Supplementary Material

Future temperature and salinity in Puget Sound, Washington State, under CMIP6 climate change scenarios

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Table S1. *Summary of the different ocean grid resolutions of CMIP6-endorsed models that participated in ScenarioMIP. The model names in bold were used in this paper.*

Model name	**Modeling group**	**Ocean Grid Resolution (km)**	**Scenarios ran**	**Reference**
ACCESS-CM2	Commonwealth Scientific and Industrial Research Organisation	110	ssp126, ssp245, ssp370, ssp585	Bi et al. (2020)
AWI-CM-1-1-MR	Alfred Wegener Institute	25	ssp126, ssp245, ssp370, ssp585	Semmler et al. (2018)
BCC-CSM2-MR	Beijing Climate Center	110	ssp126, ssp245, ssp370, ssp585	Wu et al. (2019)
CAMS-CSM1-0	Chinese Academy of Meteorological Sciences	100	ssp119ssp126, ssp245, ssp370, ssp585	Chen et al. (2019)
CanESM5	Canadian Centre for Climate Modelling and Analysis	110	ssp119, ssp126, ssp245, ssp370, ssp434, ssp460, ssp534OS, ssp585	Swart et al. (2019)
CESM2	National Center for Atmospheric Research	100	ssp126, ssp245, ssp370, ssp585	Danabasoglu et al. (2020)
CMCC-CM2-SR5	Euro-Mediterranean Centre on Climate Change	25	ssp245, ssp370, ssp585	Cherchi et al. (2018)
CNRM-CM6-1-HR	Centre National de Recherches Météorologiques/ Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique	25	ssp126, ssp245, ssp370, ssp585	Voldoire et al. (2019)
EC-Earth3	EC-Earth Consortium	100	ssp119, ssp126, ssp245, ssp370, ssp585	Massonet et al. (2020)
FGOALS-f3-L	Chinese Academy of Sciences	110	ssp126, ssp245, ssp370, ssp585	He et al. (2019)
GFDL-CM4	Geophysical Fluid Dynamics Laboratory	25	ssp245, ssp585	Dunne (2019; Held et al. (2019)
GFDL-ESM2M	Geophysical Fluid Dynamics Laboratory	55	ssp119, ssp126, ssp245, ssp370, ssp585	Dunne (2019)
GISS-E2-1-G	Goddard Institute for Space Studies	110	ssp119, ssp126, ssp245, ssp370, ssp434, ssp460, ssp585	Kelley et al. (2020)
HadGEM3-GC31-LL	Met Office Hadley Centre / Instituto Nacional de Pesquisas Espaciais	100	ssp126, ssp245, ssp585	(Jones *et al.* 2011)

Table S1. (Cont.) Model name	Modeling group	Ocean Grid Resolution (km)	Scenarios ran	Reference
INM-CM4-8	Institute for Numerical Mathematics/ Russian Academy of Science	100	ssp126, ssp245, ssp370, ssp585	Volodin et al. (2018)
INM-CM5-0	Institute for Numerical Mathematics/ Russian Academy of Science	50	ssp126, ssp245, ssp370, ssp585	Volodin et al. (2018b)
KACE-1-0-G	National Institute of Meteorological Sciences/Korea Meteorological Administration	100	ssp126, ssp245, ssp370, ssp585	Byun et al. (2019)
MCM-UA-1-0	Department of Geosciences, University of Arizona	250	ssp126, ssp245, ssp370, ssp585	Stouffer et al. (2019)
MIROC-ES2L	Japan Agency for Marine-Earth Science and Technology	100	ssp119, ssp126, ssp245, ssp370, ssp585	Haijma et al. (2020)
MPI-ESM1-2-HR	Max-Planck-Institut für Meteorologie	45	ssp126, ssp245, ssp370, ssp585	Gutjahr et al. (2019)
MRI-ESM2-0	Meteorological Research Institute	100	ssp119, ssp126, ssp245, ssp370, ssp434, ssp460, ssp534OS, ssp585	Yukimoto et al. (2019)
NESM3	Nanjing University of Information Science and Technology	100	ssp126, ssp245, ssp585	Yang et al. (2020)
NorESM2-LM	Norwegian Climate Center	110	ssp126, ssp245, ssp370, ssp585	Seland et al. (2020)
NorESM2-MM	Norwegian Climate Center	110	ssp126, ssp245, ssp370, ssp585	Seland et al. (2020)

Bi D, Dix M, Marsland S, et al (2020) Configuration and spin-up of ACCESS-CM2, the new generation Australian Community Climate and Earth System Simulator Coupled Model. JSHESS 1–27. https://doi.org/10.1071/ES19040

Byun Y-H, Lim Y-J, Sung HM, et al (2019) NIMS-KMA KACE1.0-G model output prepared for CMIP6 amip. https://doi.org/10.22033/ESGF/CMIP6.8350

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Hajima T, Watanabe M, Yamamoto A, et al (2020) Development of the MIROC-ES2L Earth system model and the evaluation of

biogeochemical processes and feedbacks. Geosci Model Dev 13:2197–2244. https://doi.org/10.5194/gmd-13-2197-2020
He B, Bao Q, Wang X, et al (2019) CAS FGOALS-f3-L Model Datasets for CMIP6 Historical Atmospheric Model Intercomparison Project Simulation. Adv Atmos Sci 36:771–778. https://doi.org/10.1007/s00376-019-9027-8
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Seland Ø, Bentsen M, Seland Graff L, et al (2020) The Norwegian Earth System Model, NorESM2 – Evaluation of theCMIP6 DECK and historical simulations. Climate and Earth System Modeling http://doi.org/10.5194/gmd-2019-378
Semmler T, Danilov S, Gierz P, et al (2020) Simulations for CMIP6 with the AWI climate model AWI-CM-1-1. Climatology (Global Change) 549. https://doi.org/10.1002/essoar.10501538.1
Stouffer R (2019) U of Arizona MCM-UA-1-0 model output prepared for CMIP6. https://doi.org/10.22033/ESGF/CMIP6.2421
Swart NC, Cole JNS, Kharin VV, et al (2019) The Canadian Earth System Model version 5 (CanESM5.0.3). Geosci Model Dev 12:4823–4873. https://doi.org/10.5194/gmd-12-4823-2019
Voldoire A, Saint-Martin D, Sénési S, et al (2019) Evaluation of CMIP6 DECK Experiments With CNRM-CM6-1. J Adv Model Earth Syst 11:2177–2213. https://doi.org/10.1029/2019MS001683
Volodin EM, Mortikov EV, Kostrykin SV, et al (2018) Simulation of the modern climate using the INM-CM48 climate model. Russian J Numer Anal Math Modelling 33:367–374. https://doi.org/10.1515/rnam-2018-0032
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Table S2. *Summary of average projection values for Puget Sound for each scenario. Standard error for the ROMS baseline value is the same across every scenario, since the interpolated anomalies were overlaid onto the ROMS time-series output.*

	Projection	Mean SST	Max SST	Min SST	SE	Mean Salinity	Max Salinity	Min Salinity	SE
CNRM-CM6-1-HR									
ssp126	Short-term	12.2	16.7	8.2		29.1	30.8	26.8	
	Long-term	12.7	17.3	8.7		28.5	30.2	26.2	
ssp245	Short-term	12.0	16.5	8.0		28.8	30.5	26.5	
	Long-term	13.2	17.7	9.2		28.1	29.8	25.8	
ssp370	Short-term	12.0	16.5	8.0		29.1	30.8	26.8	
	Long-term	13.7	18.2	9.7		27.7	29.5	25.4	
ssp585	Short-term	12.2	16.7	8.2		28.8	30.6	26.5	
	Long-term	14.7	19.2	10.7		27.4	29.2	25.2	
GFDL-CM4									
ssp245	Short-term	12.3	16.8	8.3		29.5	31.3	27.2	
	Long-term	14.0	18.5	10.0		29.1	30.9	26.8	
ssp585	Short-term	12.5	17.0	8.5		29.6	31.4	27.4	
	Long-term	15.1	19.6	11.1		28.8	30.6	26.5	
Baseline ROMS	-	11.2	15.7	7.2	0.0216	29.3	31.0	27.0	0.0658

Figure S1. Initial model grid resolution for models used. Both models have a 25km ocean grid resolution.

