Losing our natives - sustaining the forest functions of big old native trees in a rapidly changing environment

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Part One

OBJECTIVES FOR LONG-LIVED TREES

We like big old trees…

- Within forests: old-growth; virgin forest; late-successional forest; ancient woodland; wildwood; urskog
- And individually: champion trees, veteran trees, heritage trees, granny trees
- '…forest stands that include...large trees have been found more attractive.' – Robert Ribe
- 'A sure cure for seasickness is to sit under a tree' - Spike Milligan

The Pontfadog oak blown down, aged 1285 years

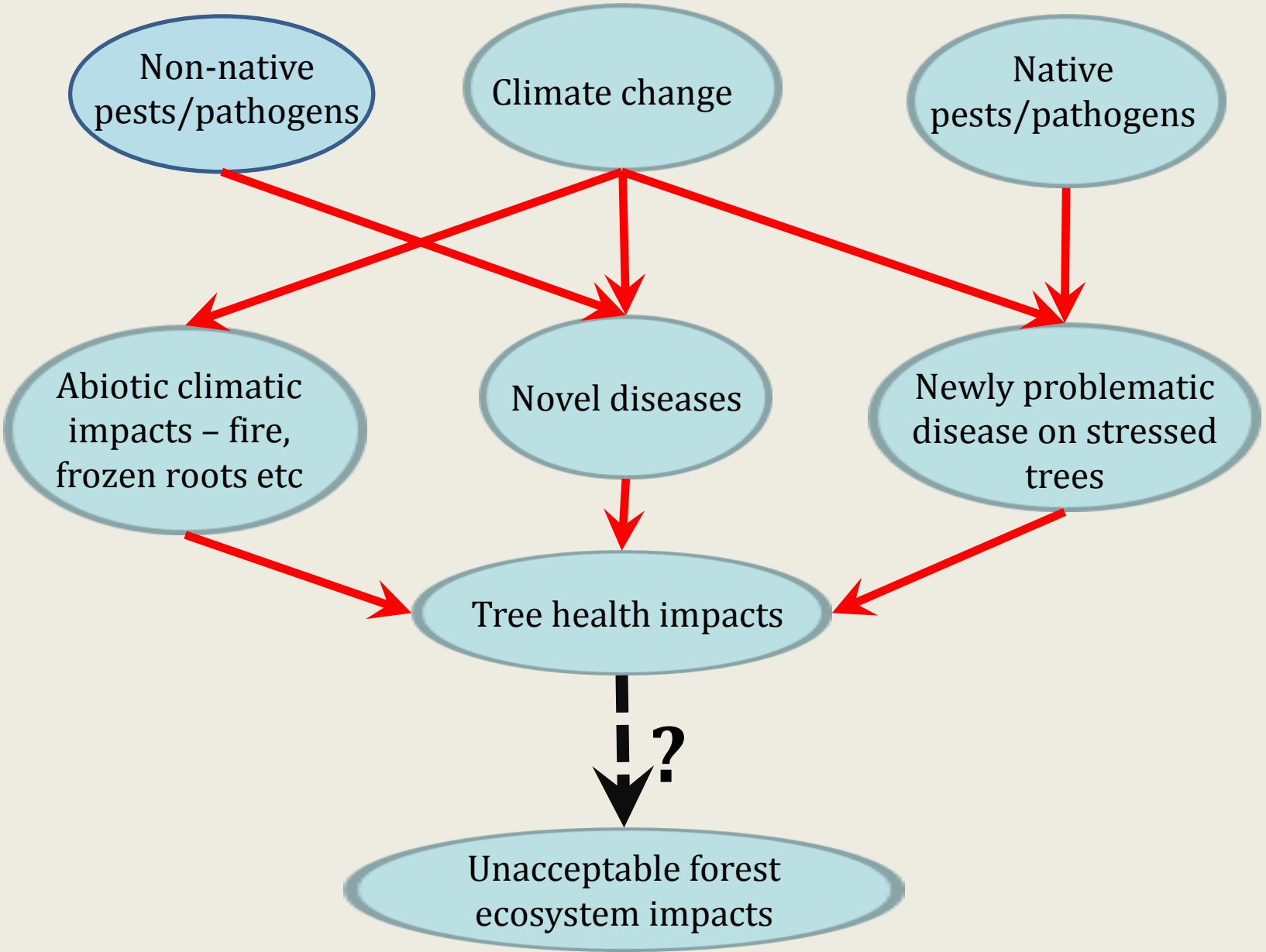
What's our responsibility?

