

Interactive impacts of climate and conifers on water and wildfire

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Background

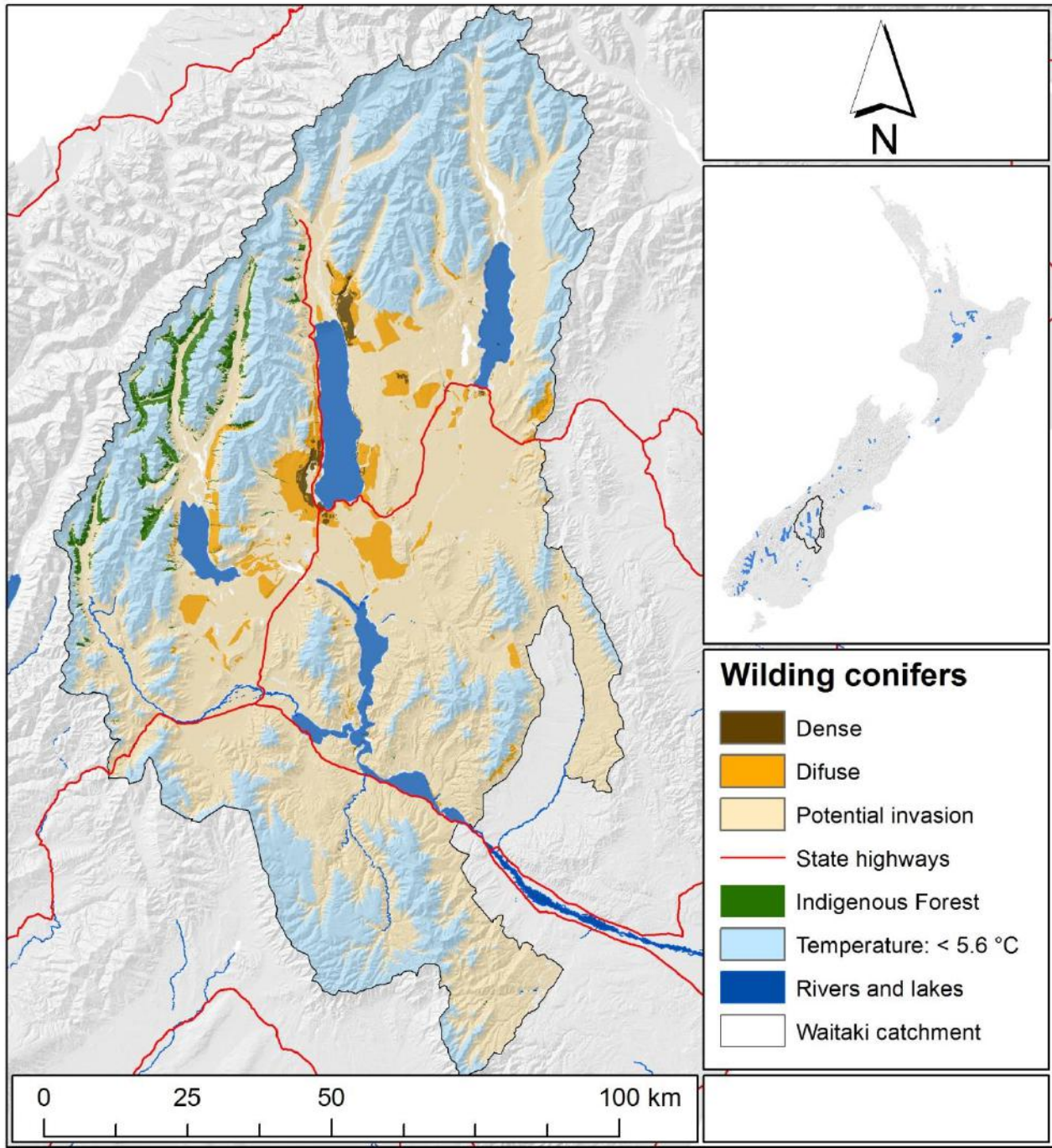
- Wilding conifers invading large areas of non-woody veg., particularly in eastern rainshadow of Sth. Island
- Conifers reduce water yield through increased interception loss and transpiration
- They increase wildfire hazard by providing large amounts of highly flammable fuel

