

WILD SEAWEED HARVESTING AS A DIVERSIFICATION OPPORTUNITY FOR FISHERMEN

KELP ATLAS

A report for Highlands and Islands Enterprise

May 2018



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This report should be cited as:

Burrows M.T. & Allen, C.J. (2018) . *A report by SRSL for HIE*, pp. 406

1 SUMMARY

This report is a supplementary document that accompanies the report 'Wild Seaweed Harvesting as a Diversification Opportunity for Fishermen', which was undertaken by SAMS Research Services Ltd. (SRSL) for Highlands and Islands Enterprise (HIE) (Burrows *et al.*, 2018)¹.

Part of the project work undertaken for that report was the development of a spatial model that predicts the locations around the Scottish Coast where the habitat is suitable for four species of kelp to grow: *Laminaria hyperborea*, *Saccharina latissima*, *Laminaria digitata* and *Saccorhiza polyschides*.

The main report contains details of how the predictive model was constructed and validated, and the outputs will be made available for Marine Science via the National Marine Plan interactive website (<https://marinescotland.atkinsgeospatial.com/nmpi/>). However, in order to make some of the outputs of the modelling accessible, this supplementary 'Kelp Atlas' has been created.

For this Kelp Atlas, the coastline of Scotland is divided into 49 x 50 km squares. Each of these 50 km squares is displayed as a zoomed in map for the four kelp species examined during the project, showing where the model predicted habitat suitable for that specific kelp species to grow. Map legends show the 'confidence' that kelp will be found in a given location, which follows the criteria given below:

-3	~5% Likelihood of kelp species being present
-2	~10% Likelihood of kelp species being present
-1	~25% Likelihood of kelp species being present
0	~50% Likelihood of kelp species being present
1	~75% Likelihood of kelp species being present
2	~90% Likelihood of kelp species being present
3	~95% Likelihood of kelp species being present

For *Laminaria hyperborea* and *Saccharina latissima* additional maps have been added that show the predicted biomass of kelp. These were not able to be produced for *Laminaria digitata* and *Saccorhiza polyschides* due to insufficient data being available to create biomass estimates.

Additionally, the biomass maps for *Laminaria hyperborea* and *Saccharina latissima* have also been overlaid with records of Priority Marine Features in Scottish Waters. This gives an indication of likely areas where kelp harvesting activities may be under higher scrutiny due to the presence of species and habitats of conservation importance for Scotland.

¹ Burrows M.T., Fox, C.J., Moore, P., Smale, D., Sothoran, I., Benson, A., Greenhill, L., Martino, S., Parker, A., Thompson, E., Allen, C.J. (2018) Wild Seaweed Harvesting as a Diversification Opportunity for Fishermen. *A report by SRSL for HIE*, pp. 171

2 KELP ATLAS

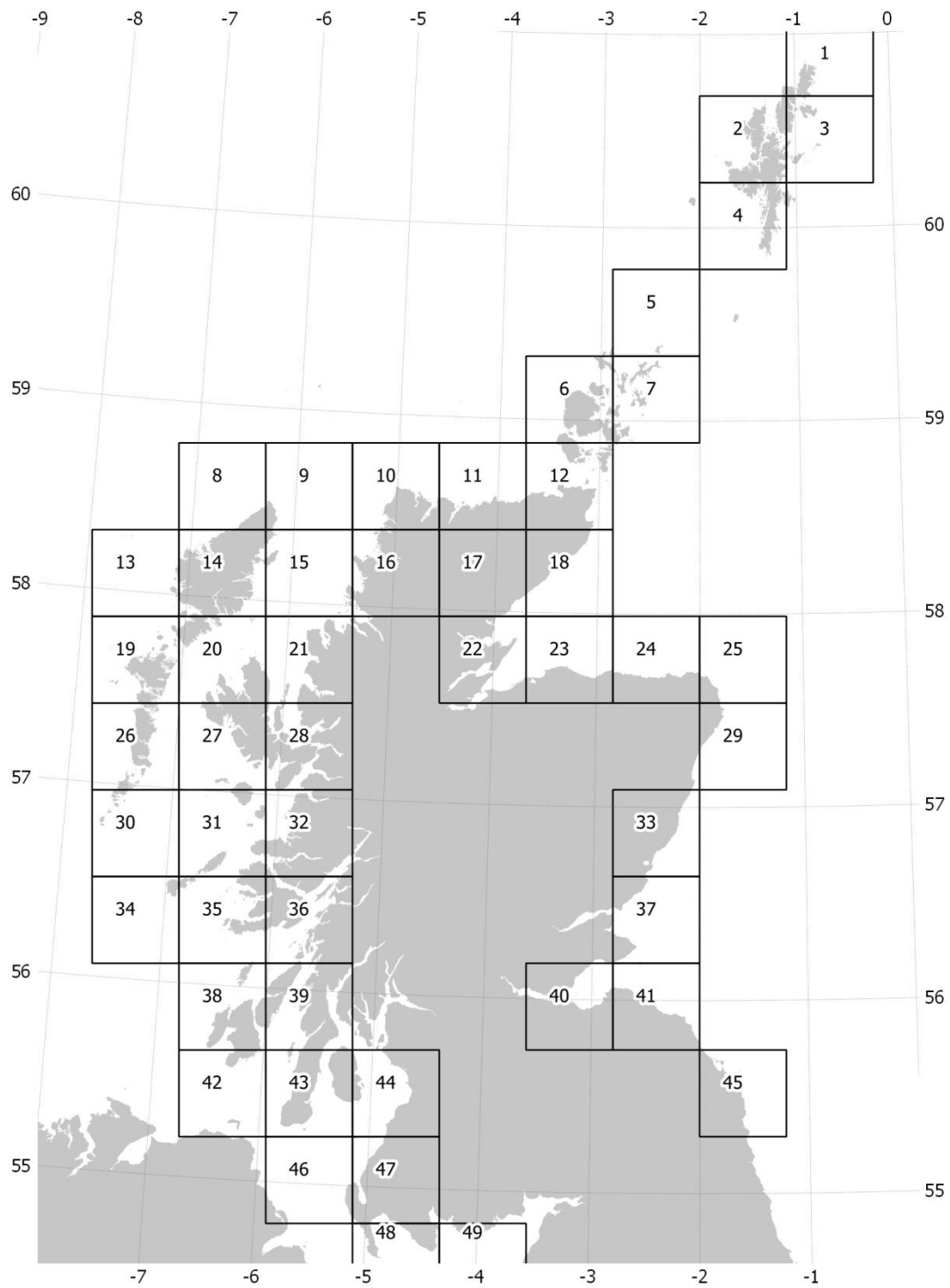
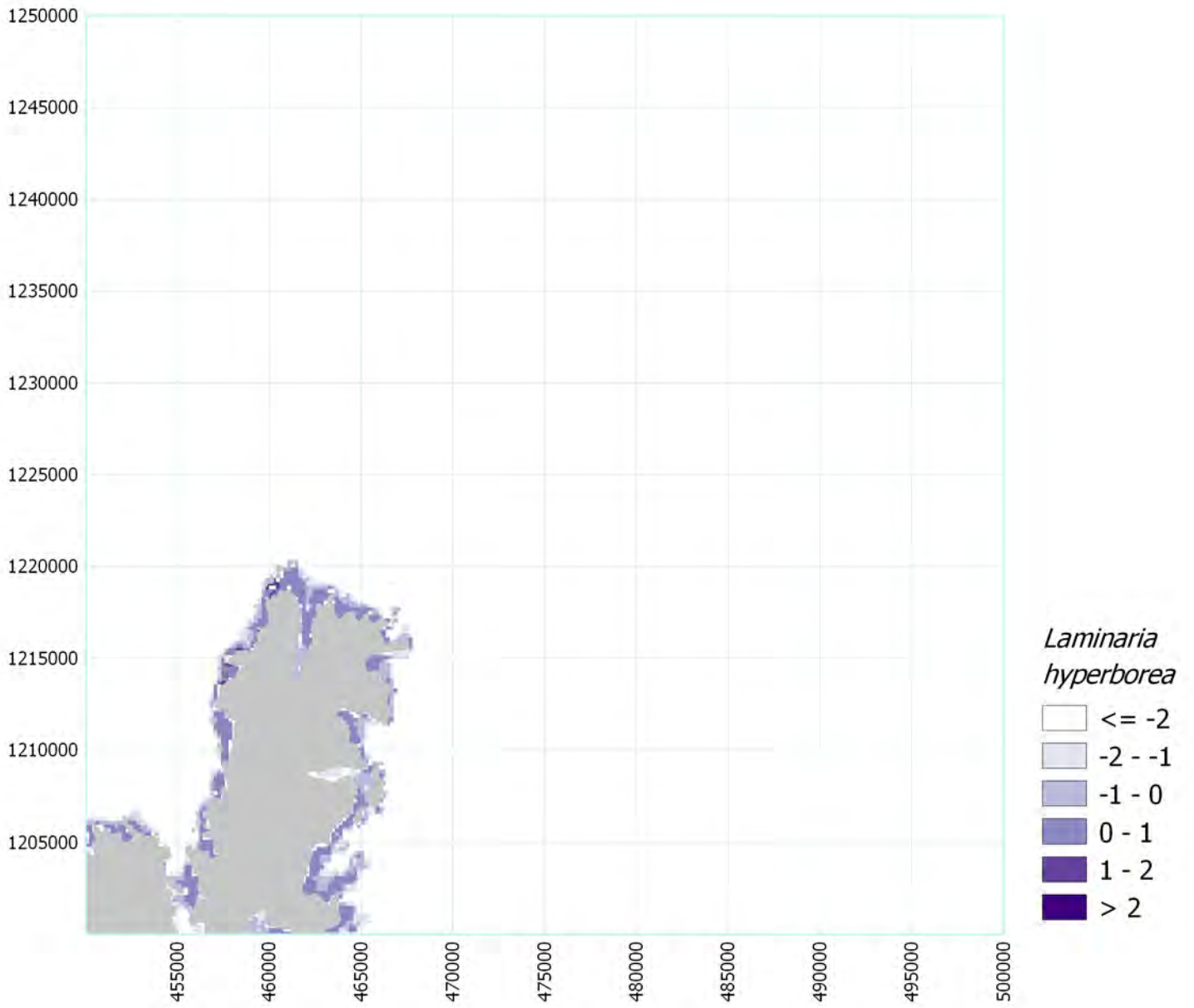


Figure 1. Scottish coastline split into 50 km squares. Each square is numbered, which is repeated on each map within this Kelp Atlas

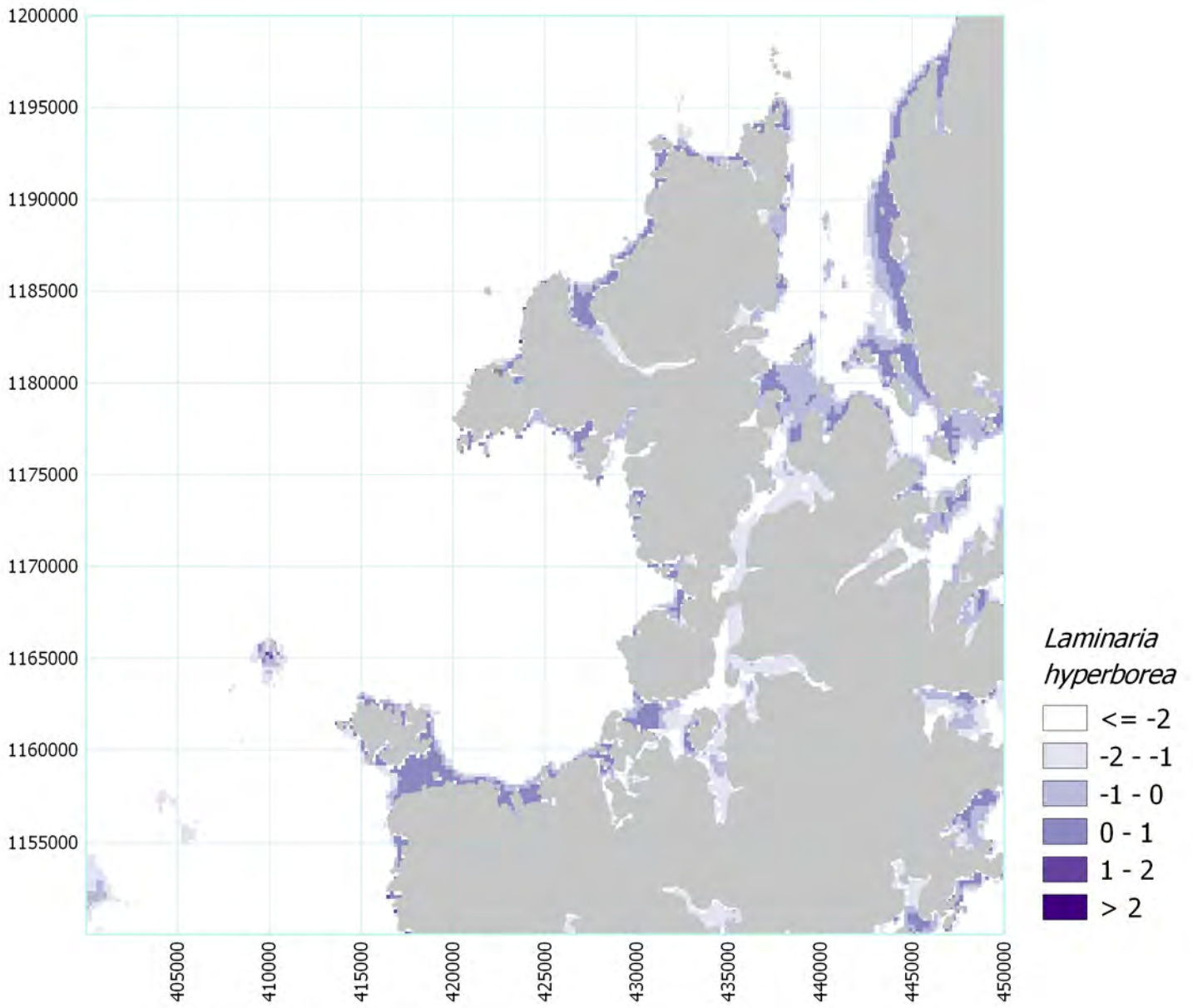
2.1 *Laminaria hyperborea*

The following pages show first the habitat suitability for *Laminaria hyperborea*, followed by maps showing predicted biomass, and finally maps showing the overlap between kelp habitats and Priority Marine Features.

