



Update on the Provincial-level Projection of the Current Mountain Pine Beetle Infestation and Implications for Fibre Supply

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Landscape Modelling Team Lead

April 21, 2010

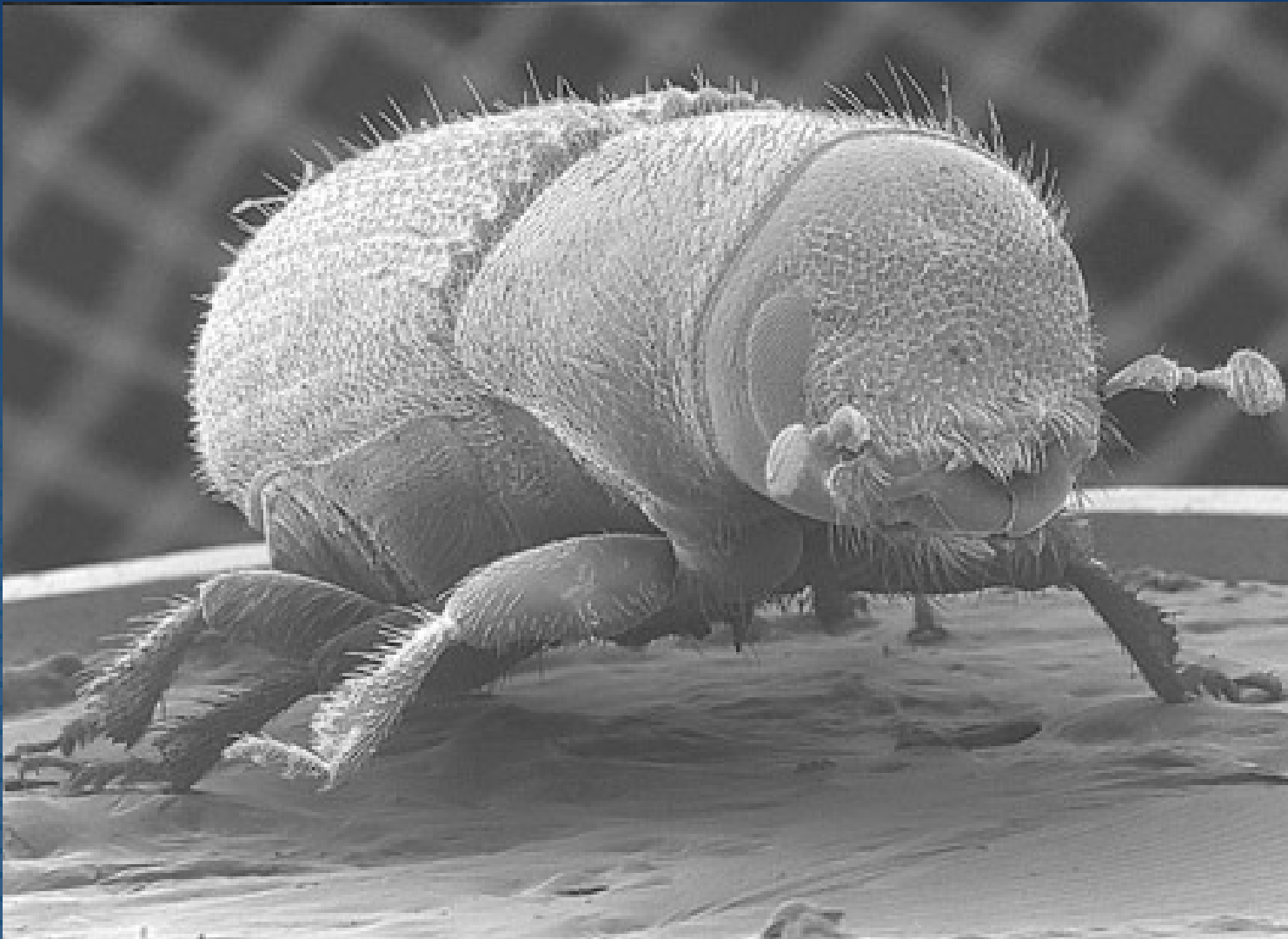


Presentation Overview

- ◆ Why do we care about the Mountain Pine Beetle?
- ◆ Key Project Questions
- ◆ Model Overview
- ◆ Observed and Projected Annual Pine Mortality
- ◆ Observed and Projected Cumulative Pine Mortality
- ◆ Key Conclusions
- ◆ Conclusion Caveats

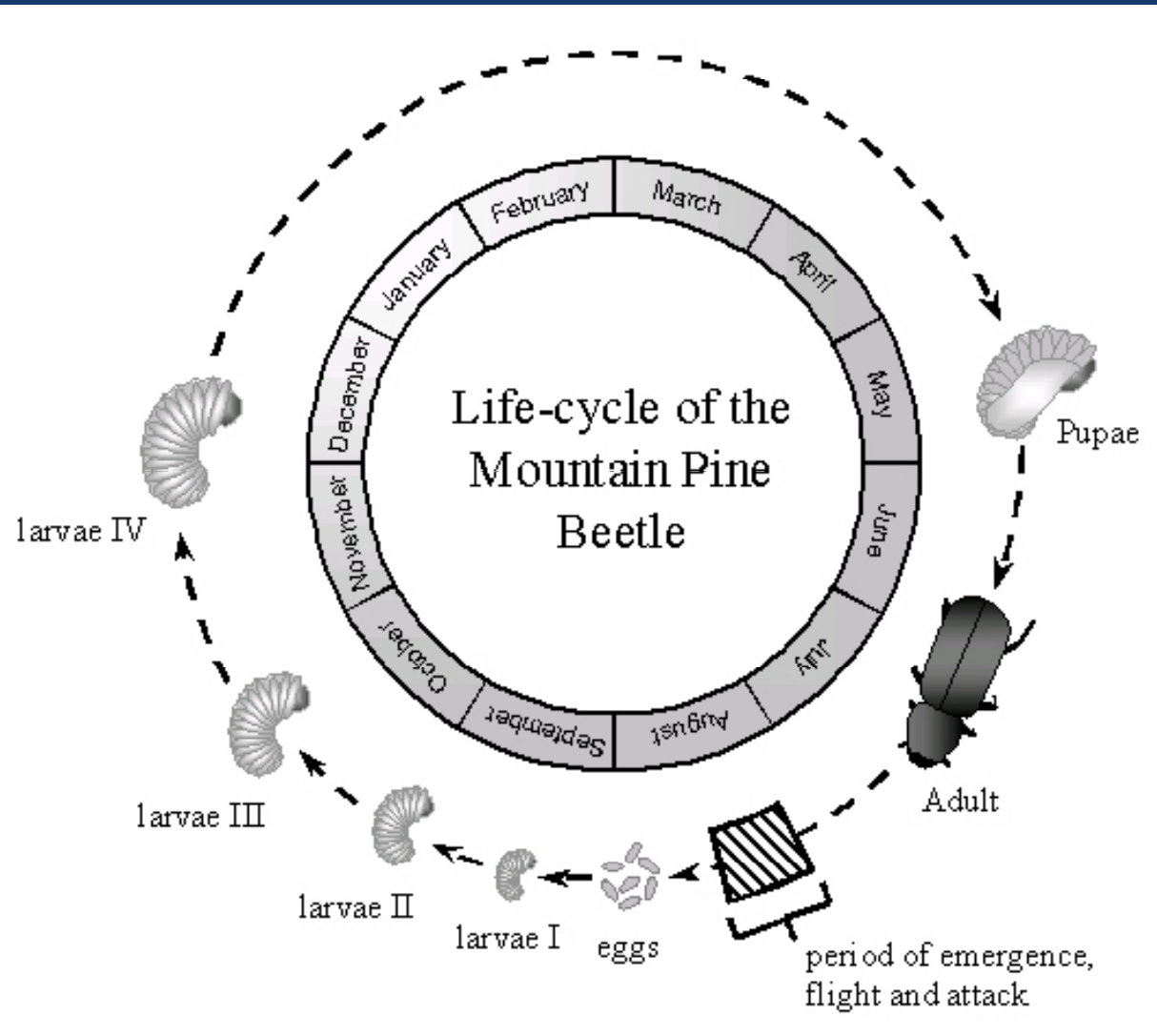


The Mountain Pine Beetle (*Dendroctonus ponderosae*), aka MPB





The Mountain Pine Beetle (*Dendroctonus ponderosae*), aka MPB







Attack Stages

◆ Green-attack

- Green to greenish-yellow needles
- From initial beetle attack (usually August) to following June

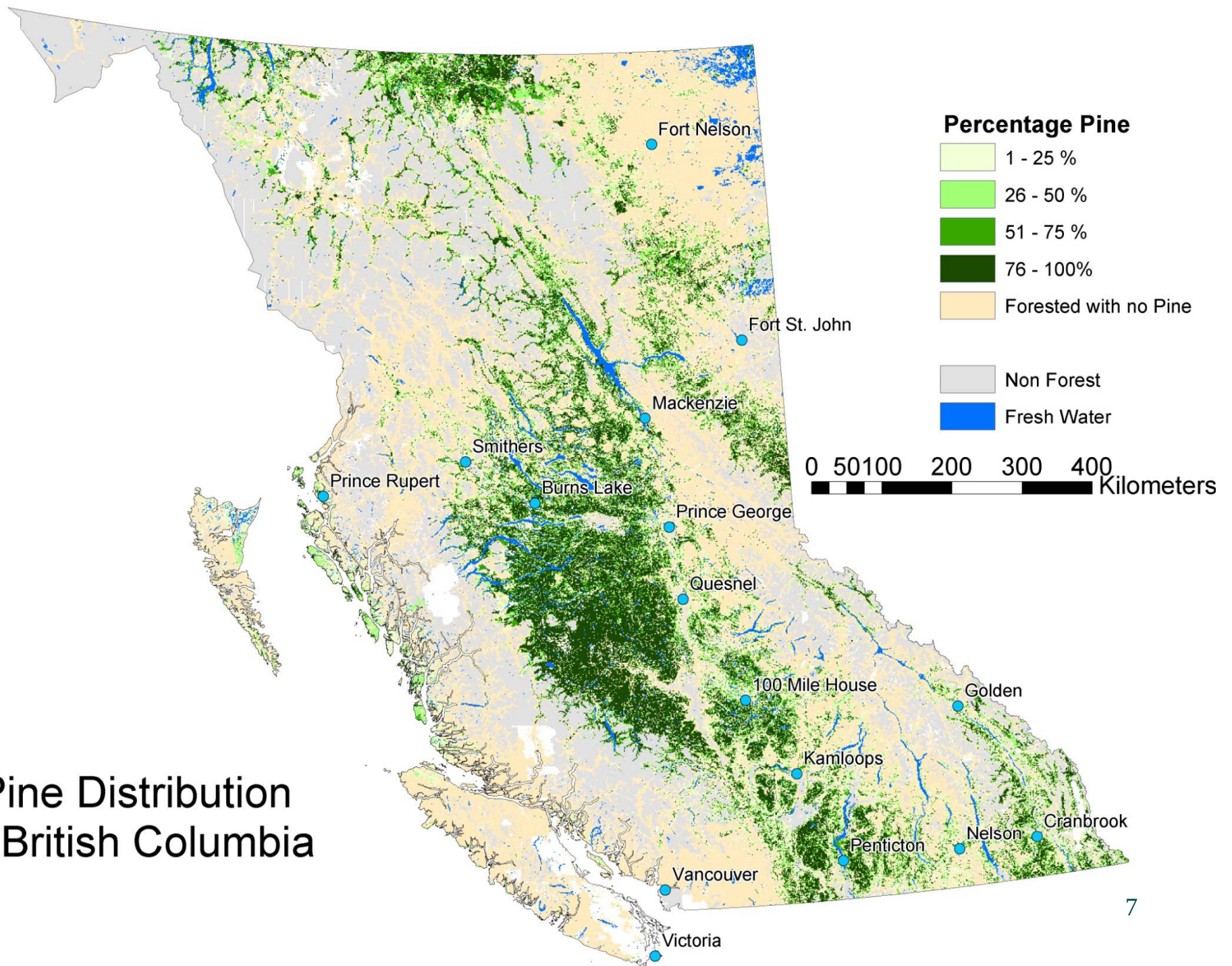
◆ Red-attack (mapped by Aerial Overview)

- Red and orange needles
- Approximately 1 year following the attack

◆ Gray-attack

- Loss of needles
- About 2 to 3 years following the attack

Pine Distribution in British Columbia





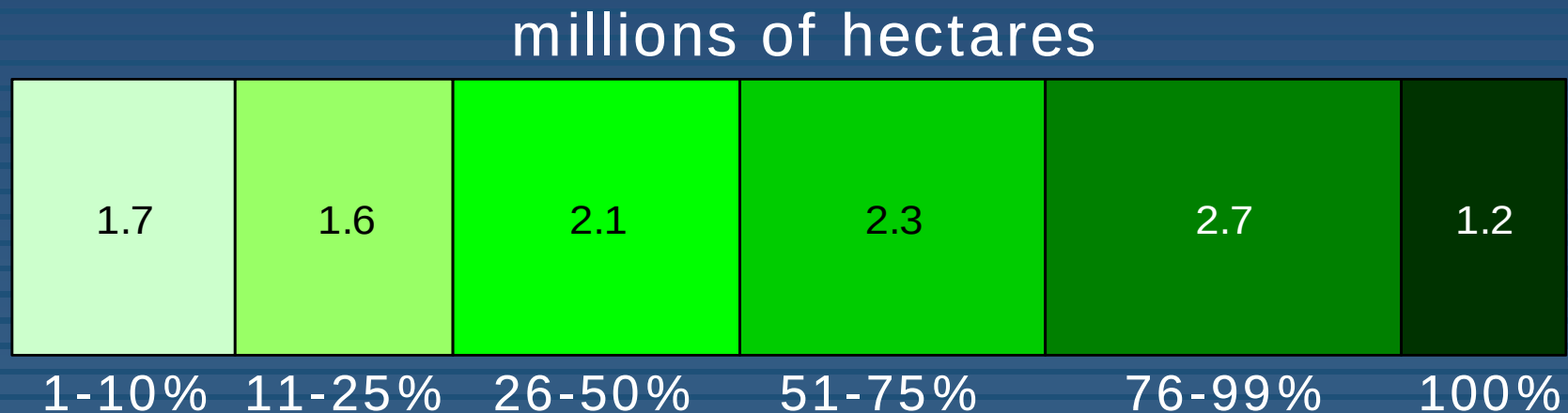
How Much Pine in BC?

- 48 million ha of forest (51% of BC)
- 26 million ha with pine (54% of forest)
- Provincial timber harvesting land base (THLB) is approx. 18 million ha
- Provincial THLB has 12 million ha of forest with pine (67% of THLB)
- Interior THLB has 10 million ha of the forest with pine



How Much Pine in BC?

12 million hectares of mature forest
with pine on the THLB





How Much Pine Volume in BC?

- ◆ 4.6 billion m^3 of mature volume on the THLB (at the start of the current outbreak in 1999)
- ◆ 1.35 billion m^3 (29%) of the mature THLB volume is pine
- ◆ 1.34 billion m^3 of the above is in the interior
 - 37% of the interior THLB



Key Project Questions

- ◆ About the Outbreak
 - How big will it get, and how fast?

- ◆ About Forest Management
 - Does beetle control slow it?
 - How much wood will be lost?



Key Conclusions

- About forest management:
 - Beetle control has limited effectiveness.
 - Amounts of dead wood will vary in space and time.
 - Non-recovered losses will be very high.
 - The things we don't know matter.



Provincial-level MPB Projection Model (aka BCMPB)

Agents of Landscape Change

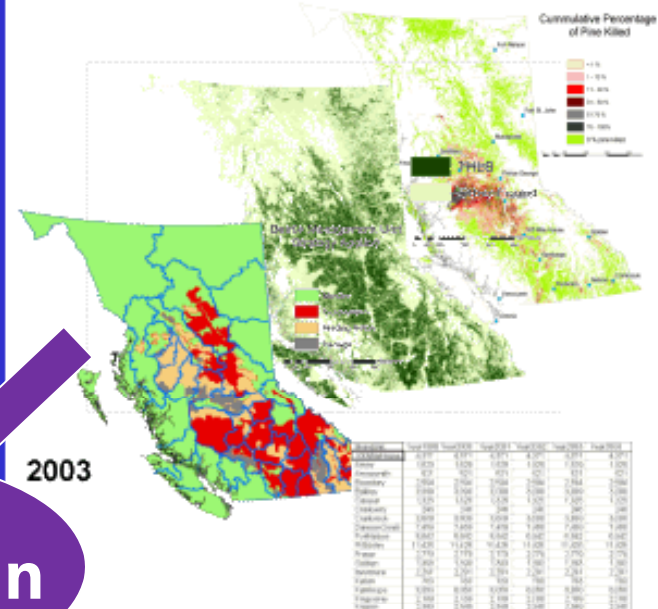


Beetle Damage

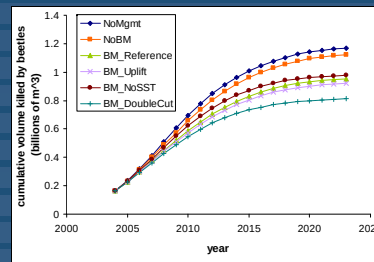
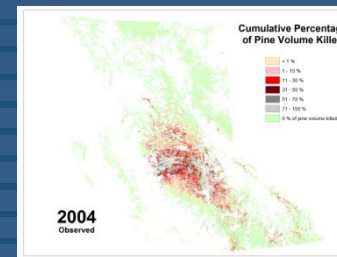


Logging

Input Data



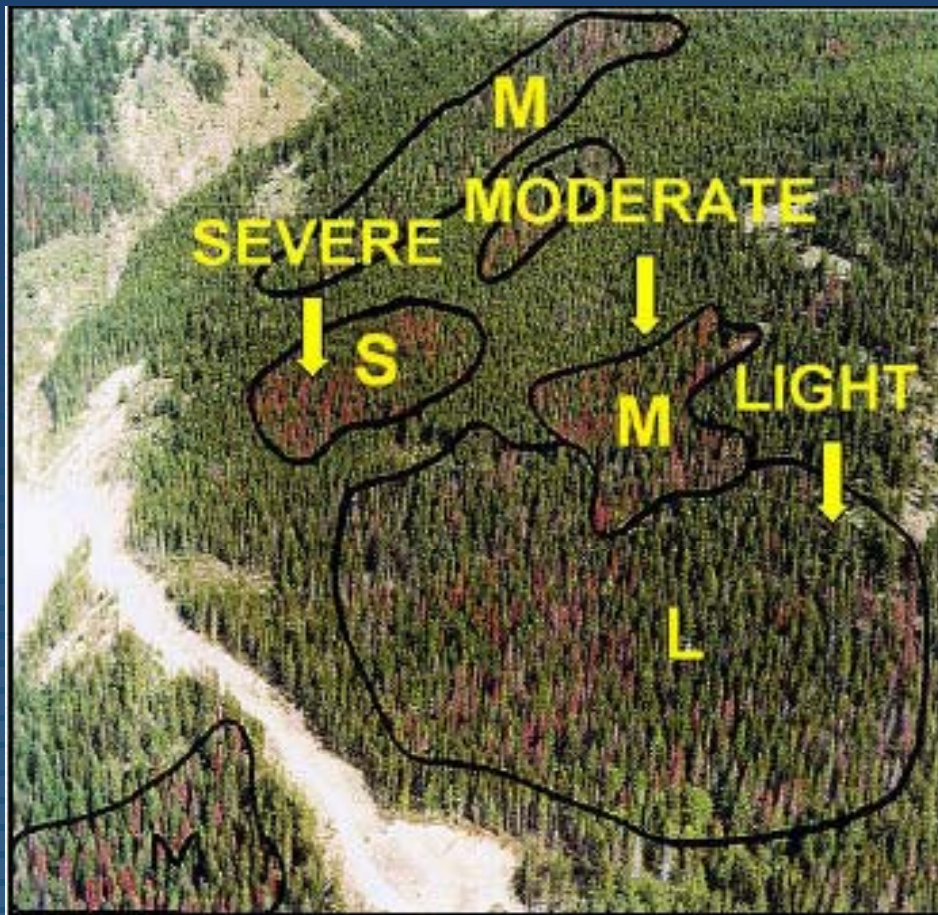
Projection





Aerial Overview of Forest Health

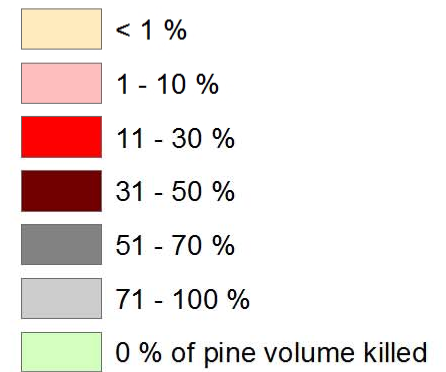
Proportion of **red-attack** pine to green trees



