Climate change adaptation: long-term landbase investment

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BCCFA conference

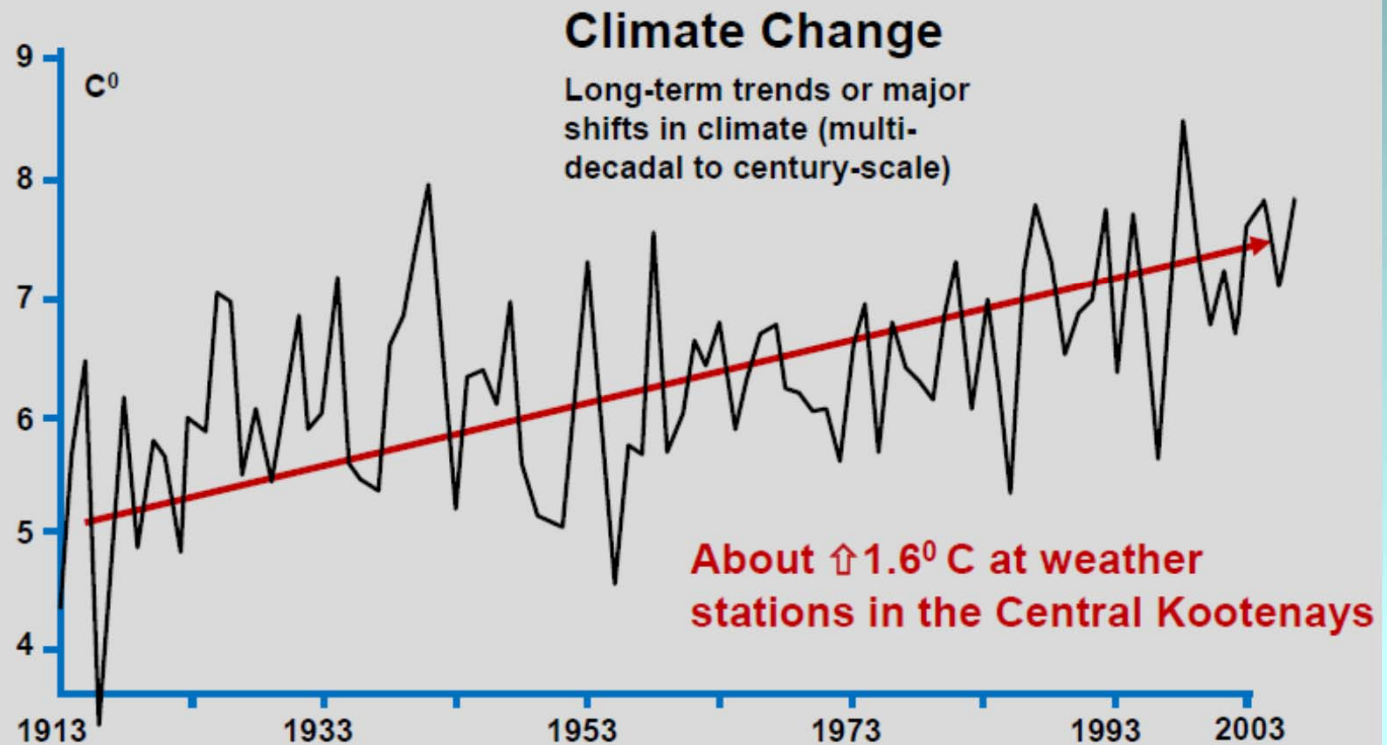May 27, 2016

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**

Climate Change

Long-term trends or major shifts in climate (multi-decadal to century-scale)

