



Climate change adaptation: long-term landbase investment

Erik Leslie, RPF

Forest Manager, Harrop-Procter
Community Co-operative

BCCFA conference

May 27, 2016

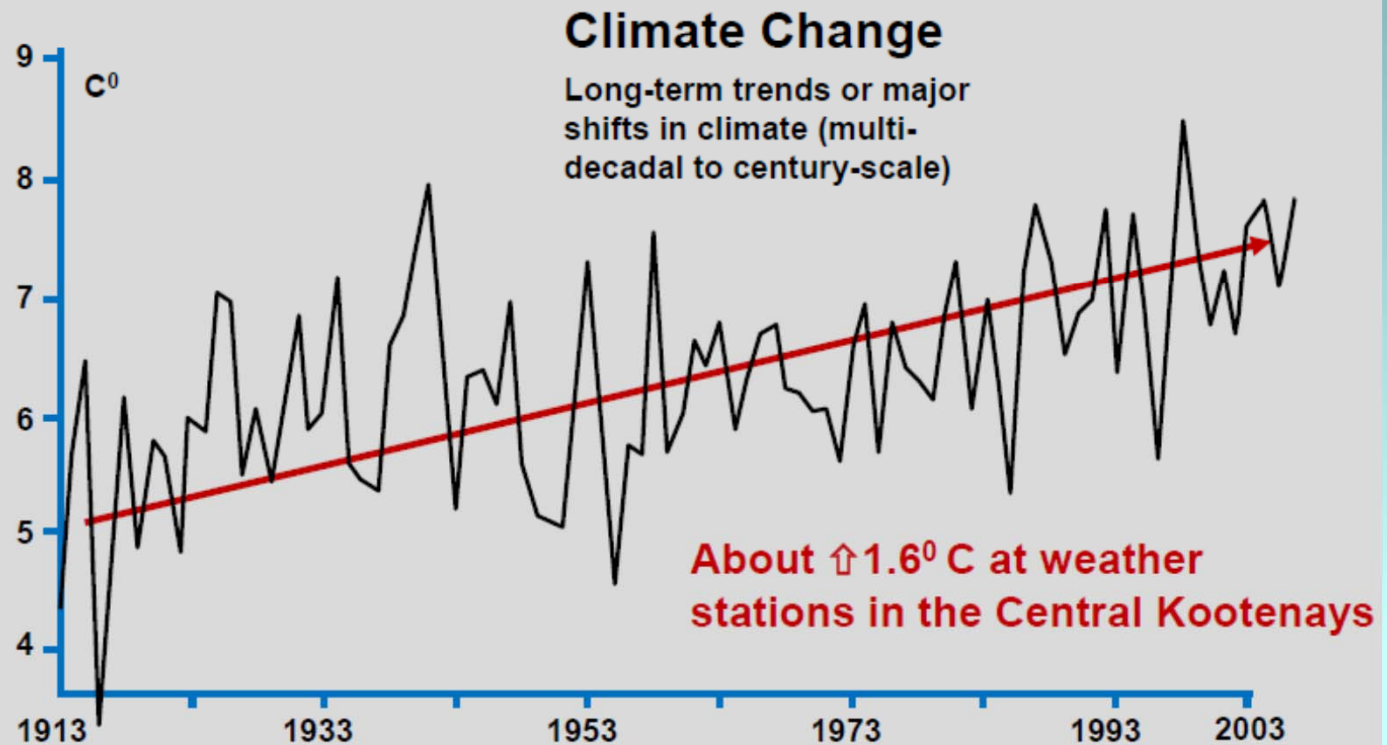
Harrop-Procter has made climate change adaptation a top priority and has invested \$70,000 in an applied CC adaptation project

1. **Why** invest in climate change adaptation?
2. **Where** and **How** invest in climate change adaptation?