Severity classes:

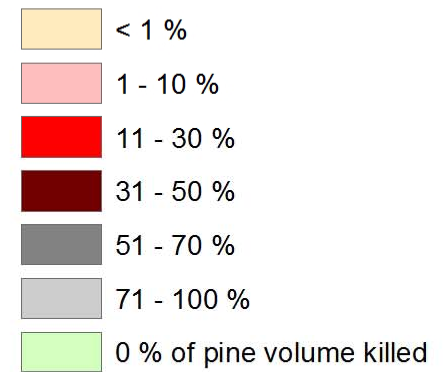
- Trace ($< 1\%$)
- Light (1–10%)
- Moderate (11–30%)
- Severe (31–50%)
- Very Severe (51–100%)

Cumulative Percentage of Pine Volume Killed

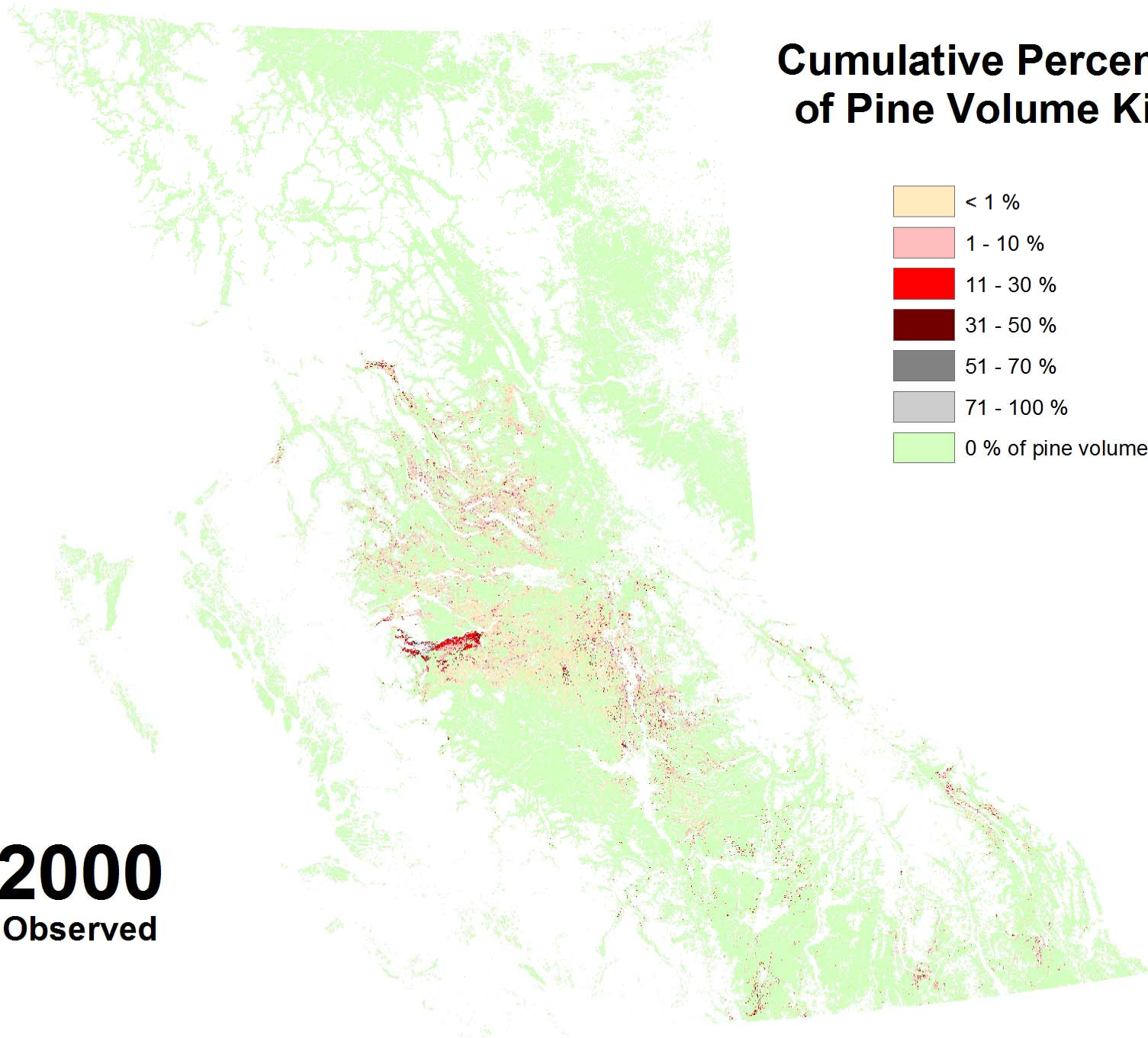


1999
Observed

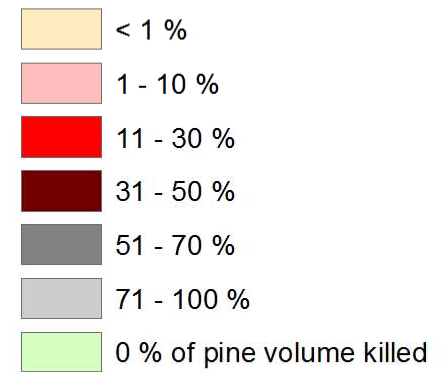
Cumulative Percentage of Pine Volume Killed



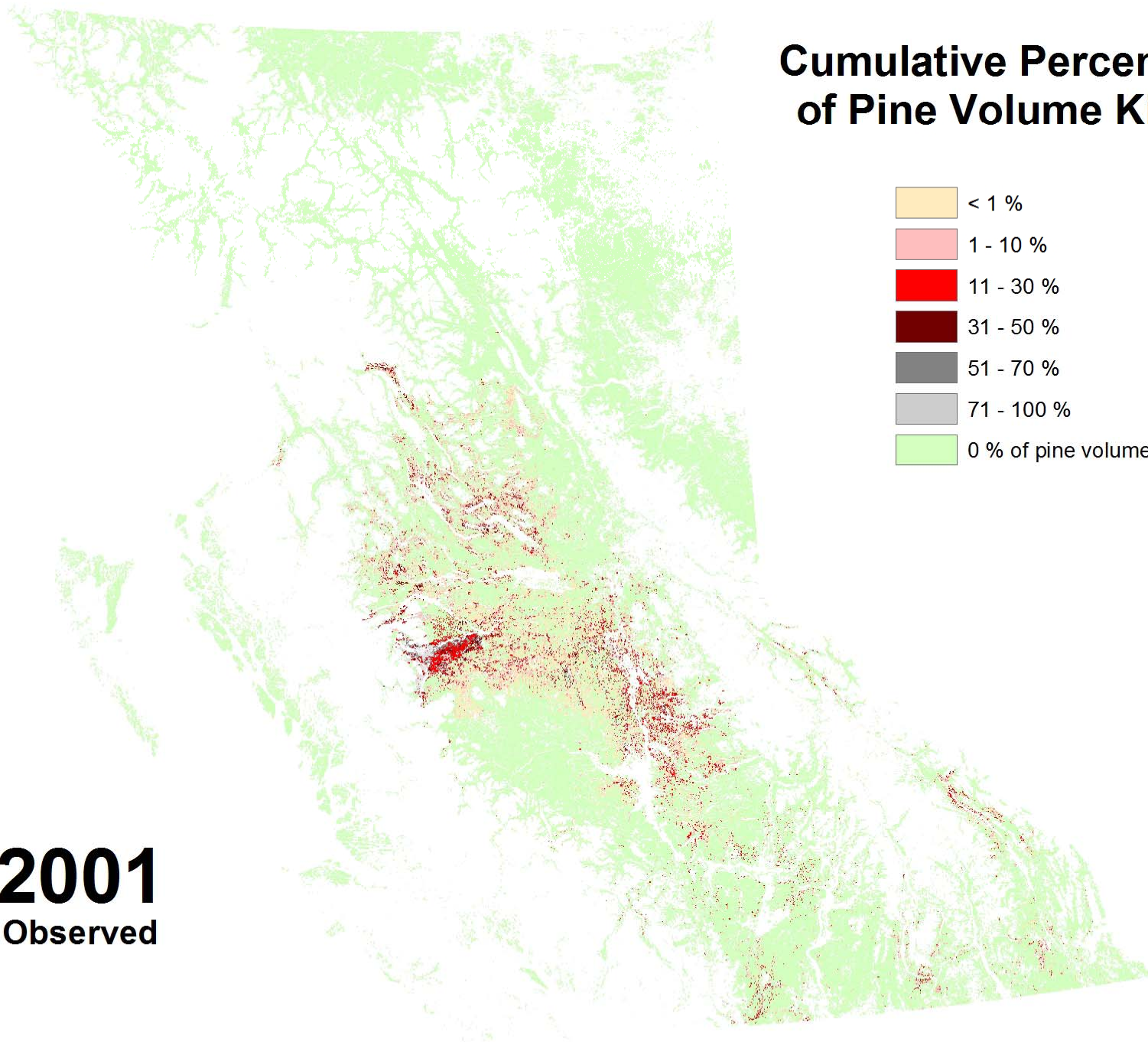
2000
Observed



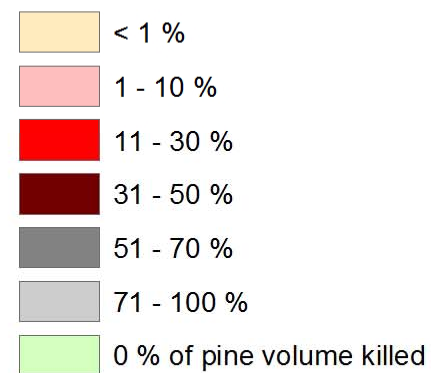
Cumulative Percentage of Pine Volume Killed



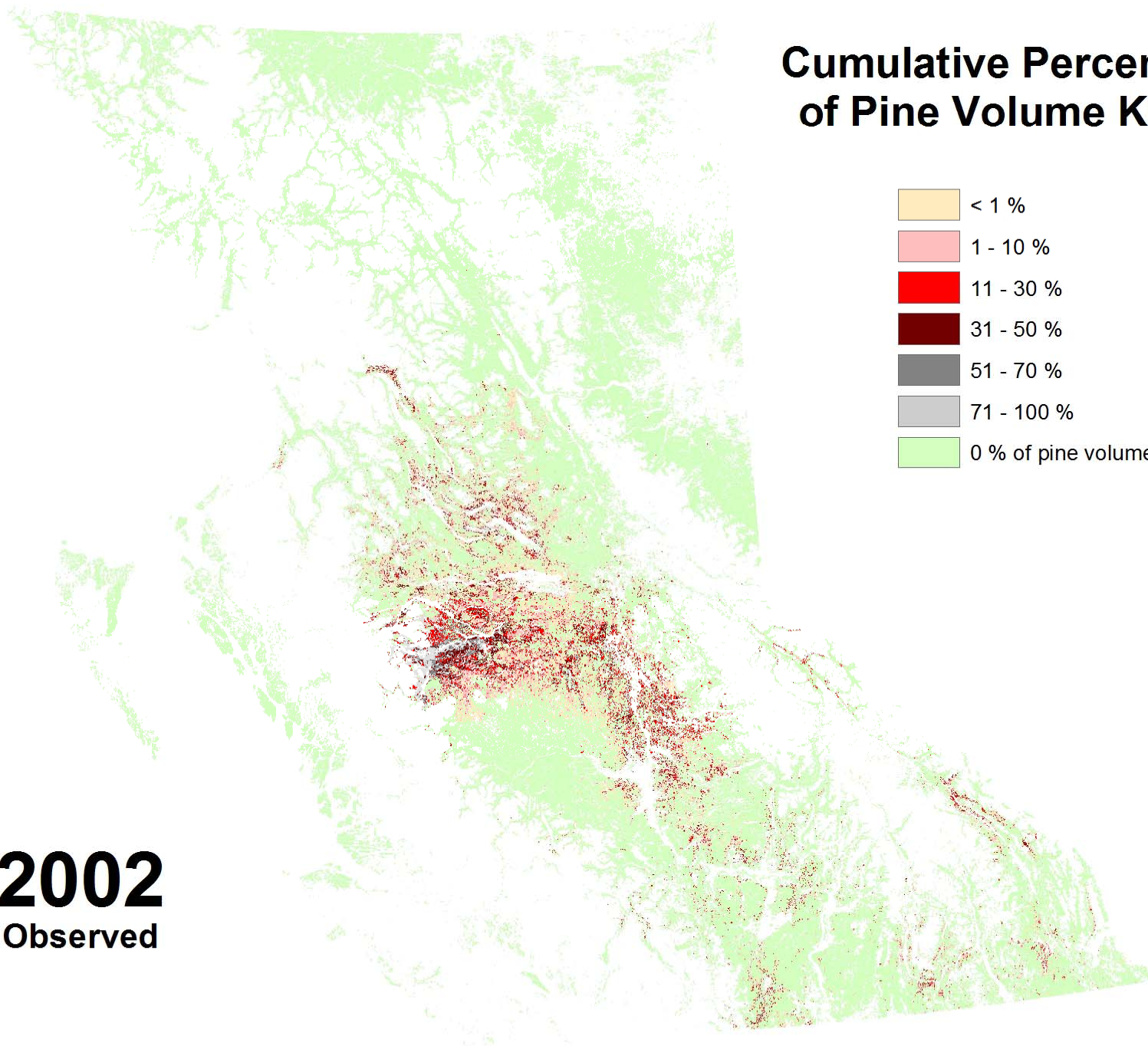
2001
Observed



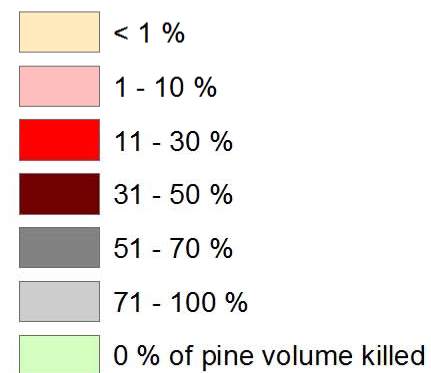
Cumulative Percentage of Pine Volume Killed



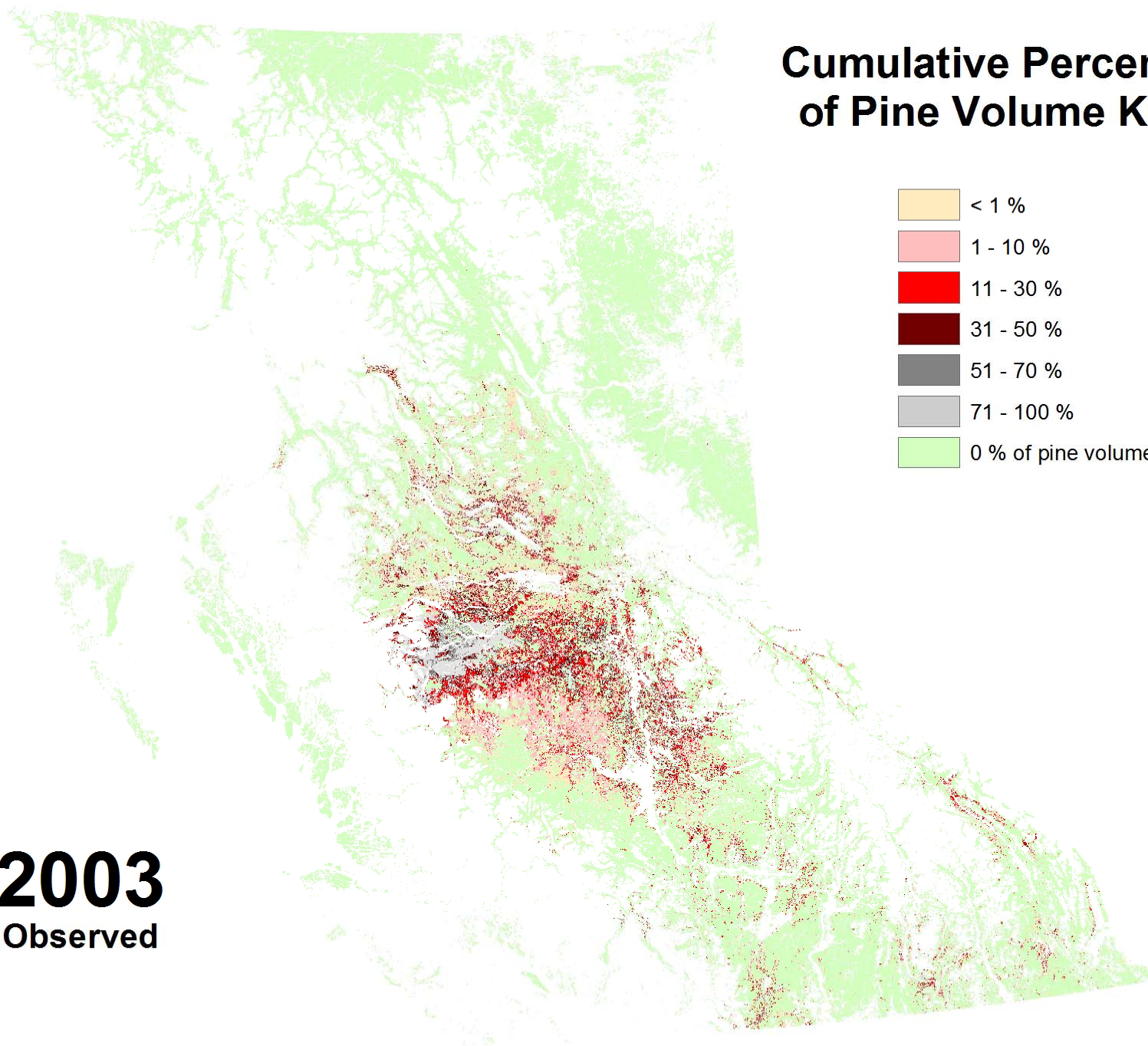
2002
Observed



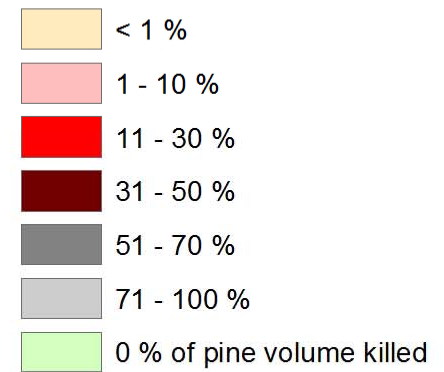
Cumulative Percentage of Pine Volume Killed