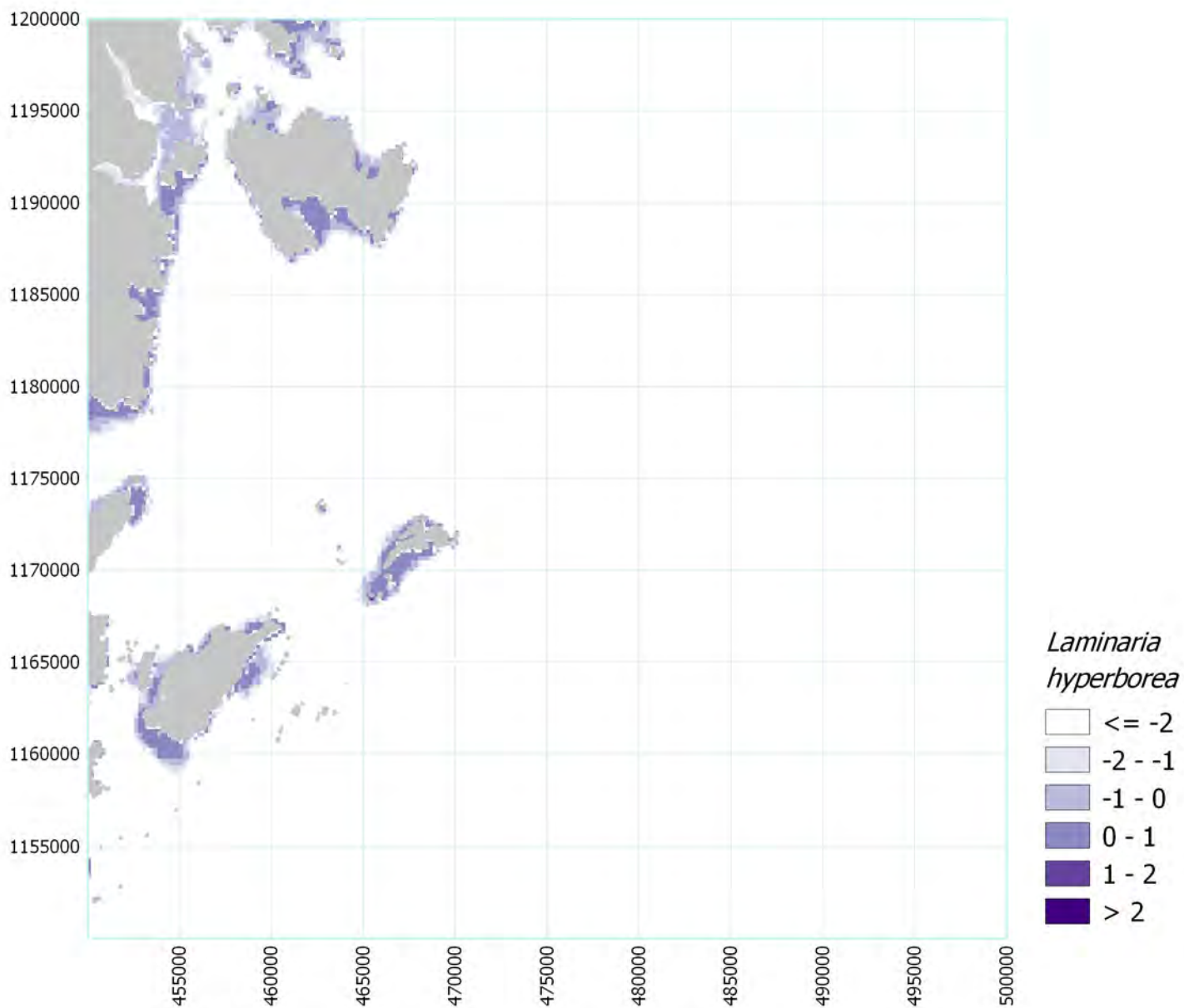
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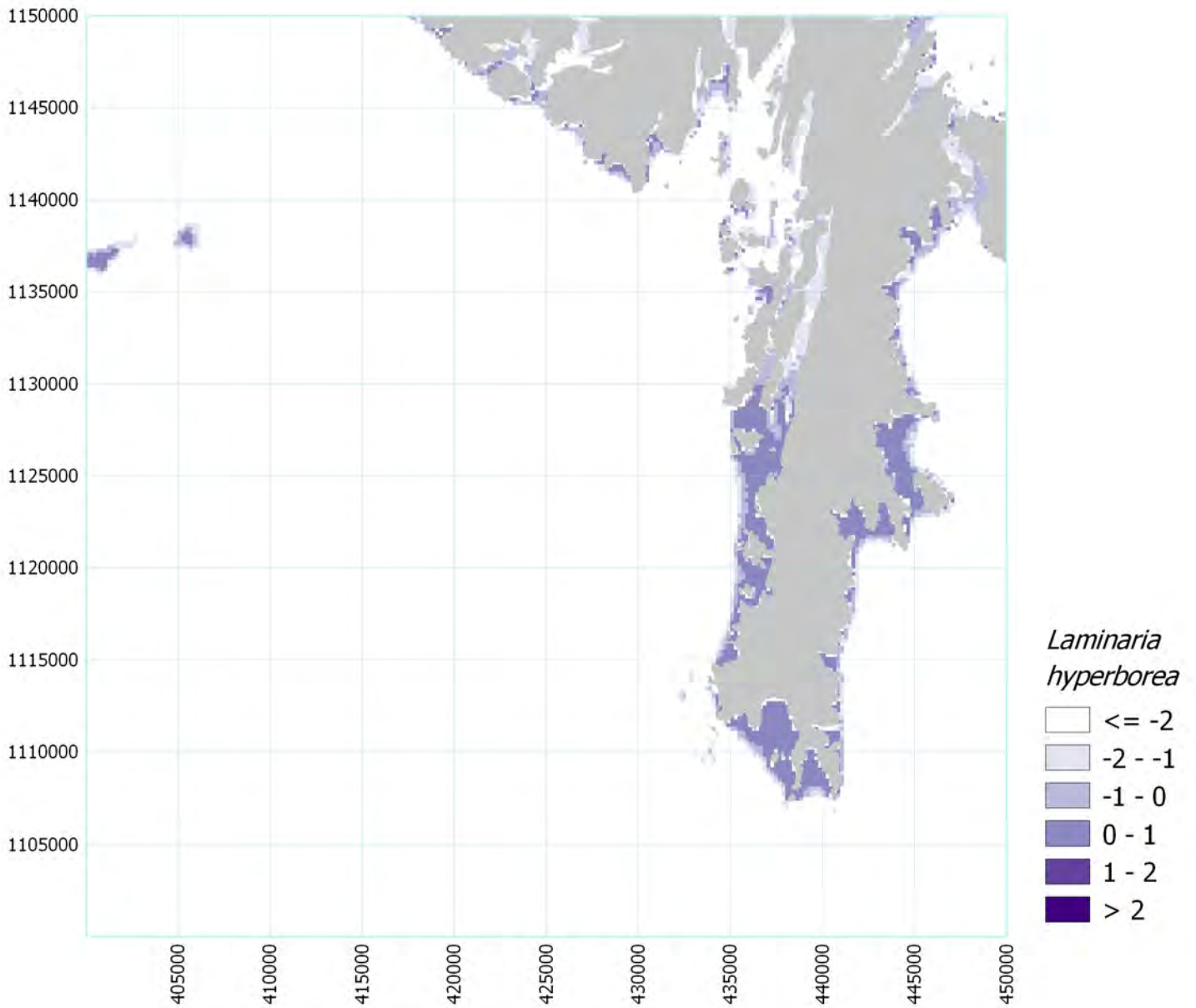
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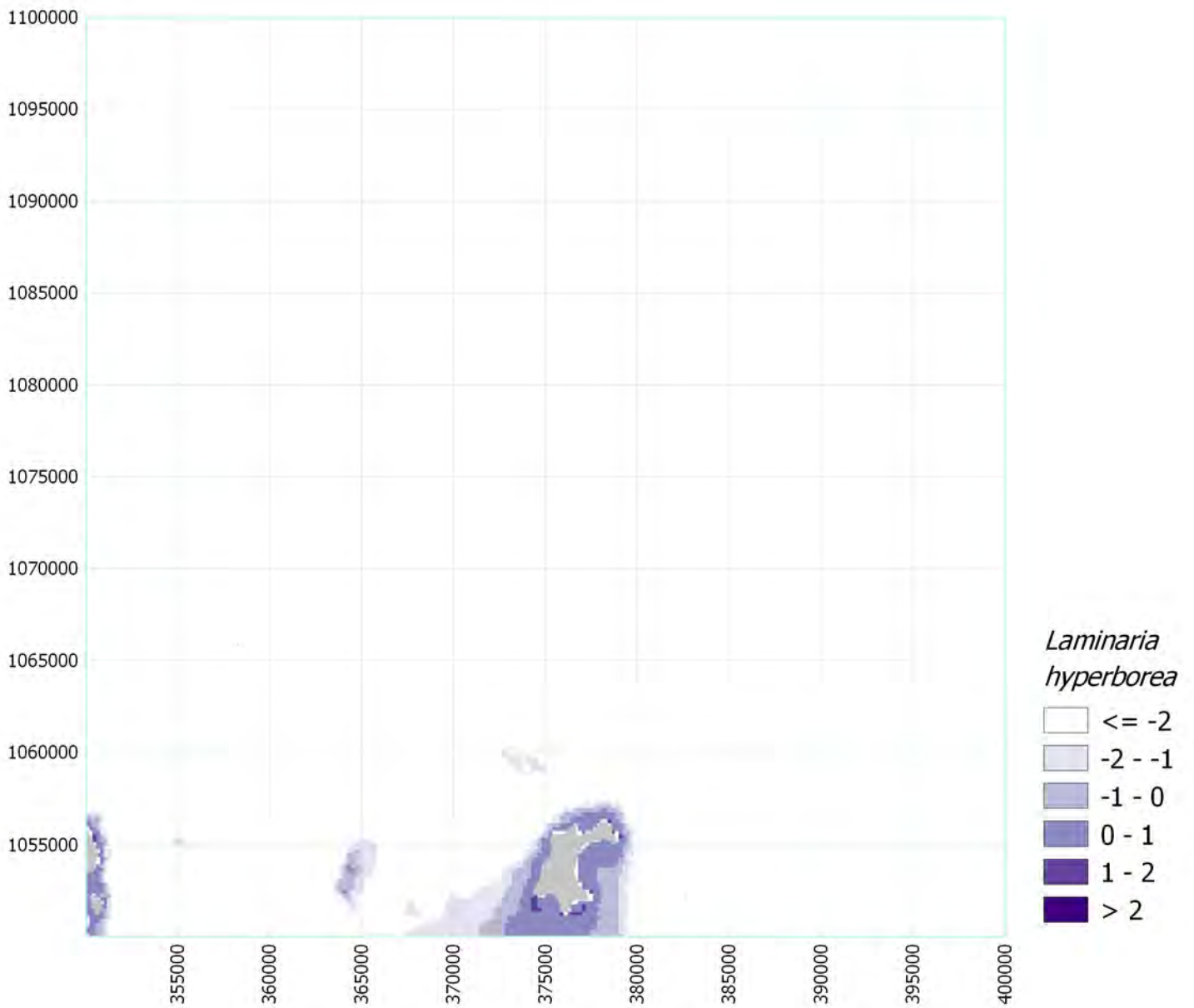
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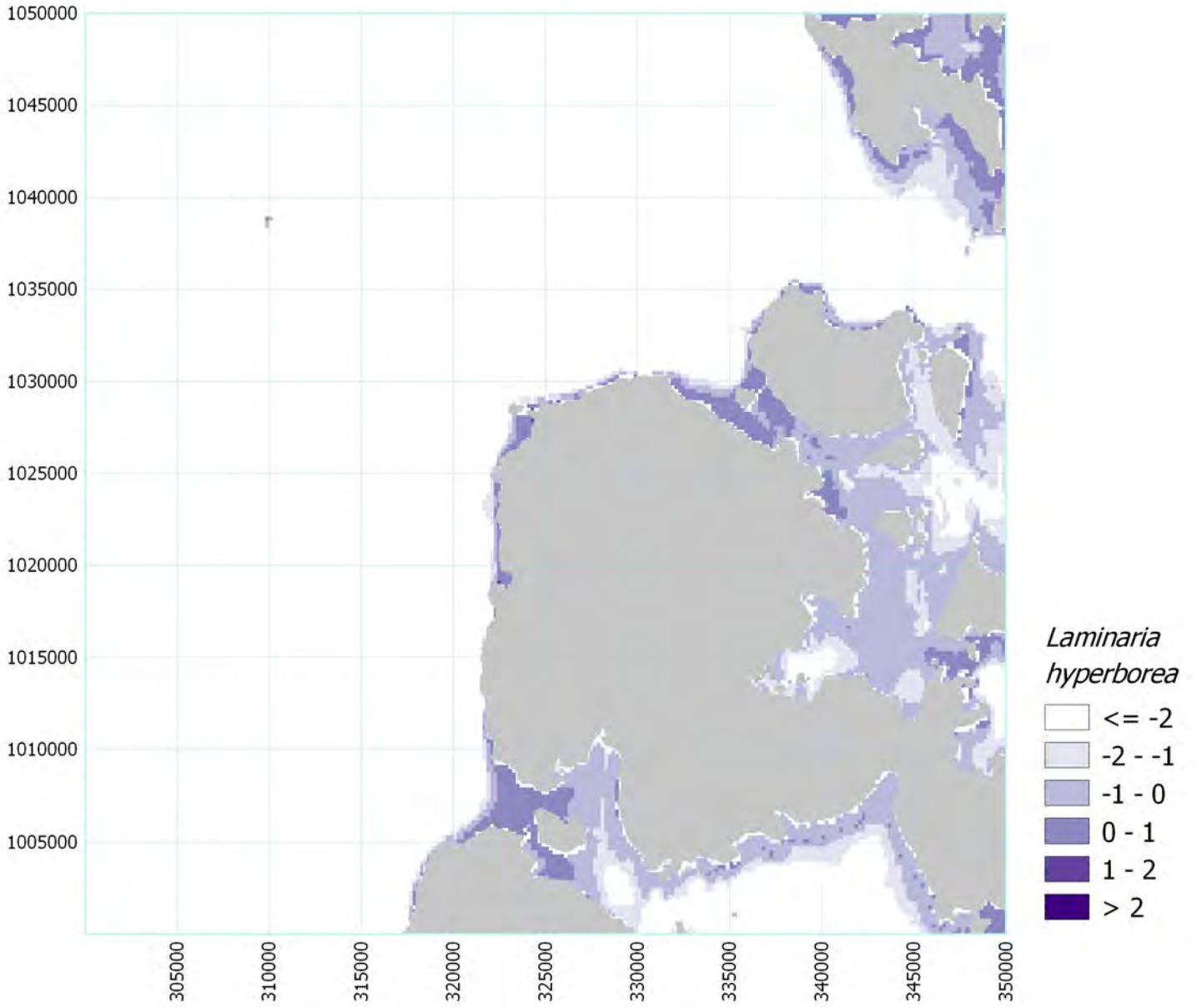
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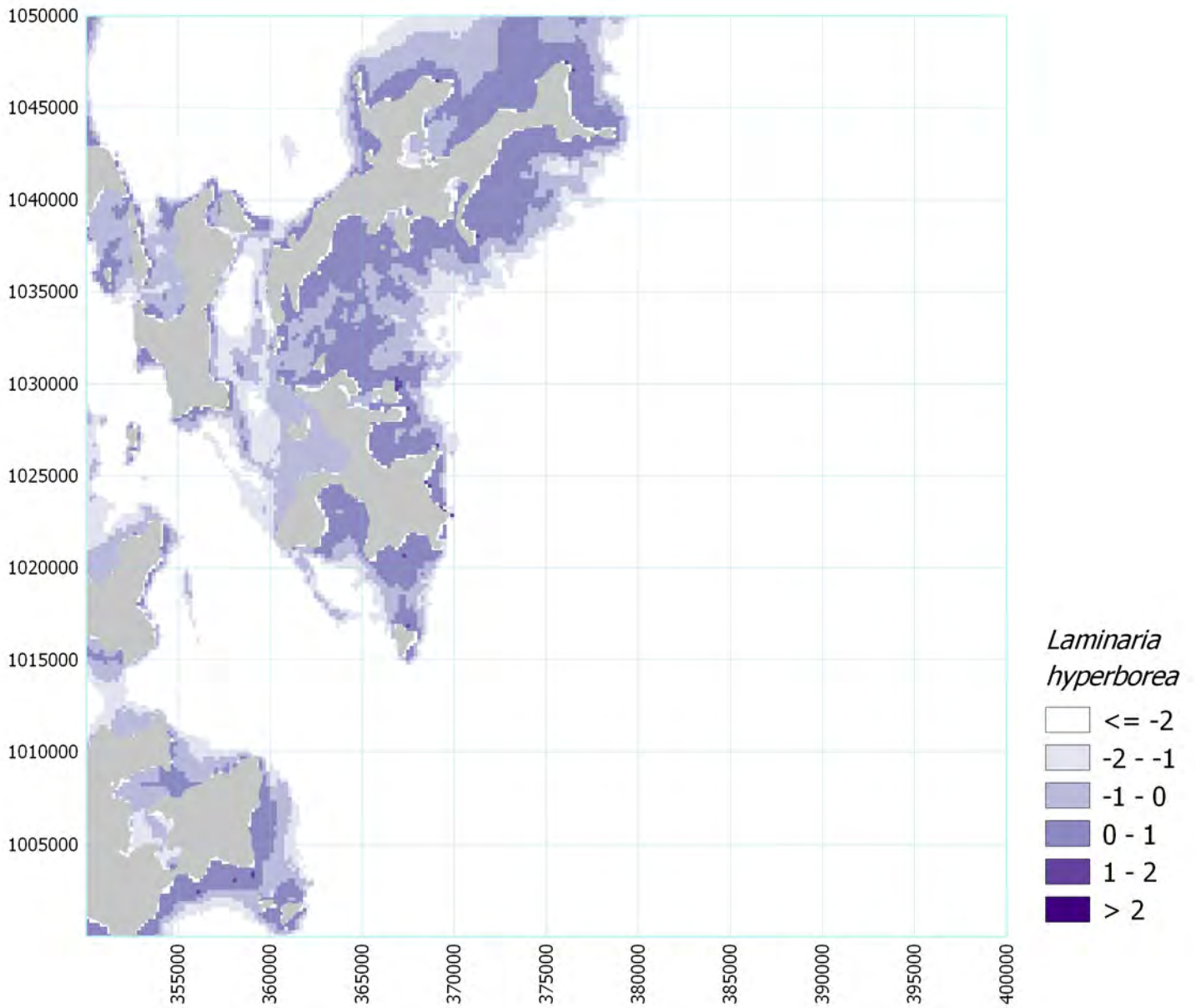
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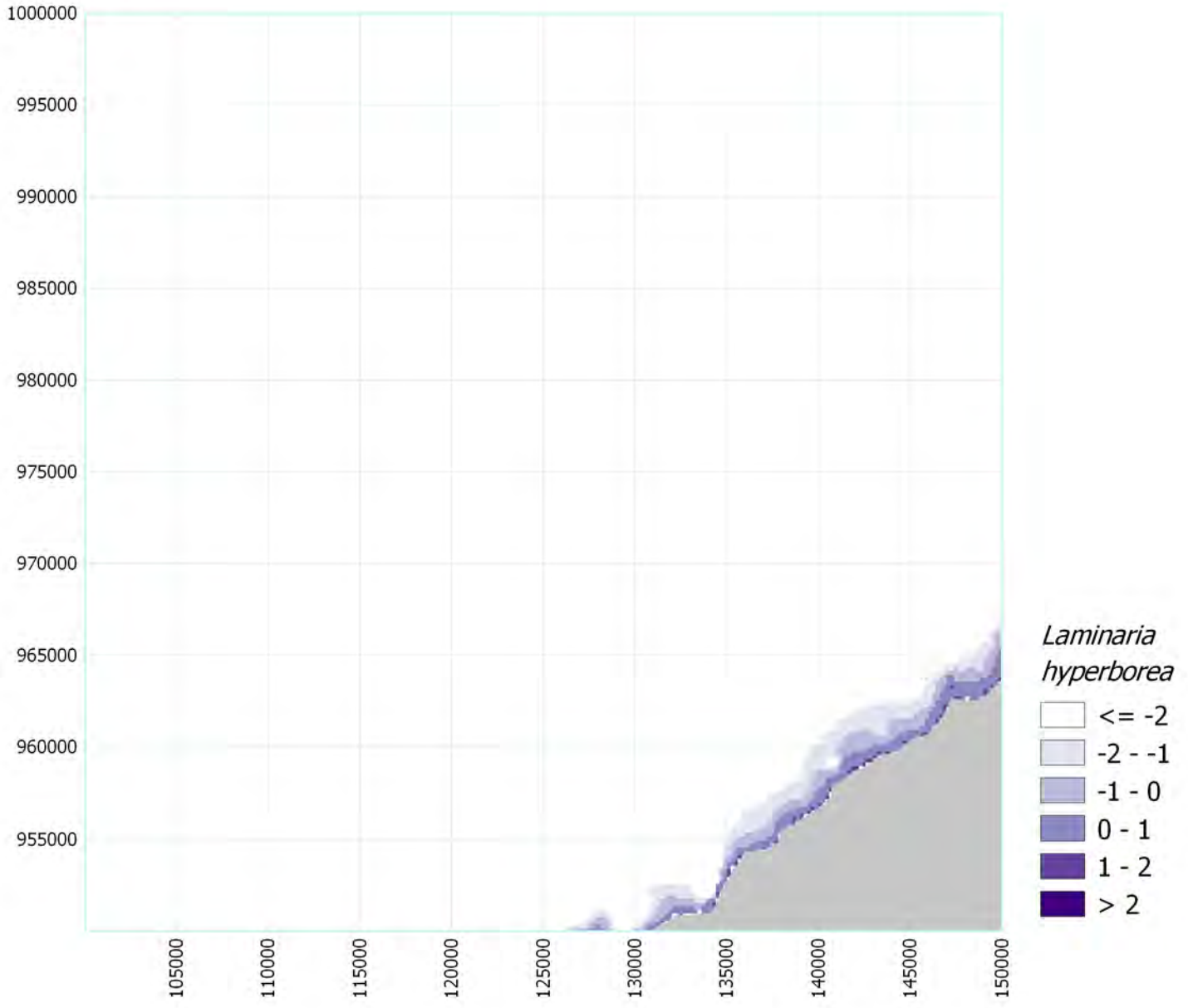
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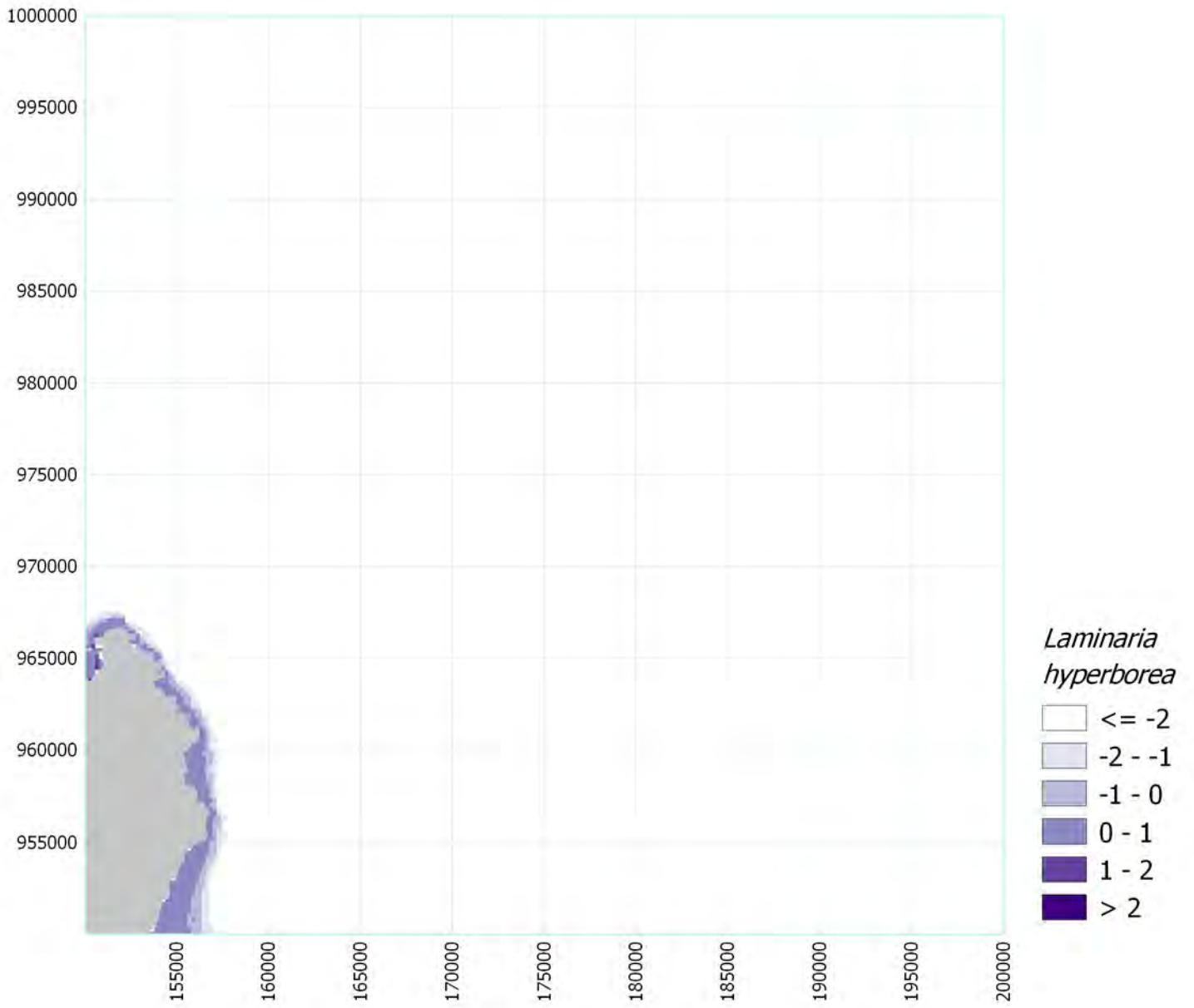
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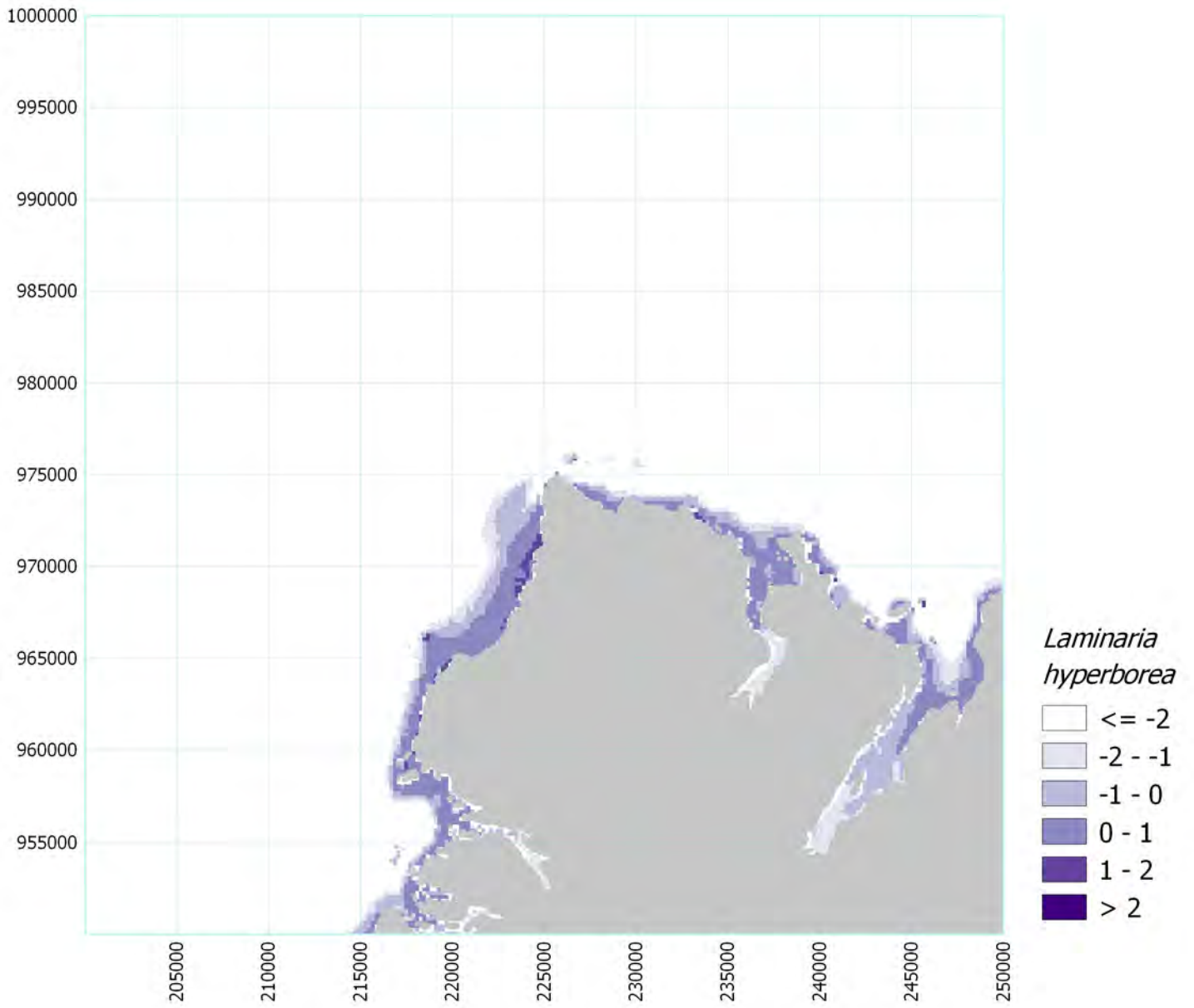
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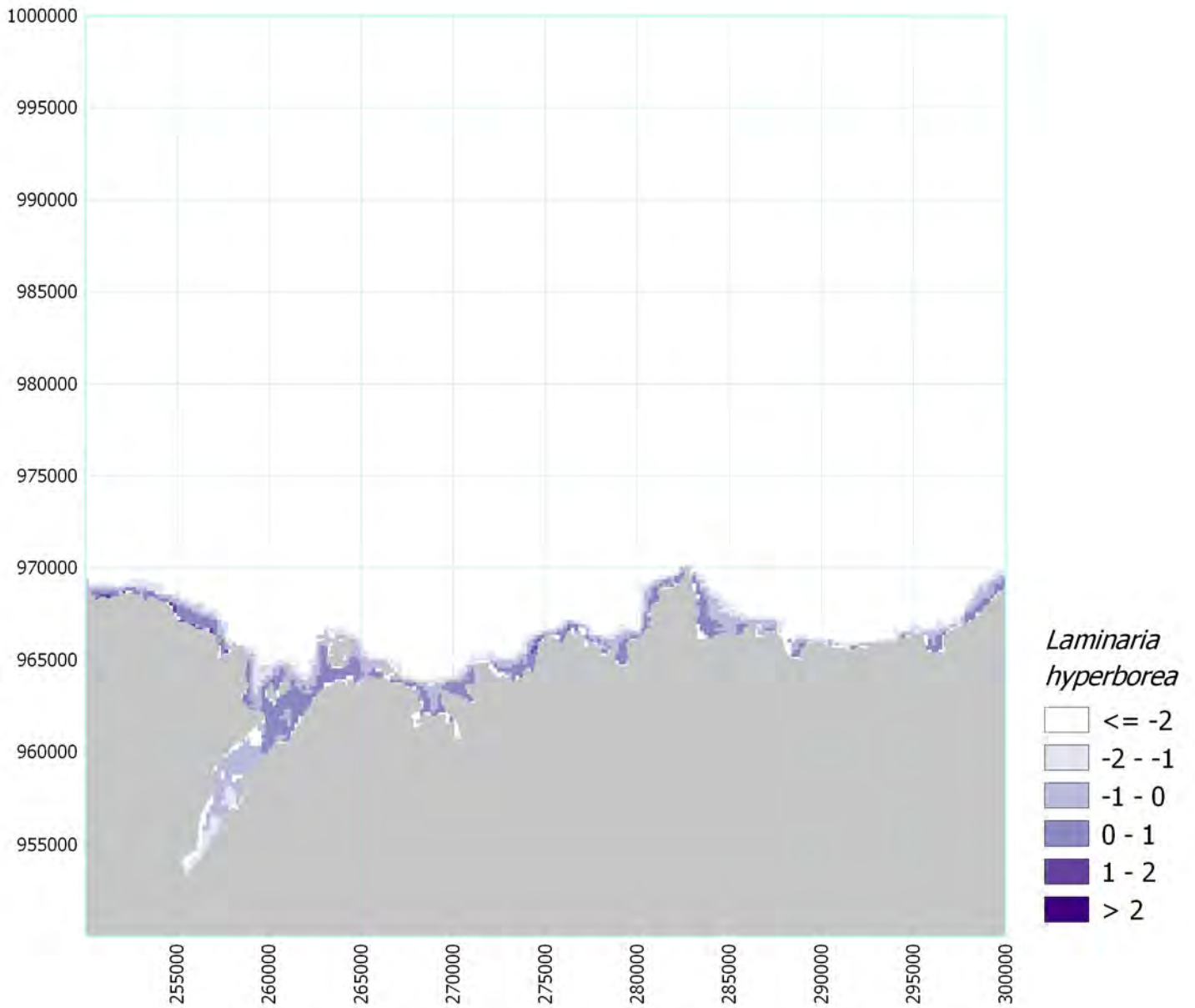
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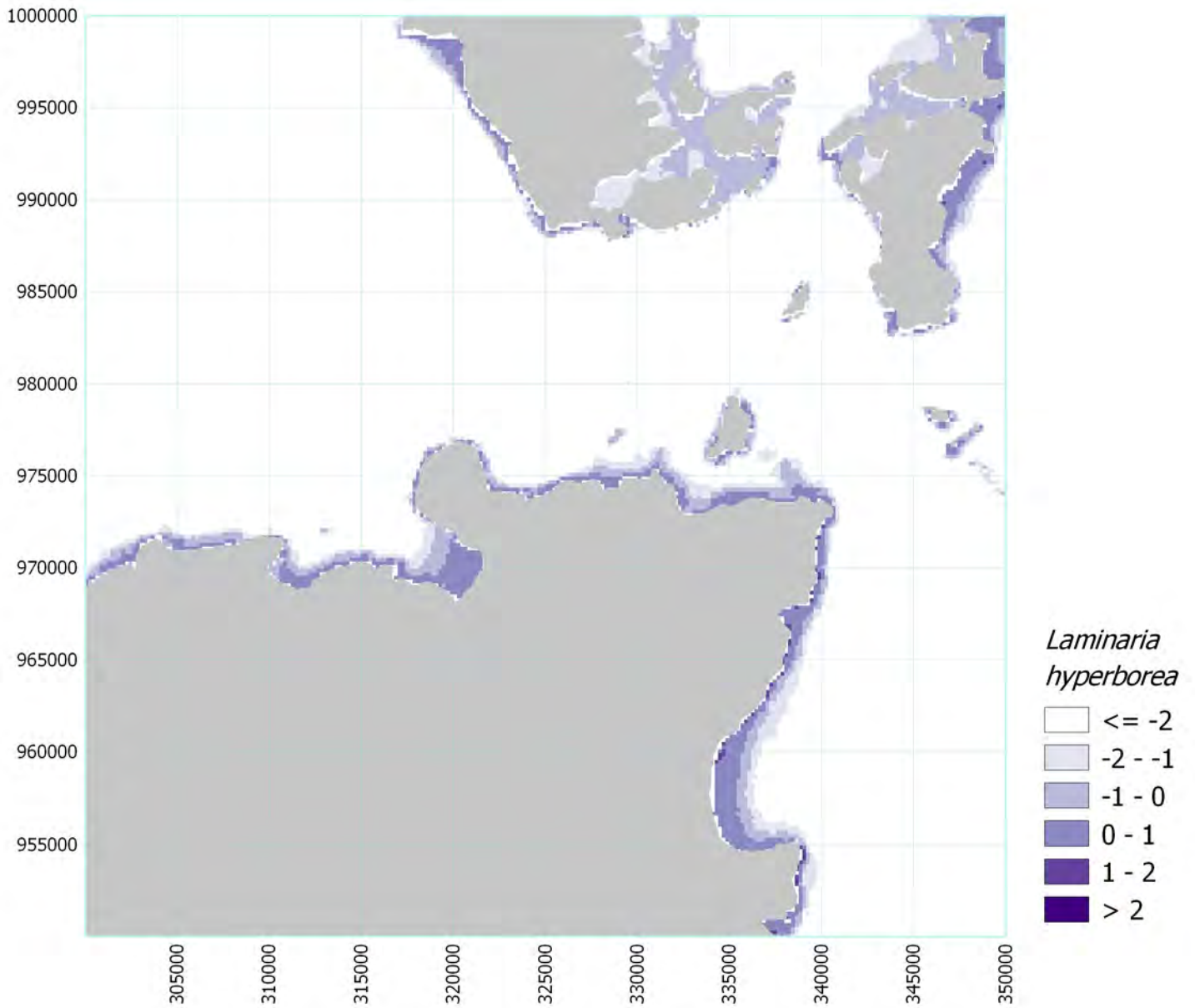
