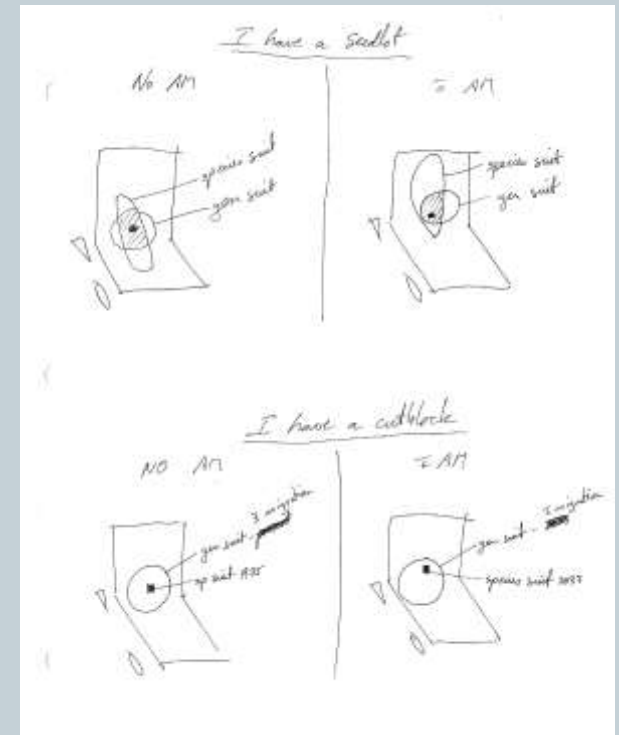




Climate Change Adaptation Research

Extension

- Climate Based Seed Transfer (CBST)
 - Why
 - How
- Other CC adaptation strategies





Climate Change Adaptation Research Extension

← → http://www.chinabeverage.org/cbst_en/ CBST2017

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THE 9th CHINA INTERNATIONAL BEVERAGE INDUSTRY EXHIBITION ON SCIENCE & TECHNOLOGY

Shanghai New International Expo Centre (SNIEC),China

Countdown Days/ **000**

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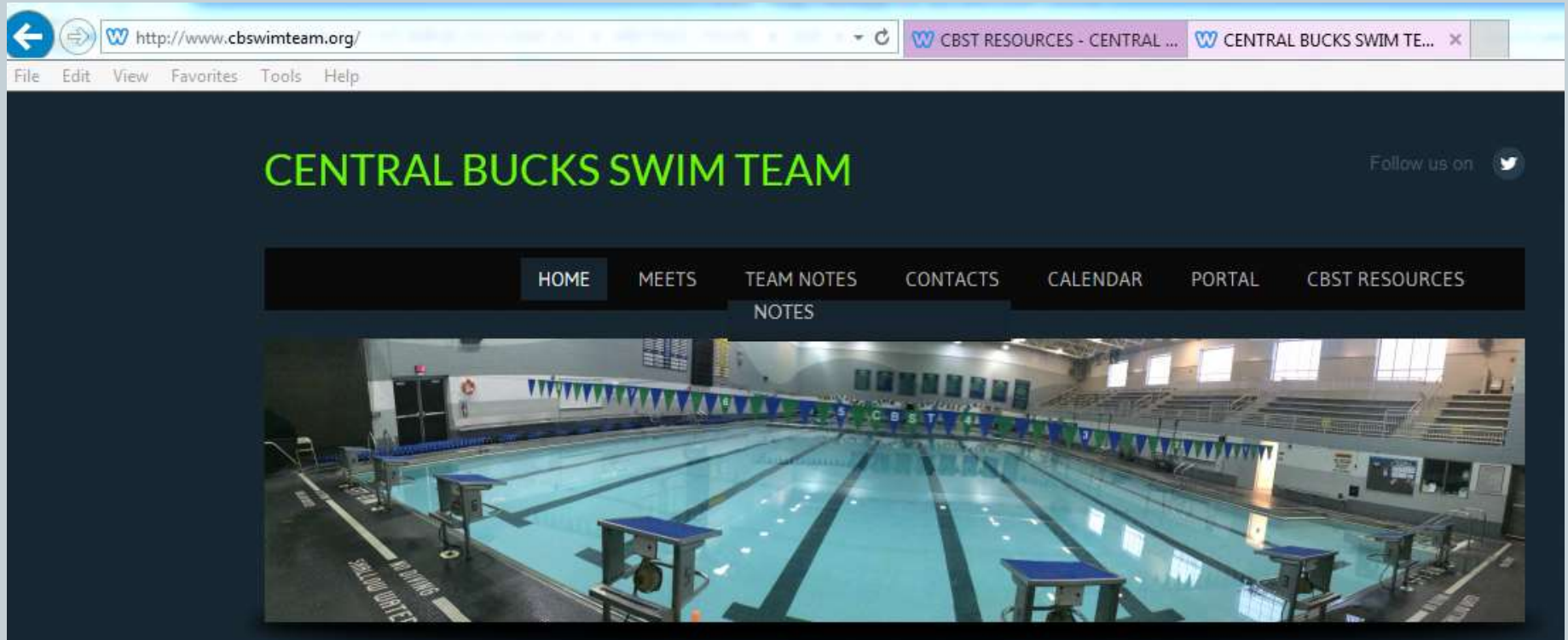
THE SCROLL

CBST, the World's Largest LGBT Synagogue, Gets a New Home

Congregation Beit Simchat Torah in Manhattan is moving—and growing into—an architecturally striking space
By **Marjorie Ingall**



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CBST:US was acquired by MRK:US

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Your capital is at risk

Before it's here, it's on the Bloom

1D | 1M | 1Y | 5Y **Time Frame** [Add Comparison](#) [+](#) [Indicators ▾](#)



CBST

Received: 14 February 2017 | Revised: 29 May 2017 | Accepted: 1 June 2017

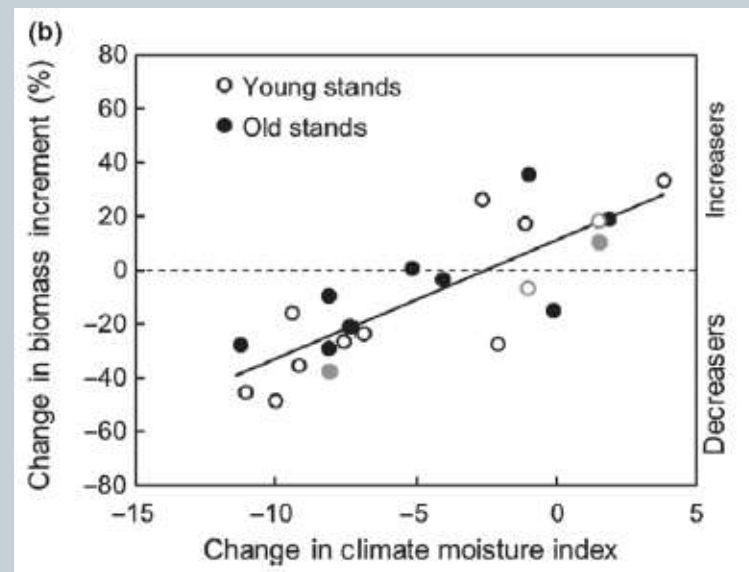
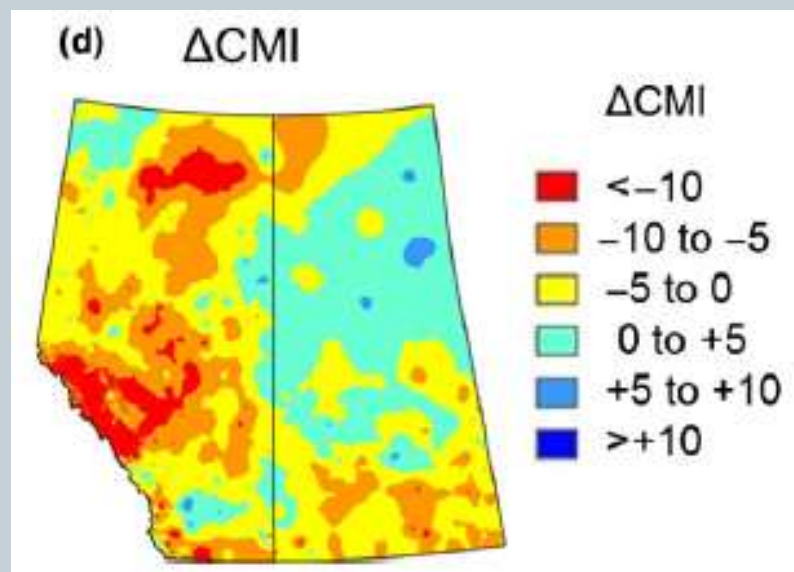
DOI: 10.1111/gcb.13795

PRIMARY RESEARCH ARTICLE

WILEY Global Change Biology

Recent climatic drying leads to age-independent growth reductions of white spruce stands in western Canada

Edward H. Hogg¹  | Michael Michaelian¹ | Trisha I. Hook¹ | Michael E. Undershultz²





