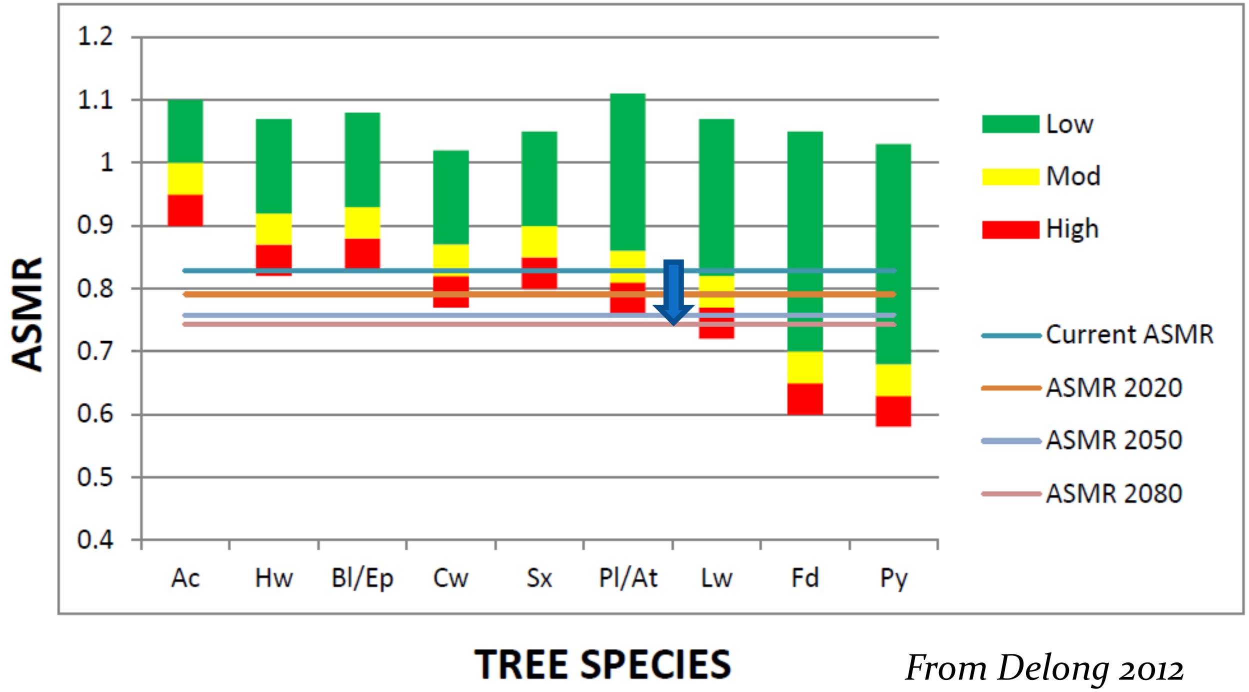
Slater Ck
Mill Ck
West Arm Provincial Park
West Arm Provincial Park
Midge Creek Wildlife Management Area
ASMR
(Absolute Moisture Regime)
2085 Climate
Wet
Mesic
Very Dry

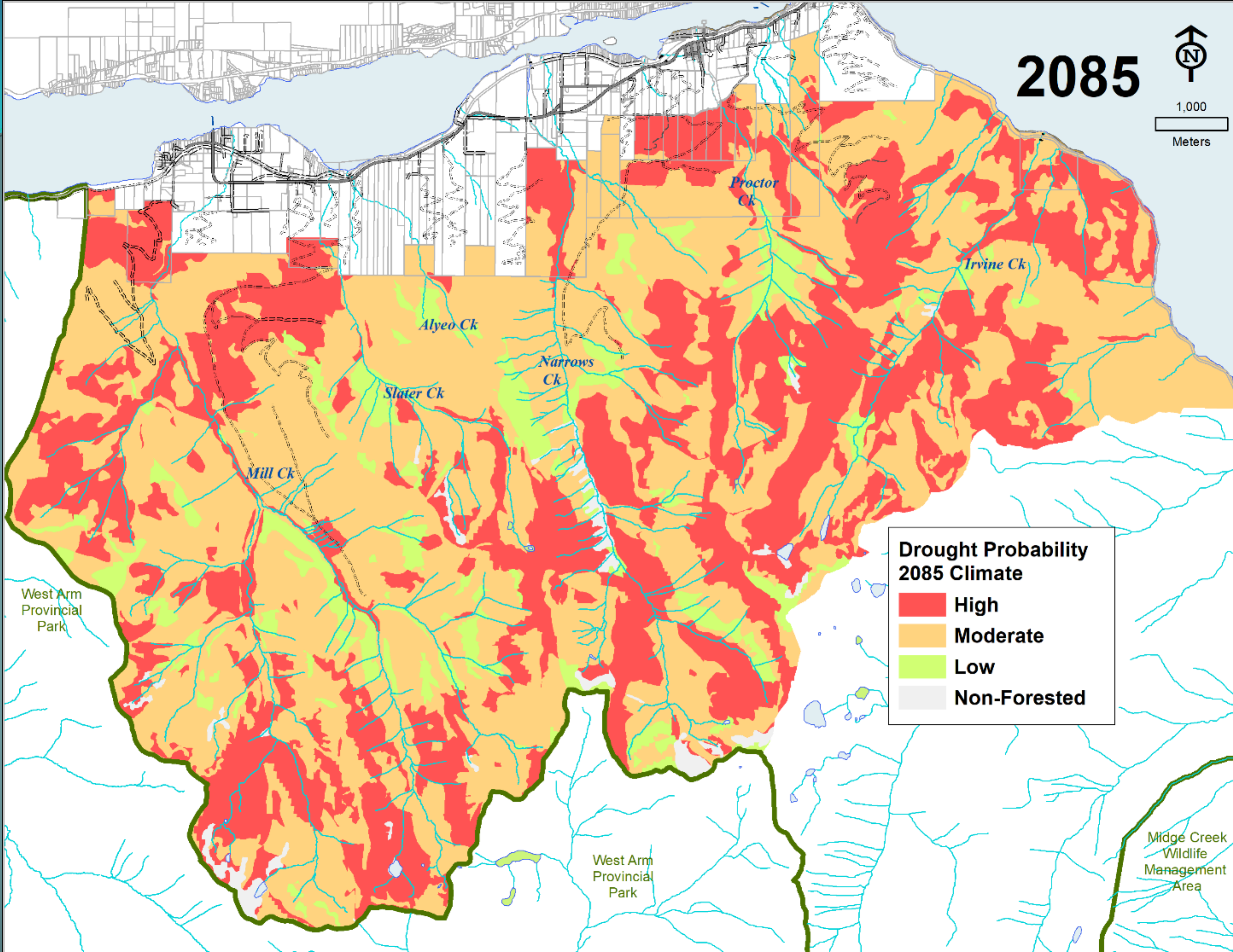
Drought probability: Tree species

BEC	ICH dw 1	Bigeoclimatic Unit	
RSMR	4	Relative Soil Moisture Regime	
		Actual Soil Moisture Regime	