Premise: we have enough science to act

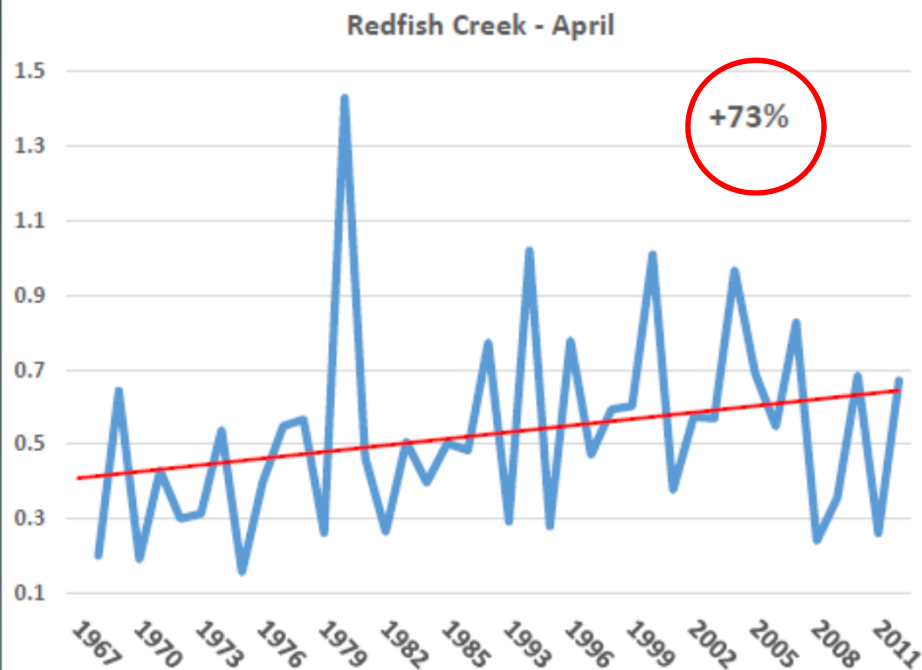
Average Annual Temperature has Increased Over the Last Century