Background

- Conifer invasion is a major problem in Upper Waitaki
- Potentially exacerbate decrease in water yield and increase in wildfire threat expected from climate change
- Conifer impacts might also be intensified by climate change

Outline

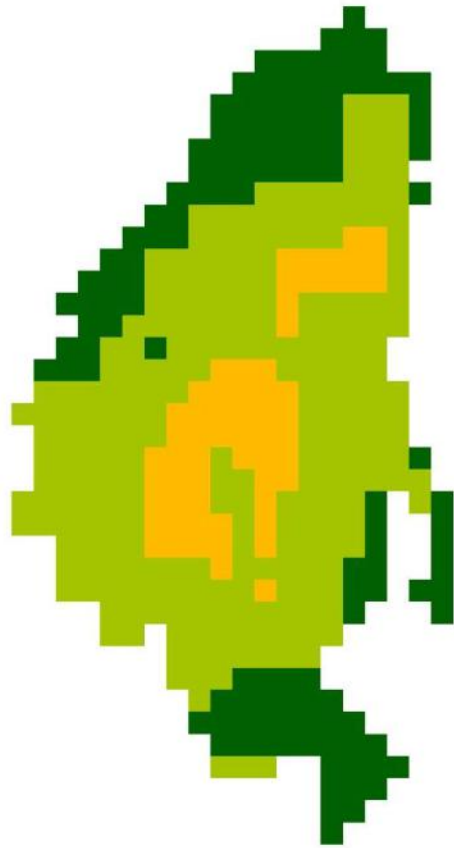
- Current landcover vs conifer invasion of all invasion prone areas >10 degrees slope
- Model impacts on water yield using WATYIELD model (Fahey et al. 2010)
- Estimate changes in wildfire threat using head fire intensity (NRFA)
- Three climate periods (1986-2005; 2046-2065 and 2081-2100). Scenario RCP8.5/Hadley (HagGEM2-ES) model



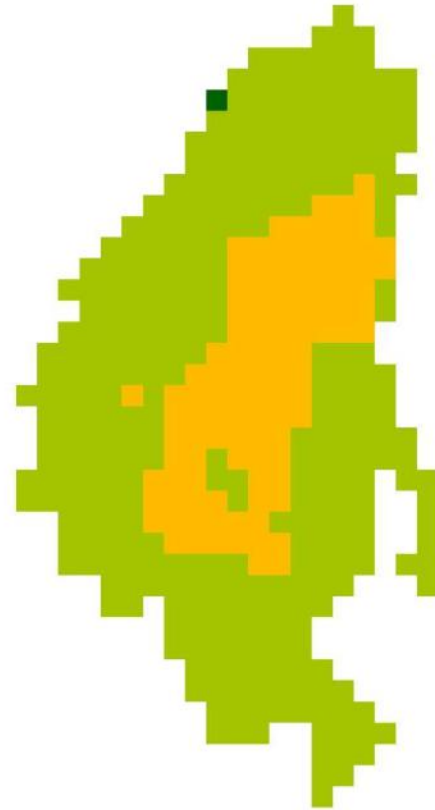
Methods – head fire intensity

- Three cover types – forest, shrubland grassland
- Estimate 80th percentile for HFI for each cover type across entire catchment
- Clip according to LCDB4 2012 cover type or potential invasion scenario
- Compare mean for each combination of land cover and climate period.