About ⇧1.6⁰ C at weather stations in the Central Kootenays

From Reasoner 2014

Significant changes over past 30 years

Climate Change Impacts Streamflows and Snowpack

Redfish Creek - April
+73%
Trend Analysis (Zhang, 1999)
Mann Kendall p = 3.8E-2
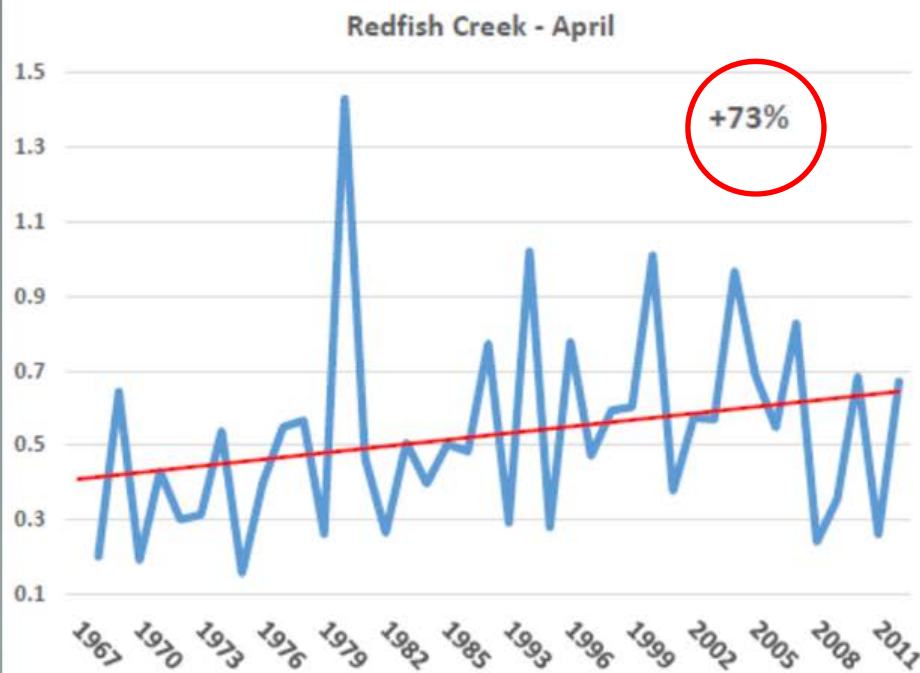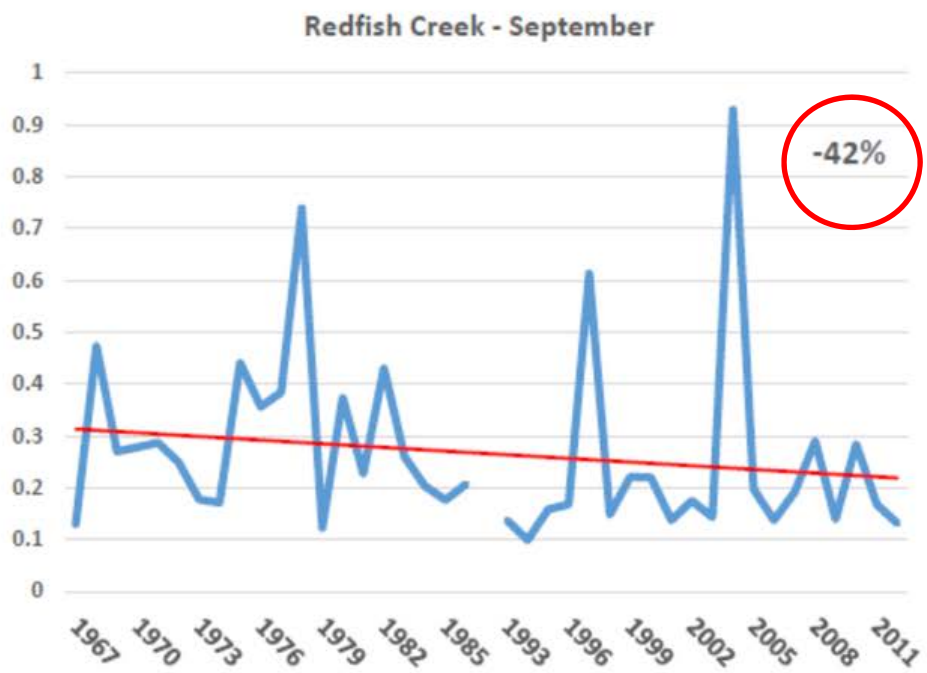
Redfish Creek - September
-42%
Trend Analysis (Zhang, 1999)
Mann Kendall p = 3.7E-2