Values			
Current ASMR	**ASMR 2020**	**ASMR 2050**	**ASMR 2080**
0.83	0.79	0.76	0.74



From Delong 2012



2085
N
1,000
Meters
Proctor Ck
Irvine Ck
Alyeo Ck
Narrows Ck
Slater Ck
Mill Ck
Drought Probability 2085 Climate
High
Moderate
Low
Non-Forested
West Arm Provincial Park
West Arm Provincial Park
Midge Creek Wildlife Management Area

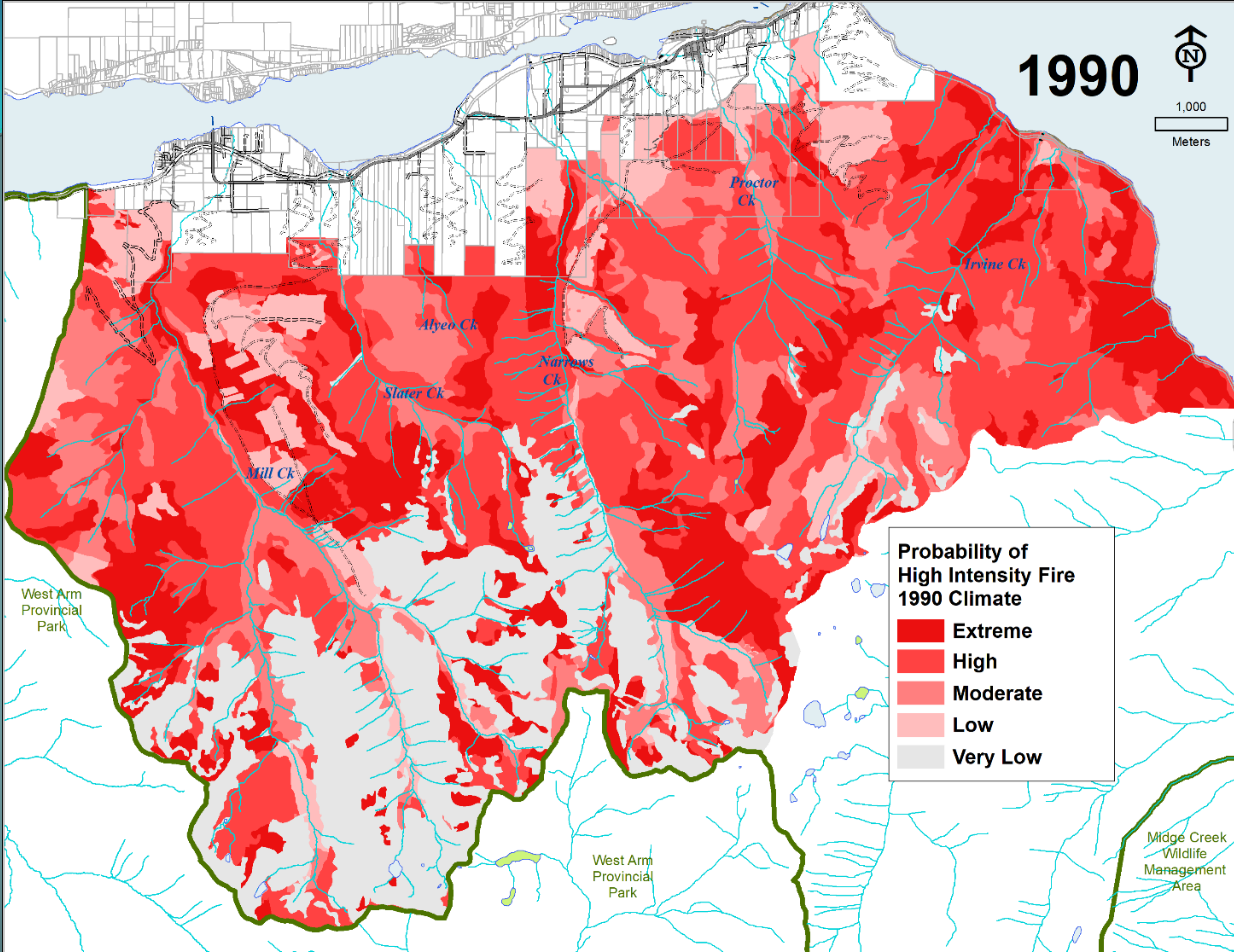
Fire probability

Fire probability: likelihood of high severity fire

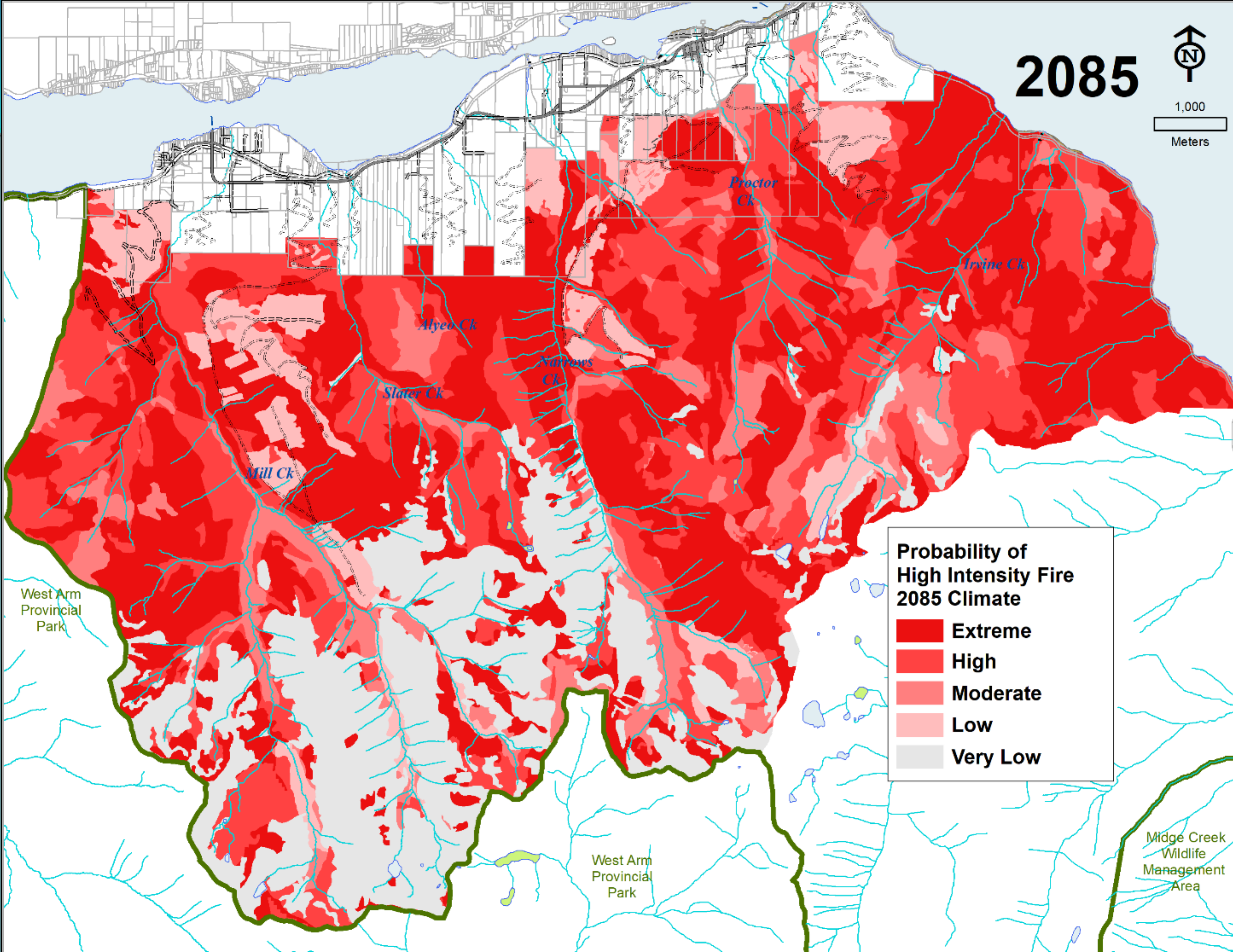
Did not use provincial algorithm

Fuel_Load	ASMR			
	A_DRY	B_MOD	C_MOIST	D_WET
a_Extreme	a_Extreme	a_Extreme	a_High	d_V_Low
a_High	a_Extreme	a_High	b_Mod	d_V_Low