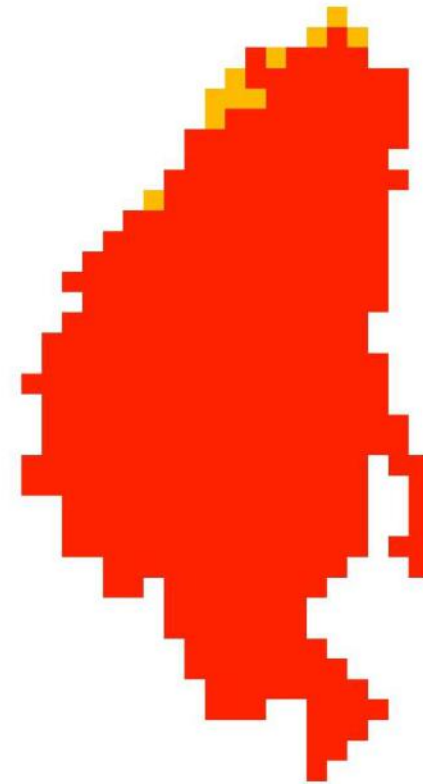
Forest



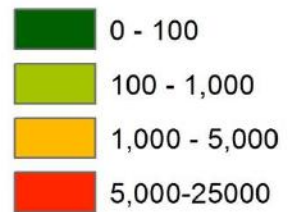
Grassland

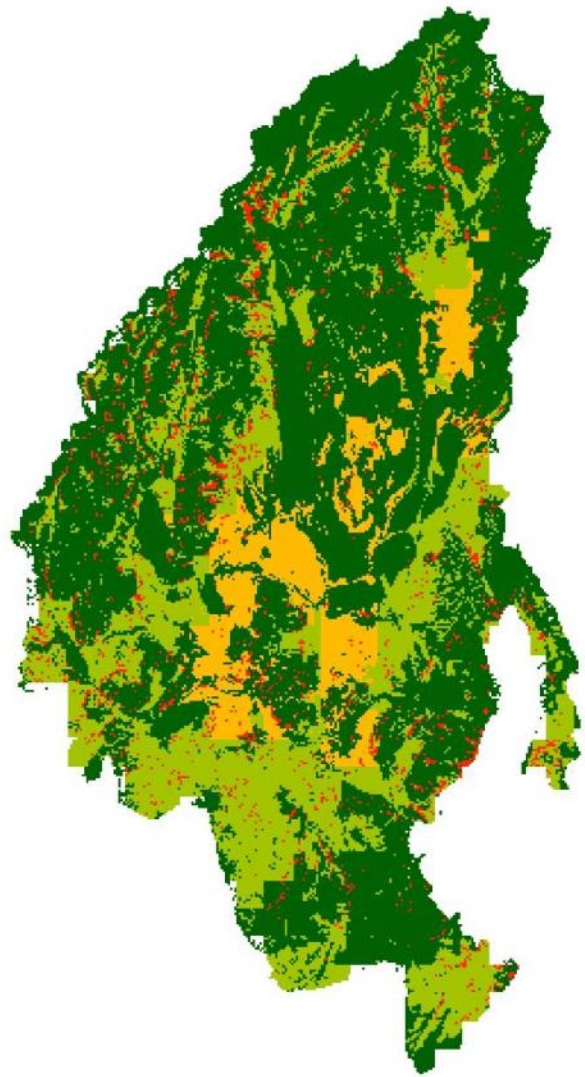