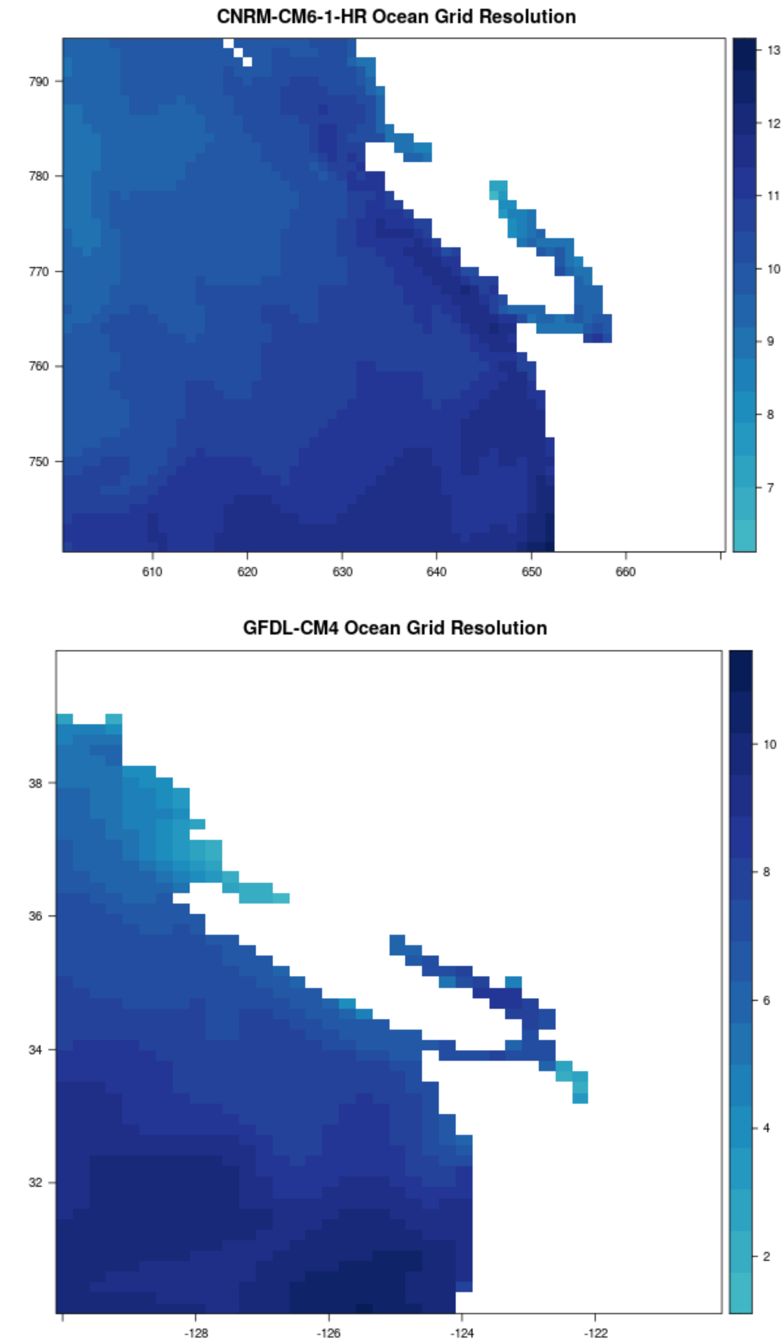
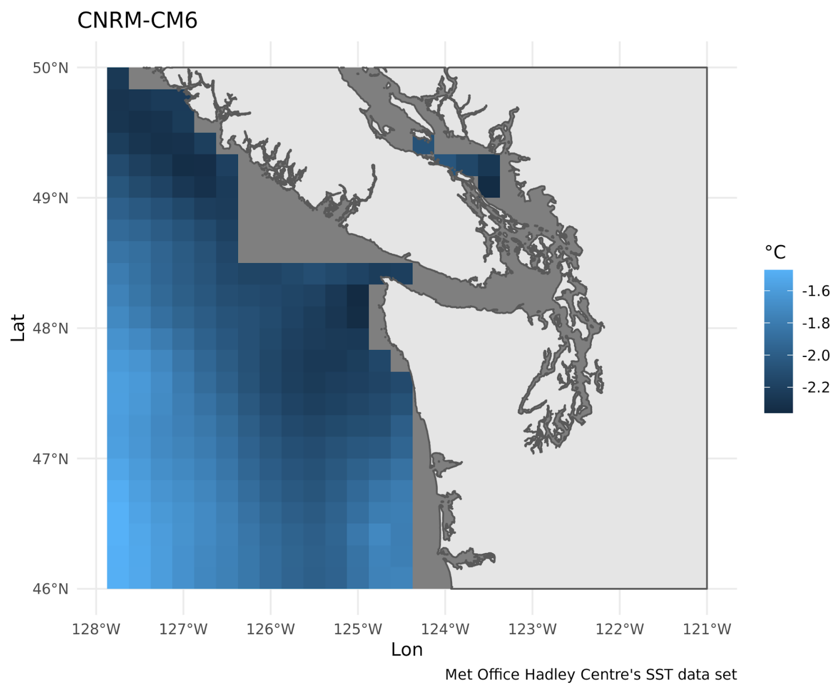


Figure S2. Mean ocean temperature bias, comparing Met Office Hadley Centre's SST data set (Rayner 2003) to the CNRM-CM6-1 and GFDL-CM4 models.



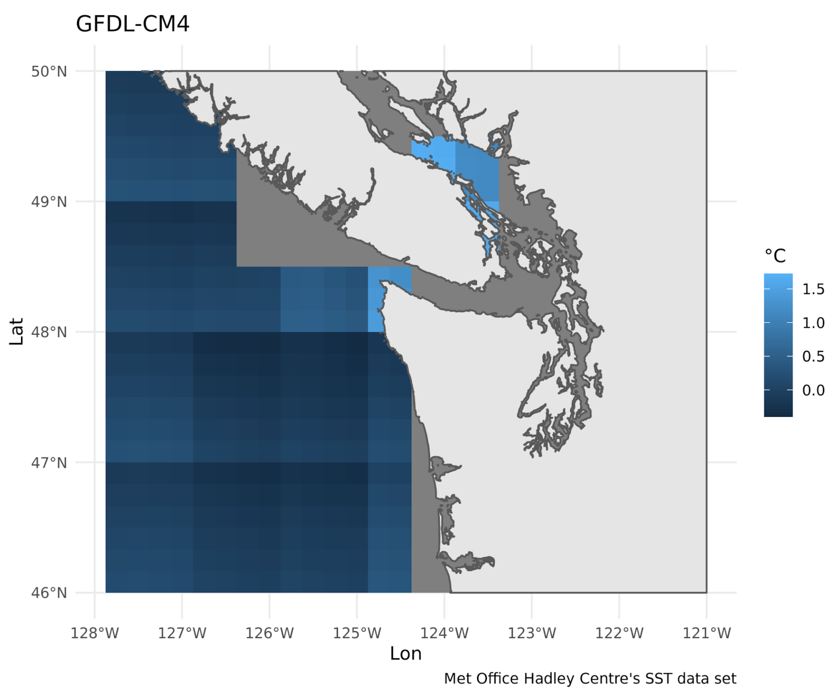


Figure S3. Short-term (2020-2050) and long-term (2070-2100) interpolated SST anomaly (°C) projections for the Salish Sea.