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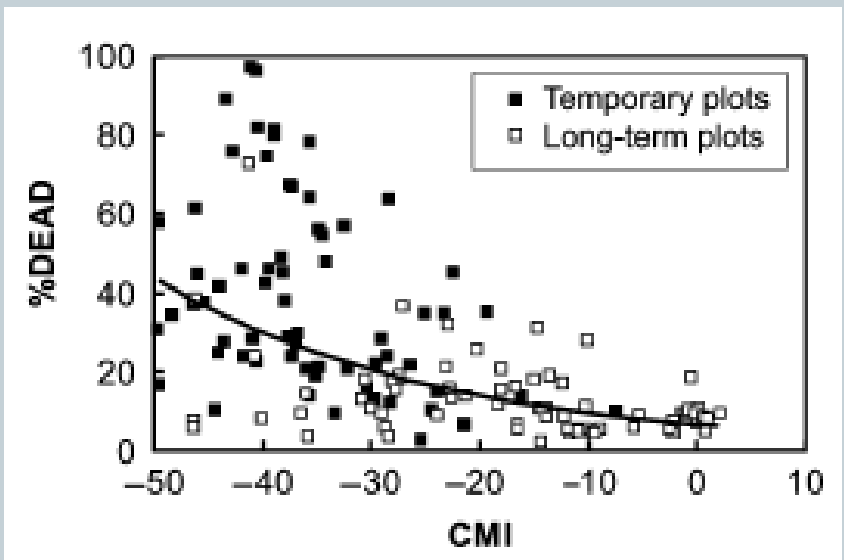
Global Change Biology

Global Change Biology (2011) 17, 2084–2094, doi: 10.1111/j.1365-2486.2010.02357.x

Massive mortality of aspen following severe drought along the southern edge of the Canadian boreal forest

MICHAEL MICHAELIAN, EDWARD H. HOGG, RONALD J. HALL and ERIC ARSENAULT

Natural Resources Canada, Canadian Forest Service, 5320-122 Street, Edmonton, AB, Canada T6H 3S5





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Twentieth-century warming and the dendroclimatology of declining yellow-cedar forests in southeastern Alaska

Colin M. Beier, Scott E. Sink, Paul E. Hennon, David V. D'Amore, and Glenn P. Juday

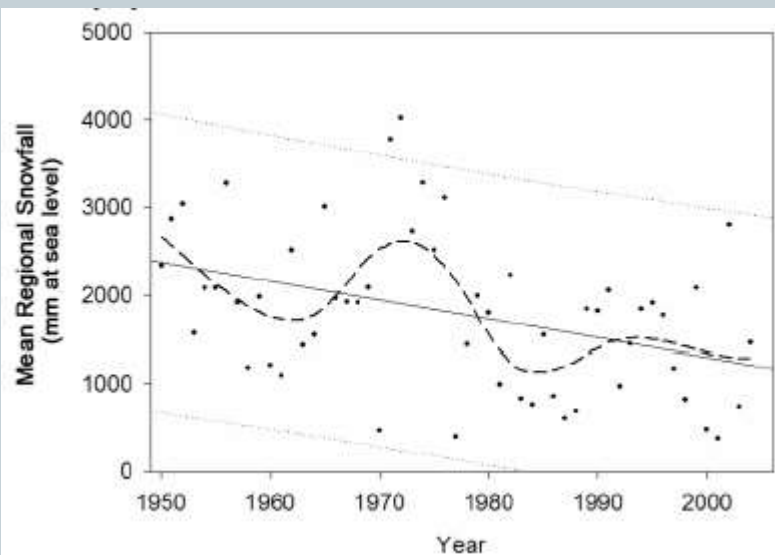


Photo: P. Hennon
Beier et al. 2008



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Illingworth PI provenance trial



Seed source -1.3 °C
Plantation -1.3 °C



Seed source -1.3 °C
Plantation 2.9 °C

Climate change is not good for trees!

↓ growth
↓ wood quality
↑ pest damage

} ↓ value

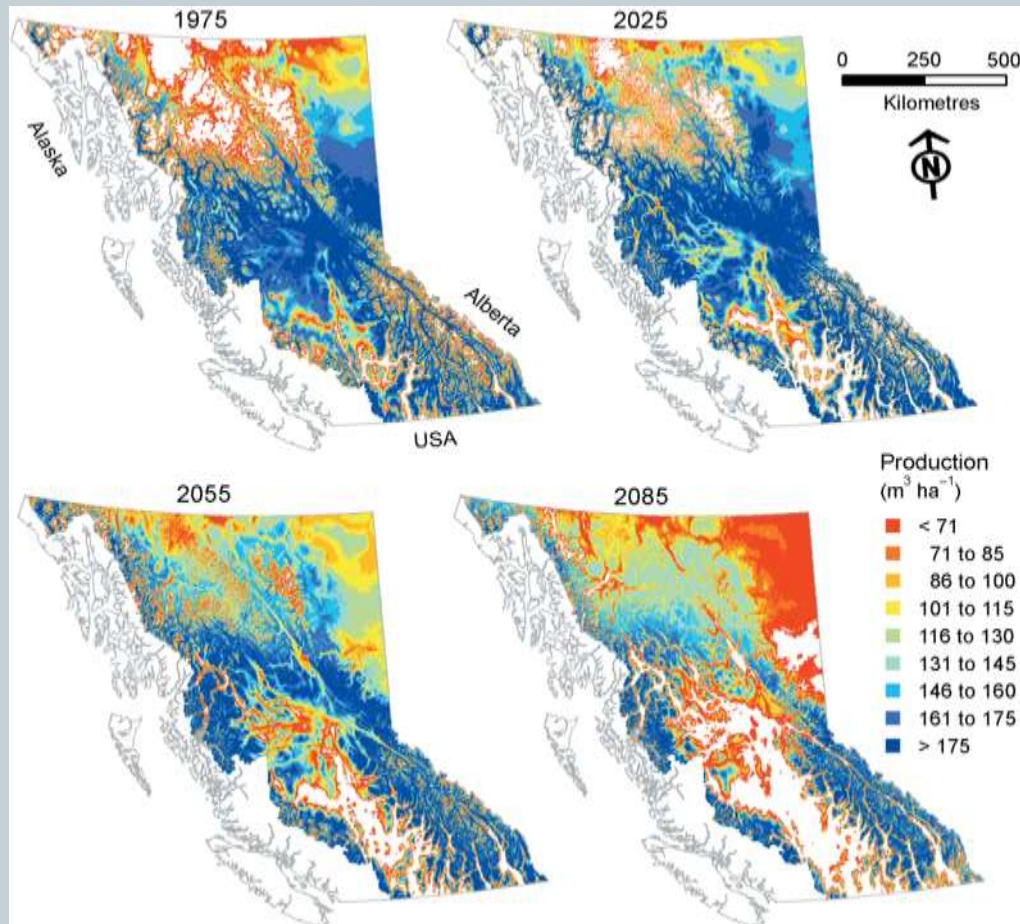


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Lodgepole pine productivity



Climate change is not good for trees!

Productivity decline: 10-30% by 2080

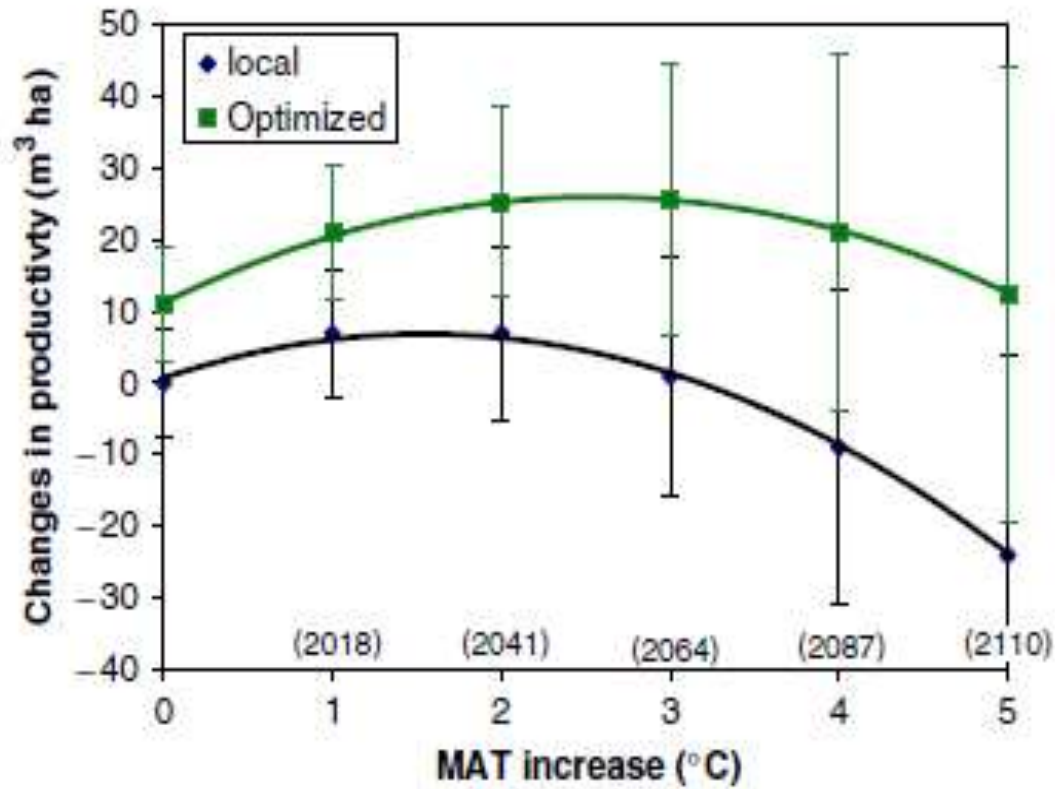


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Illingworth PI provenance trial