Shrubland

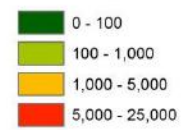


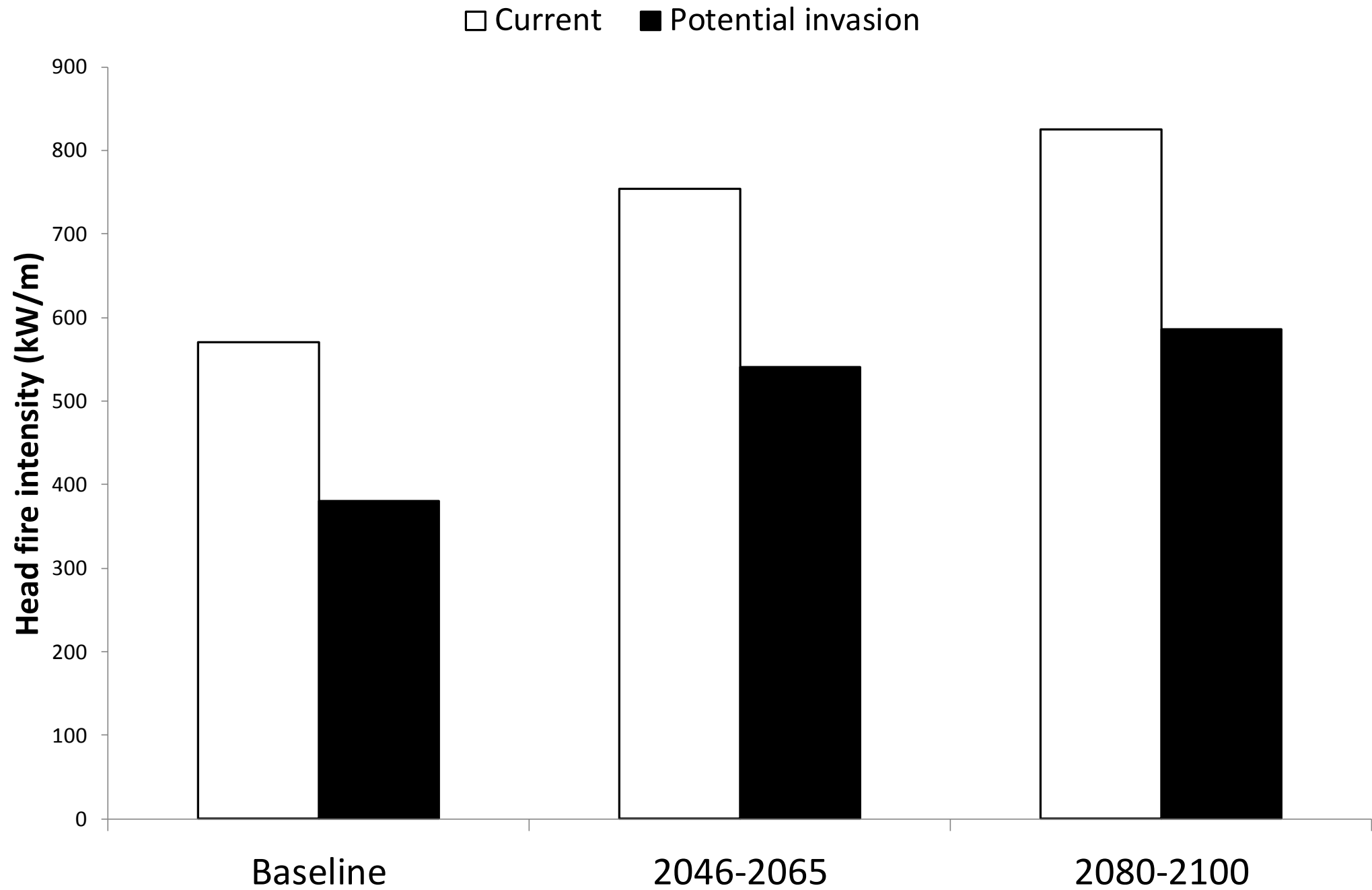
Head fire intensity (kW/m) 2046-2065