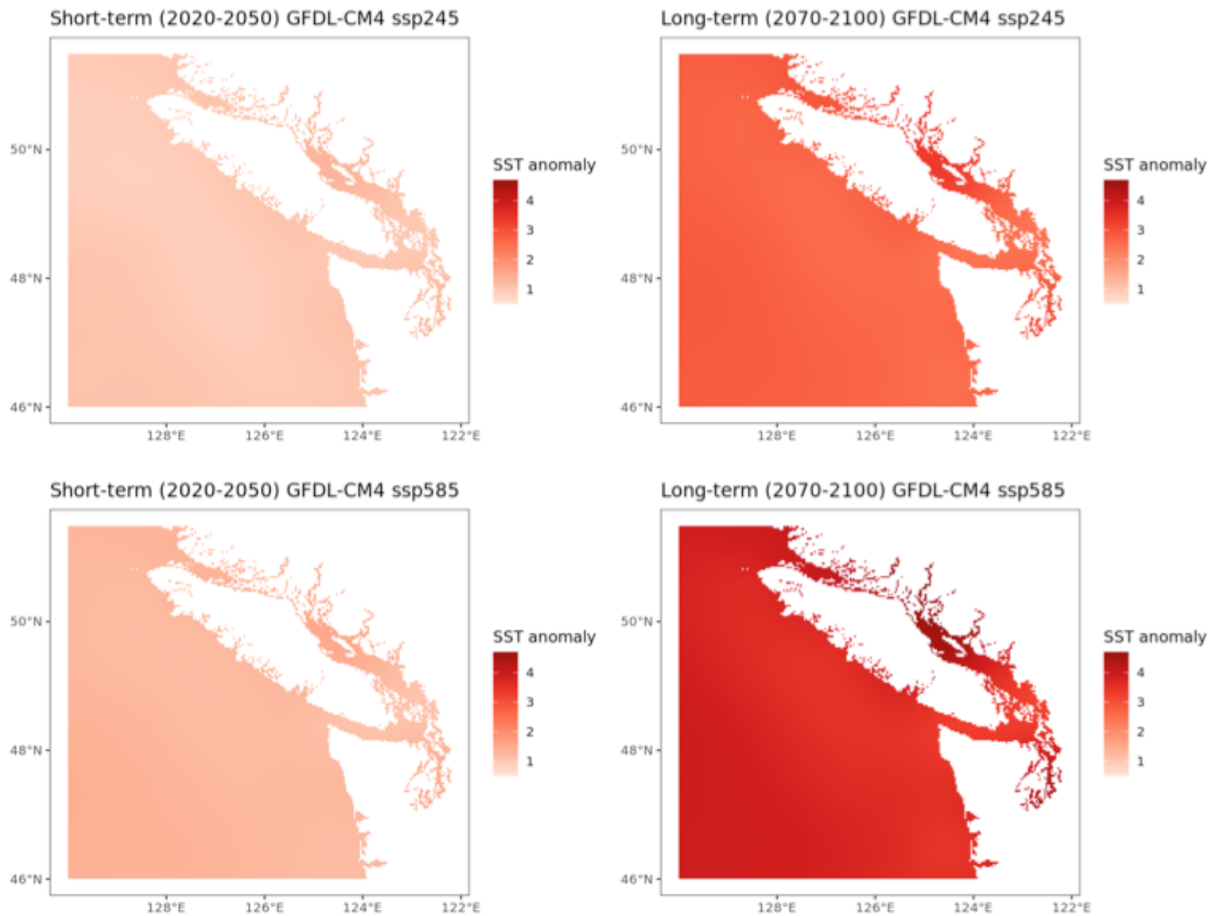


Figure S3. (Cont.)

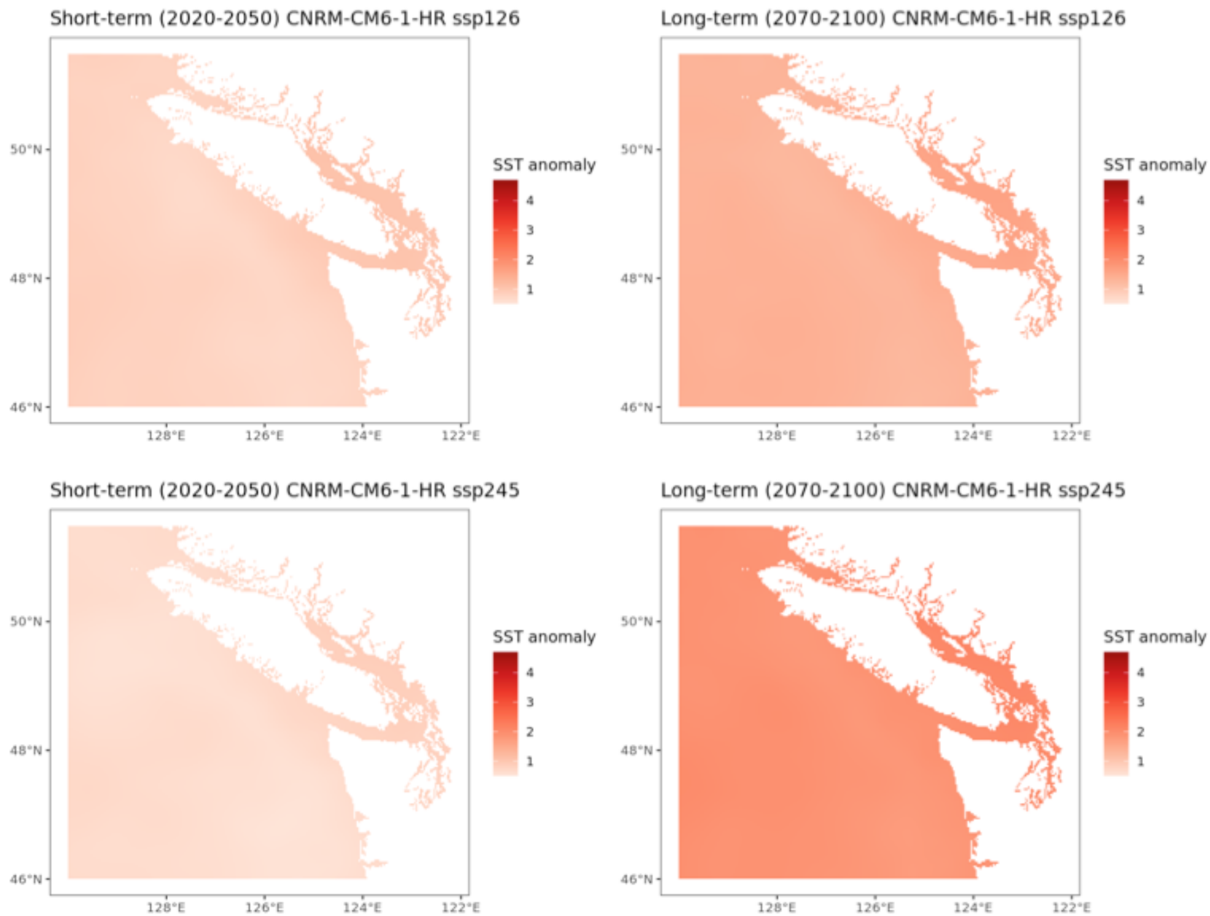


Figure S3. (Cont.)

