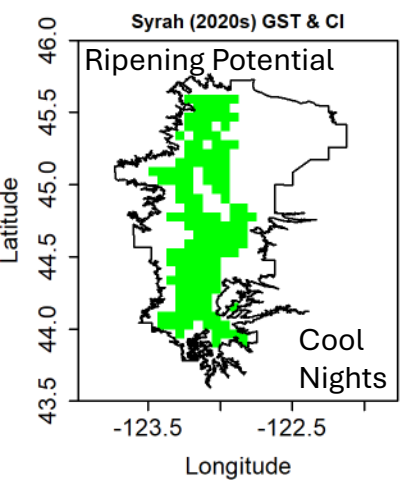
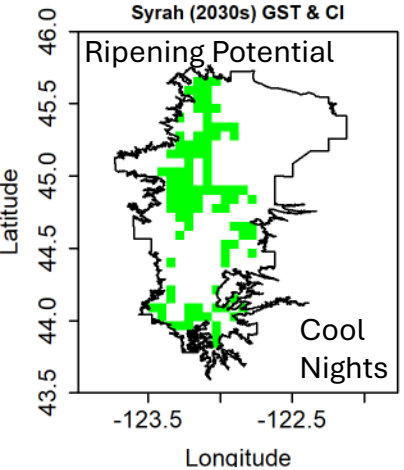
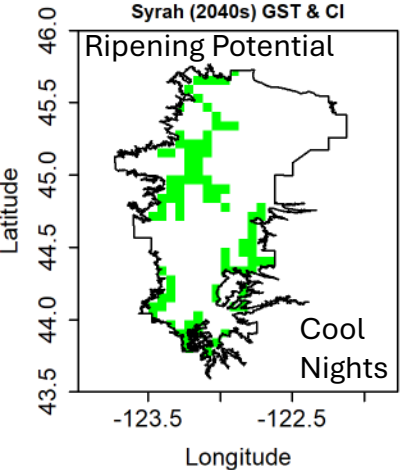
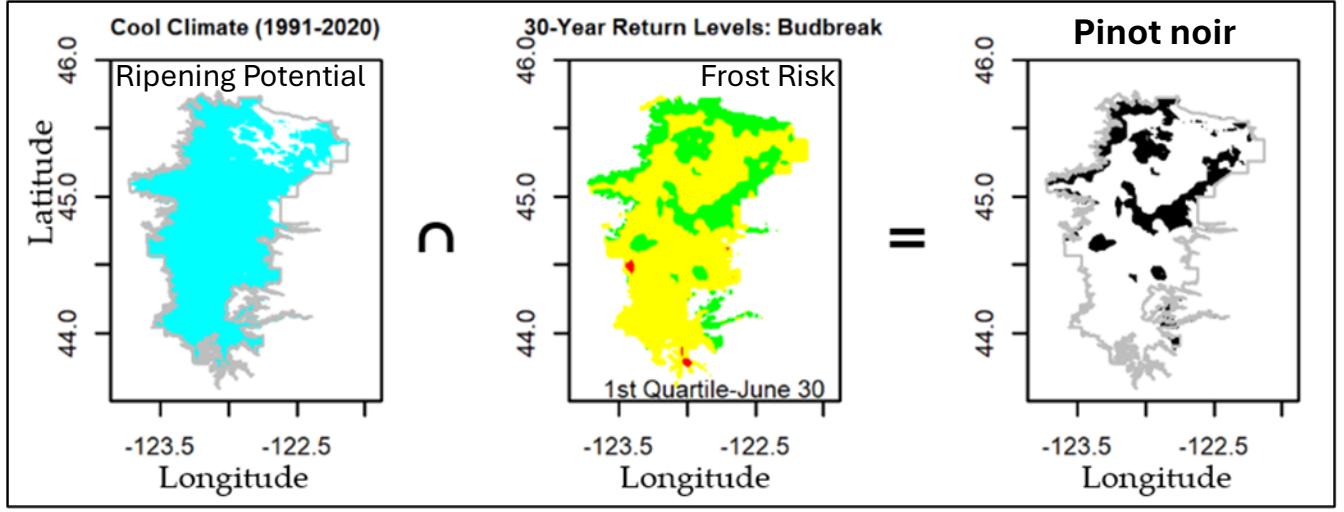




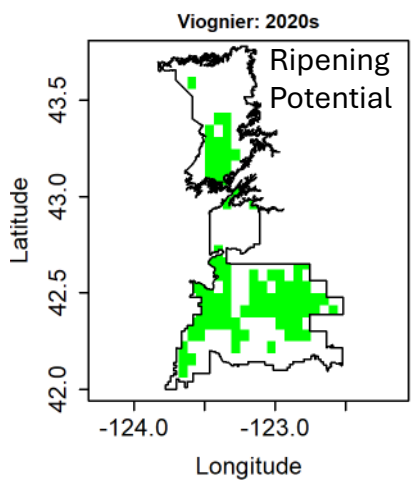


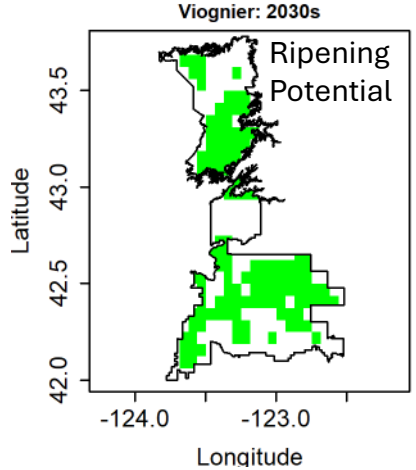


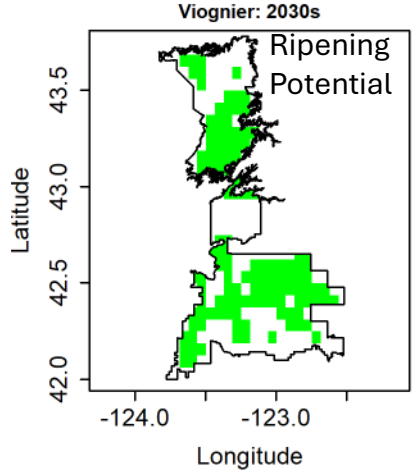
Climate Evaluations and Alternative Varieties

Brian Skahill and Bryan Berenguer
Chemeketa Community College
Wine Studies

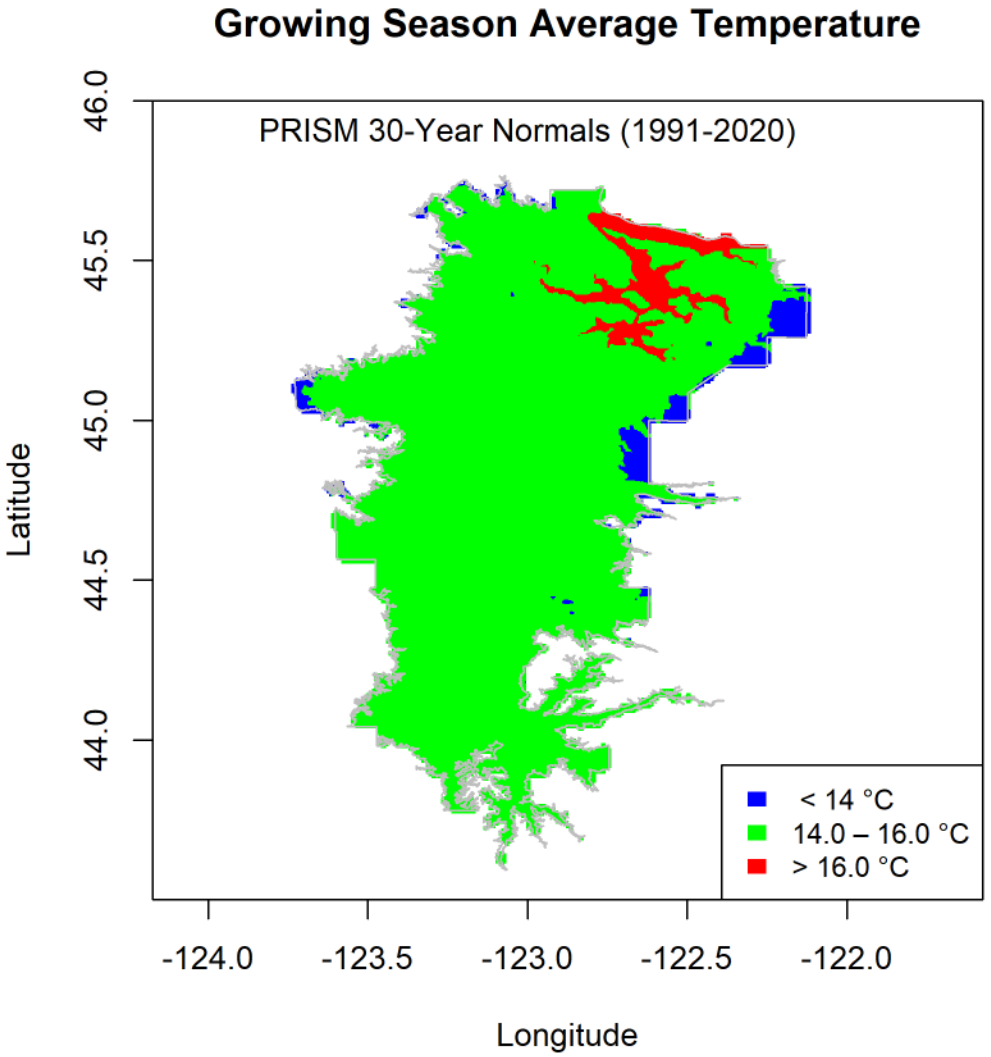
Oregon Wine Symposium
February 03, 2025

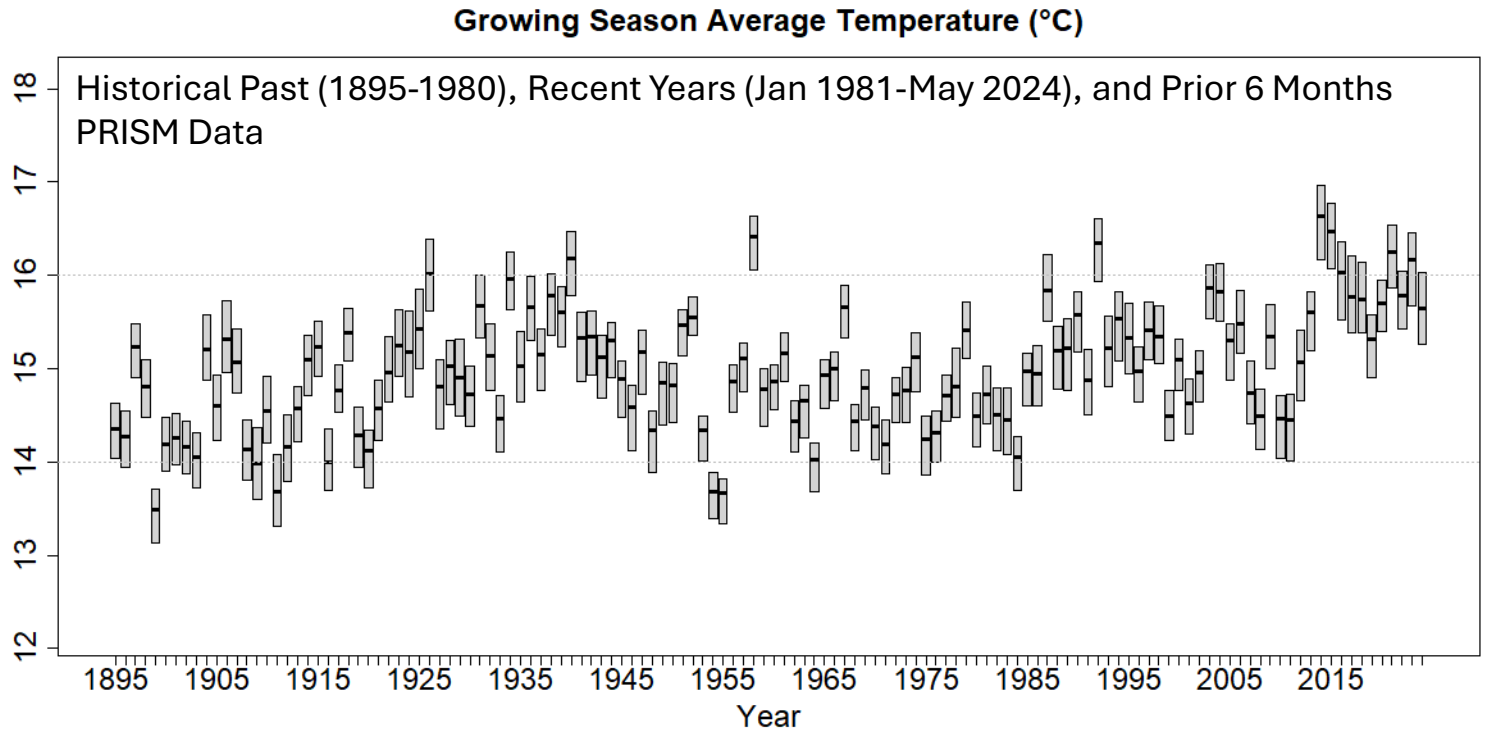






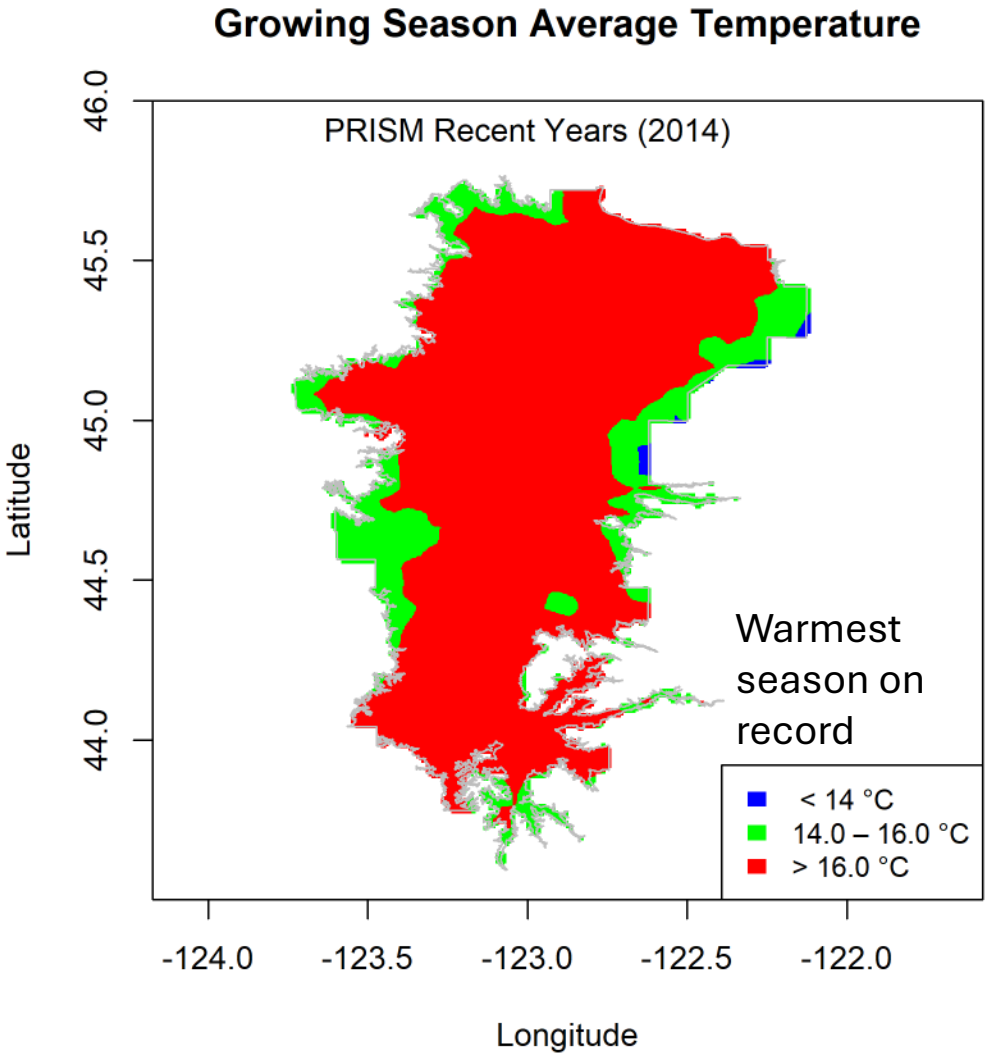
Willamette Valley AVA

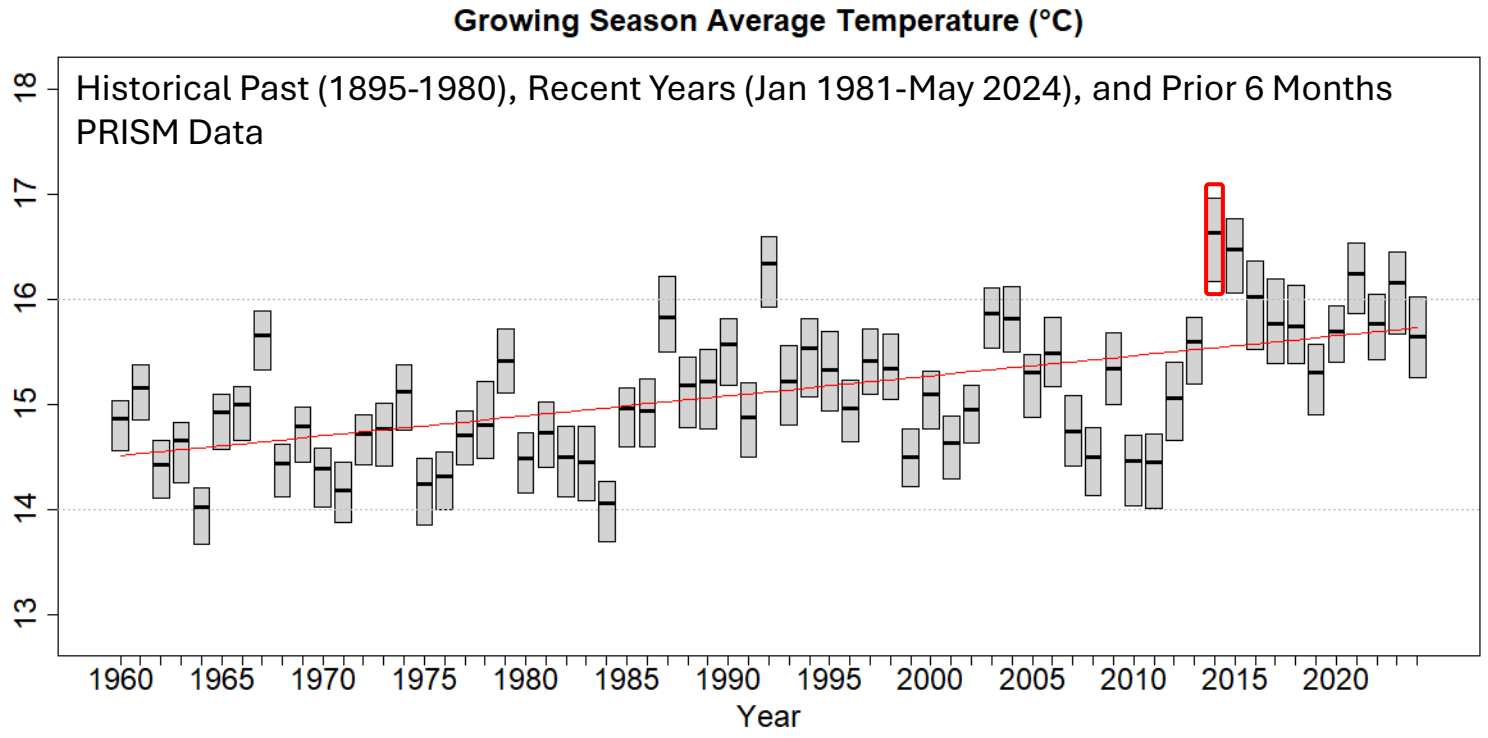




Applications of the Mann-Kendall Test for Trend Detection (with median values of the growing season average temperature)
1895-2024: suggested strong evidence for a positive trend
1960-2024: suggested strong evidence for a (more) positive trend

Willamette Valley AVA





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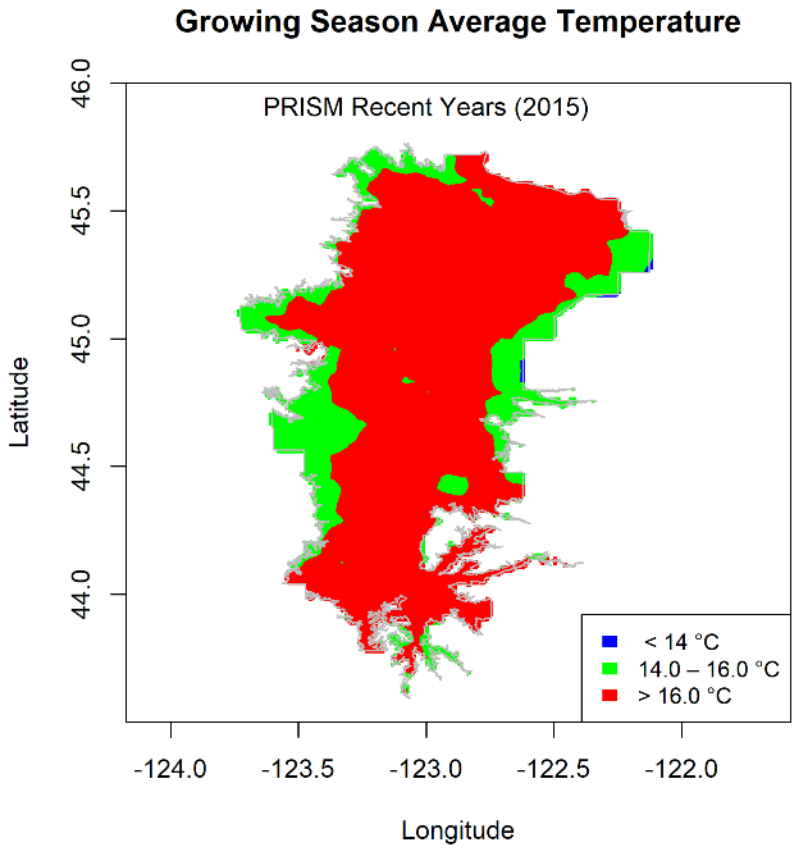
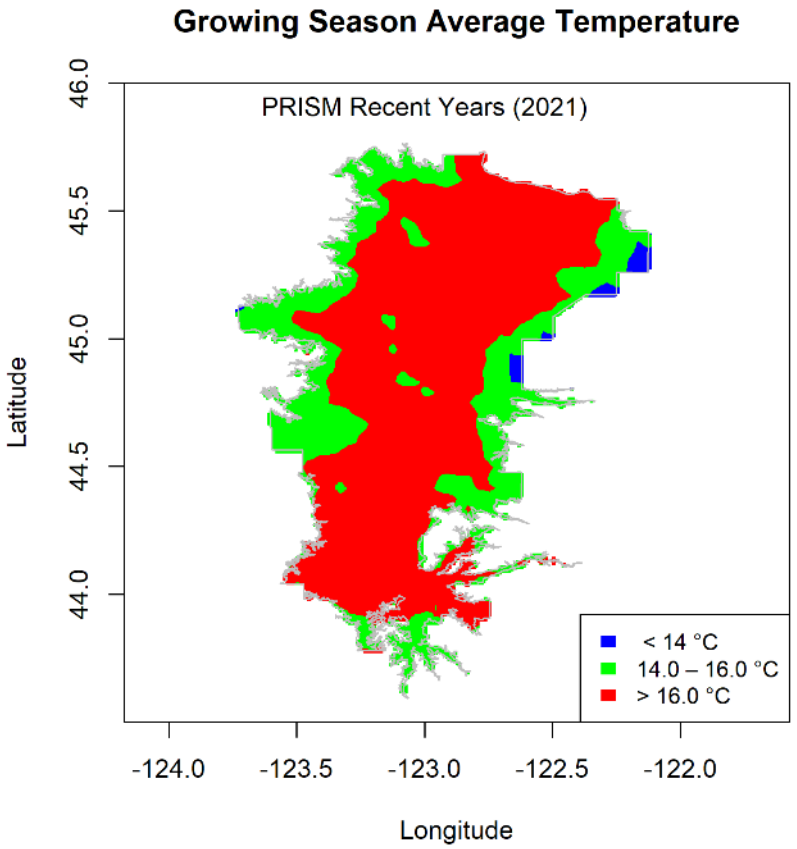
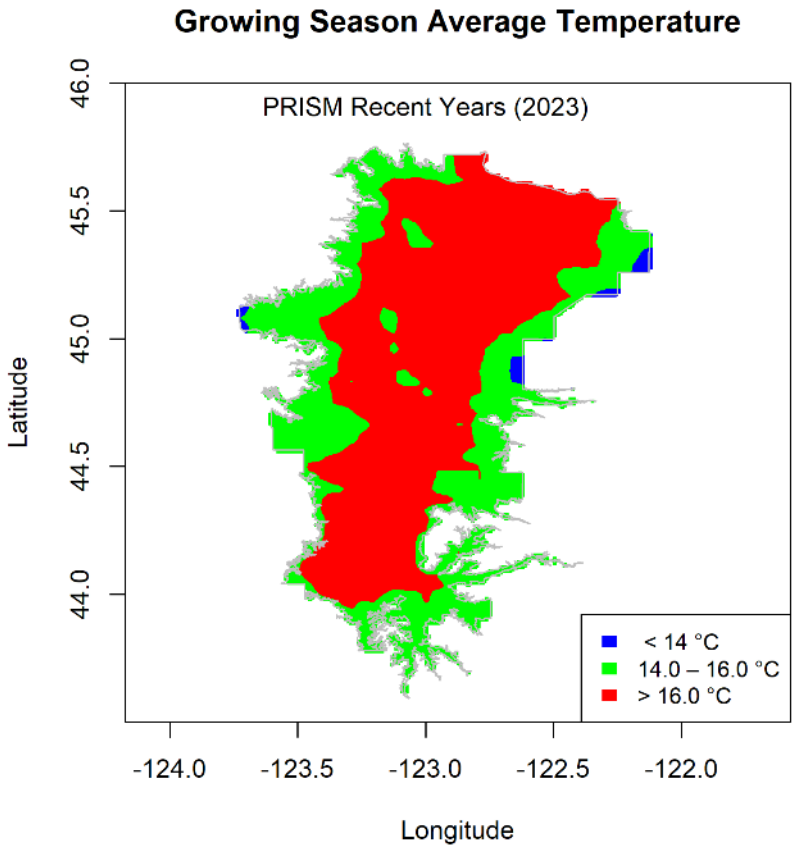
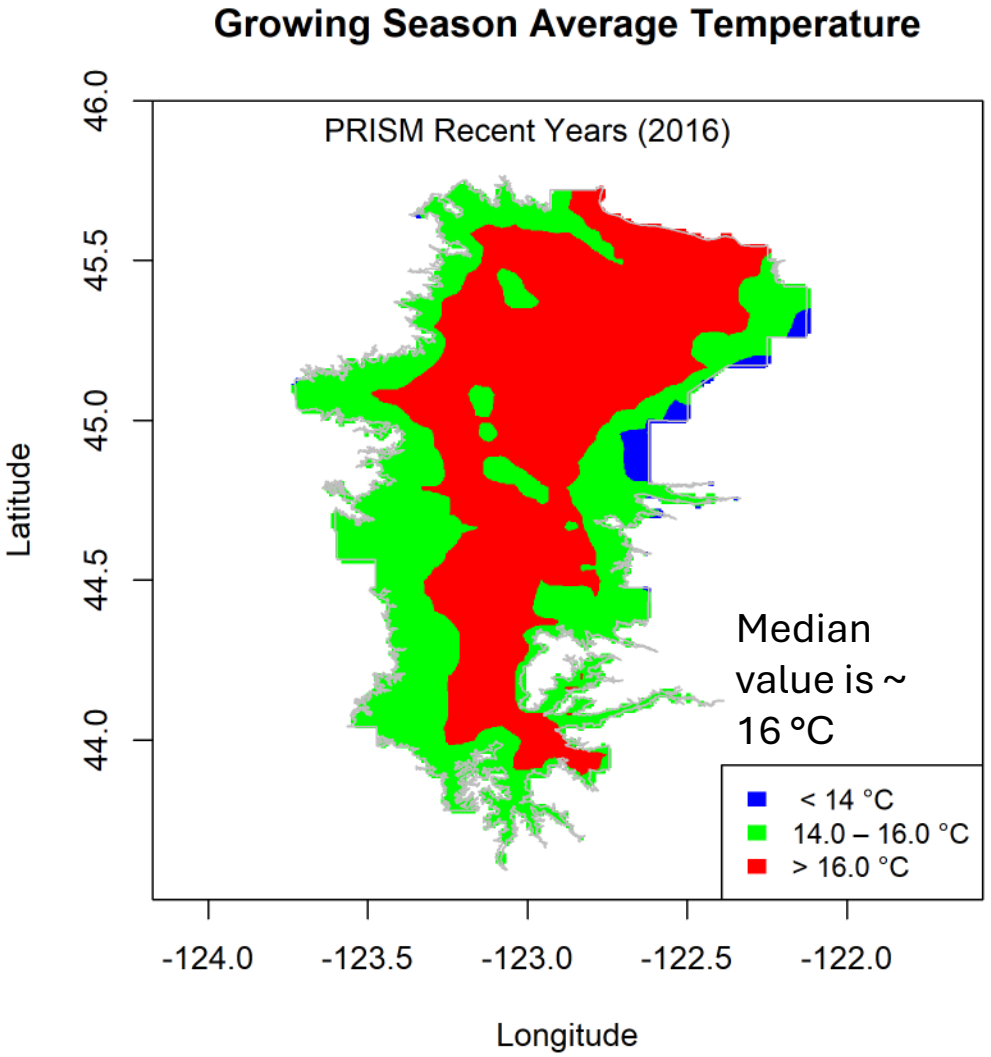
Willamette Valley AVA