Head fire intensity (kW/m) 2046-2065





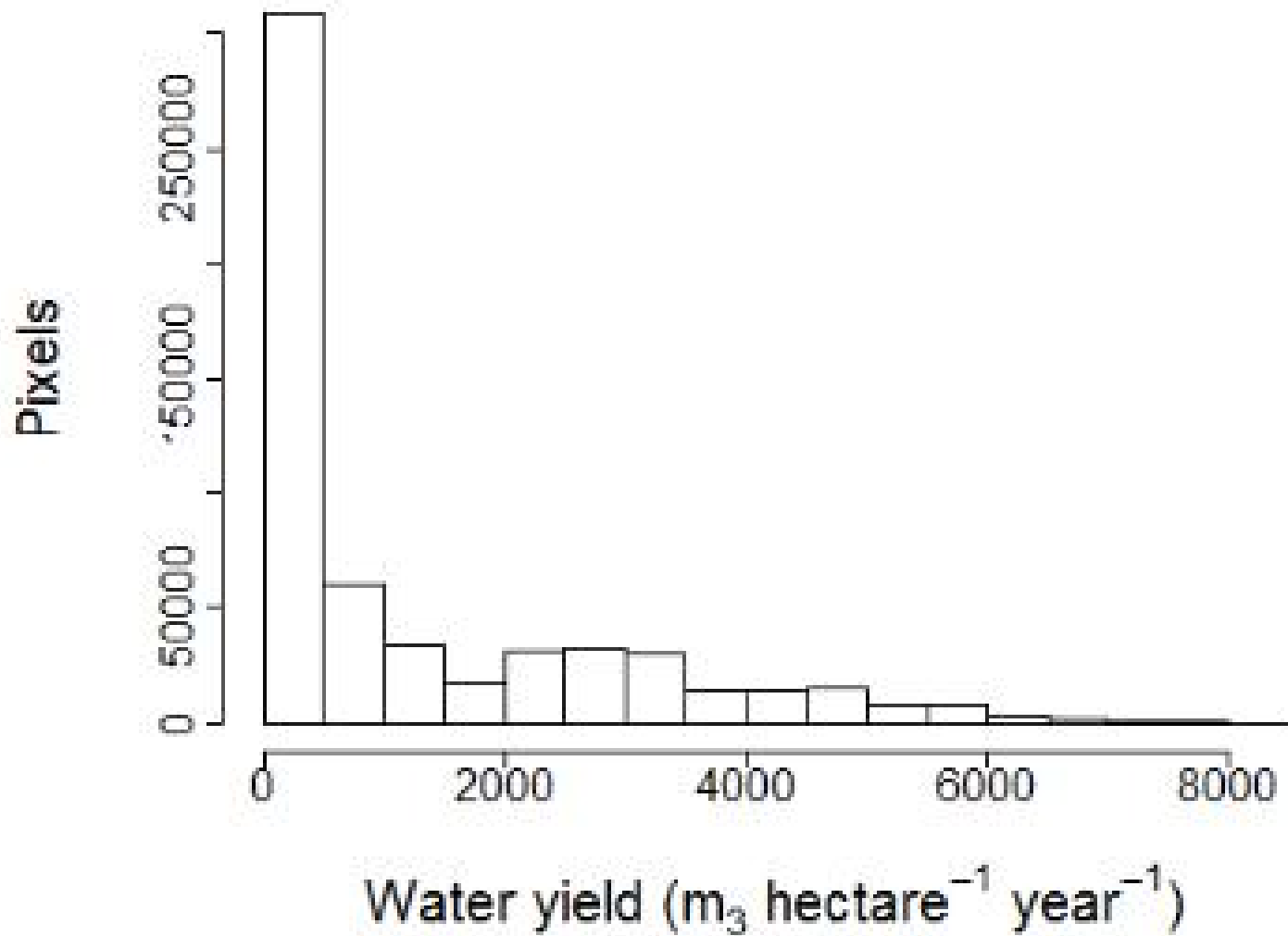
Conclusions – head fire intensity

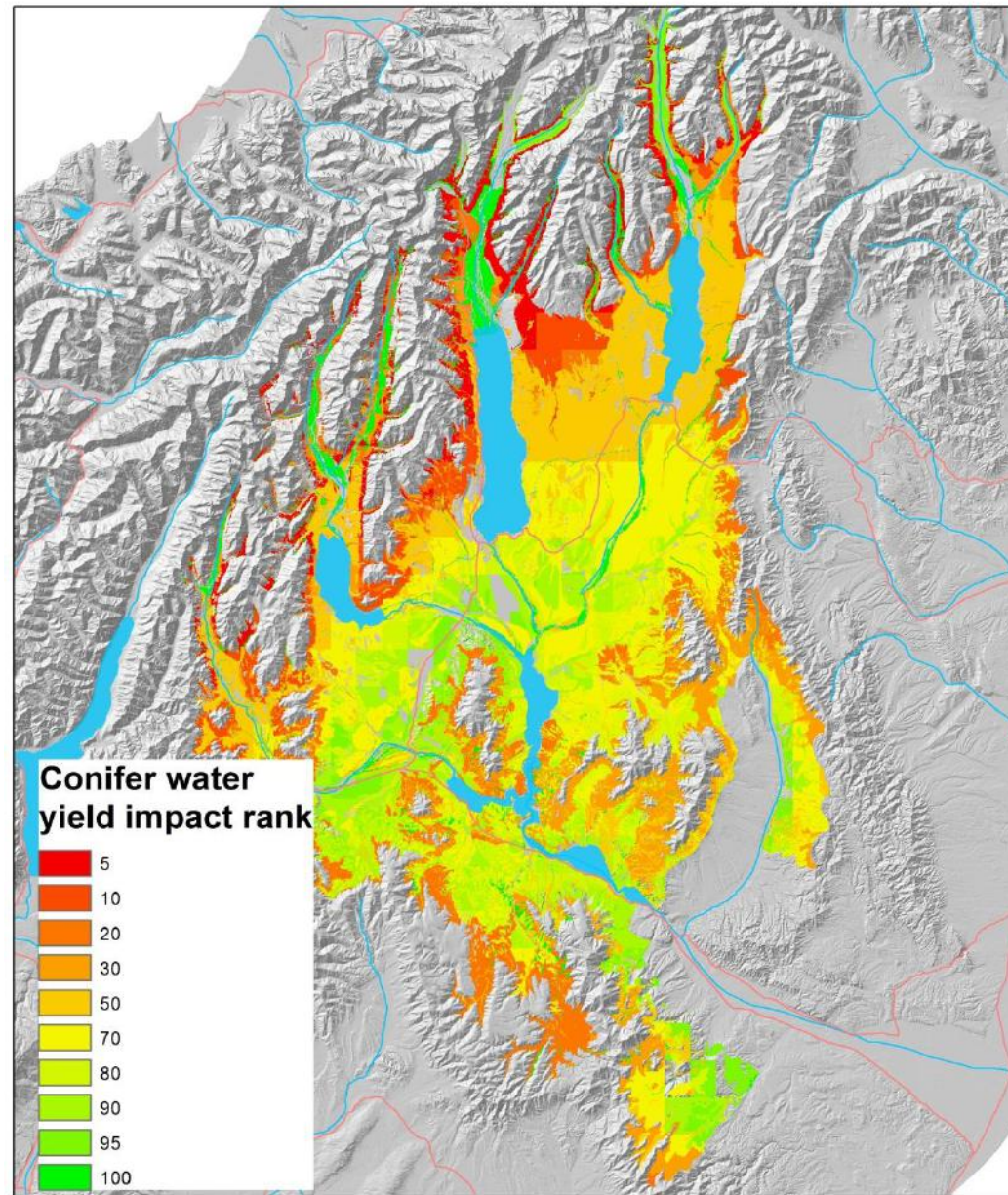
- Climate change intensifies wildfire threats
- Conifer invasion decreases wildfire threats
- Need fire behaviour properties specific to wilding conifers stands