b_Moderate	a_High	b_Mod	C_Low	d_V_Low
c_Low	b_Mod	C_Low	C_Low	d_V_Low
d_Very_Low	d_V_Low	d_V_Low	d_V_Low	d_V_Low

Adjust rating based on
- **Slope**
- **% dead pine/ balsam**
- **cedar/hemlock component**



1990
N
1,000
Meters
Proctor Ck
Irvine Ck
Alyeo Ck
Narrows Ck
Slater Ck
Mill Ck
West Arm Provincial Park
West Arm Provincial Park
Midge Creek Wildlife Management Area
Probability of High Intensity Fire 1990 Climate
Extreme
High
Moderate
Low
Very Low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Probability of High Intensity Fire 2085 Climate
Extreme
High
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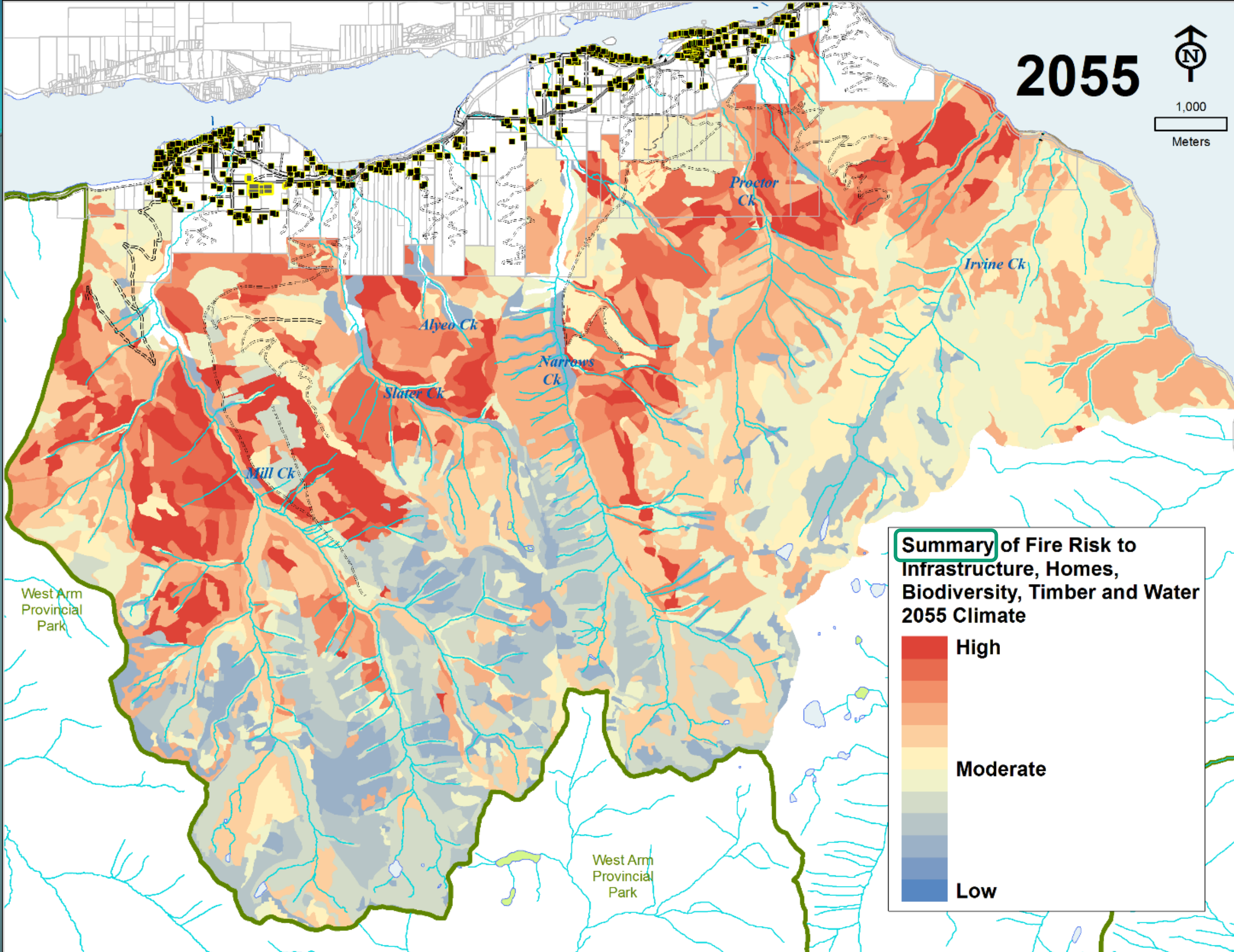
Low
Very Low