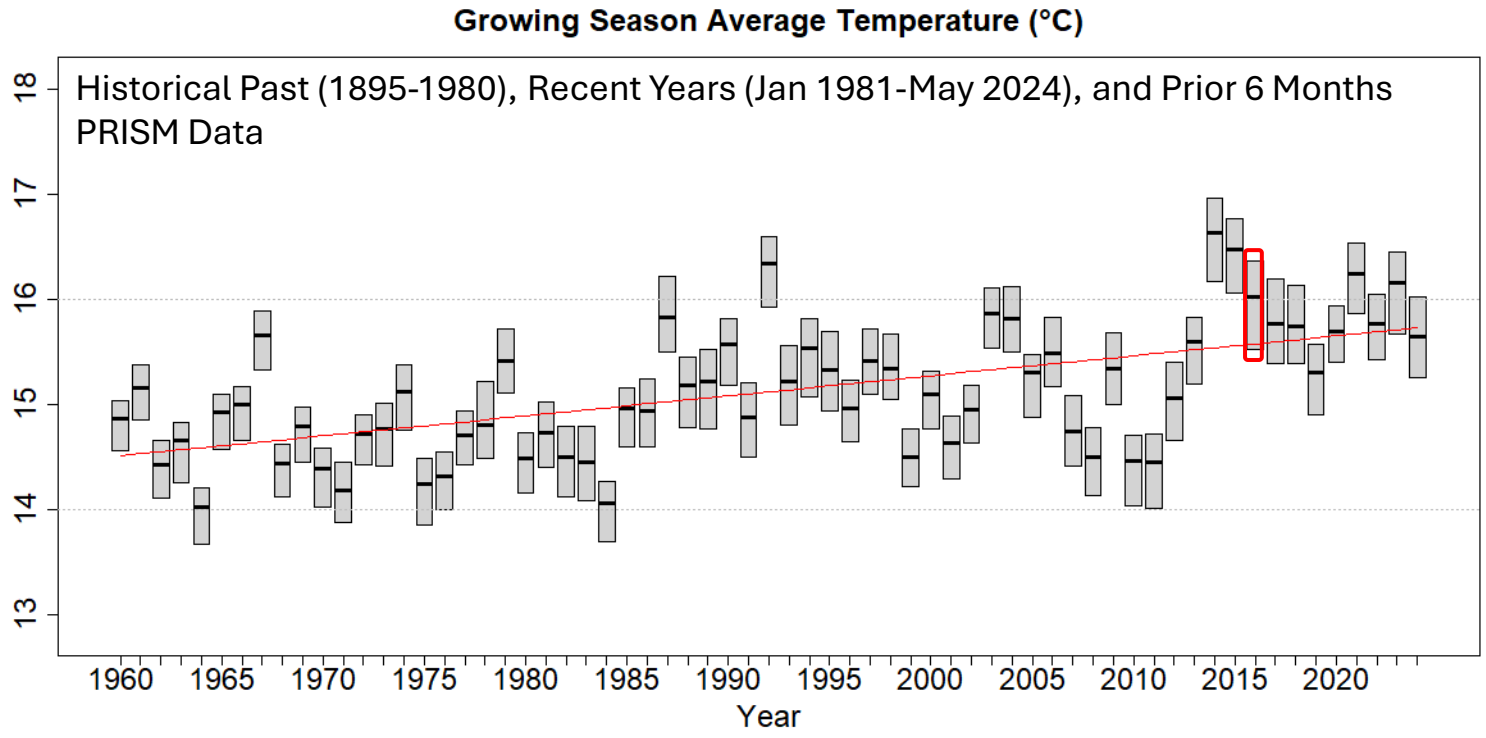






Willamette Valley AVA





Applications of the Mann-Kendall Test for Trend Detection (with median values of the growing season average temperature)
1895-2024: suggested strong evidence for a positive trend
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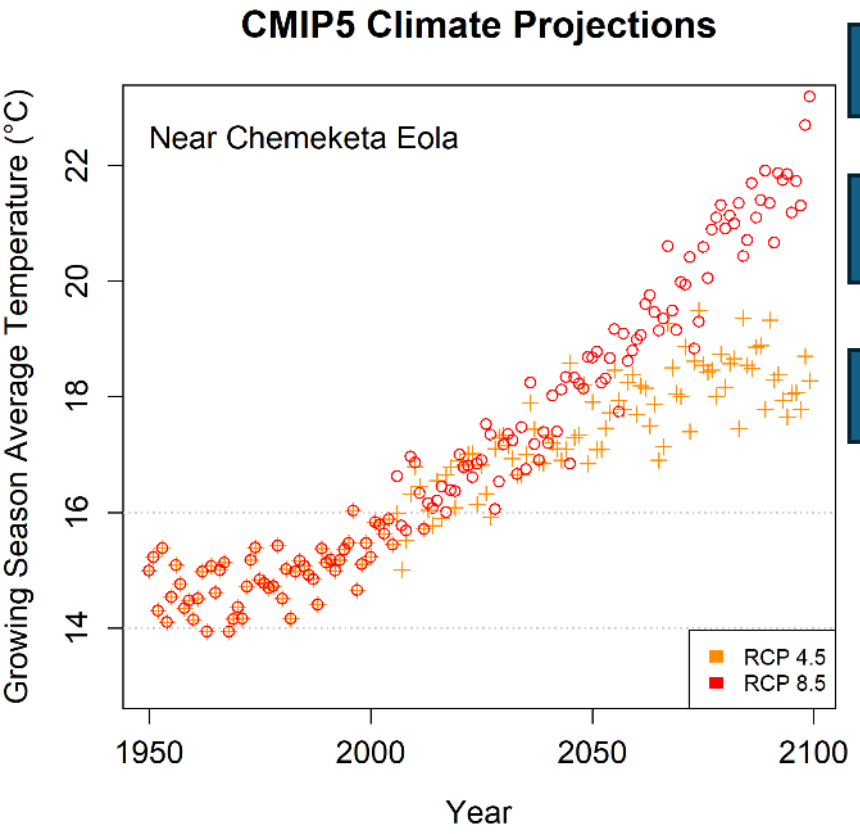
Climate Projections / Varietal Footprints



RCP = representative concentration pathway

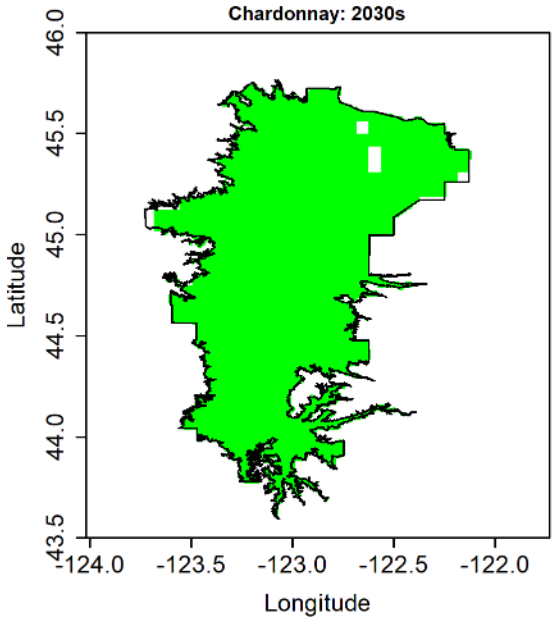
RCP 4.5 is an intermediate stabilization scenario

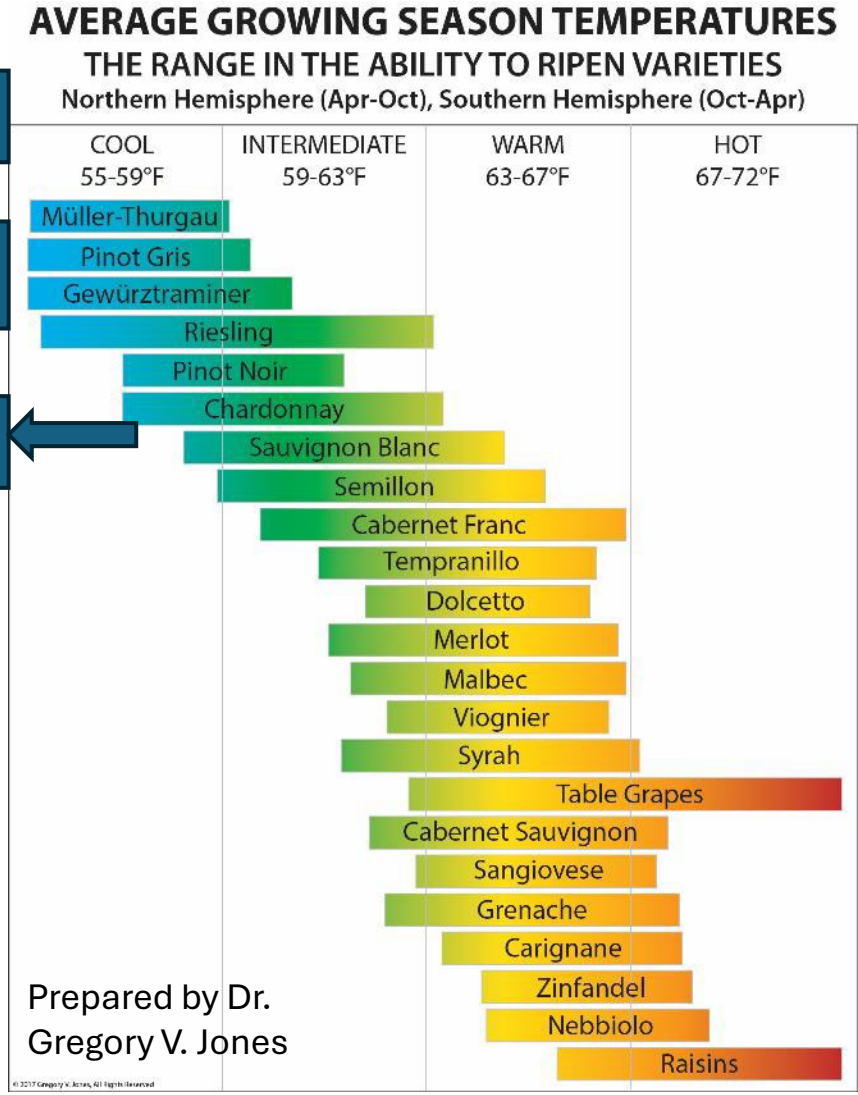
RCP 8.5 is a high emission scenario

CMIP5 RCP 4.5 Climate Projections

Compute Growing Season Average Temperature (GST)

Reclassify Computed GST Values

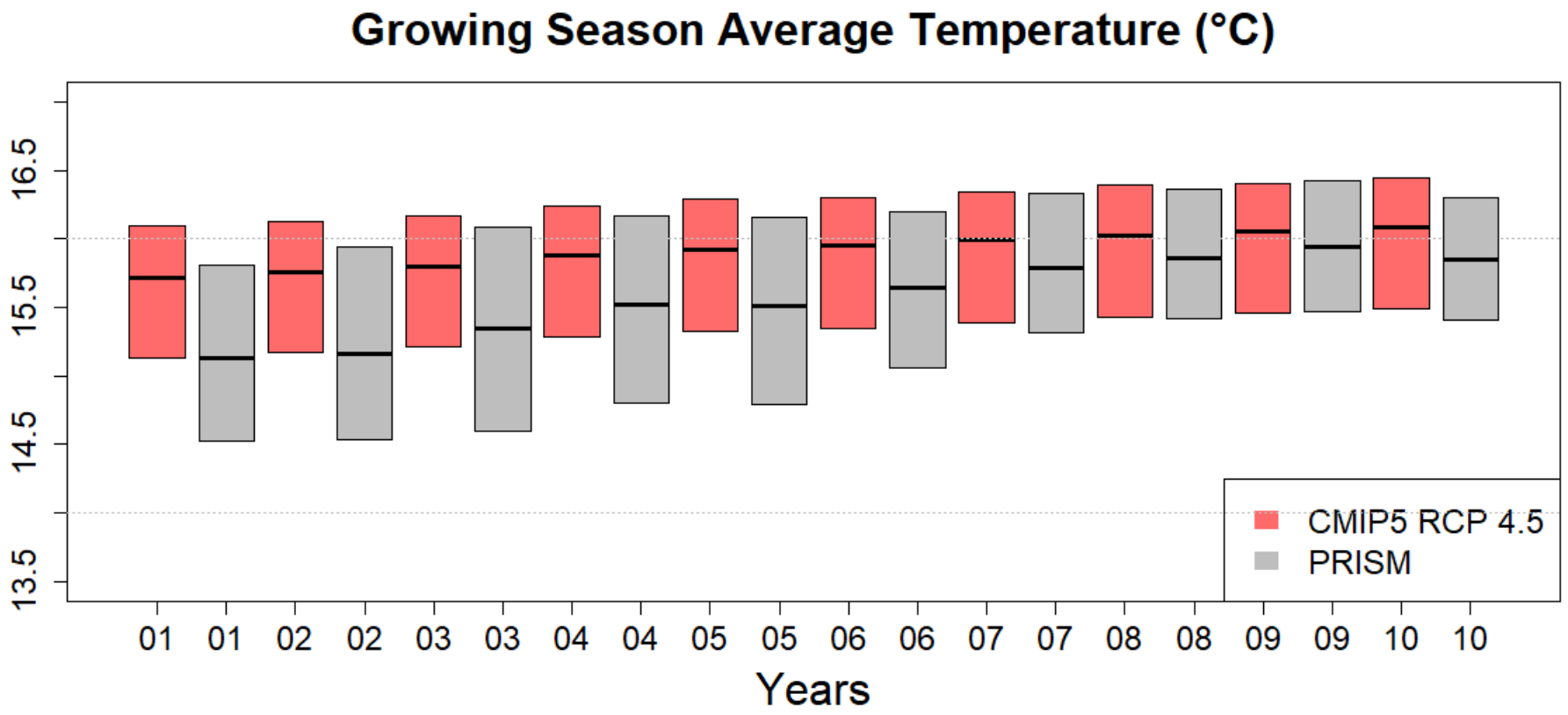




Jones, G.V. (2006). Climate and terroir: Impacts of climate variability and change on wine. In *Fine Wine and Terroir: The Geoscience Perspective. Geoscience Canada*. R.W. Macqueen and L.D. Meinert (eds.), (Geological Association of Canada, St. John's, Newfoundland), pp. 1-14.

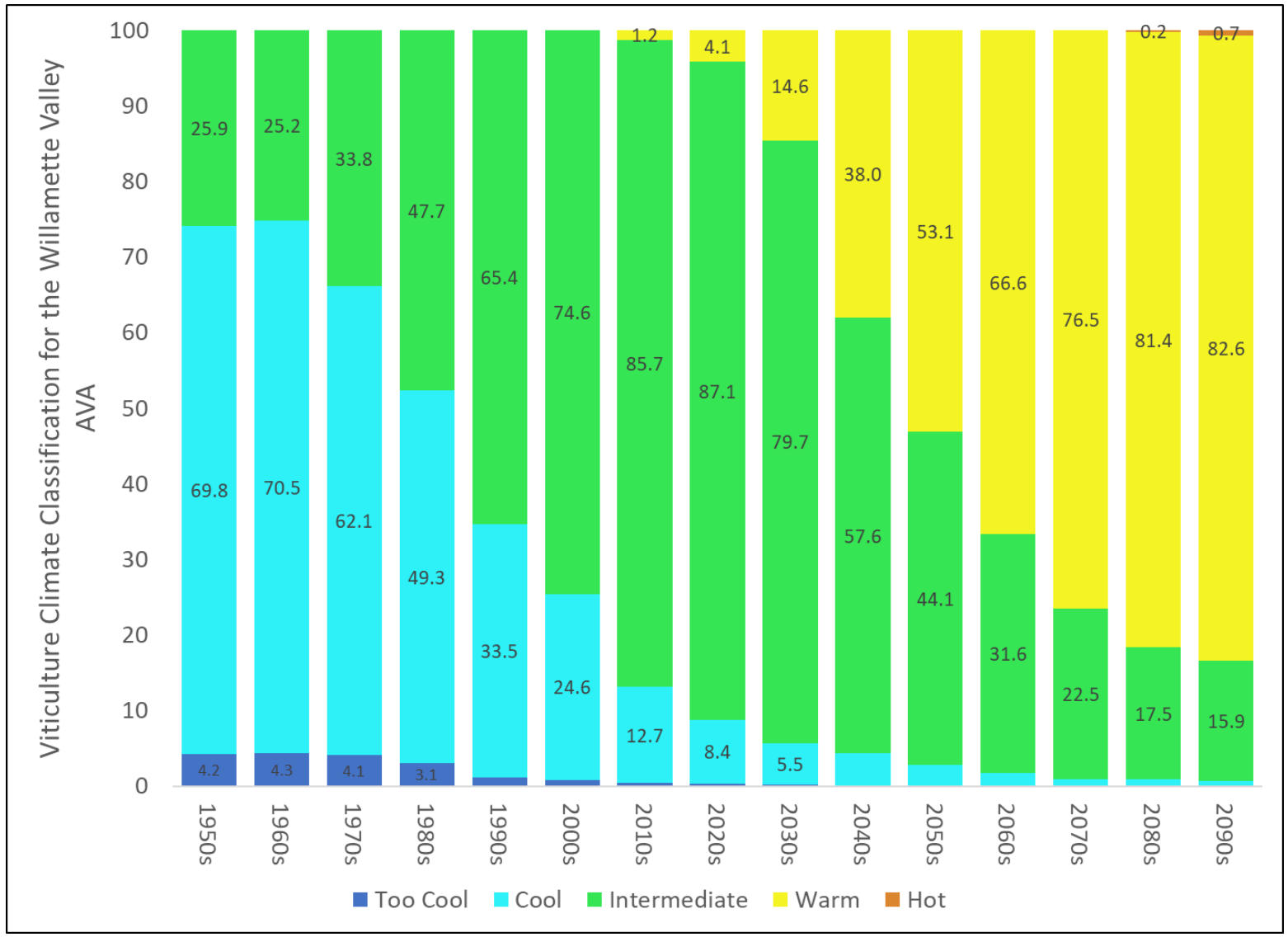
PRISM / Climate Projection Comparisons

The median difference between growing season average temperature values computed throughout the entire Willamette Valley AVA using CMIP5 RCP 4.5 projections and PRISM gridded observations was -0.04028 °C for 1950-2005 (the CMIP5 historical period).



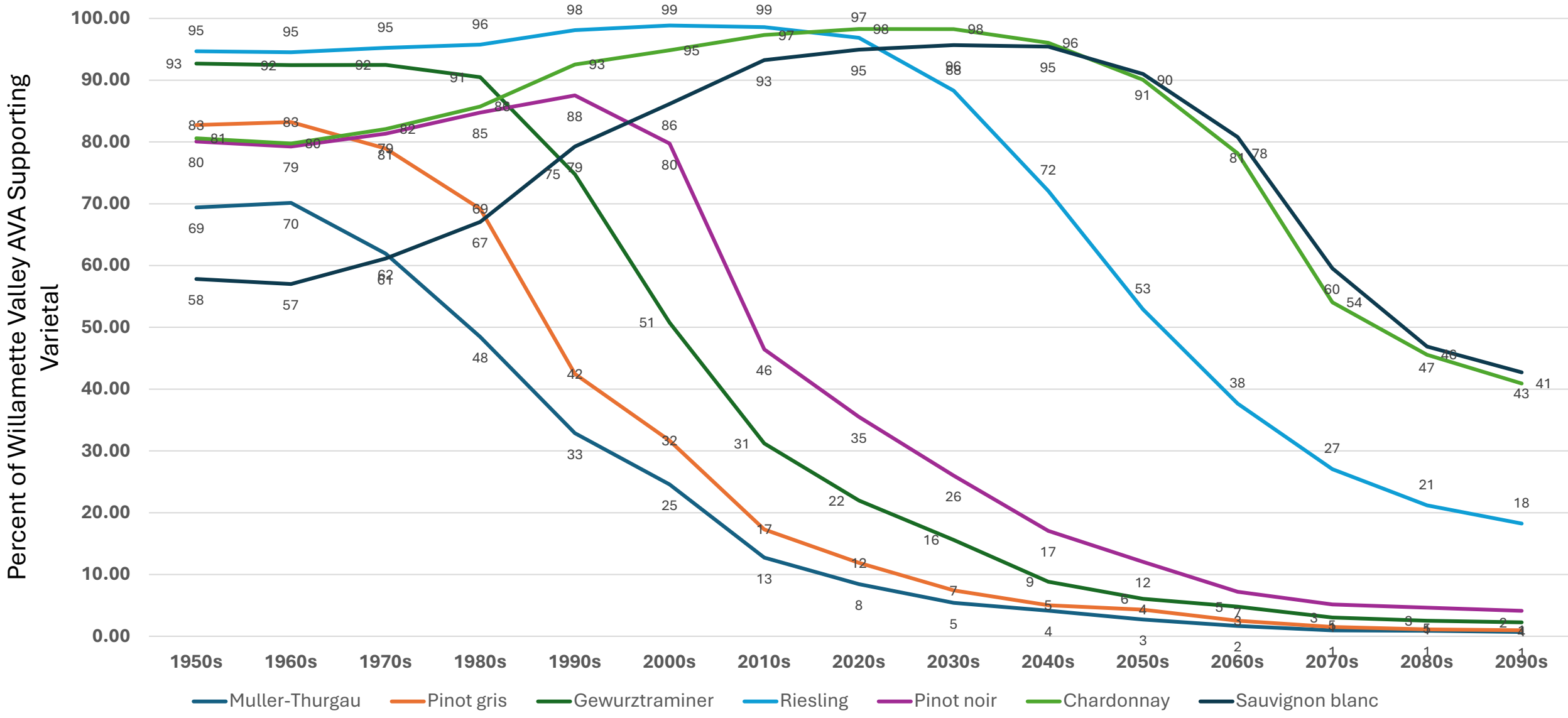
01=2006-2015; 02=2007-2016; 03=2008-2017; 04=2009-2018; 05=2010-2019
06=2011-2020; 07=2012-2021; 08=2013-2022; 09=2014-2023; 10=2015-2024