Methods – water yield

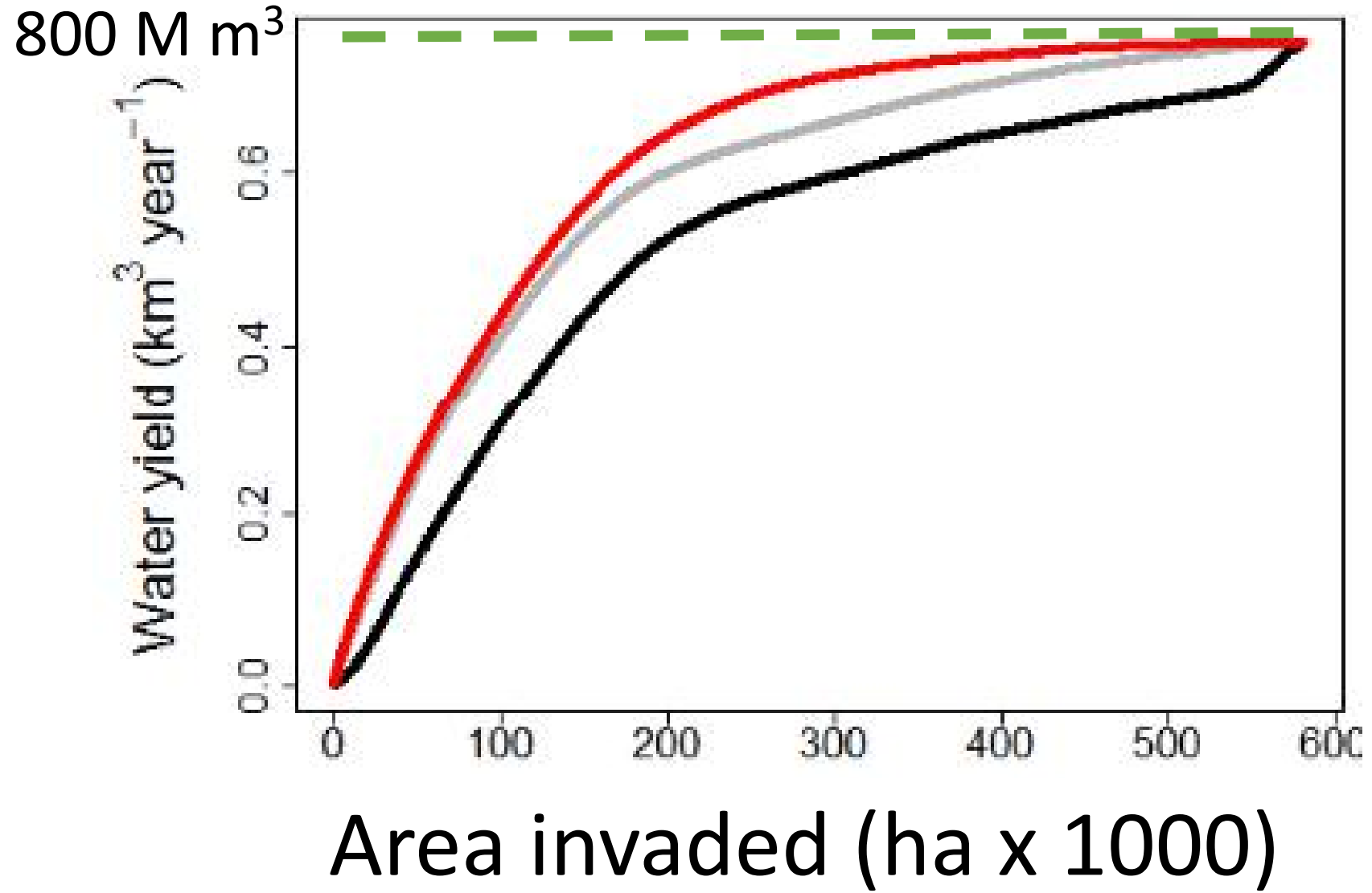
- Assign different crop coeff., interception fraction and loss to LCDB cover classes.
- Include water holding capacity of soil
- Compare total water yield for each combination of land cover and climate period.