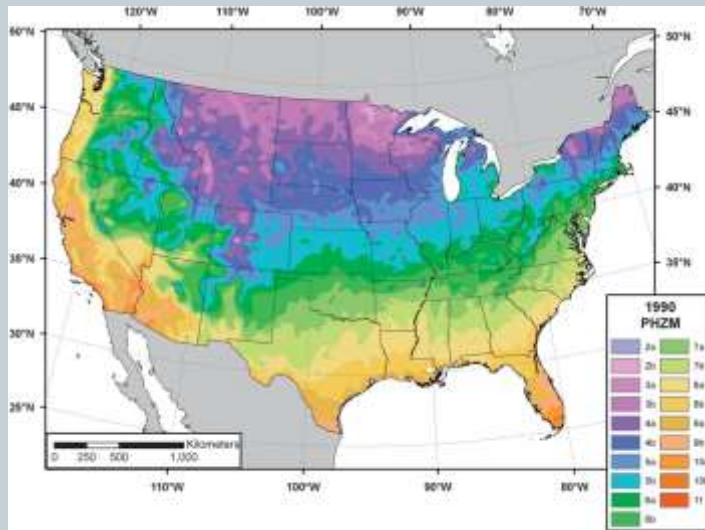
Assisted migration can mitigate some of the CC impacts

Wang et al., 2006

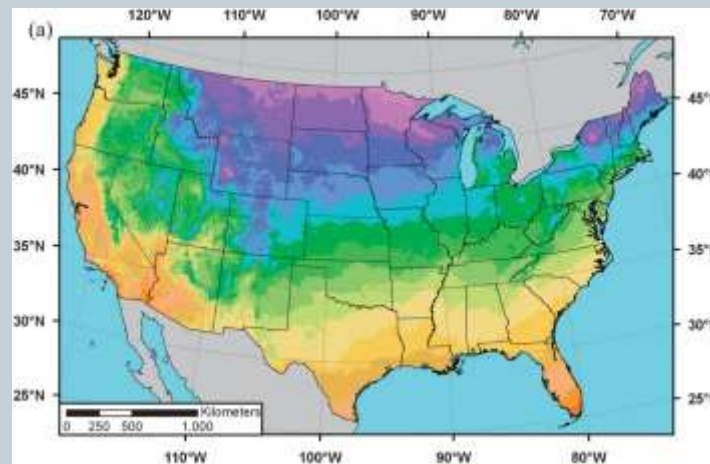


Climate Change Adaptation Research Extension

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**1990 Plant Hardiness
Zone Map**



**2012 Plant Hardiness
Zone Map**



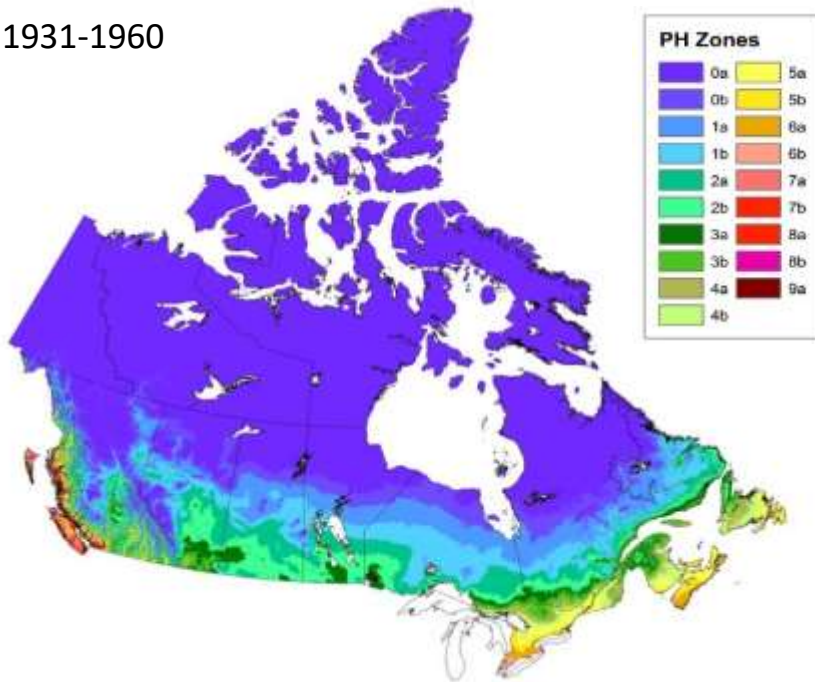
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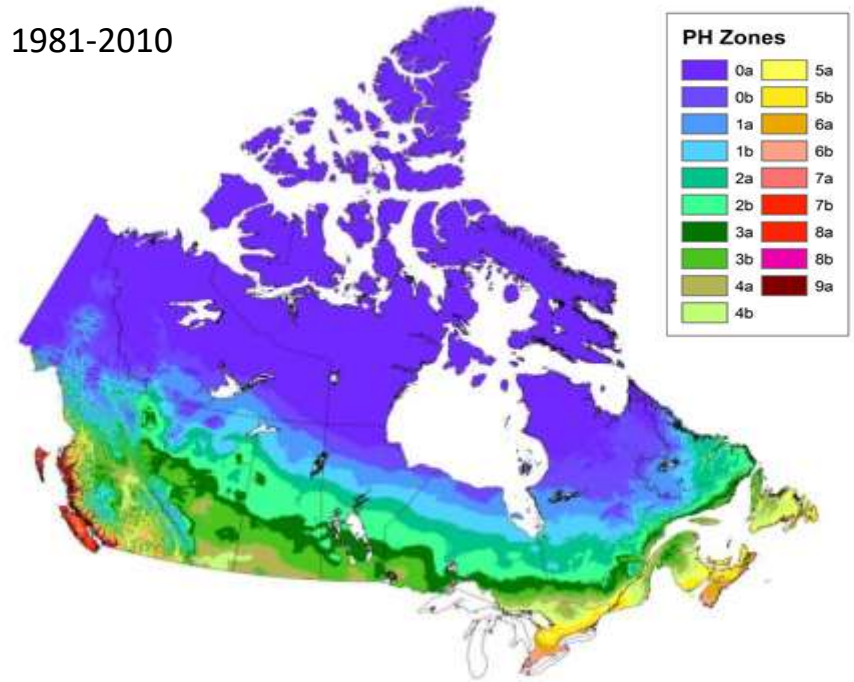
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Plant Hardiness zone map

1931-1960



1981-2010



McKenney et al. 2014. BioScience



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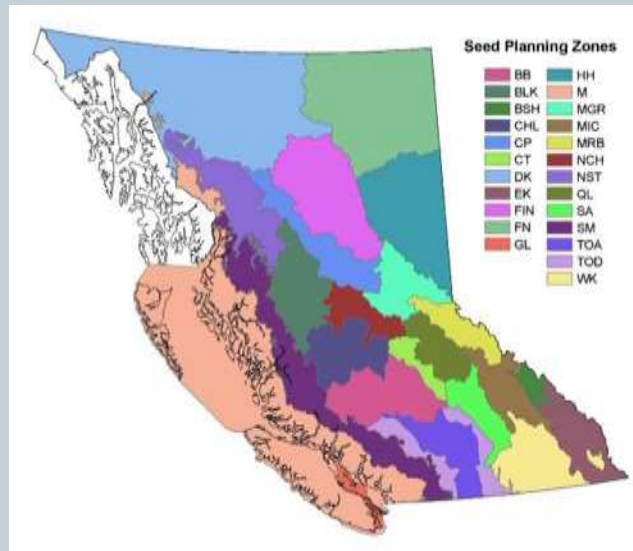
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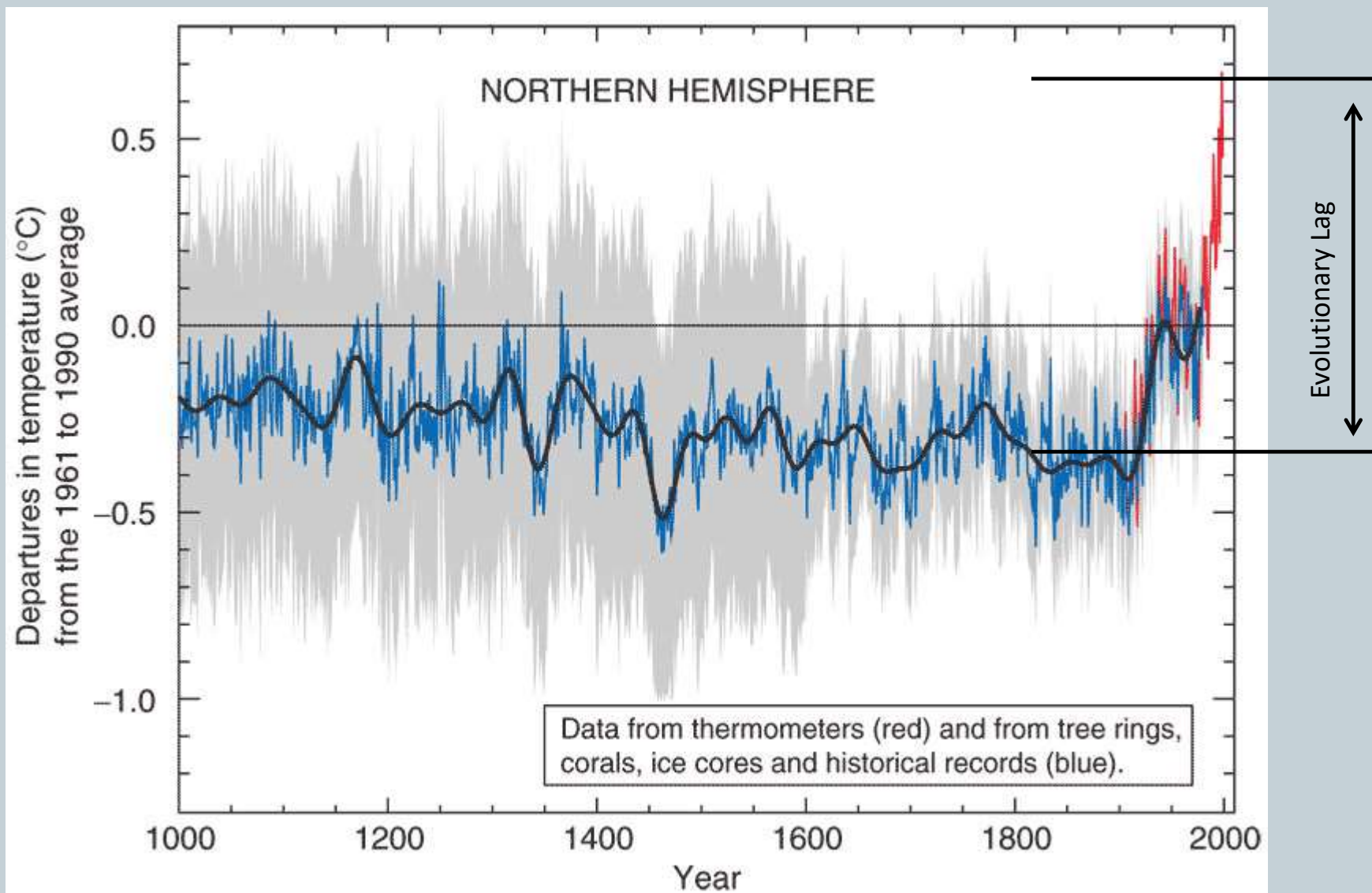