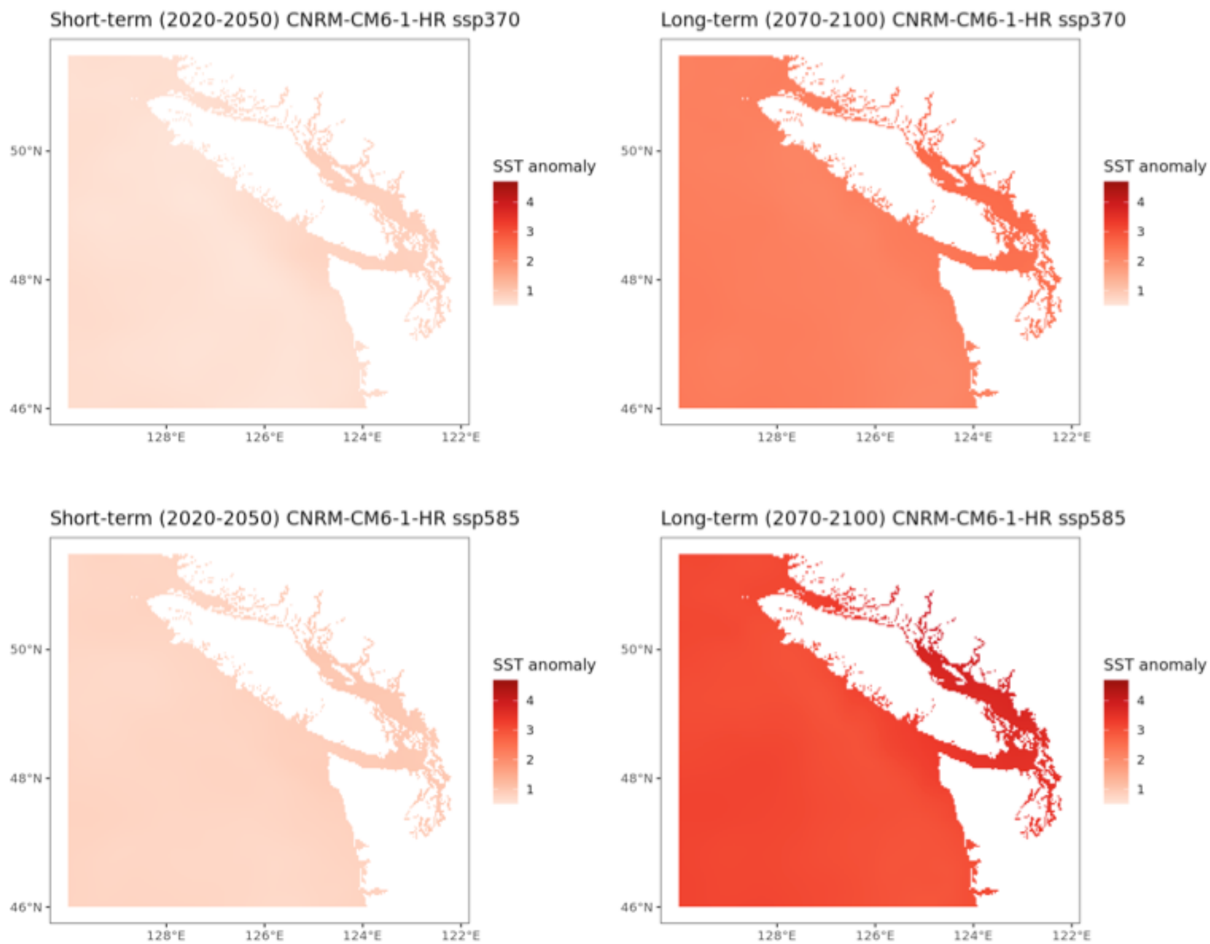


Figure S4. Short-term (2020-2050) and long-term (2070-2100) interpolated salinity anomaly projections for the Salish Sea. Note, the scale differs between models in order to better express variability.

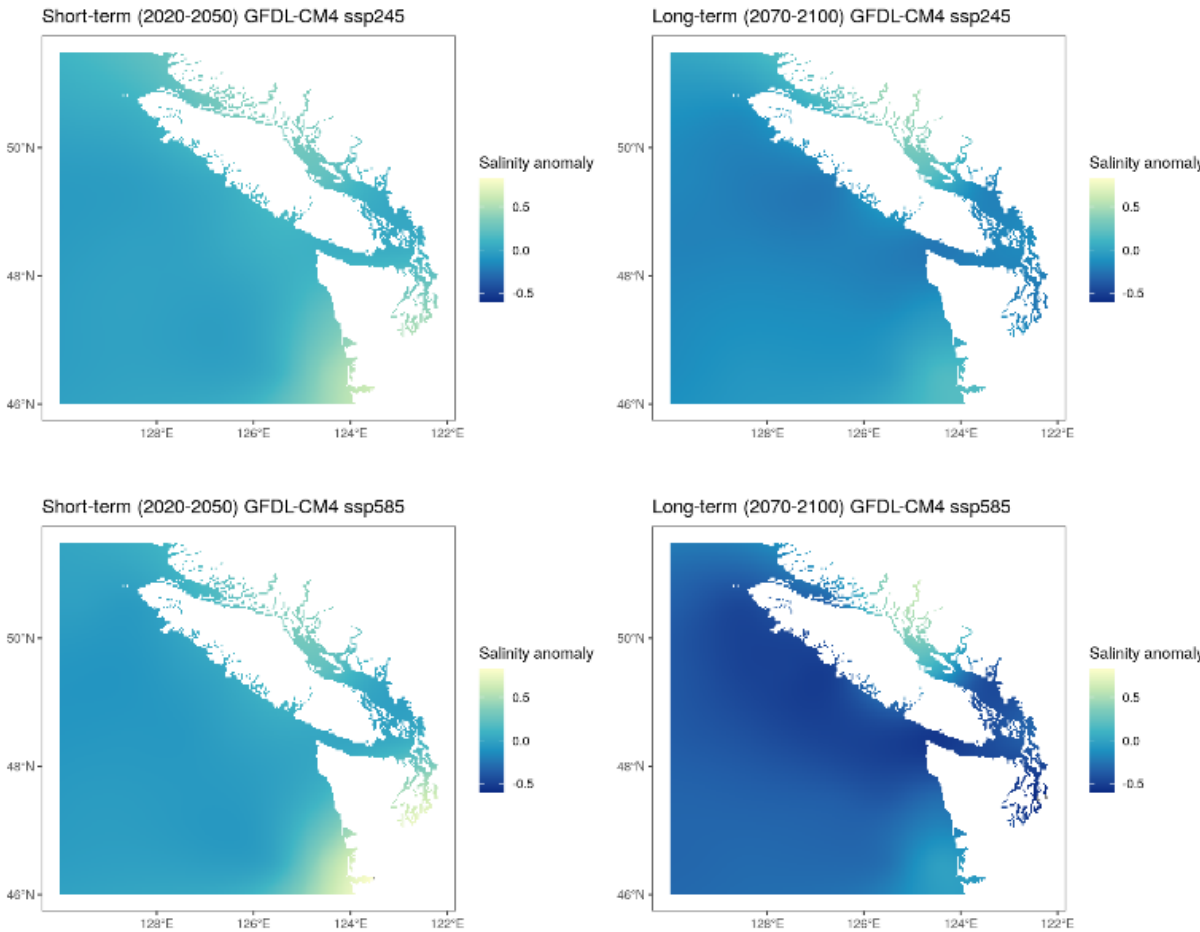


Figure S4. (Cont.)