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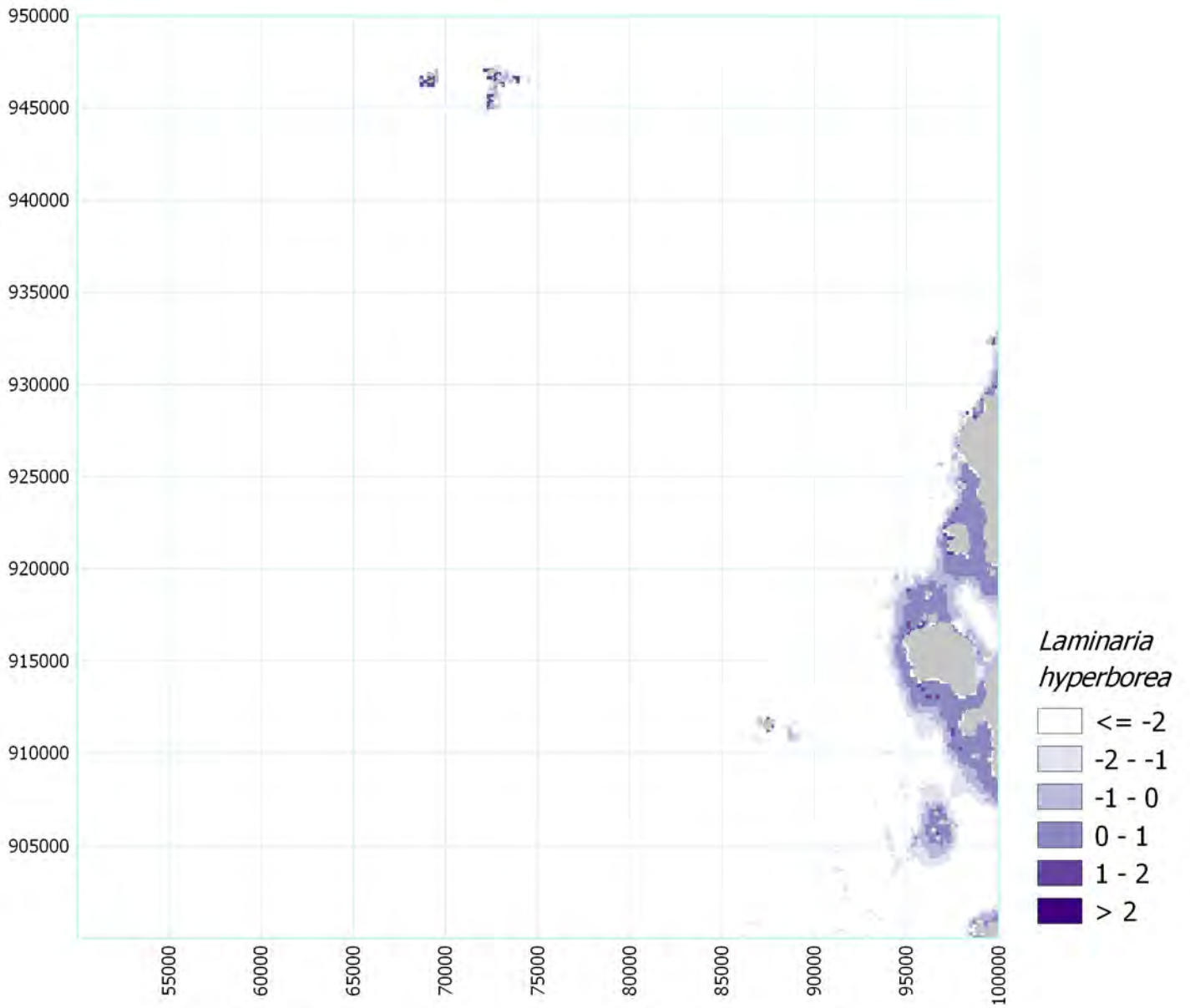
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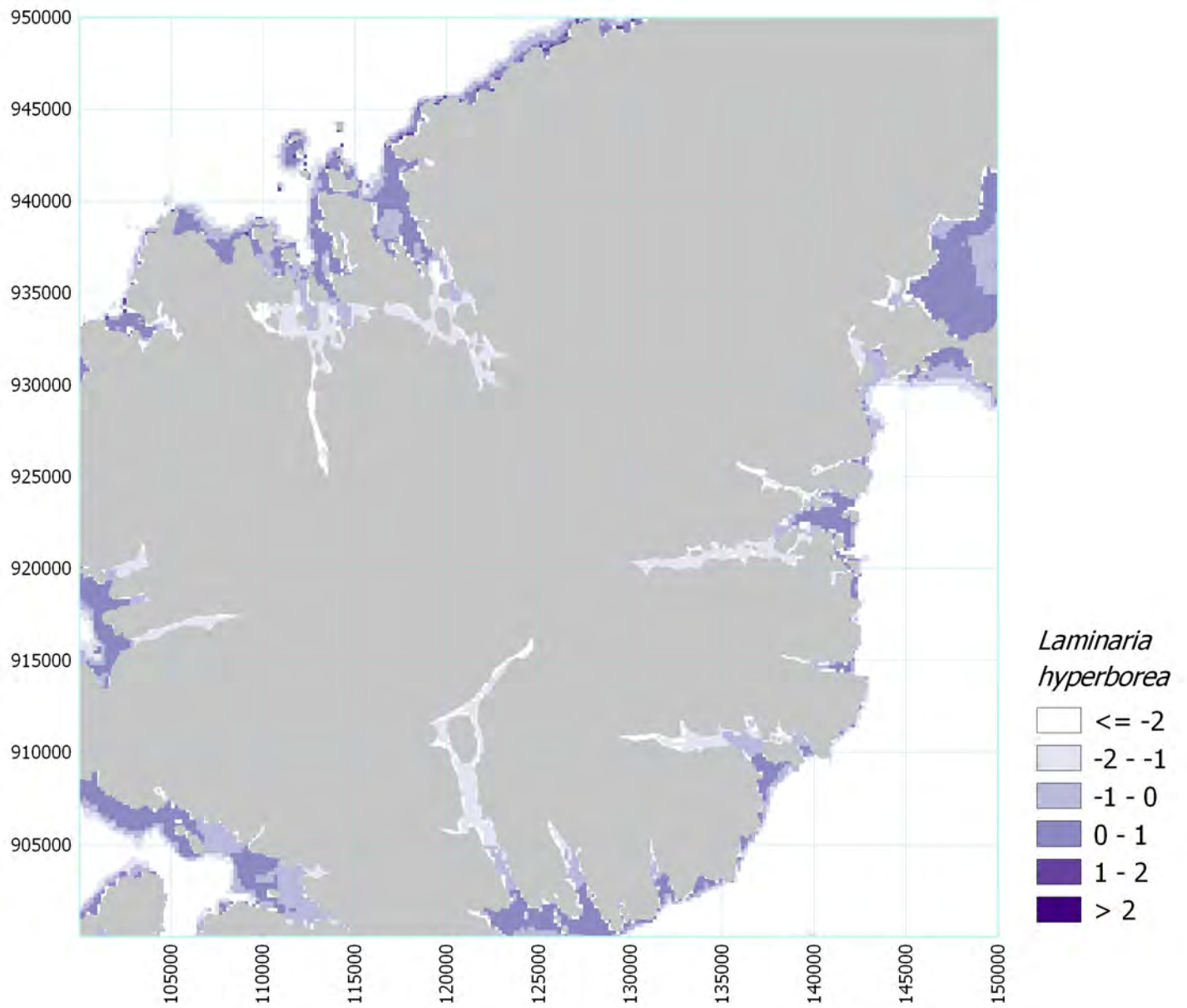
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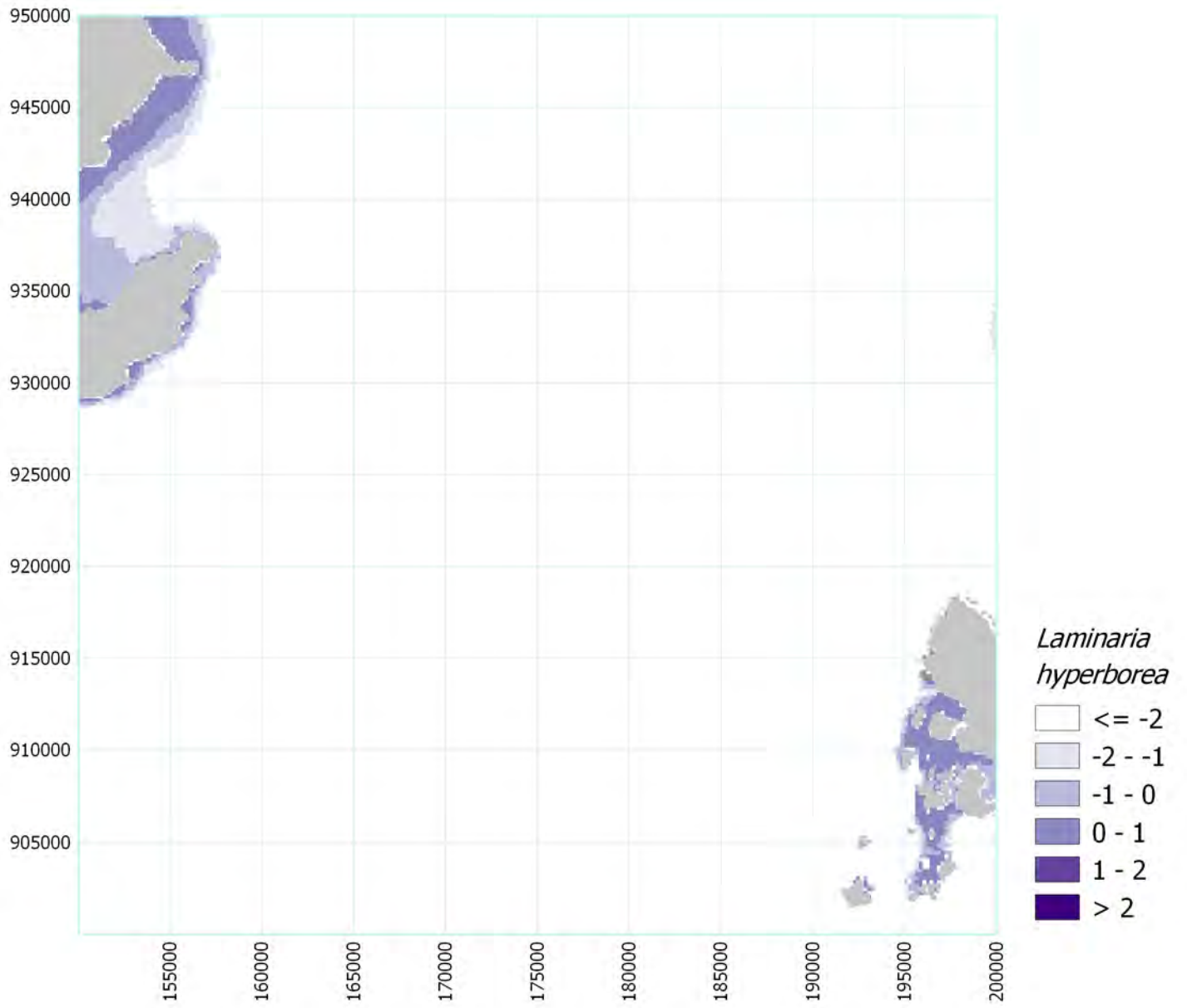
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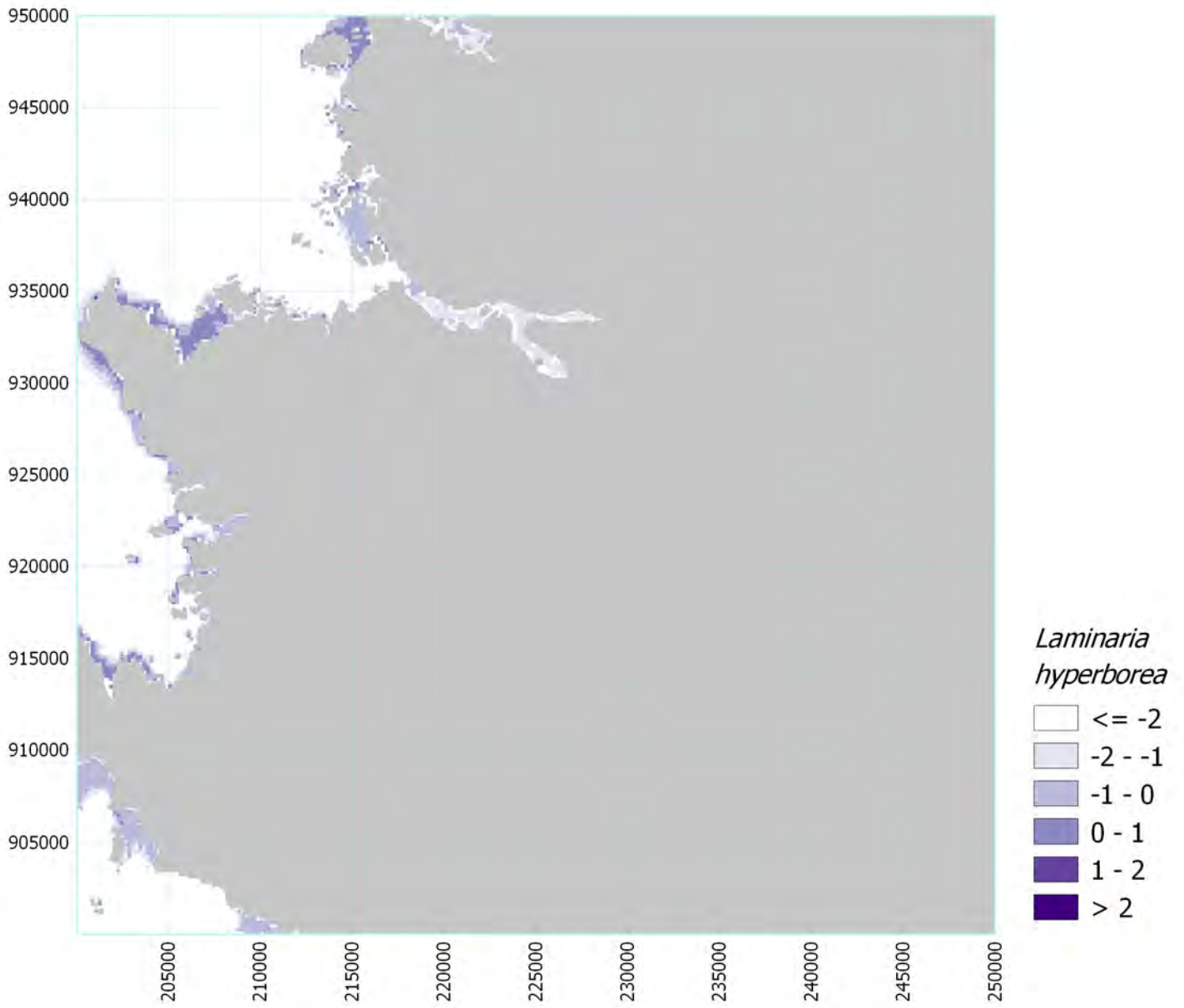
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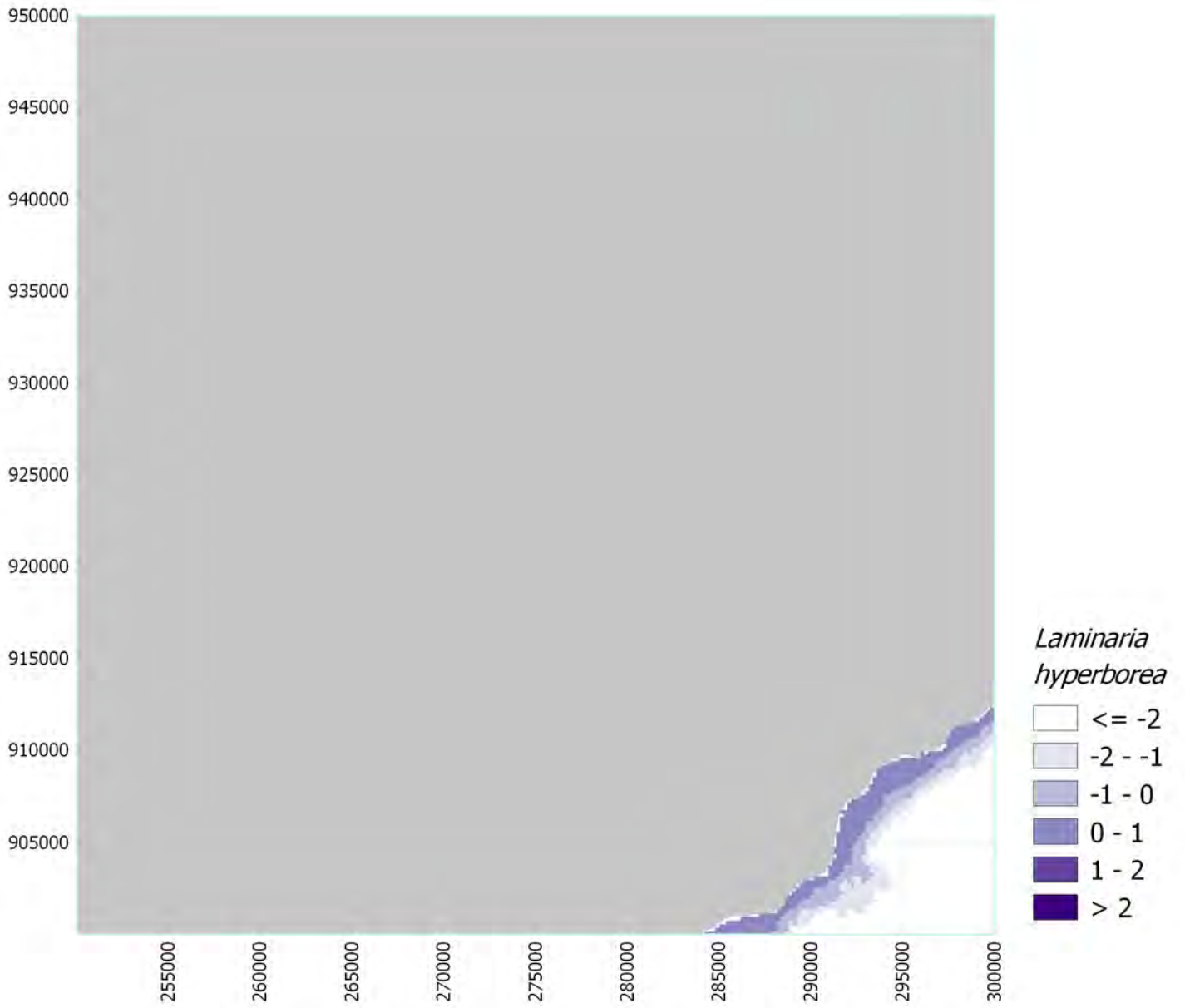
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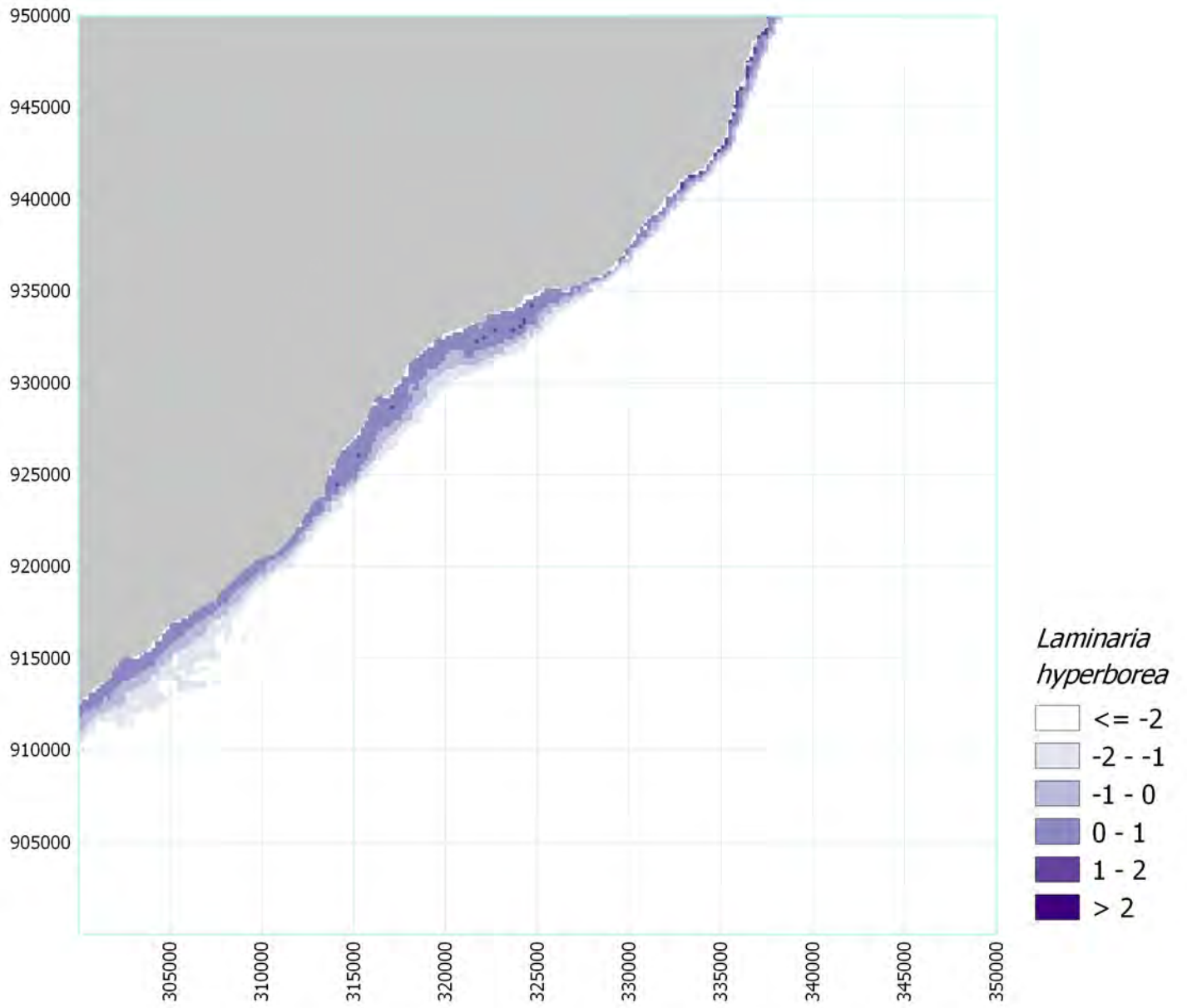
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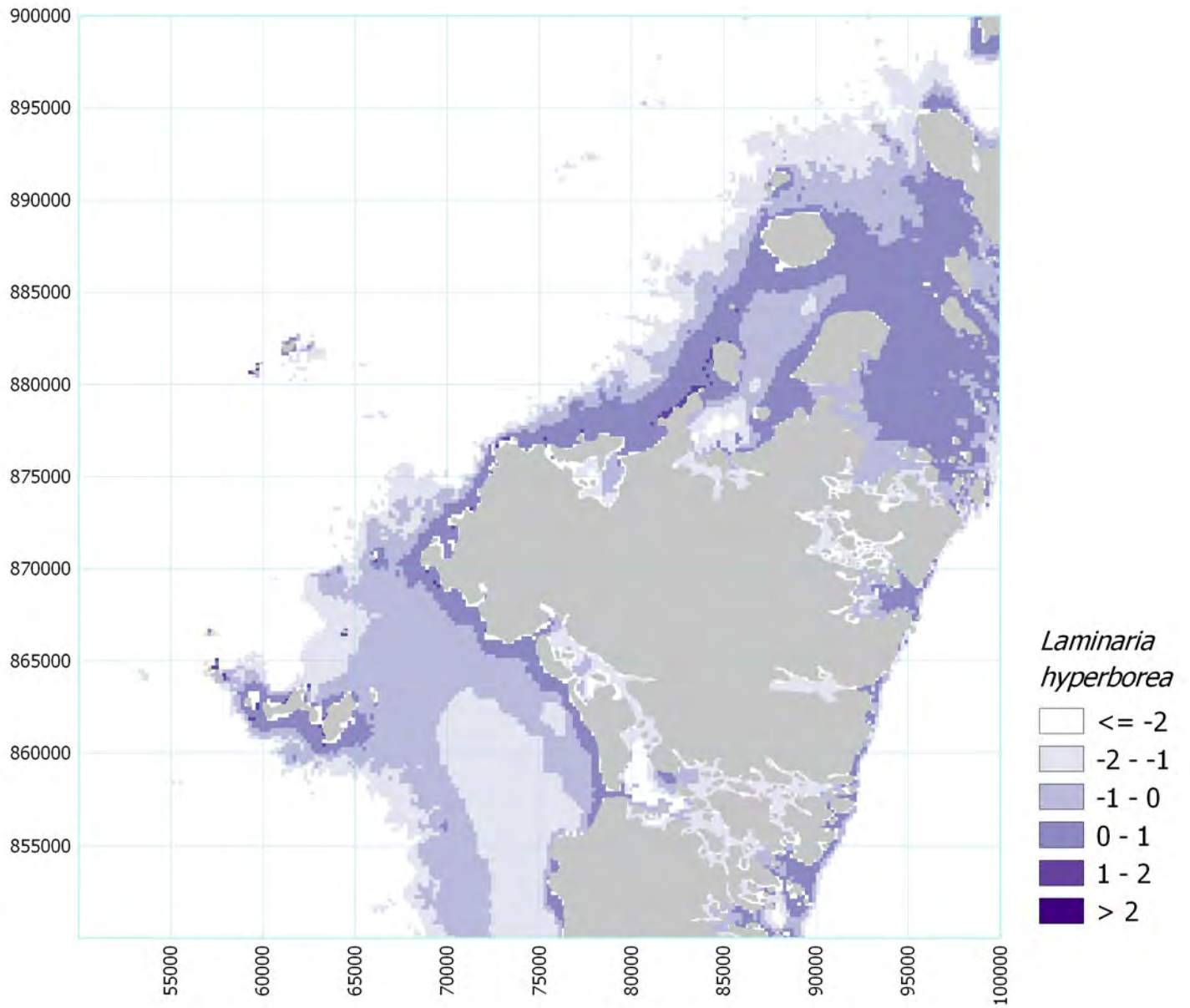
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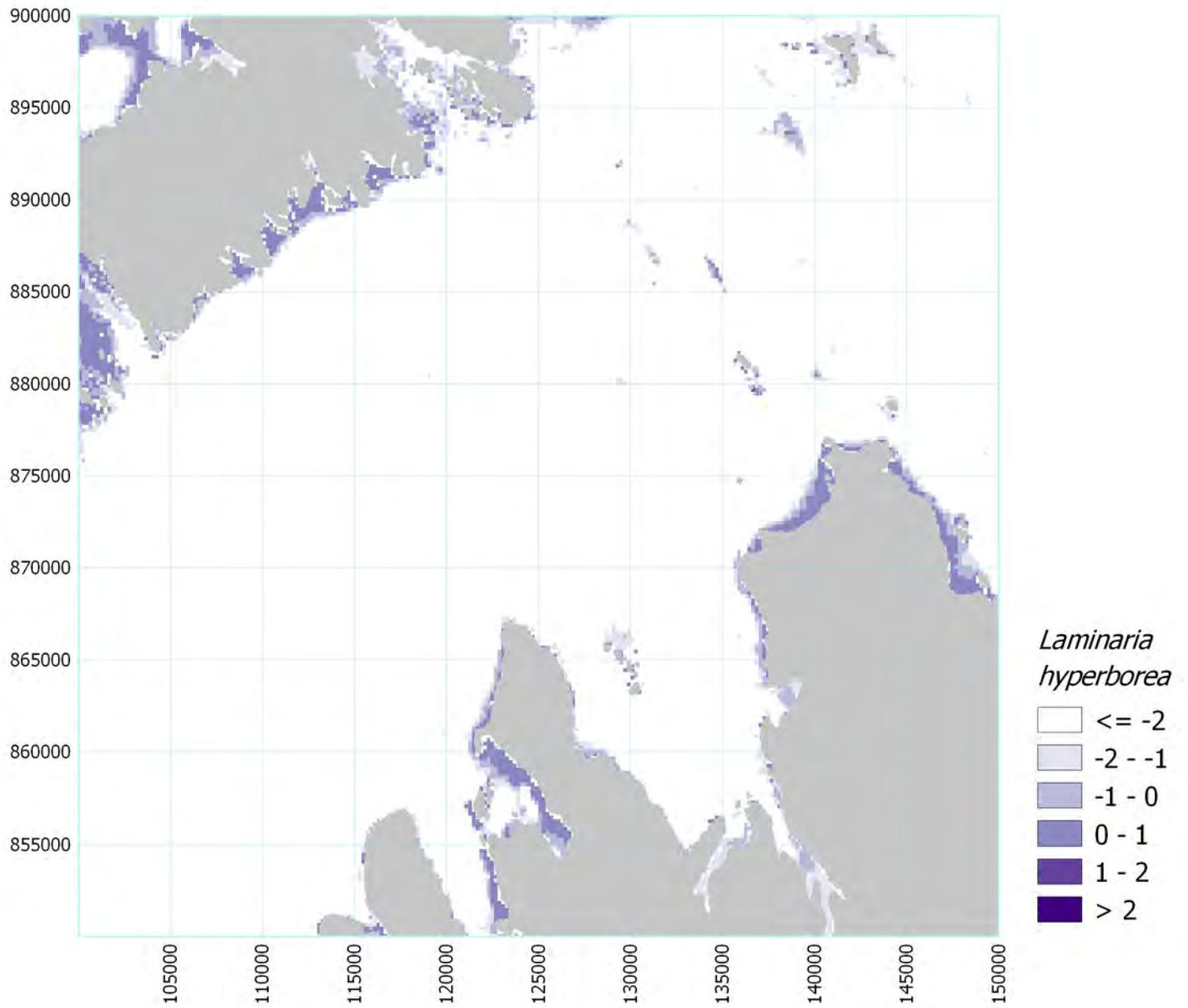
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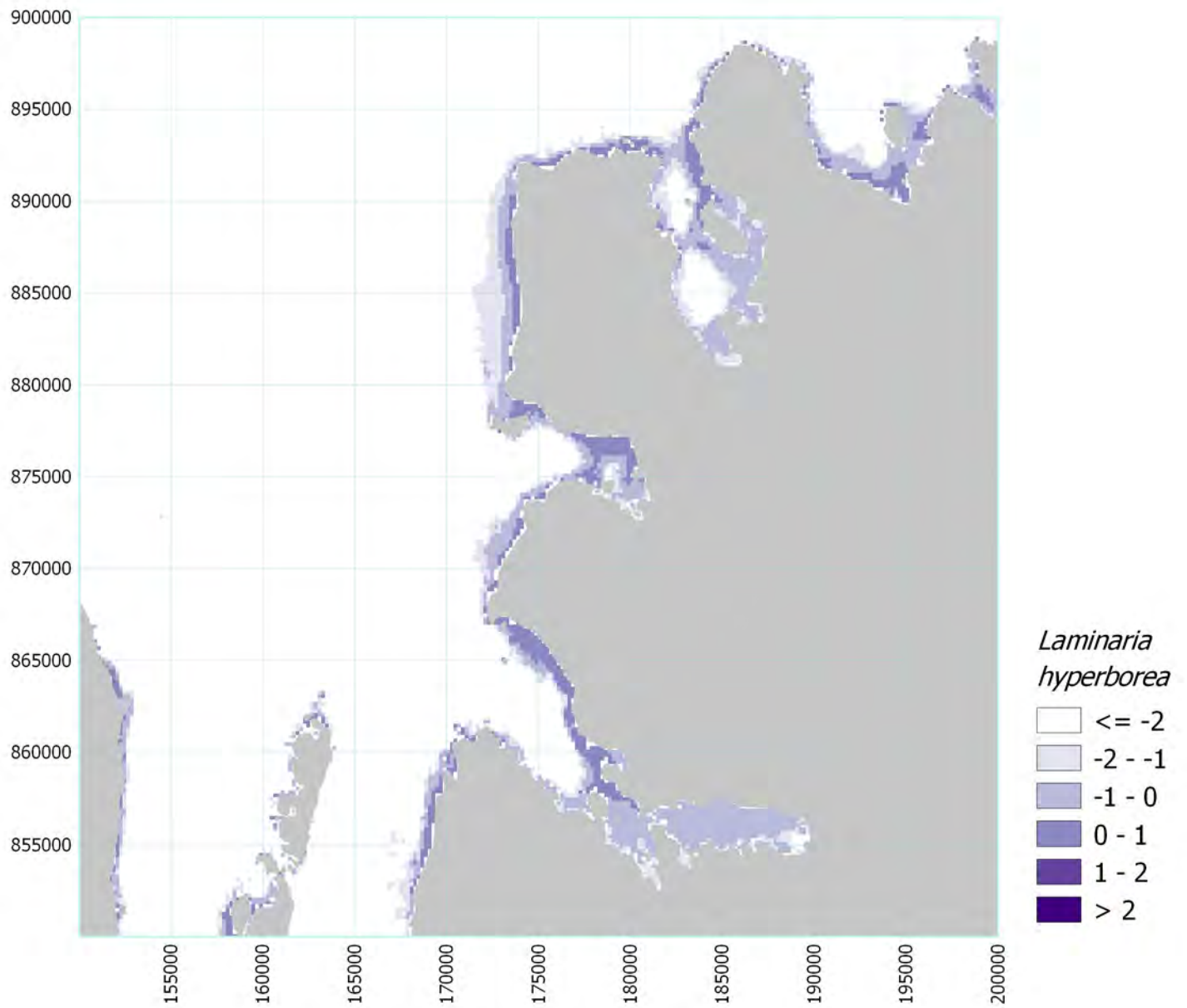
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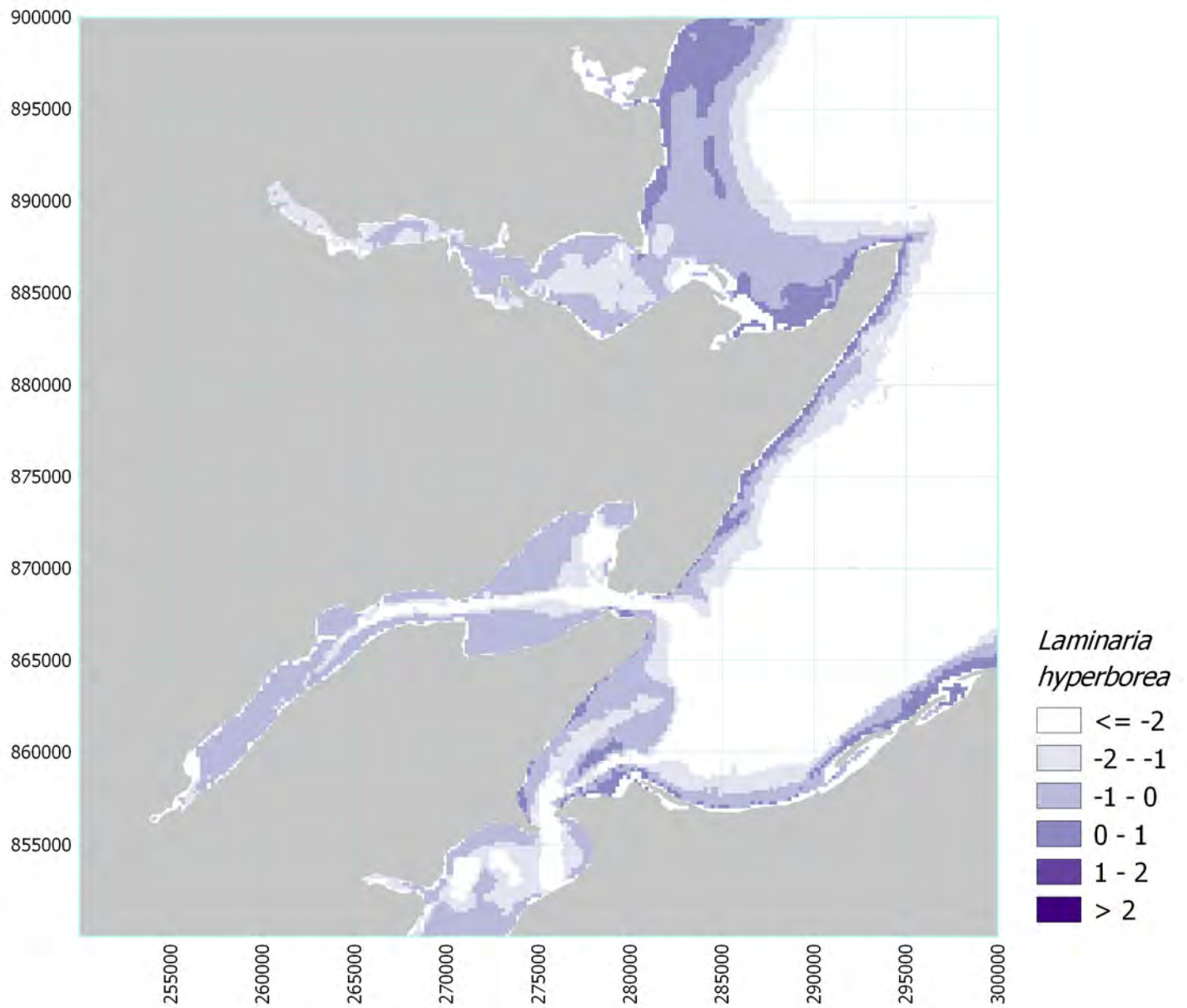