Current seed transfer zones
(geography)



CBST
(climate)

- Facilitates accurate assisted migration
- Better matching of seedlot and plantation climate



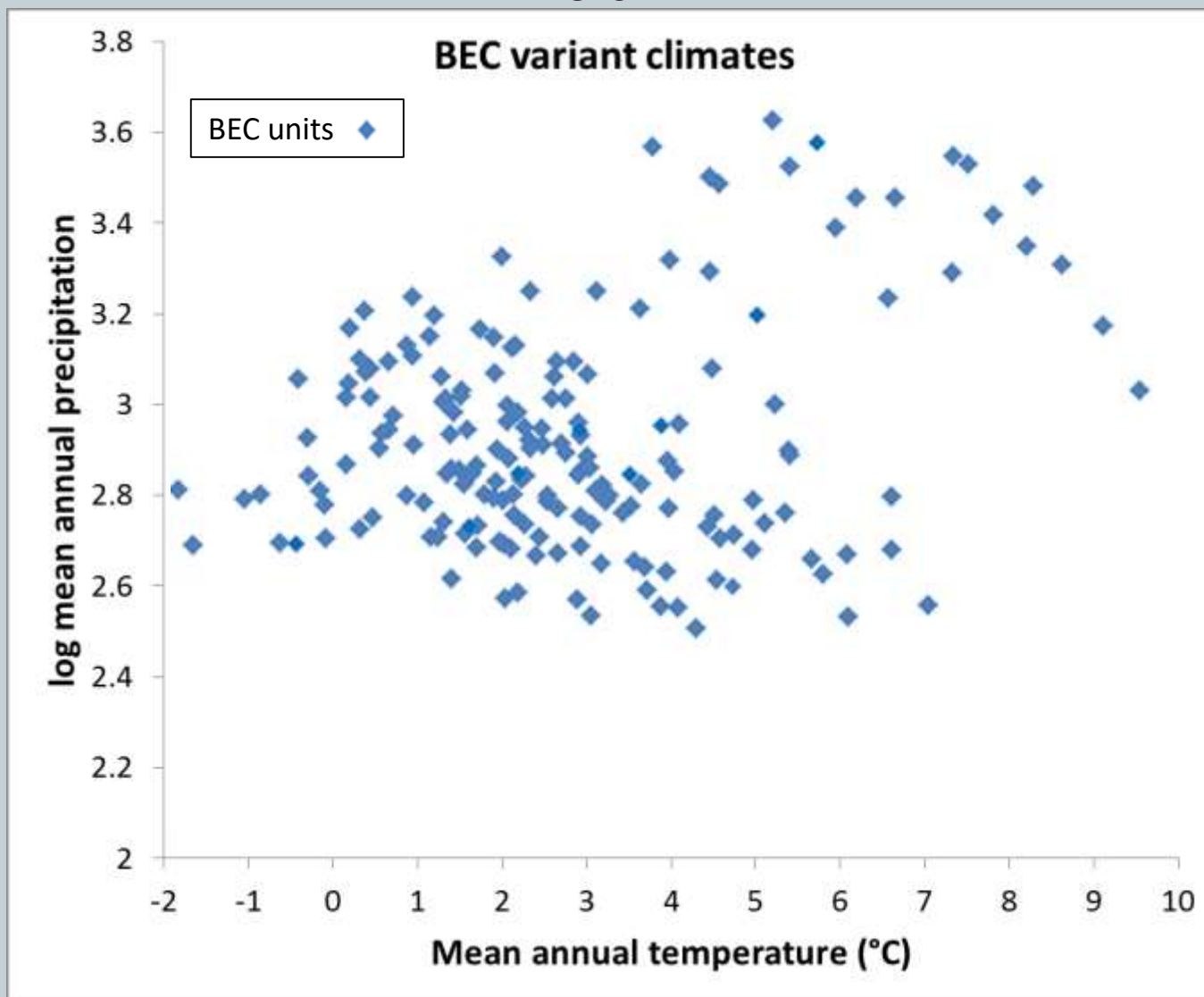
IPCC 2001



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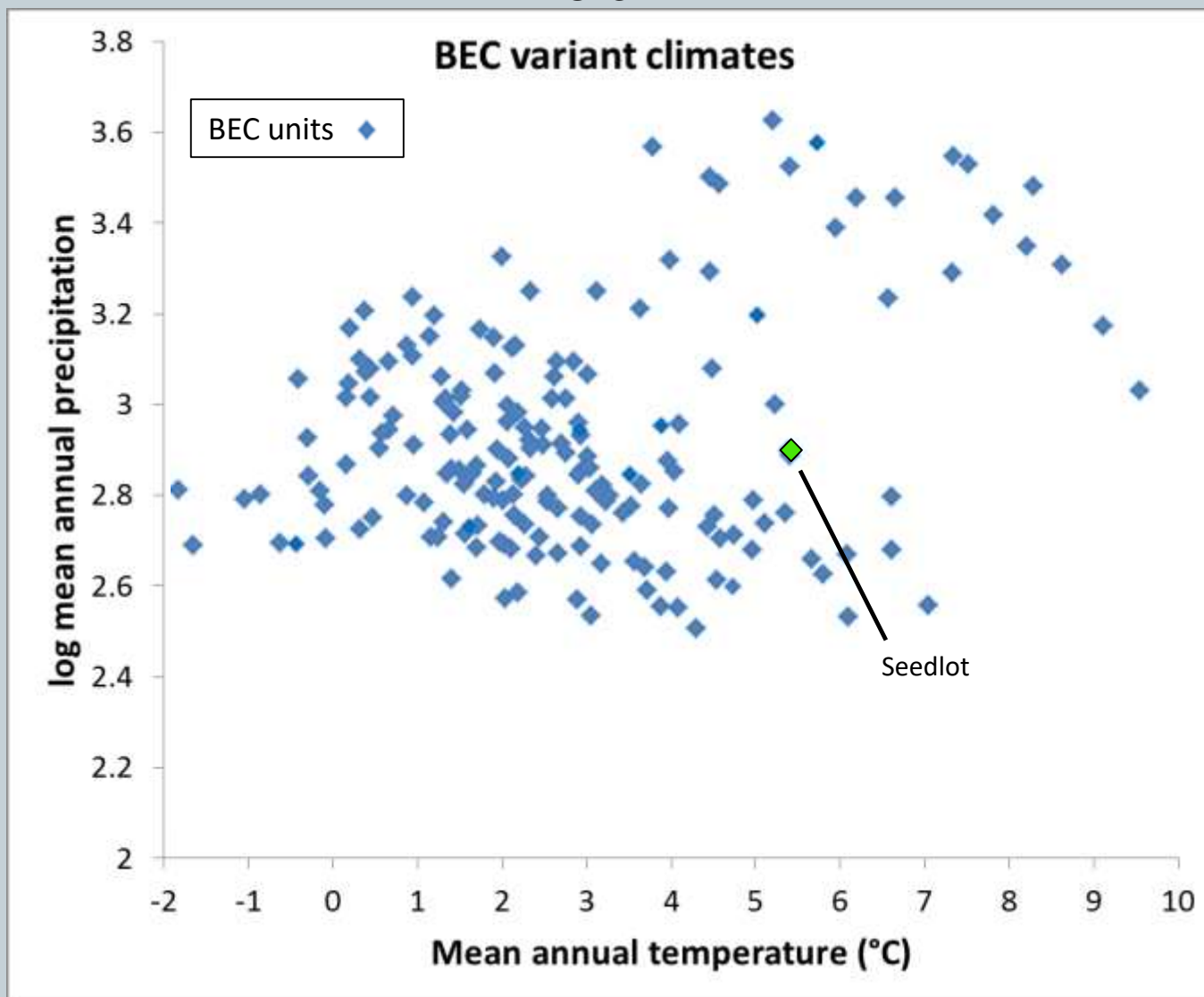