GST Projections for the WV AVA

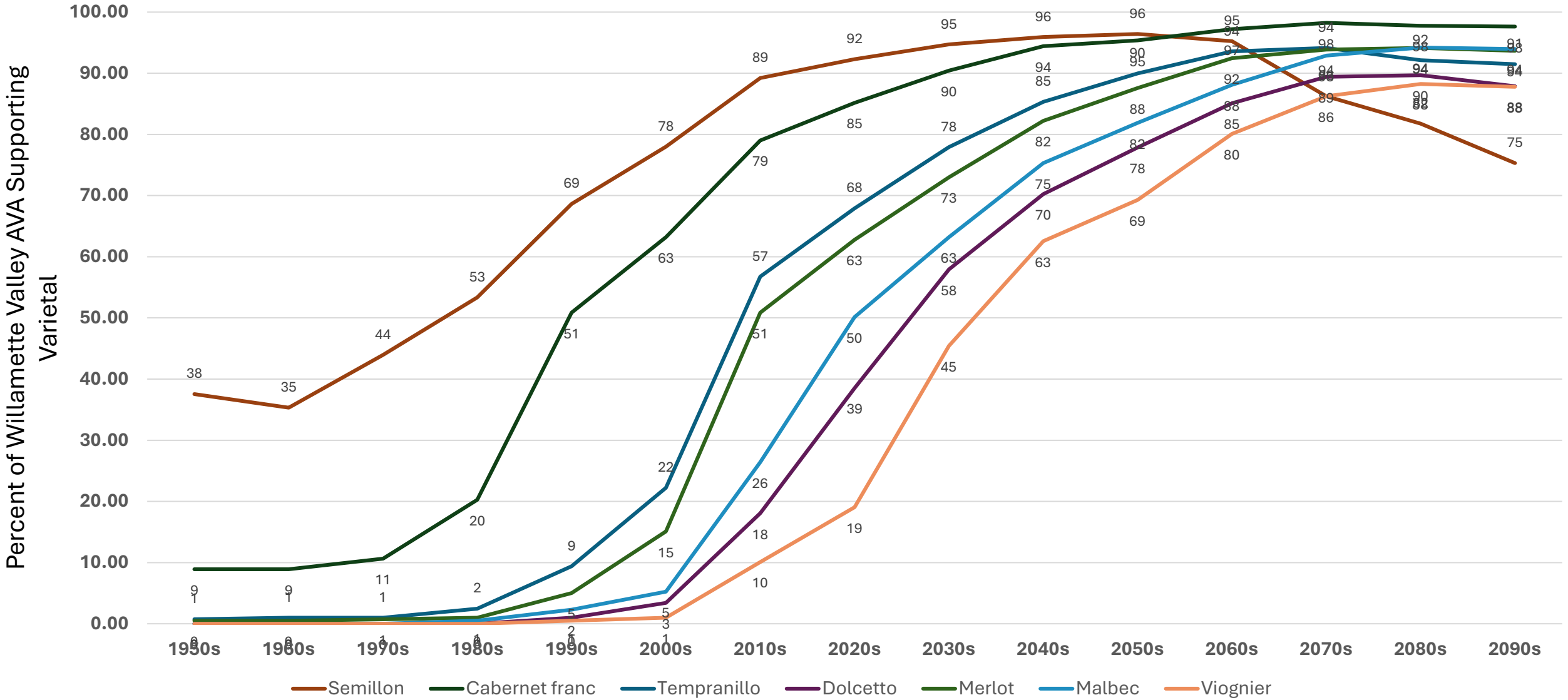


GST	
Class interval (°C)	Class of viticulture climate
< 13	Too cool
13-15	Cool
15-17	Intermediate
17-19	Warm
19-21	Hot
21-24	Very hot
> 24	Too hot

Reclassified GST Projections for the WV AVA



Reclassified GST Projections for the WV AVA



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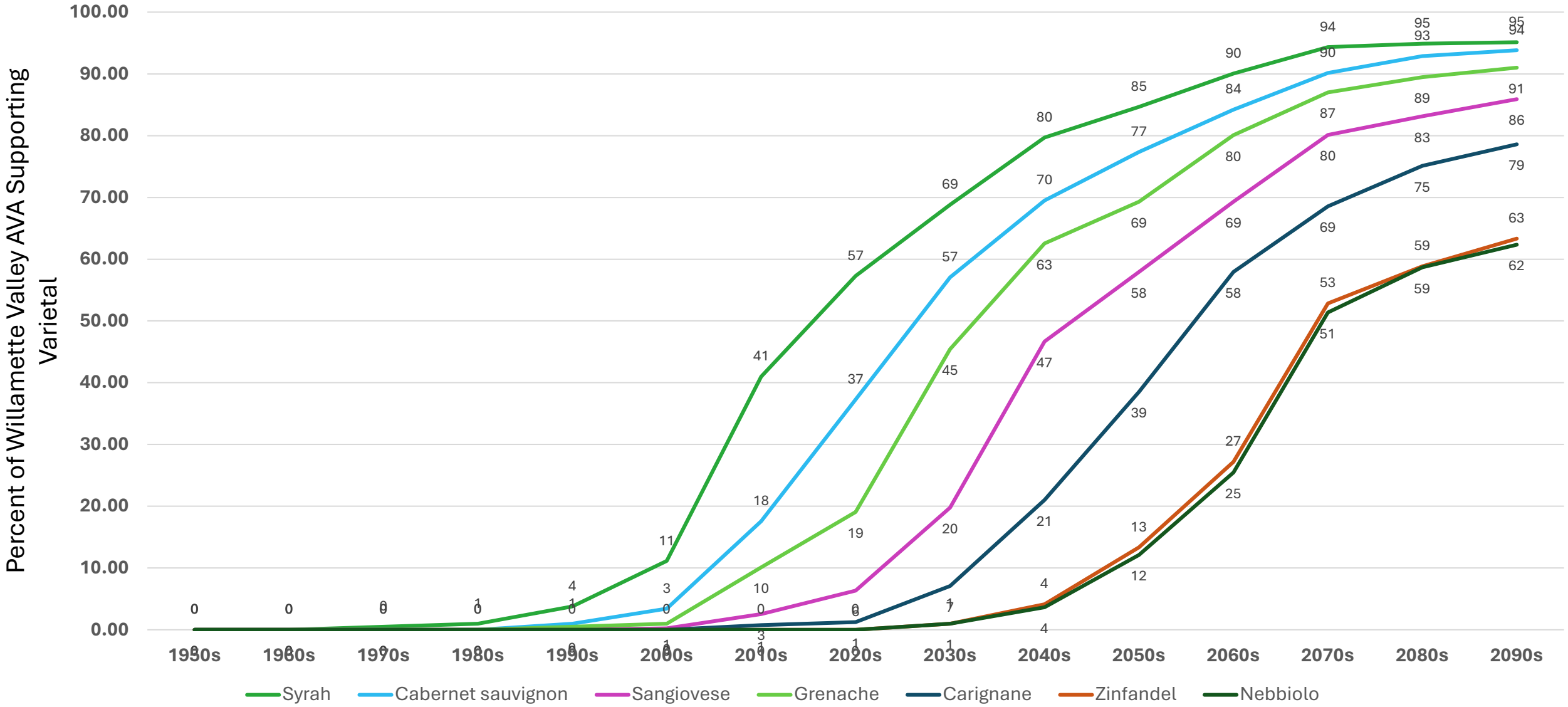
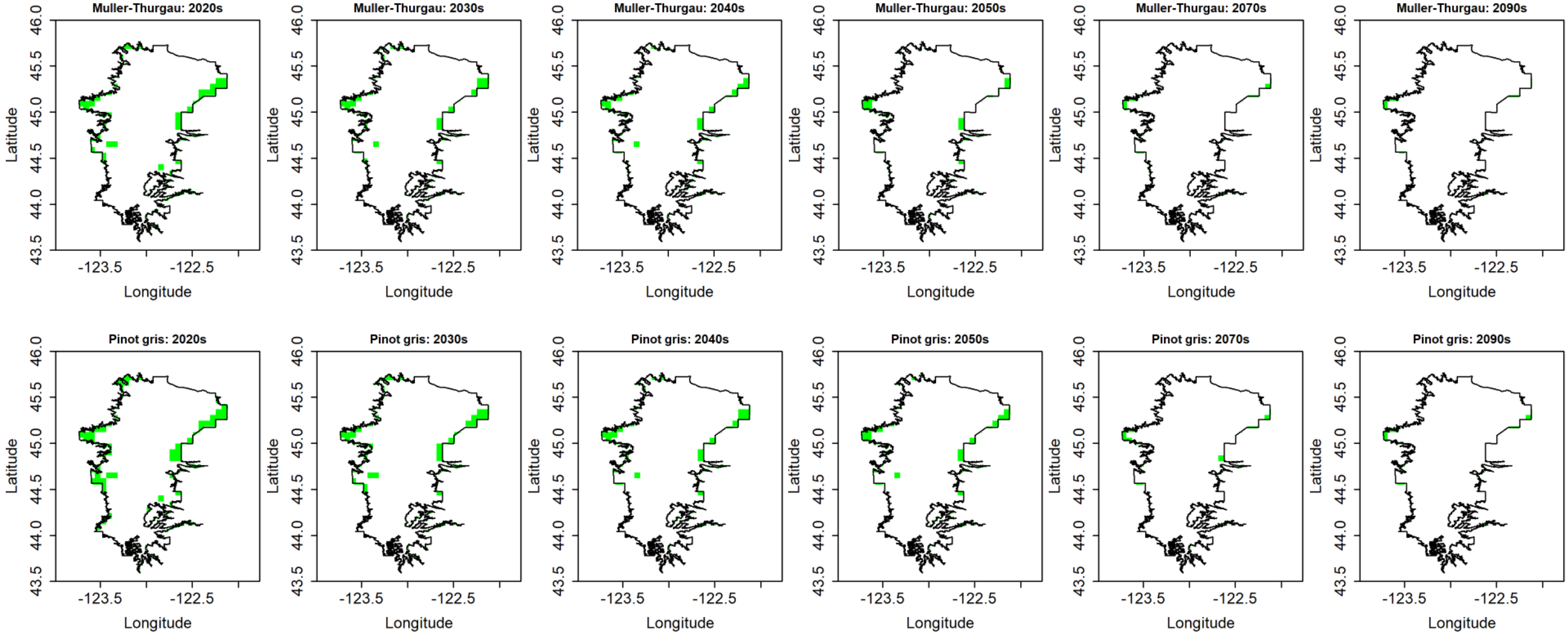


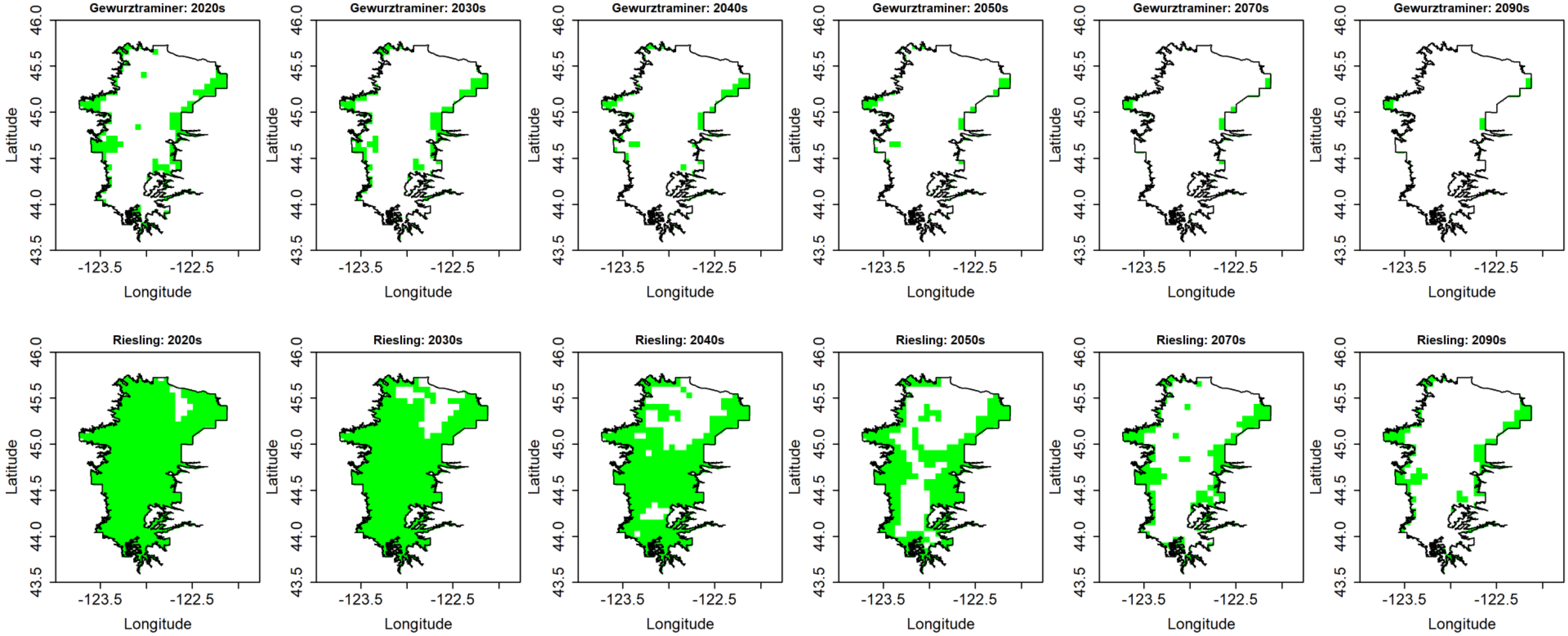
Observations from the Climate Projections

- Chardonnay, Semillon, Sauvignon blanc, Riesling, and Cabernet franc had the largest footprints across all 15 decades
- Cabernet franc, Semillon, Tempranillo, Merlot, and Syrah had the largest footprints from the 2020s – 2090s
- Chardonnay, Sauvignon blanc, Riesling, Semillon, and Cabernet franc had the largest footprints from the 2000s – 2040s
- Cabernet franc, Merlot, Tempranillo, Syrah, and Malbec had the largest footprints from the 2050s – 2090s

Reclassified GST Projections for the WV AVA



Reclassified GST Projections for the WV AVA



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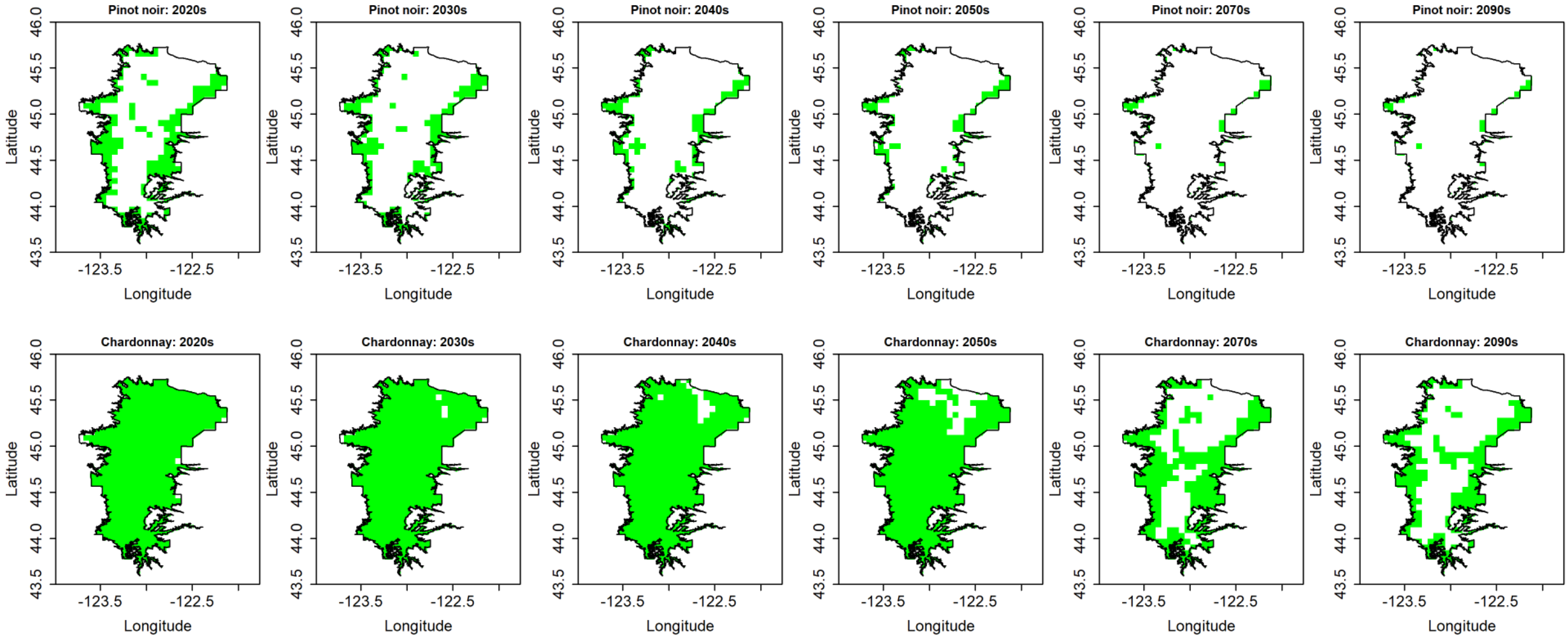

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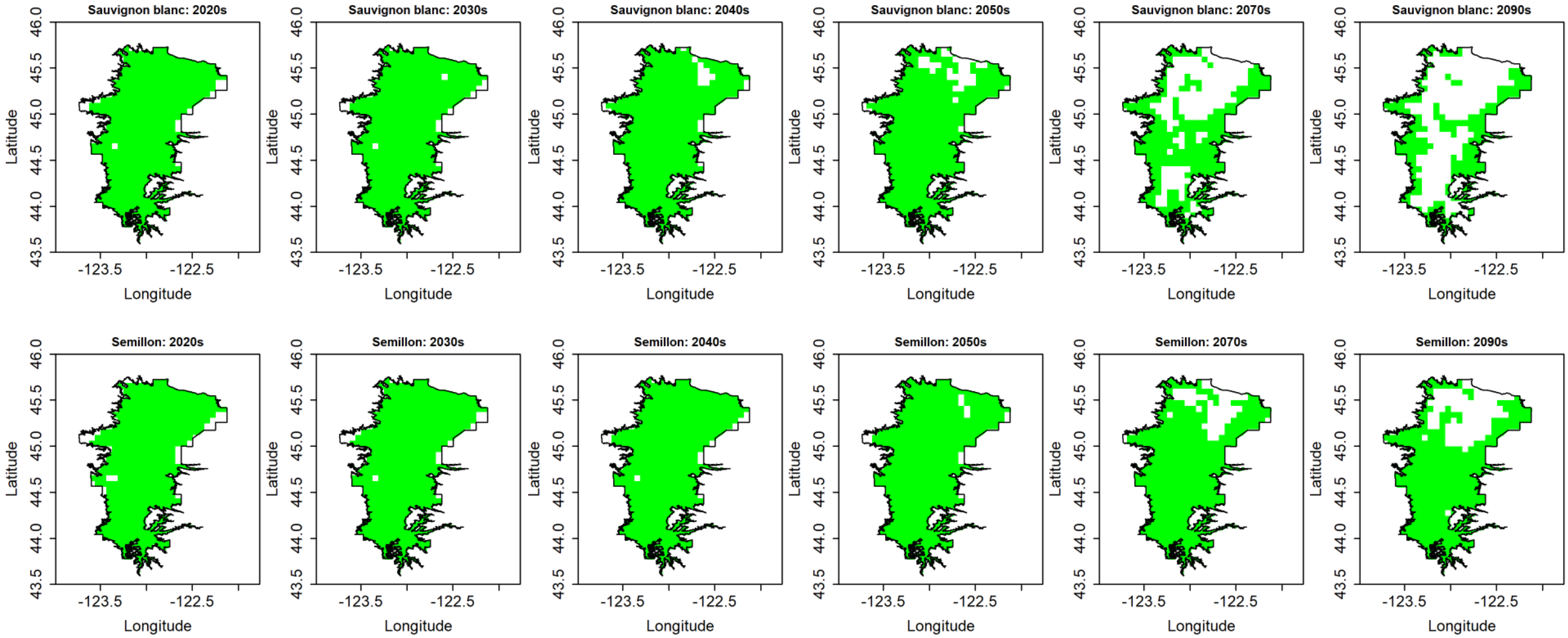

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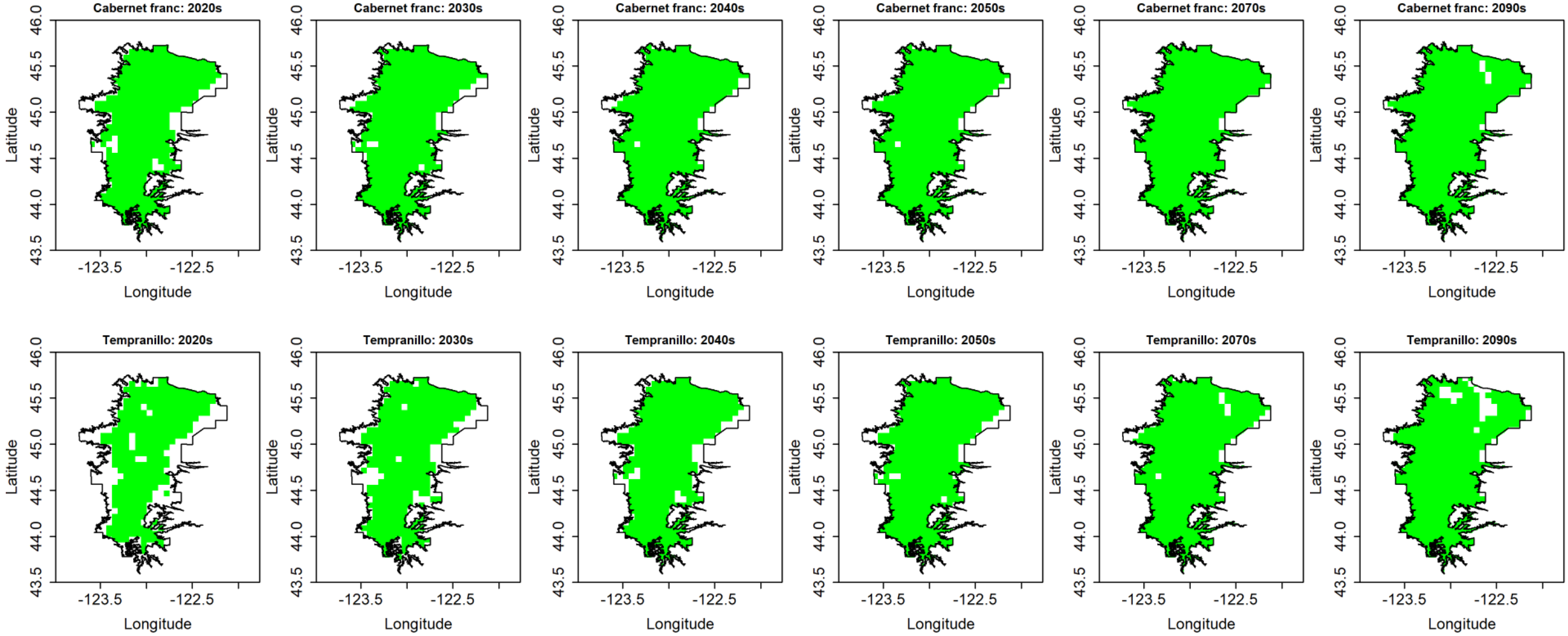

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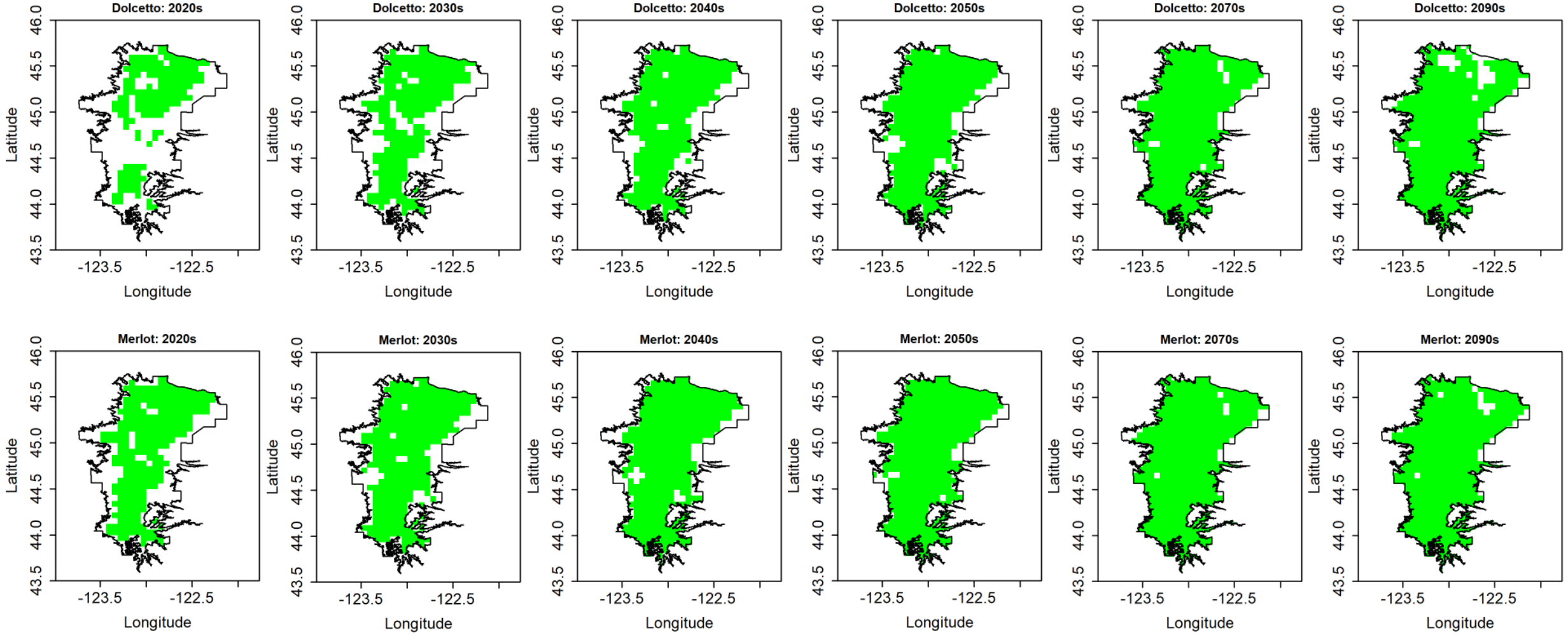