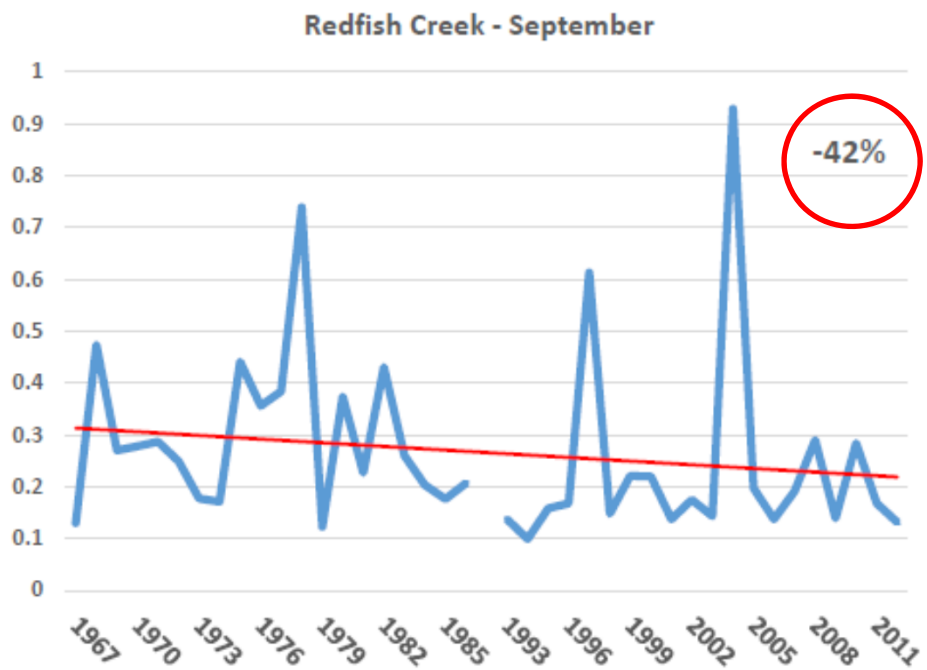
From Reasoner 2014

Significant changes over past 30 years

Climate Change Impacts Streamflows and Snowpack

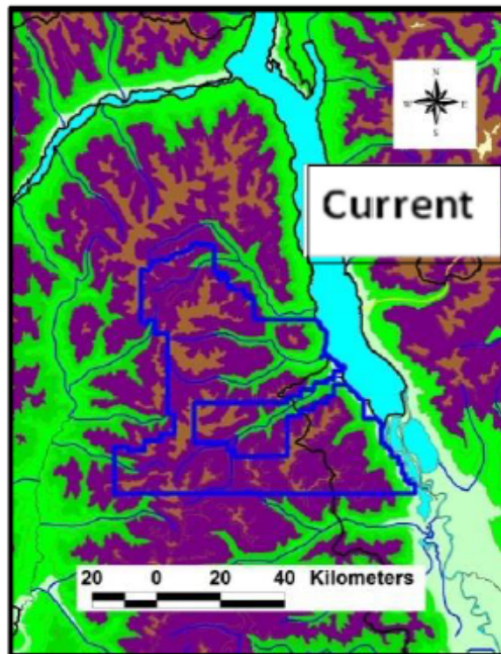


Trend Analysis (Zhang, 1999)
Mann Kendall $p = 3.8E-2$

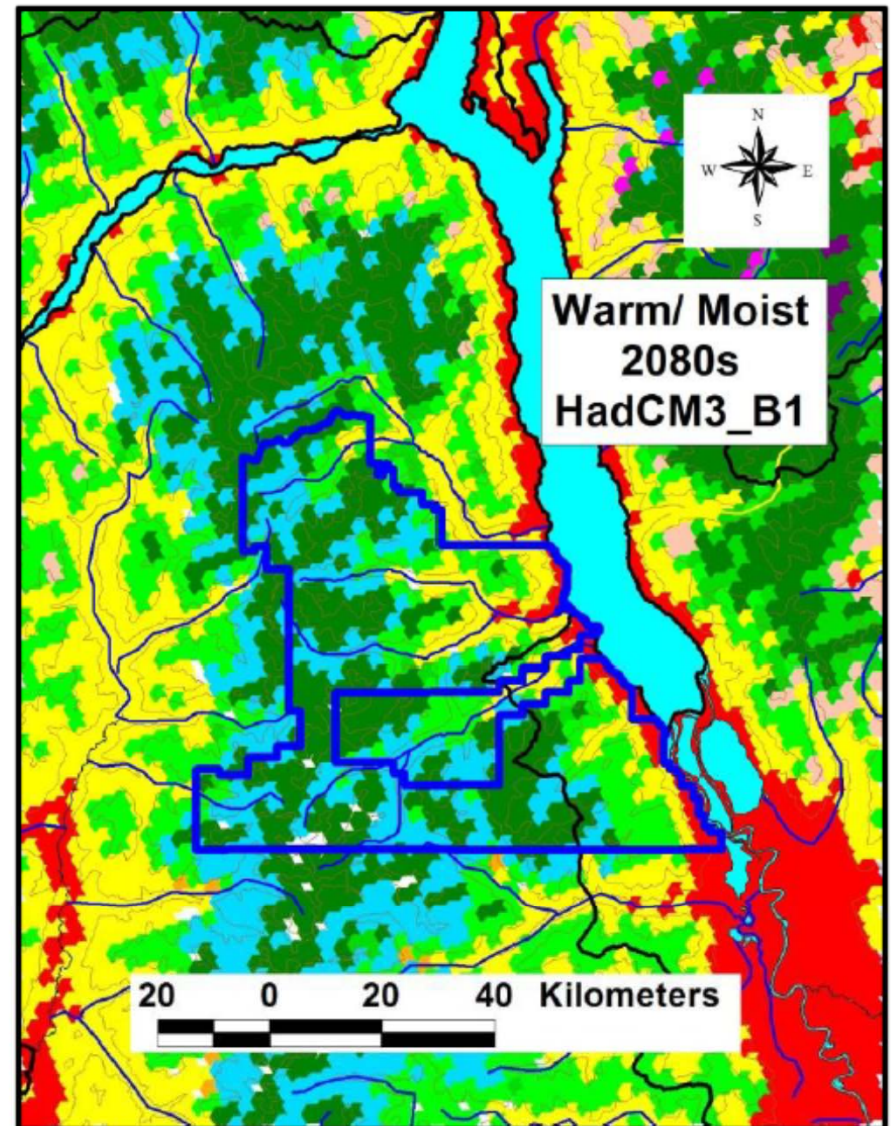


Trend Analysis (Zhang, 1999)
Mann Kendall $p = 3.7E-2$

Monthly Mean Discharge (m³/s)