2055
N
1,000
Meters
Proctor Ck
Irvine Ck
Alyeo Ck
Narrows Ck
Slater Ck
Mill Ck
West Arm Provincial Park
West Arm Provincial Park
Summary of Fire Risk to Infrastructure, Homes, Biodiversity, Timber and Water 2055 Climate
High
Moderate
Low

Risk assessment conclusions

Triage—need to prioritize

Highest risk areas

Homes: Untreated WUI (except moist sites)

Water: Headwaters areas with high fire likelihood

Biodiversity: Old forests on drier sites

Timber: Accessible stands on drier sites, especially cedar/hemlock

Operations strategy

Resist (protect)

- Construct fuel breaks
- Protect old forests & riparian (hold carbon)
- Connectivity—reserves

Realign (transition)

- Change forest structure
- New stocking standards
  - Ponderosa pine, deciduous
- Connectivity—treatments

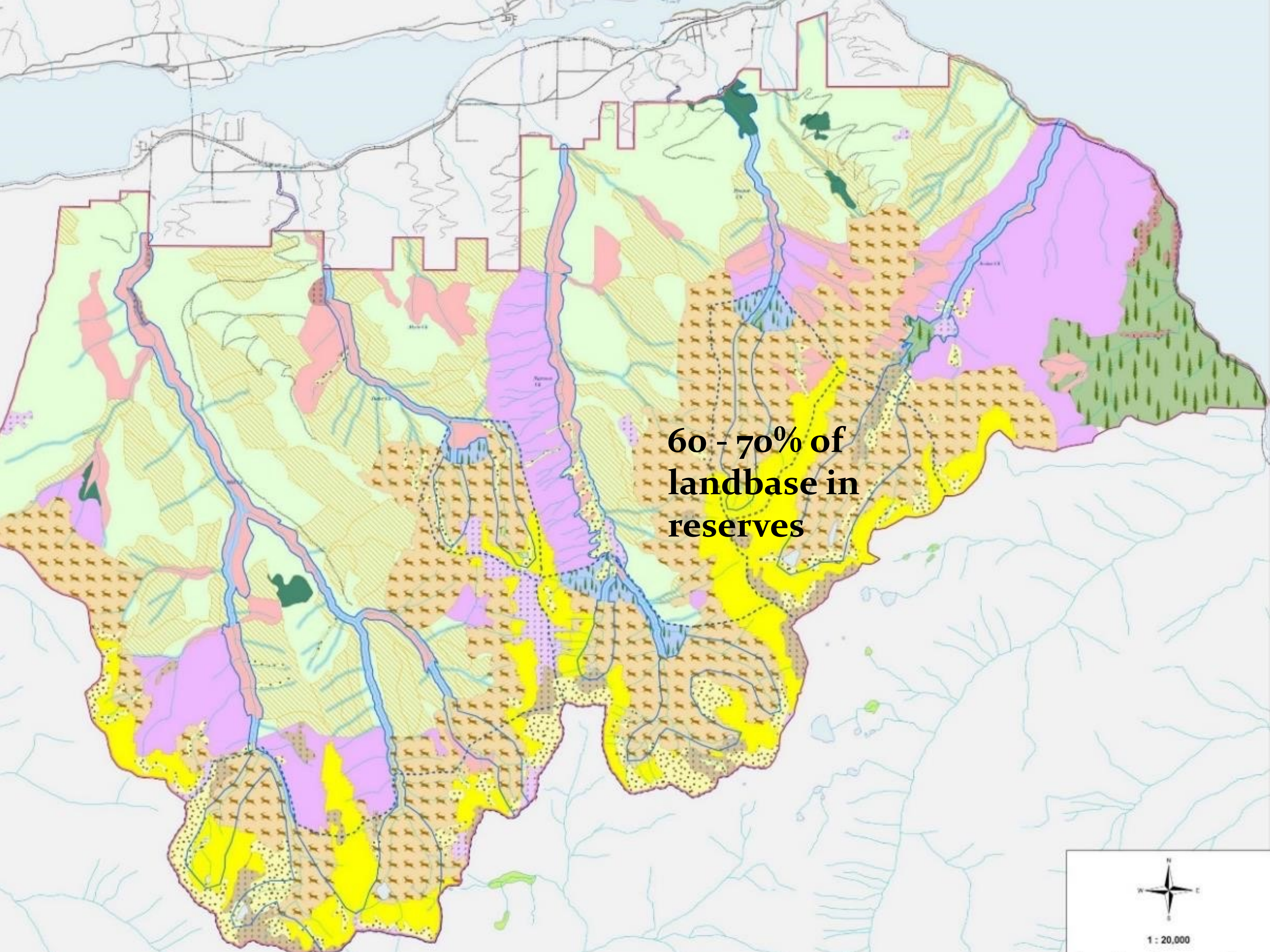
Operations strategy

Carbon carrying capacity

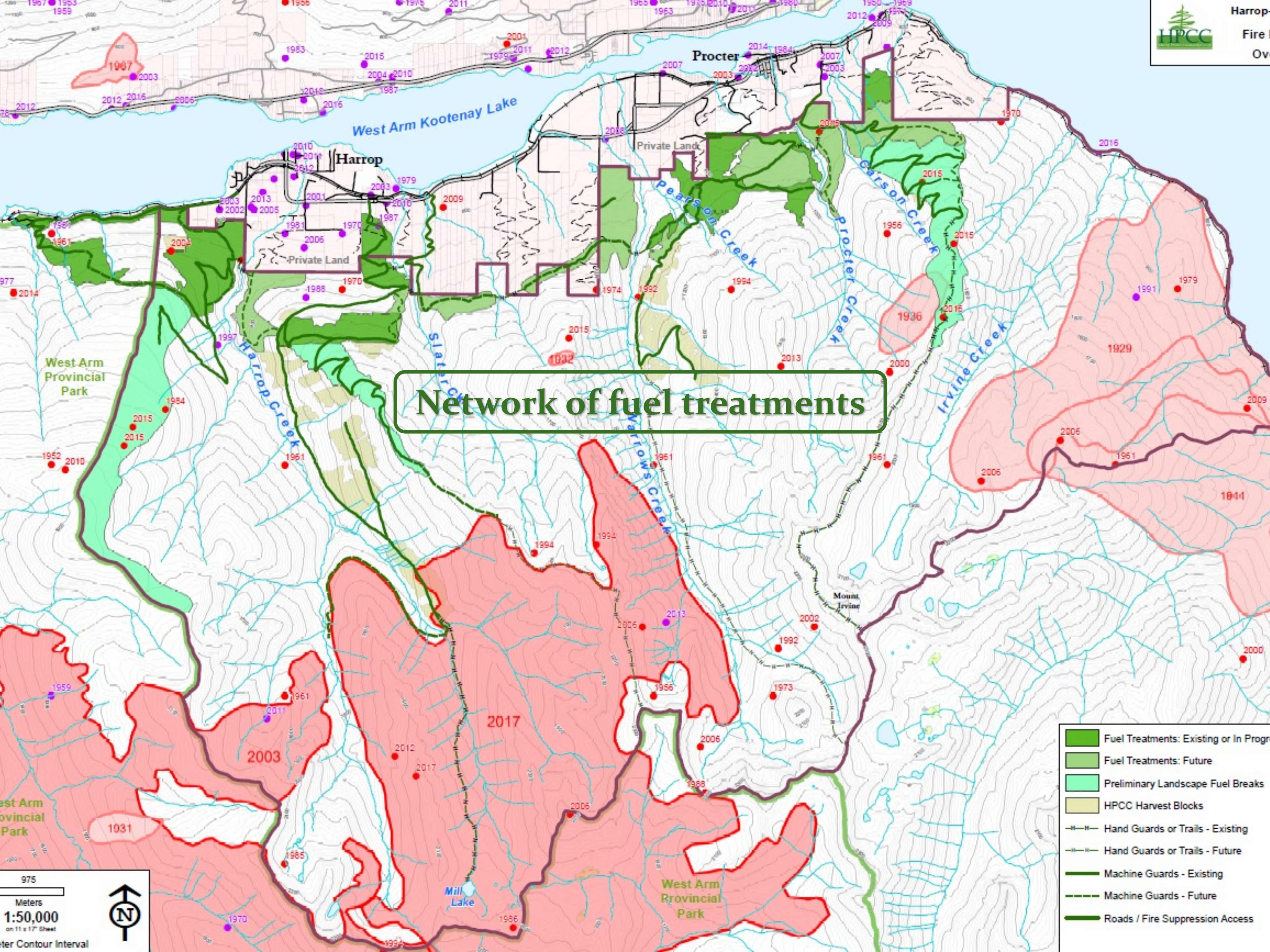
Peak carbon was June 2003…

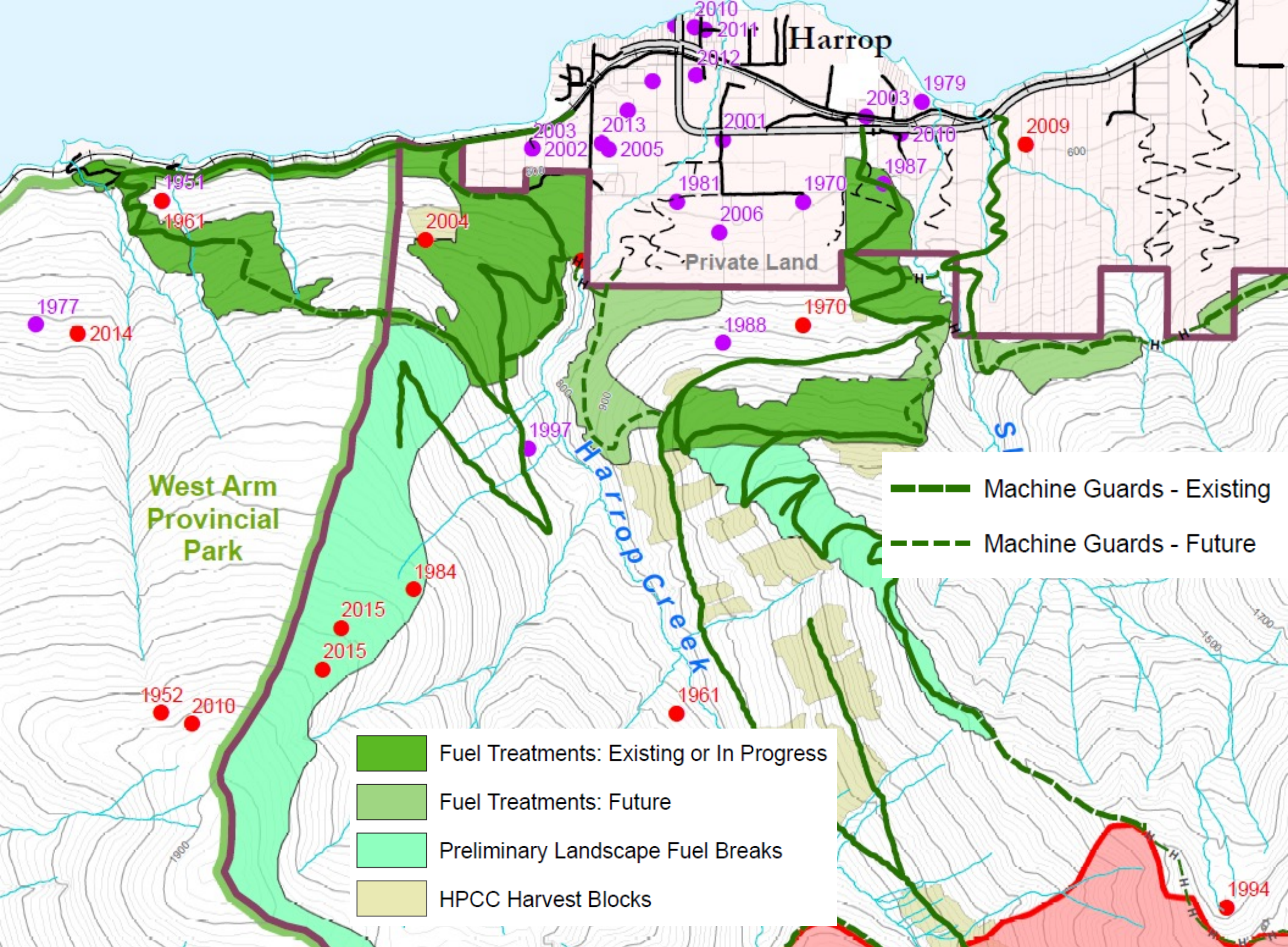
Where can we hold carbon?