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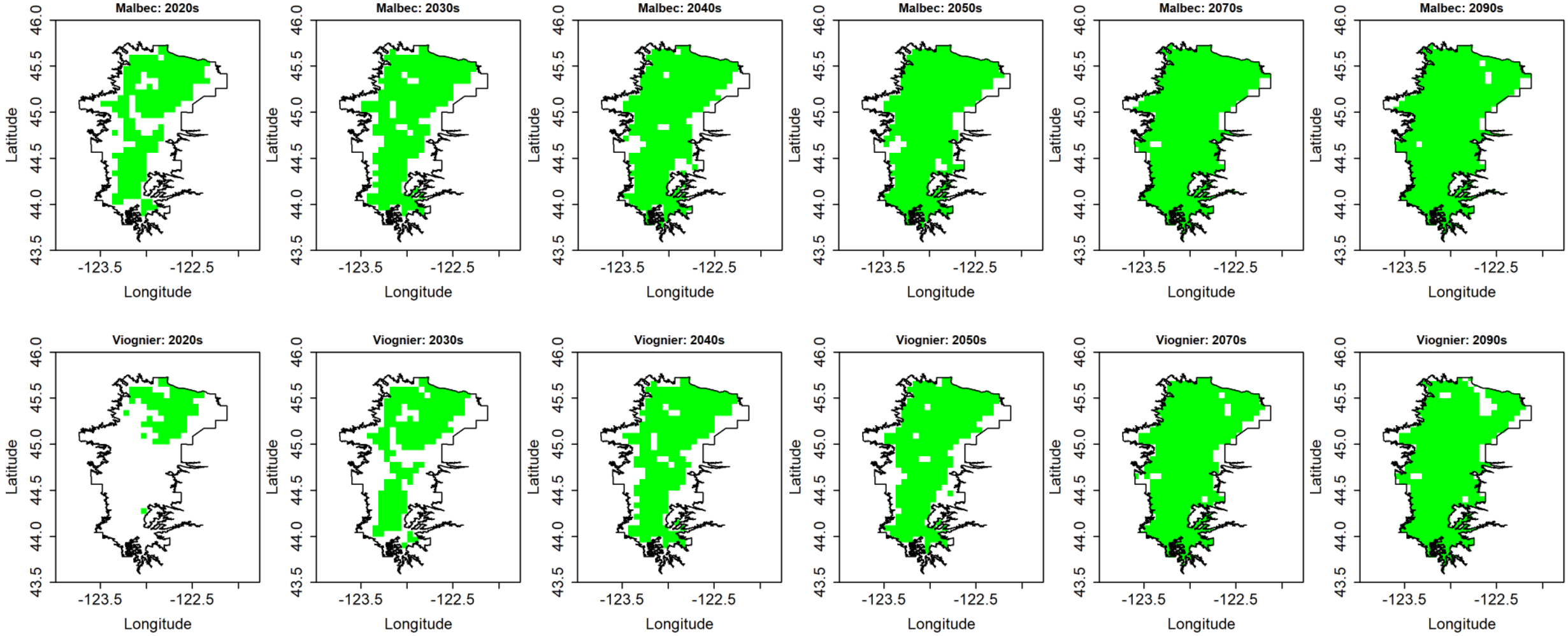

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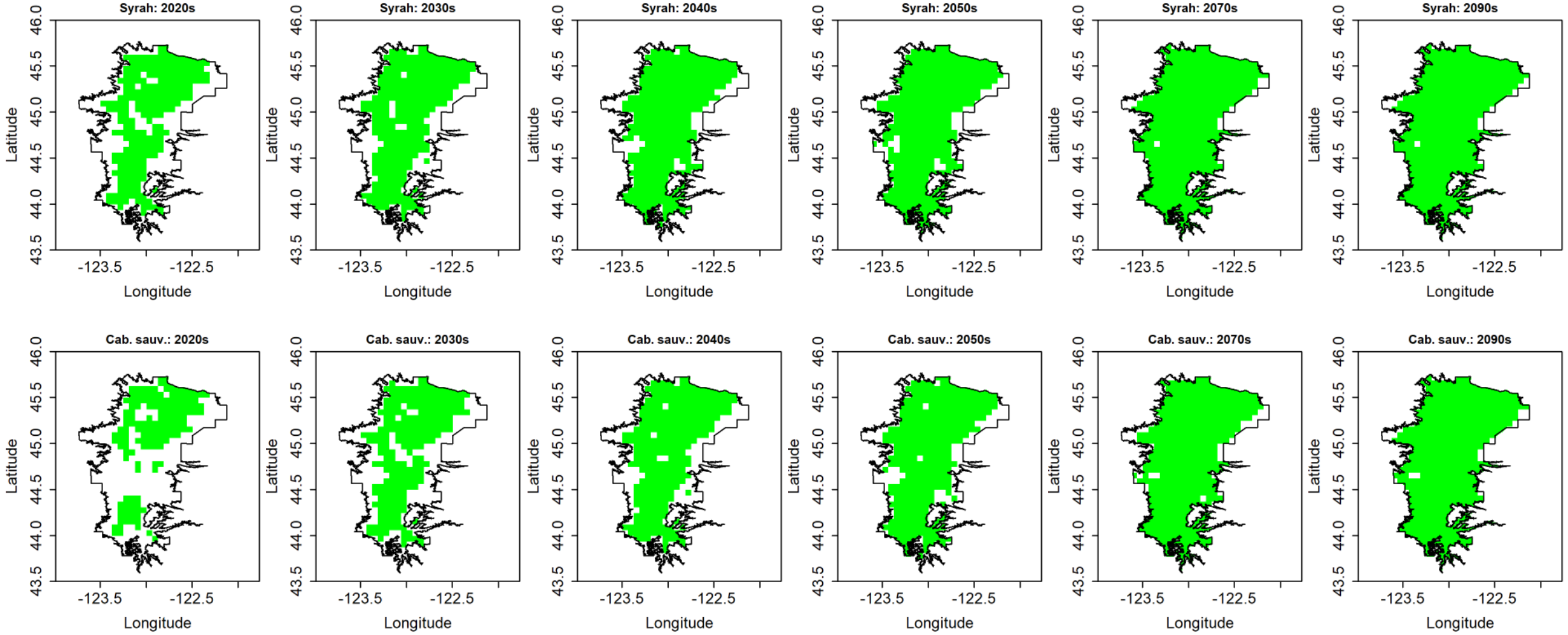

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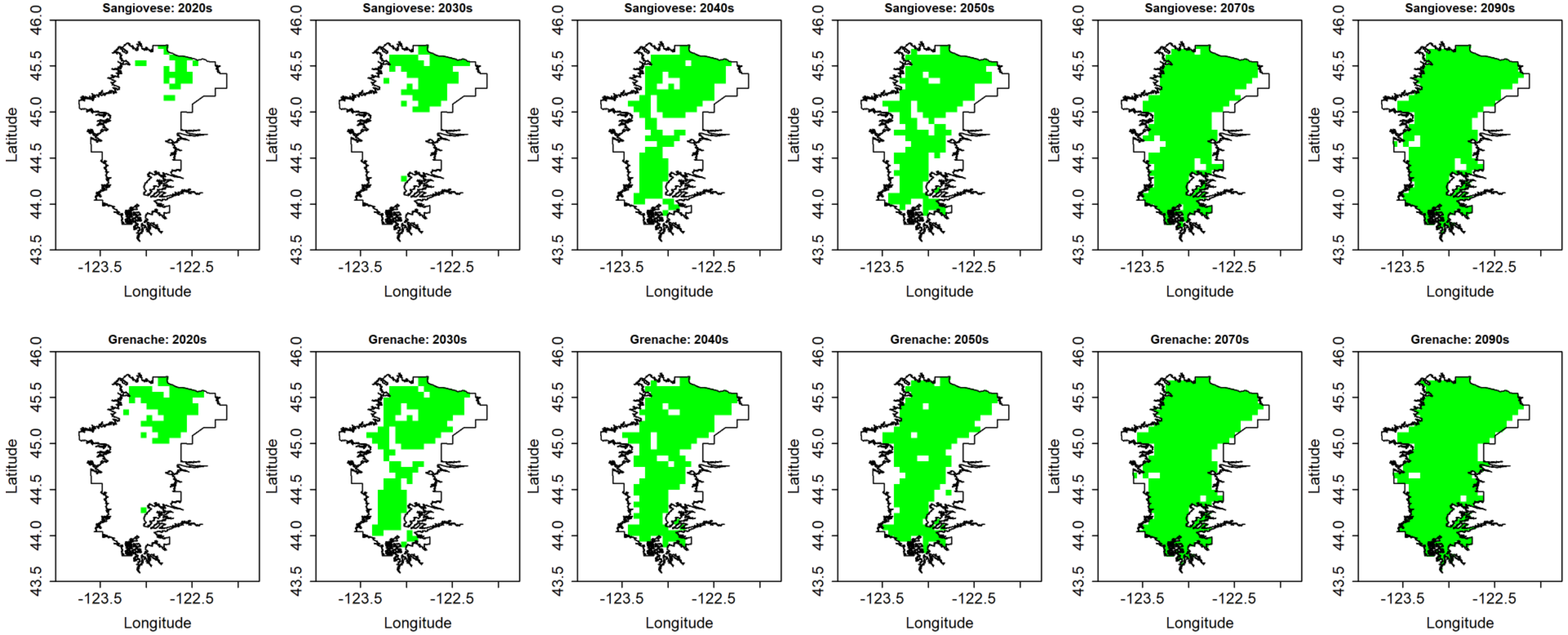

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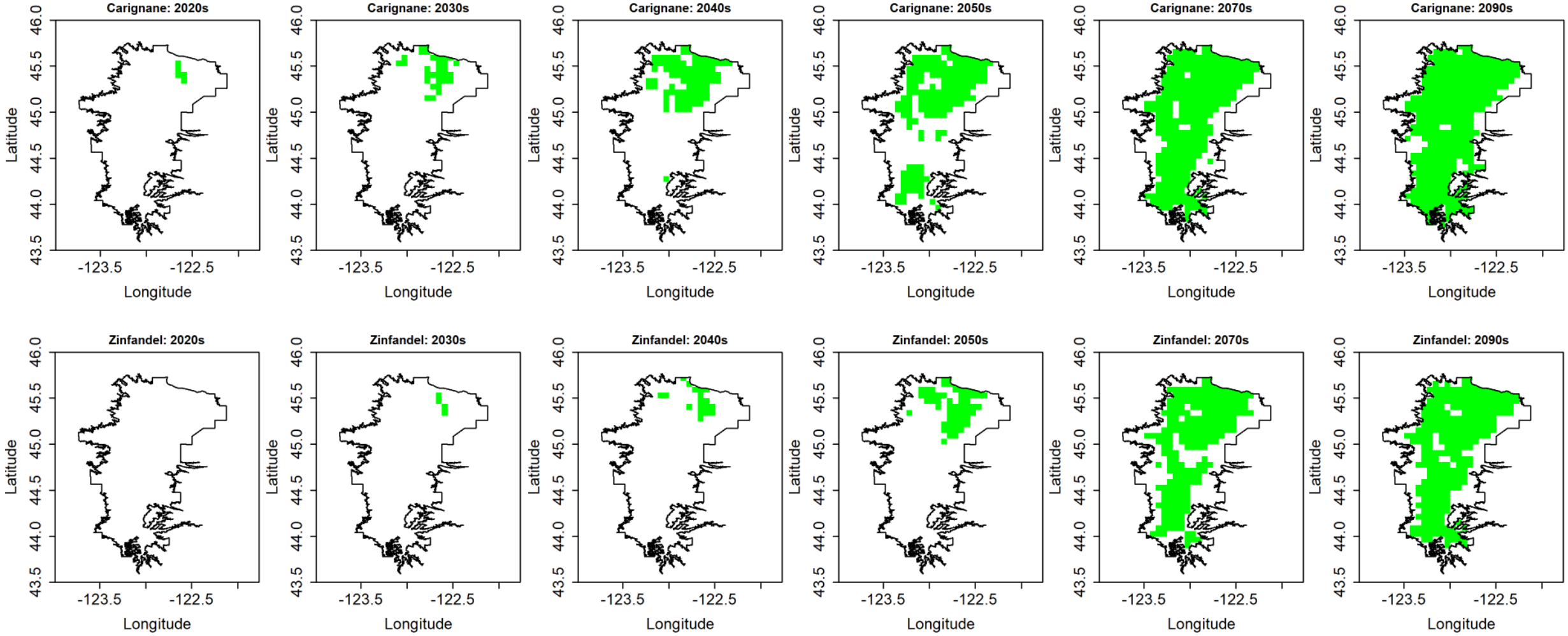

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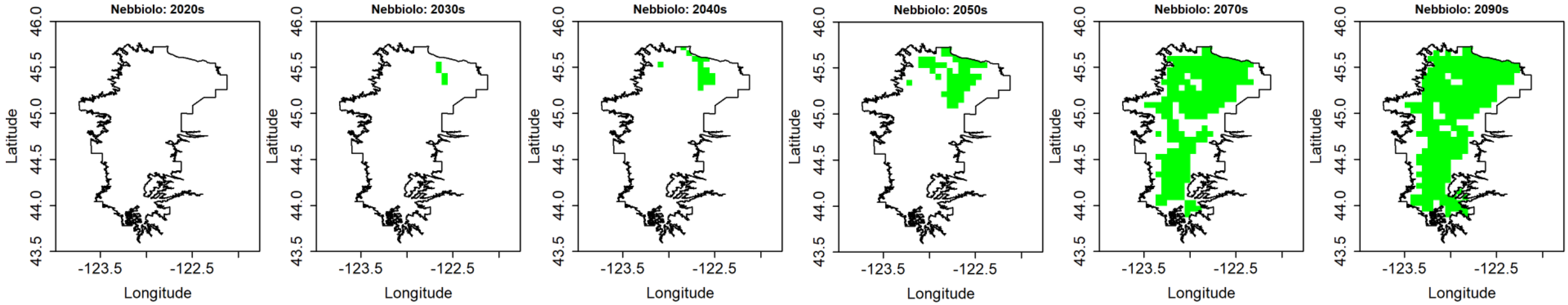
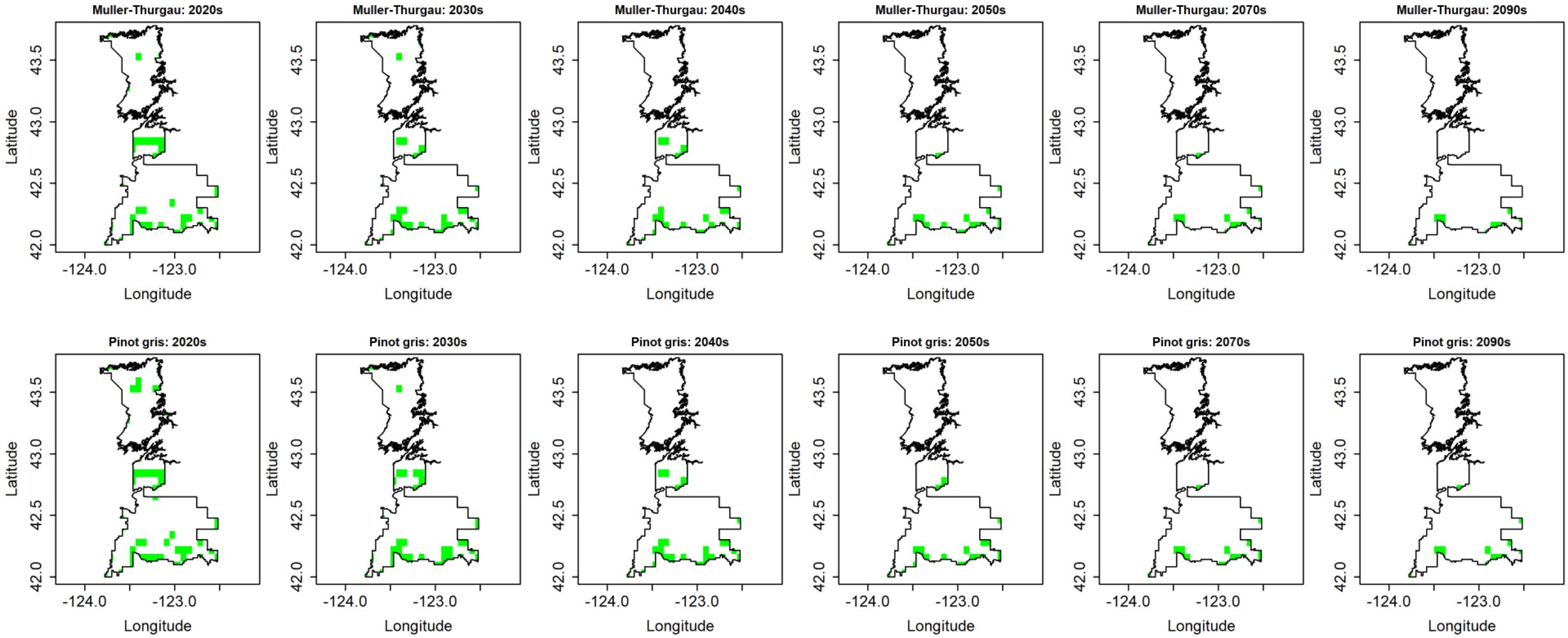


Reclassified GST Projections for the SOR AVA



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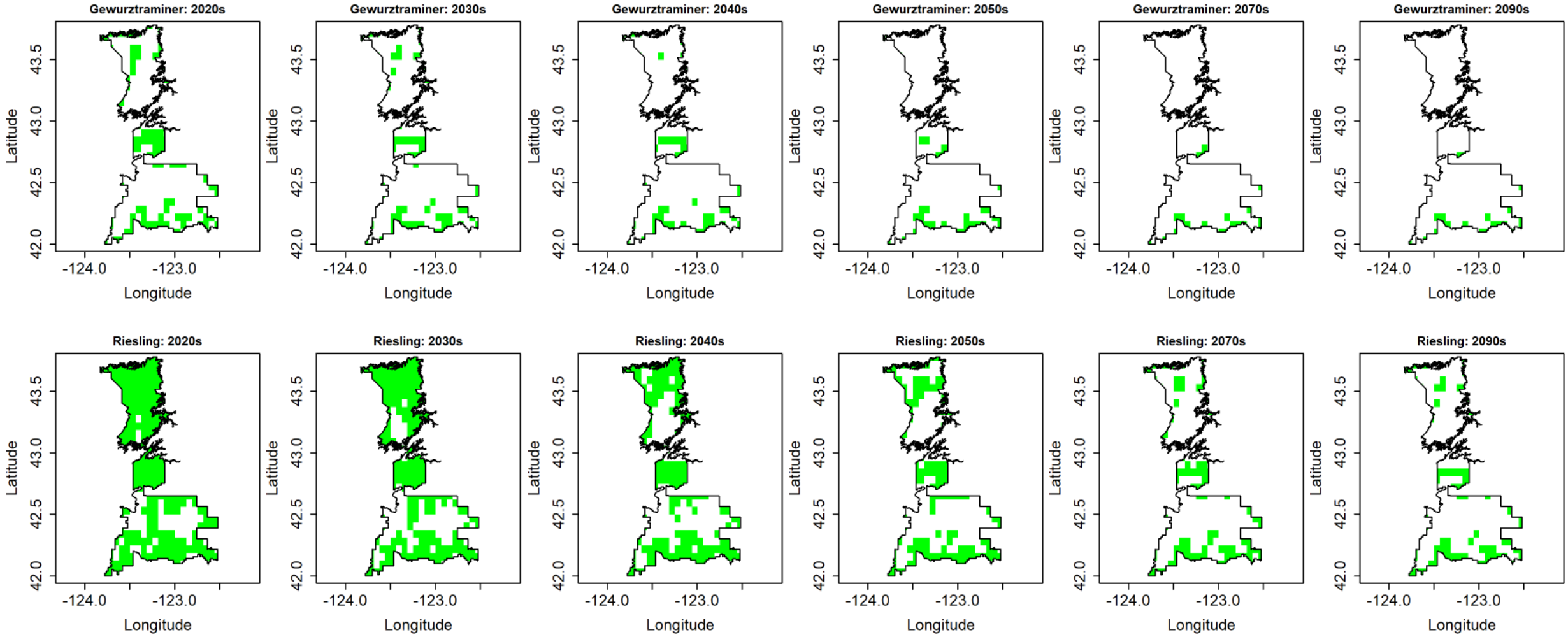

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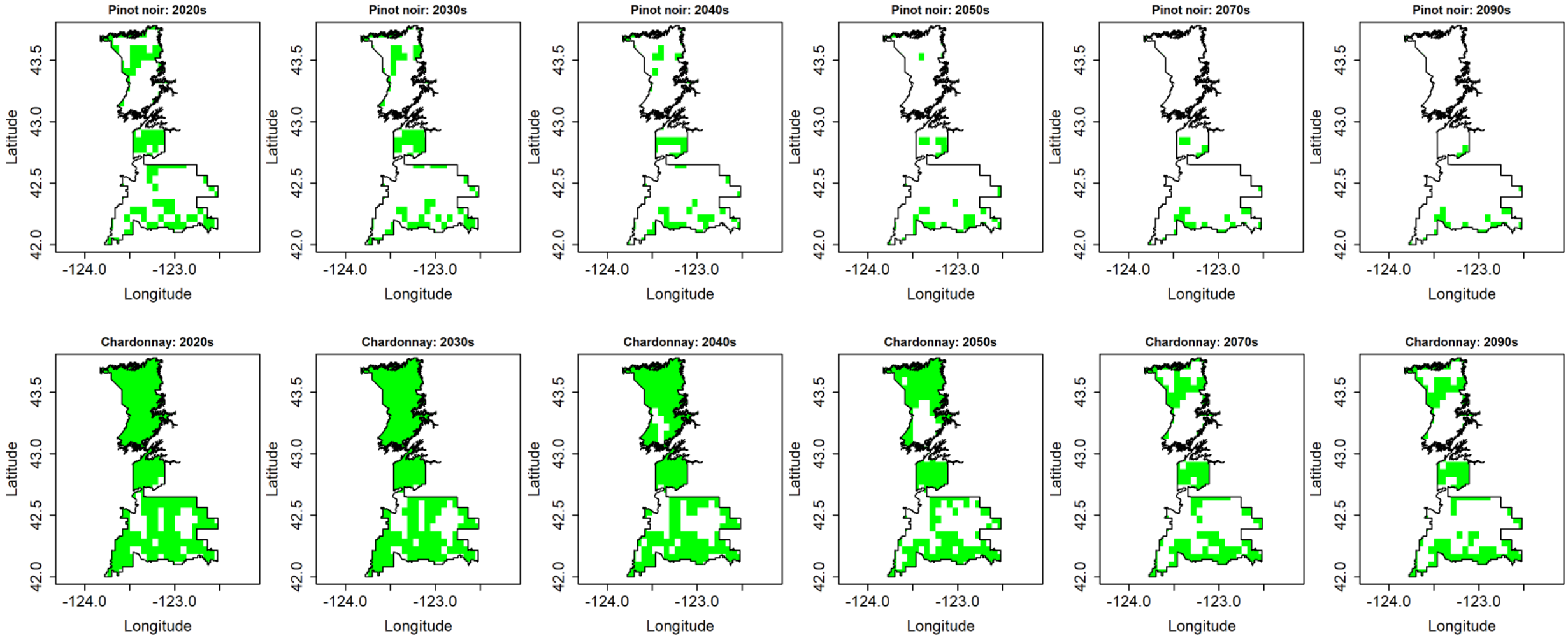

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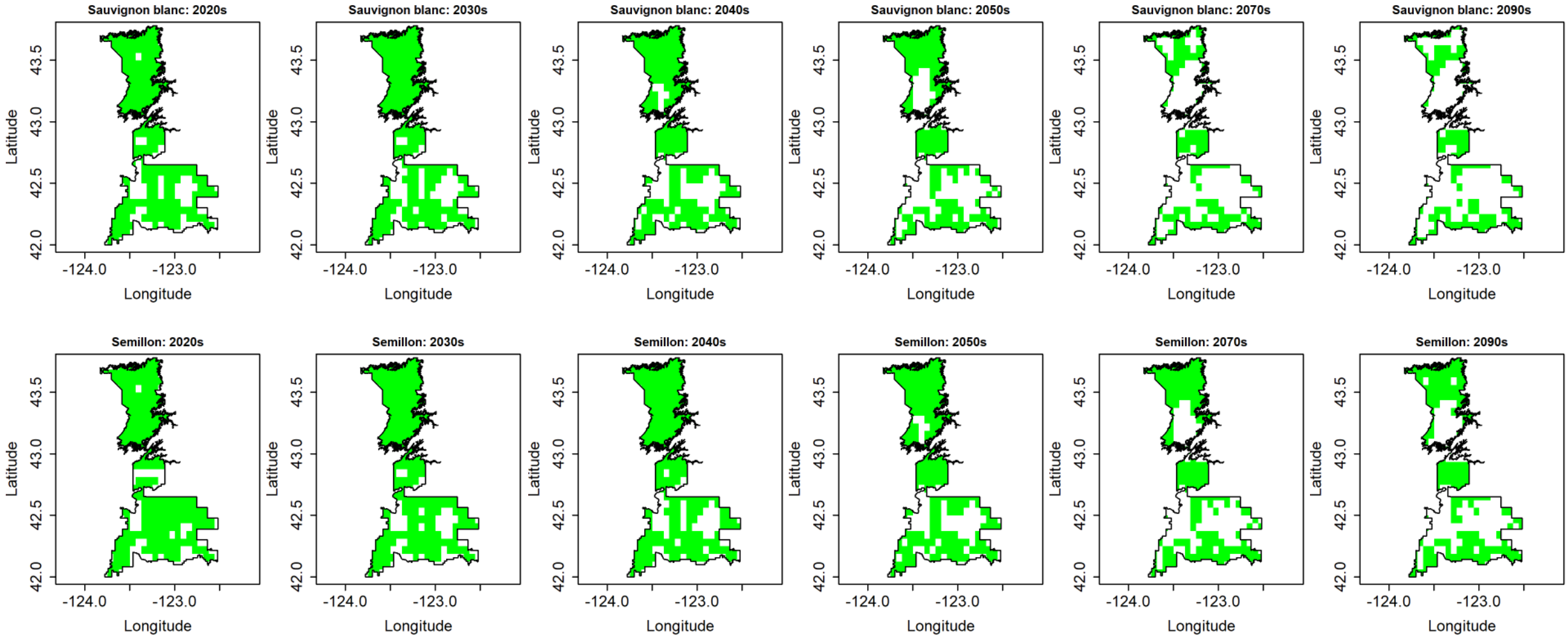

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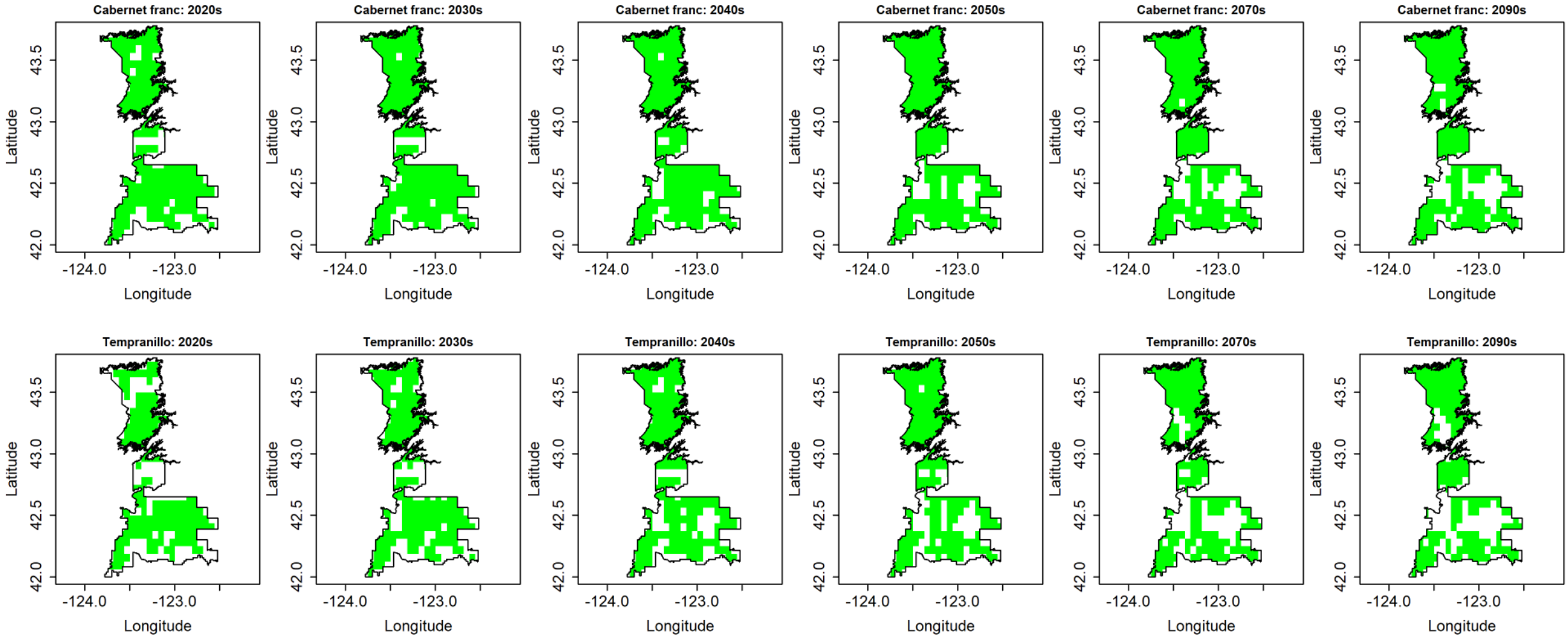