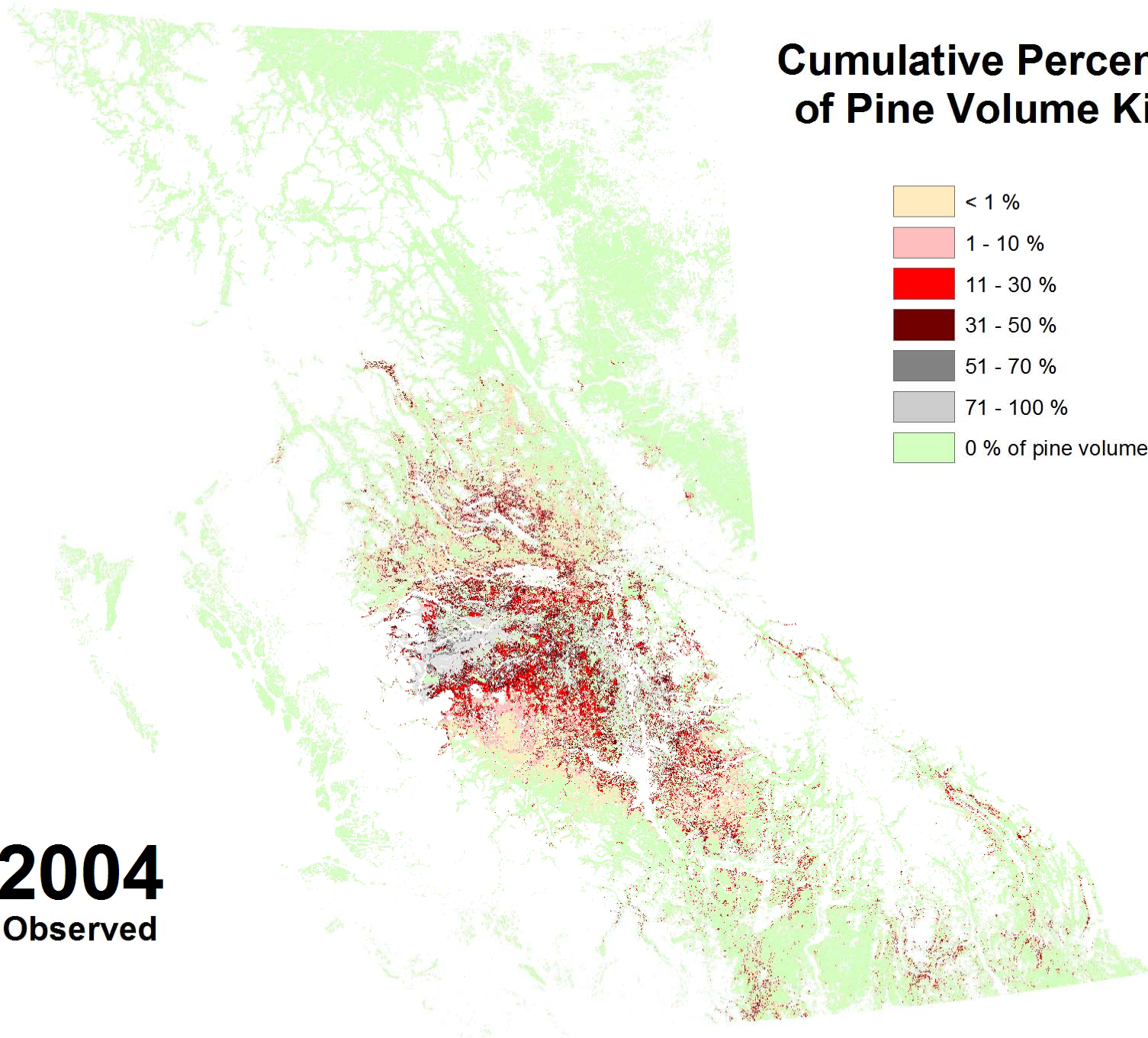
2003
Observed



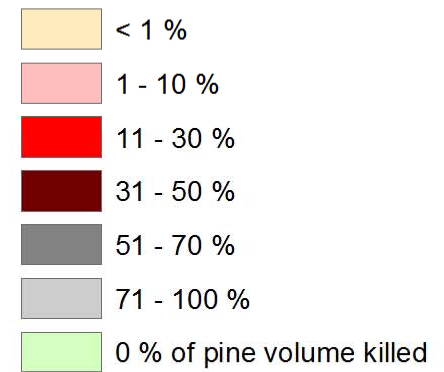
Cumulative Percentage of Pine Volume Killed



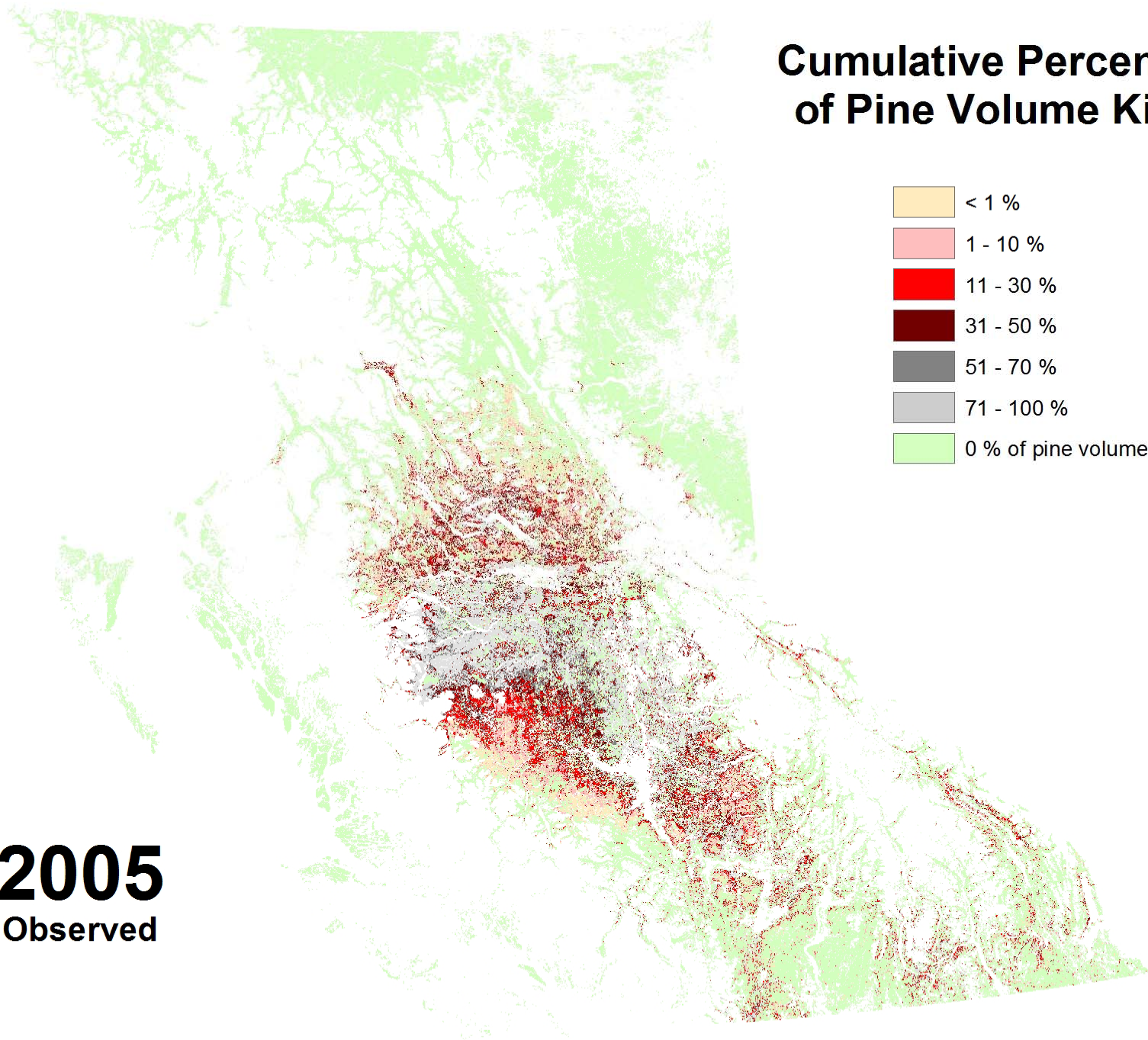
2004
Observed



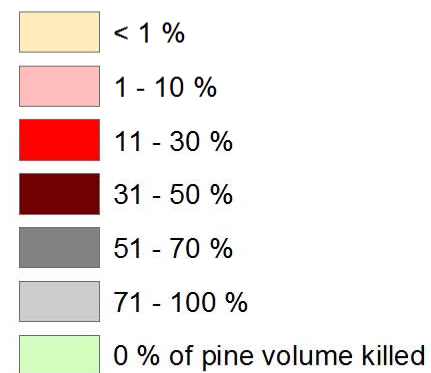
Cumulative Percentage of Pine Volume Killed



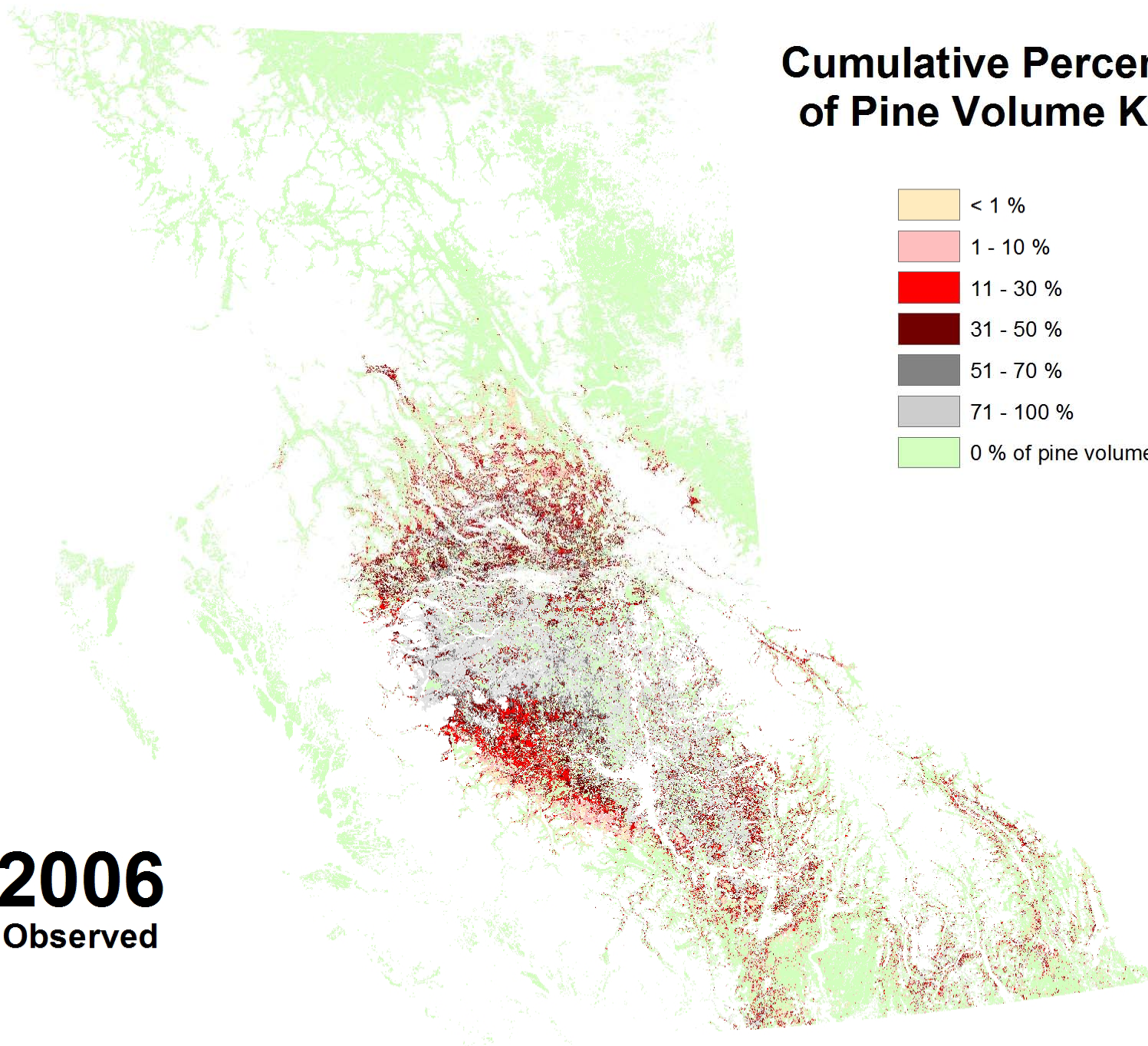
2005
Observed



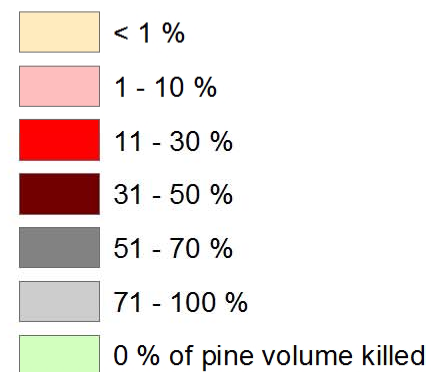
Cumulative Percentage of Pine Volume Killed



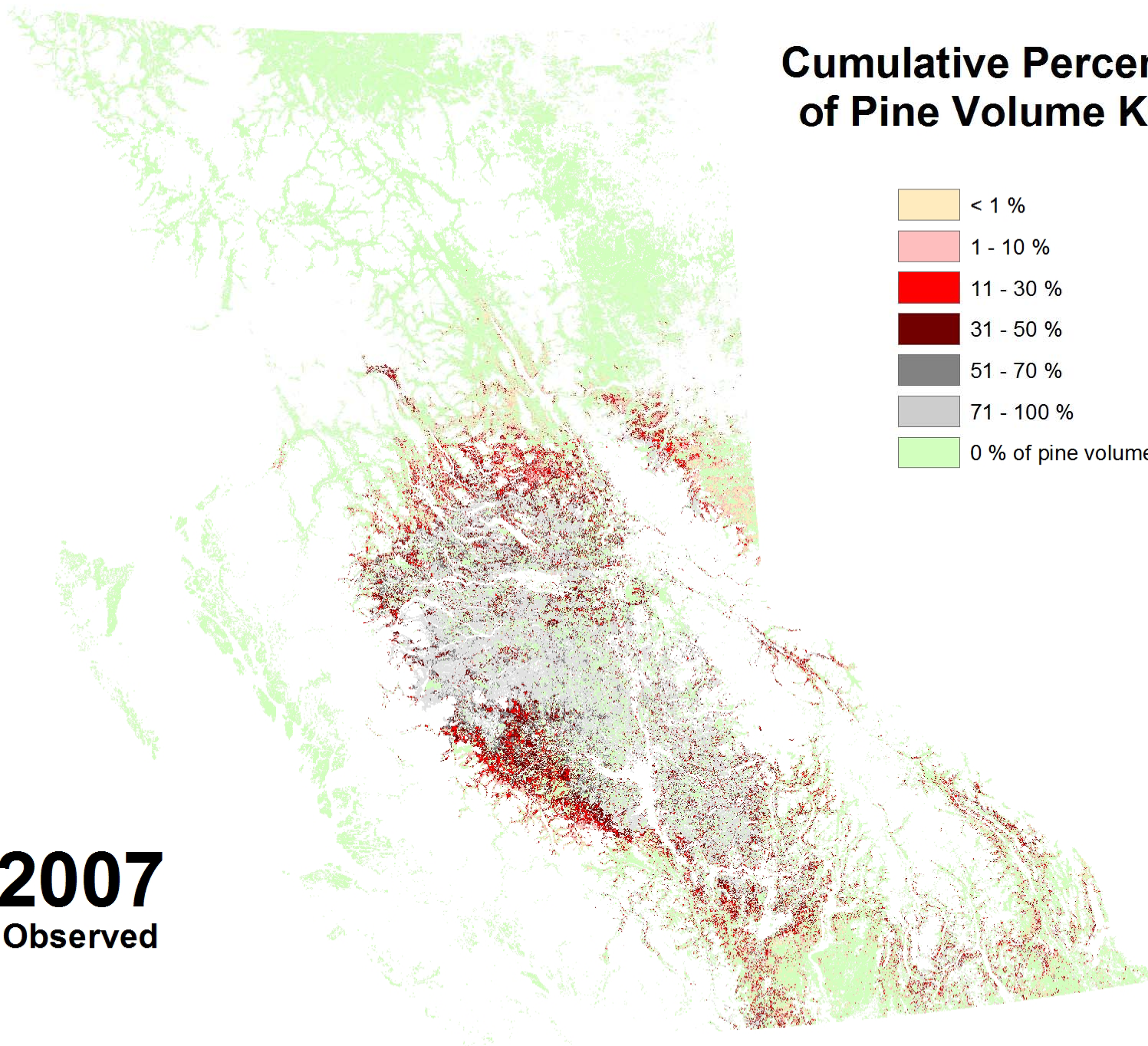
2006
Observed



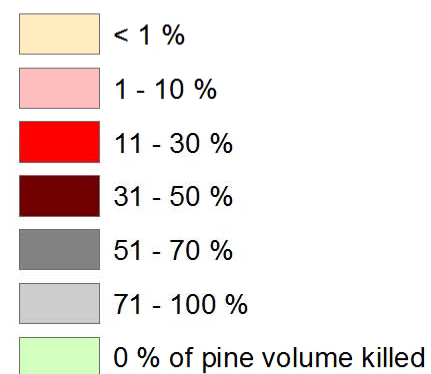
Cumulative Percentage of Pine Volume Killed



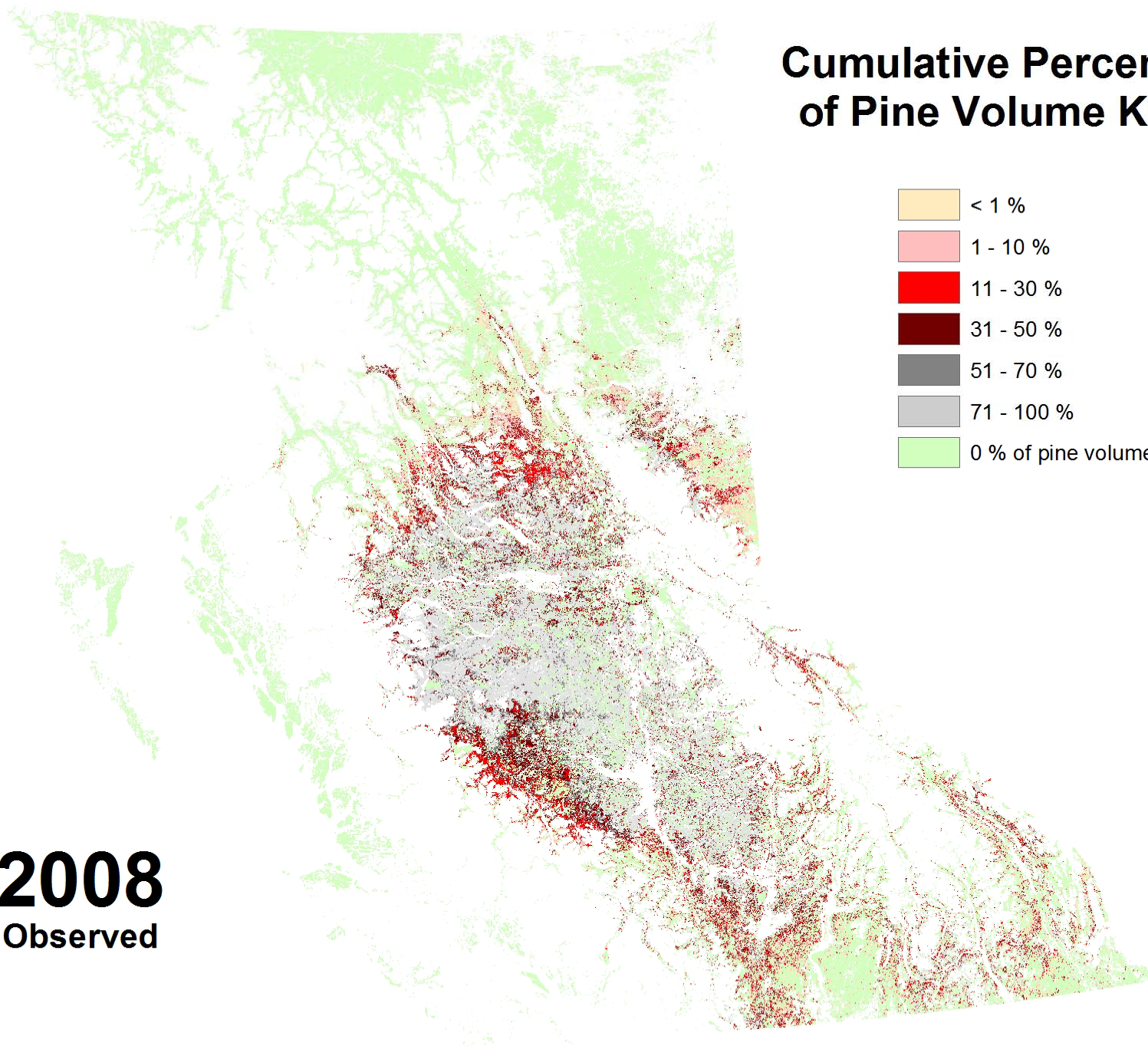
2007
Observed



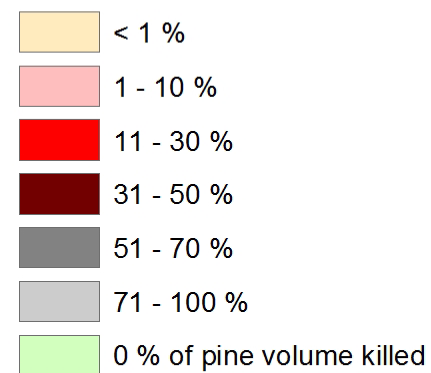
Cumulative Percentage of Pine Volume Killed