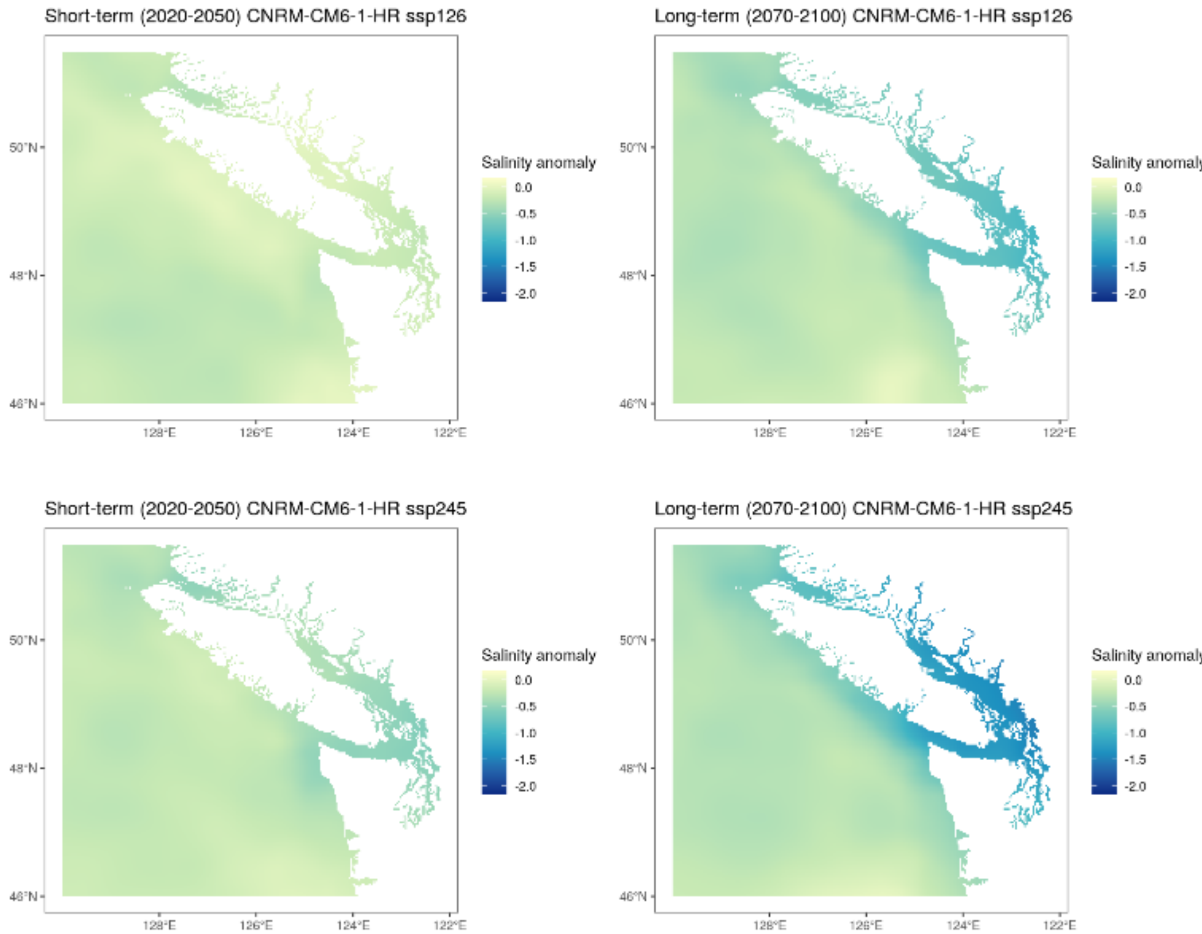


Figure S4. (Cont.)

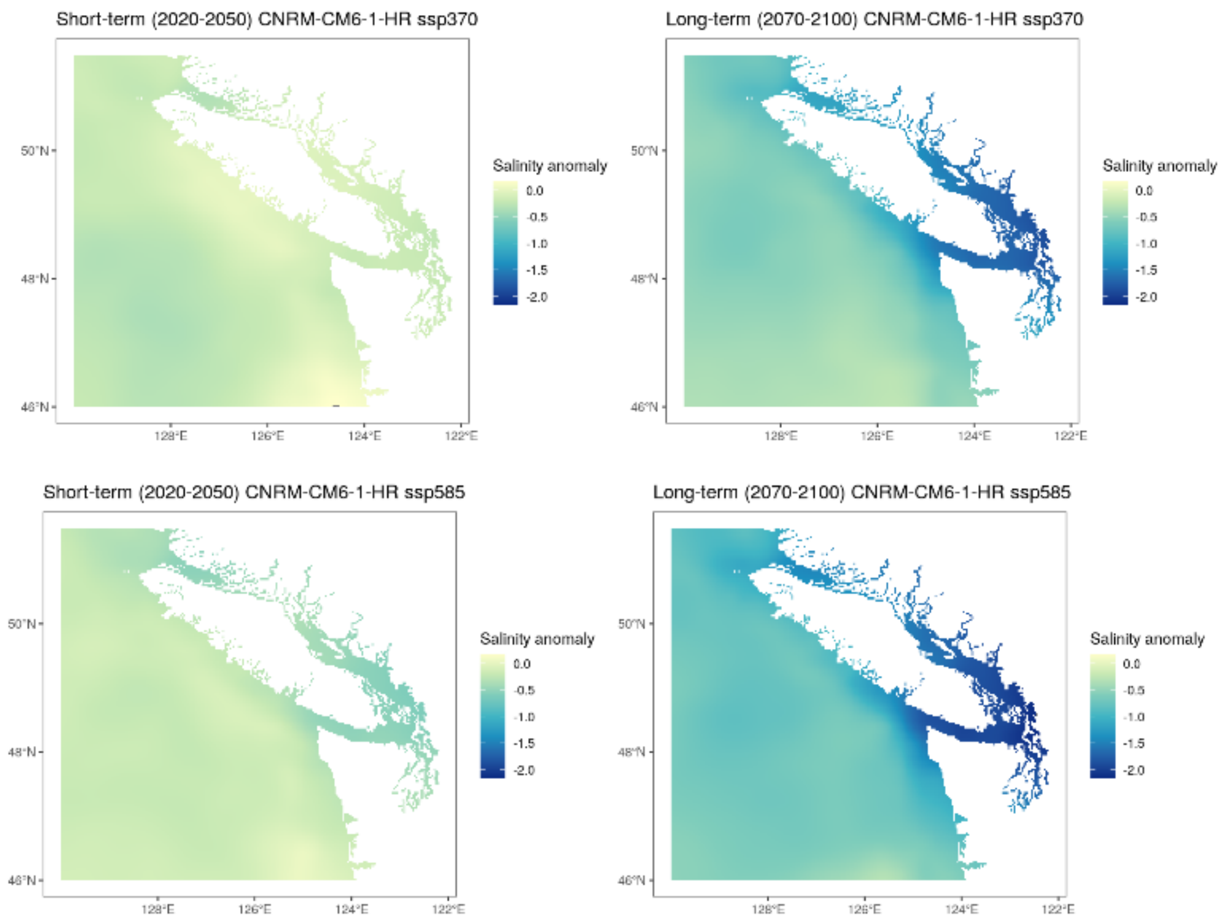


Figure S5. Variability between models for average sea surface temperature and sea surface salinity change for ssp245 short-term and long-term projections. Temporal patterns come from the ROMS time-series, which ran from 2005-2006.

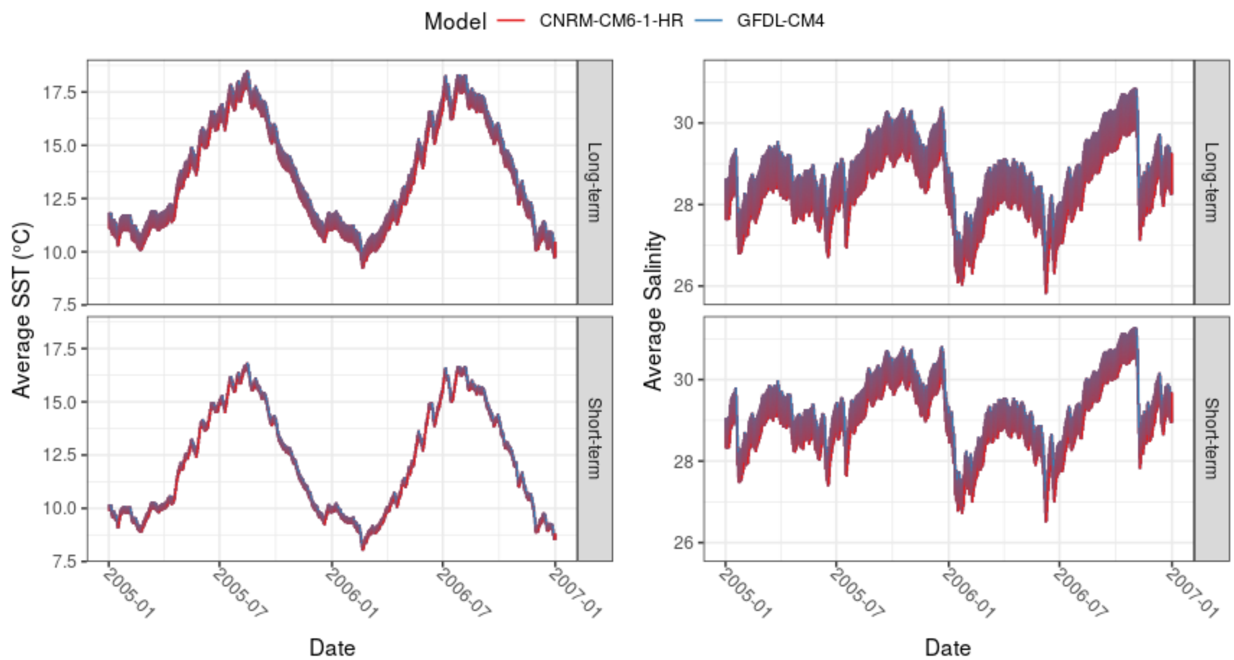
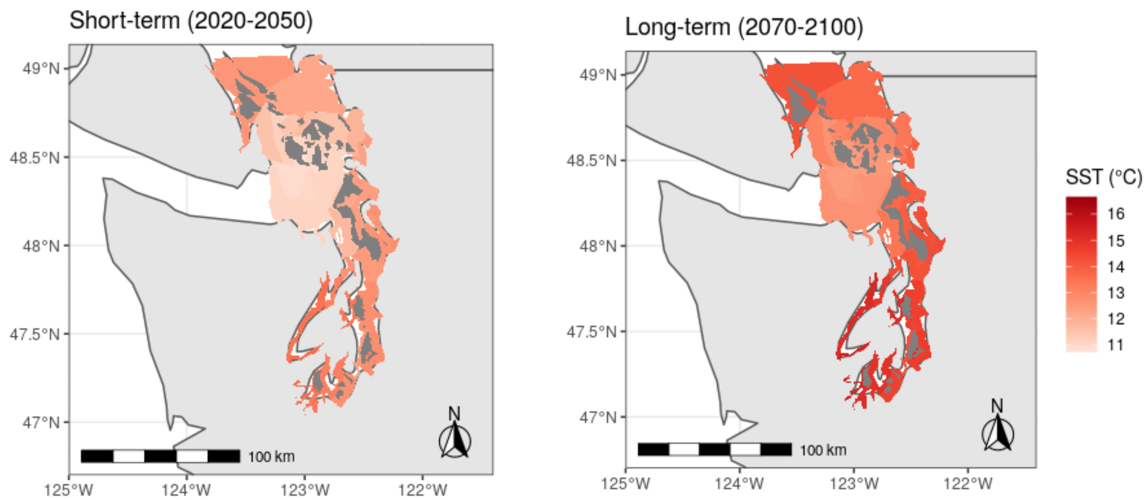