- Alpine
- Alpine parkland
- Wet subalpine forest
- Dry subalpine forest
- Coastal hemlock
- Transitional coast/ interior hemlock
- Montane/sub-boreal spruce forest
- Wet interior cedar/ hemlock
- Moist interior cedar/ hemlock
- Dry interior cedar hemlock
- Grand fir/ Douglas-fir
- Wet Douglas-fir
- Dry Douglas-fir
- Ponderosa pine savannah
- Grassland/ steppe



From Utzig et al 2012/ 2016

Climate models: simplified summary

Over the next 30 to 50 years:

- Fall/ winter/ spring 2 - 5° warmer and 10 - 25% wetter
- Summers 3 - 7° warmer and up to 30% drier
- ~5 to 50 times more average annual area burned
- Increased frequency and magnitude of extreme precipitation events

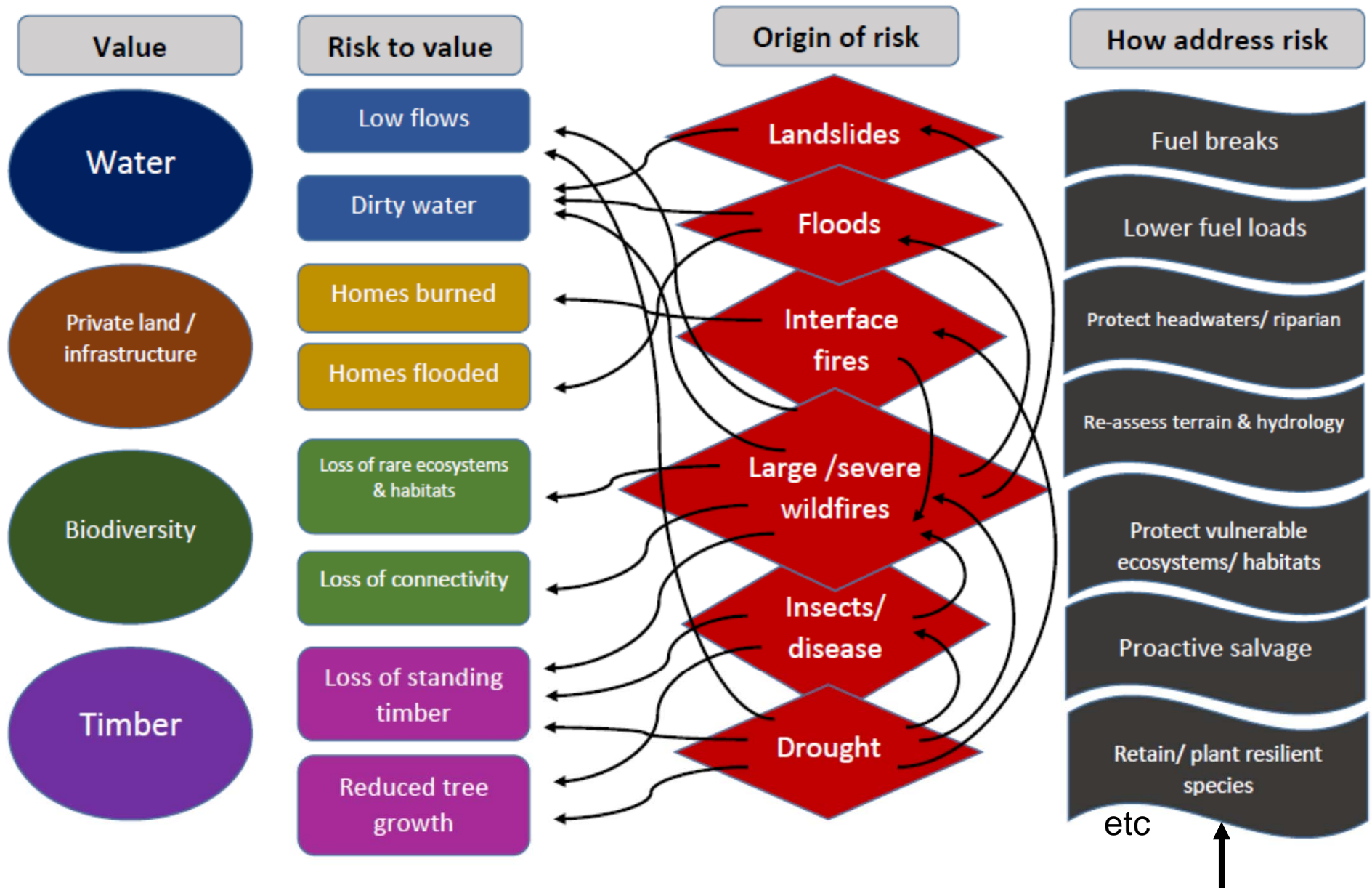
Good enough to get started...