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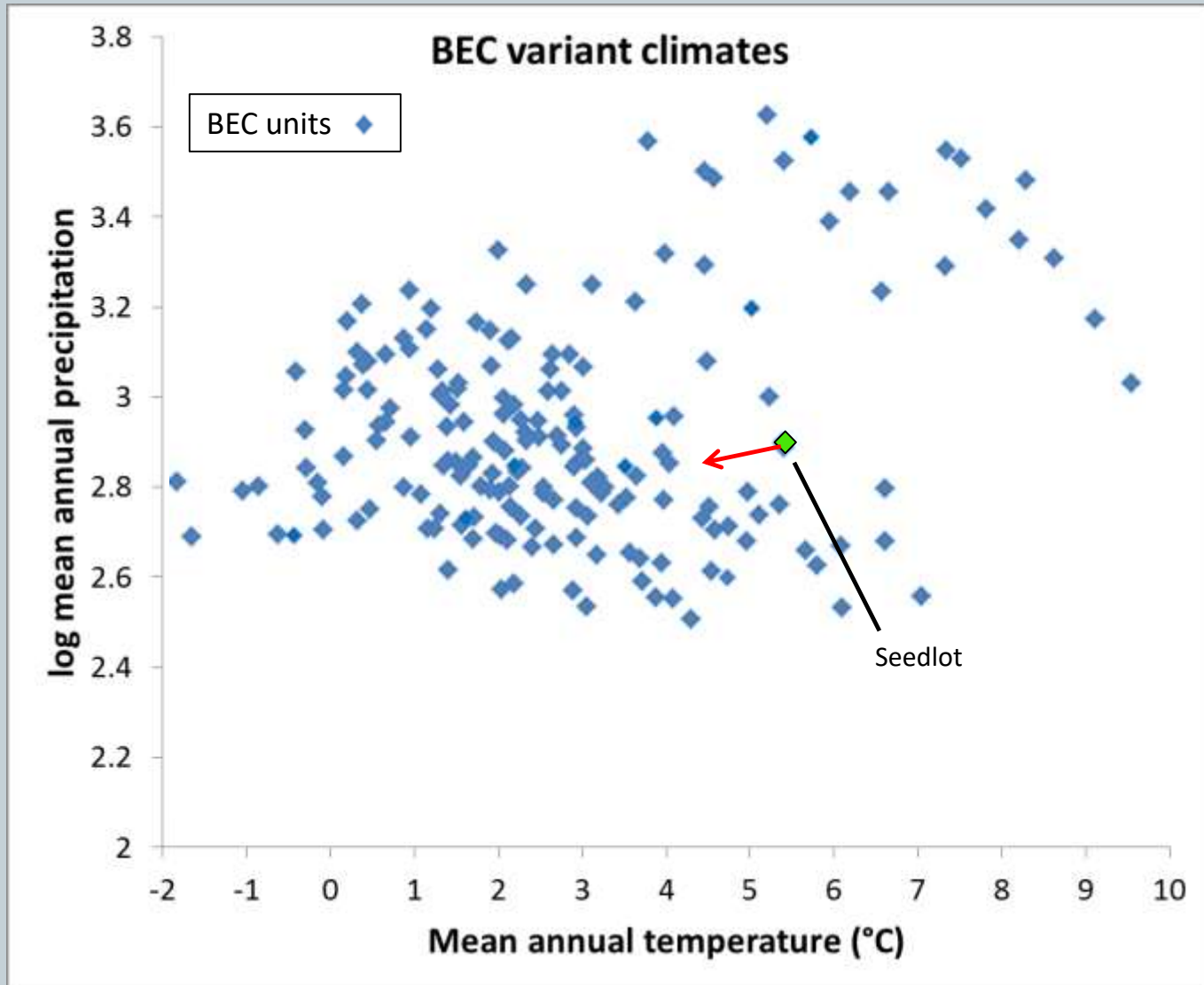




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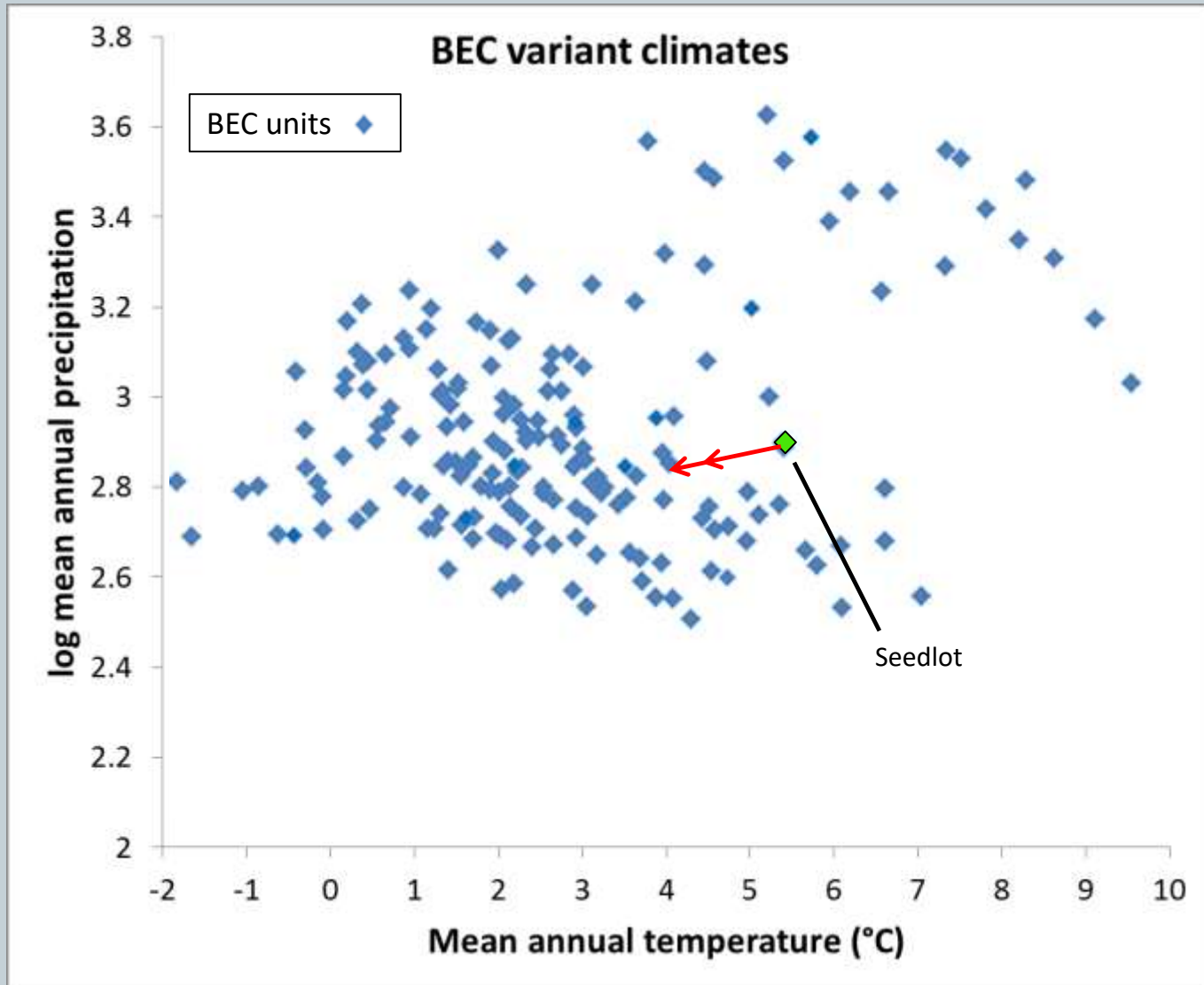




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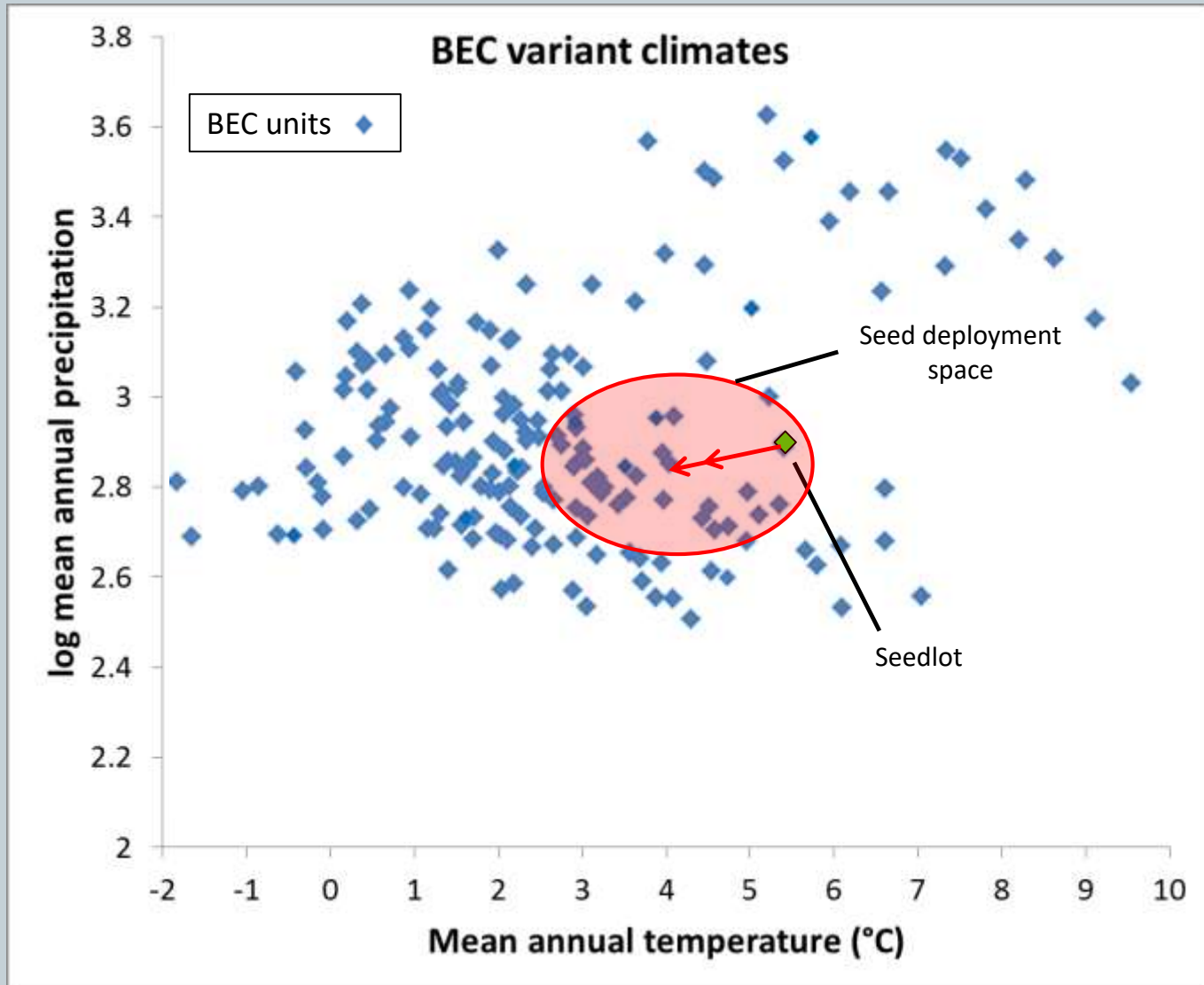