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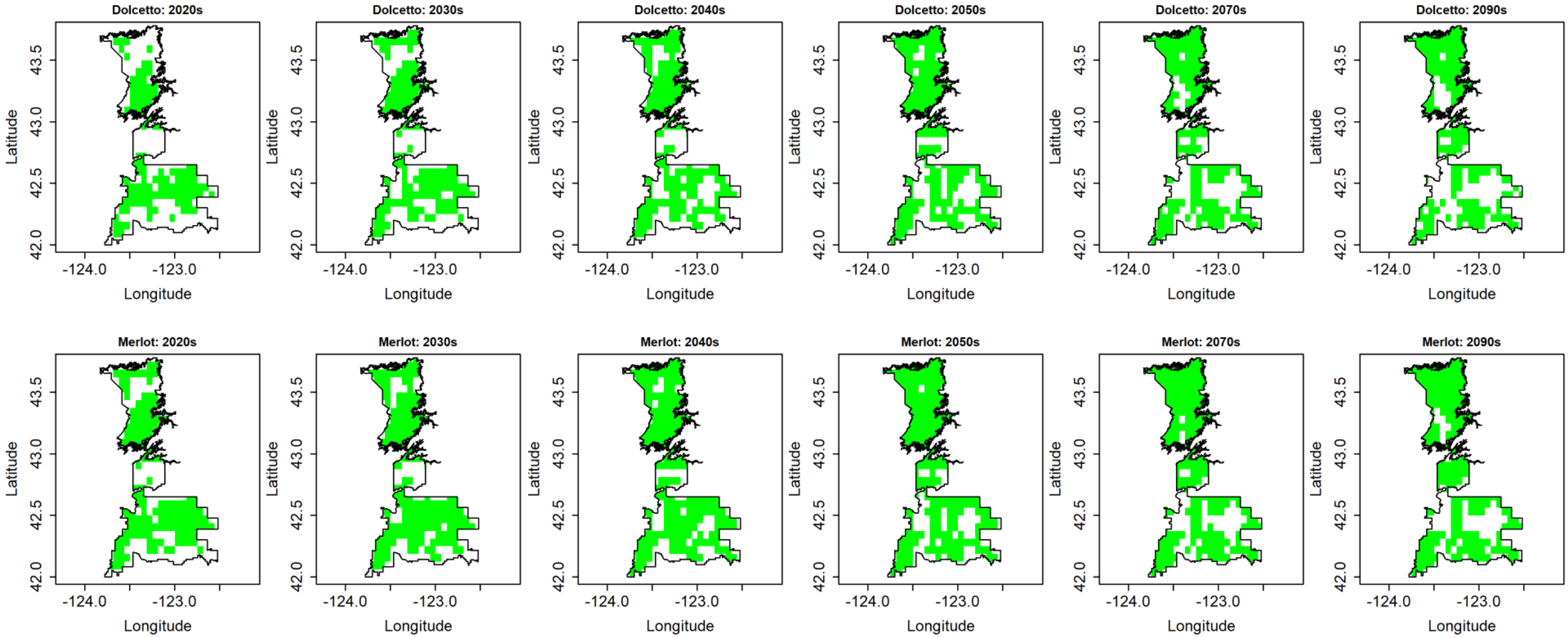

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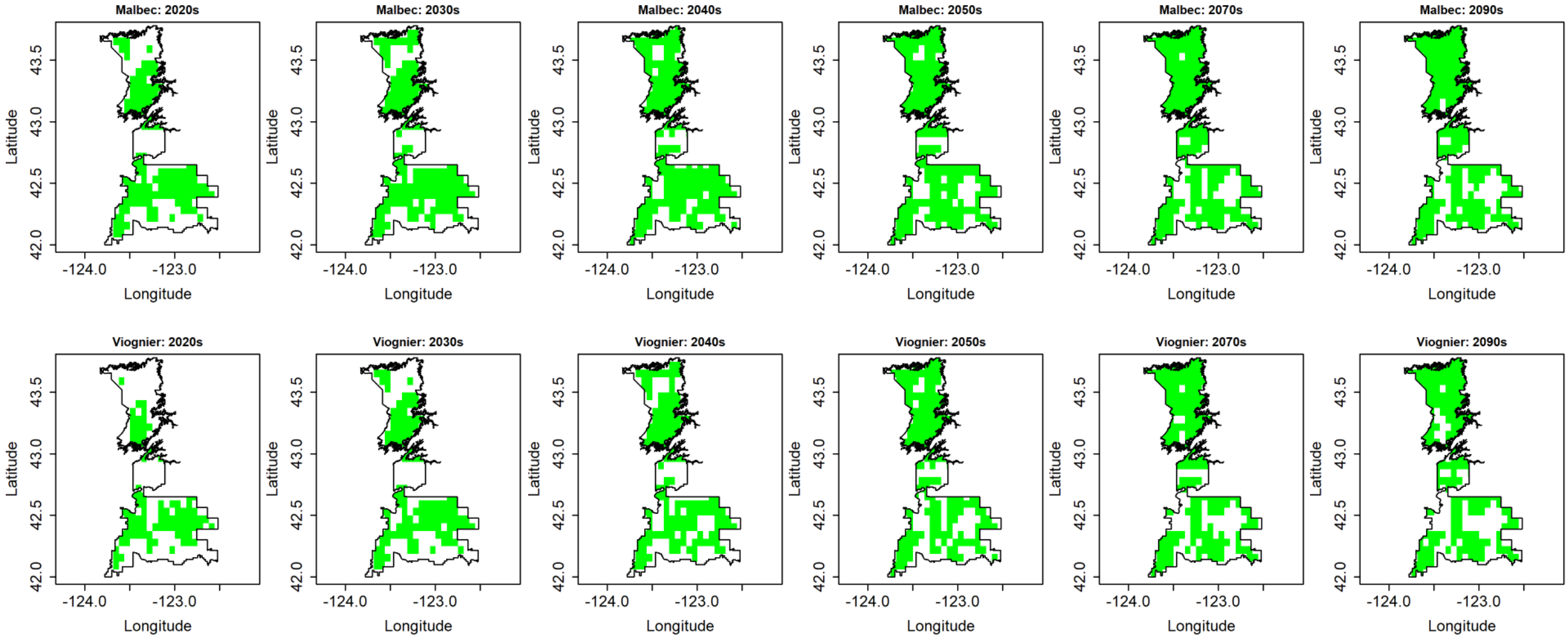

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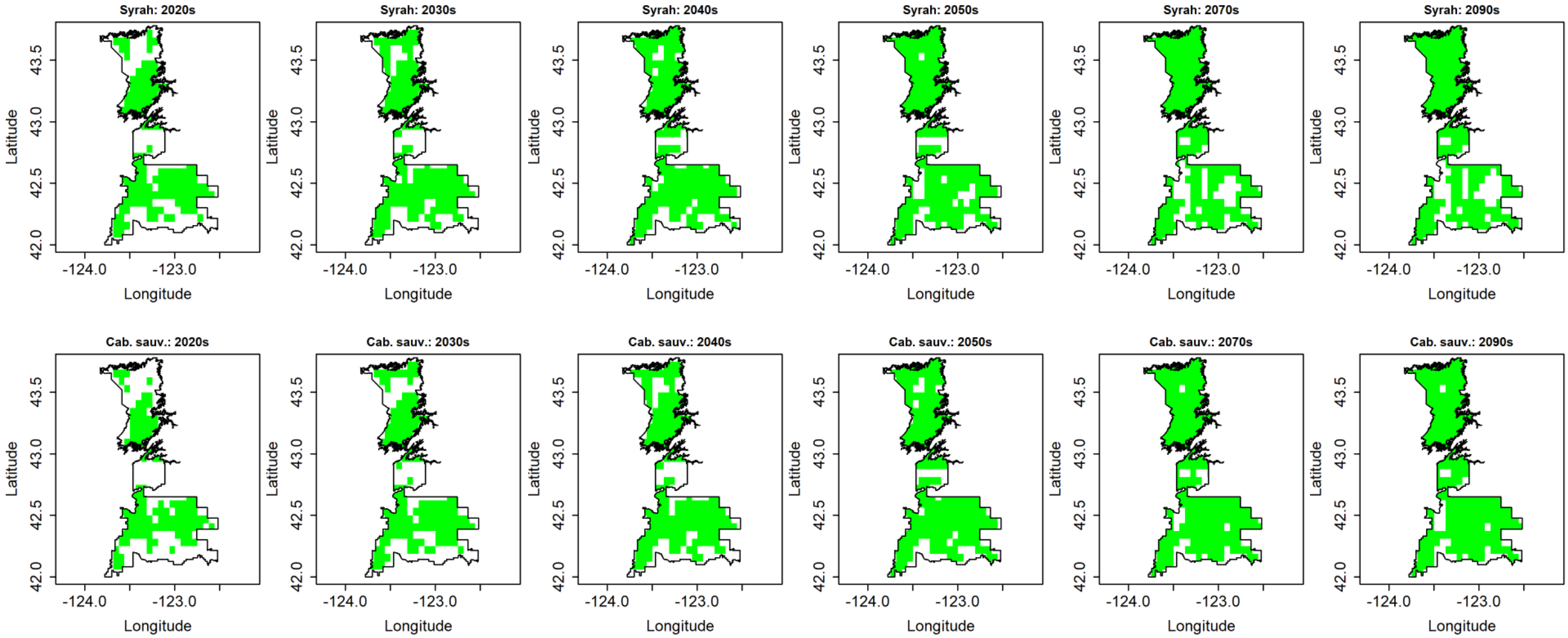

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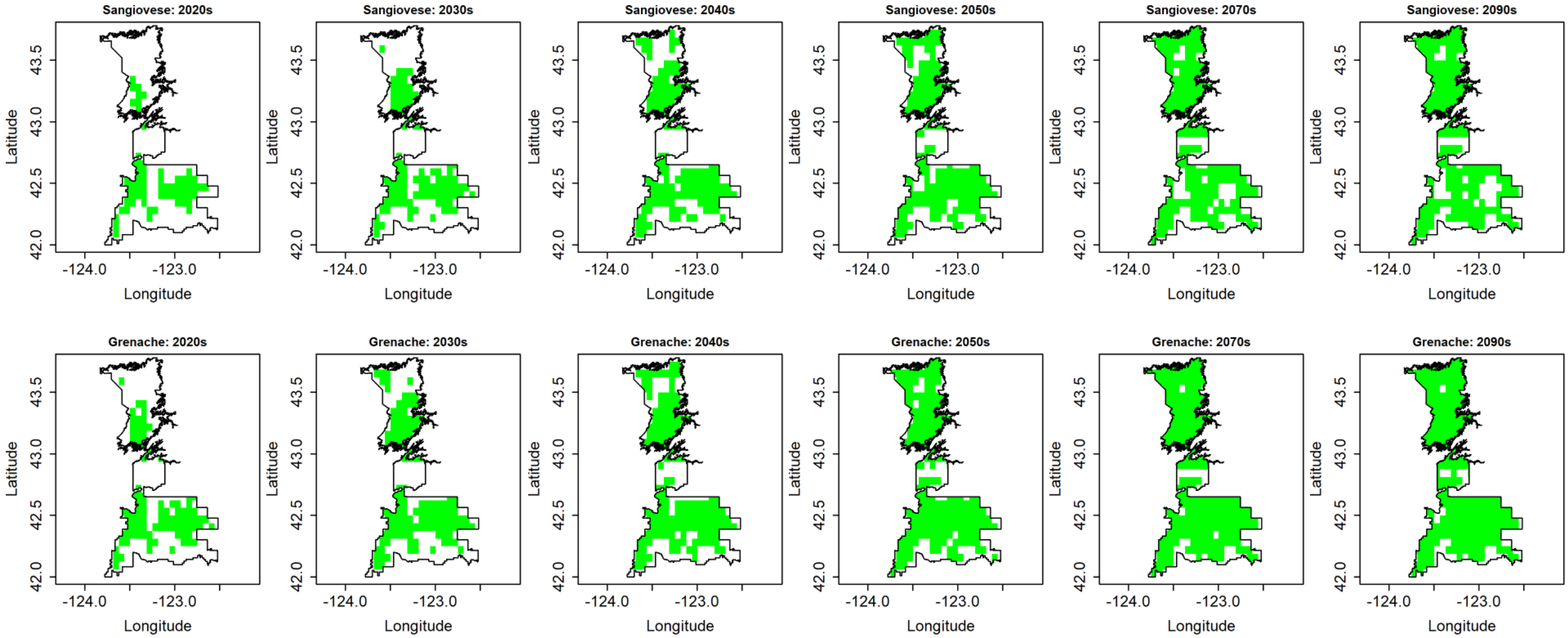

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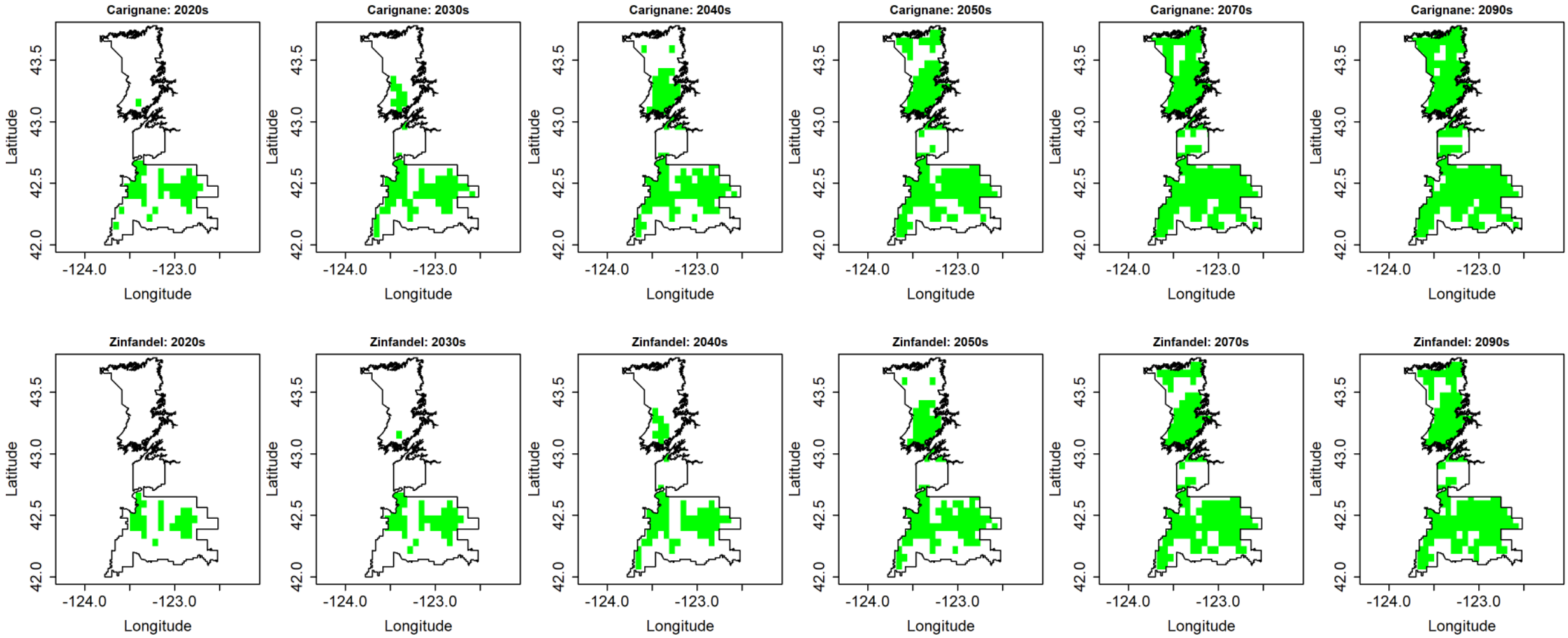

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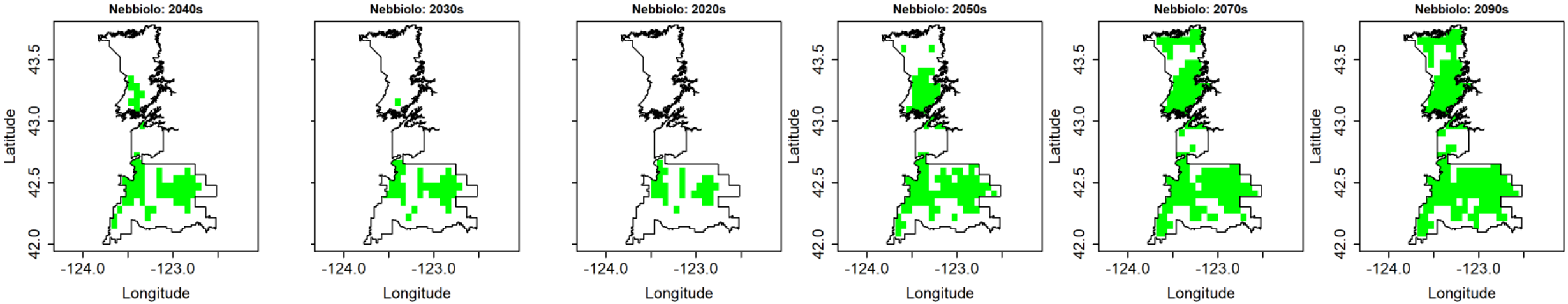
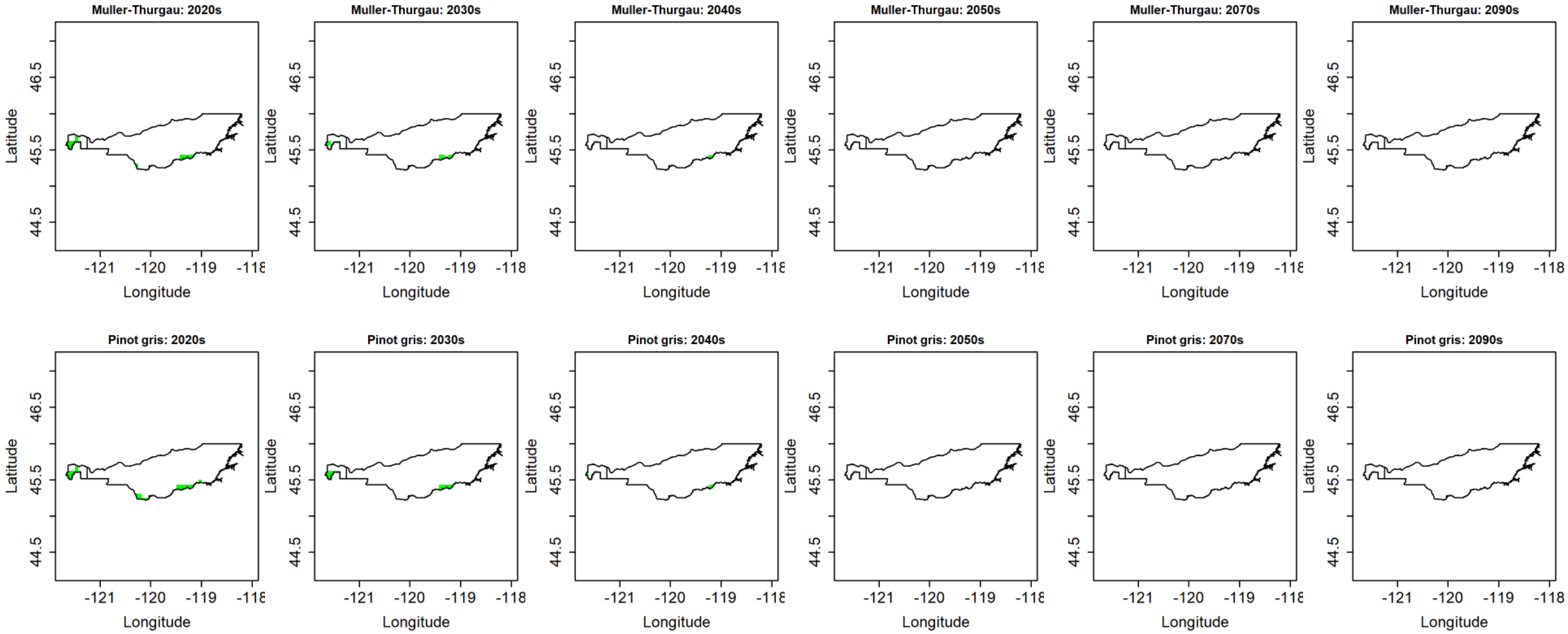


Reclassified Projections for CG & CV AVAs



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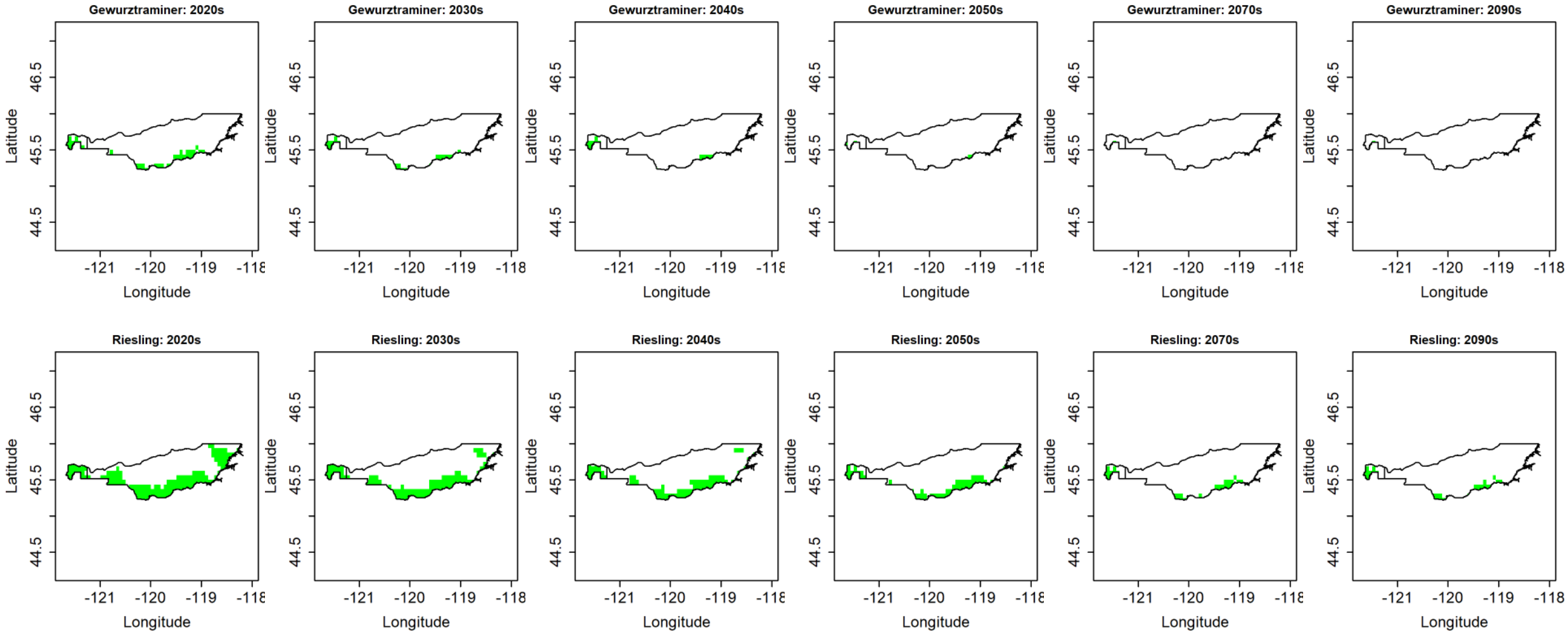