Why invest in CC project?

Values at risk

- Timber/ jobs
- Homes/ infrastructure
- Water supply

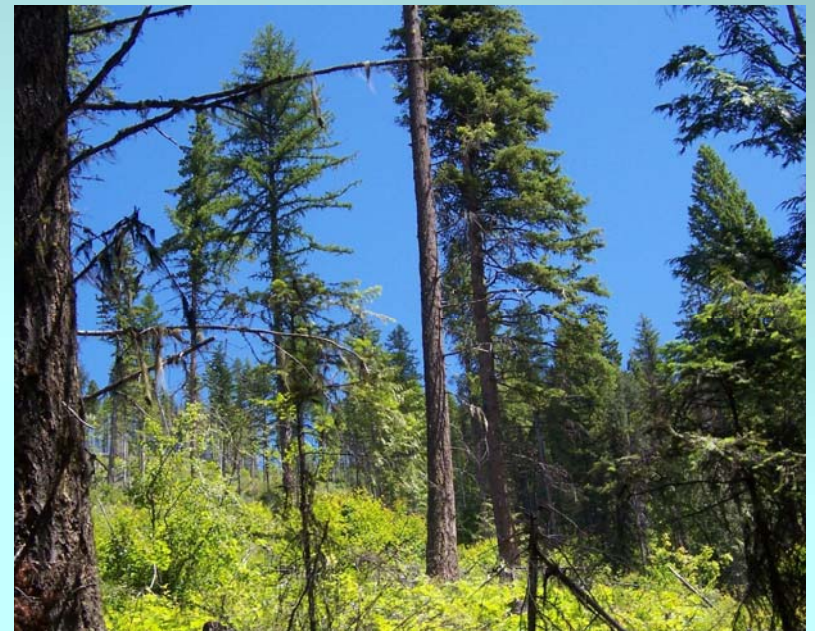
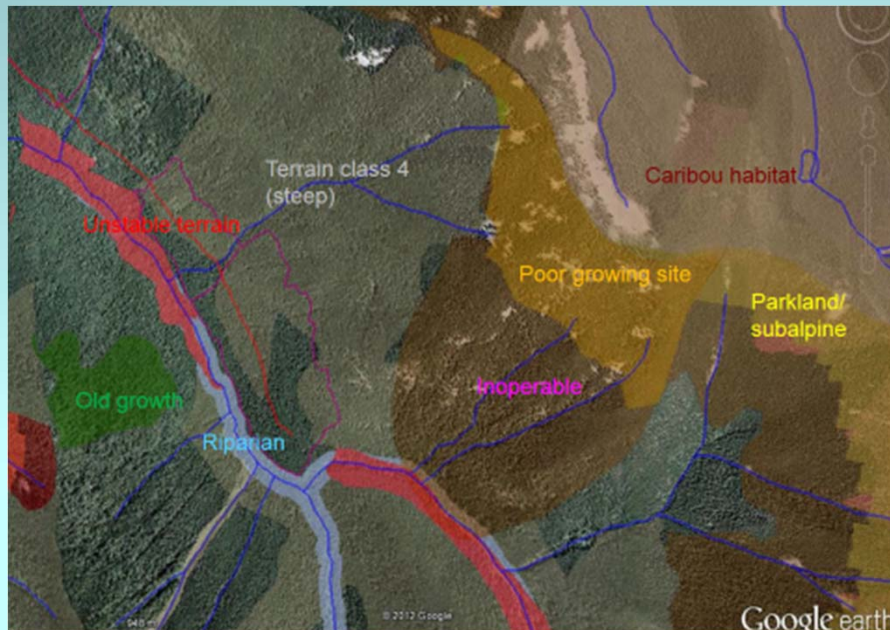




Investments in risk mitigation

Where and How invest?

1. Where: risk assessment
2. How: silviculture/ operations strategy



1. Risk Assessment

Where do we 'protect'? **Where** do we log?