Figure S6. Spatial variations in downscaled projected SST for GFDL-CM4 and CNRM-CM6-1-HR scenarios in both the short-term and long-term. Choropleth map polygons come from the Puget Sound Atlantis ecosystem model polygons (Morzaria-Luna *et al.* 2020). The value within each polygon is the calculated average over the course of the two-year ROMS time-series.

GFDL-CM4 ssp245



GFDL-CM4 ssp585

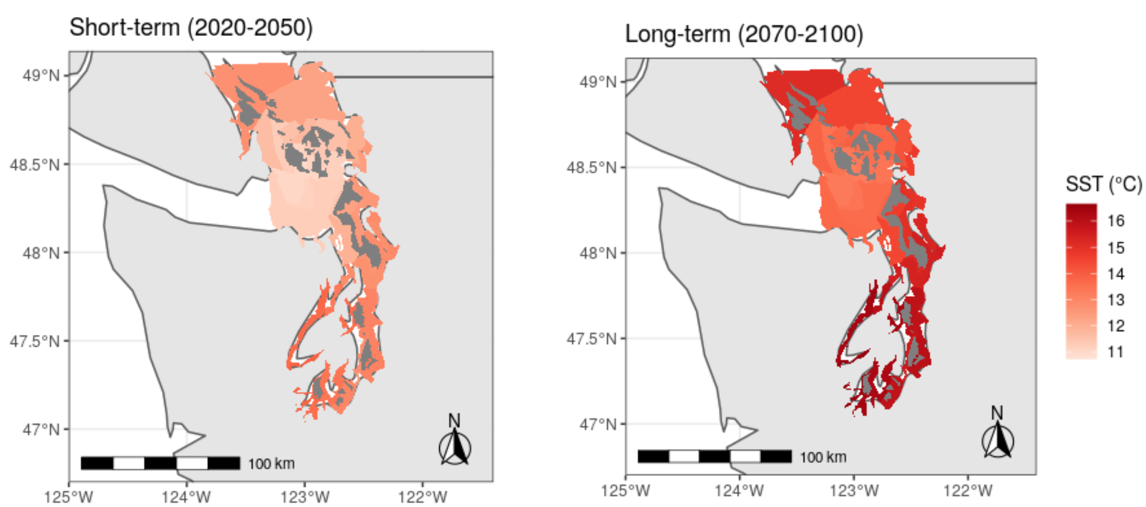
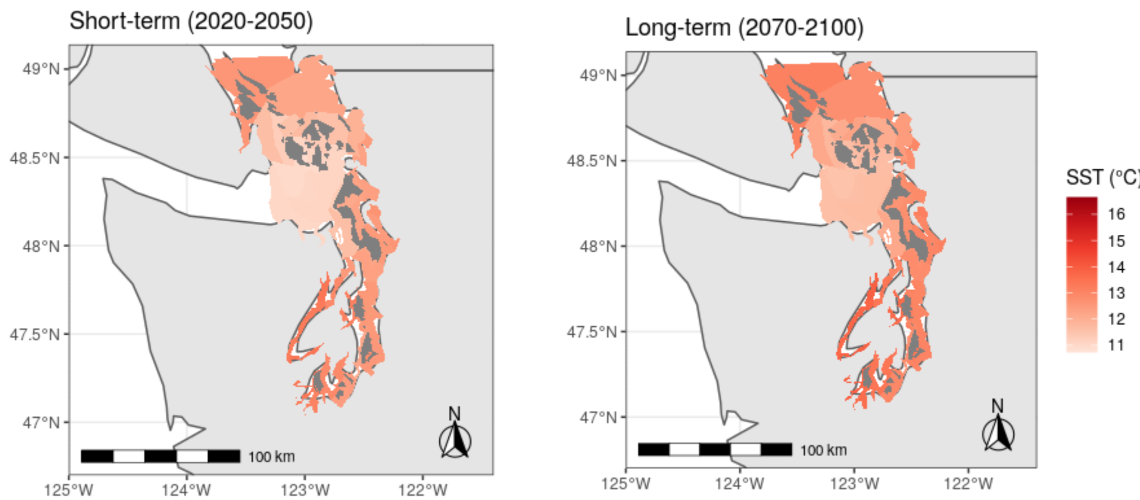


Figure S6 (Cont.)