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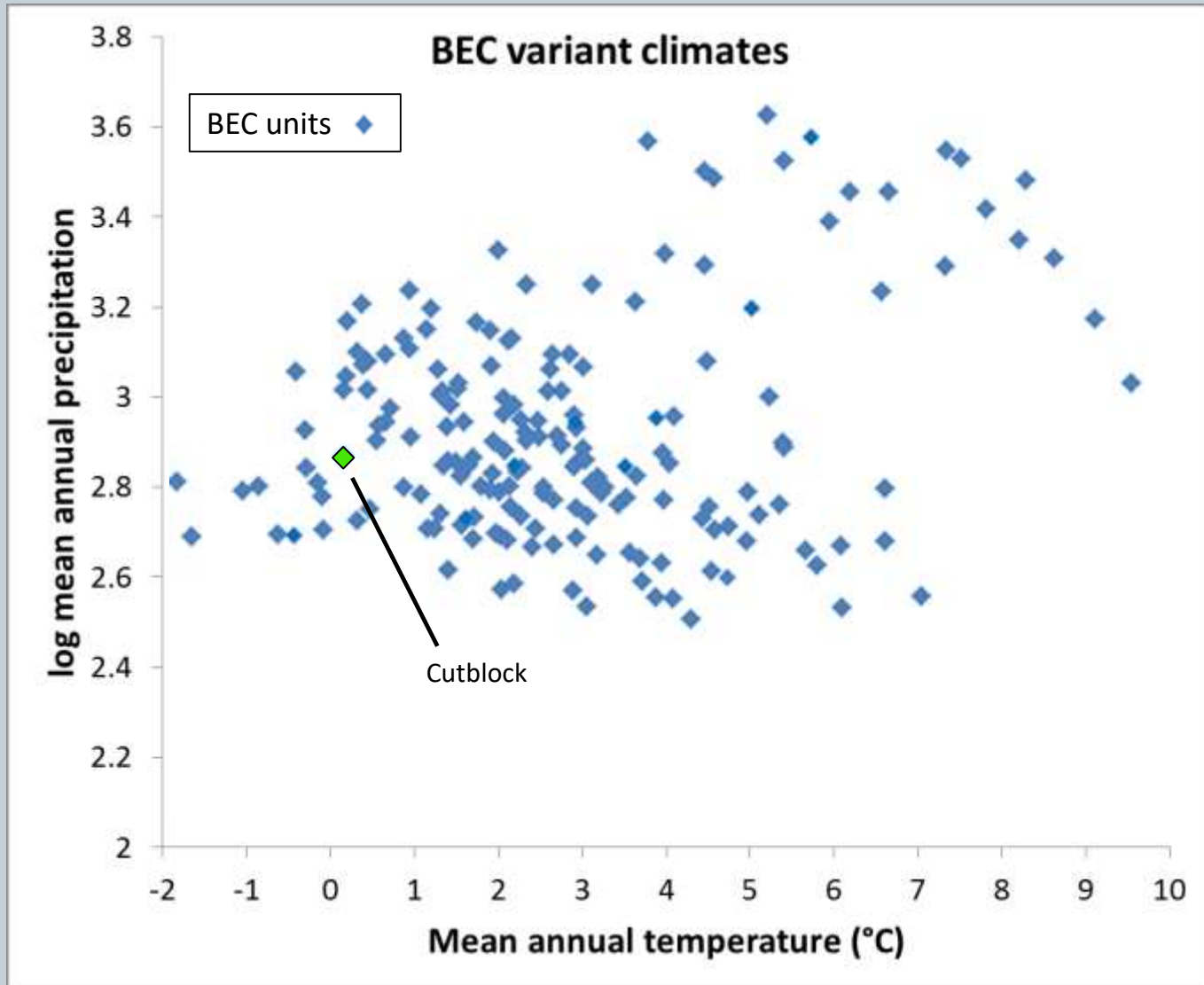




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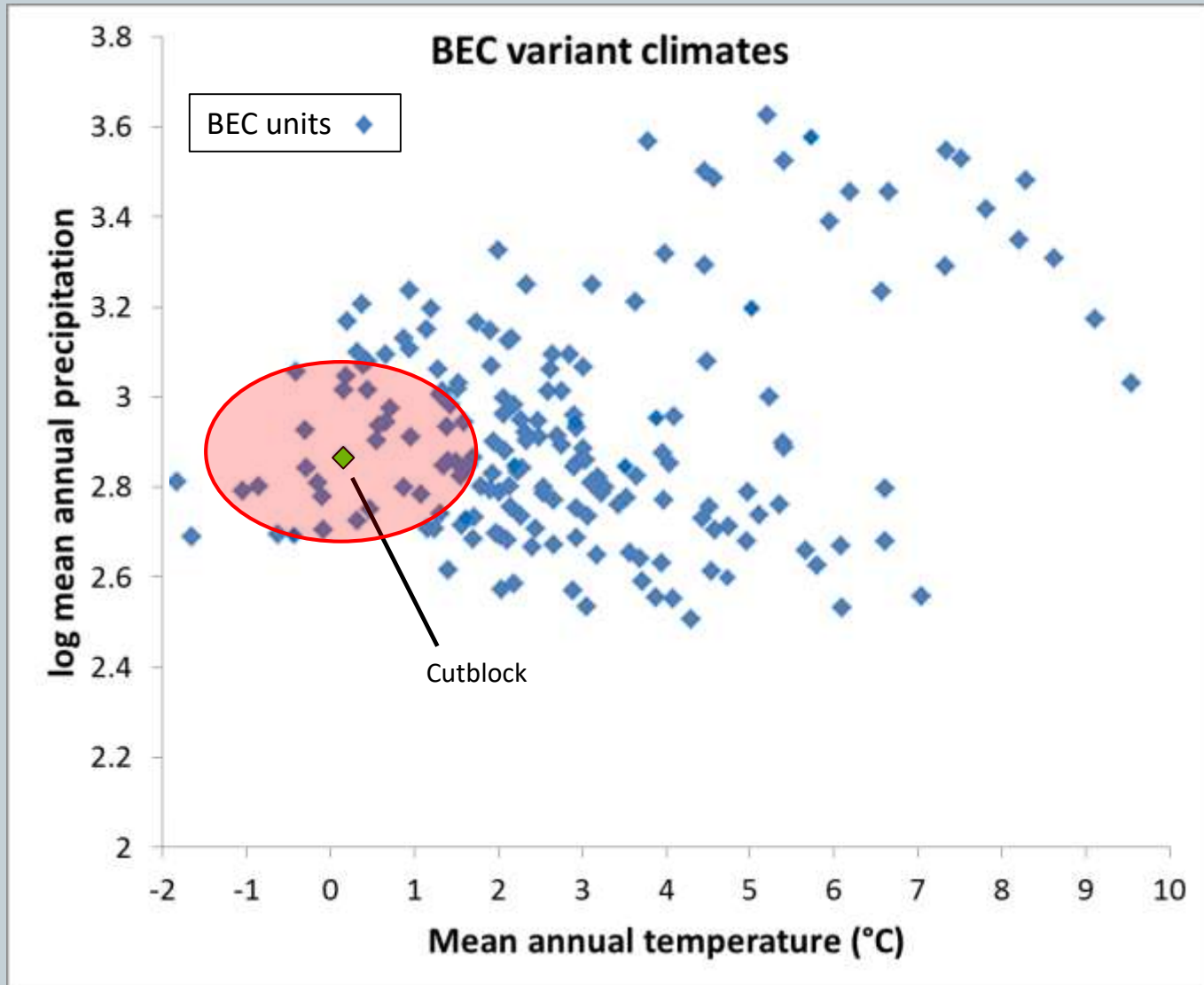