- Identify priority areas based on values at risk
- Triage—limited resources

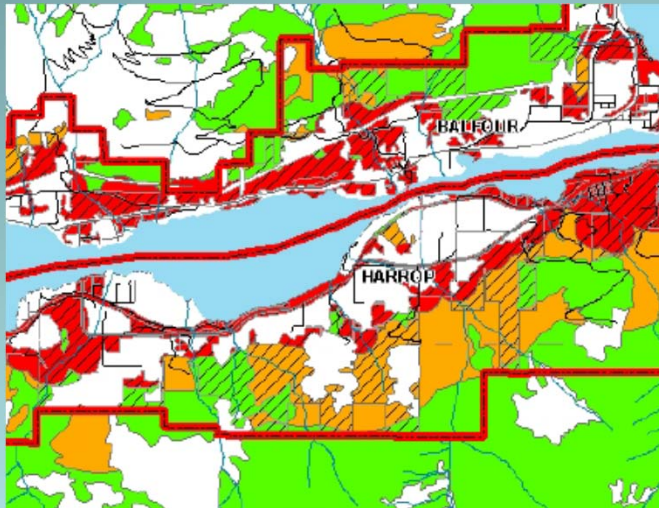
Investment strategy: resist or re-align?

Fire risk: landscape



- Assess & map fuel hazards across landbase—LiDAR
- Assess & map wildfire consequence: *impact on values*
 - **Prioritize:** where (try to) protect?
 - Locations for fuel breaks

Fire risk: WUI



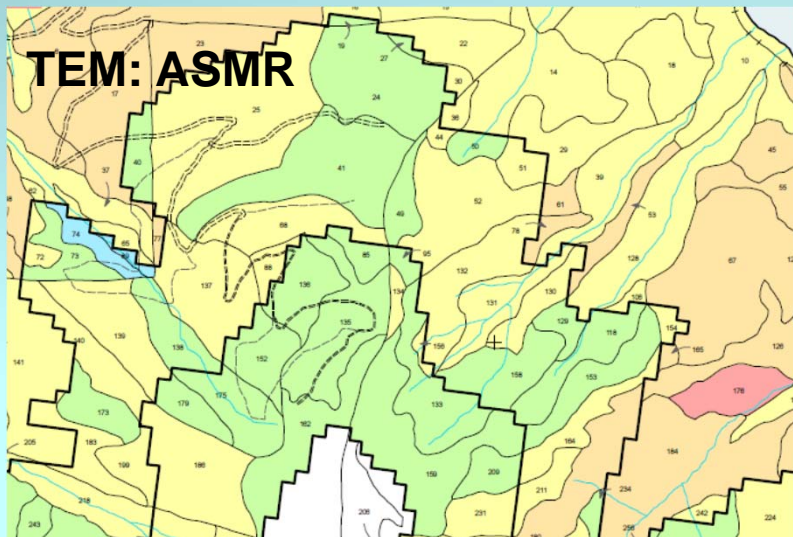
From Blackwell 2008 CWPP

- Map high hazard fuels (LiDAR)
- **Prioritize** WUI treatment areas



Drought risk tool: absolute soil moisture

- Identify current + future high drought probability *sites* and *stands*
- Combine probability with consequence to identify high risk areas
 - **Prioritize** salvage / conversion?
 - Where can we grow cedar?
 - Where manage for old growth?



ASMR converted to Risk

					RSMR							
UNIT					0	1	2	3	4	5	6	7
KAM	1	1	BG	xh1	VH	VH	VH	VH	VH	H	VL	VL
KAM	2	2	BG	xh2	VH	VH	VH	VH	VH	H	VL	VL
CAR	3	1	BG	xh3	VH	VH	VH	VH	VH	M	VL	VL
KAM	4	3	BG	xw1	VH	VH	VH	H	H	M	VL	VL
CAR	5	2	BG	xw2	VH	VH	VH	VH	VH	H	VL	VL
KAM	6	4	PP	xh1	VH	VH	VH	H	H	M	VL	VL
KAM	7	5	PP	xh2	VH	VH	VH	H	H	M	VL	VL

From Delong 2012

2. How invest: Silviculture/ operations strategy

How protect/ log?