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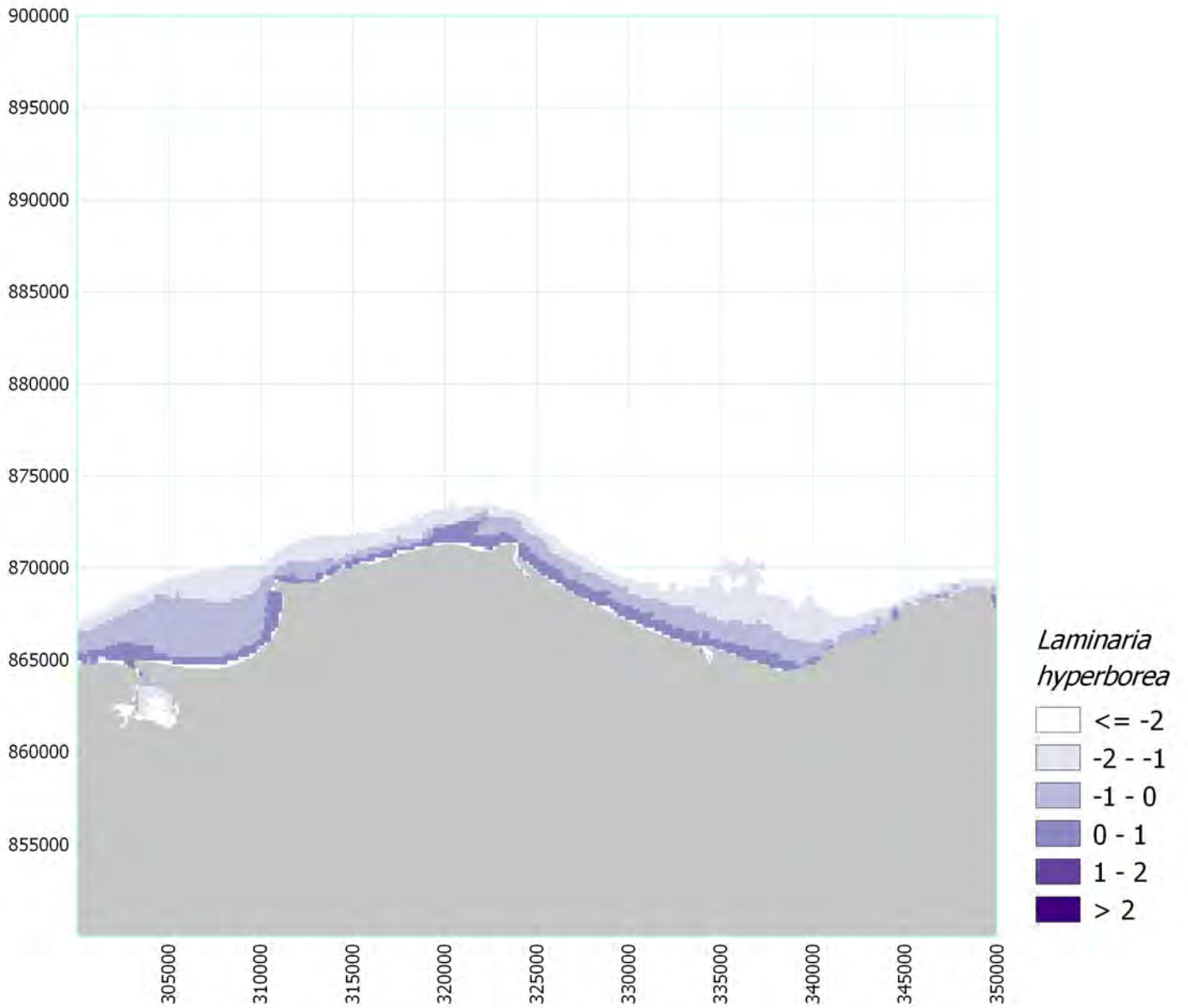
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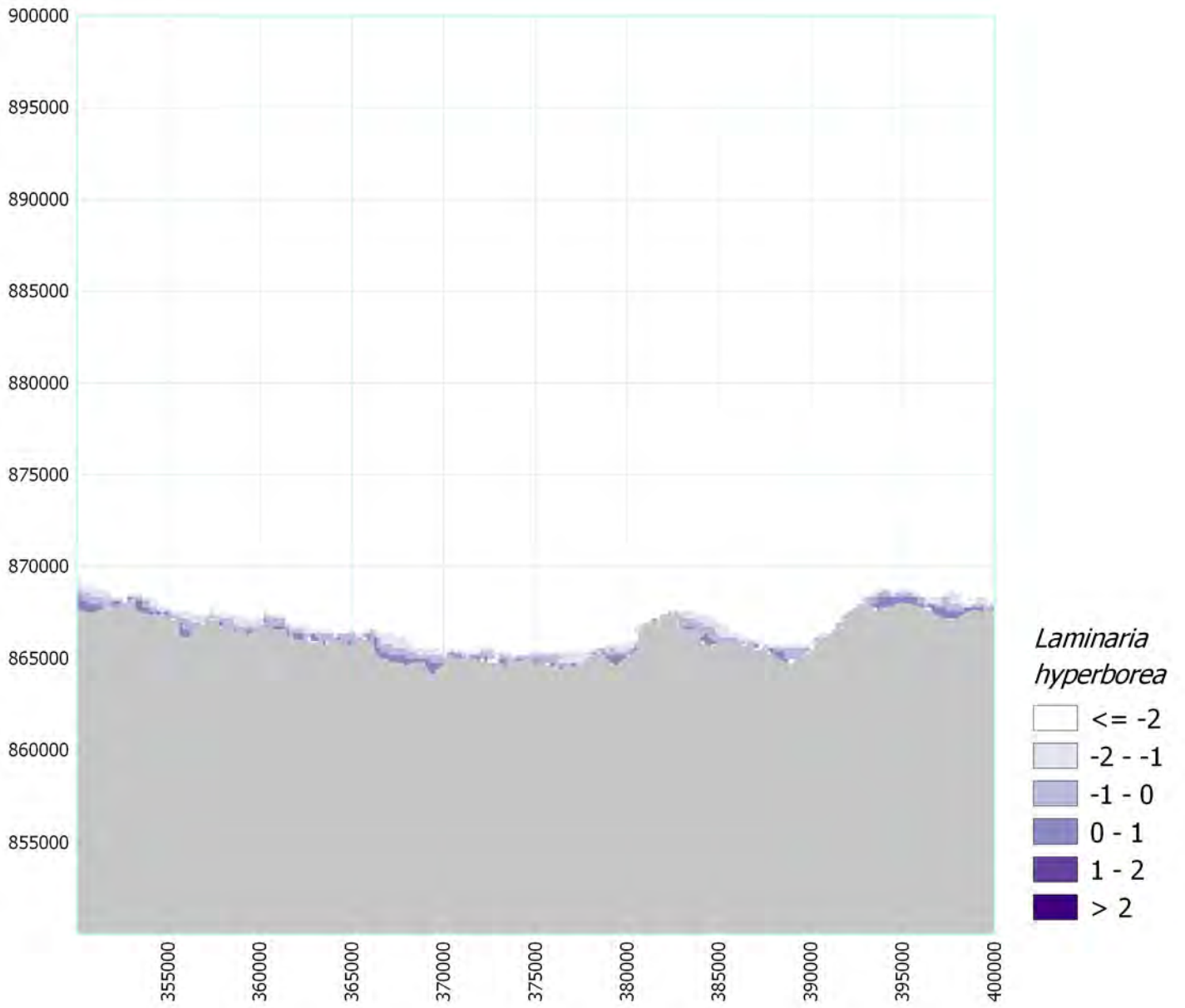
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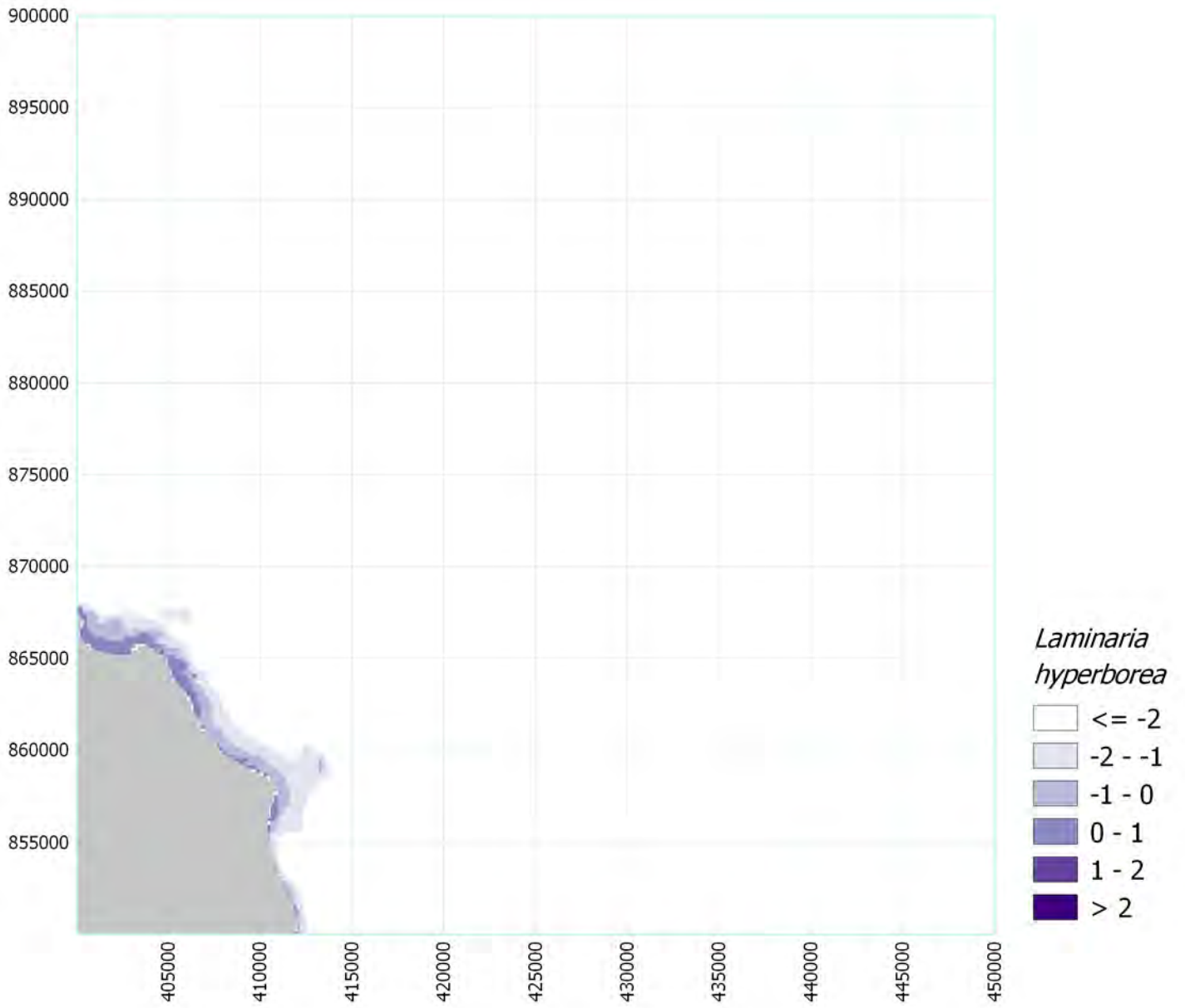
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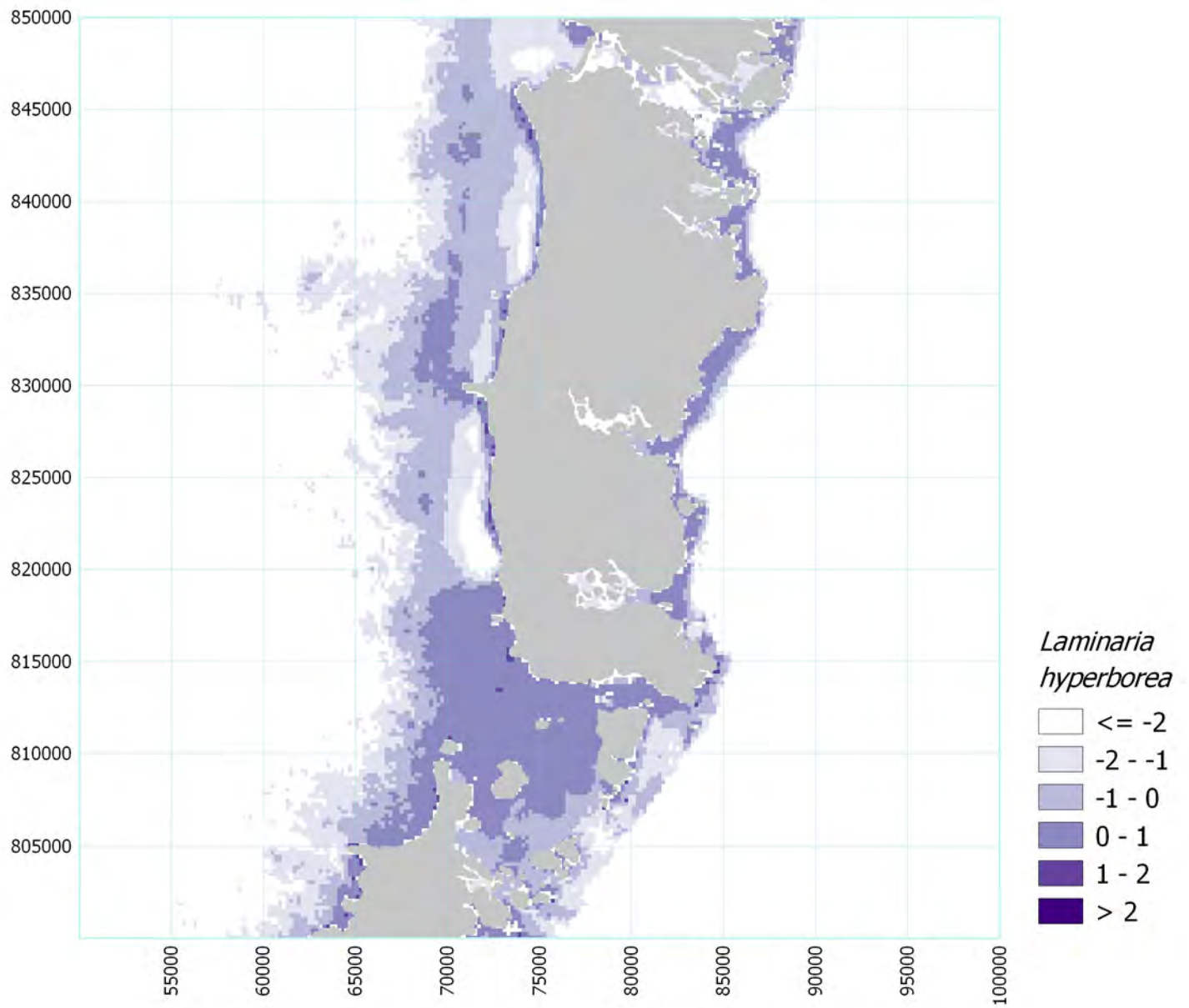
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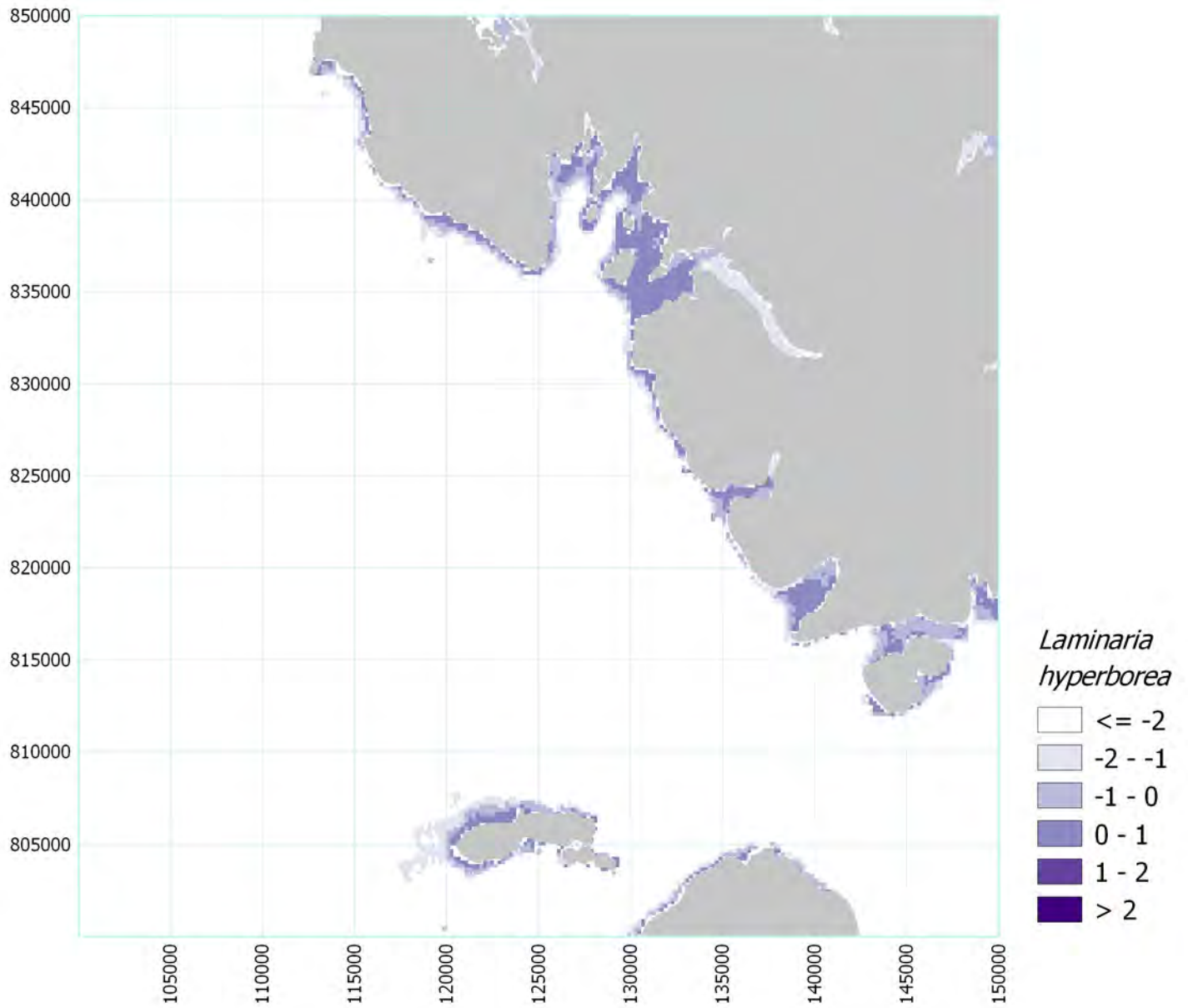
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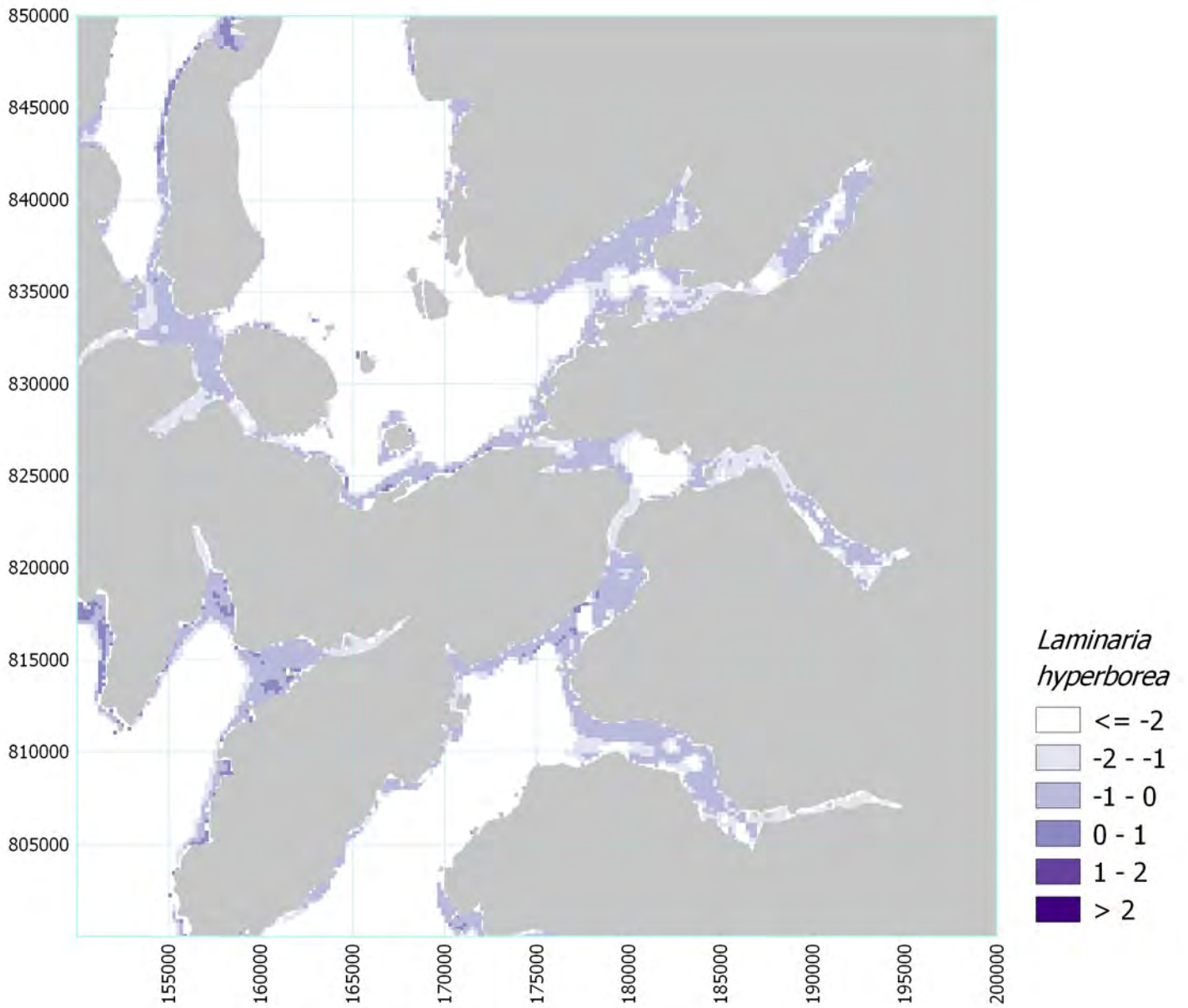
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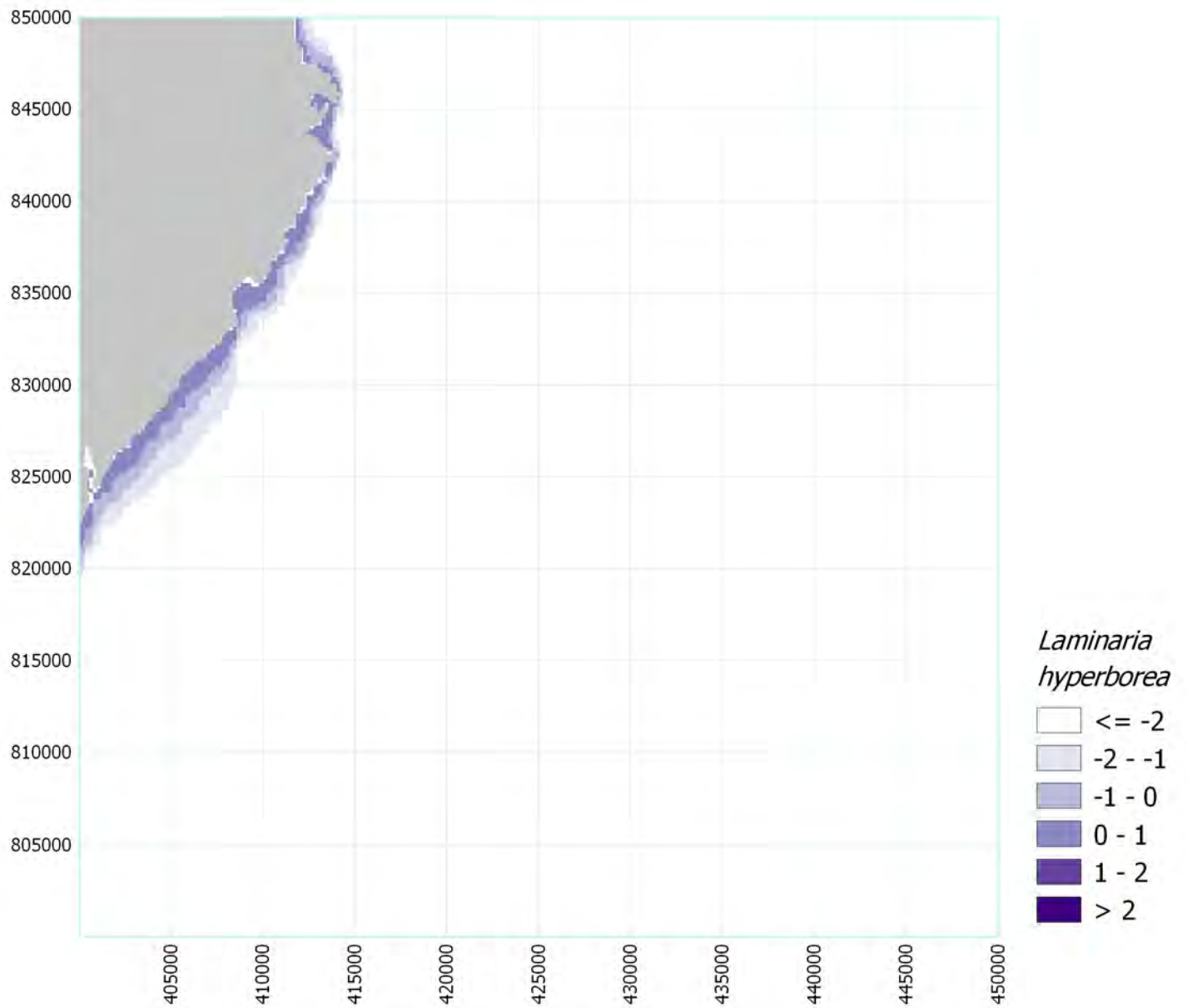
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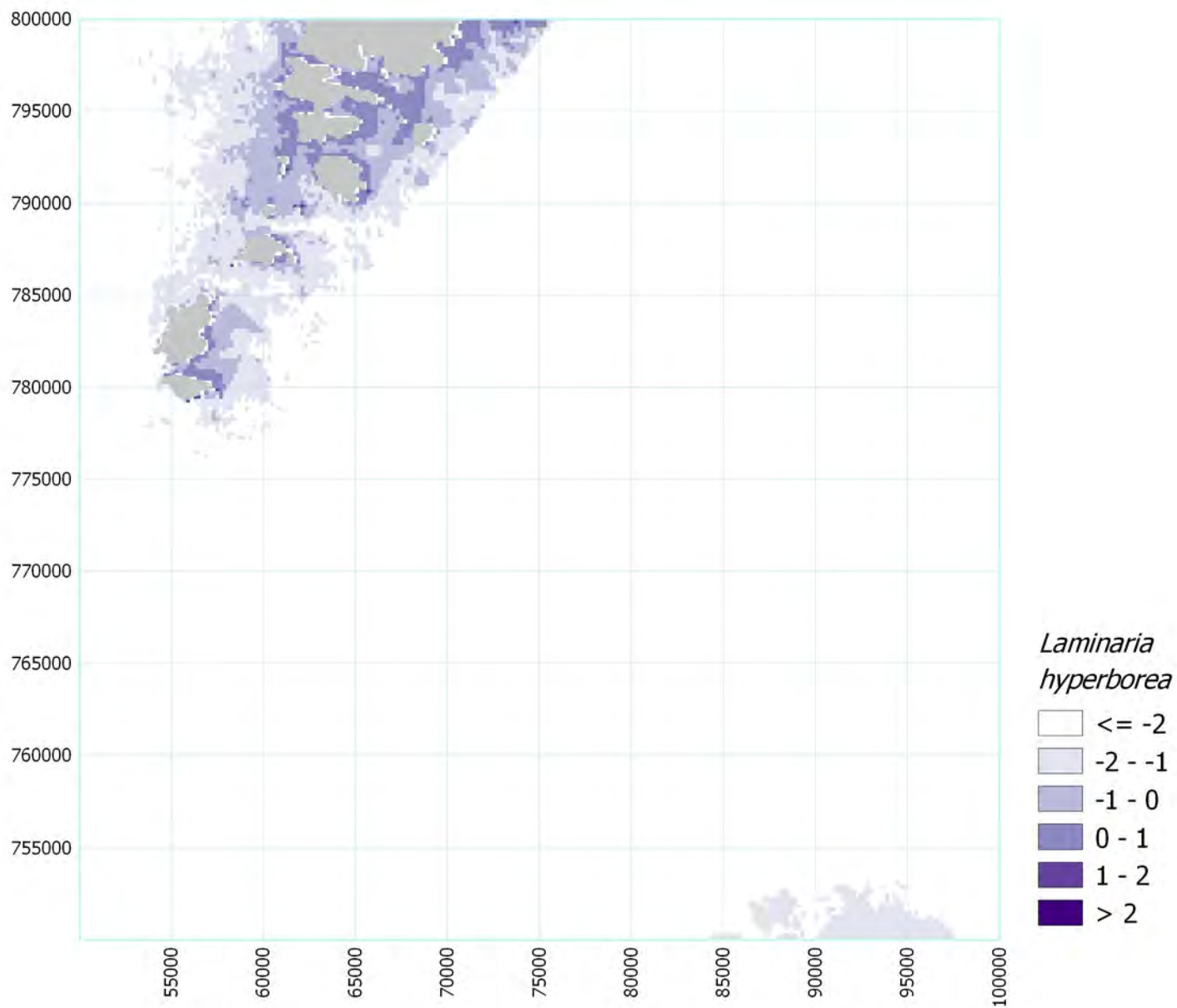
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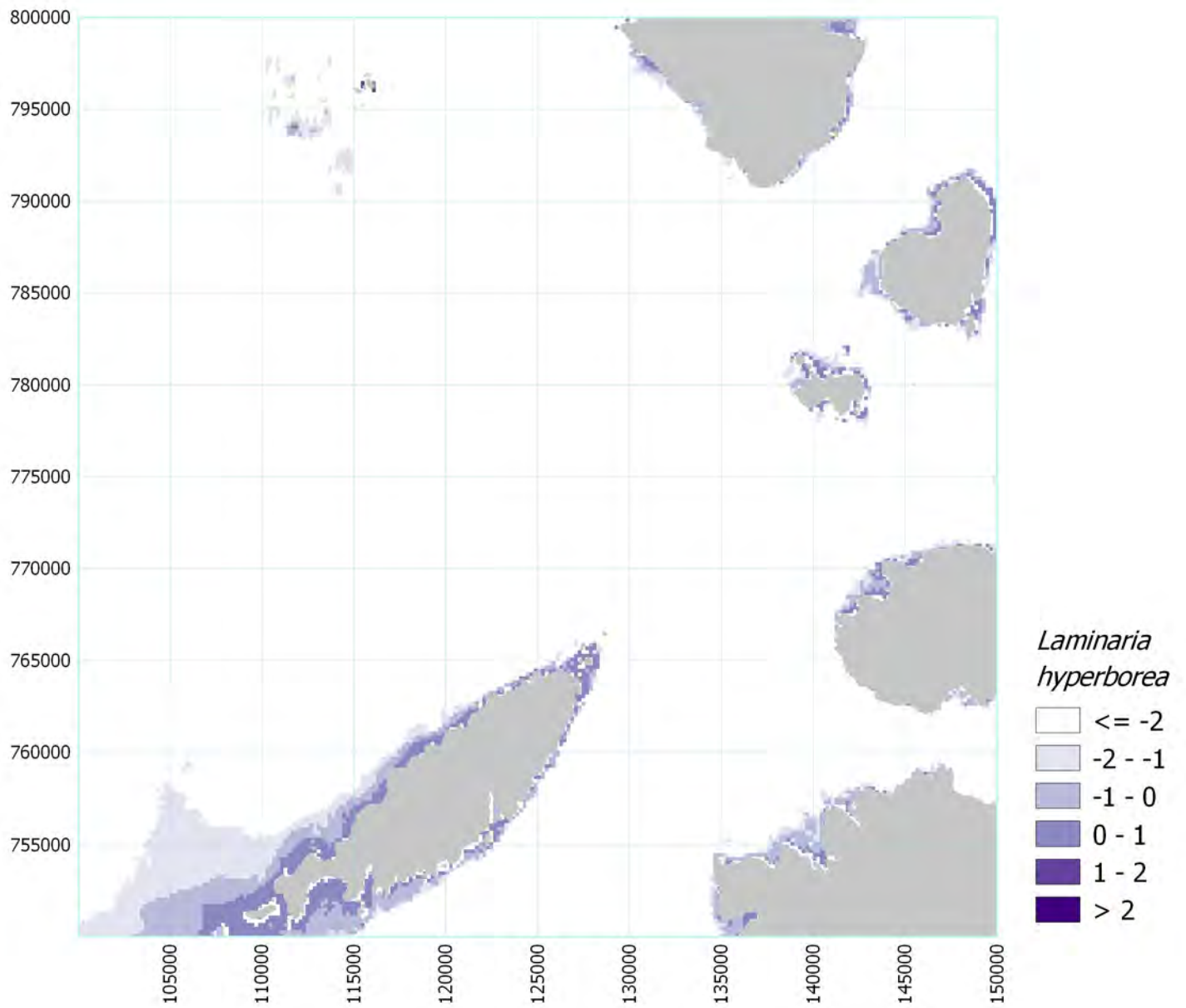