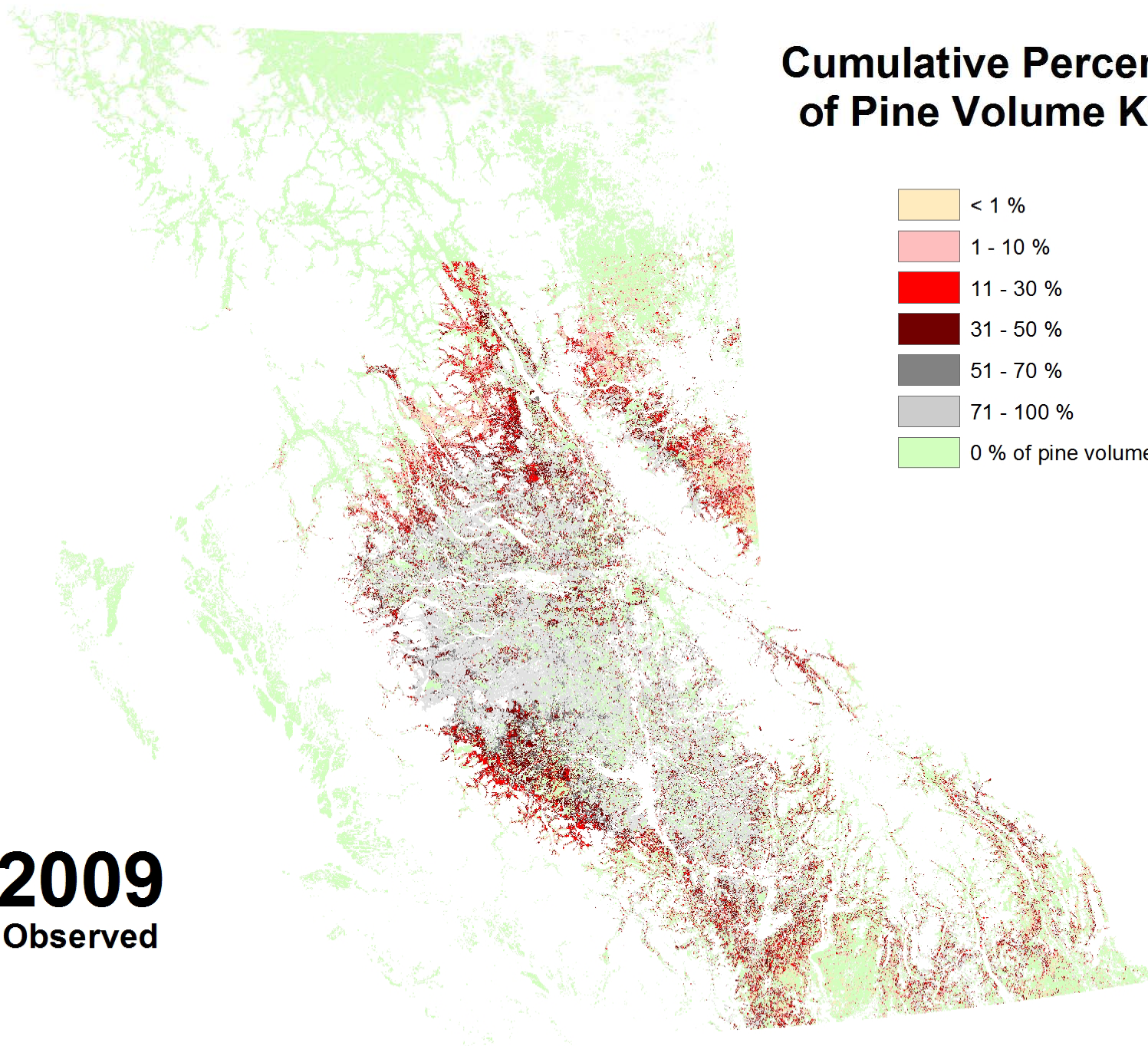
2008
Observed



Cumulative Percentage of Pine Volume Killed

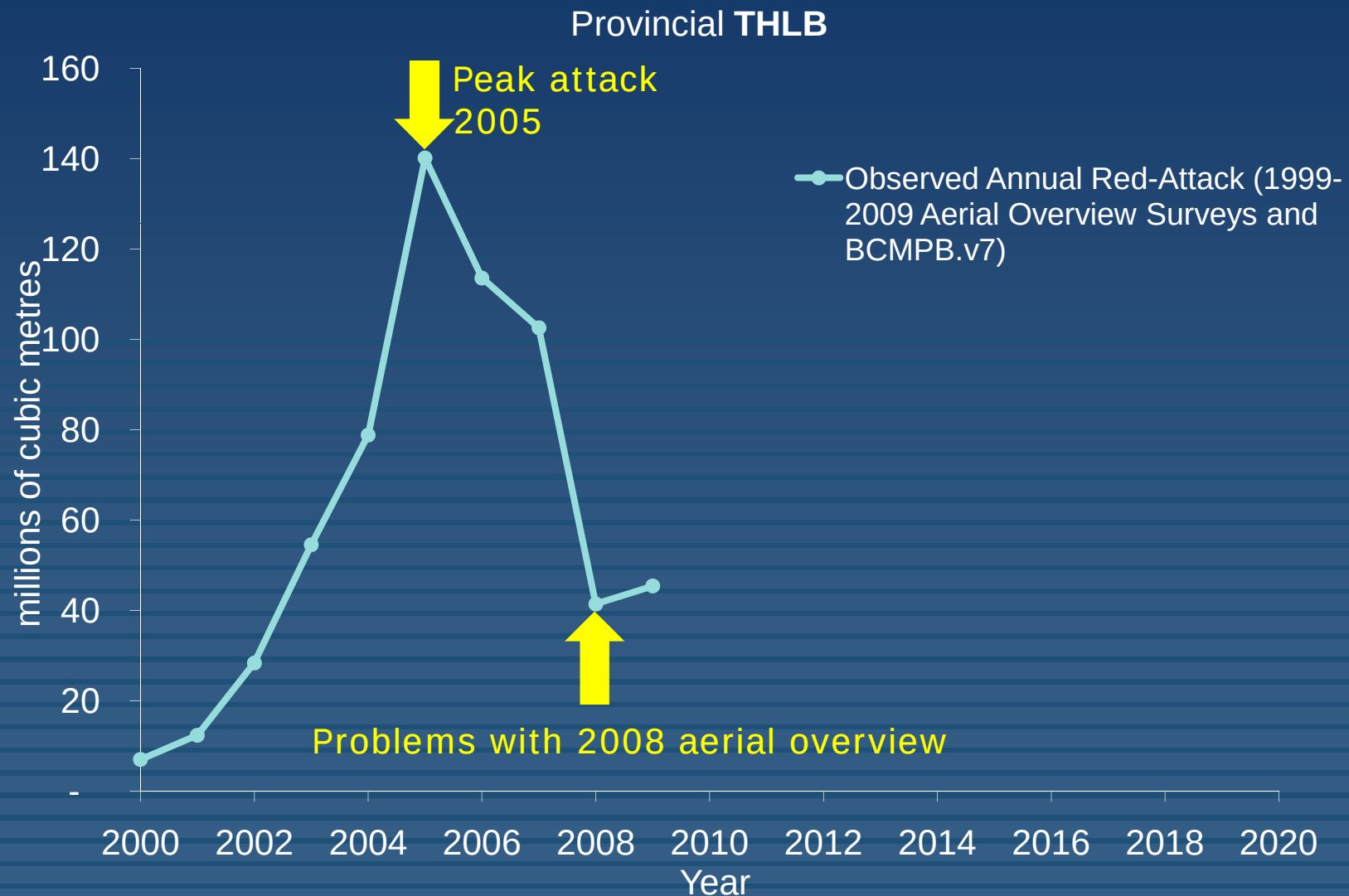


2009
Observed





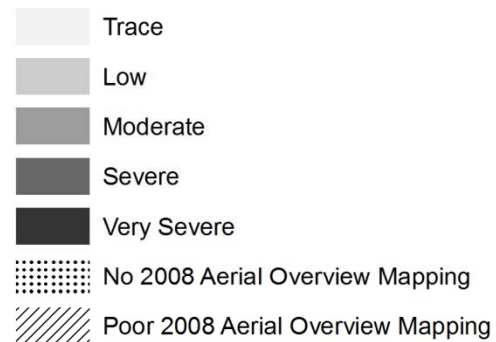
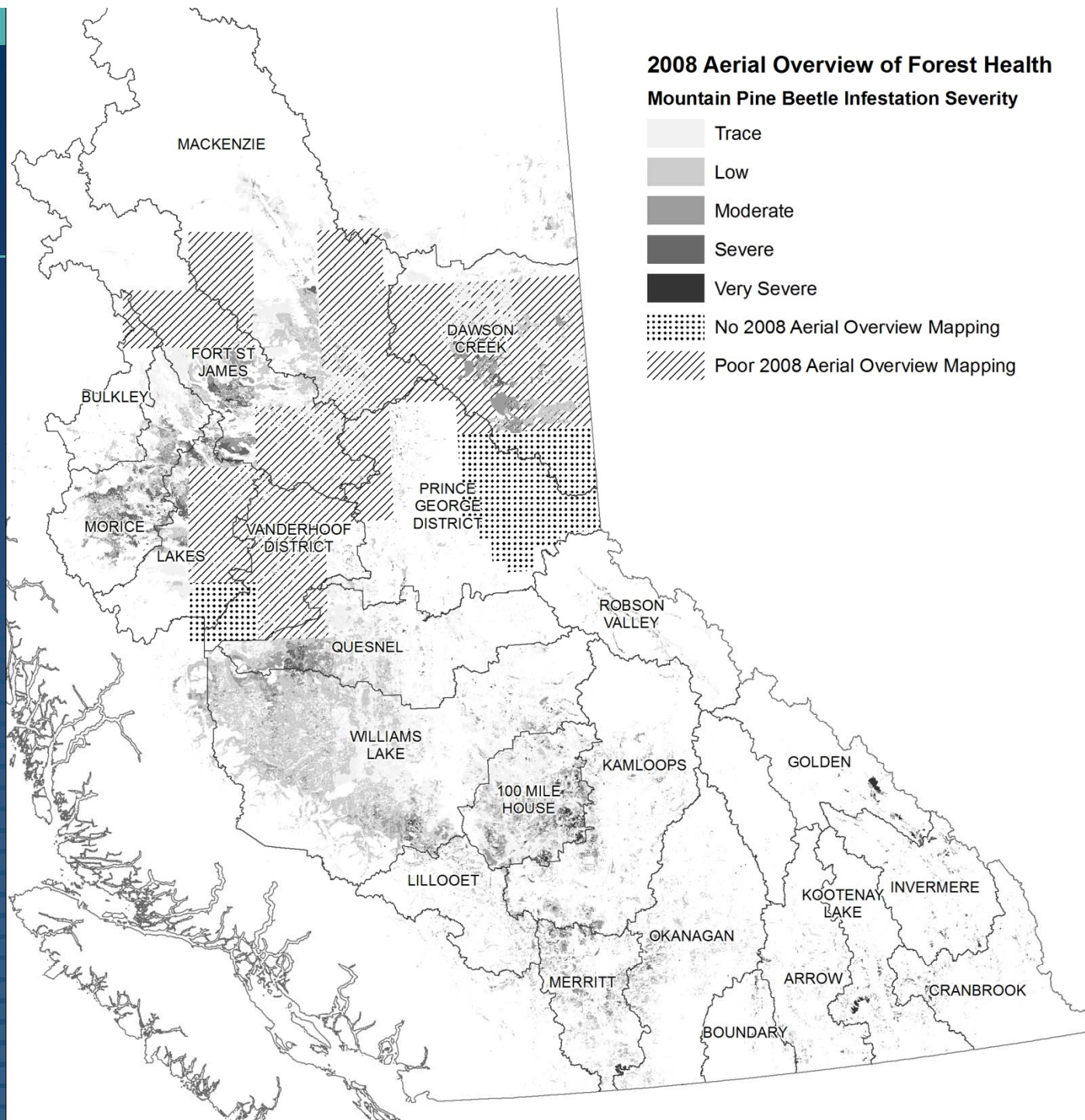
Observed Annual Pine Volume Killed on the Provincial THLB