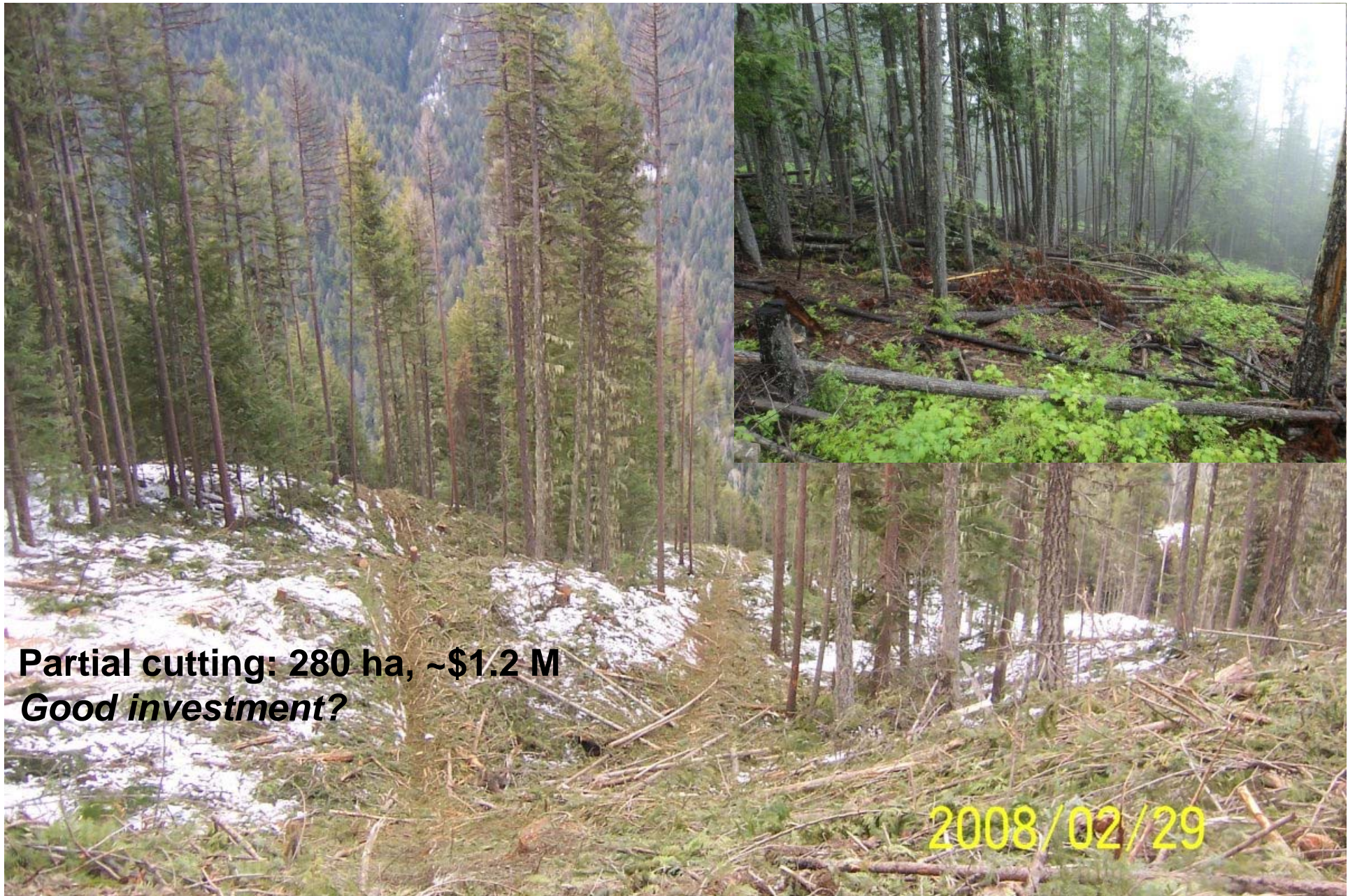
Specific to ecosystem and stand types (operational working groups)

- Opening sizes/ shapes
- Partial cutting specs
- Fuel treatment specs
- Road planning & design
- Prescribed fire

How do we regenerate?

- Species/ provenances?
- Density?
 - Convert to open forest?





Partial cutting: 280 ha, ~\$1.2 M
Good investment?