Monthly Mean Discharge (m^3/s)
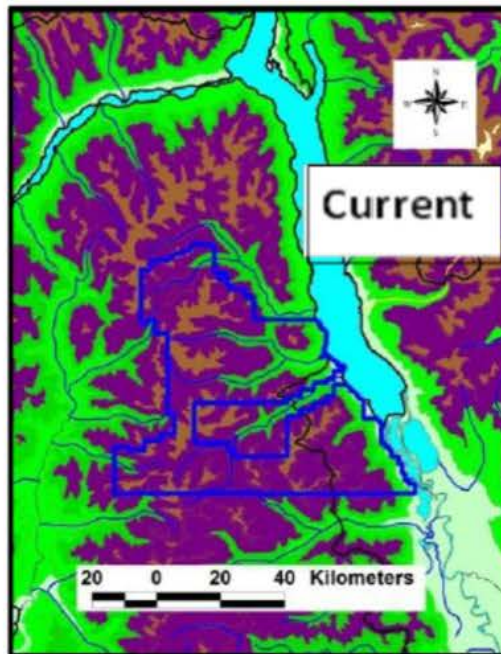
Legend:
- Alpine
- Alpine parkland
- Wet subalpine forest
- Dry subalpine forest
- Coastal hemlock
- Transitional coast/ interior hemlock
- Montane/sub-boreal spruce forest
- Wet interior cedar/ hemlock
- Moist interior cedar/ hemlock
- Dry interior cedar hemlock
- Grand fir/ Douglas-fir
- Wet Douglas-fir
- Dry Douglas-fir
- Ponderosa pine savannah
- Grassland/ steppe

Current

Warm/ Moist 2080s HadCM3_B1
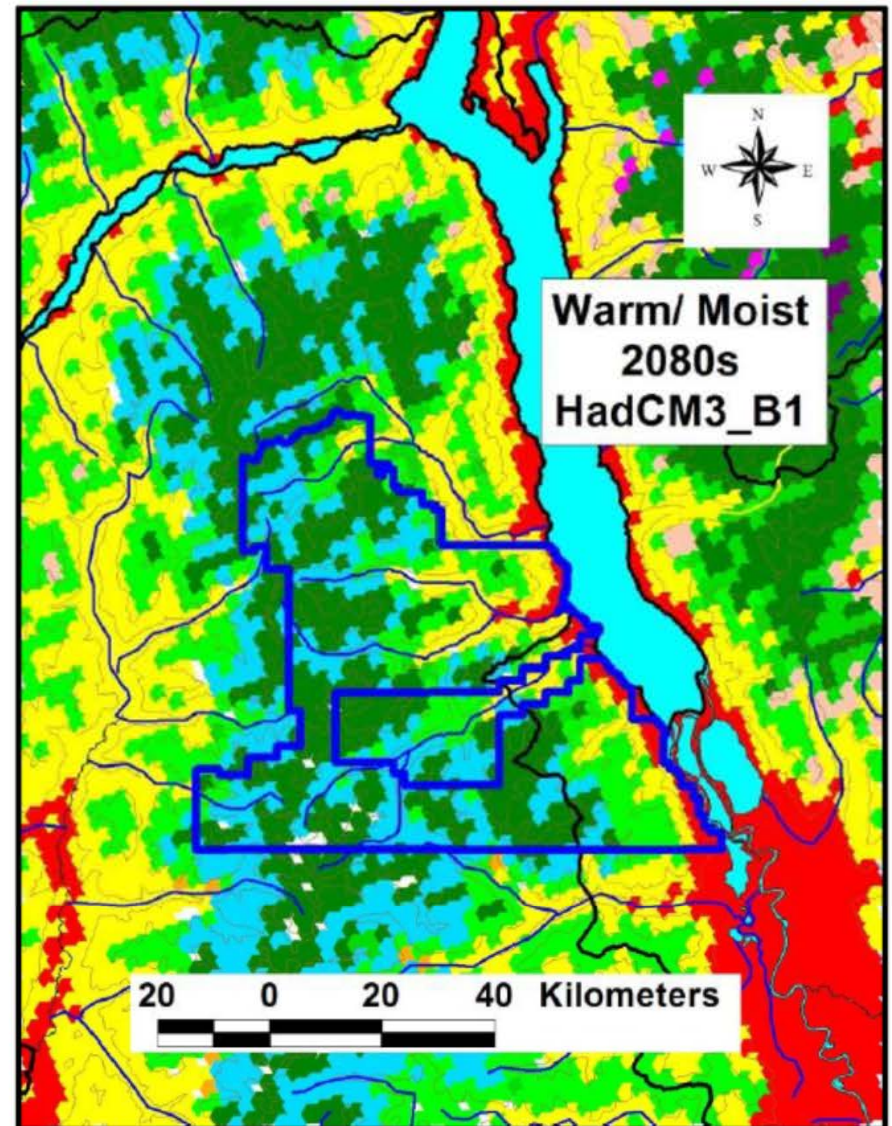
From Utzig et al 2012/ 2016