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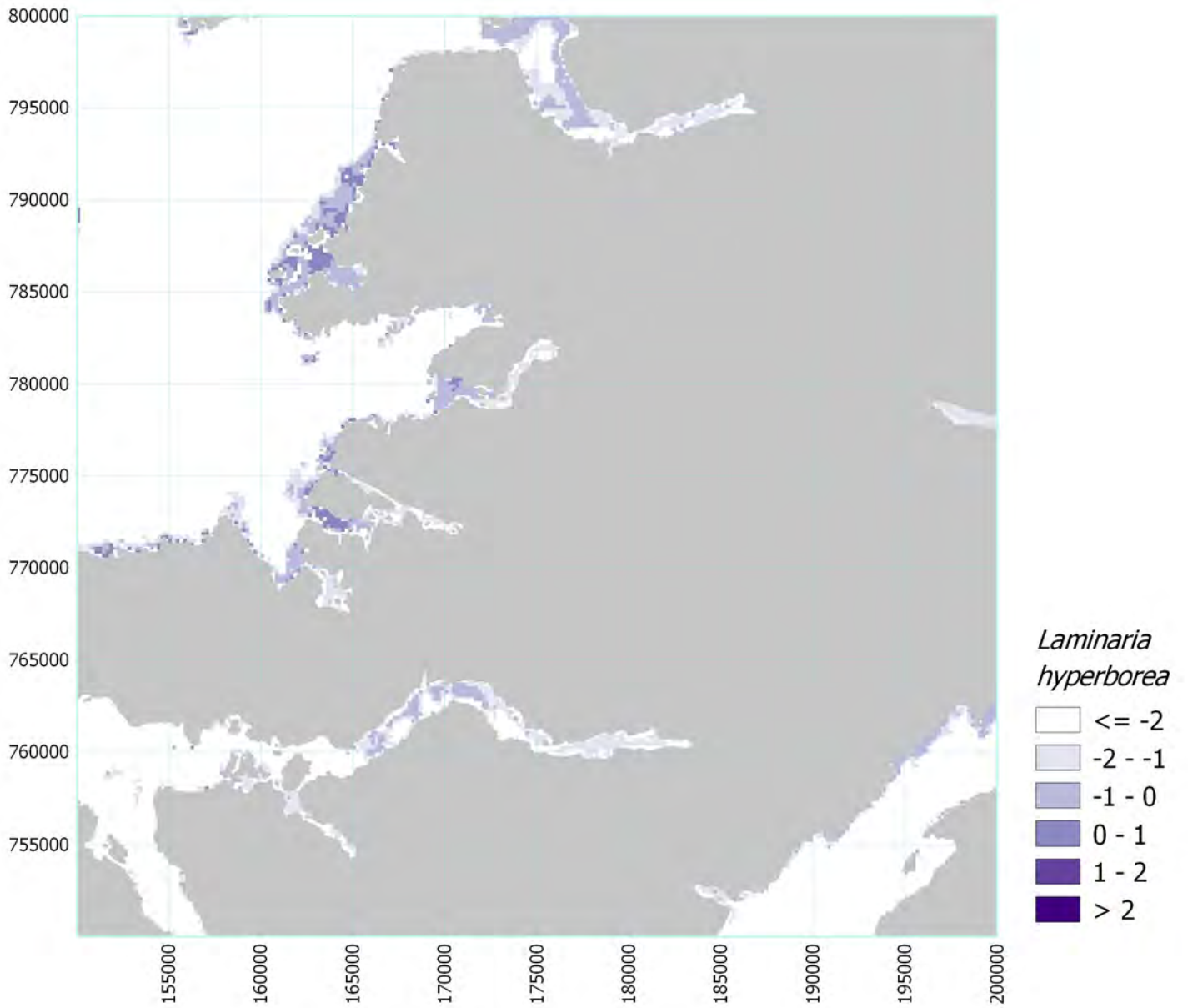
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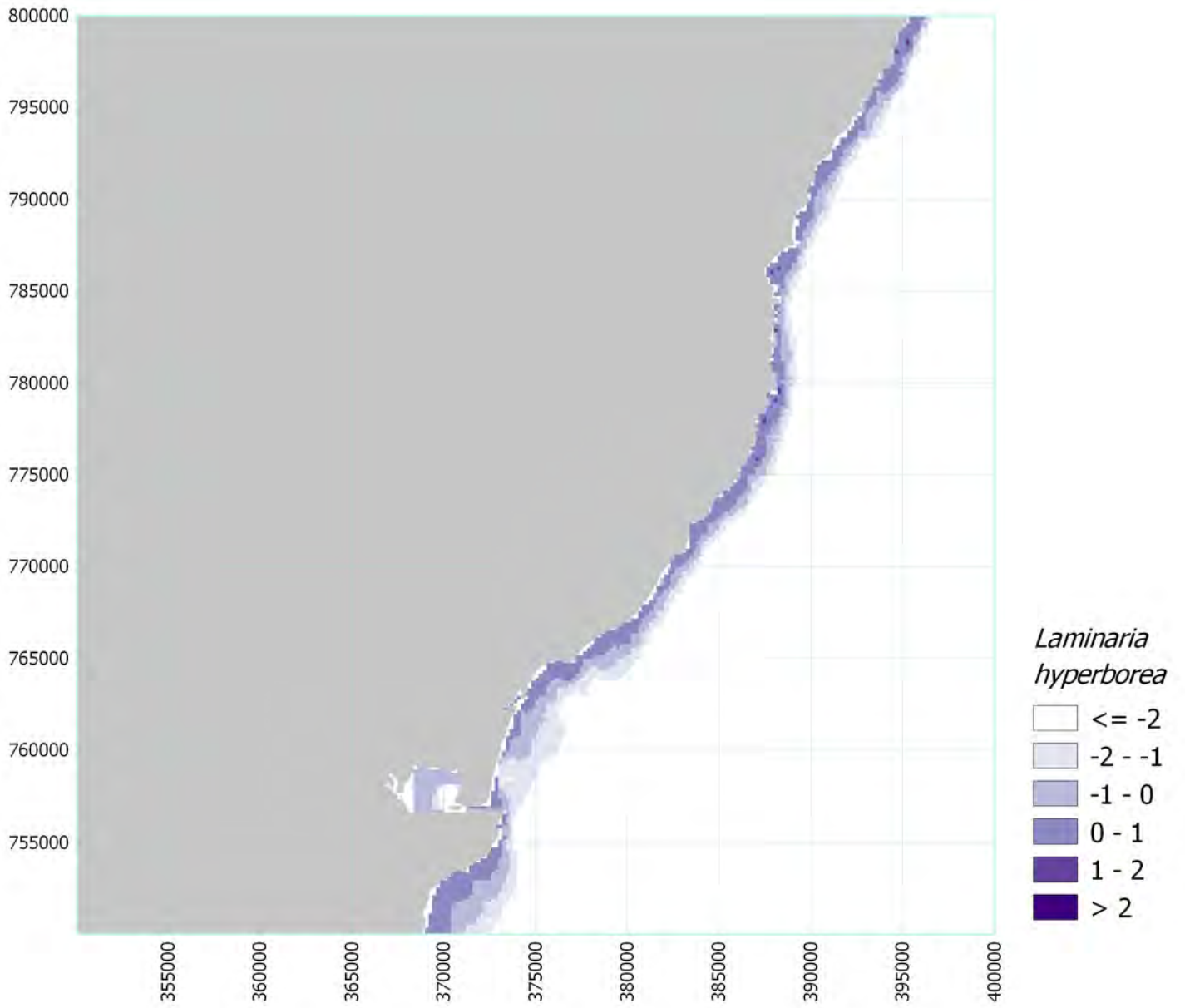
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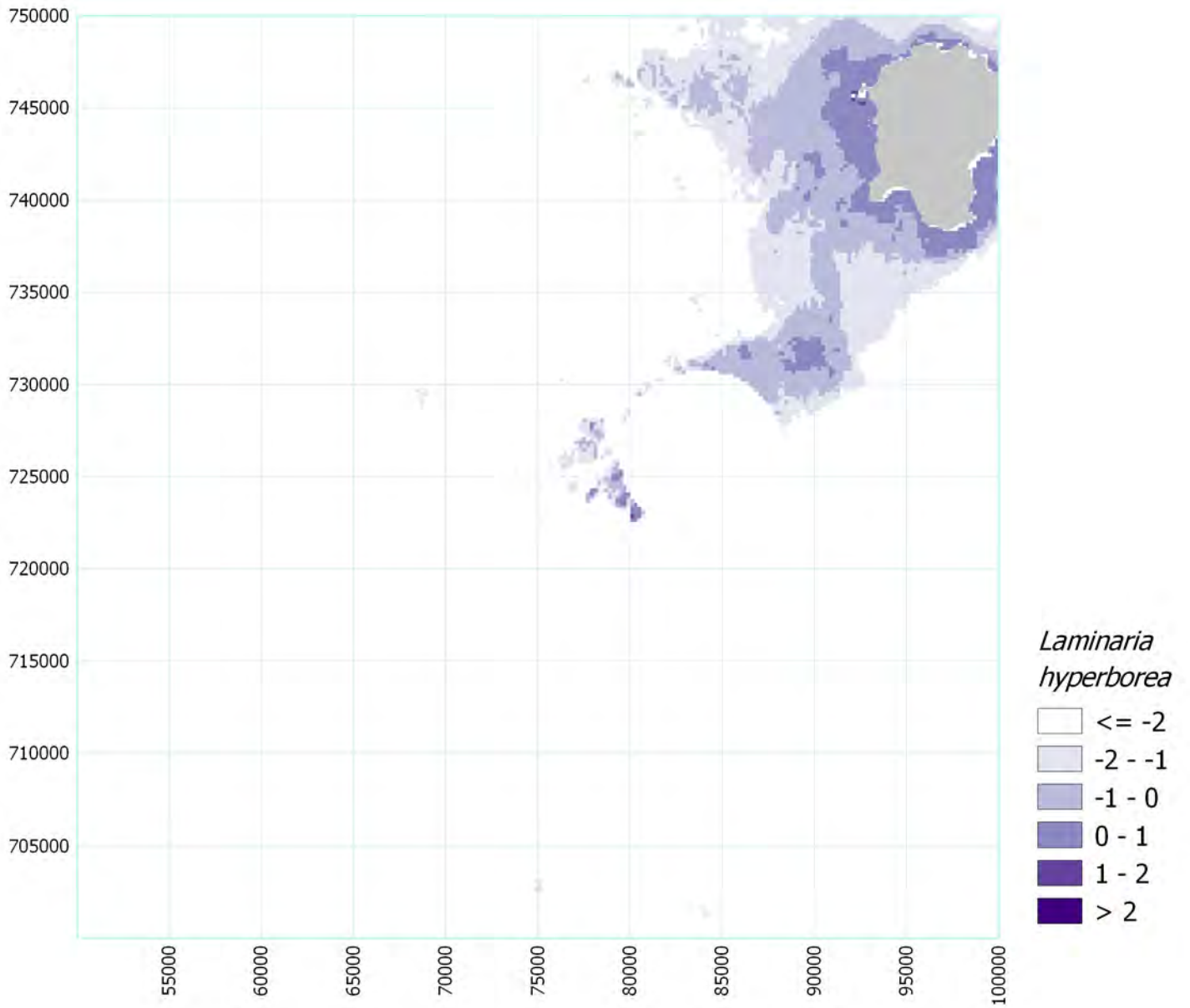
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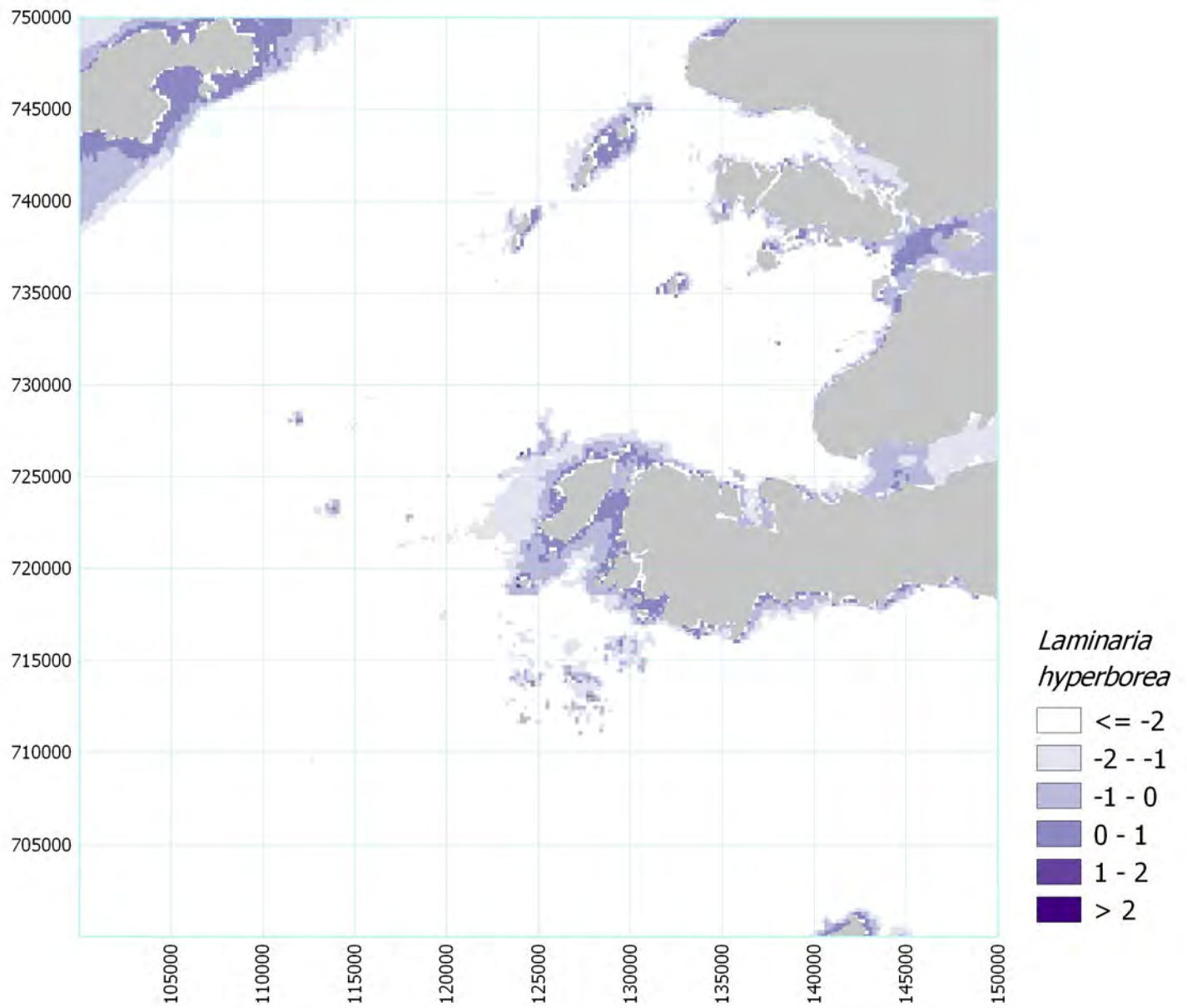
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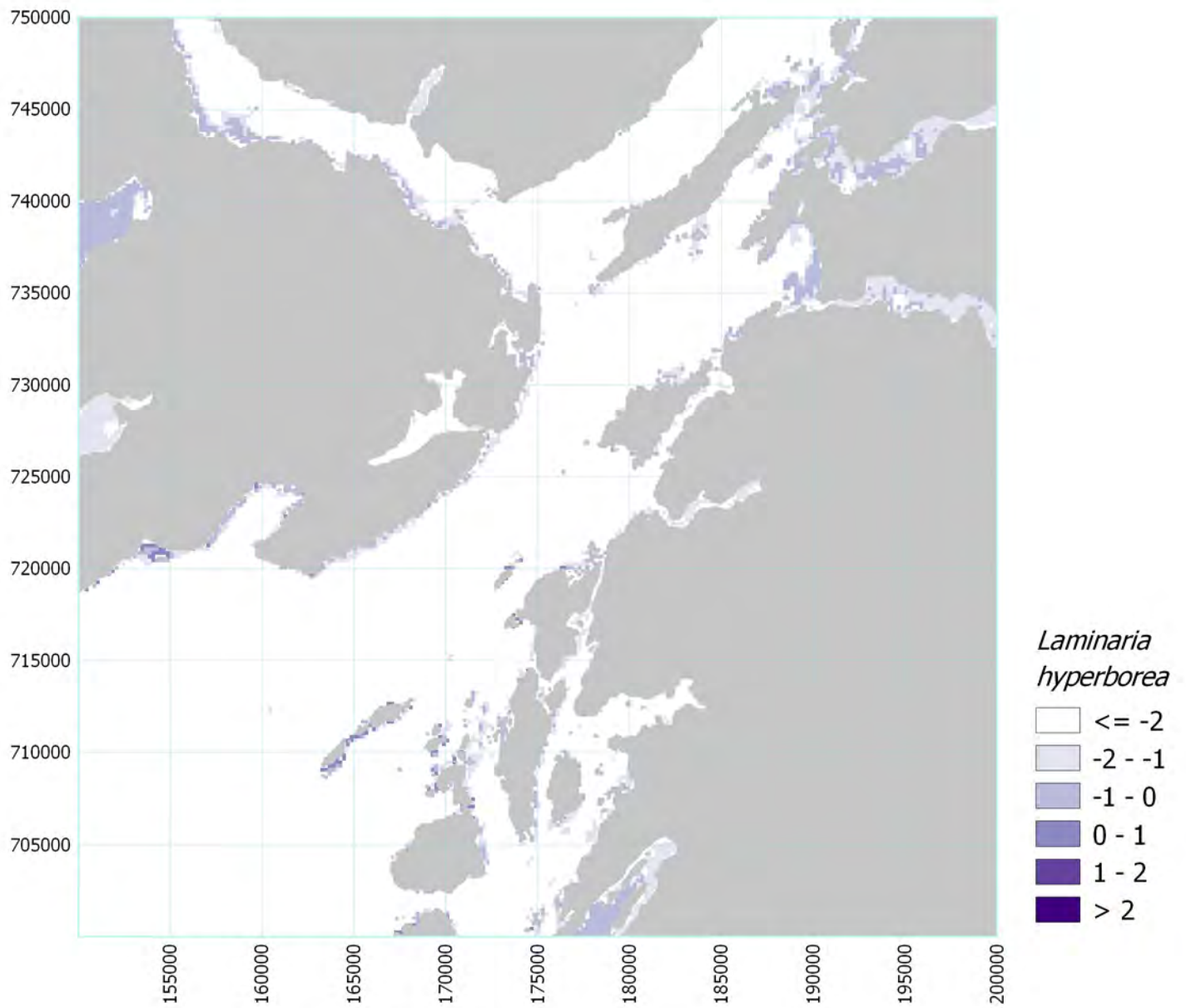
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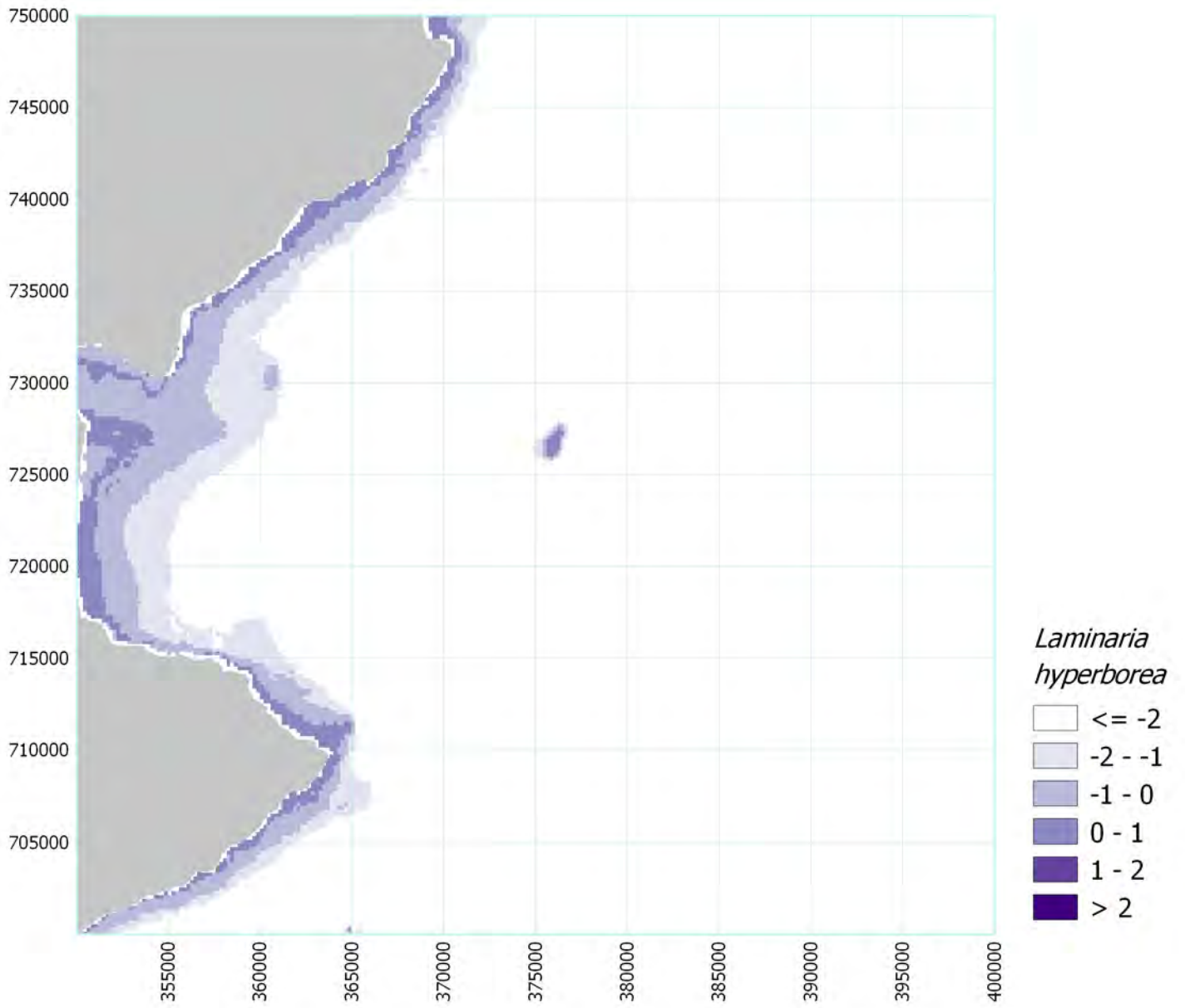
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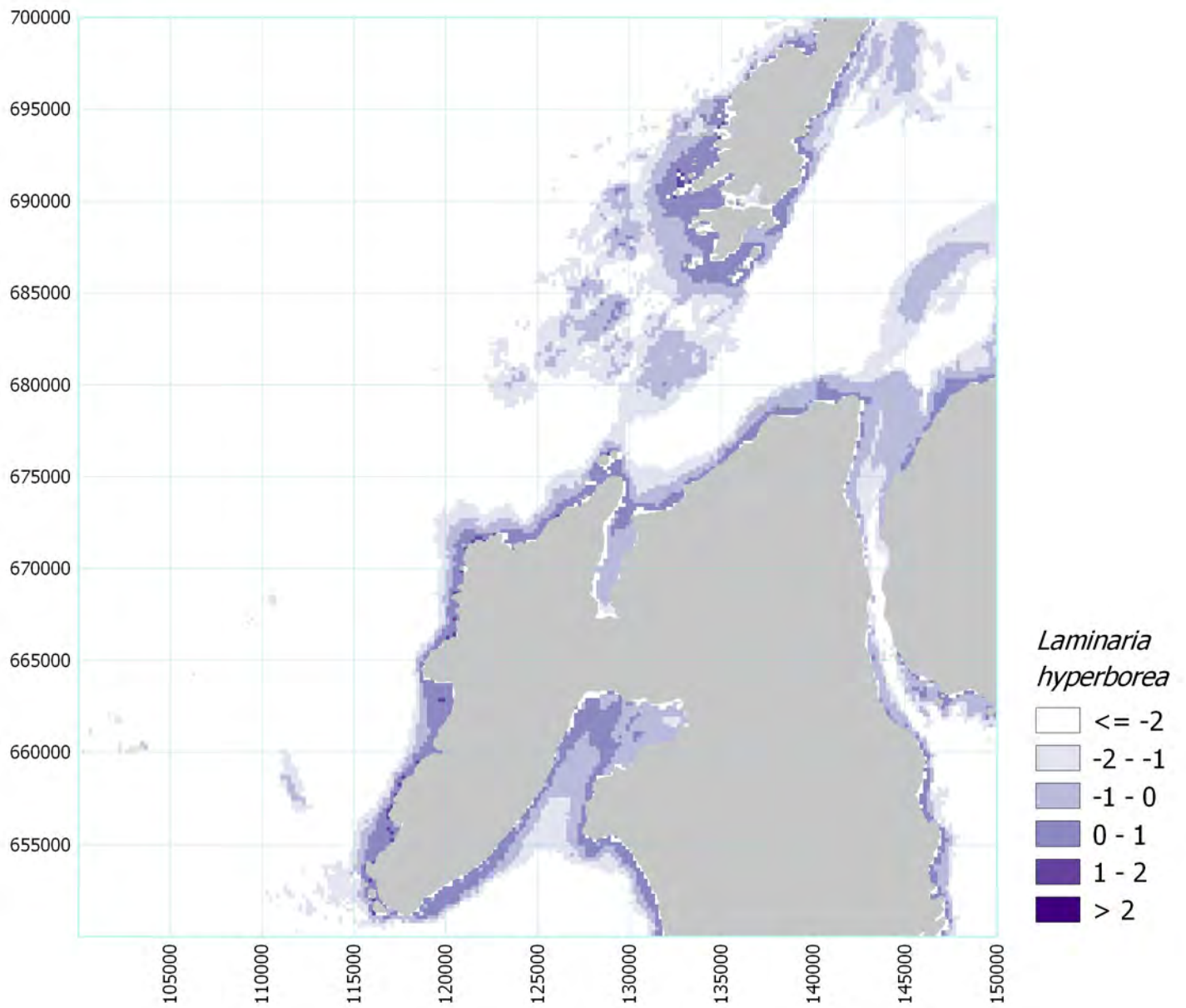
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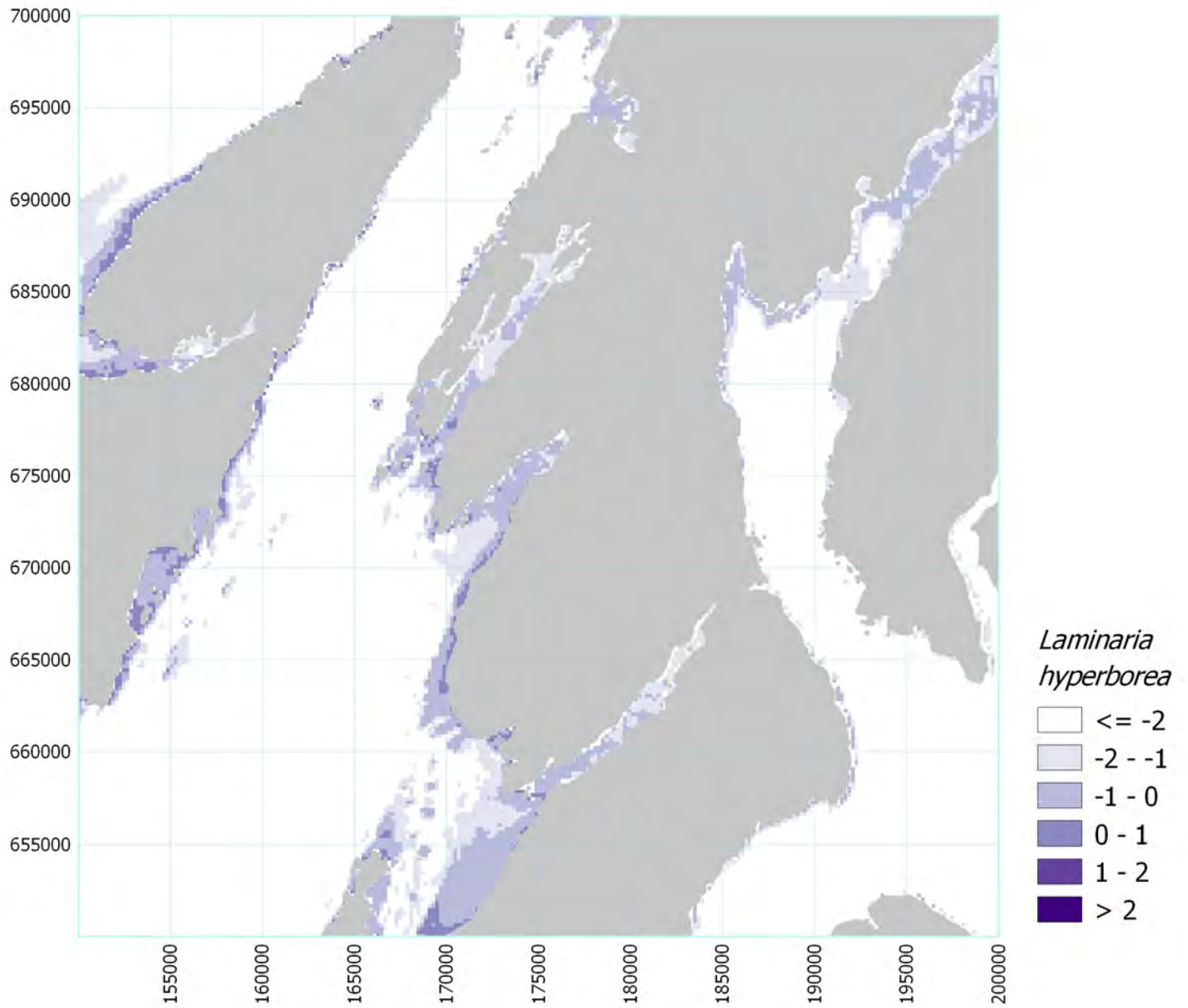
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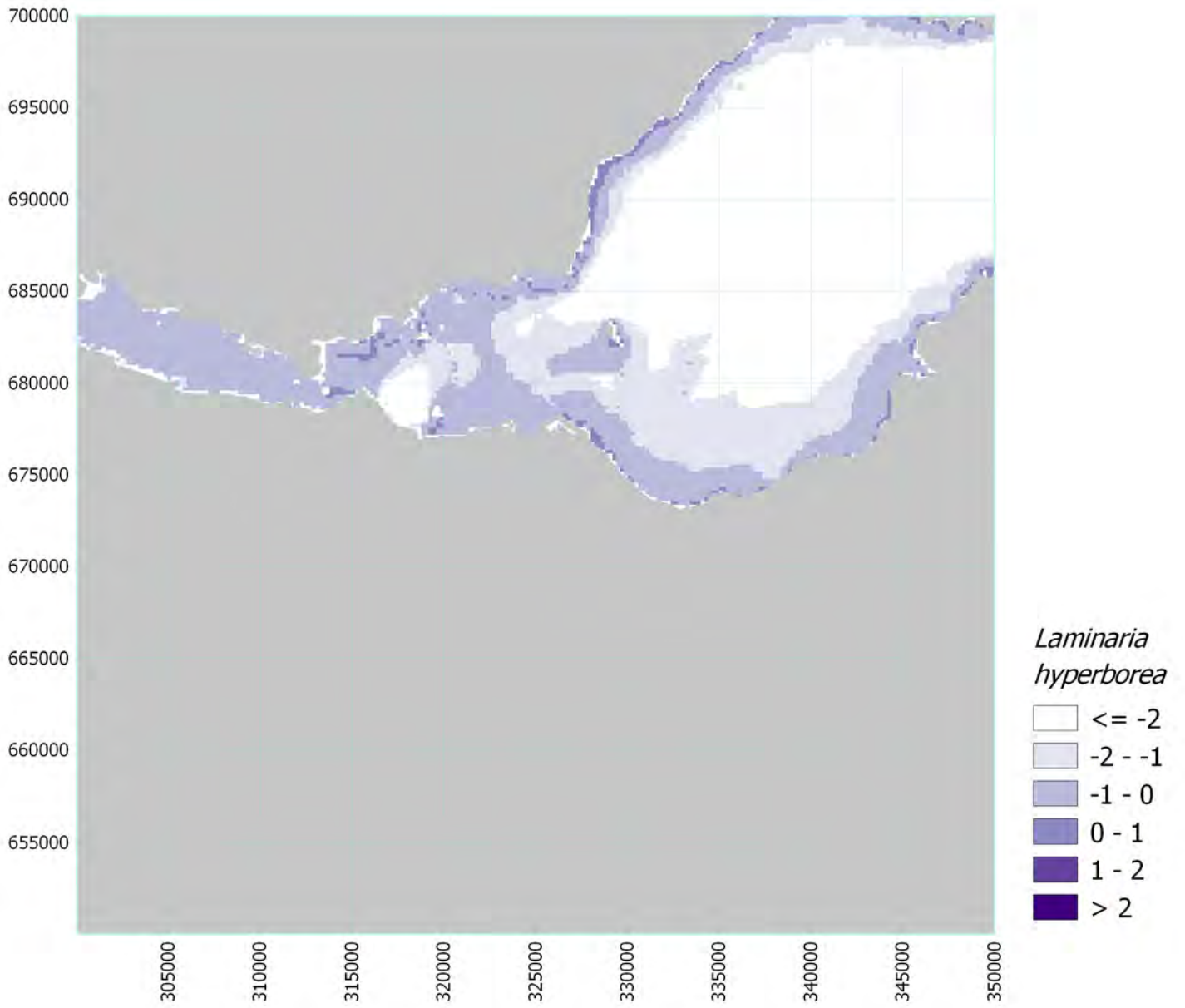
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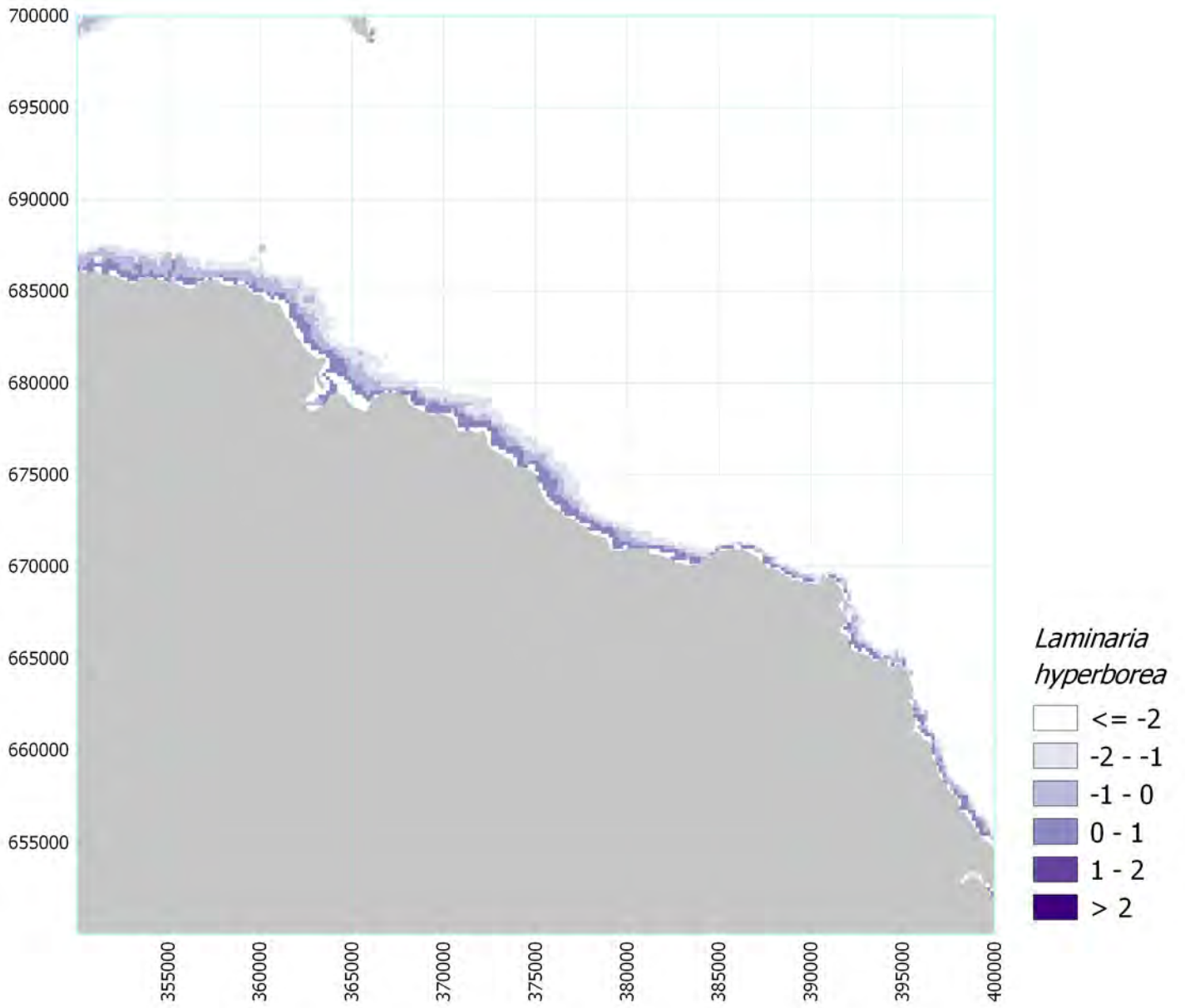