- The central thing for which Conservation stands is to make this country the best possible place to live in, both for us and ***for our descendants***. – Gifford Pinchot, 1910.
- The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now ***and in the future***, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems. - Ministerial Conference on the Protection of Forests in Europe, and the UN Food and Agriculture Organization.
- **As forest managers, maintaining and renewing our stock of big, old trees is perhaps our chief responsibility, particularly in conservation or multi-use forests.**

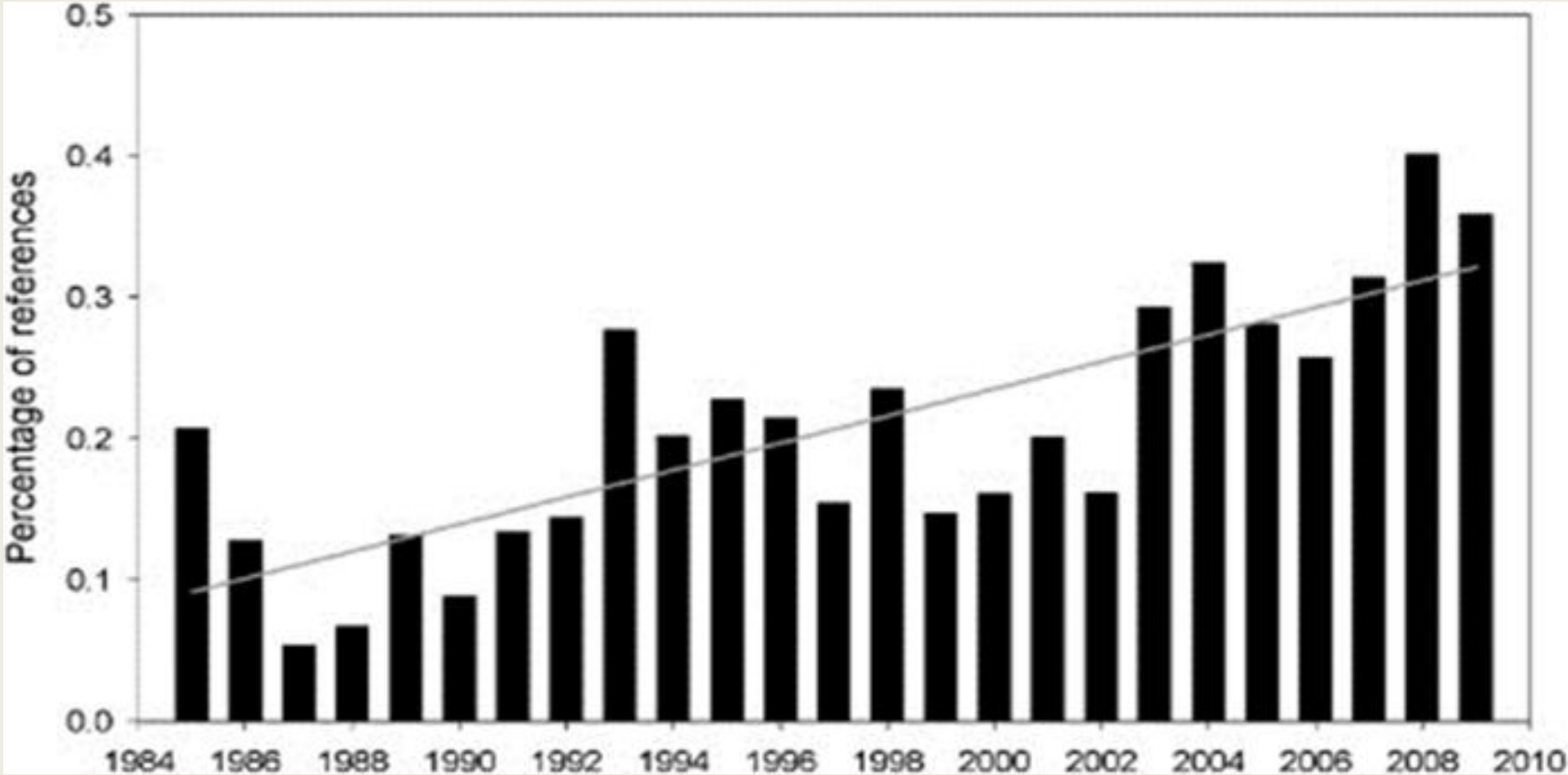
Part Two

THREATS AND UNCERTAINTY

Drivers of tree health problems



Trend in reports of climate-related forest mortality in the scientific literature, 1985-2009