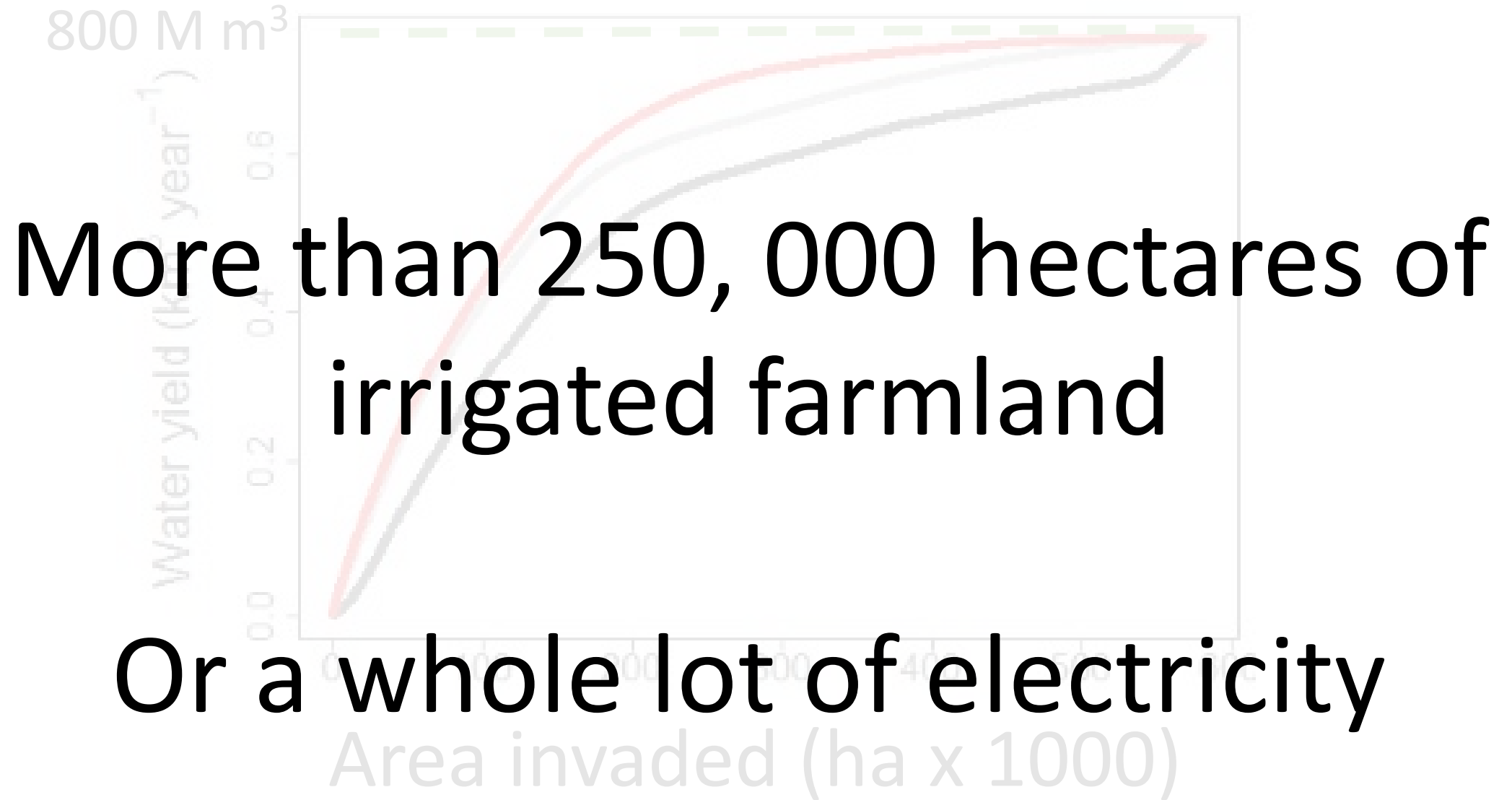
Water yield reduction





Mason et al. Biological Invasions (under review)





Conclusions – water yield

- Invasion is likely to exacerbate effects of climate change on water yield
- Wilding conifer control key consideration in climate change impact mitigation
- Need data on key water balance parameters for wilding conifer stands

General Conclusions

- Accurate spread models to simulate invasion under different control scenarios
- Need better data on wilding conifer impacts to support prioritisation of control efforts
- Winning with wildings MBIE Endeavour programme