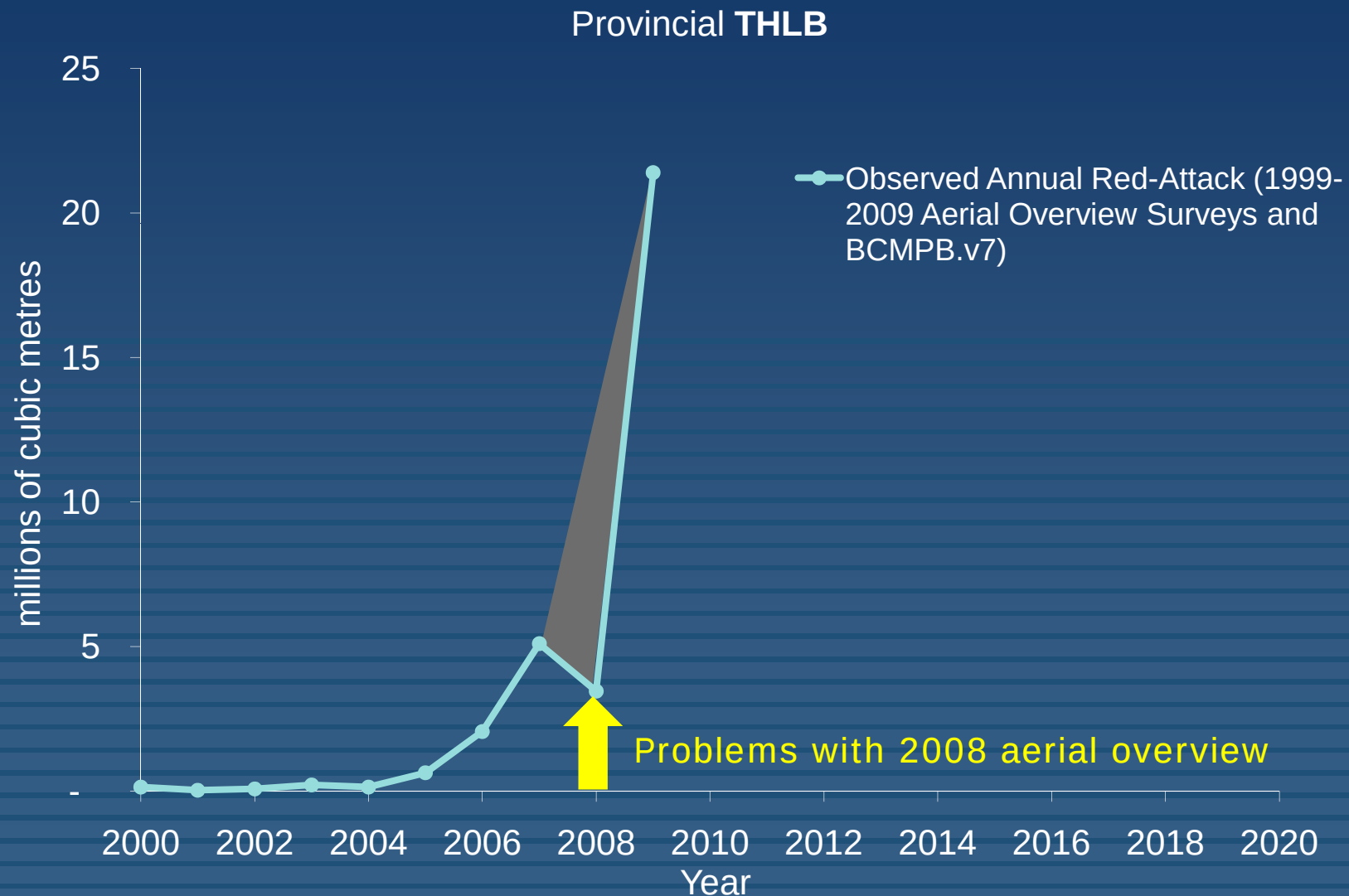
2008 Aerial Overview of Forest Health

Mountain Pine Beetle Infestation Severity



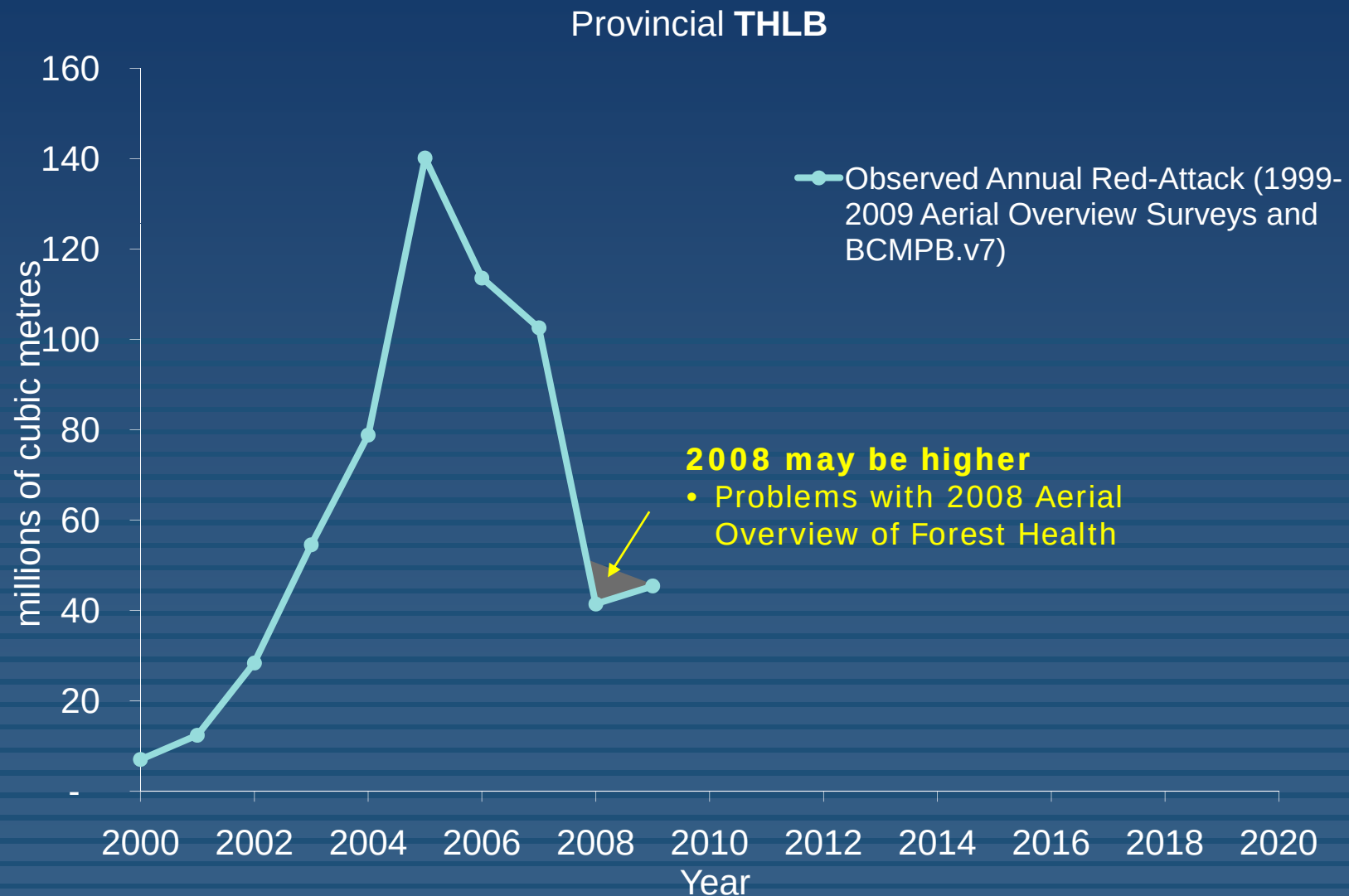


Annual Pine Volume Killed on Mackenzie TSA THLB

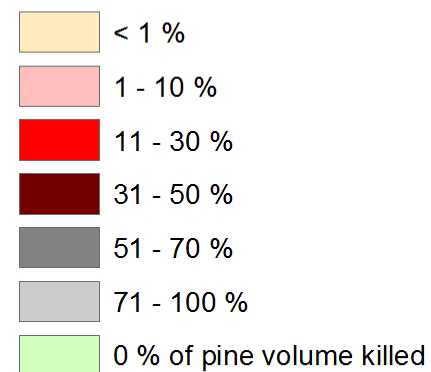




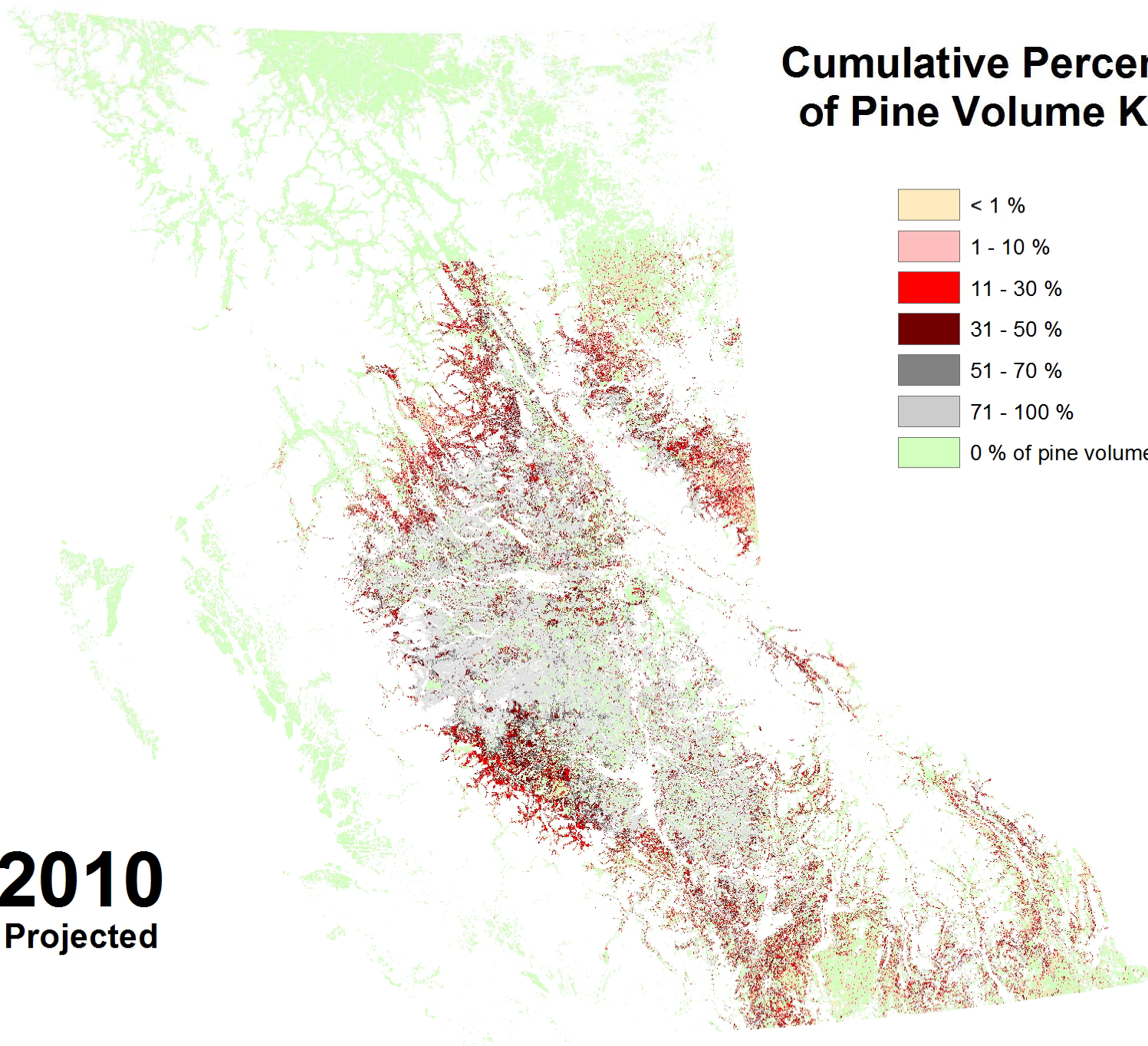
Observed Annual Pine Volume Killed on the Provincial THLB



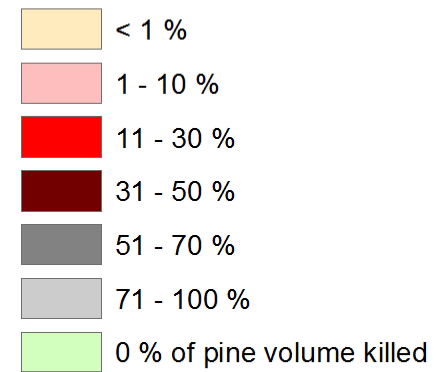
Cumulative Percentage of Pine Volume Killed



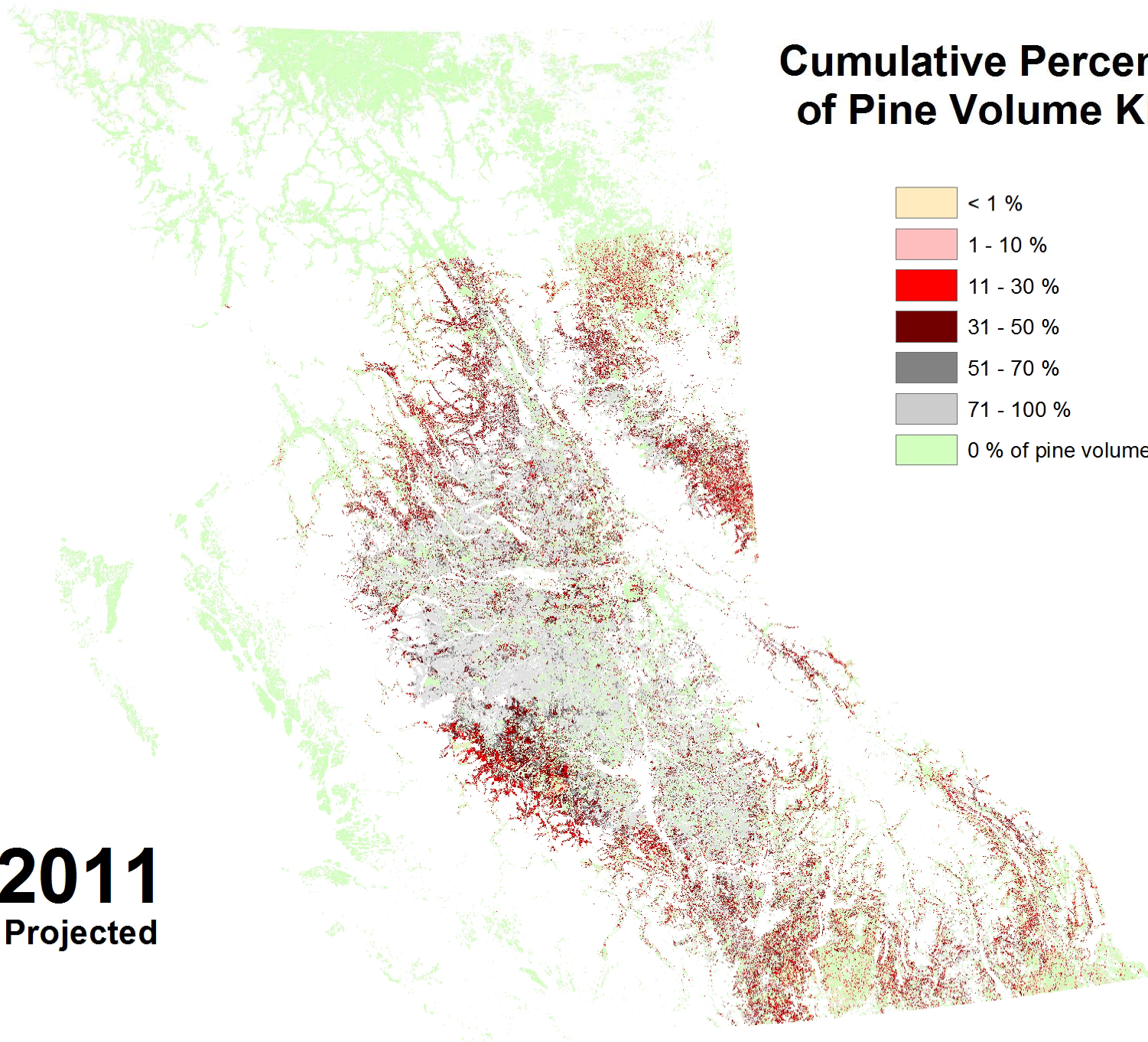
2010
Projected



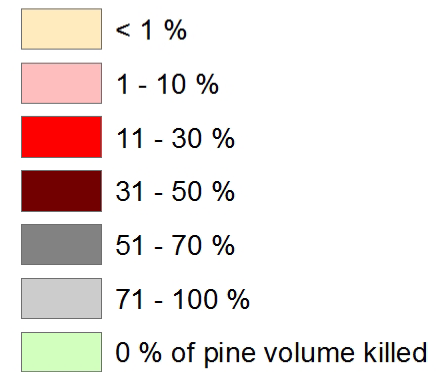
Cumulative Percentage of Pine Volume Killed



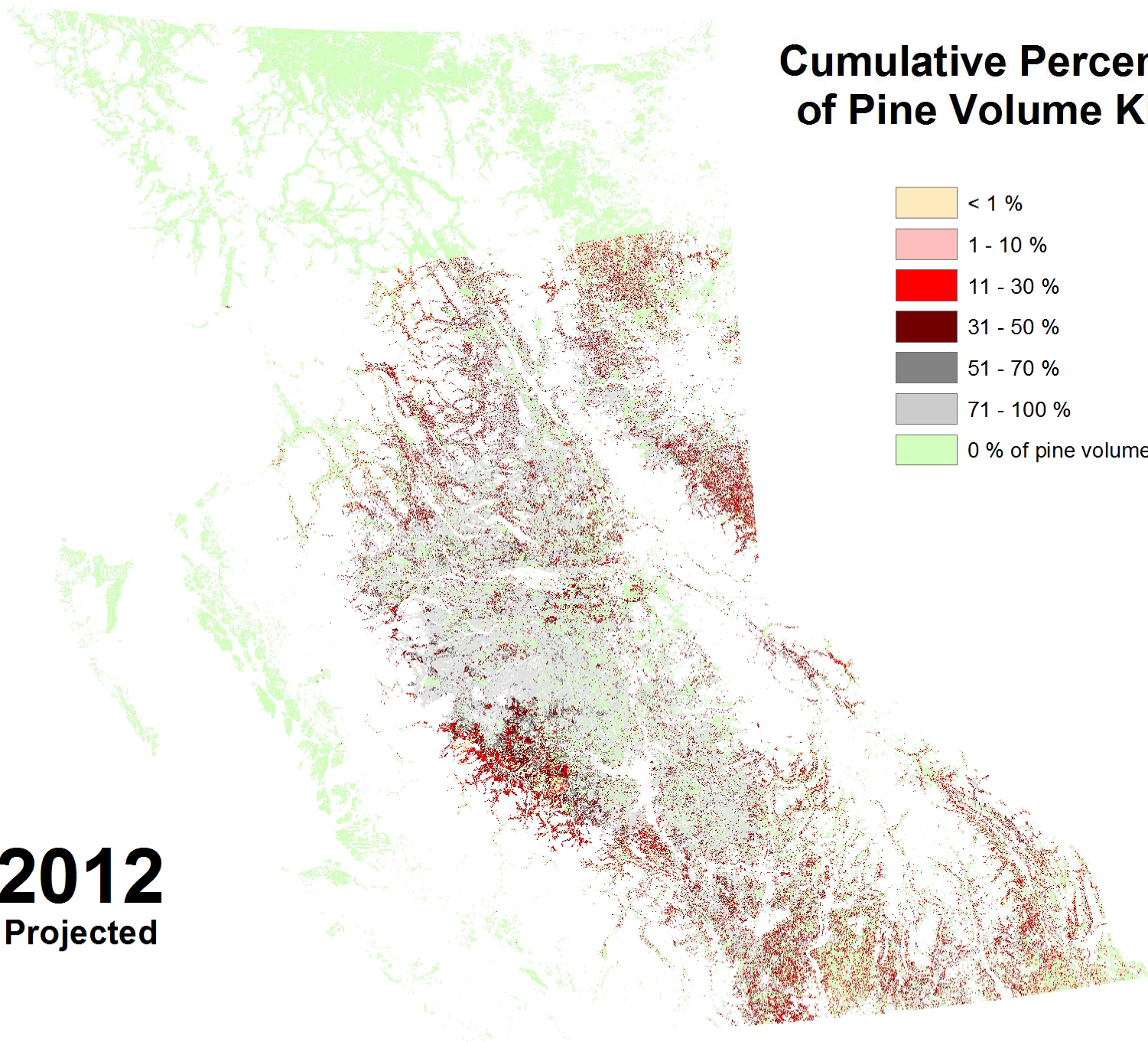
2011
Projected



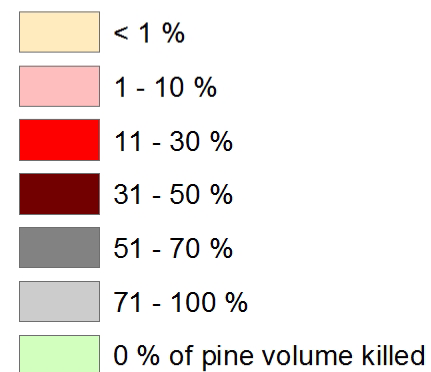
Cumulative Percentage of Pine Volume Killed



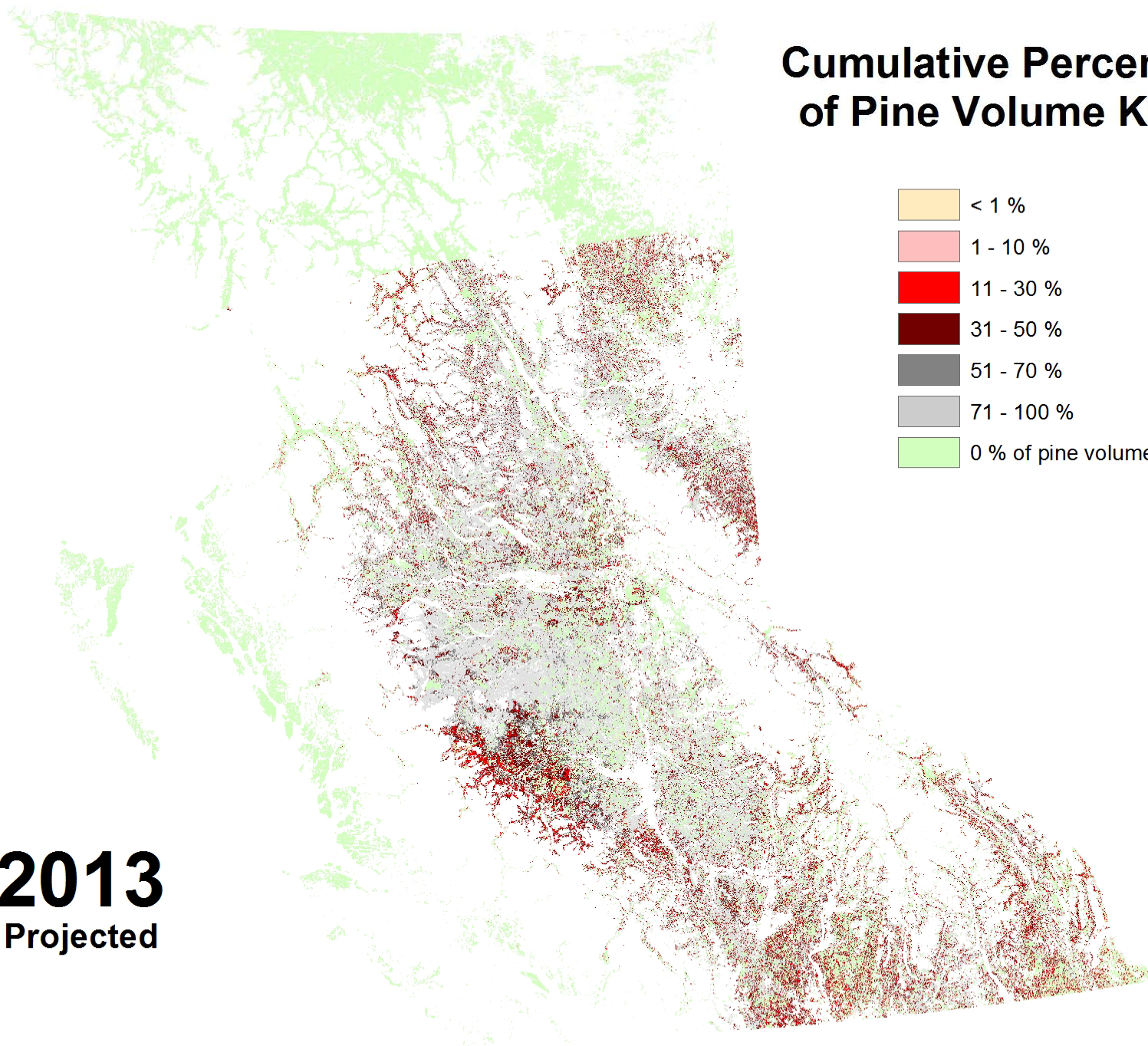
2012
Projected



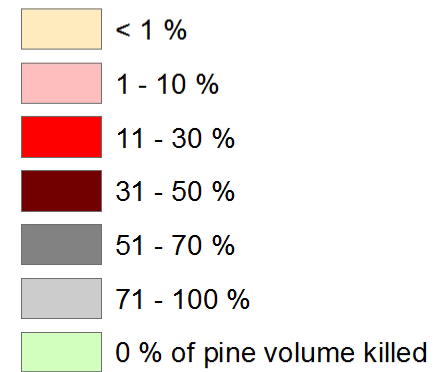
Cumulative Percentage of Pine Volume Killed