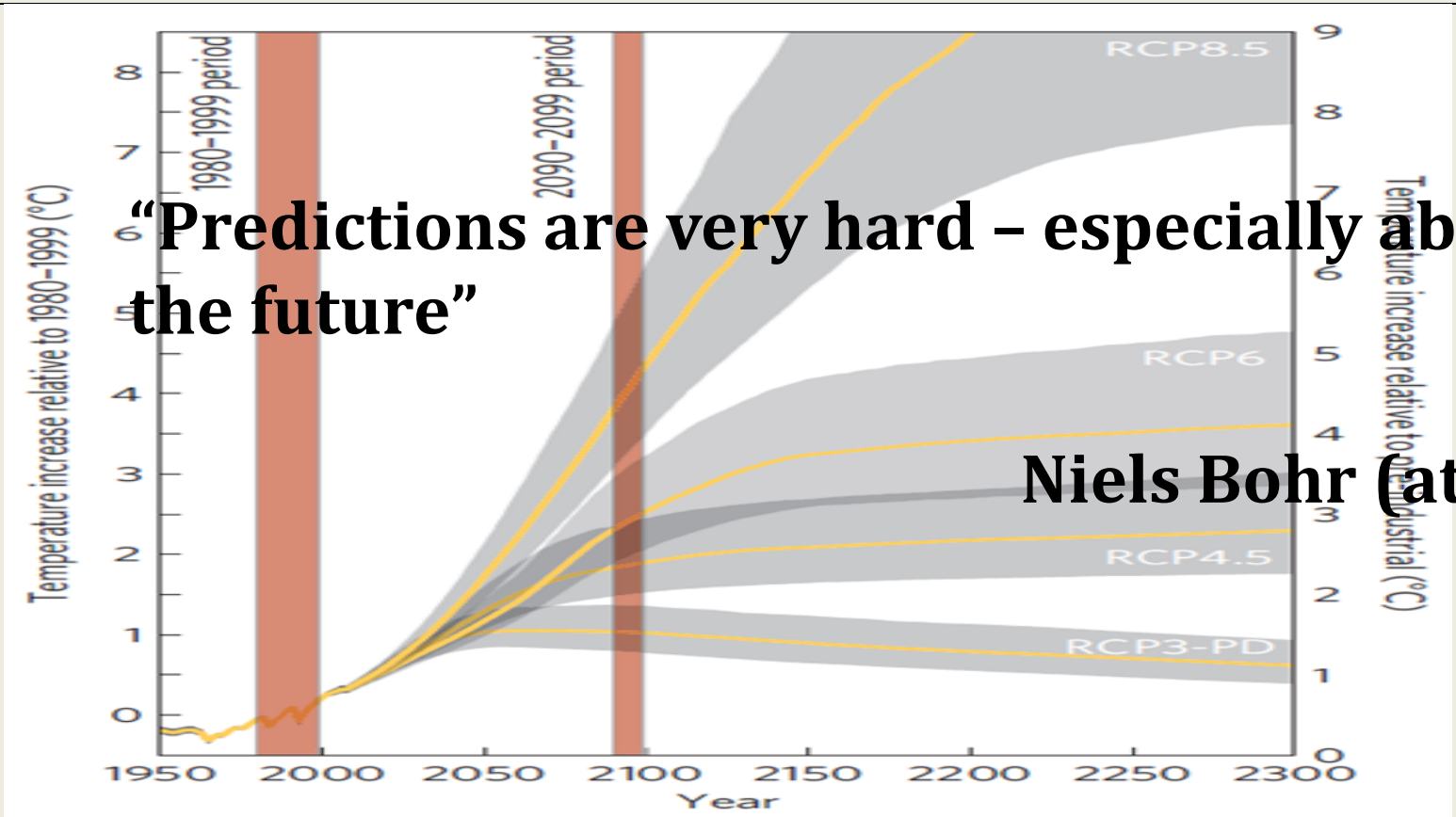
Allen, C. et al. A global overview of drought and heat-induced tree mortality reveals emerging climate change risks for forest. For. Ecol.Manage. 2010, 259, 4, 660-684