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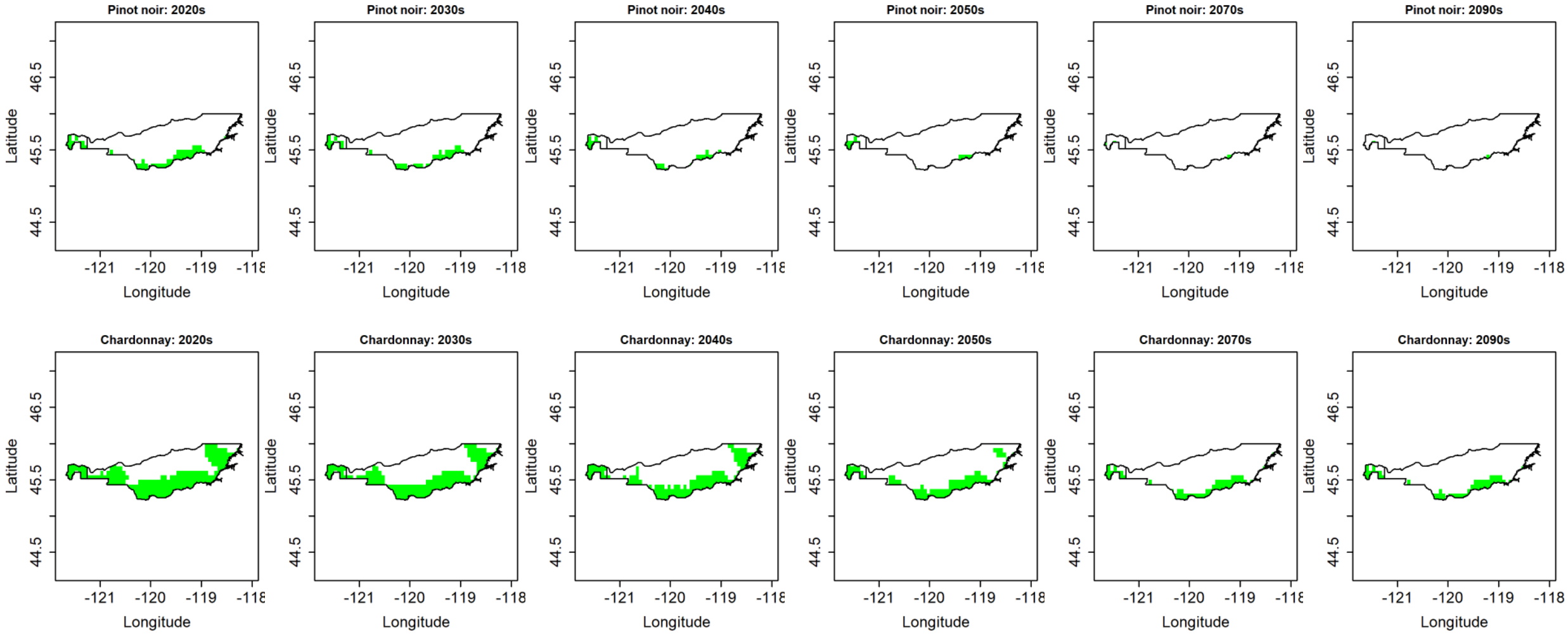
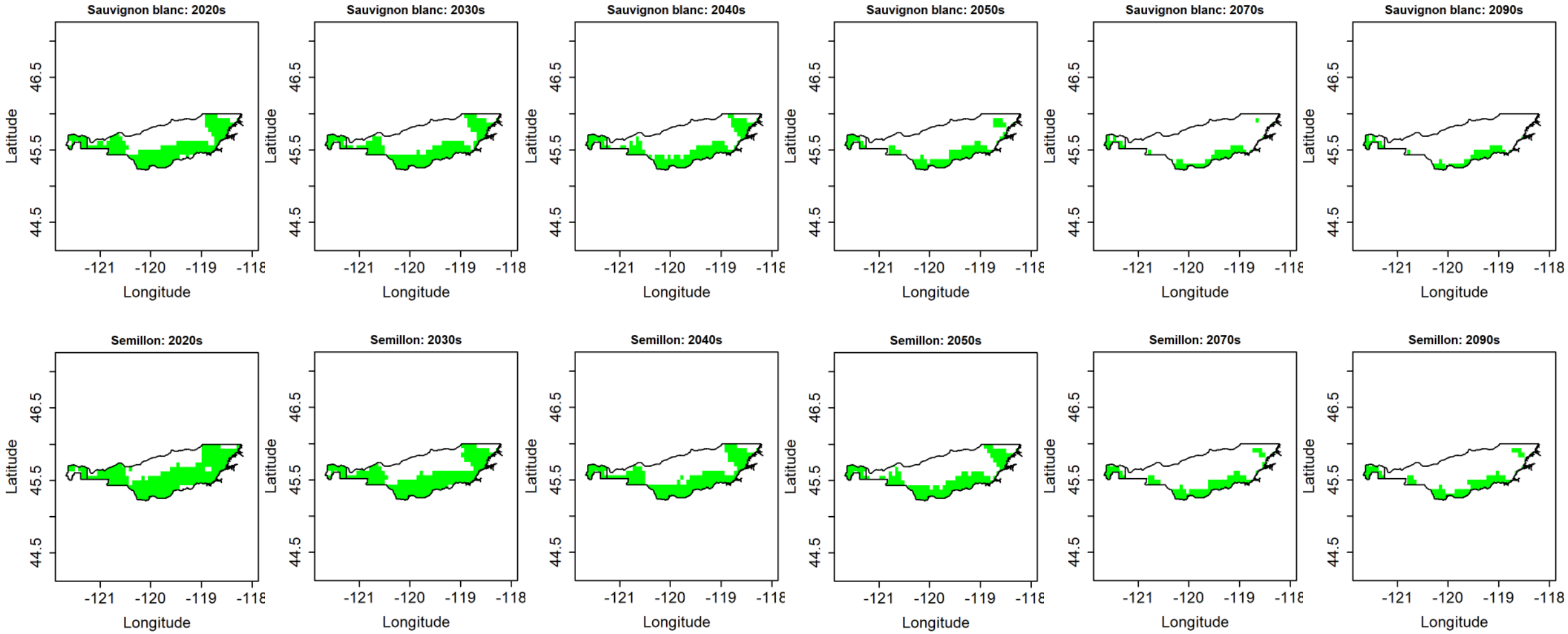


Reclassified Projections for CG & CV AVAs



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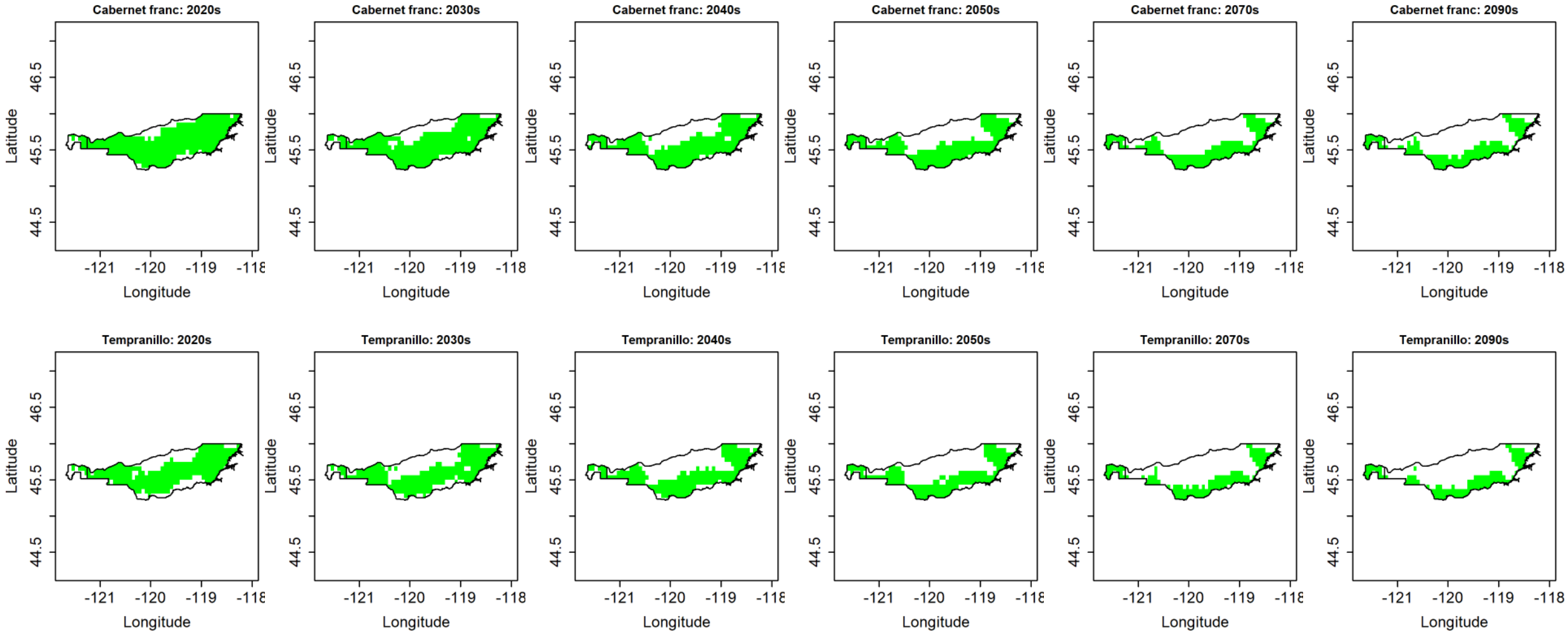

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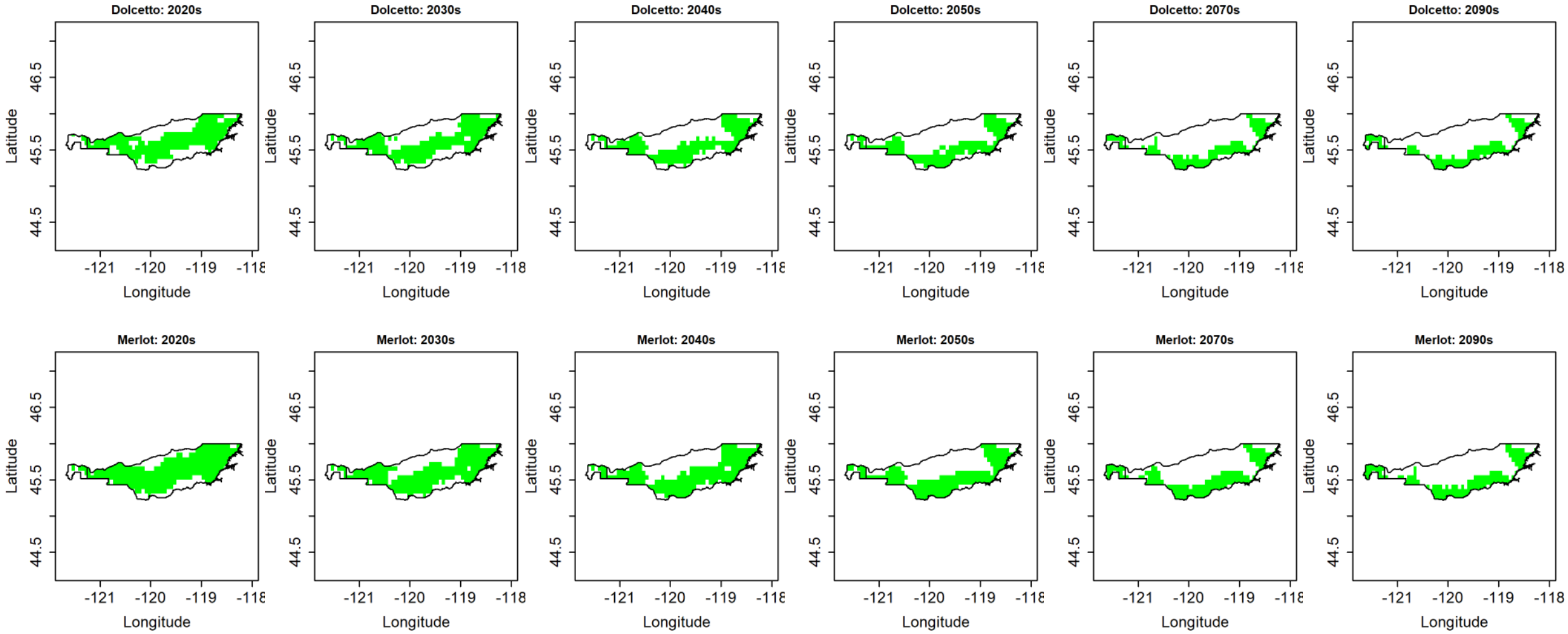

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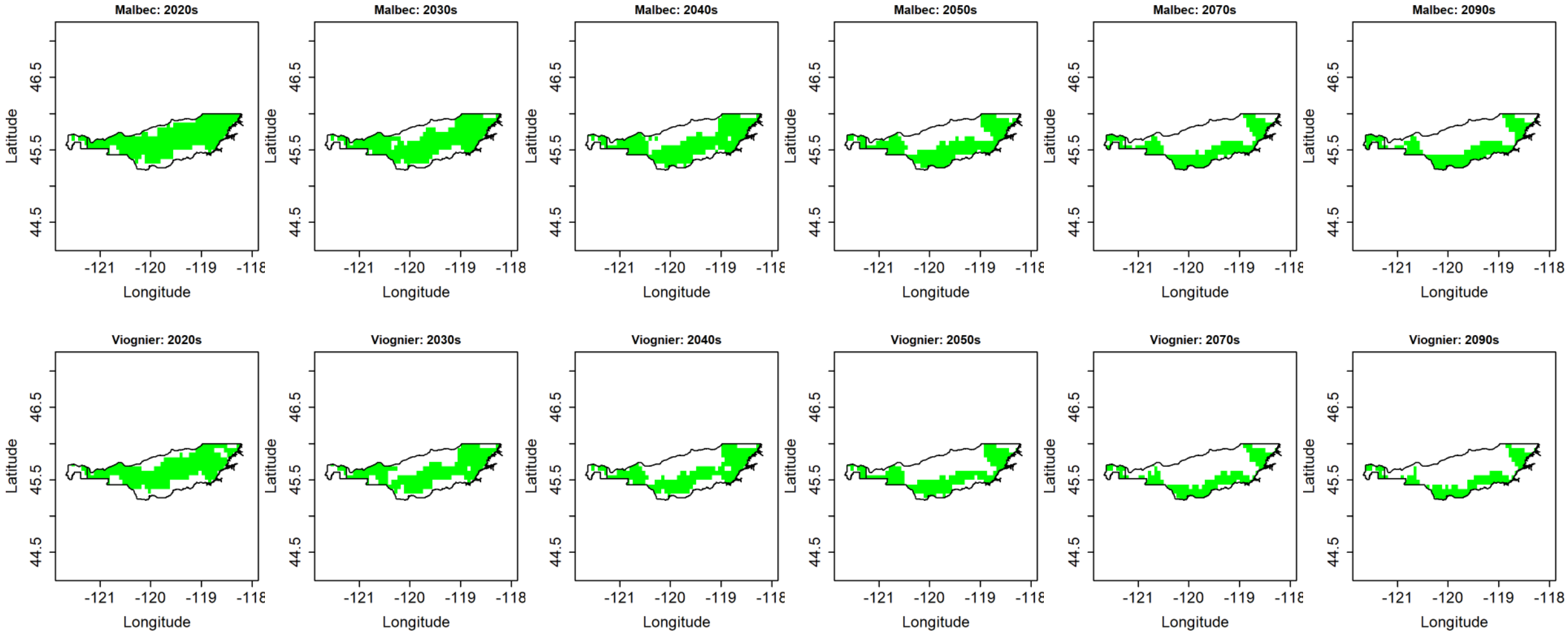

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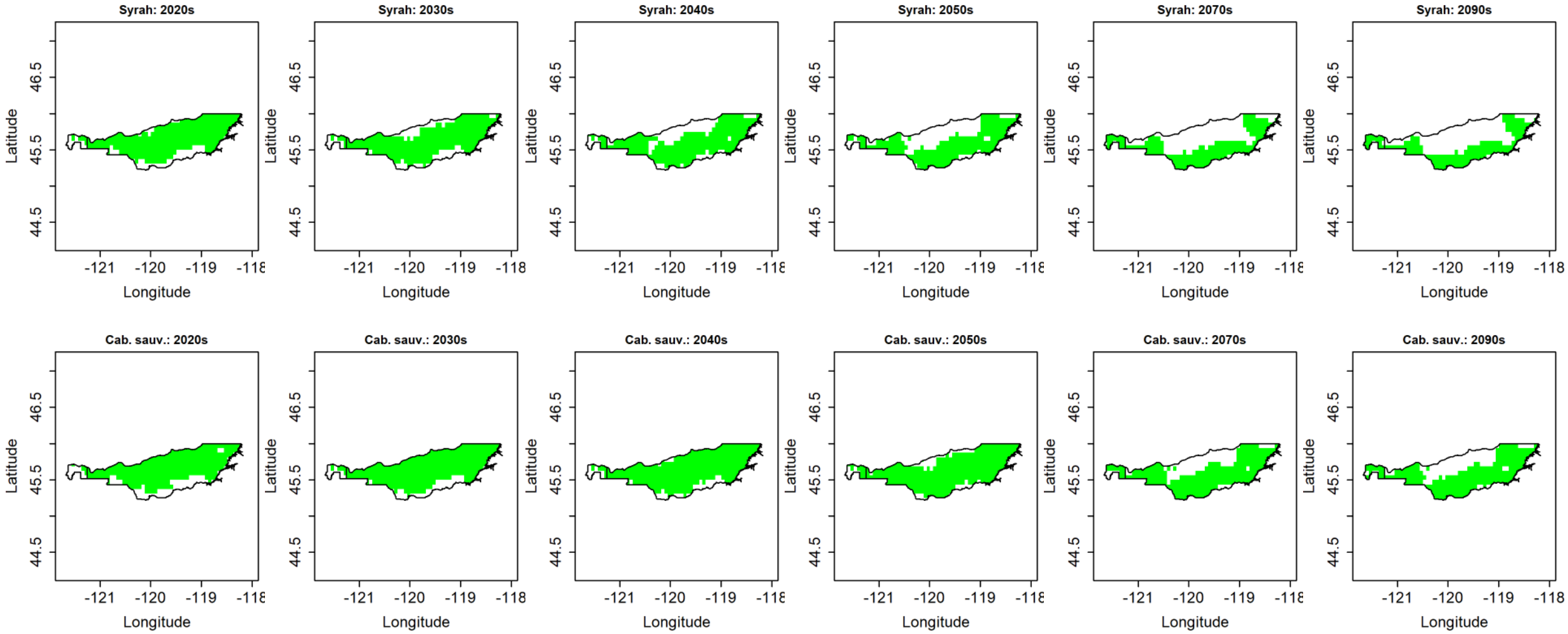

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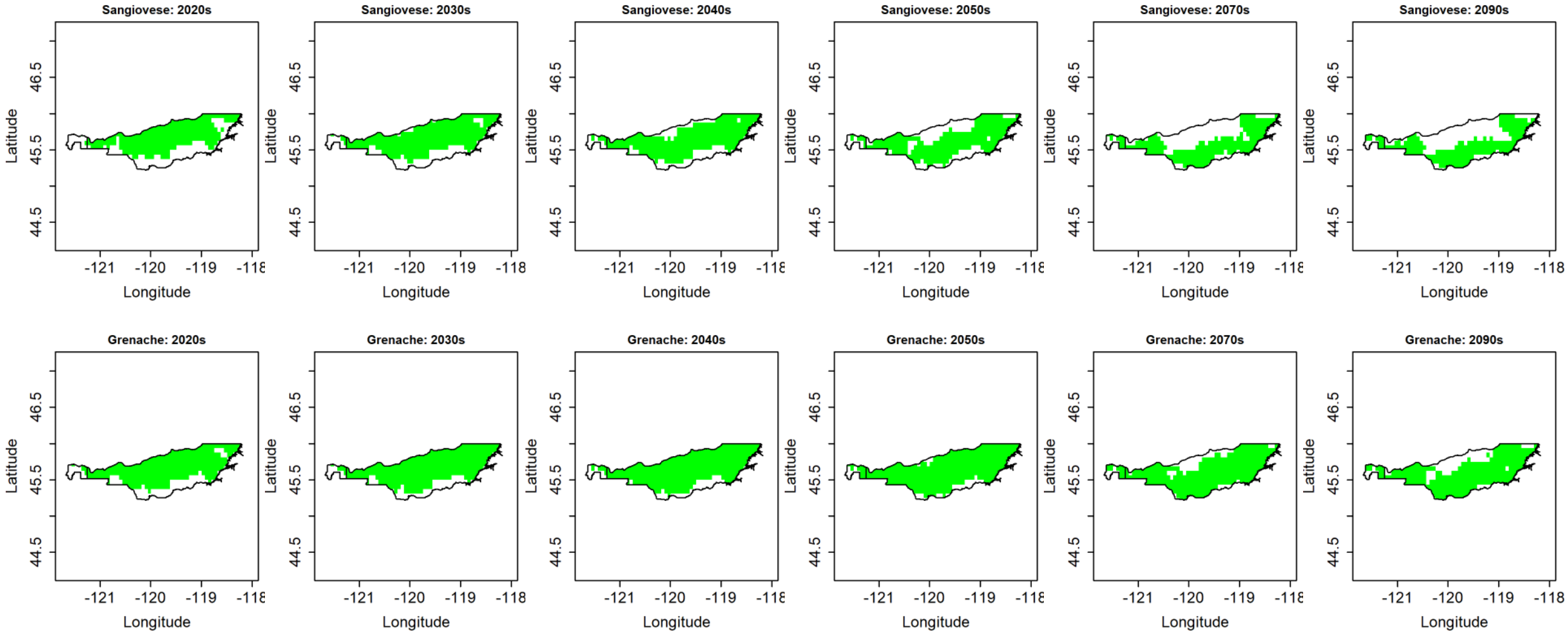

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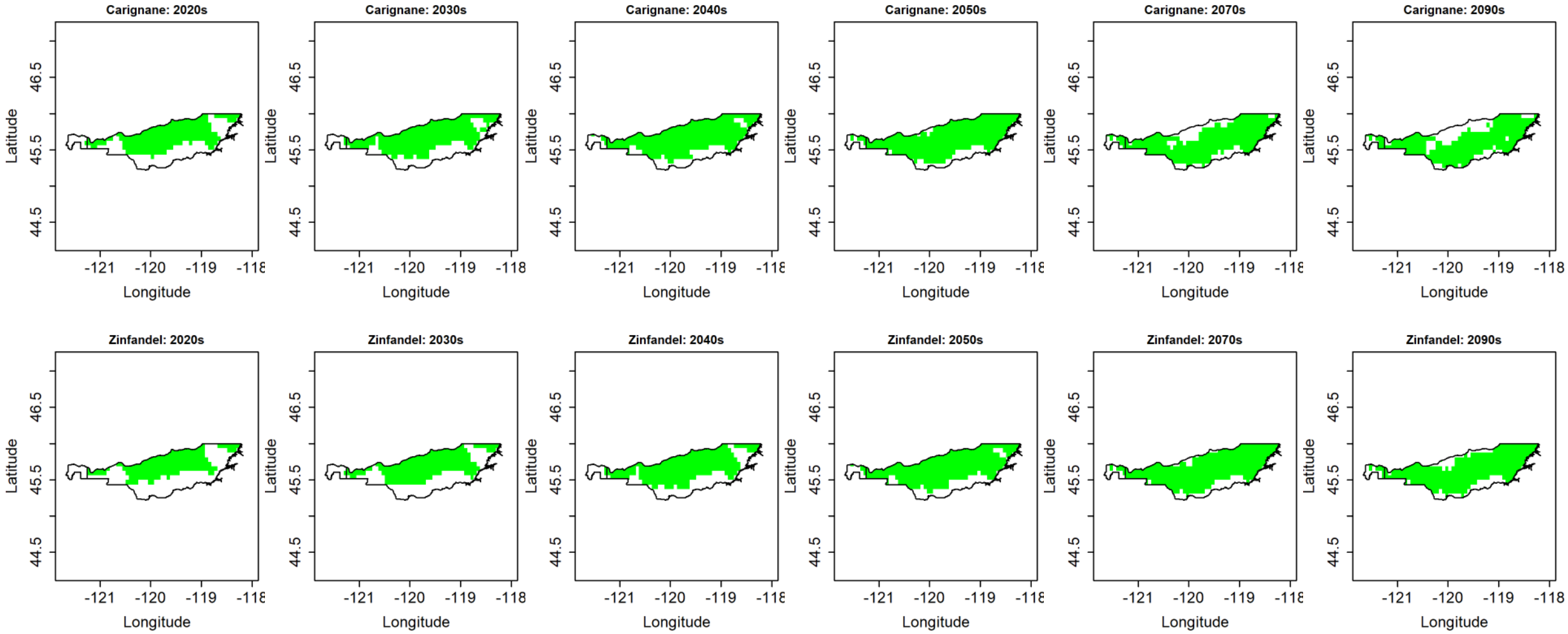

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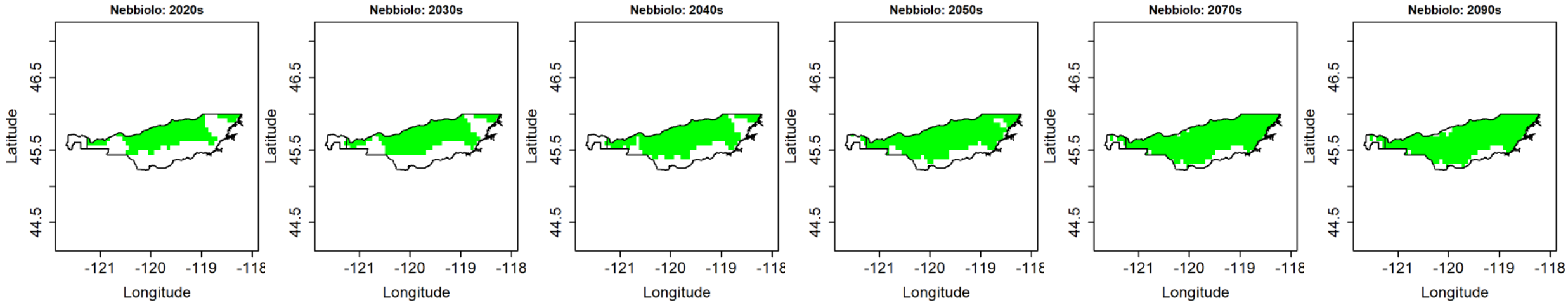
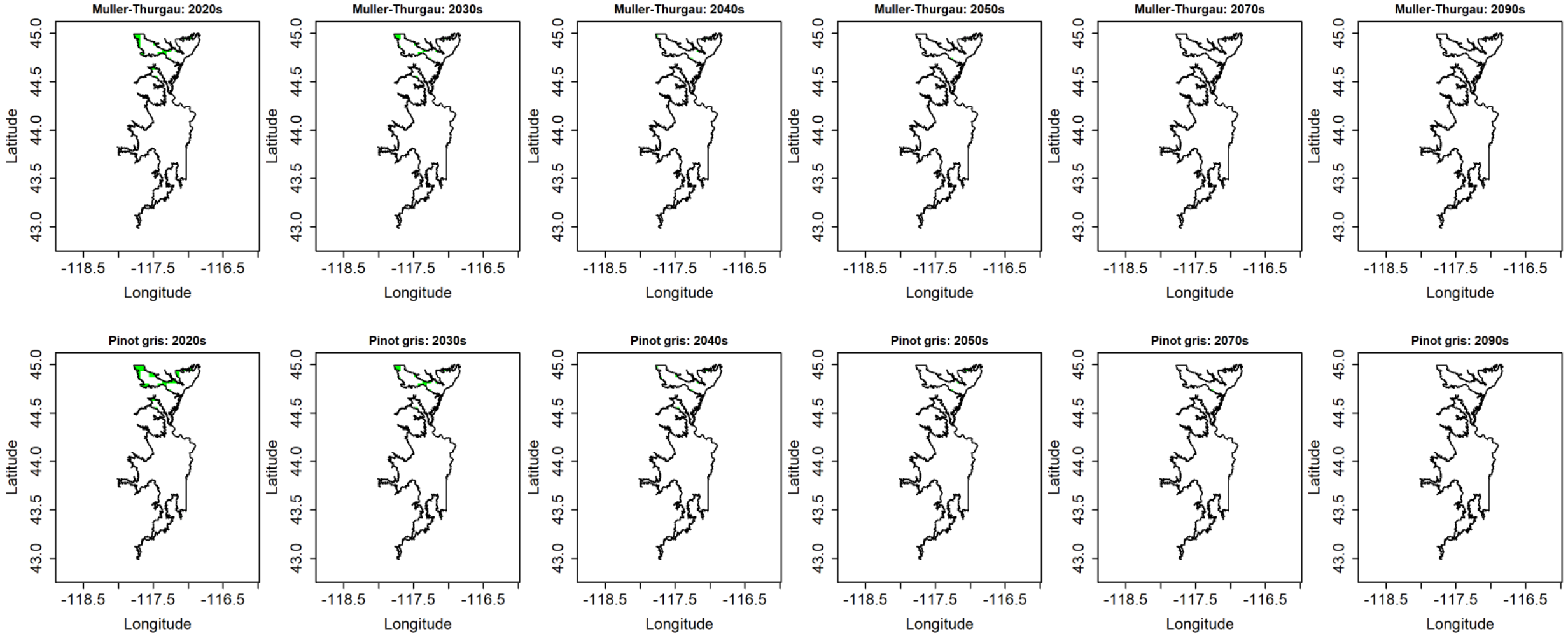