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**
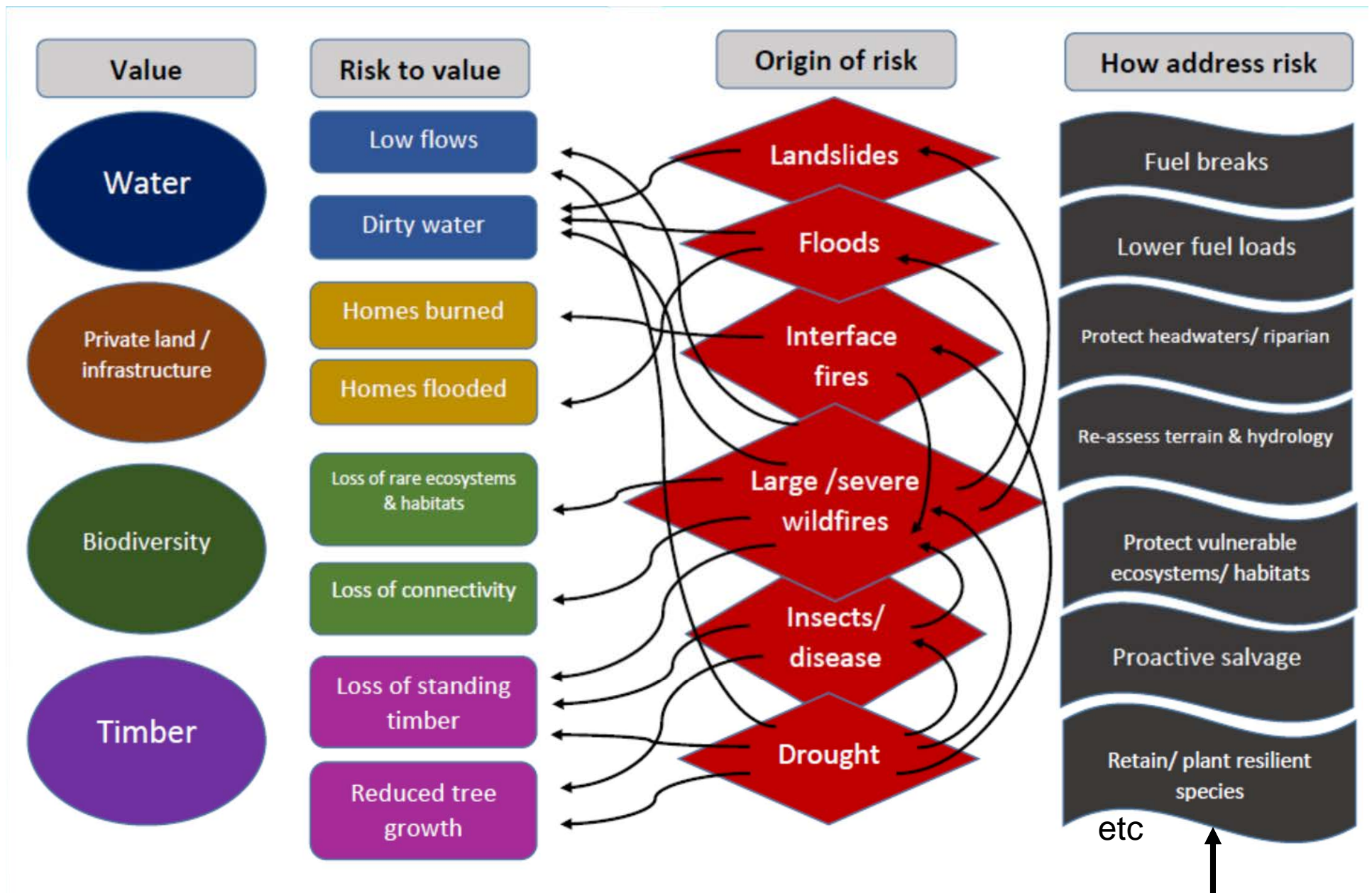- **Increased frequency and magnitude of extreme precipitation events**