Recent documented drought-induced mortality localities in North America indicated with numbers

Allen, C. et al. A global overview of drought and heat-induced tree mortality reveals emerging climate change risks for forest. For. Ecol.Manage. 2010, 259, 4, 660-684

Drought-induced oak dieback, central France 2012

Climate predictions and tree growth timescales



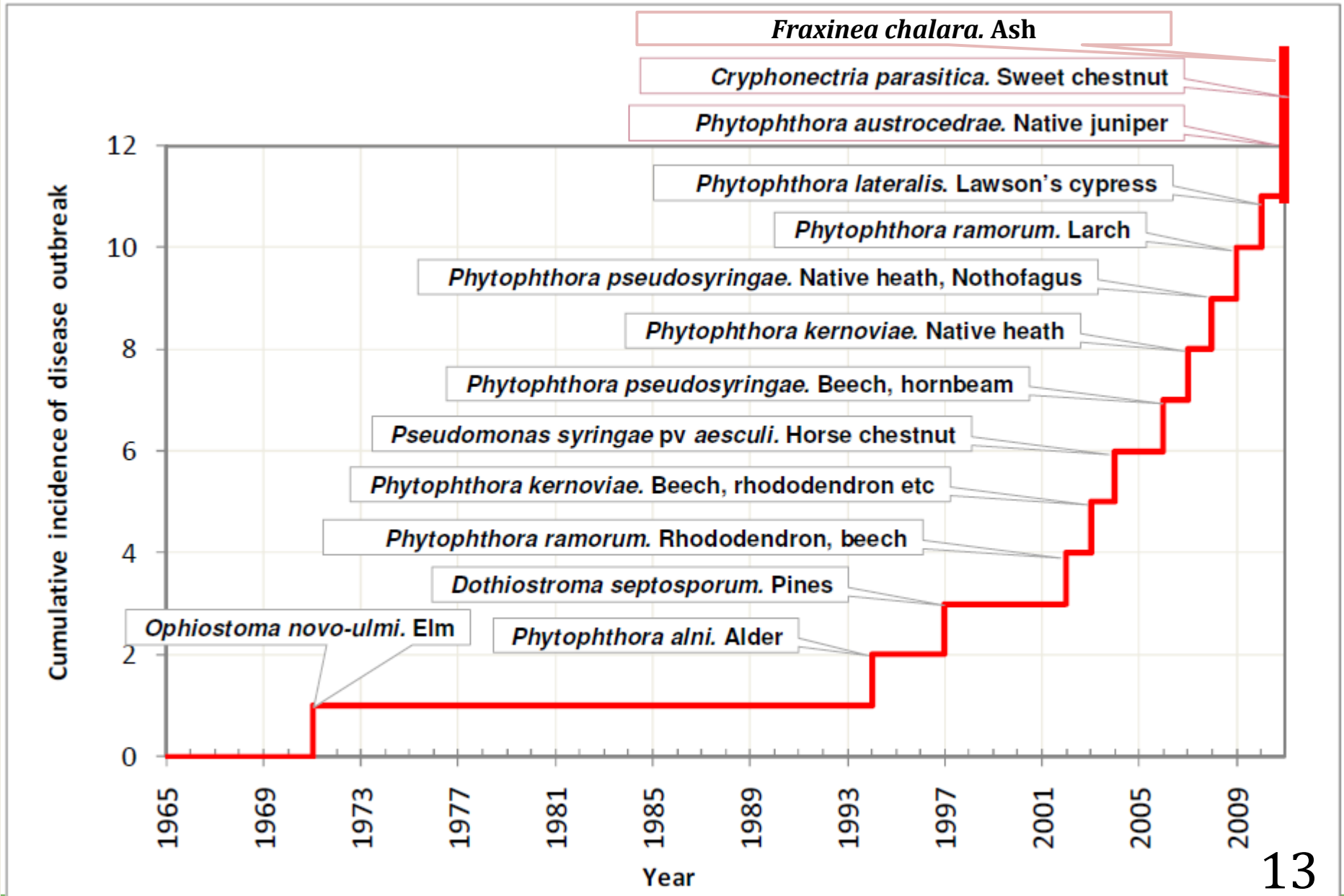
"Predictions are very hard – especially about the future"

Niels Bohr (attrib.)