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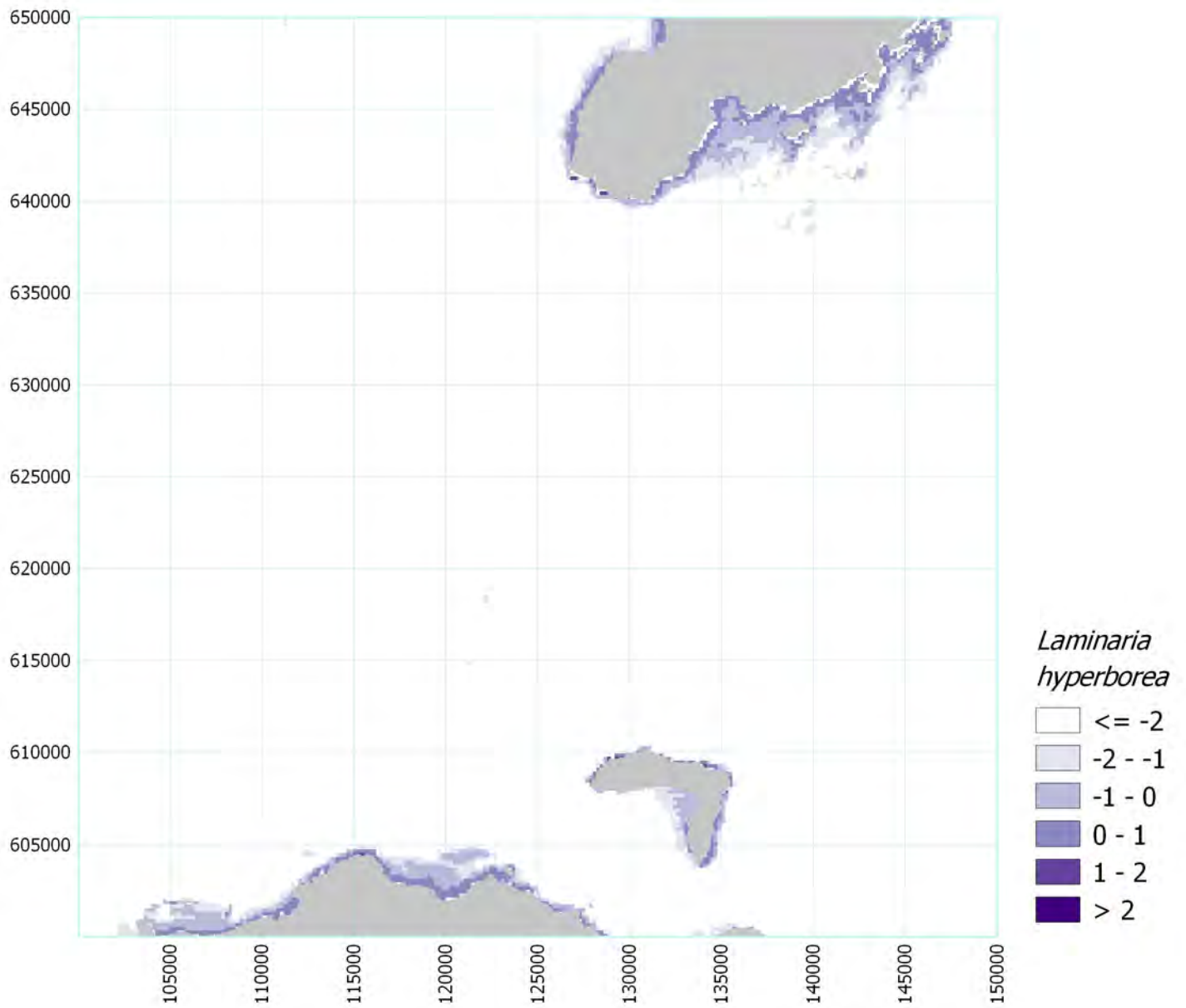
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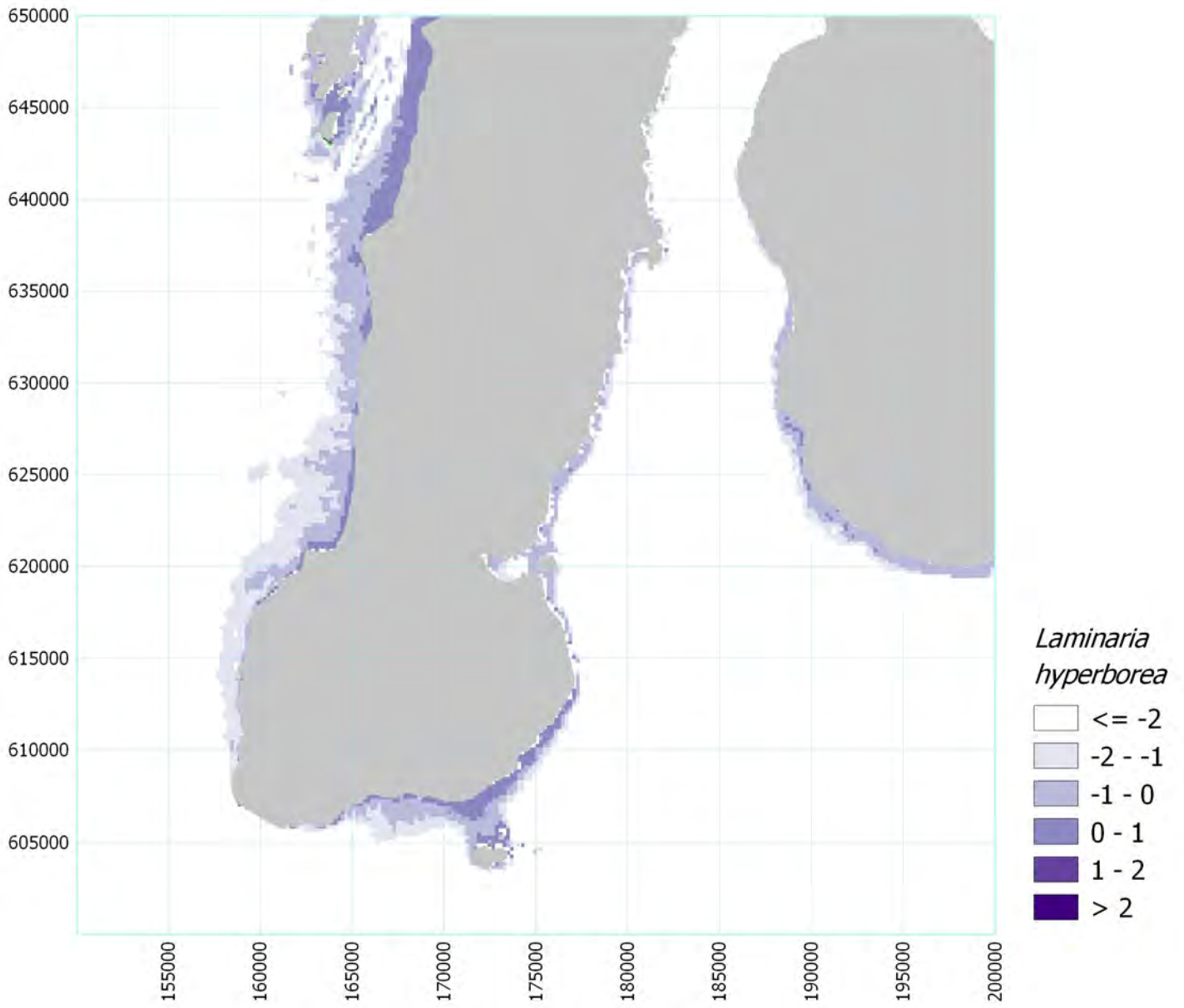
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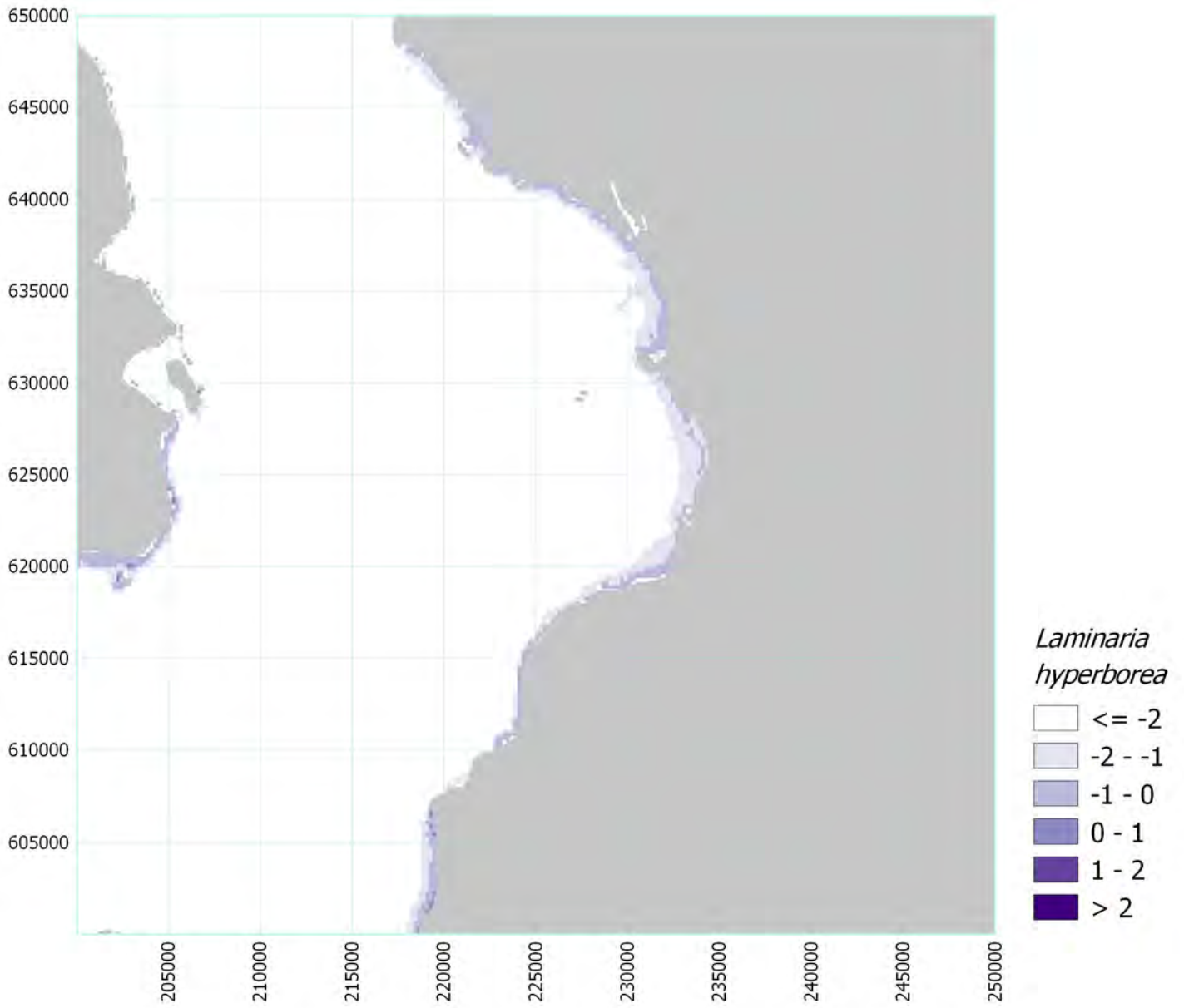
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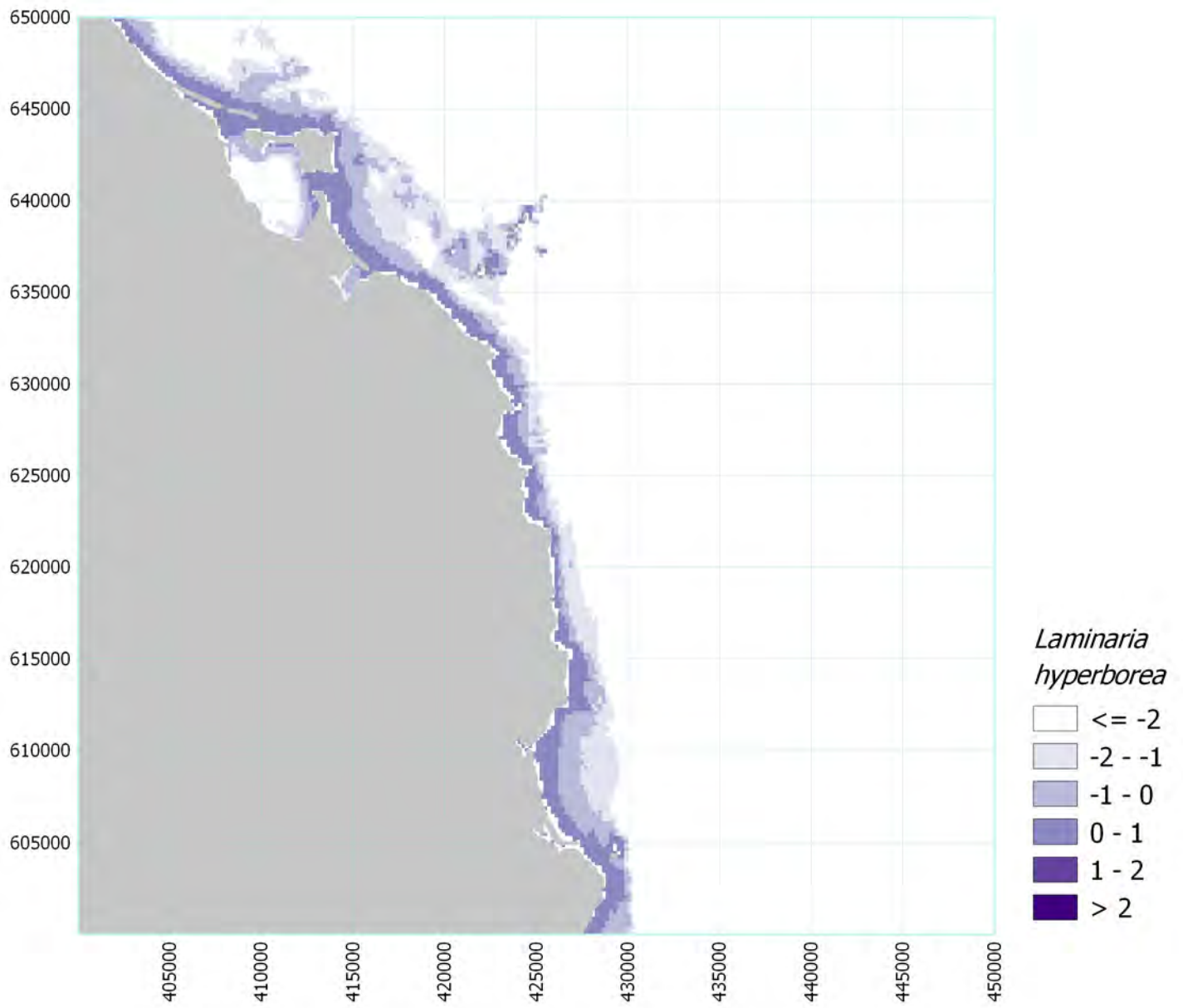
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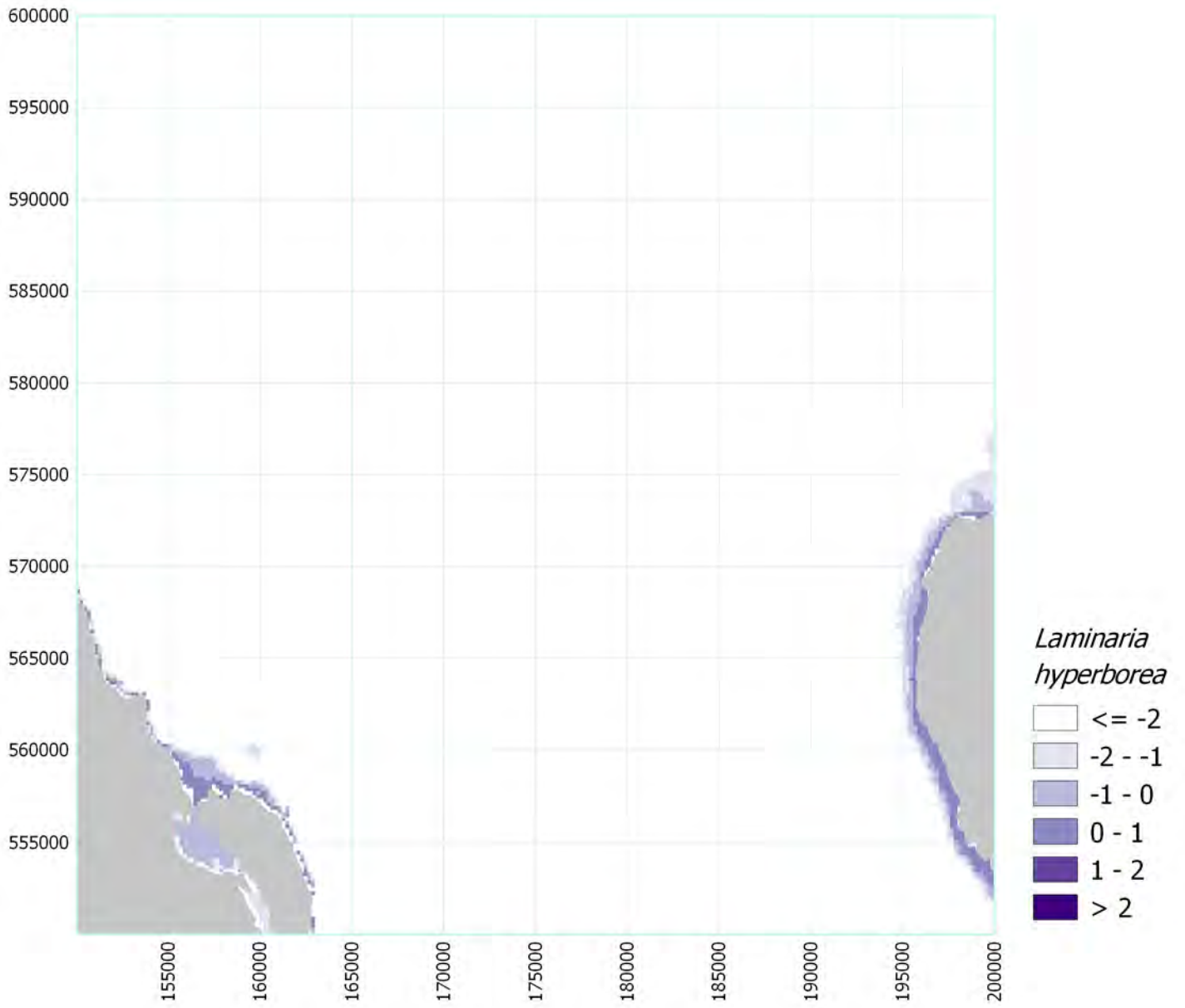
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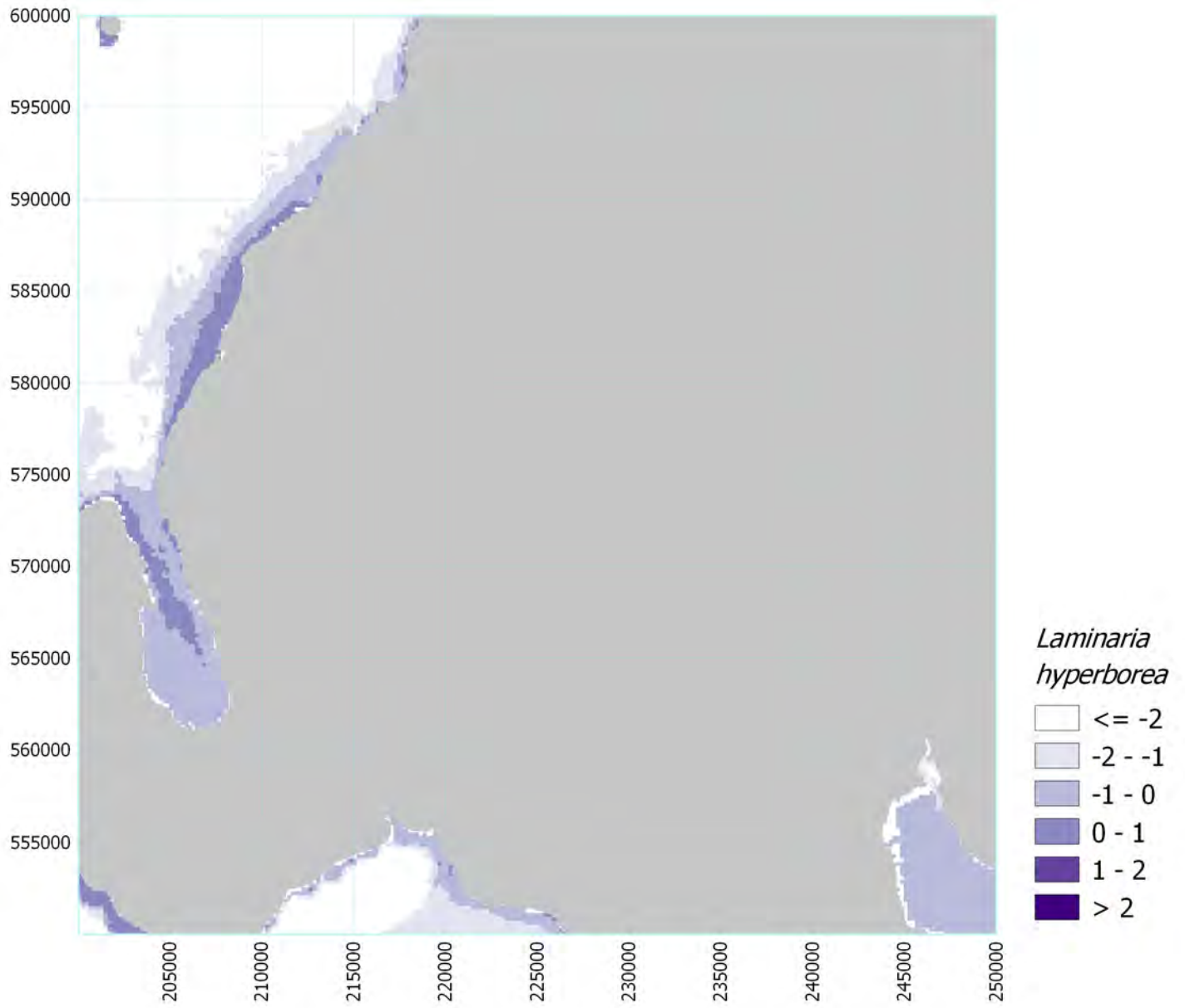
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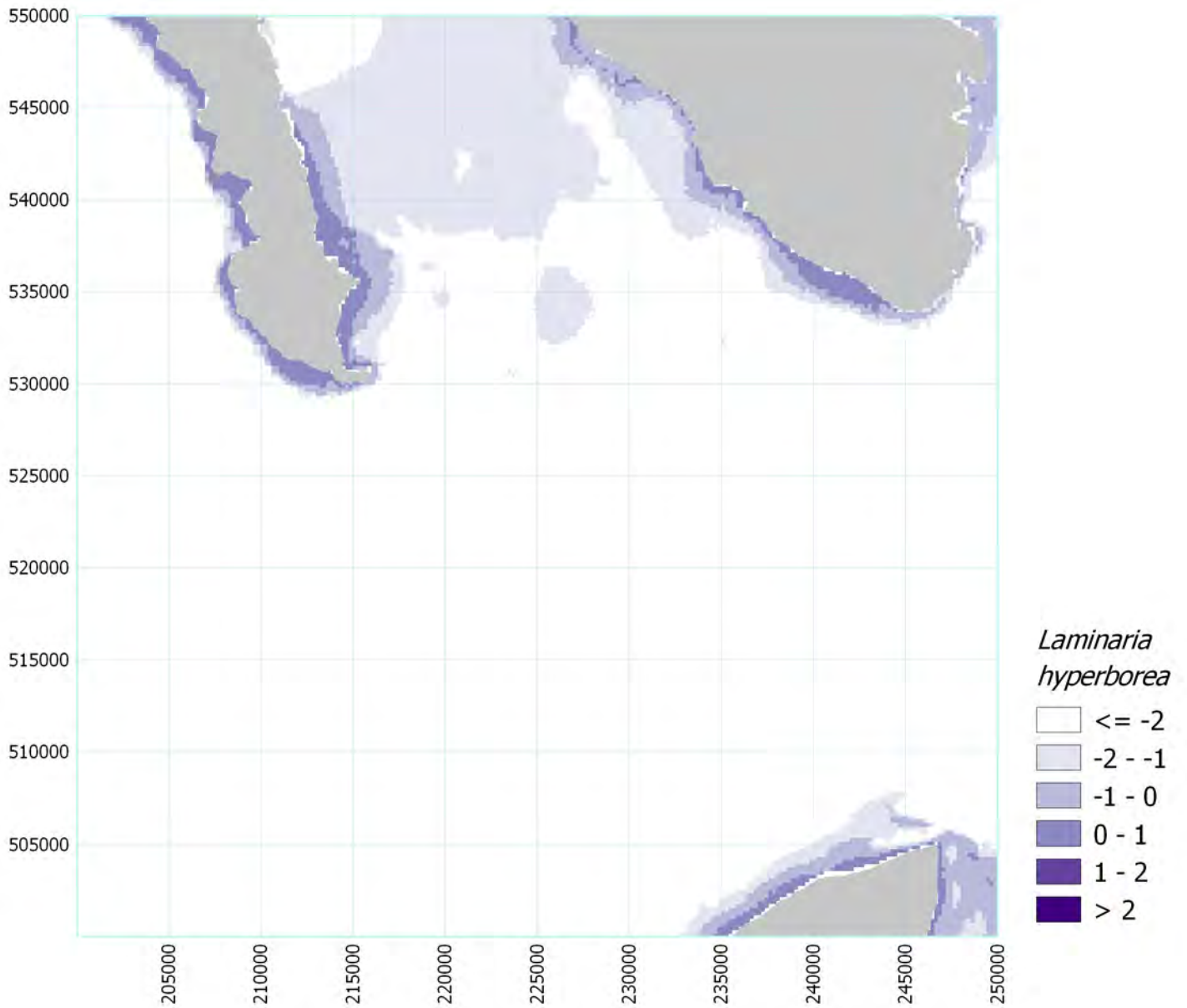
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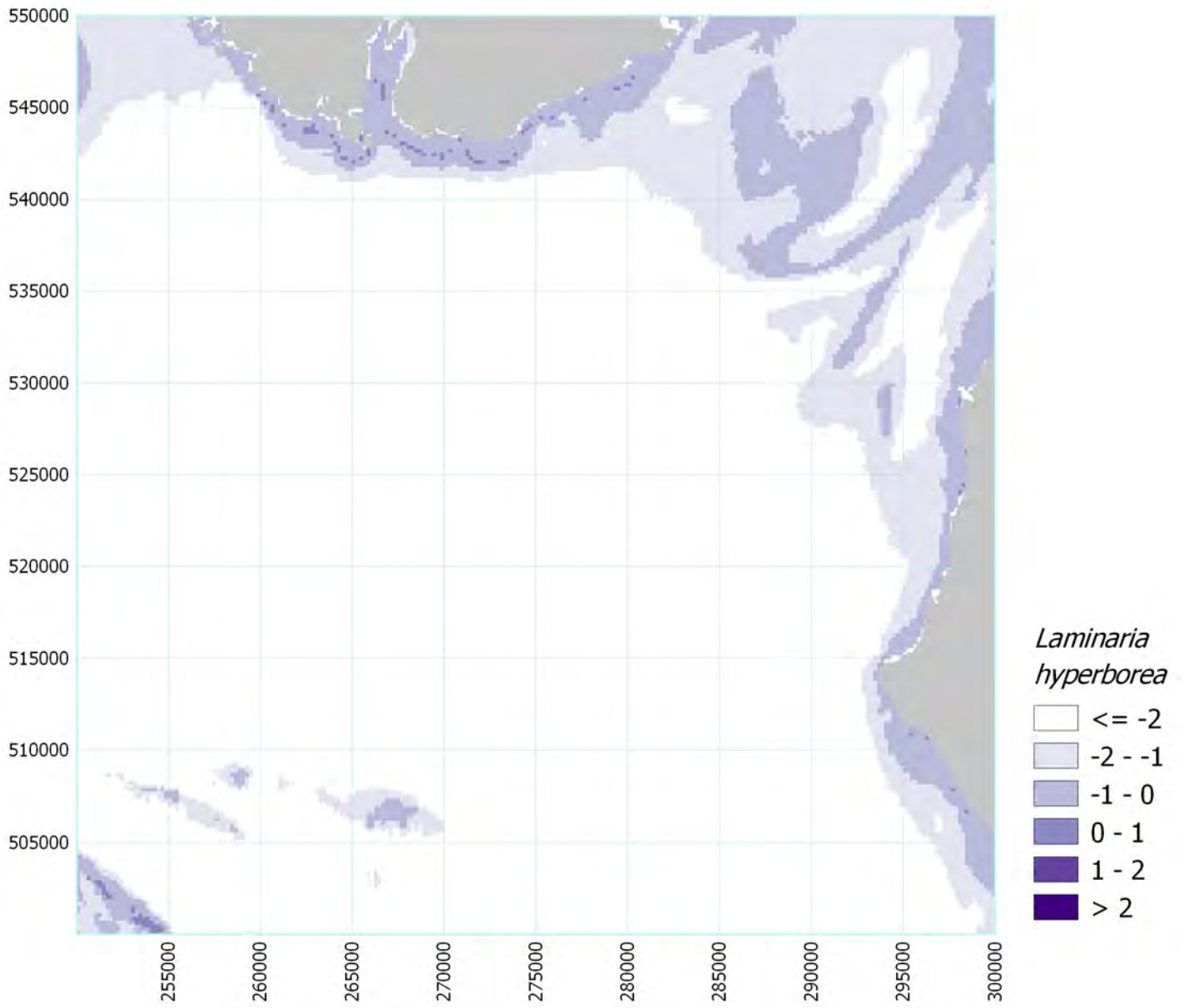
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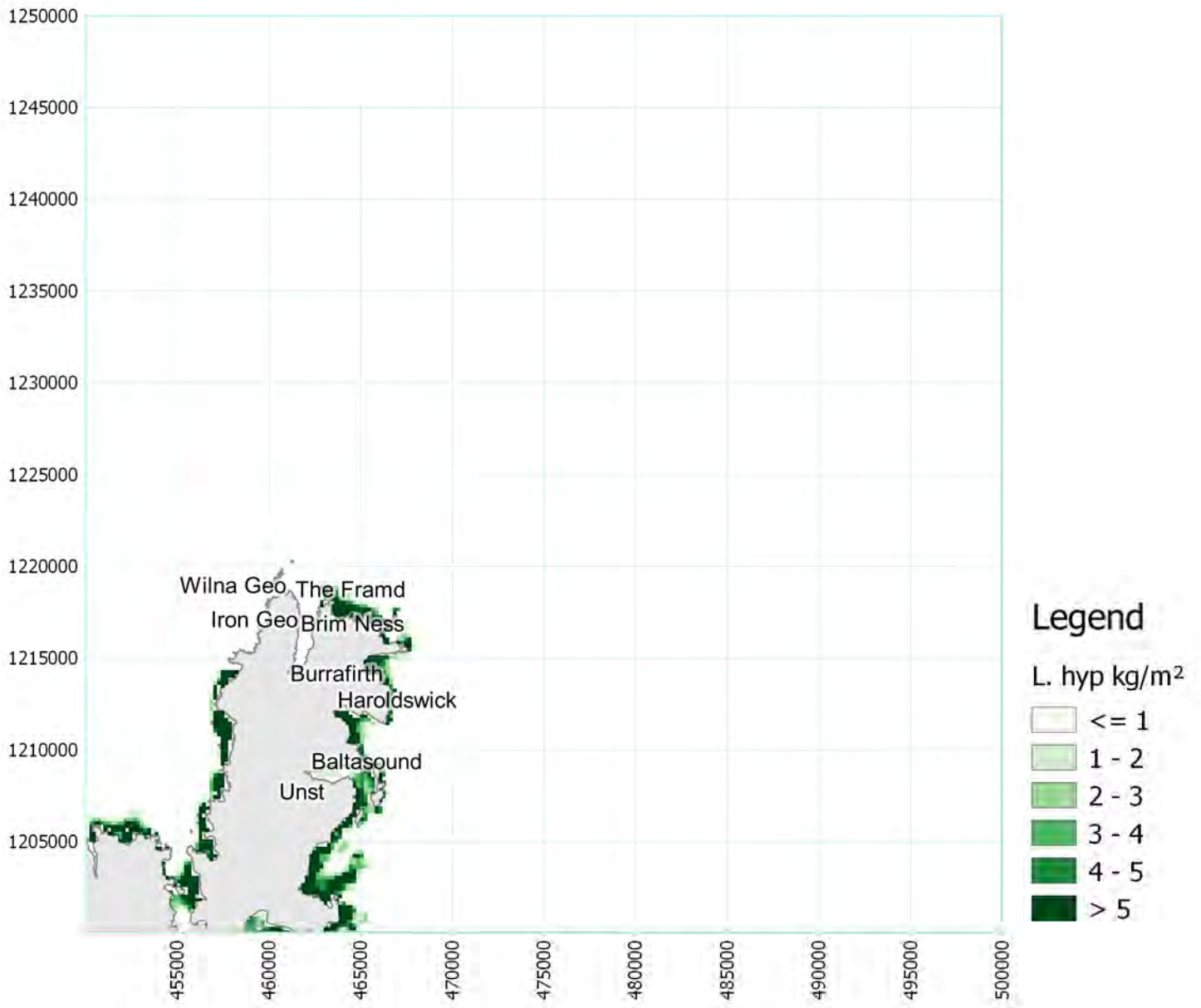