Reclassified GST Projections for the SRV AVA



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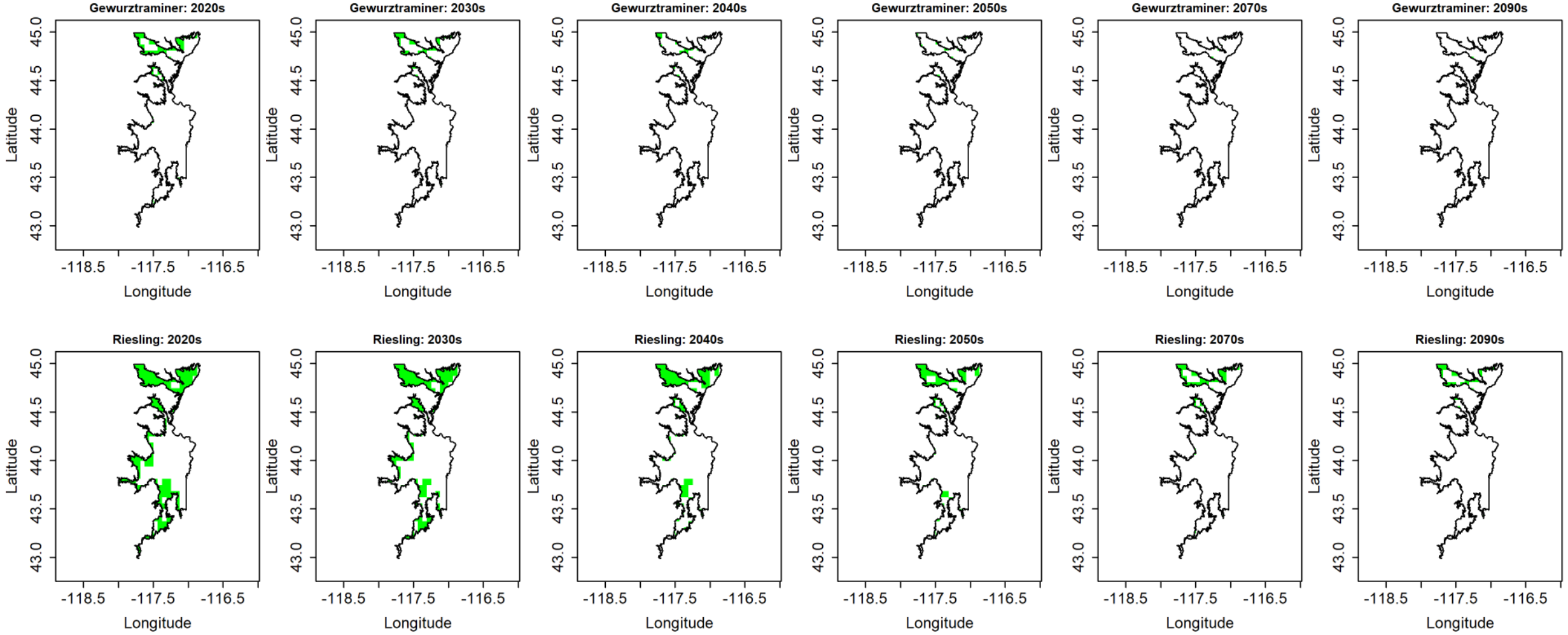

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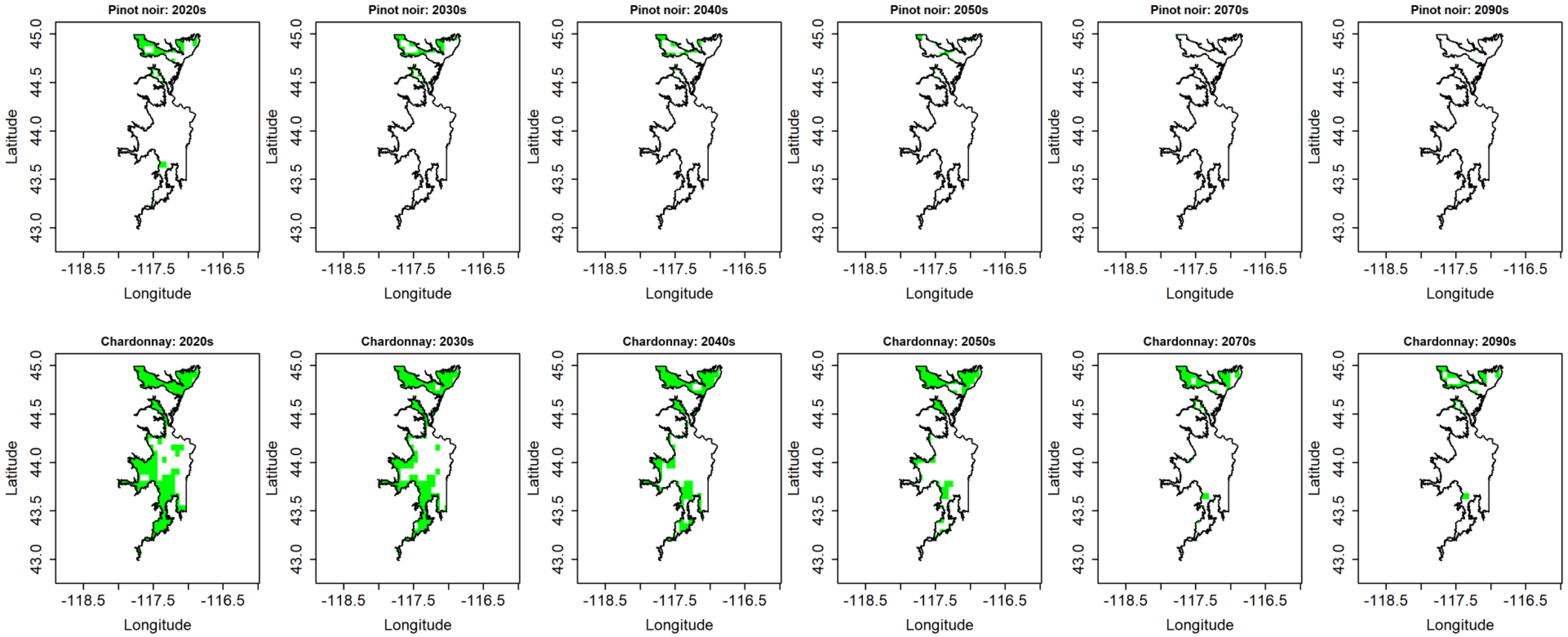

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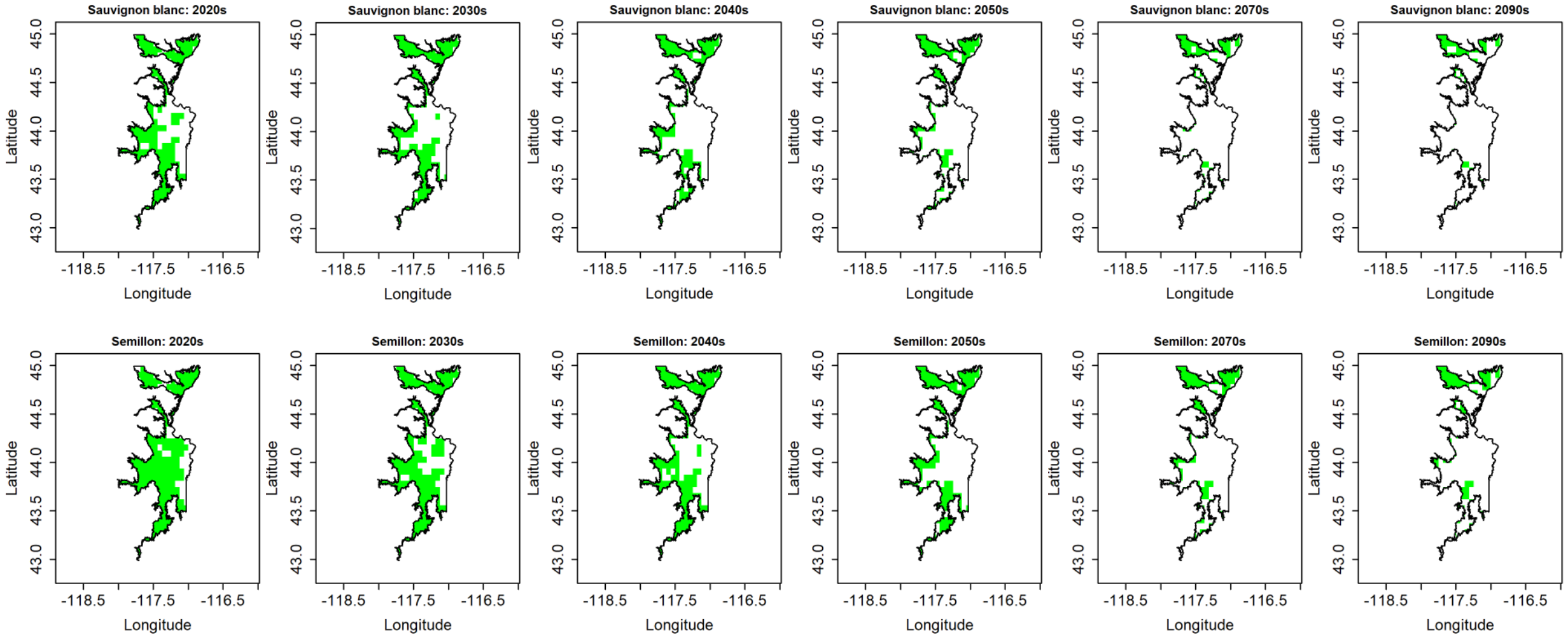

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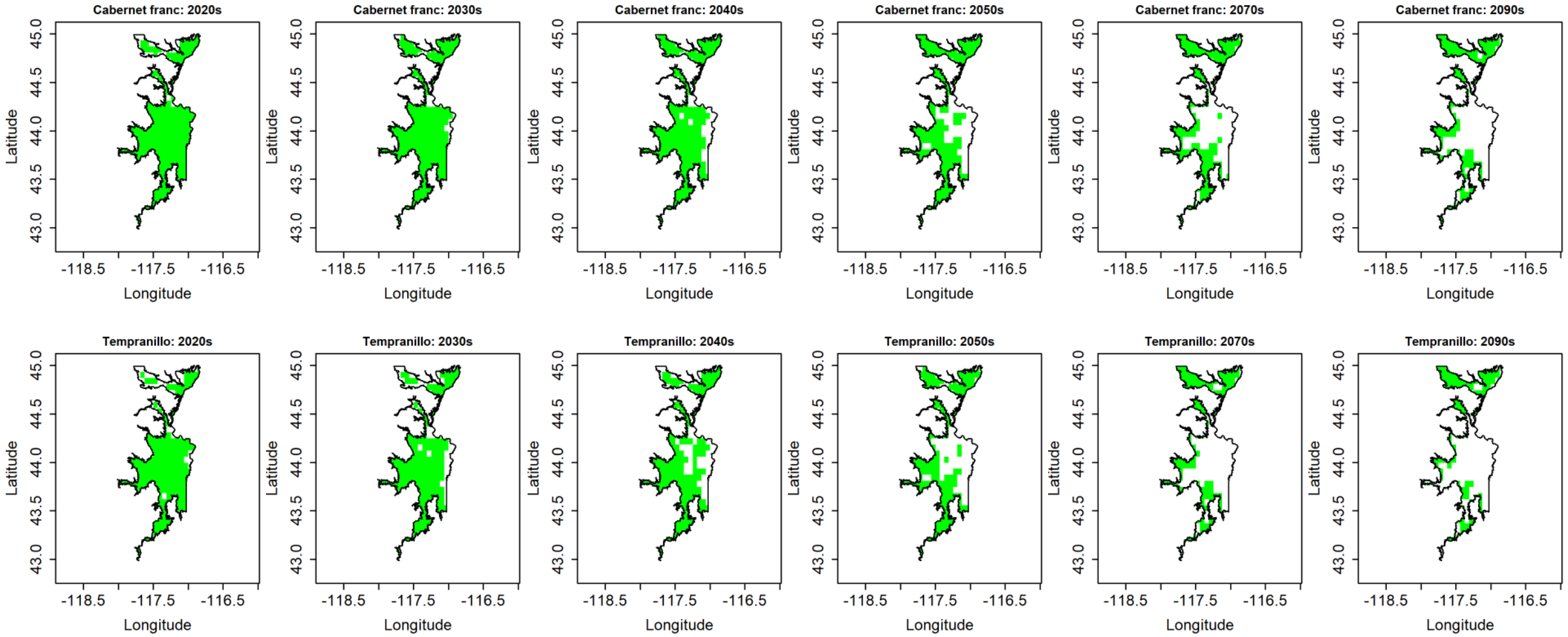

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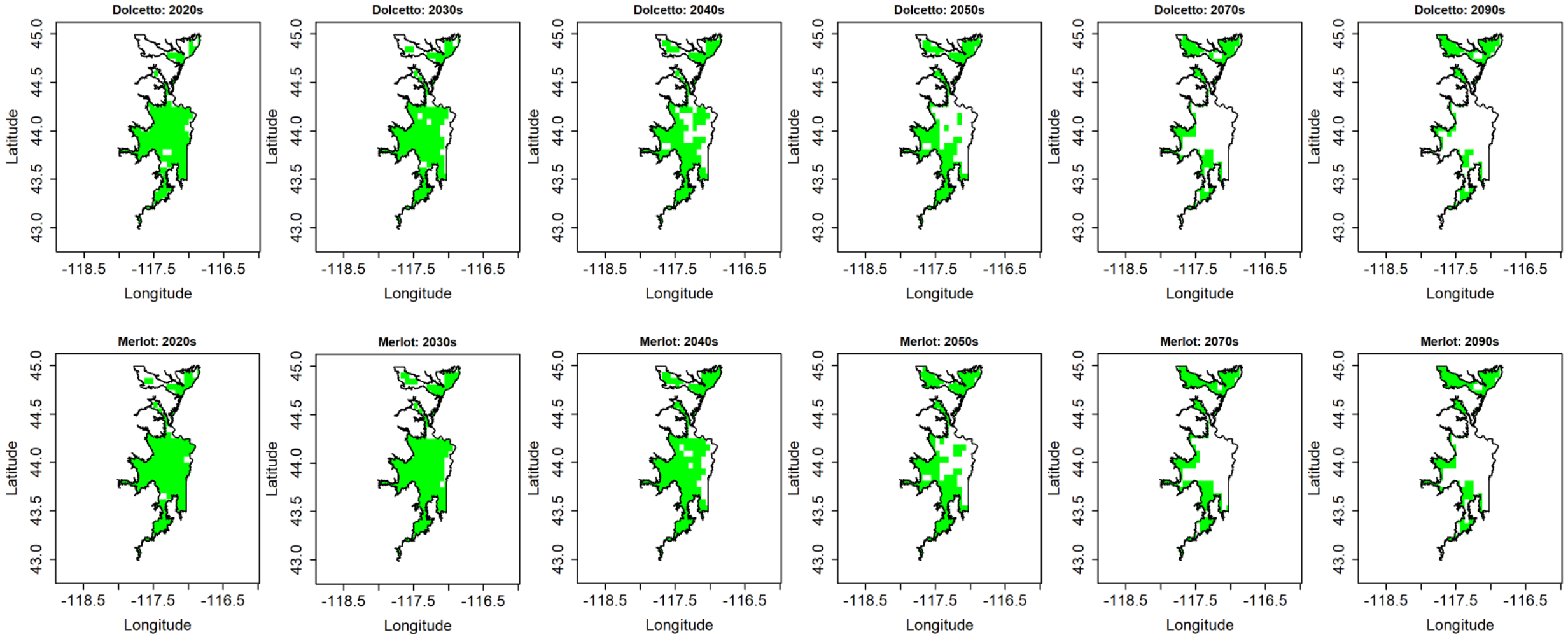

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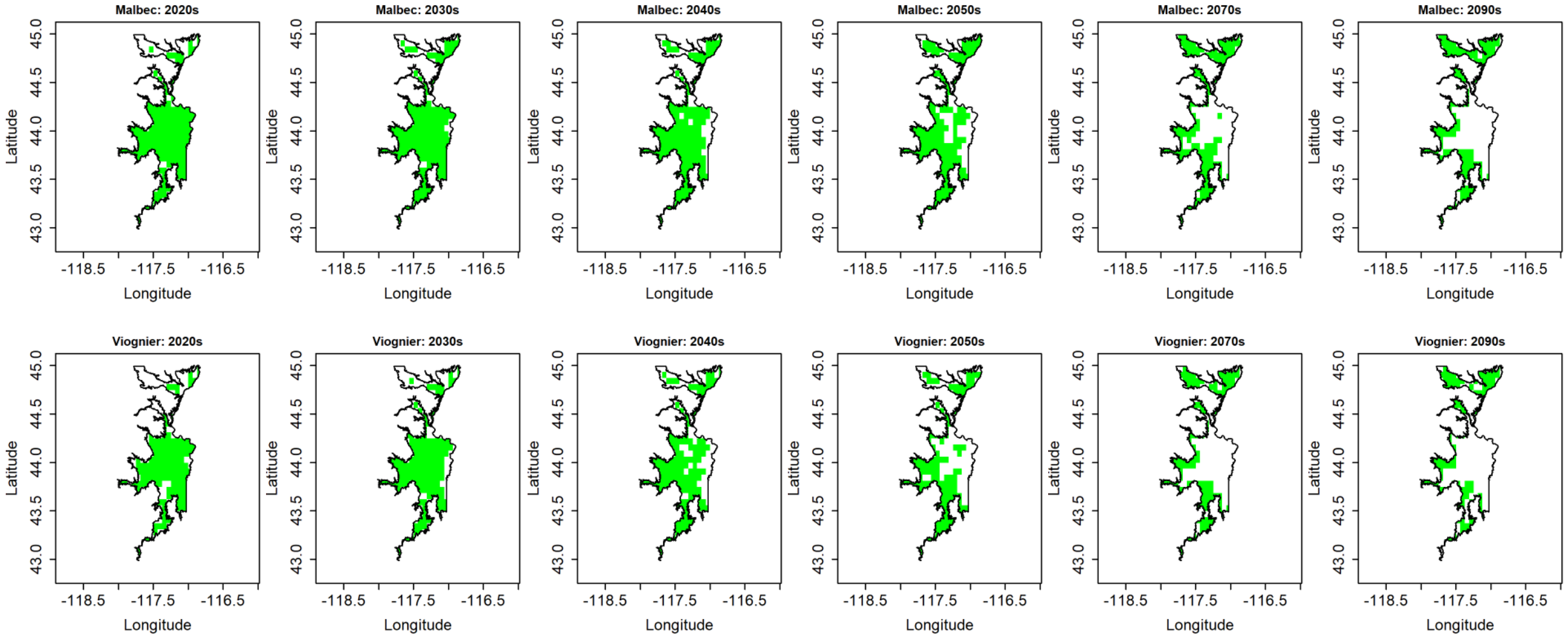

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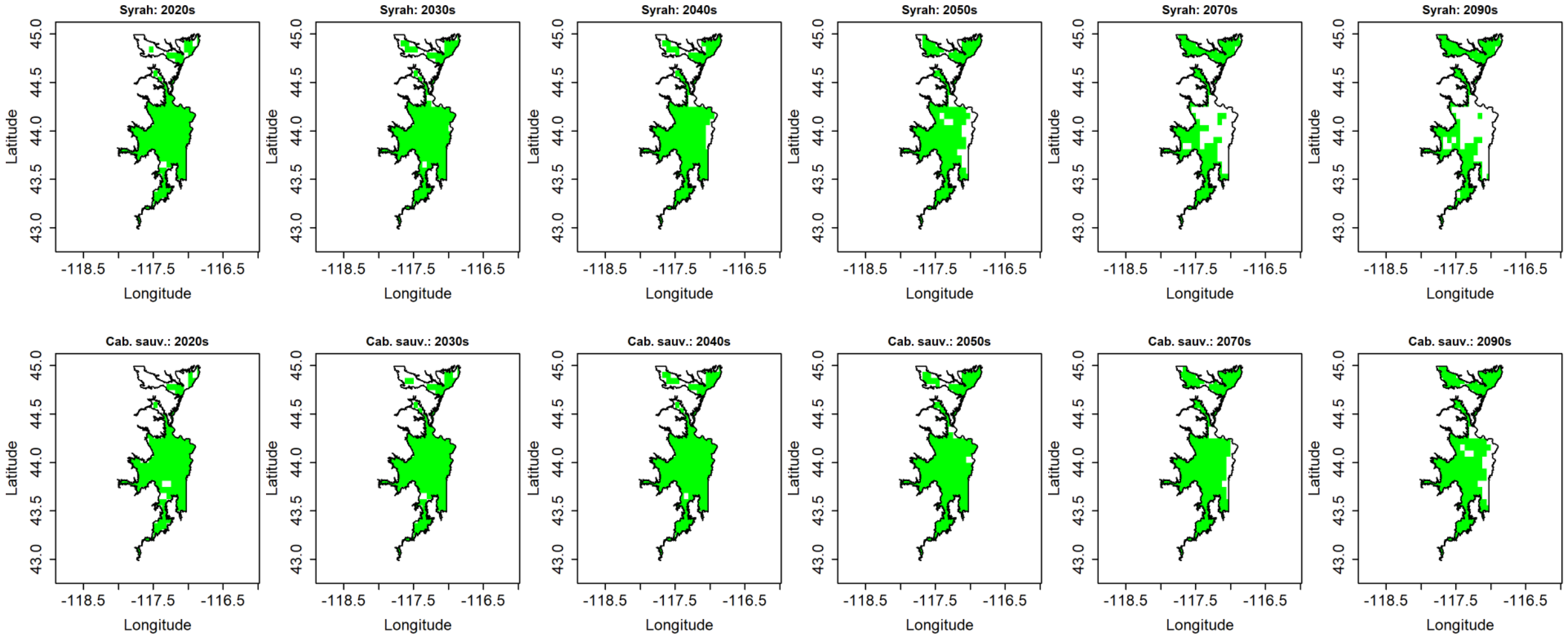

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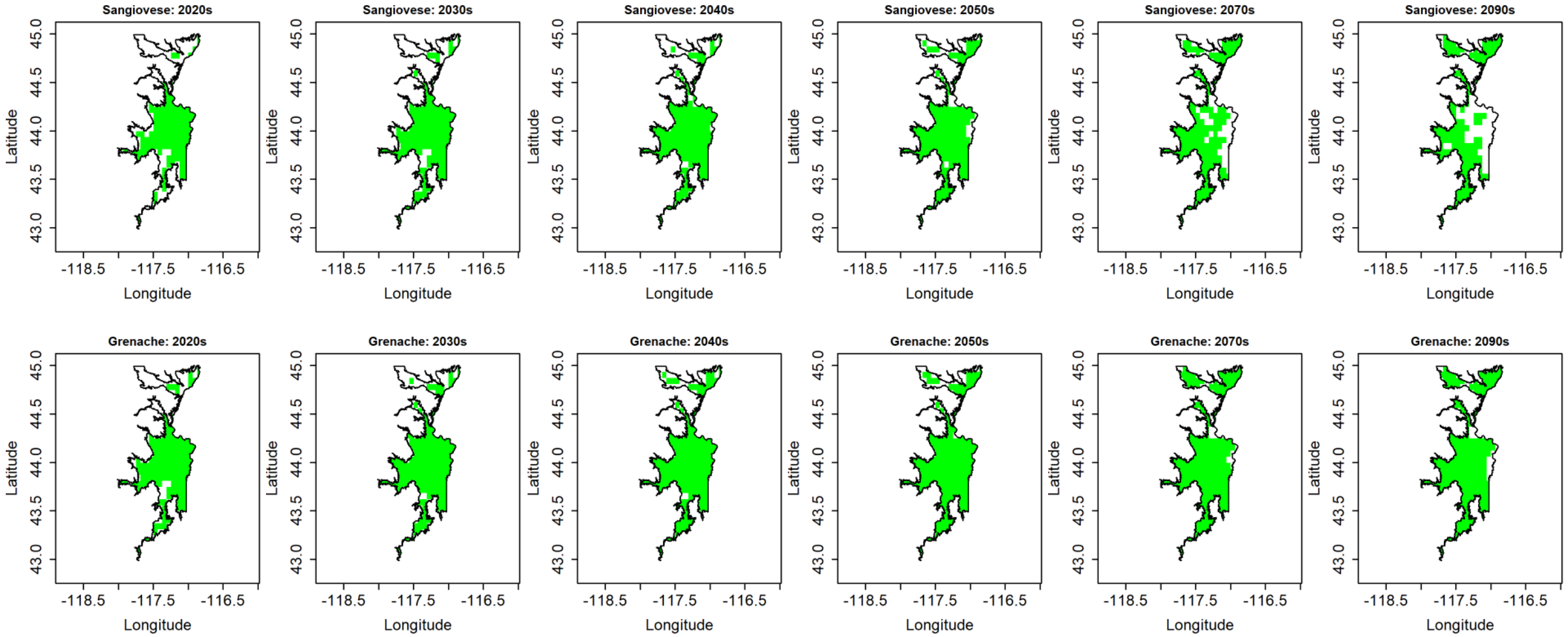