Good enough to get started...

Why invest in CC project?

Values at risk
- Timber/ jobs
- Homes/ infrastructure
- Water supply

Value
- Water
- Private land / infrastructure
- Biodiversity
- Timber

Risk to value
- Low flows
- Dirty water
- Homes burned
- Homes flooded
- Loss of rare ecosystems & habitats
- Loss of connectivity
- Loss of standing timber
- Reduced tree growth

Origin of risk
- Landslides
- Floods
- Interface fires
- Large /severe wildfires
- Insects/ disease
- Drought

How address risk
- Fuel breaks
- Lower fuel loads
- Protect headwaters/ riparian
- Re-assess terrain & hydrology
- Protect vulnerable ecosystems/ habitats
- Proactive salvage
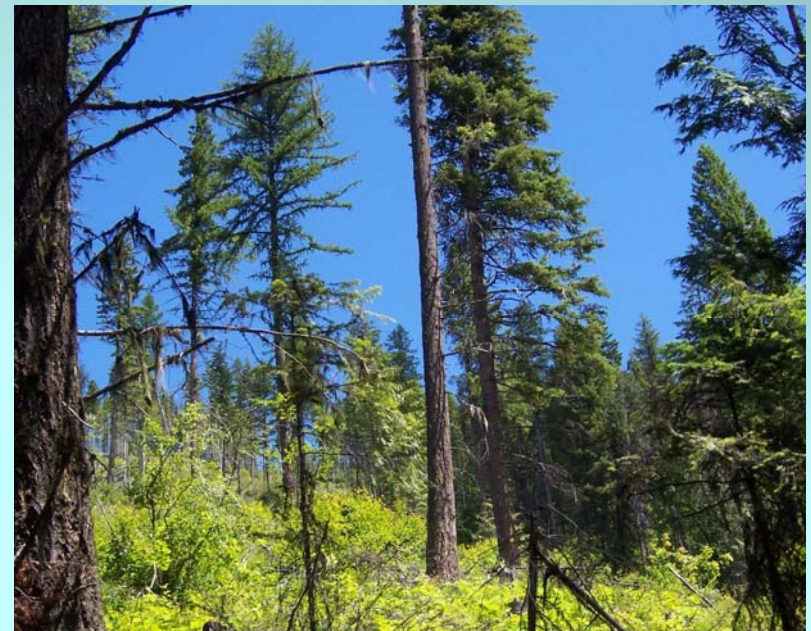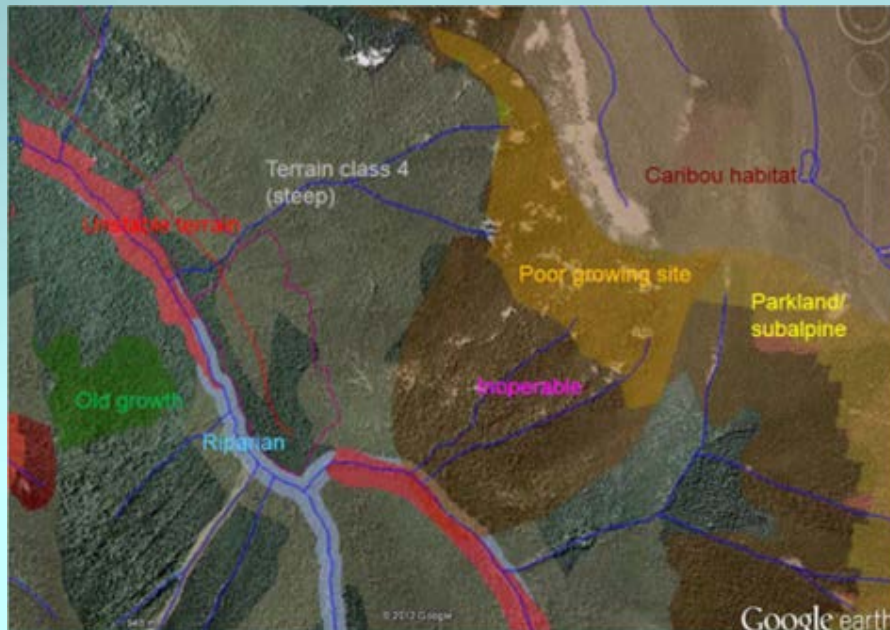- Retain/ plant resilient species
- etc