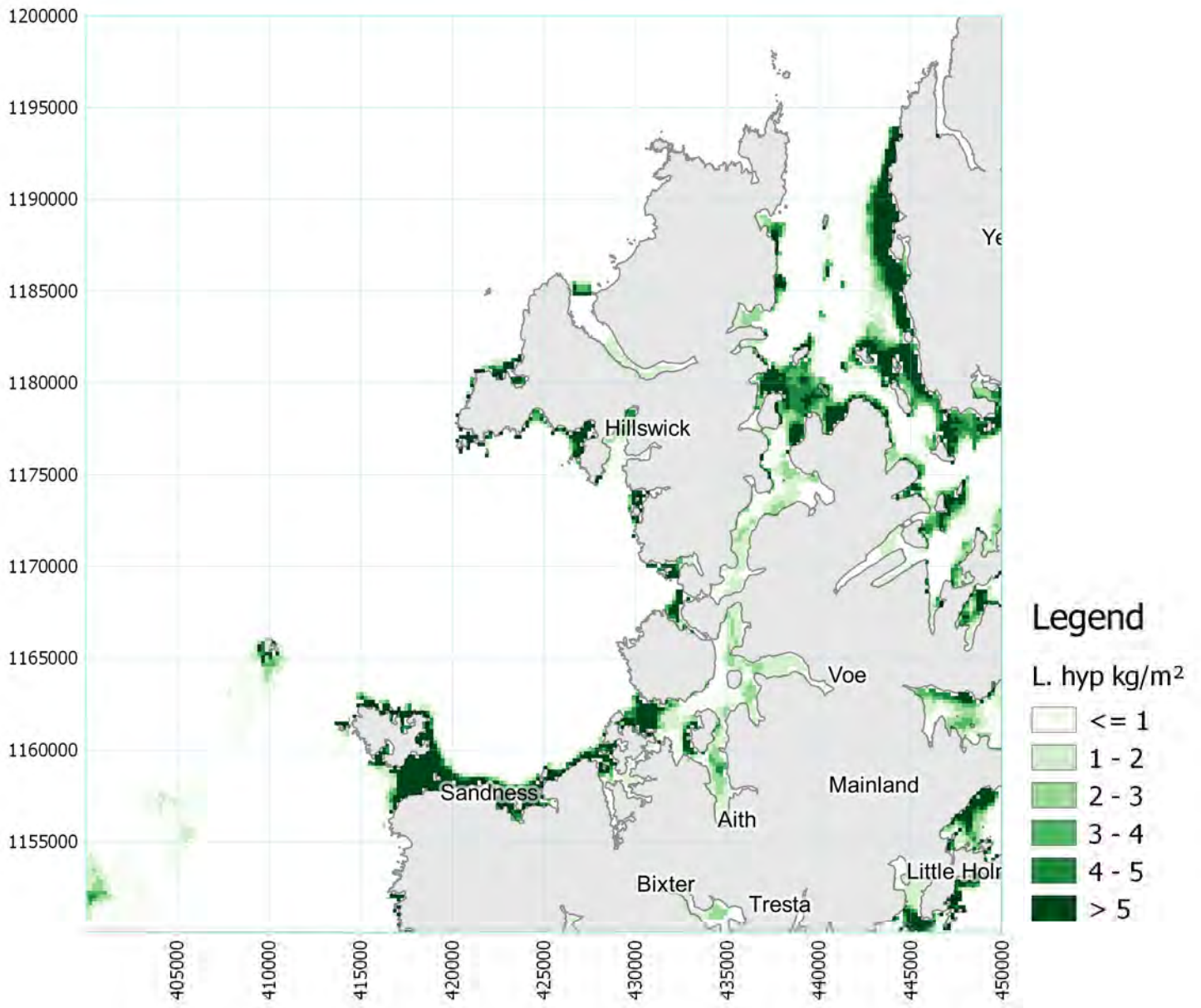
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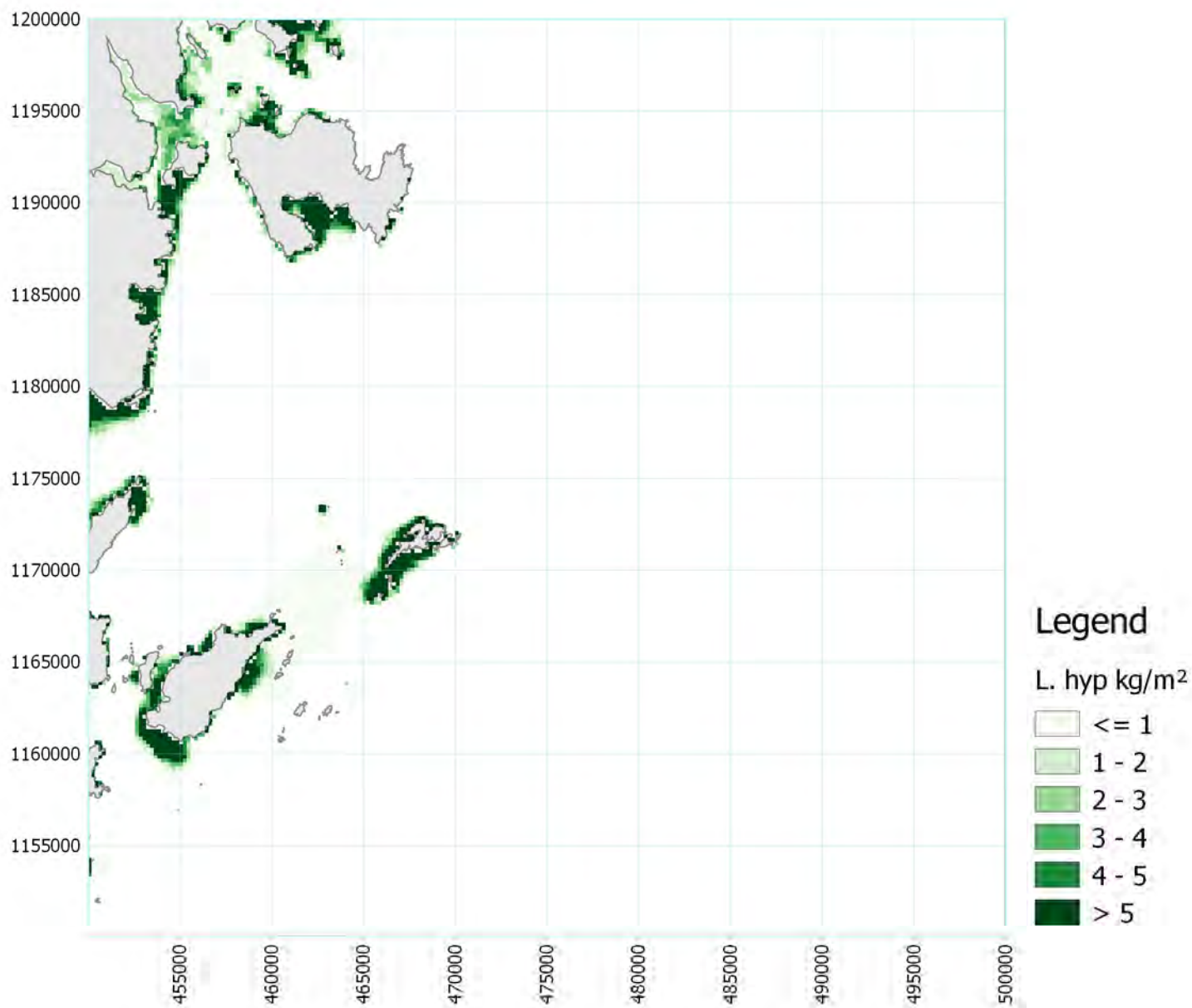