CNRM-CM6-1-HR ssp126



CNRM-CM6-1-HR ssp245

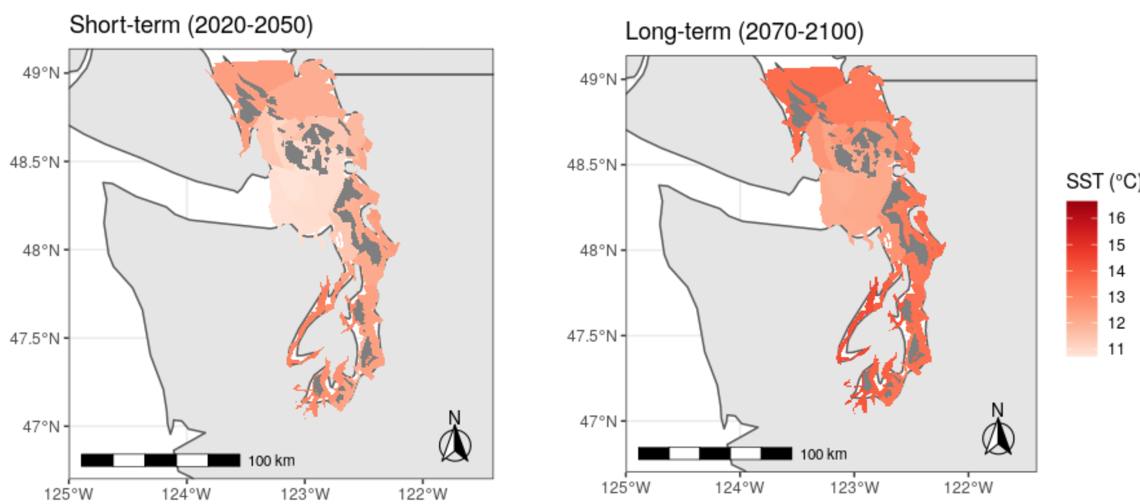
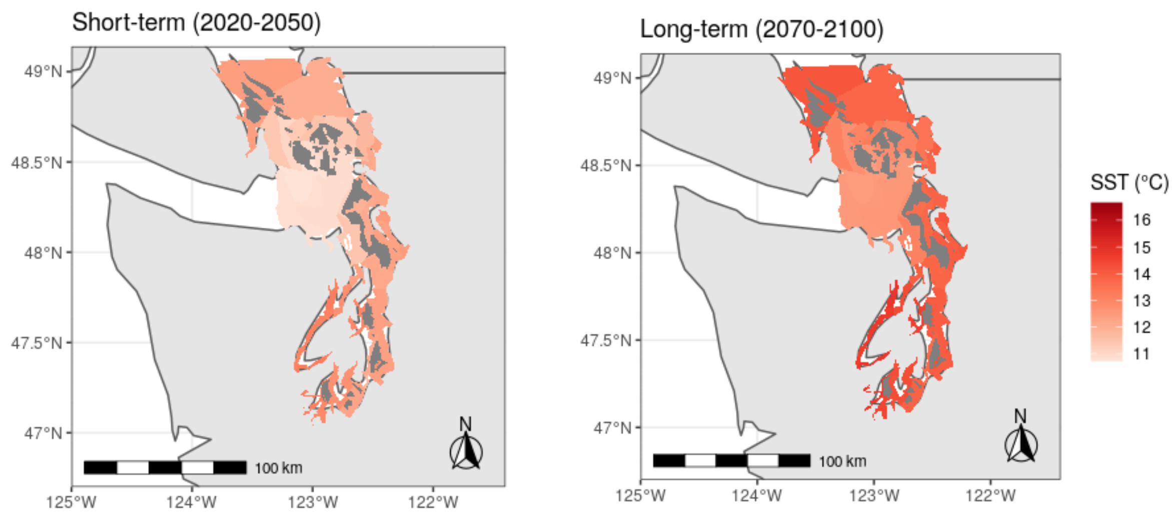


Figure S6 (Cont.)

CNRM-CM6-1-HR ssp370



CNRM-CM6-1-HR ssp585

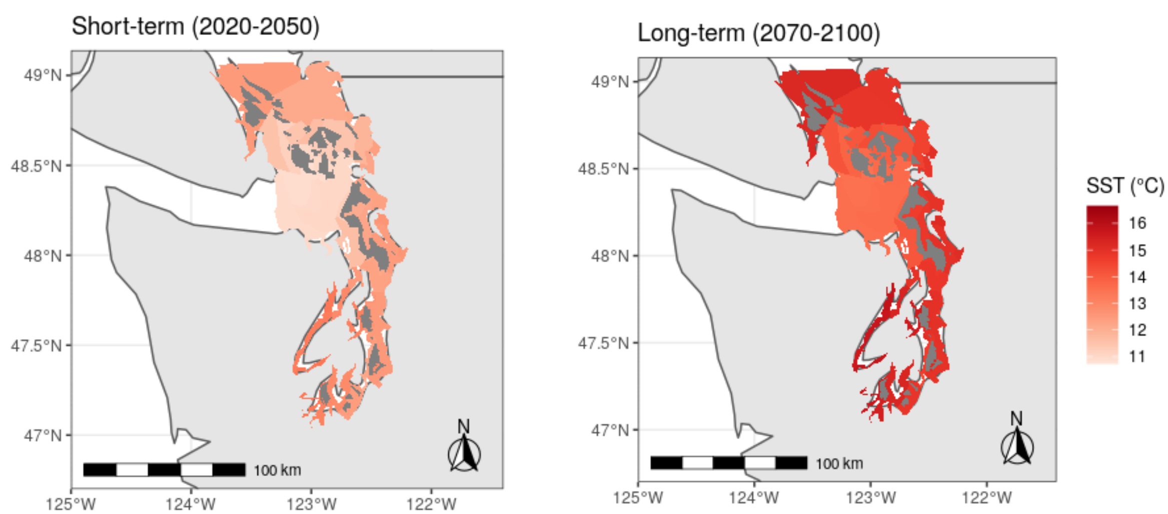


Figure S7. Spatial variations in downscaled projected sea surface salinity for GFDL-CM4 and CNRM-CM6-1-HR scenarios in both the short-term and long-term. Choropleth map polygons come from the Puget Sound Atlantis ecosystem model polygons (Morzaria-Luna *et al.* 2020). The value within each polygon is the calculated average over the course of the two-year ROMS time-series.

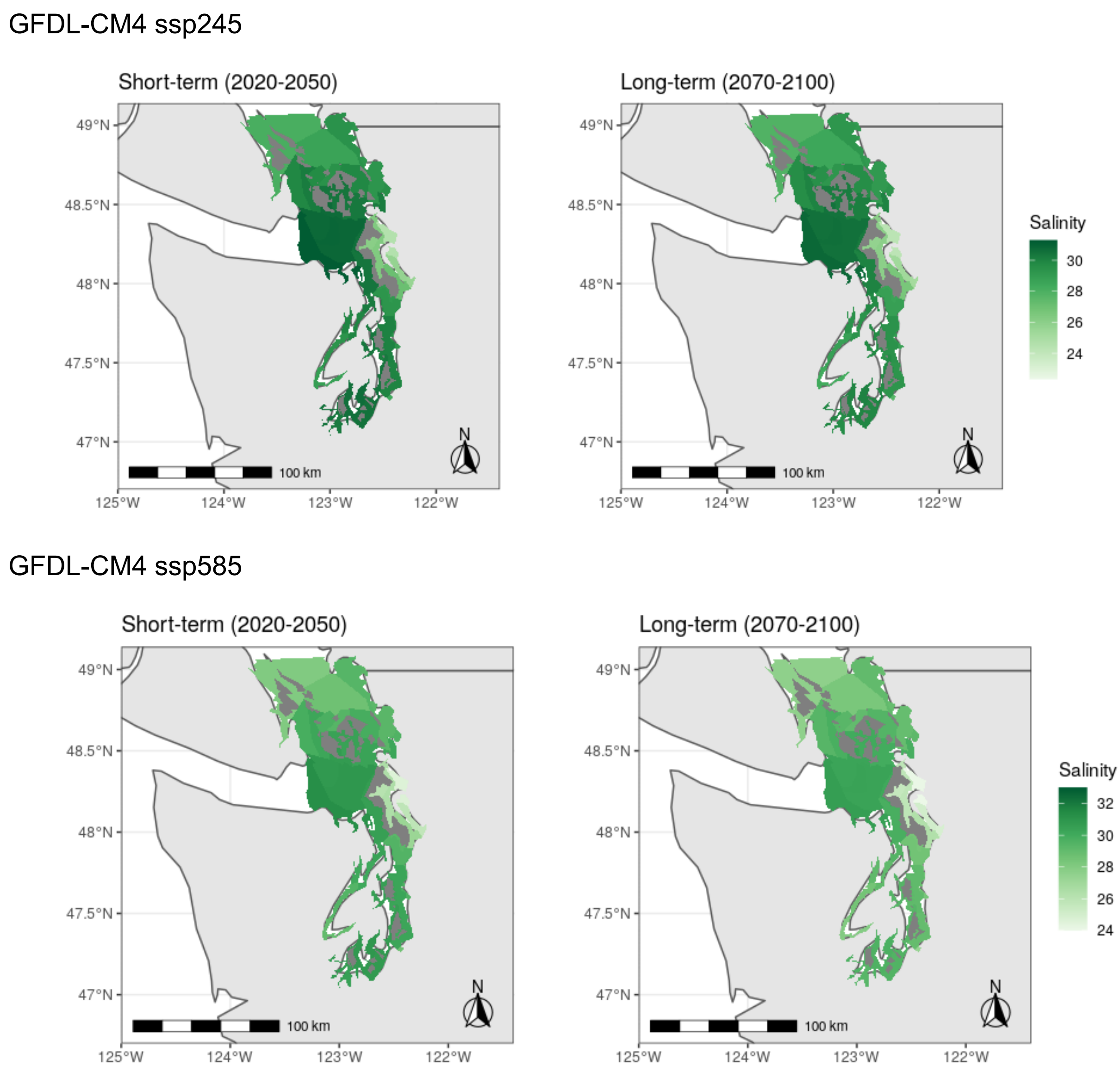
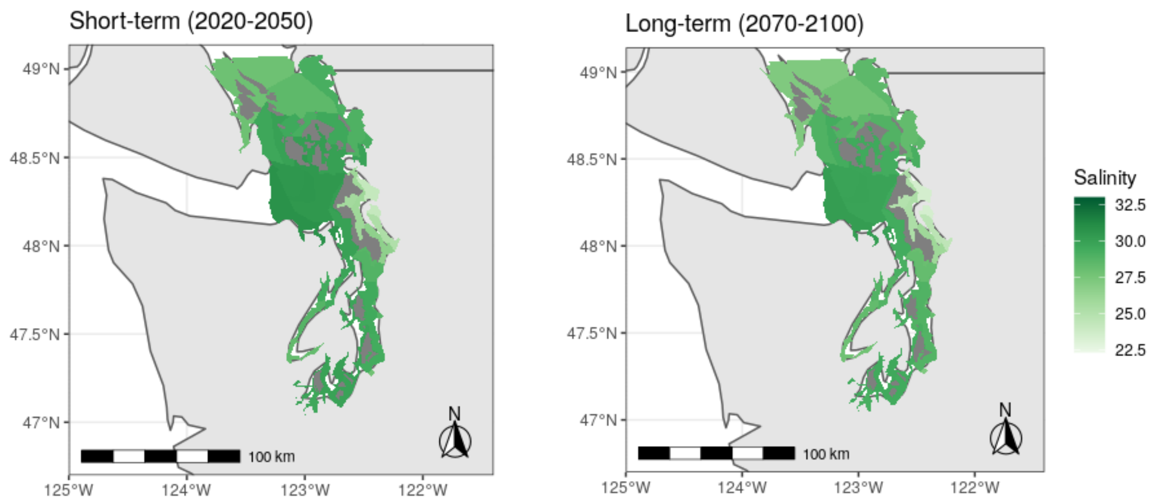