Investments in risk mitigation

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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
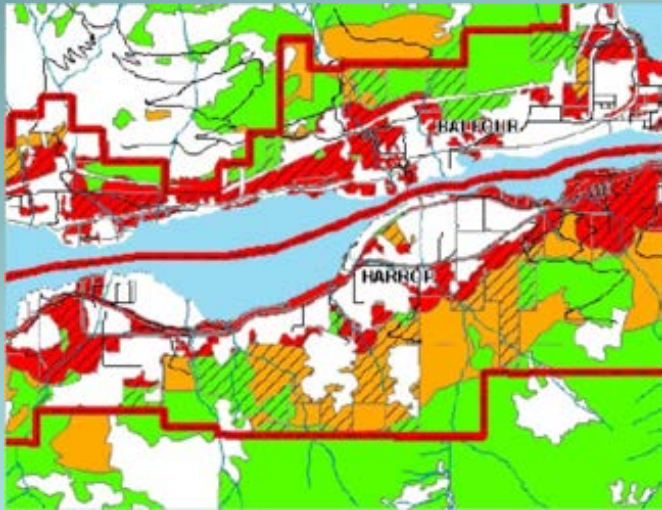- Triage—limited resources

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
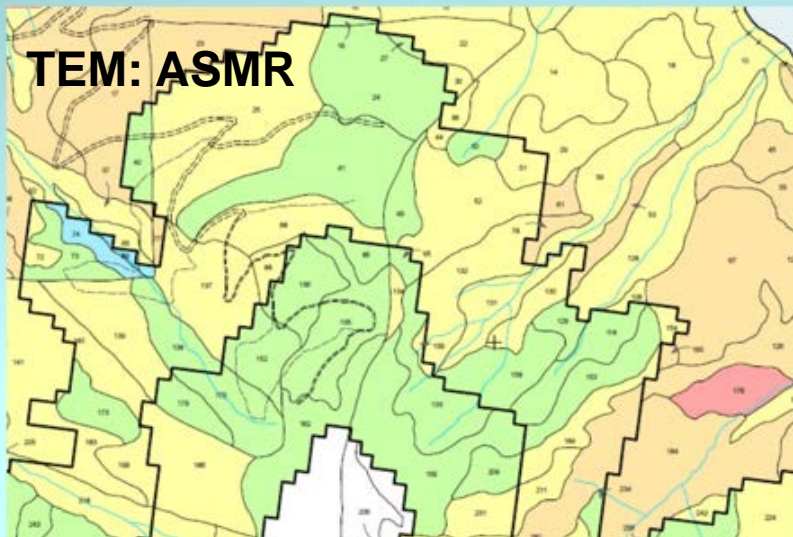
Fire risk: WUI

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?