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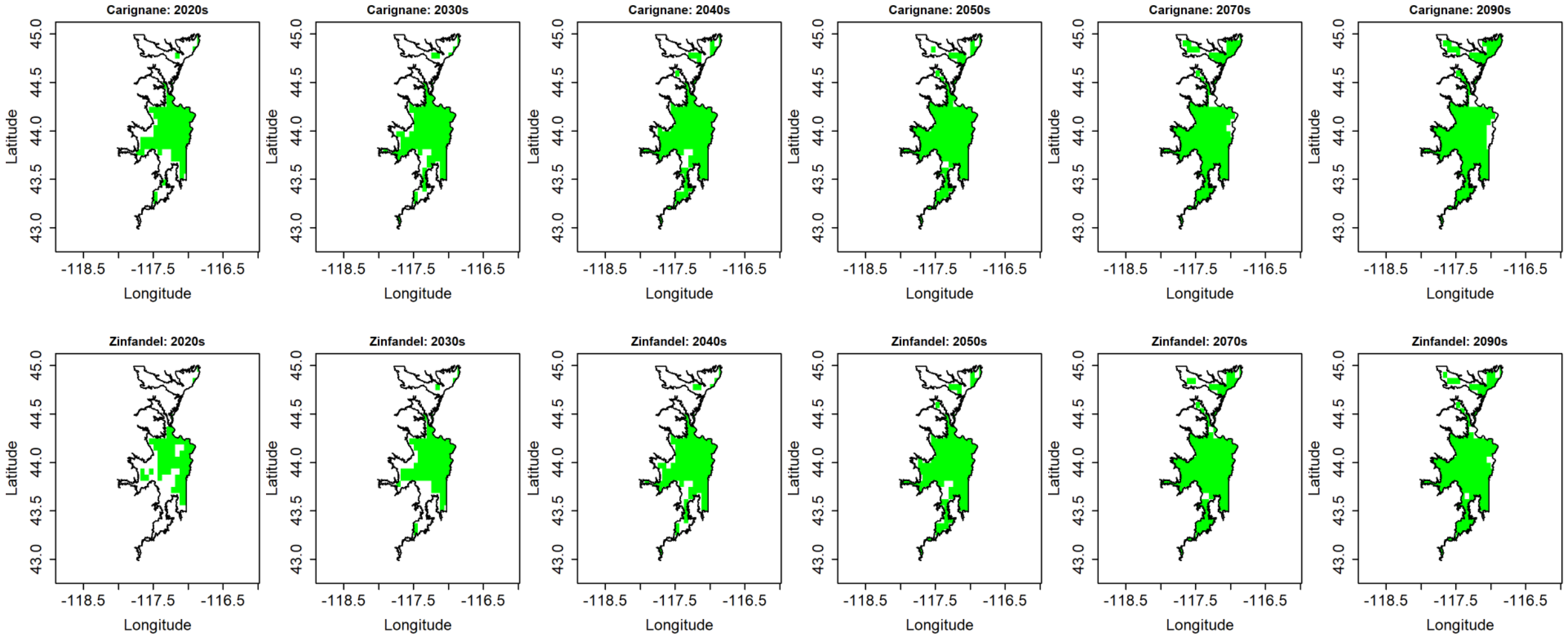

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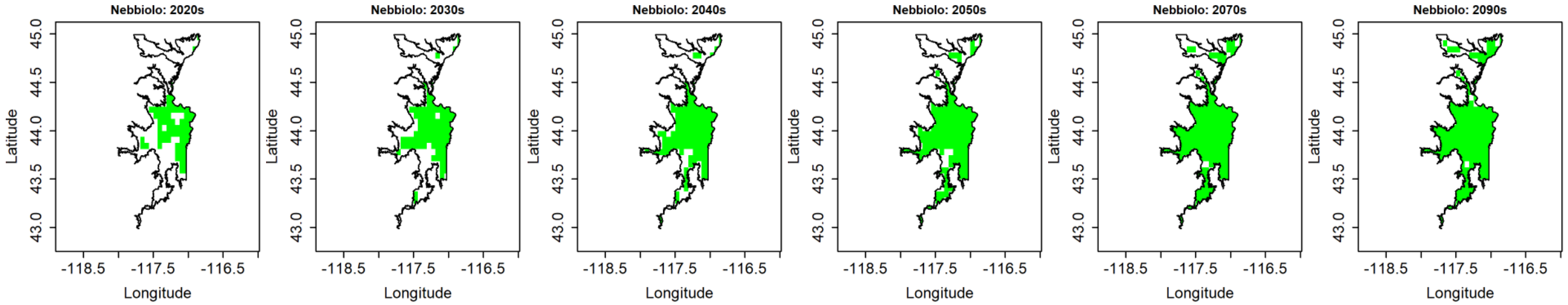
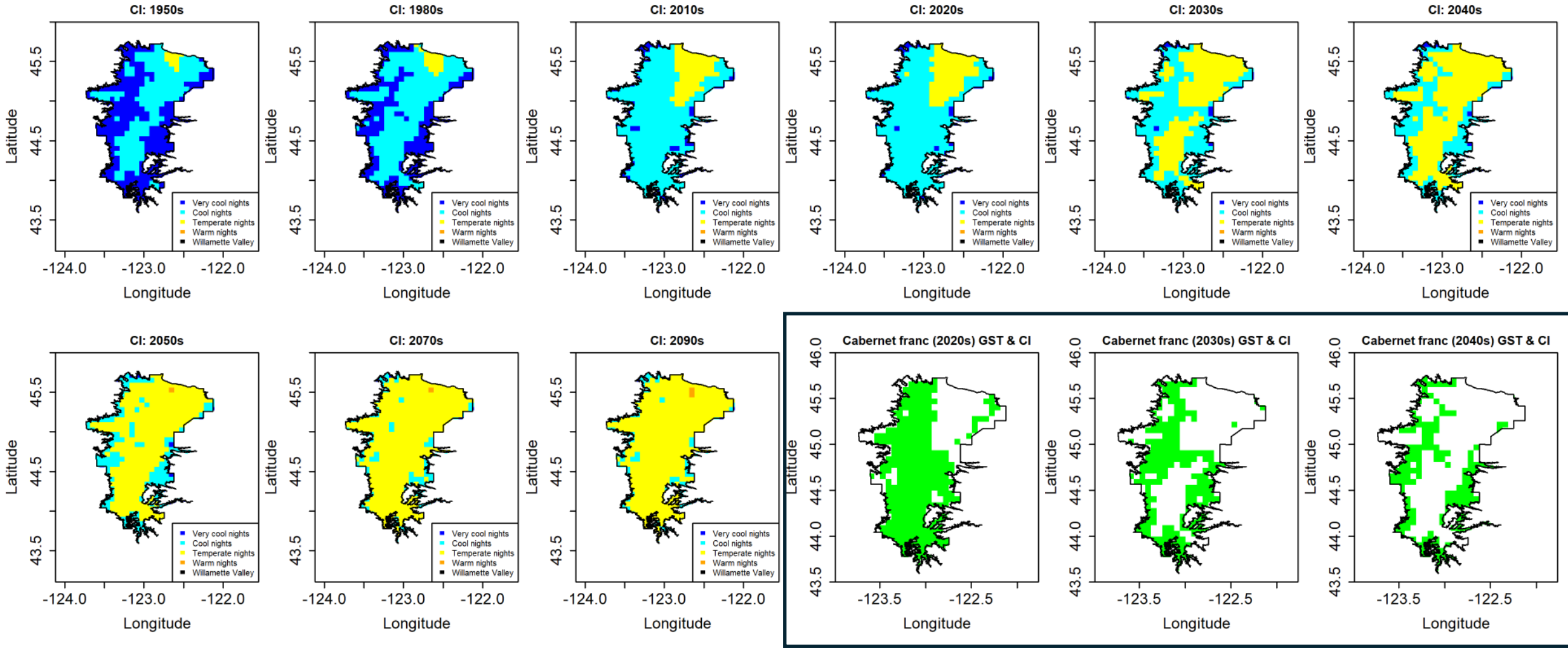


Combining the GST and Cool Night Indices



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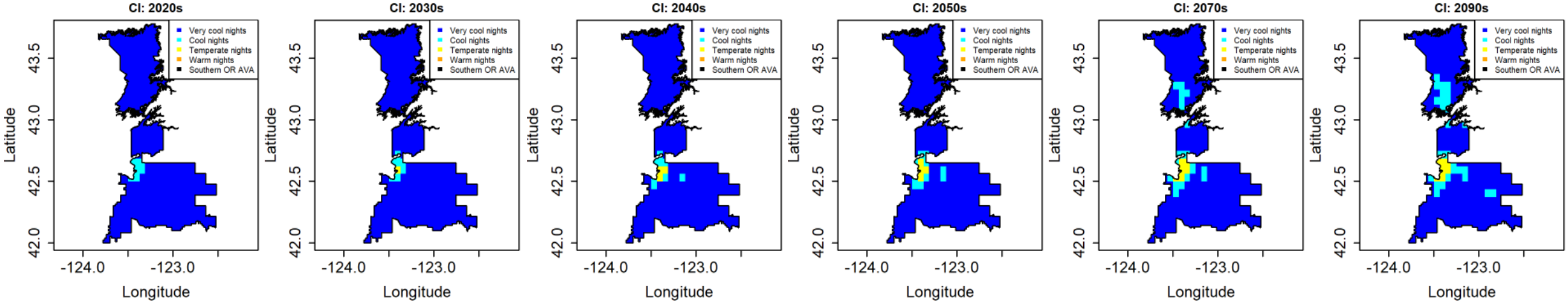

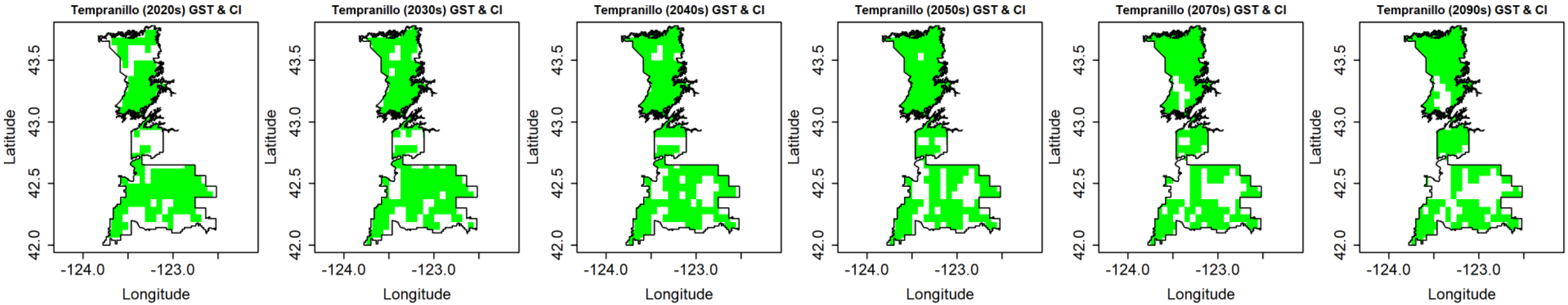

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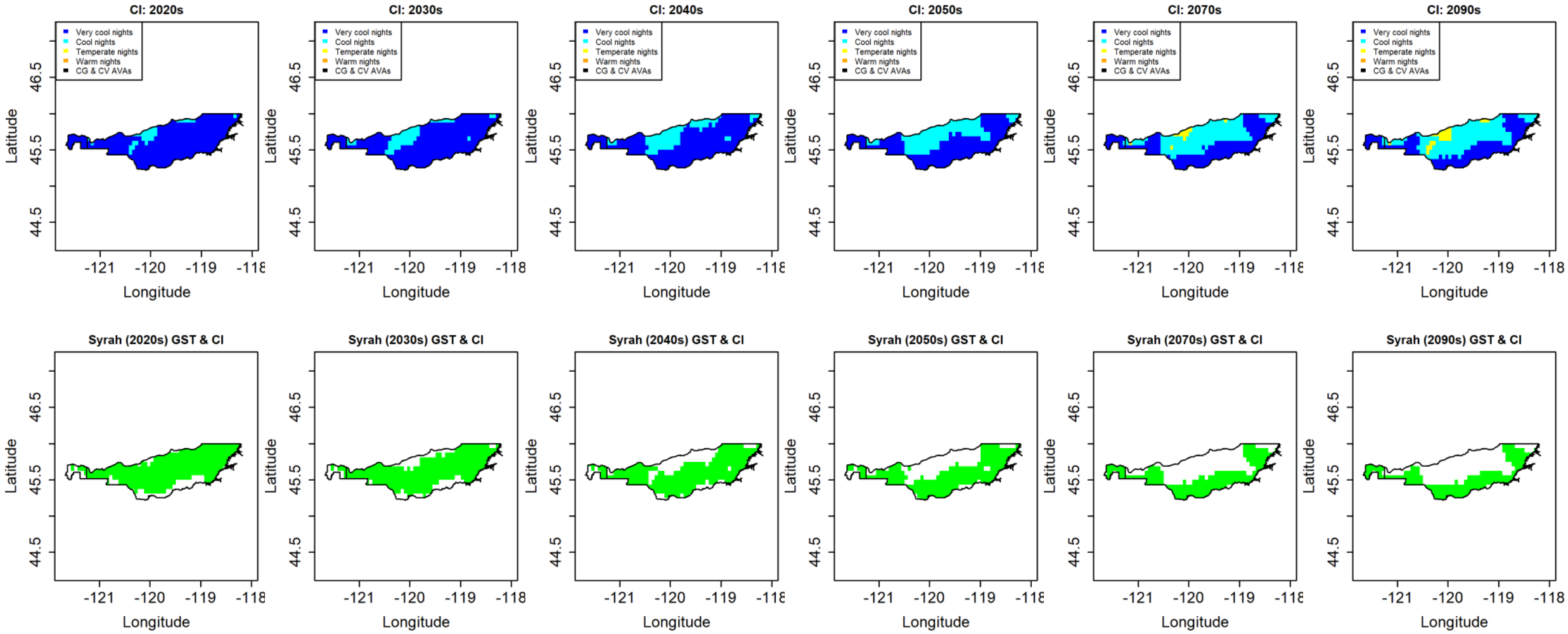

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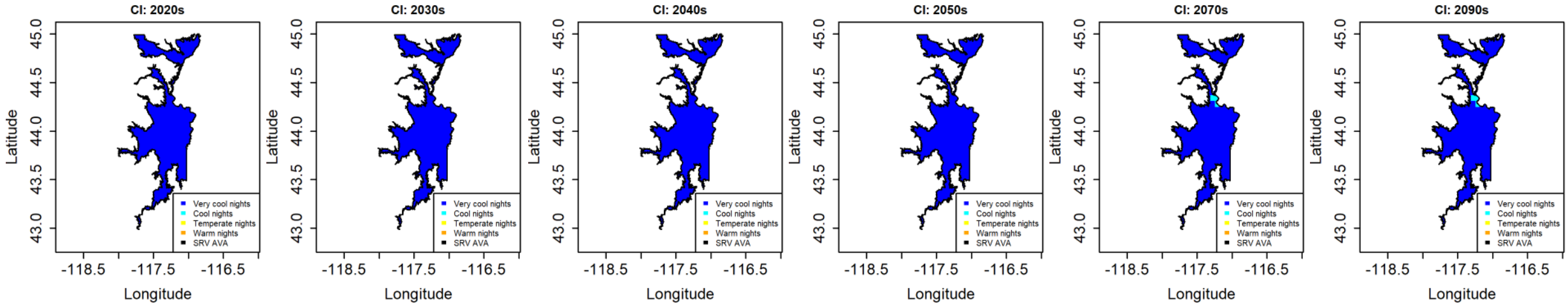
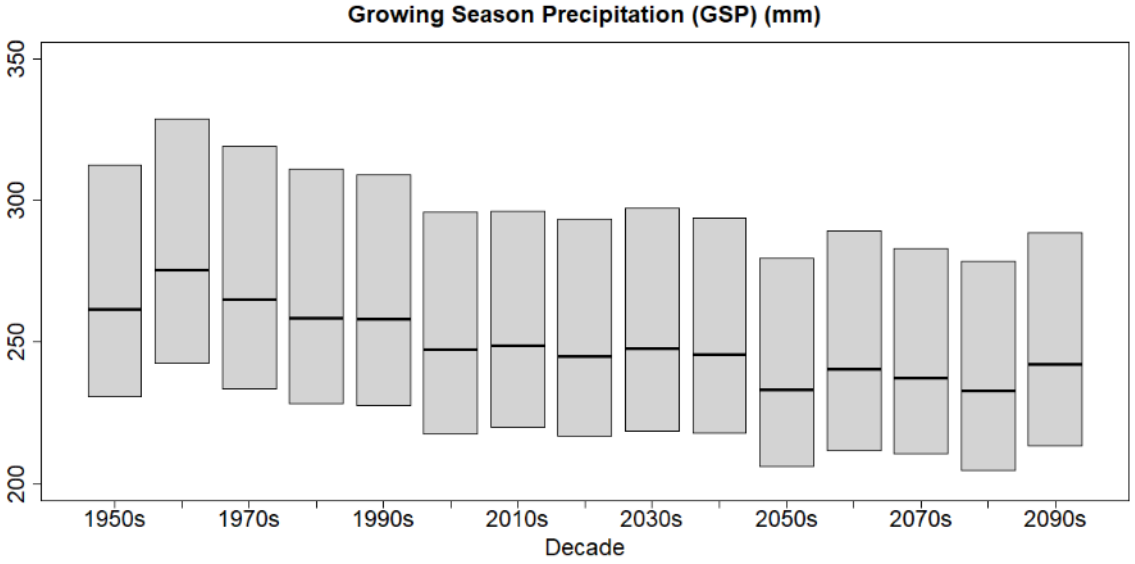
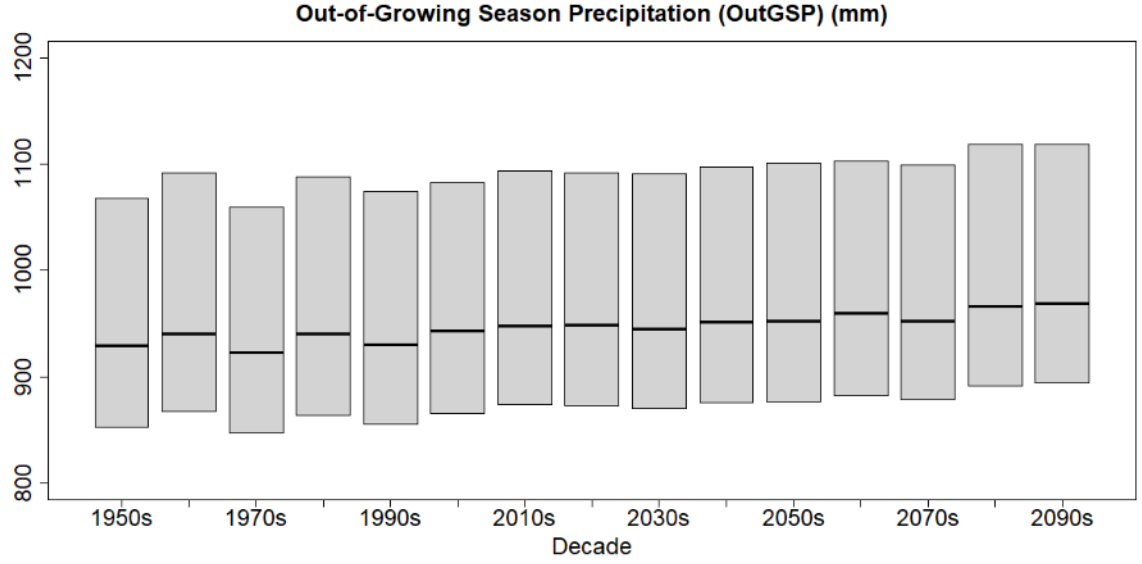
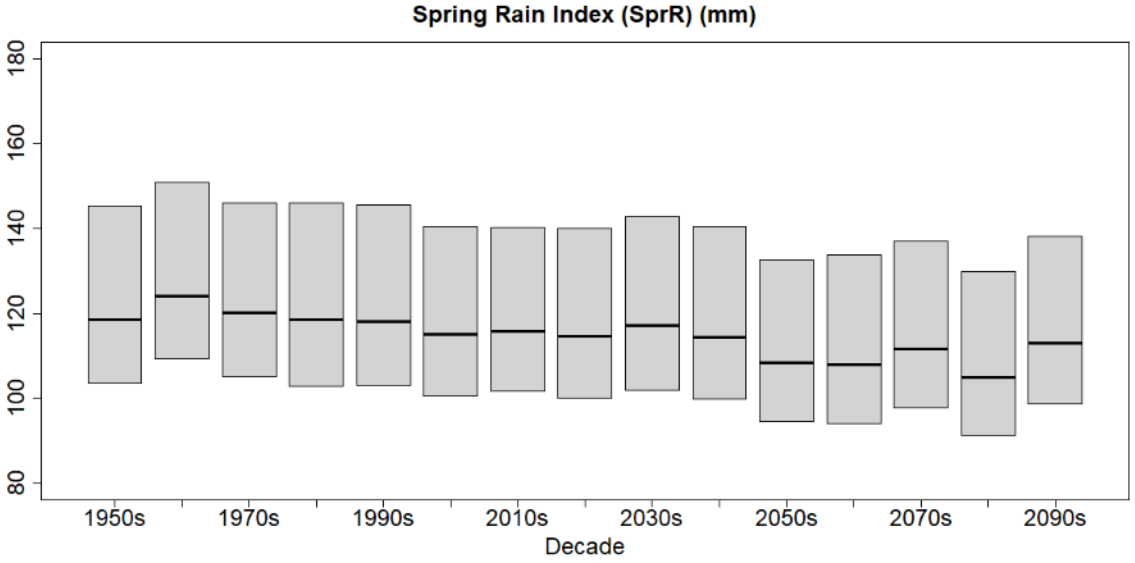


Projections for Precipitation Indices (WV AVA)

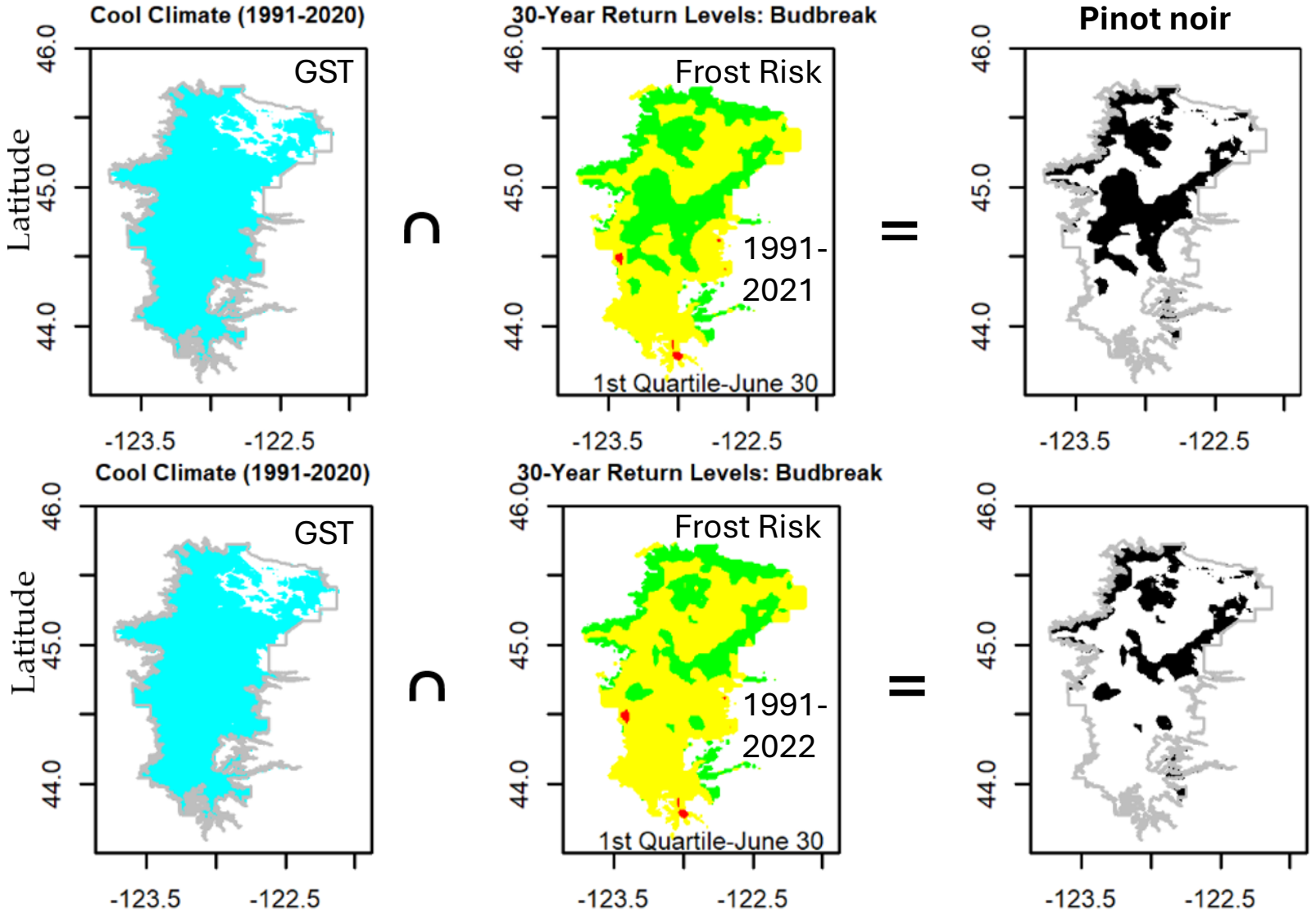






- GSP: assess water stress risk for non-irrigated vineyards
- OutGSP: to help understand water availability at the start of a growing season
- SprR: “spring wetness”; wet springs = greater vigor and increased fungal disease risk; dry springs = delayed vegetative growth

Combining the GST w/ Frost Risk Calculations



Computed return levels were reclassified relative to no injury/injury and LT_{50} budbreak threshold temperature values for *Vitis vinifera* L. cv. Pinot noir (green = no injury; yellow = injury; red = exceeded the LT_{50} budbreak threshold; ∩ = intersection; black = area that simultaneously satisfies ripening and frost risk) (Source: https://doi.org/10.3390/agronomy14071566)

Comments

- The vineyard site evaluations primarily assessed grapevine cultivar ripening potential, but also considered nighttime temperatures during the ripening period, and risk assessments (WV AVA) for water stress and fungal disease, and extreme minimum surface air temperature values (spring frost)
- Several other factors influence vineyard site evaluation and selection, e.g., latitude, elevation, slope, aspect, air drainage, site history, soil characteristics, and land use
- Moreover, other factors relevant to quality wine production were not included, for example, rootstock selection, available water, canopy management, and crop thinning

Other Ways / Related Opportunities

- Evaluating grapevine site selection for new areas in OR
- Grapevine Sugar Ripeness Model (Local)
  - Need variety specific date & sugar concentration data
- Updating GST Varietal Bounds
- Combining other types of risk assessment with ripening potential
- Soil moisture modelling
  - e.g., how much longer can we dry farm in the Willamette Valley AVA?
- CMIP6 Projections

Thank you!

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