Present day->	2100->	2200->	2300->	2400->	
Scots pine, Scotland	Immaturity	Period of maturity or old-growth		Deadwood	
White pine, Ontario	Immaturity	Period of maturity or old-growth		Deadwood	
Eastern Hemlock, NE USA	Immaturity	Period of maturity or old-growth			Deadwood
Oak supporting a range of specialized lichens, Sweden	Oaks too young to support *Schismatomma decolorans or Lecanographa amylacea*	Oaks suitable for colonisation			Dead-wood

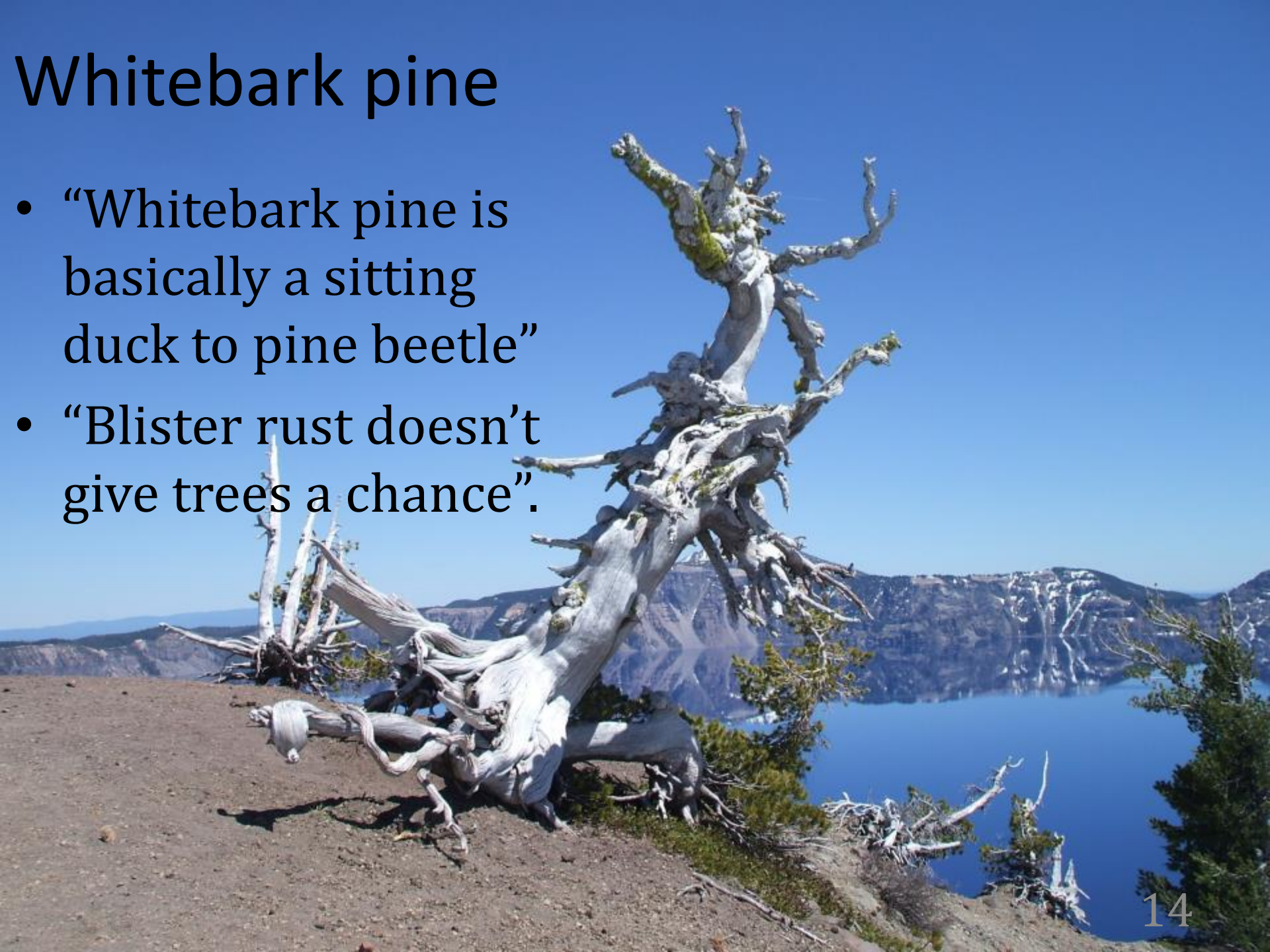
Rogelj, J.; Meinshausen, M.; Knutti, R. Global warming under old and new scenarios using IPCC climate sensitivity range estimates Nature Climate Change, 2012, 2, 4, 248