- *short-term vs long-term*
- *manage transition*

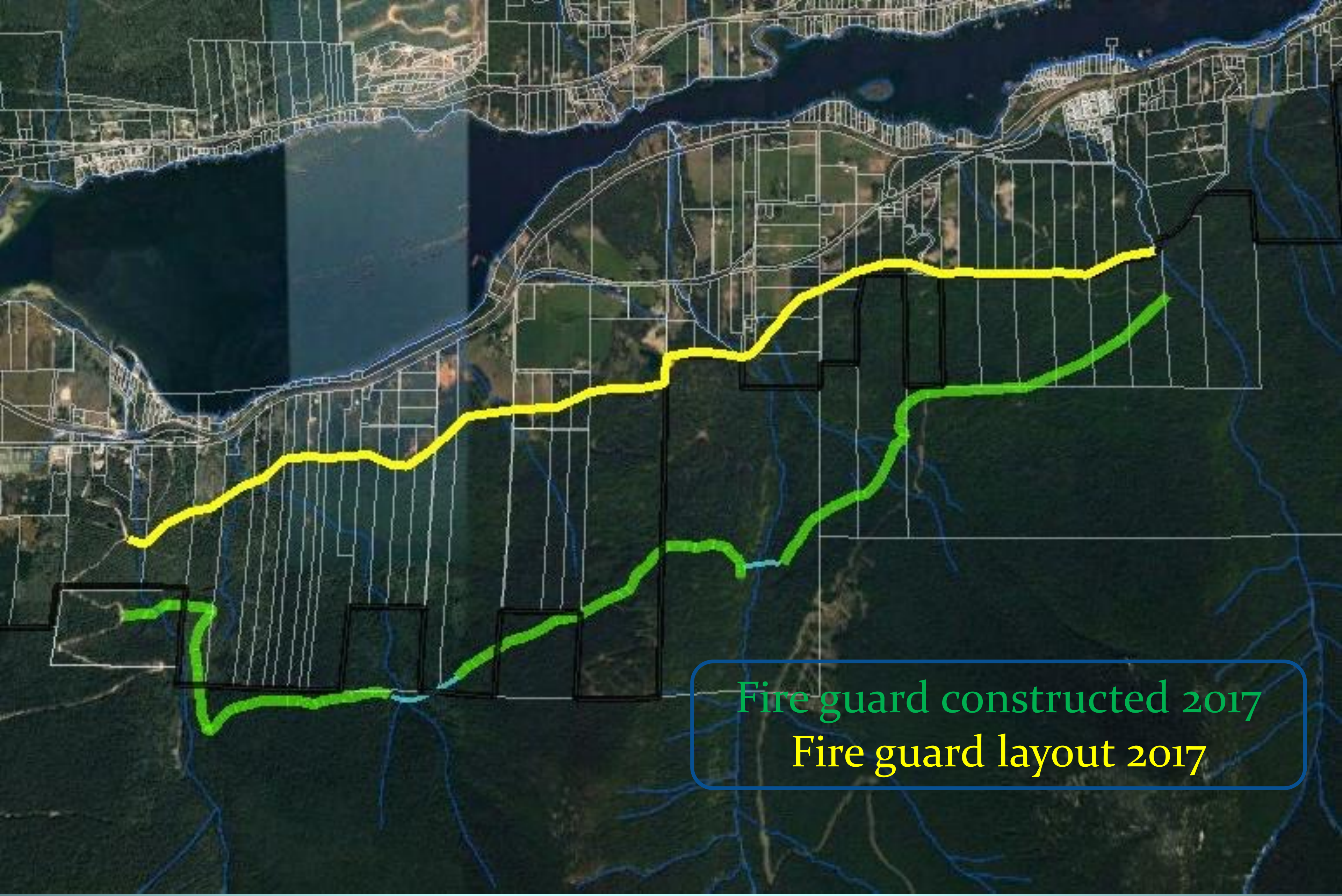

60 - 70% of
landbase in
reserves
1 : 20,000

Network of fuel treatments





Harrop
Private Land
West Arm Provincial Park
Harrop Creek
Machine Guards - Existing
Machine Guards - Future
Fuel Treatments: Existing or In Progress
Fuel Treatments: Future
Preliminary Landscape Fuel Breaks
HPCC Harvest Blocks
2010
2011
2012
1979
2003
2013
2001
2003
2002
2005
2010
2009
1987
1951
1981
1970
1961
2004
2006
1977
2014
1970
1988
1997
1984
2015
2015
1952
2010
1961
1994