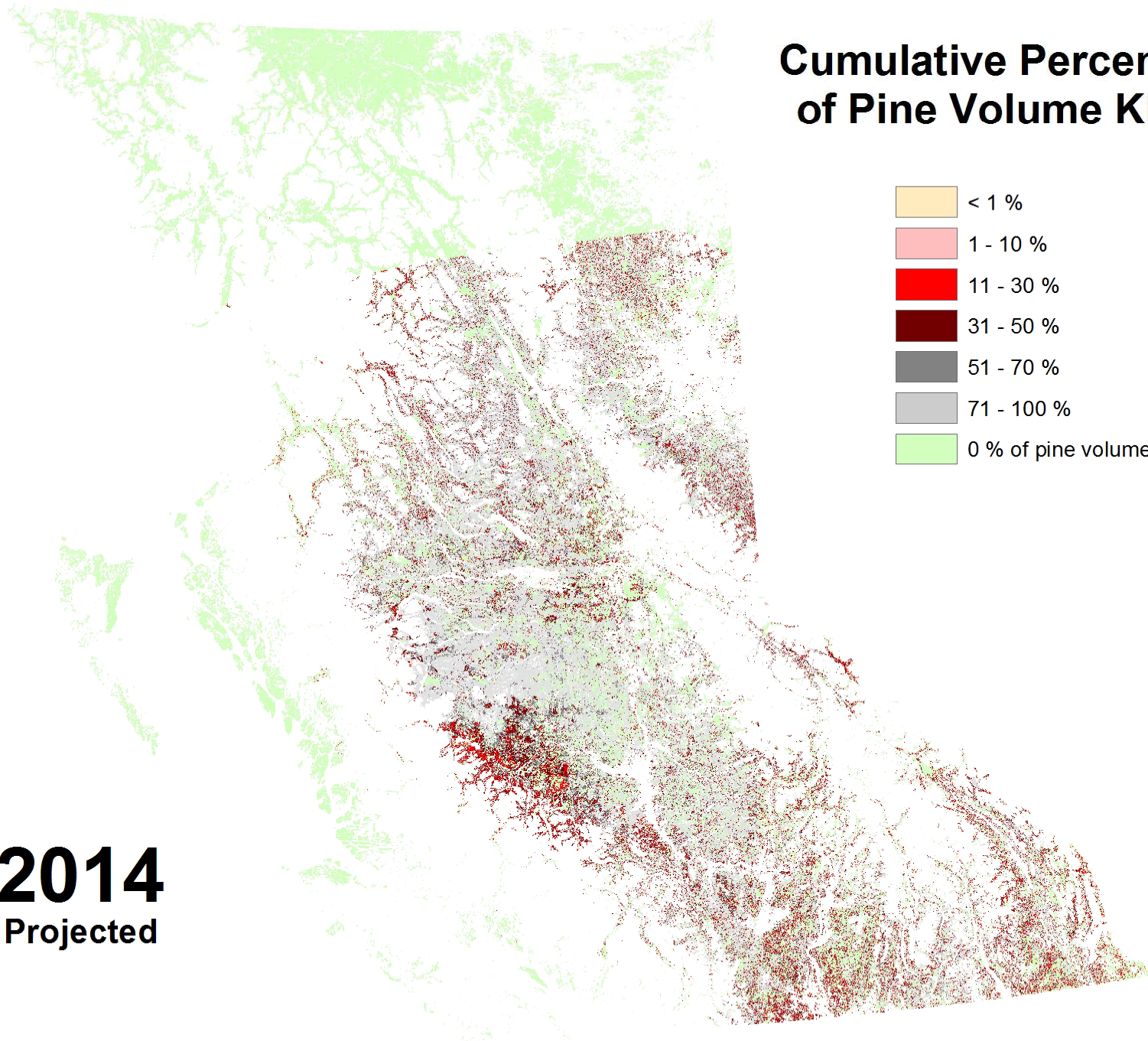
2013
Projected



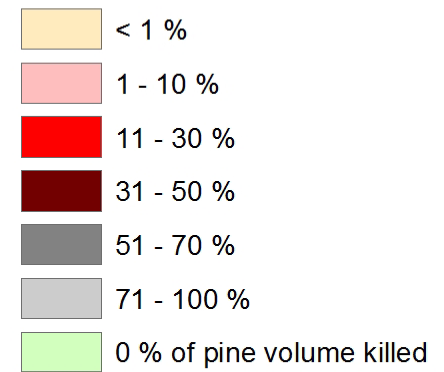
Cumulative Percentage of Pine Volume Killed



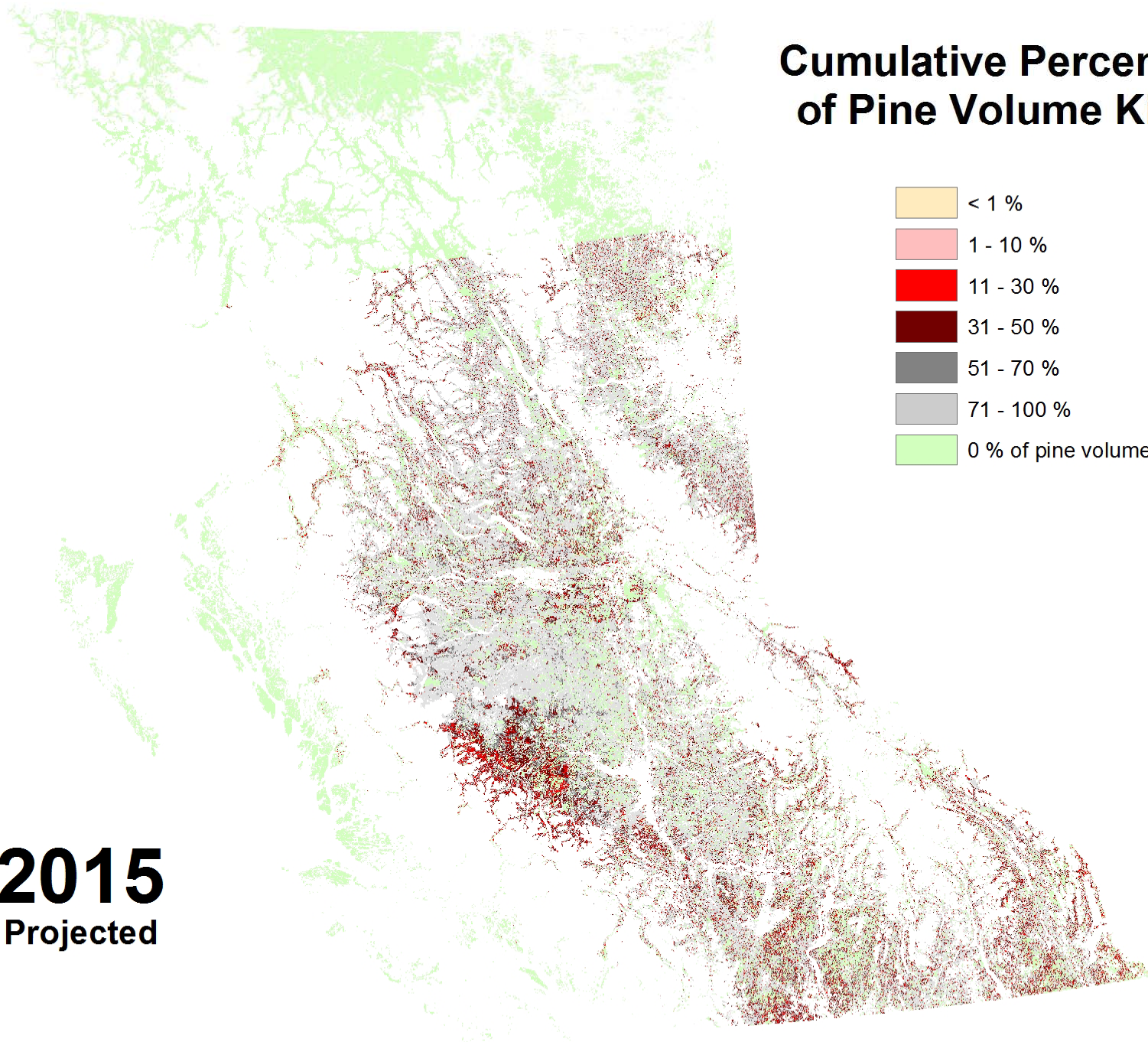
2014
Projected



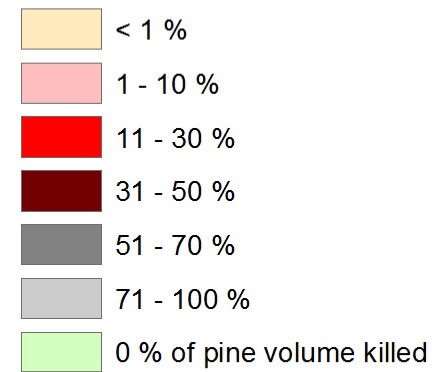
Cumulative Percentage of Pine Volume Killed



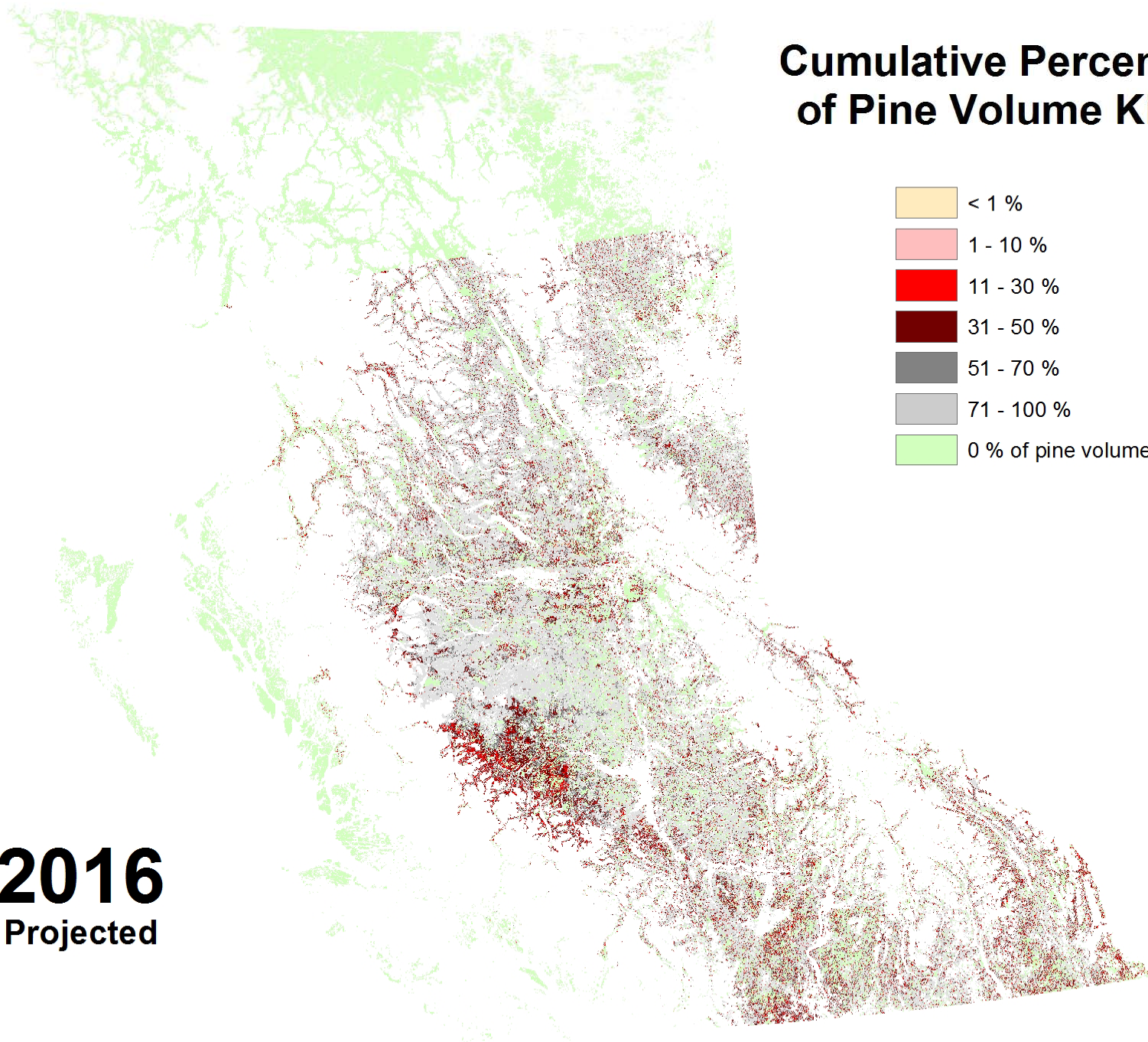
2015
Projected



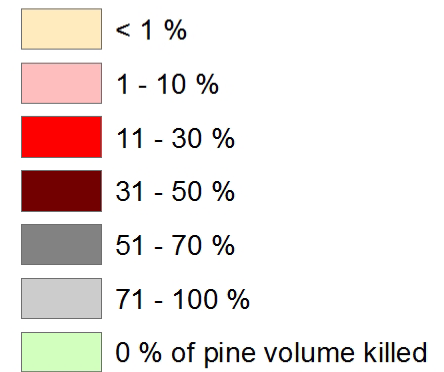
Cumulative Percentage of Pine Volume Killed



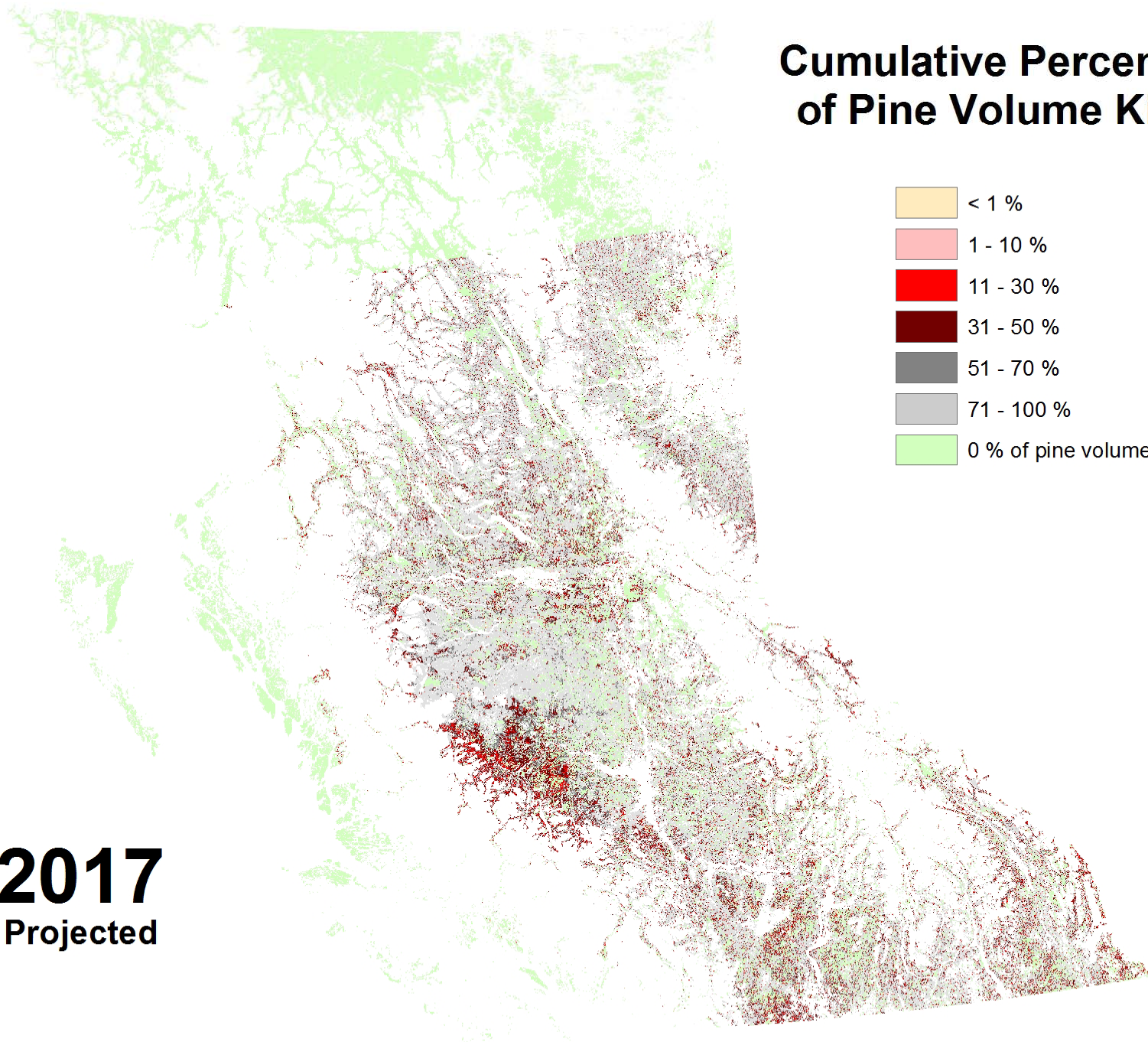
2016
Projected



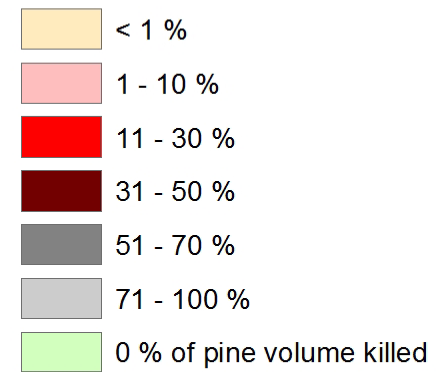
Cumulative Percentage of Pine Volume Killed



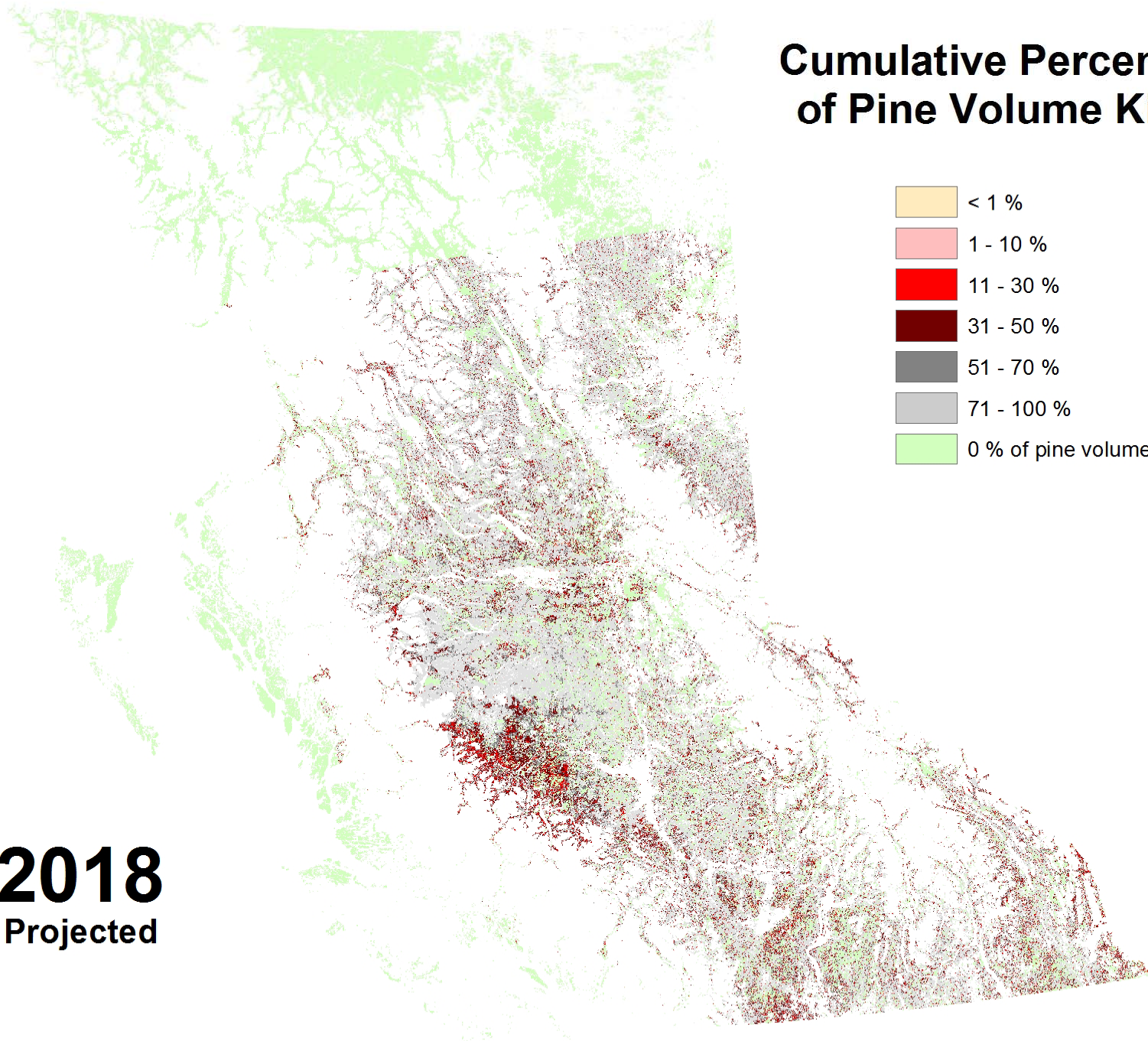
2017
Projected



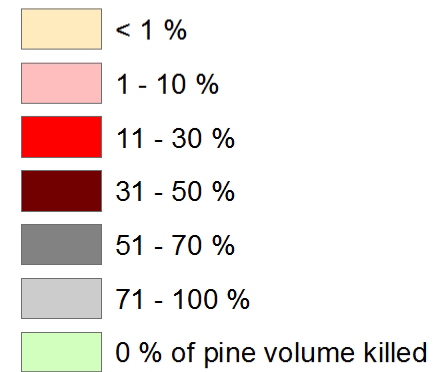
Cumulative Percentage of Pine Volume Killed