Cumulative serious tree pathogens in UK



Whitebark pine

- “Whitebark pine is basically a sitting duck to pine beetle”
- “Blister rust doesn’t give trees a chance”.



Eastern hemlock – a poor choice of memorial

Michael French of the American Chestnut Foundation holds the ceremonial first tree to be planted on Saturday, April 20, 2013, at the Flight 93 National Memorial. The tree, an Eastern Hemlock, was grown from the seed of a tree on the Gettysburg battlefield.

Getting our Ash kicked…

Ash dieback

Chalara fraxinea

Rassal Ashwood, NW Highlands

Dothistroma Needle Blight

Glen Alladale pinewood, Sutherland

Our situation:

- We can neither guarantee nor predict the long term viability of trees we start to grow today…

- Therefore, conservation objectives that depend on the long term viability of tree species risk **failure**, especially if the intended lifespan is long enough to experience very significant environmental change

Part Three

WHAT ARE WE DOING, AND WHAT SHOULD WE DO?

Do nothing…

- What problem? - *"in the great majority of situations existing native tree and shrub genepools are perfectly adequate for adaptation to climate changes if we give them a chance"* Forestry Commission Scotland 2012
- The world has changed before – let 'Nature', or evolutionary and range changes handle it.
- *Deus ex machina* - rely on future technological wizardry to address problems that will be more clearly understood

Fix problems when they occur – the ***recovery*** form of resilience

- Relies on mechanisms that return the forest and its key functions to the original state
- Includes tree-breeding, selection of 'resistant' individuals, genetic manipulation, facilitating natural selection
- But…the growing of better adapted seedlings after loss of mature trees can easily imply a multi-century 'recovery' phase, during which the functions dependent on big old trees are diminished or lost.

‘Replacement Fallacy’

New redwoods planted to replace ones cut down by Redlands church

Kristina Hernandez, Staff Writer
Posted: 03/16/2013 06:24:09 PM PDT

As part of an agreement between the city and Redlands Seventh-day Adventist Church, Aptos Blue Redwoods were planted on church property at Buena Vista Street and Brookside Avenue. (John Valenzuela/Staff Photographer)

REDLANDS - Treegate has come to an end.

After months of discussion between the city and Redlands Seventh-day Adventist Church, three Aptos Blue redwoods were planted Tuesday to replace two 80-year-old redwoods illegally cut down by the church in August at Buena Vista Street and Brookside Avenue.

Facing up to the unknowable – investment and uncertainty

- *'I skate to where the puck is going to be, not where it has been'* Wayne Gretzky
- ***Diversity*** …and ***redundancy*** as the model for risk reduction
- Diversity/redundancy in native or natural forests means non-native genotypes and species as functional analogues
- Novel (or 'fossil') combinations

On the unique value of native species…surely our objectives depend on big old *native* trees?

- Not every function of native species is unique
- Not all functions of native trees will be sustained
- Not everything can be saved – our future is very unlikely to contain the status quo
- The danger of DIY outcomes in a leadership vaccuum

Risk Management

- Urgency and extent of our response should be linked to perceived vulnerability
- Don’t put all your eggs in one basket…in uncertainty – a diversity of response is the only logical response to preserve things we value
- A diversity of diversities - Alpha, Beta, Gamma diversity

What next?

Nothing will ever be attempted if all possible objections must be first overcome - Samuel Johnson

- Research to find and assess functional analogues
- Use the need for a diversity of response to work with the willing – first actions likely to be on less-contested sites
- 'Innovation Lab'
- Address our grief

Thank You