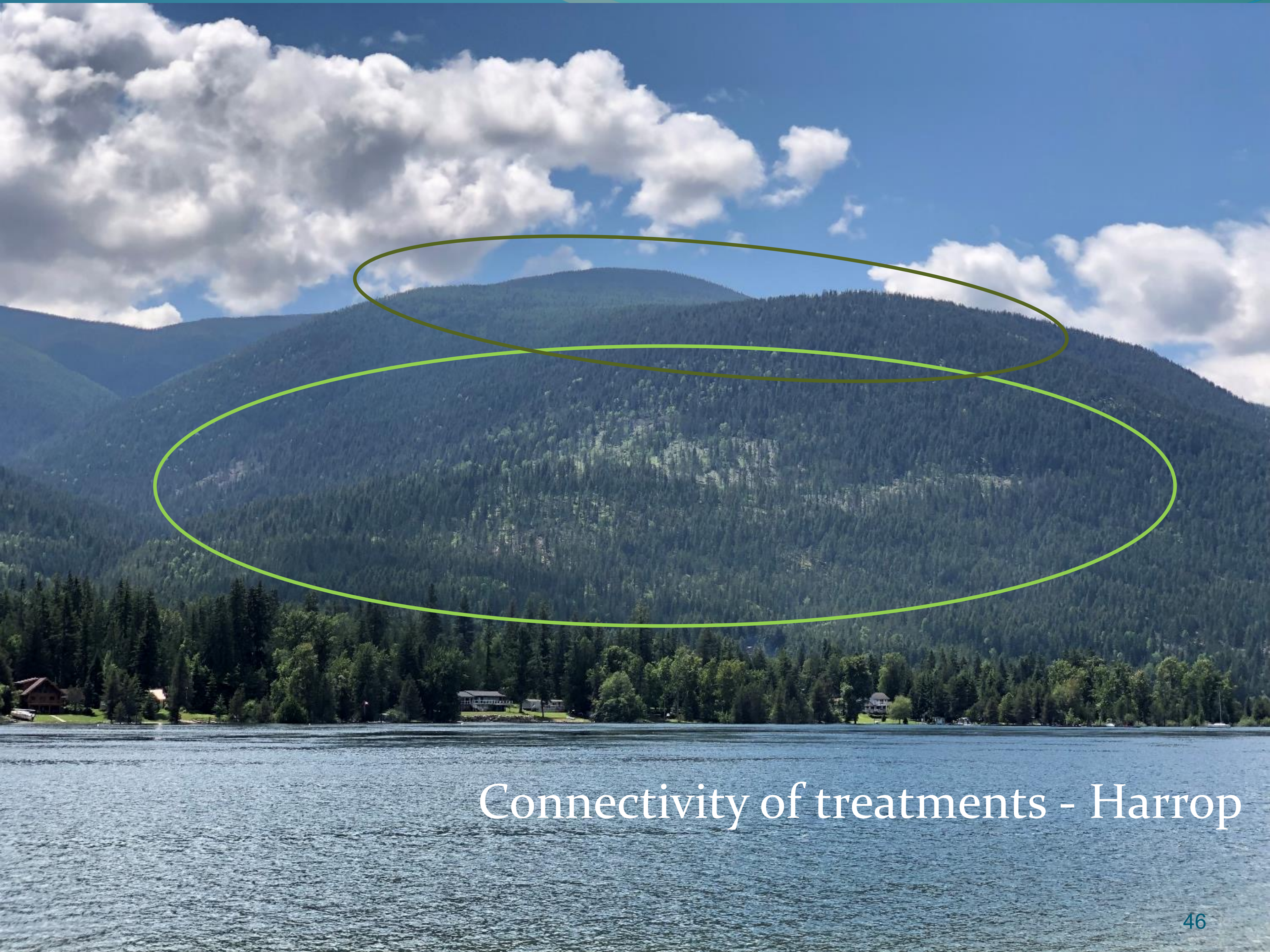

Fire guard constructed 2017
Fire guard layout 2017


Strategic re-opening of old roads


Building helipads before needed

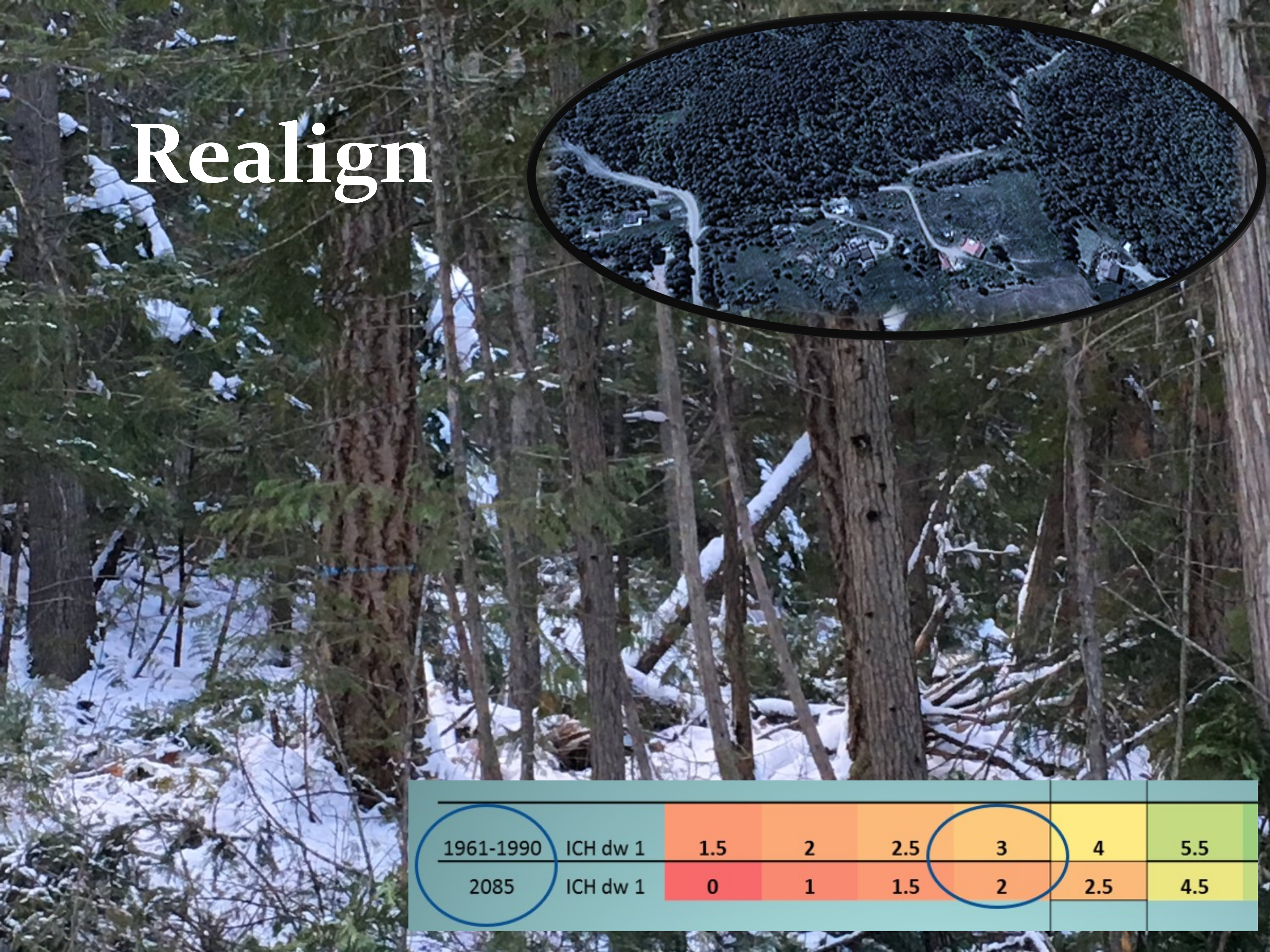

2017 machine guard
Large landscape fuel breaks


150 meters wide


Connectivity of treatments - Harrop


Realign

Realign



1961-1990	ICH dw 1	1.5	2	2.5	3	4	5.5
2085	ICH dw 1	0	1	1.5	2	2.5	4.5

Desired future conditions: *Realign drought-prone sites*

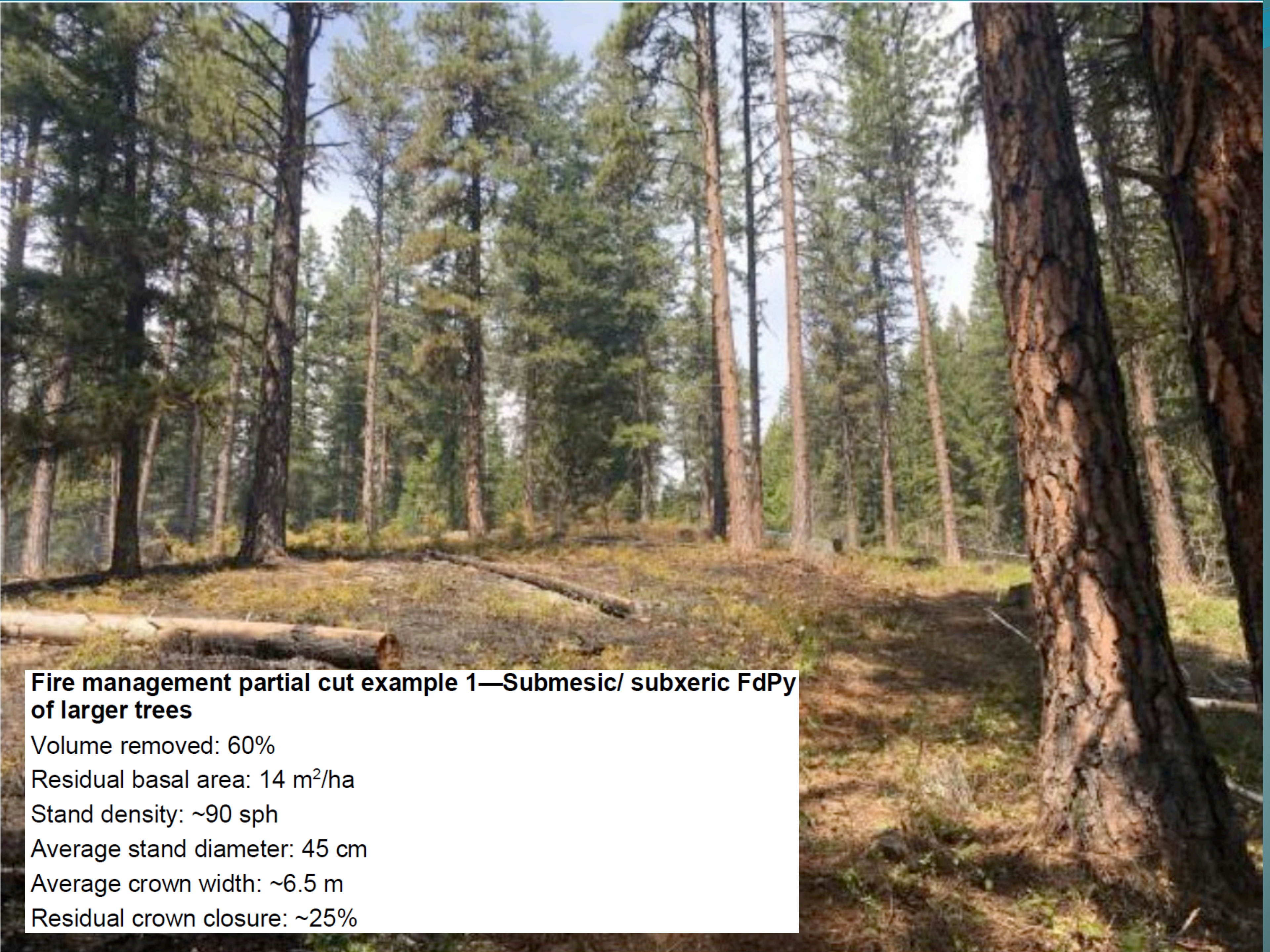
ICHdw1-104 (submesic)

- Py Fd (At) / Fd Lw (Pl)
- 150 to 400 sph
- Fine fuels <5 tonnes/ha
- Retain large/old trees
- Small patch reserves

Target: address 60% of high risk THLB by 2040

Re-introduction of fire—dry forest (Winlaw Creek 2021)

Partial cut 2019, understory burn 2020



Fire management partial cut example 1—Submesic/ subxeric FdPy of larger trees