2008/02/29

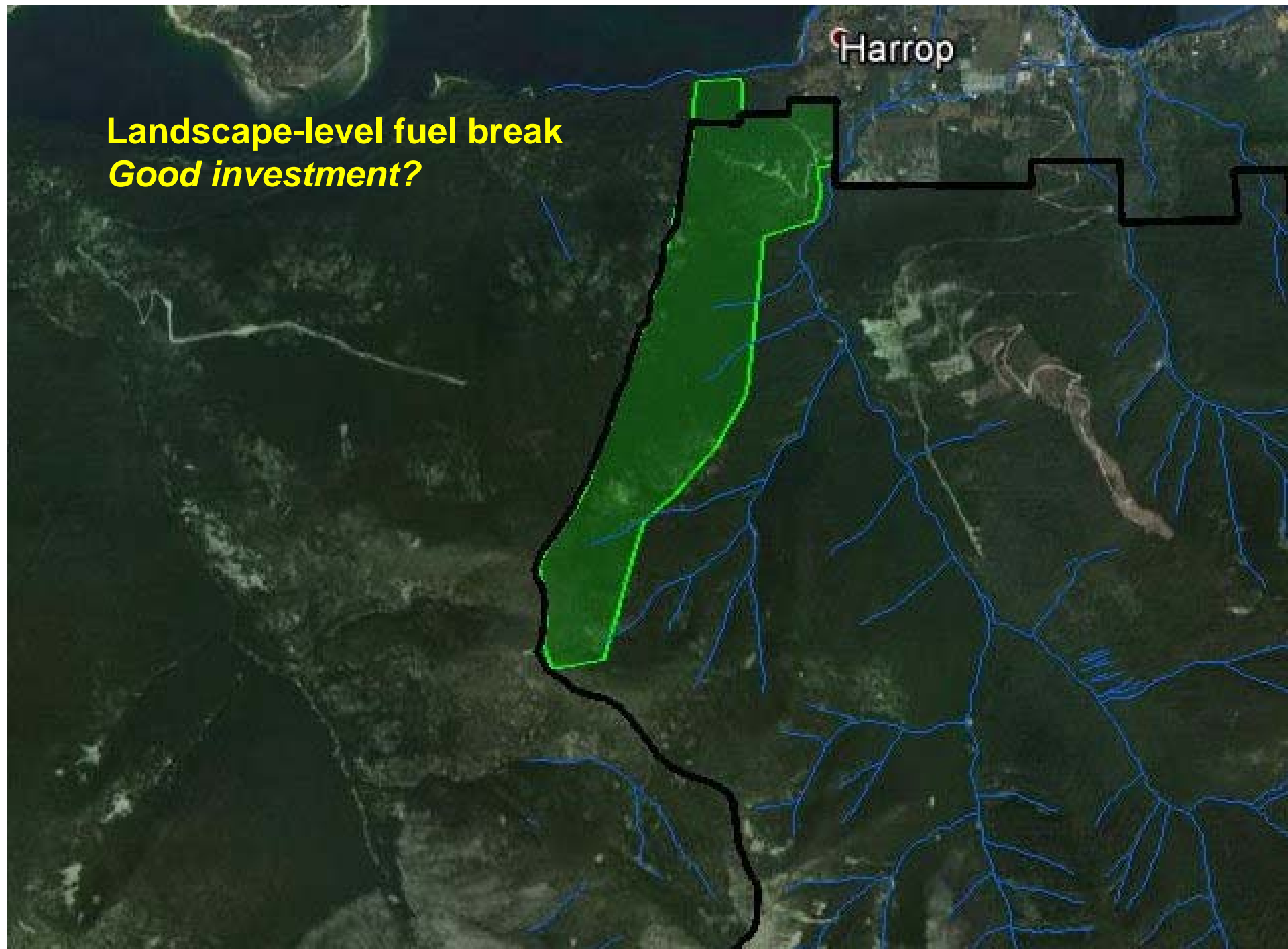
Salvage and convert
Good investment?





\$10,000 per hectare
Good investment?

Landscape-level fuel break
Good investment?



Summary

- Adaptation planning and action is an investment
- Prioritize based on risks to specific values
- Investment context: high uncertainty, rapid change
- Don't waste money swimming against the current
 - Avoid high risk investments (e.g. cedar, spruce)
- Diversification is a good investment strategy
- Expect losses
 - Mitigating loss is an investment
 - Get ready to think like a triage nurse