Figure S7 (Cont.)

CNRM-CM6-1-HR ssp126



CNRM-CM6-1-HR ssp245

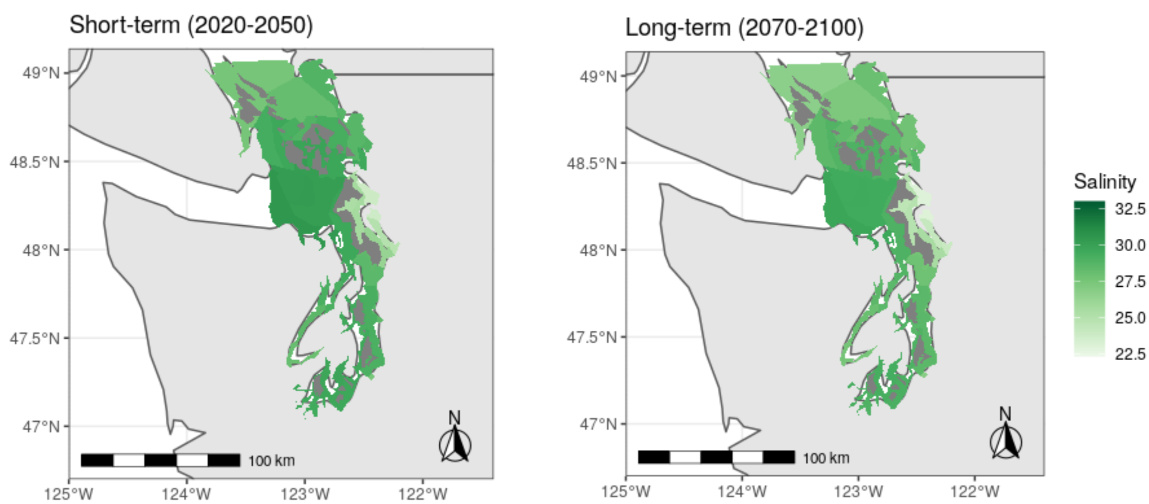
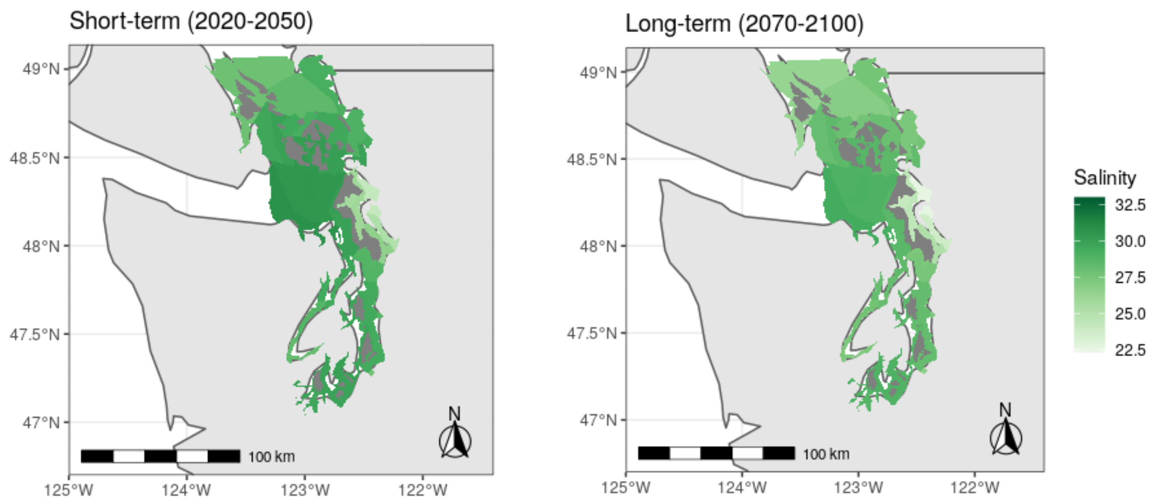
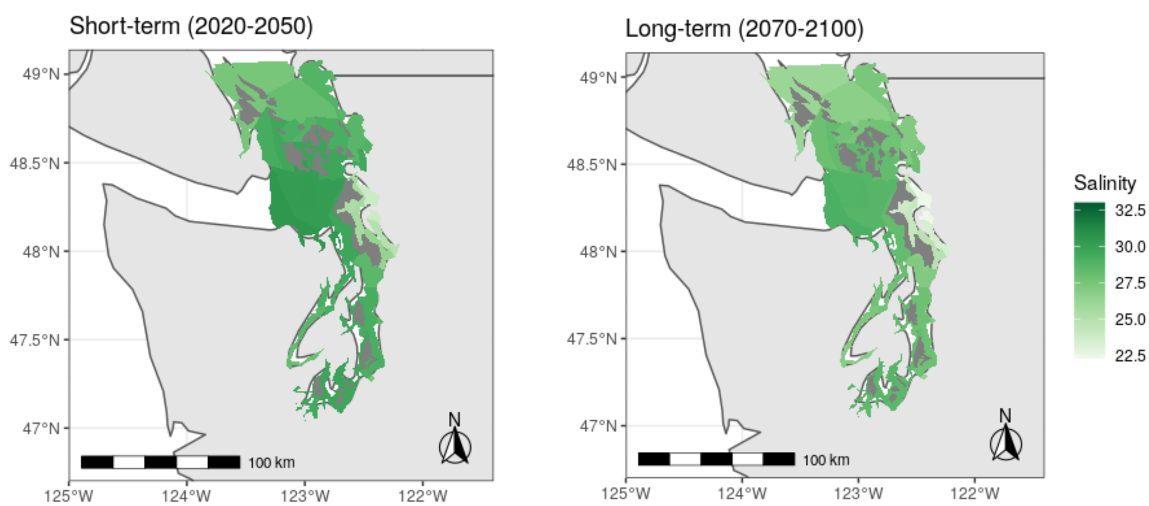


Figure S7 (Cont.)

CNRM-CM6-1-HR ssp370



CNRM-CM6-1-HR ssp585



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