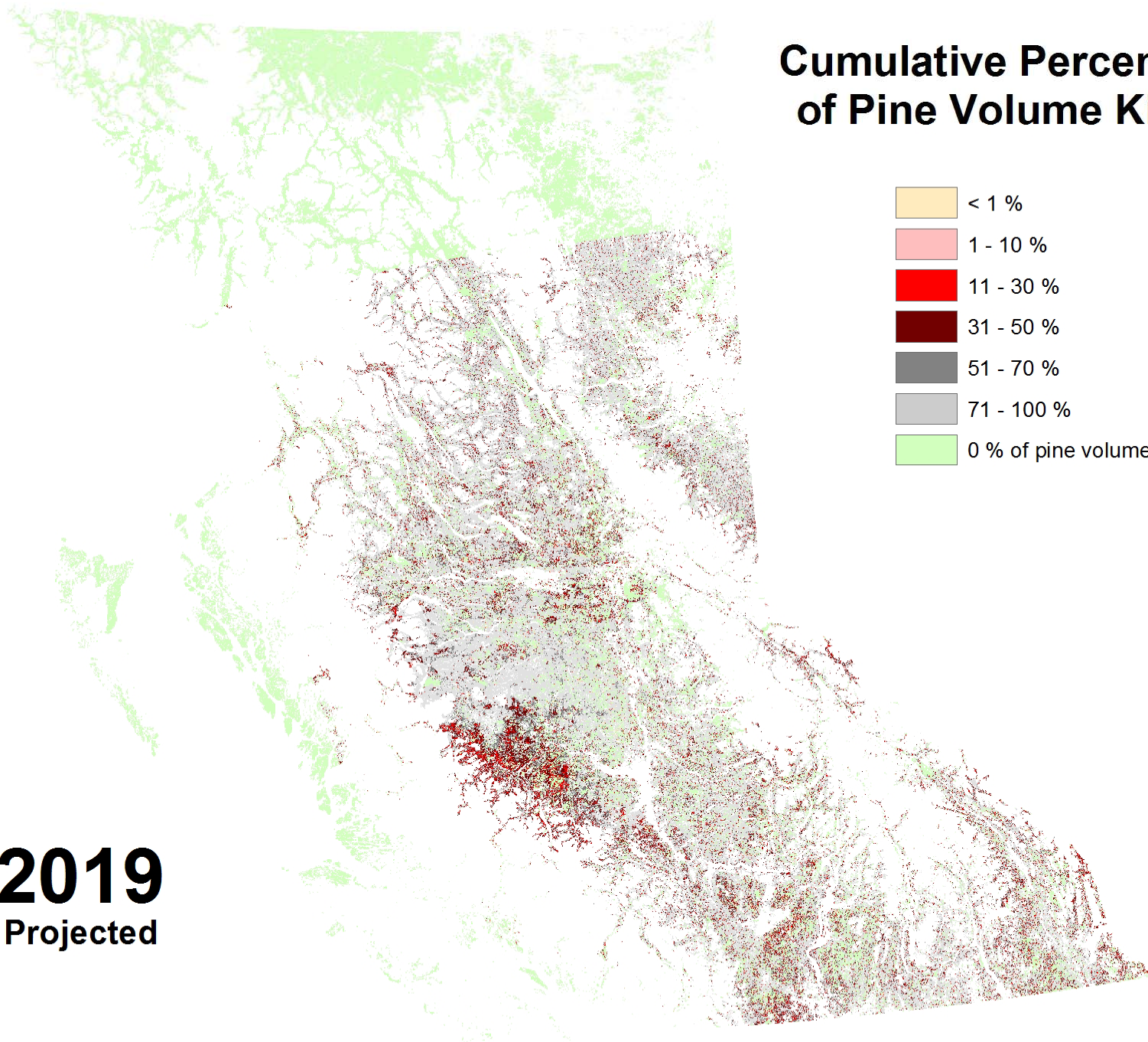
2018
Projected



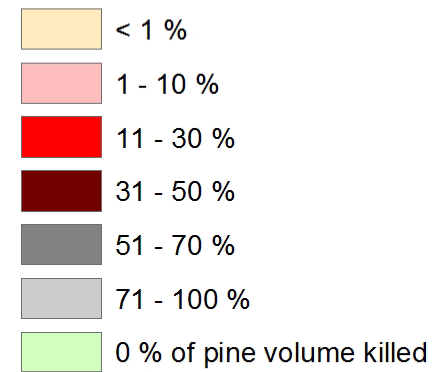
Cumulative Percentage of Pine Volume Killed



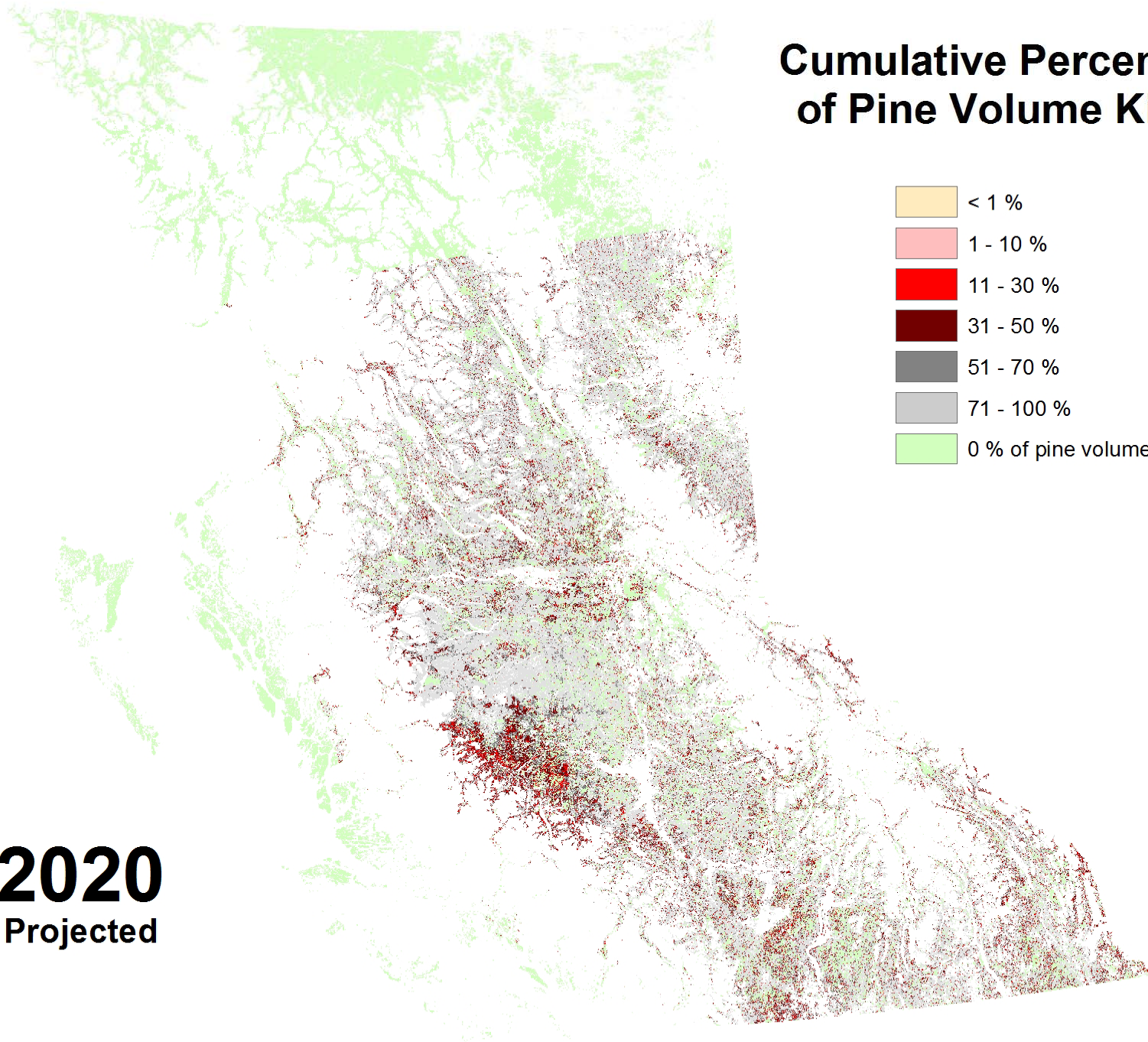
2019
Projected



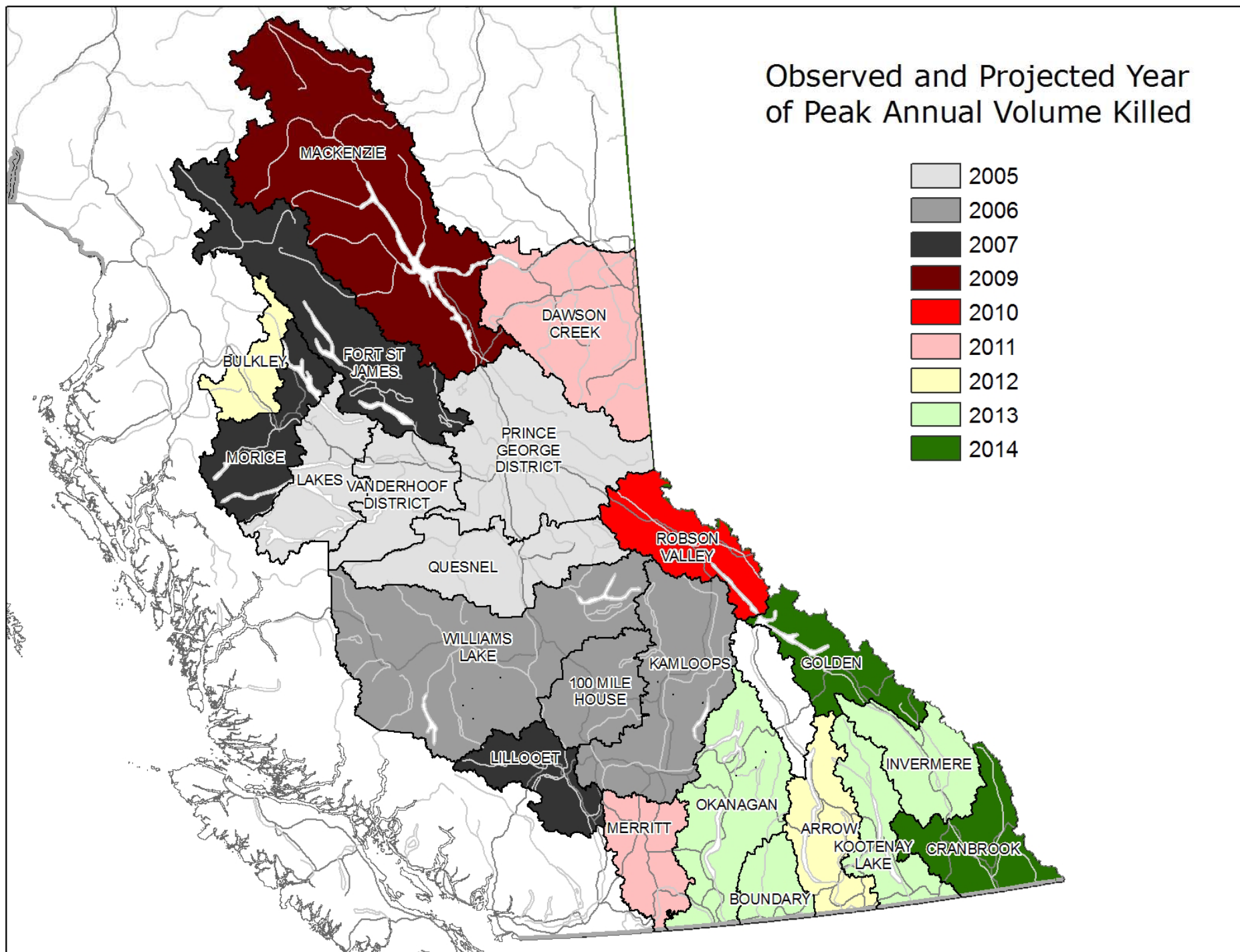
Cumulative Percentage of Pine Volume Killed