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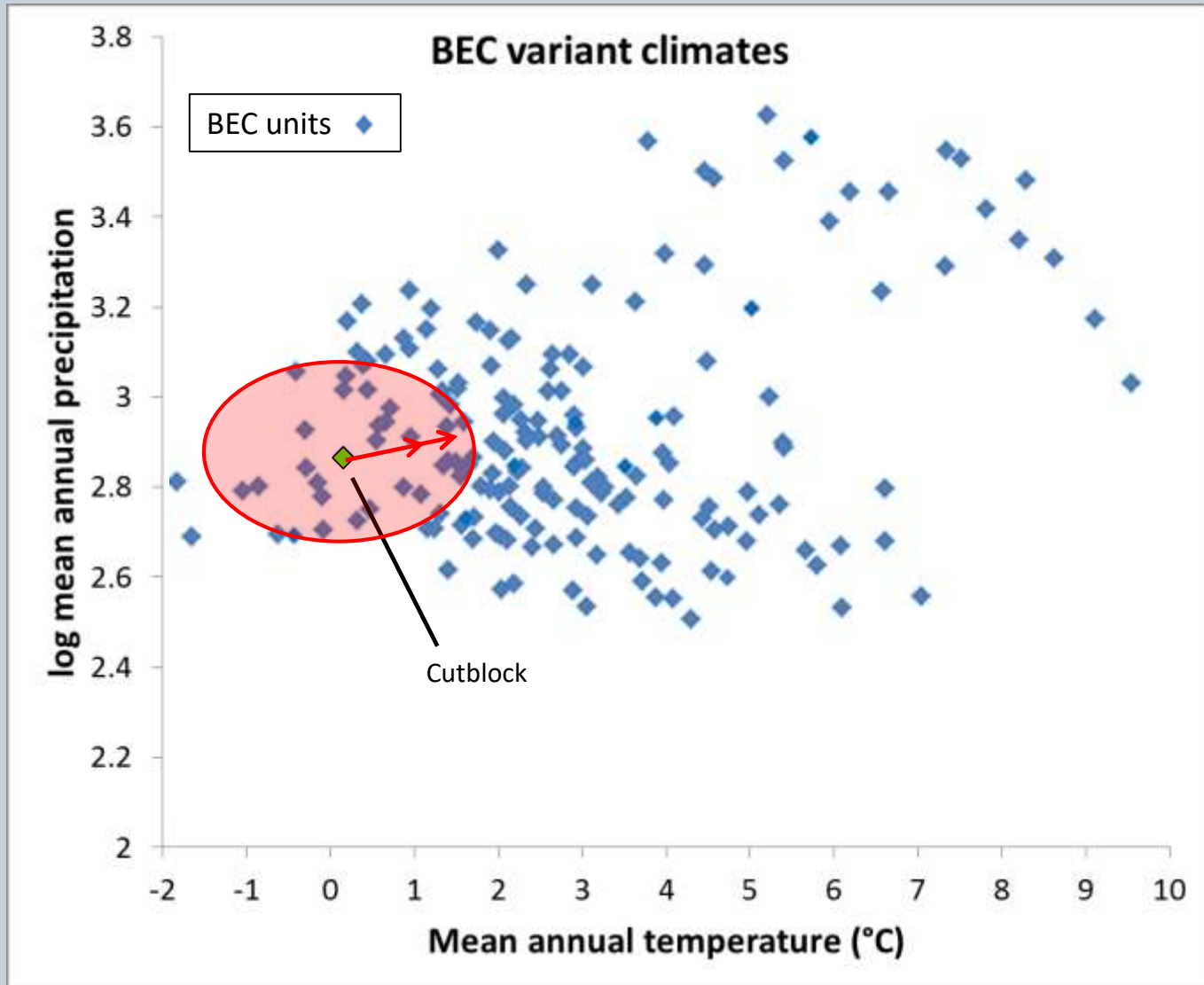




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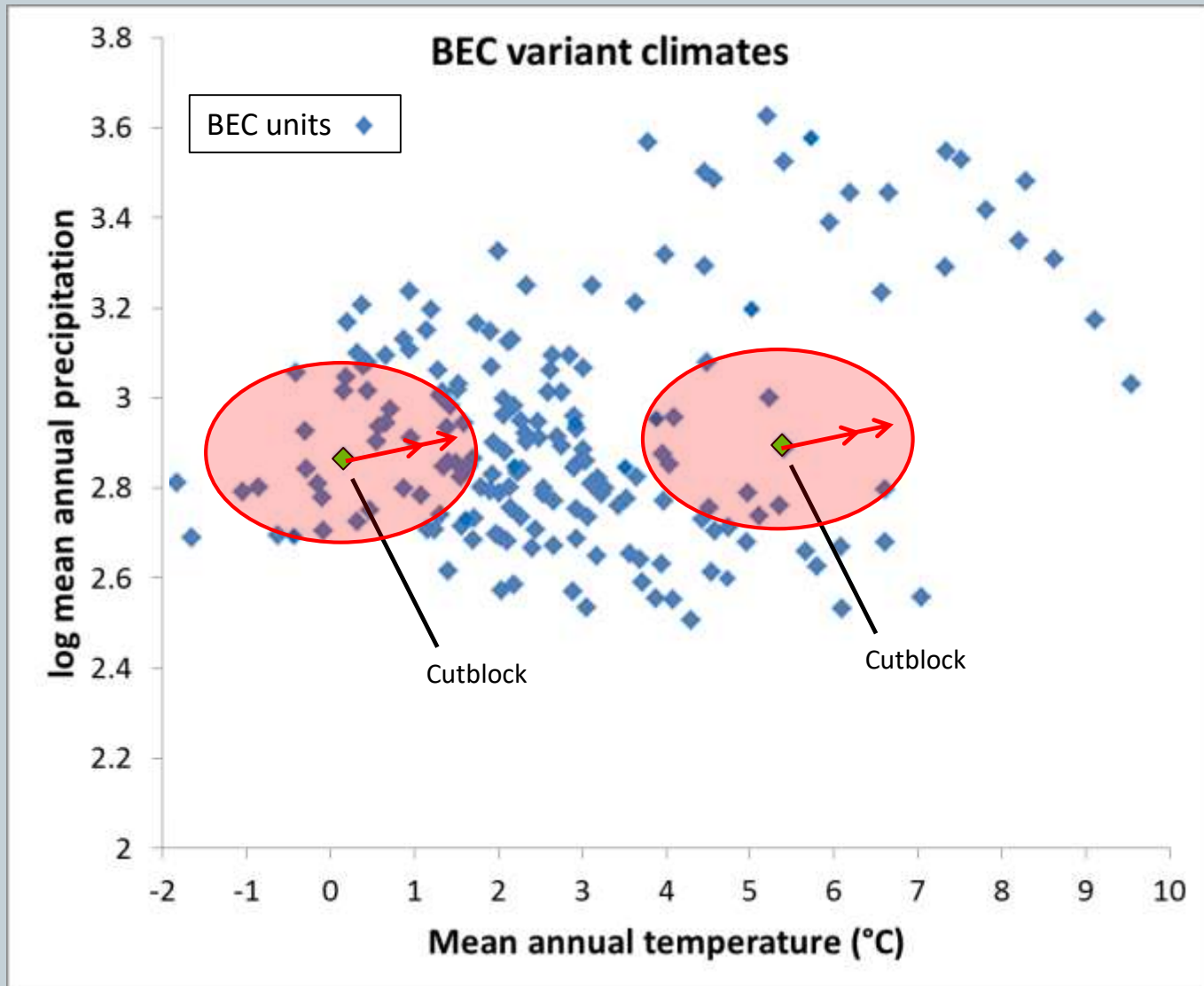




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Climate Change Adaptation Research

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Summary

1. Fixed zone → focal zone
2. Geog based → climate based
3. Assisted migration ← migrating the focus of the procurement space
4. Climate migration distance:
 - accounts for past and future CC
 - BECvar-specific
 - multivariate
 - transparent and accurately quantified without provenance tests
5. Deployability based solely on BEC climate
6. Larger average deployment area