TEM: ASMR

ASMR converted to Risk

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?

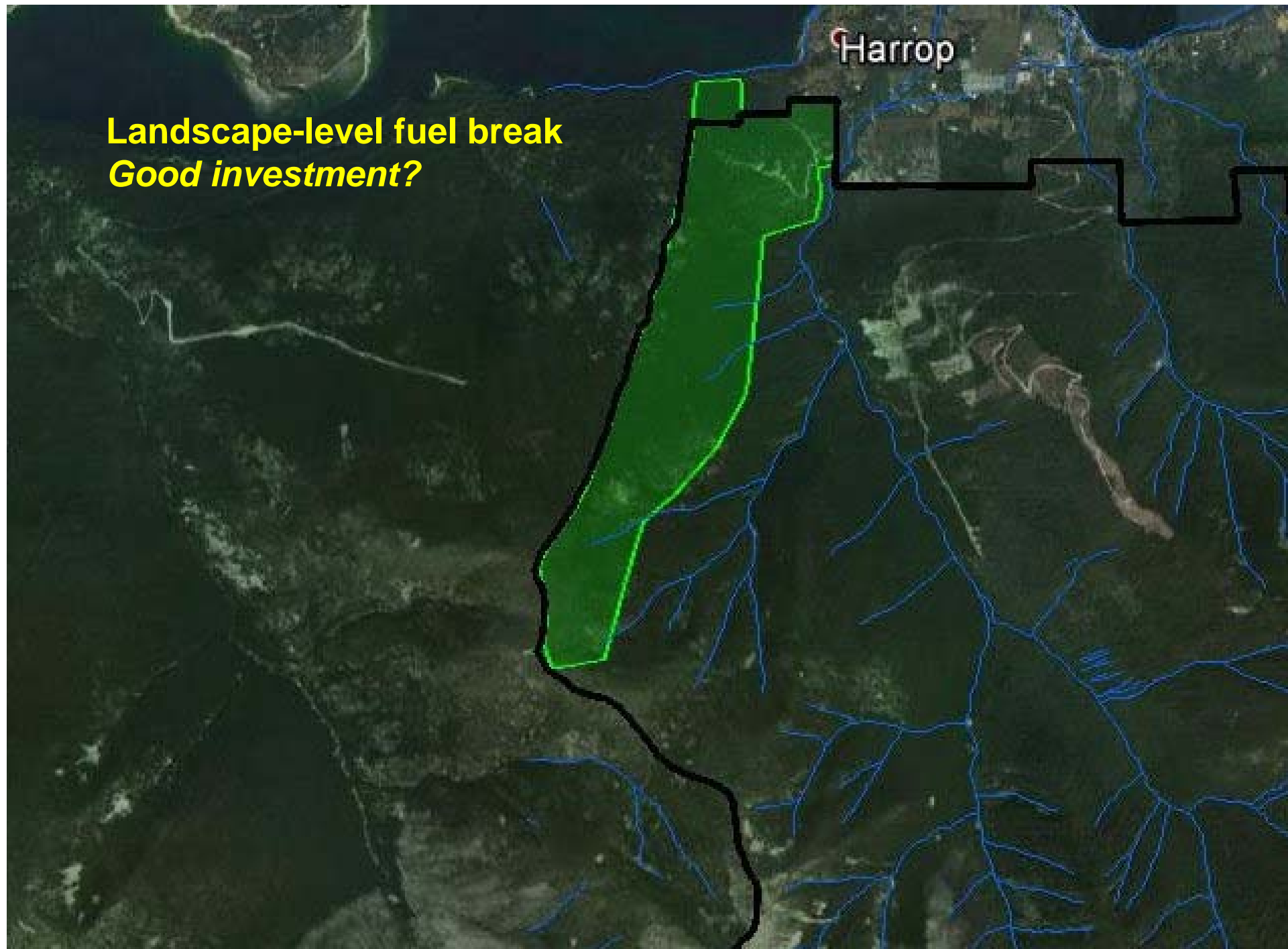**Partial cutting: 280 ha, ~$1.2 M**
Good investment?

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