Volume removed: 60%

Residual basal area: 14 m^2/ha

Stand density: ~90 sph

Average stand diameter: 45 cm

Average crown width: ~6.5 m

Residual crown closure: ~25%

Fire management even-aged stocking standards

SSID #	BGC	Site Series	Preferred species	Acceptable Species	Target WS/ ha
	ICHdw1	101	Fd[58] Lw Py Pw[31]	Pl Cw Bg At Ep	400
		102	Fd Py	Lw Pl	400
		103	Fd[58] Lw Py	Pl Pw[31]	400

Management Plan and AAC

How much do we cut?

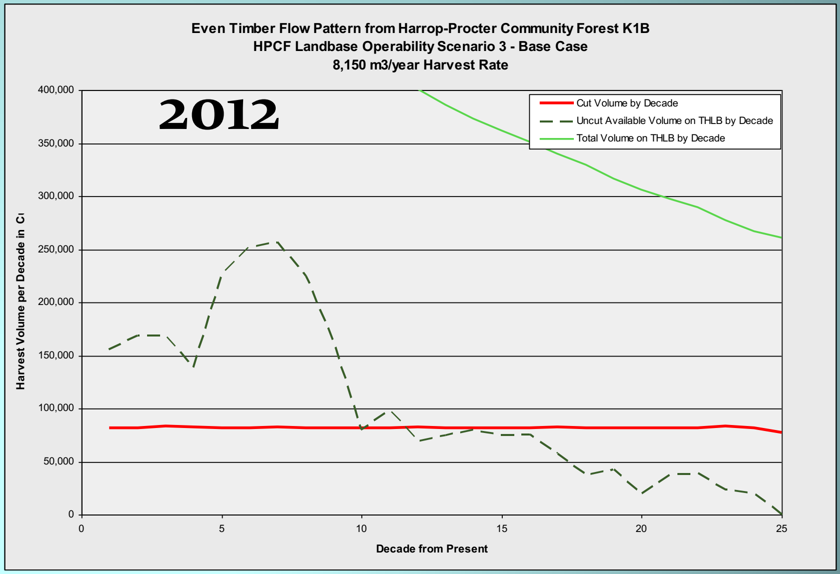
Revise TSR assumptions

- Unsalvaged losses
- Growth rates
- Hydrology—ECA limits
- Reconsider 'sustained yield' & 'even flow'

Social choices—based on risks

How fast do we realign?

- Fuel breaks—how many/ how fast?



Outreach

Educational films

Presentations

Handbook

Thank you!

www.hpcommunityforest.org

Erik@hpcommunityforest.org

HPCC

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