Climate Change Adaptation Research Extension

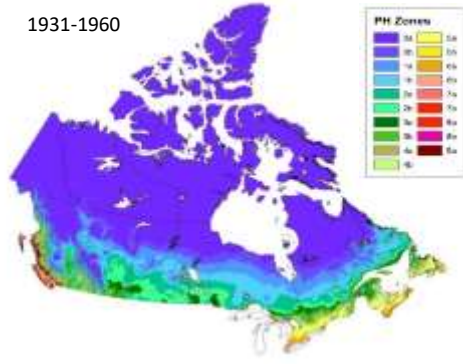
Thank you



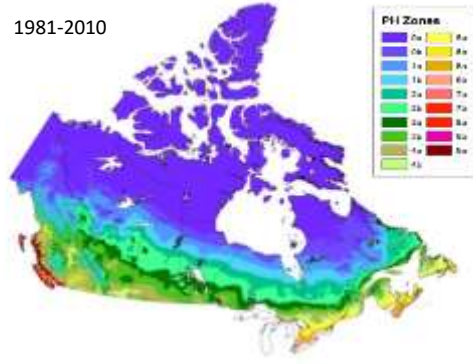
1. Assisted migration

Plant Hardiness Zones

1931-1960



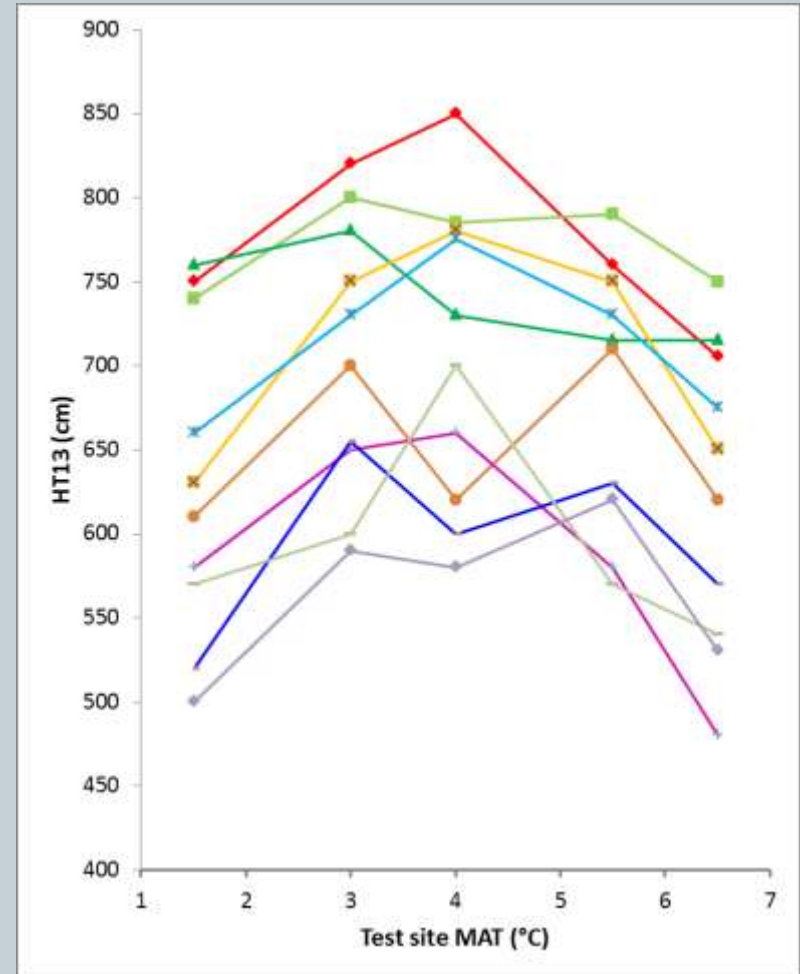
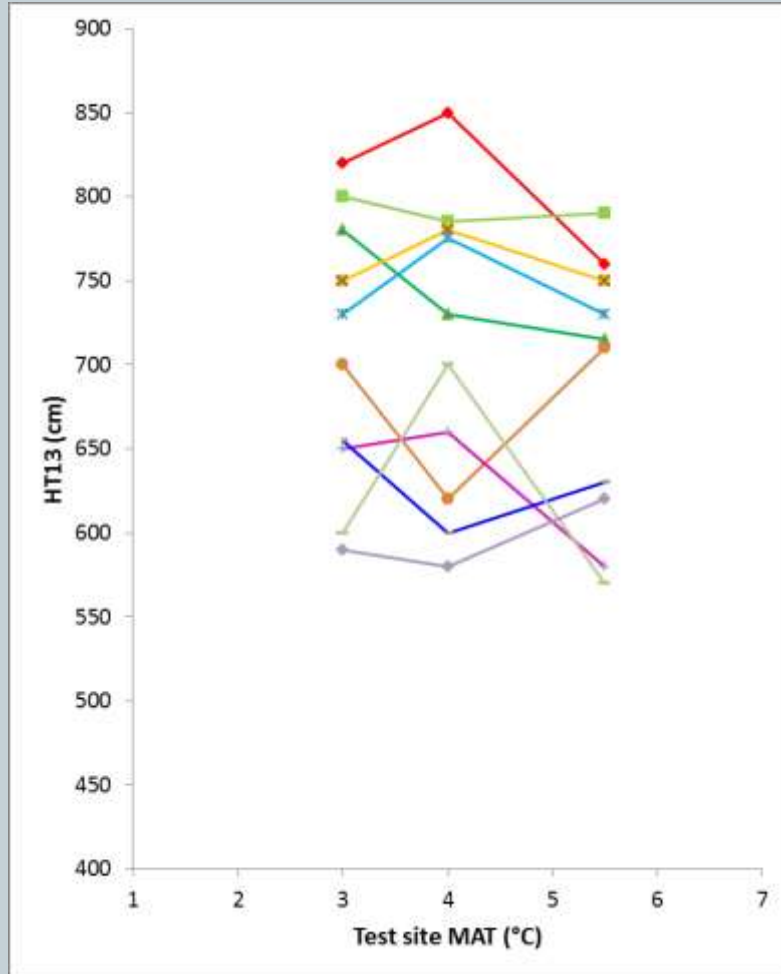
1981-2010



McKenney et al. 2014. BioScience



2. Select for wider climate tolerance



3. Increase genetic diversity



Image: Dave Simpson

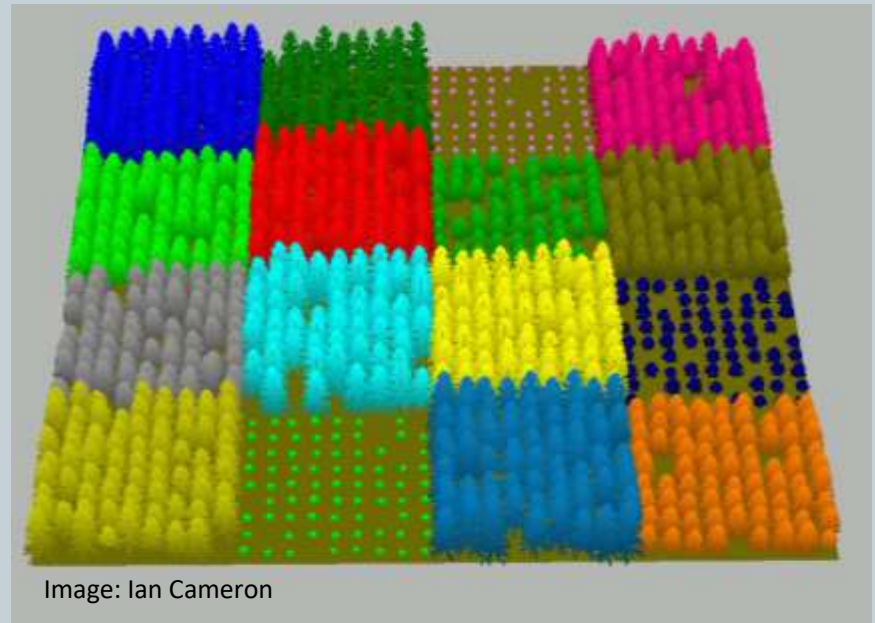


Image: Ian Cameron

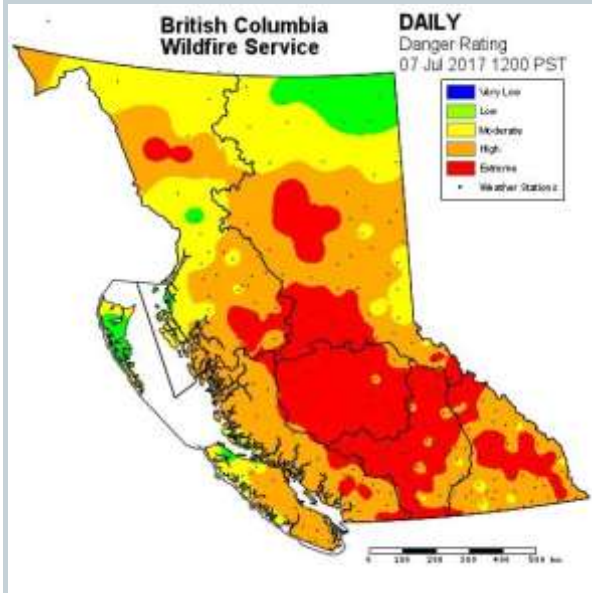
4. Select for pest resistance/tolerance



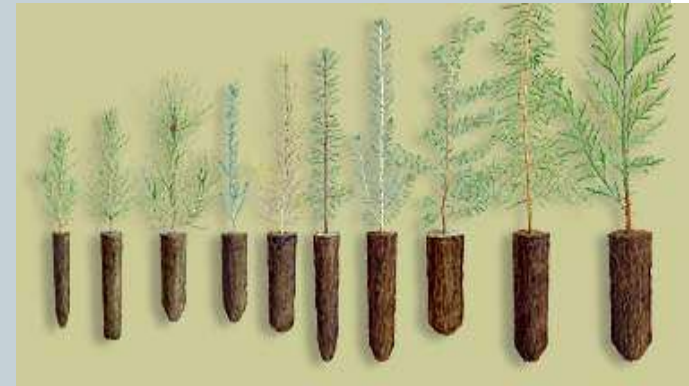
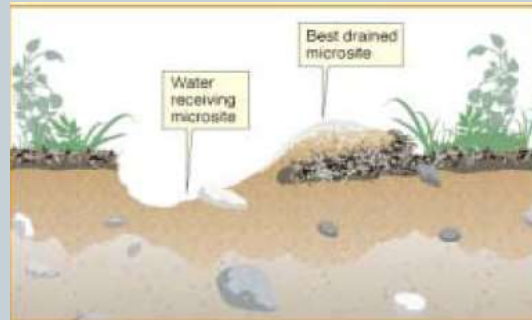
5. Genetic conservation



6. Genetic selection for drought tolerance



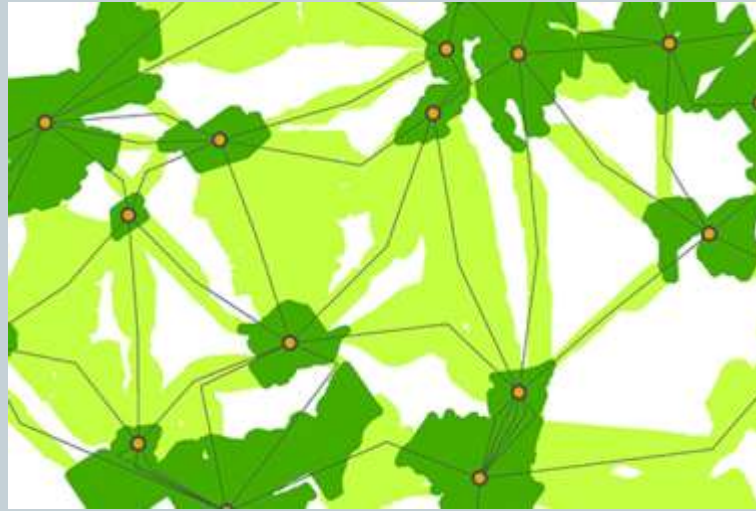
7. Silviculture strategies



Silviculture strategies to reduce CC impacts during plantation establishment

- silviculture system
- microsite planting
- stock type
- nurse plants
- timing of planting
- planting density
- diversify stand structure

8. Land use strategies





Climate Change Adaptation Research

Extension

CBST