2020
Projected

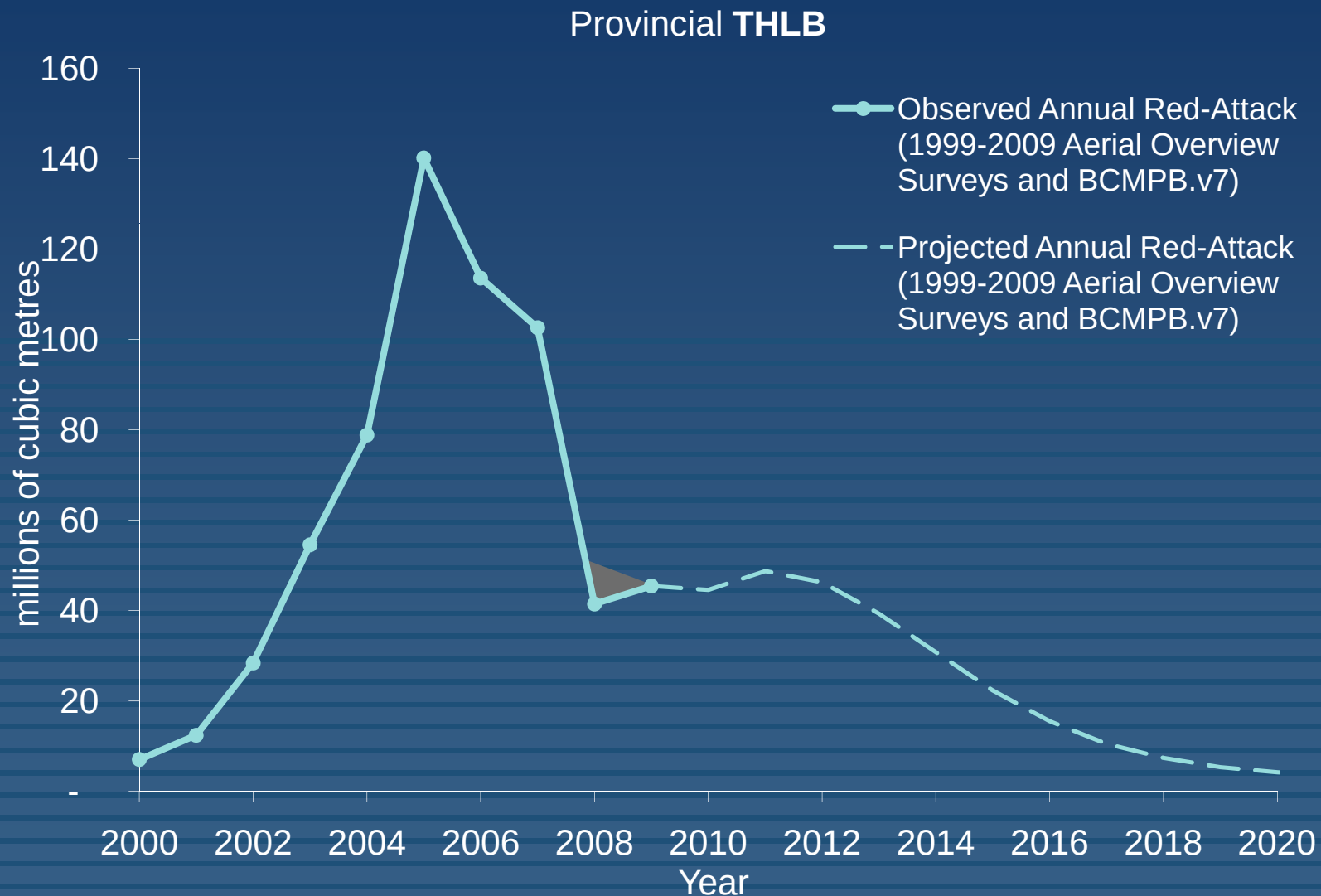


Observed and Projected Year of Peak Annual Volume Killed



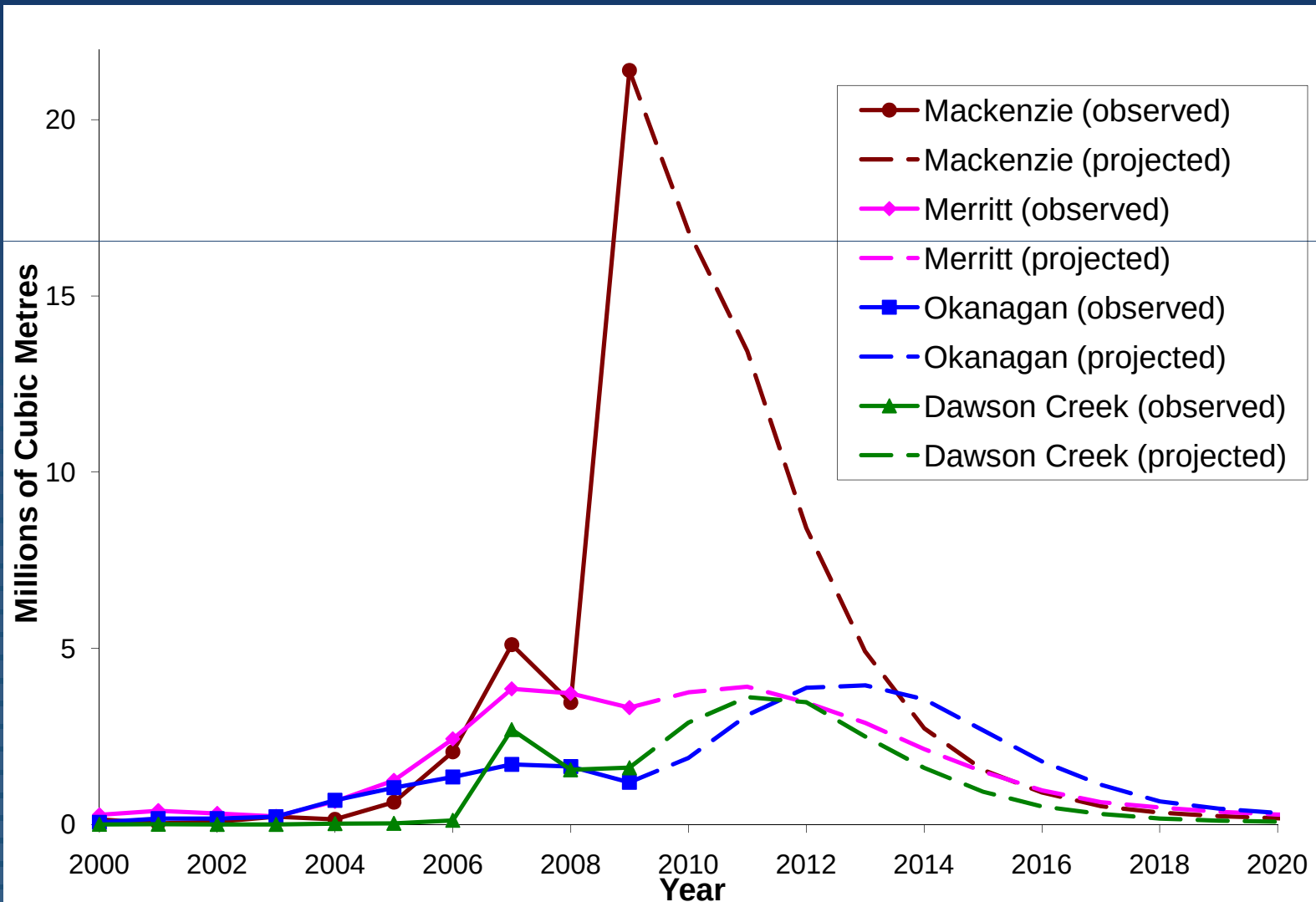


Observed and Projected Annual Pine Volume Killed on the THLB



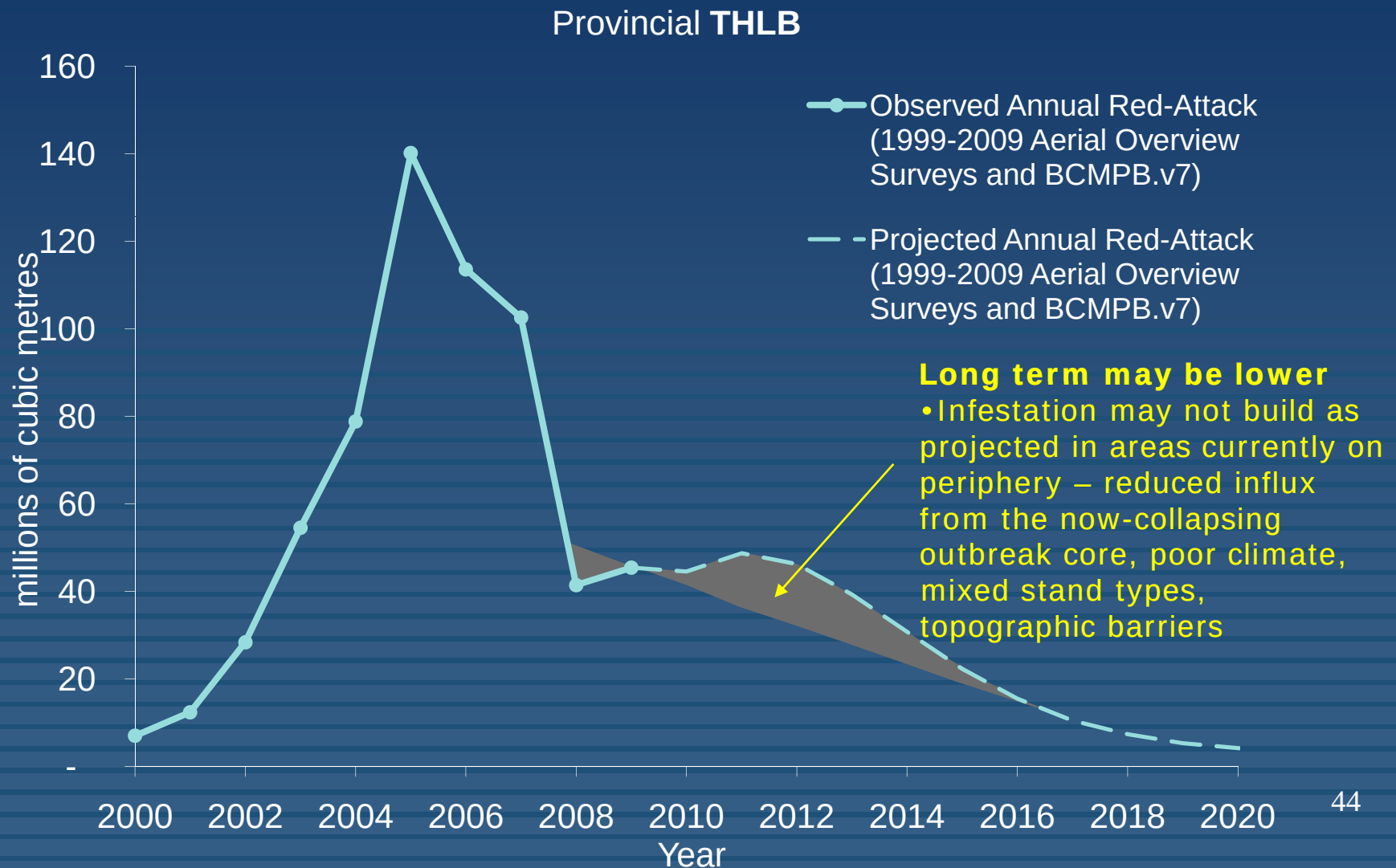


Projected Kill Uncertainty





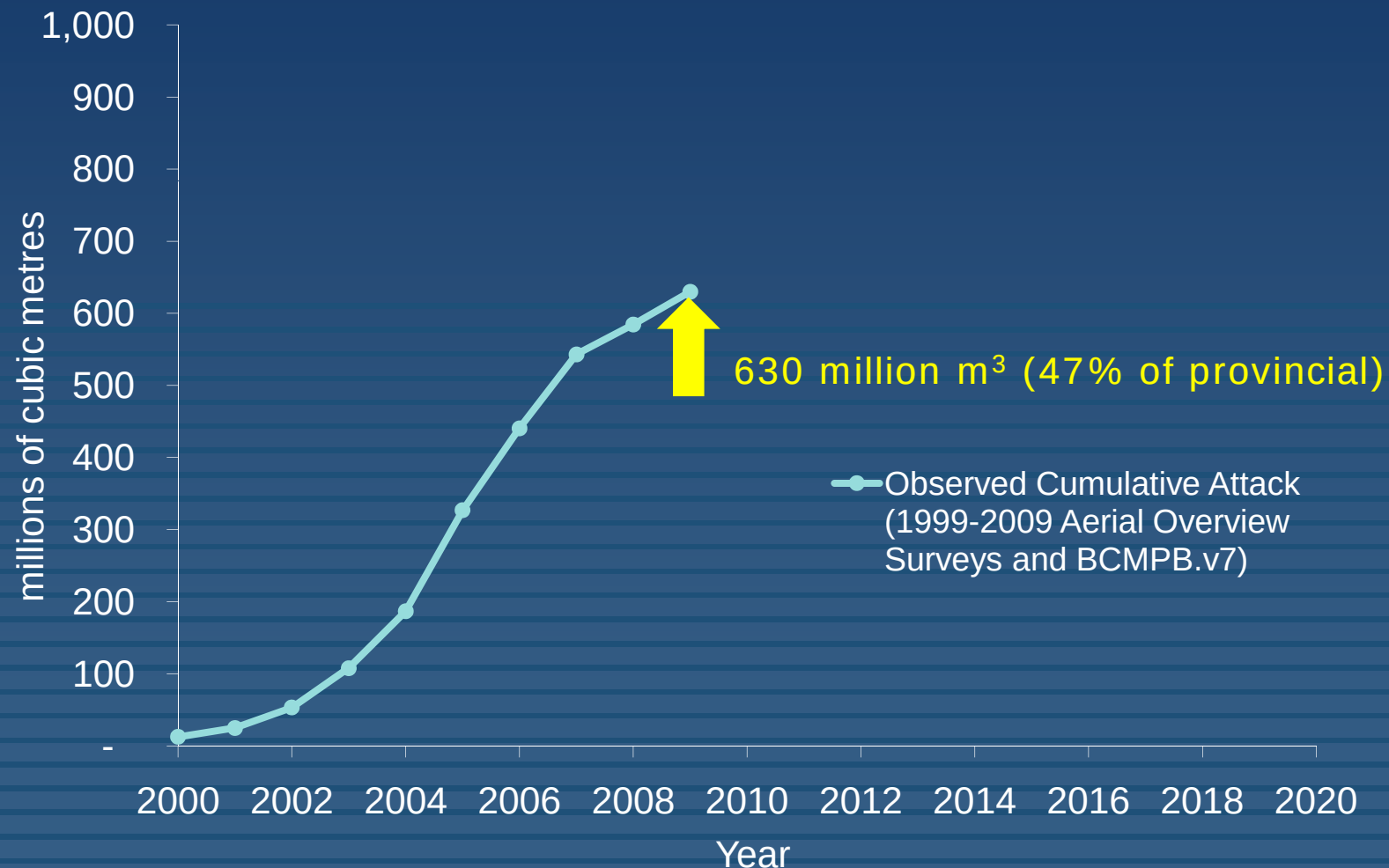
Observed and Projected Annual Pine Volume Killed on the THLB





Observed Cumulative Pine Volume Killed on the THLB

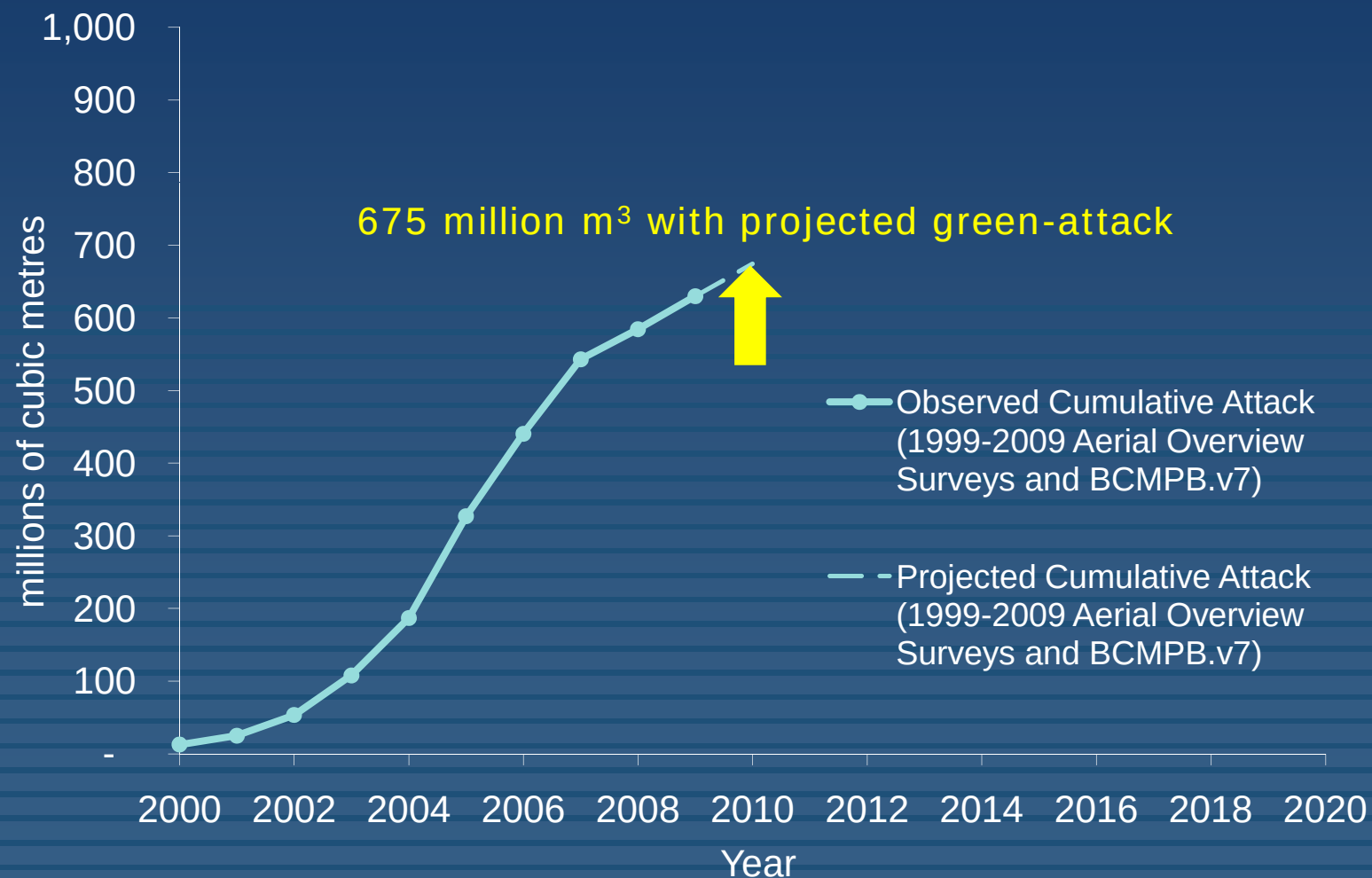
Provincial THLB





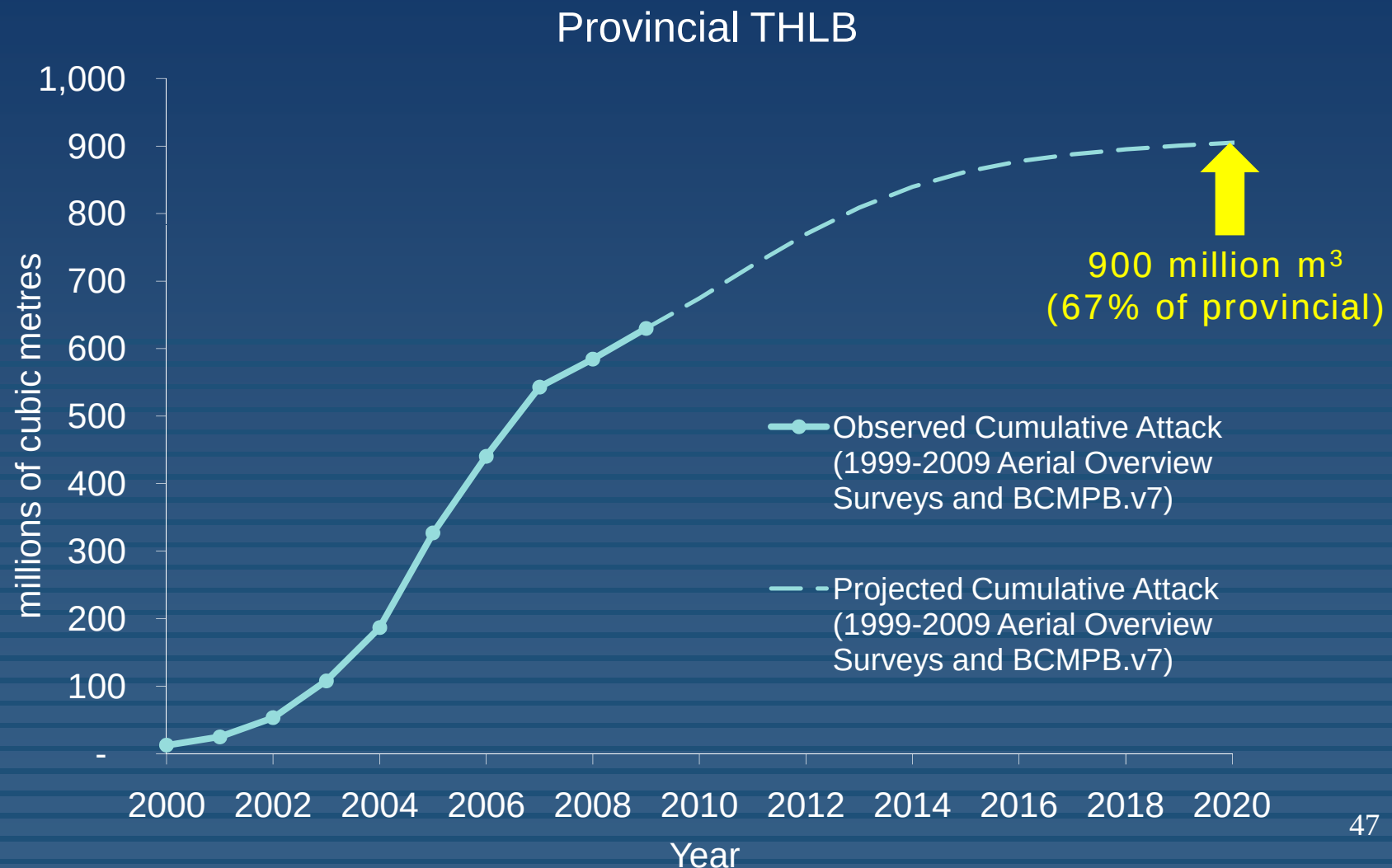
Observed Cumulative Pine Volume Killed on the THLB

Provincial THLB





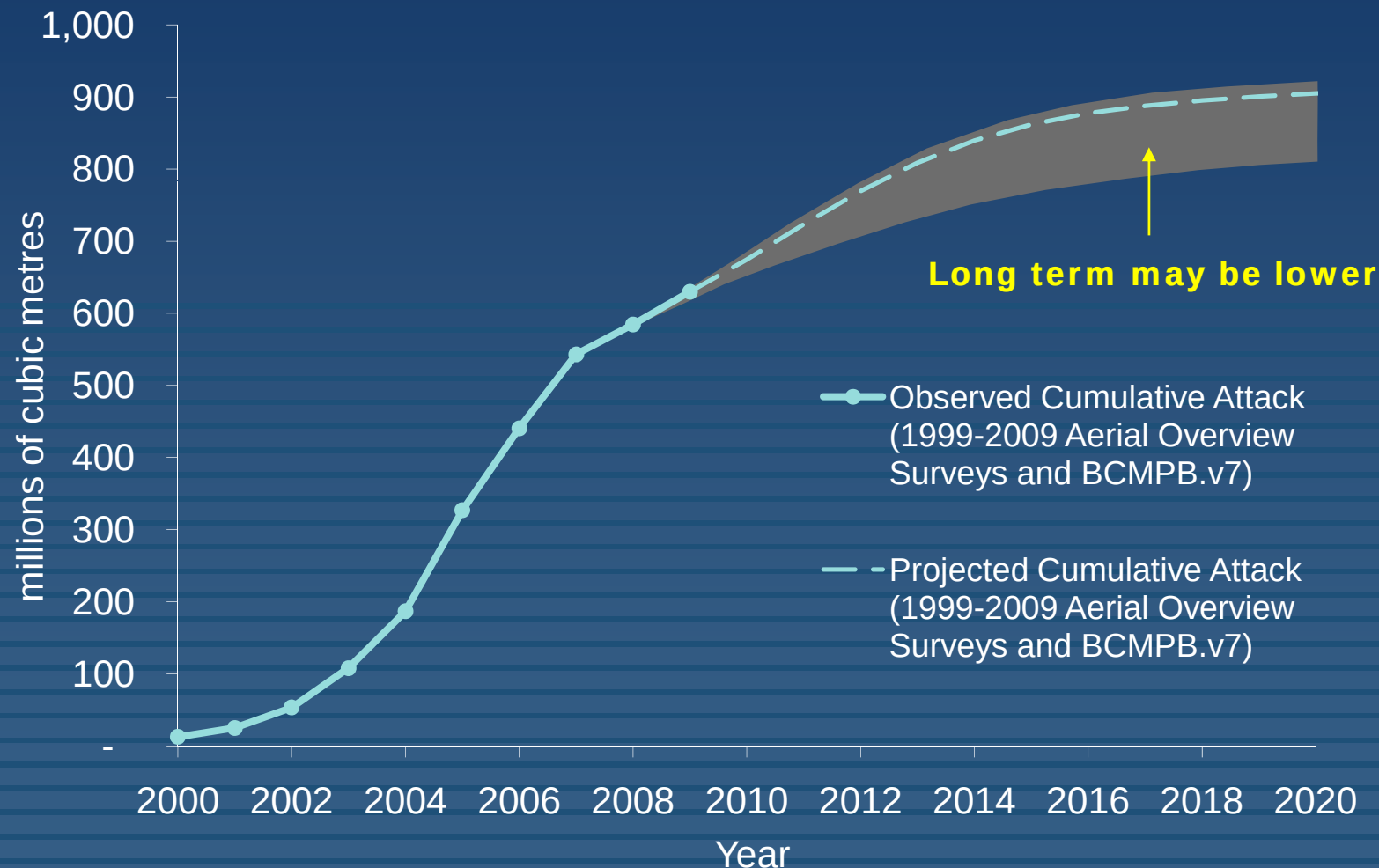
Observed and Projected Cumulative Pine Volume Killed on the THLB





Observed and Projected Cumulative Pine Volume Killed on the THLB

Provincial THLB





Key Conclusions

- About the outbreak:
 - The worst year of the outbreak was seen in 2005
 - The amount killed per year has dropped significantly since the peak in 2005
 - As of today, approximately 630 million m³ of pine (47%) have been observed killed on the THLB
 - Approximately 675 million m³ if the projected 2009 green-attack pine is included
 - Approximately 900 million m³ of pine (67%) will be killed on the THLB by the time the infestation is over in around 2020



Conclusion Caveats

- ◆ Estimates of observed and projected pine mortality are based entirely on an analysis of the Provincial Aerial Overview of Forest Health, which is an observation of red-attack (not cumulative) with low spatial and thematic precision.
- ◆ These estimates are unverified.
- ◆ BCMPB assumes the future will resemble the past, and does not simulate future weather events.
- ◆ Field sampling or airphoto interpretation techniques must be used to collect spatially precise estimates of cumulative pine loss.



Resources

- ◆ BCMPB
 - <http://www.for.gov.bc.ca/hre/bcmpb>
- ◆ Aerial Overview of Forest Health
 - <http://www.for.gov.bc.ca/hfp/health/overview>
- ◆ Stand-level Mountain Pine Beetle Population Model
 - <http://cfs.nrcan.gc.ca/subsite/mpb/stand-mpbsim>
- ◆ Spatially Explicit Landscape Event Simulator (SELES)
 - <http://seles.info>



Acknowledgements

This report is a continuation of the work originally conducted by the following people:

- ◆ Marvin Eng, Forest Practices Board
- ◆ Josie Hughes, Research Consultant
- ◆ Andrew Fall, Gowlland Technologies Ltd.
- ◆ Terry Shore, Pacific Forestry Centre, Canadian Forest Service
- ◆ Bill Riel, Pacific Forestry Centre, Canadian Forest Service
- ◆ Peter Hall, Forest Practices Branch, BC Forest Service

Each of their individual contributions to this project has been immensely important at progressing the model to where it is currently.