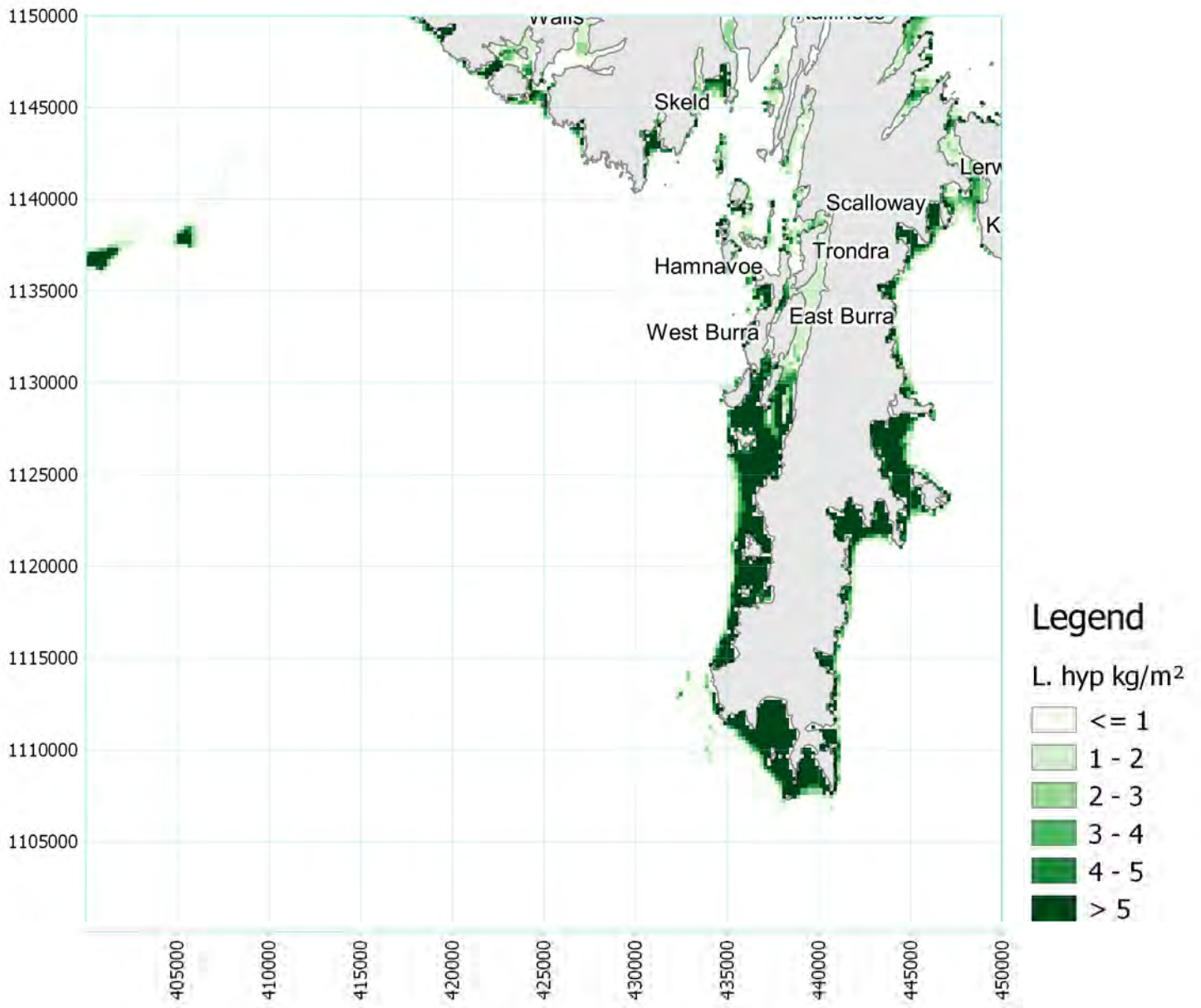
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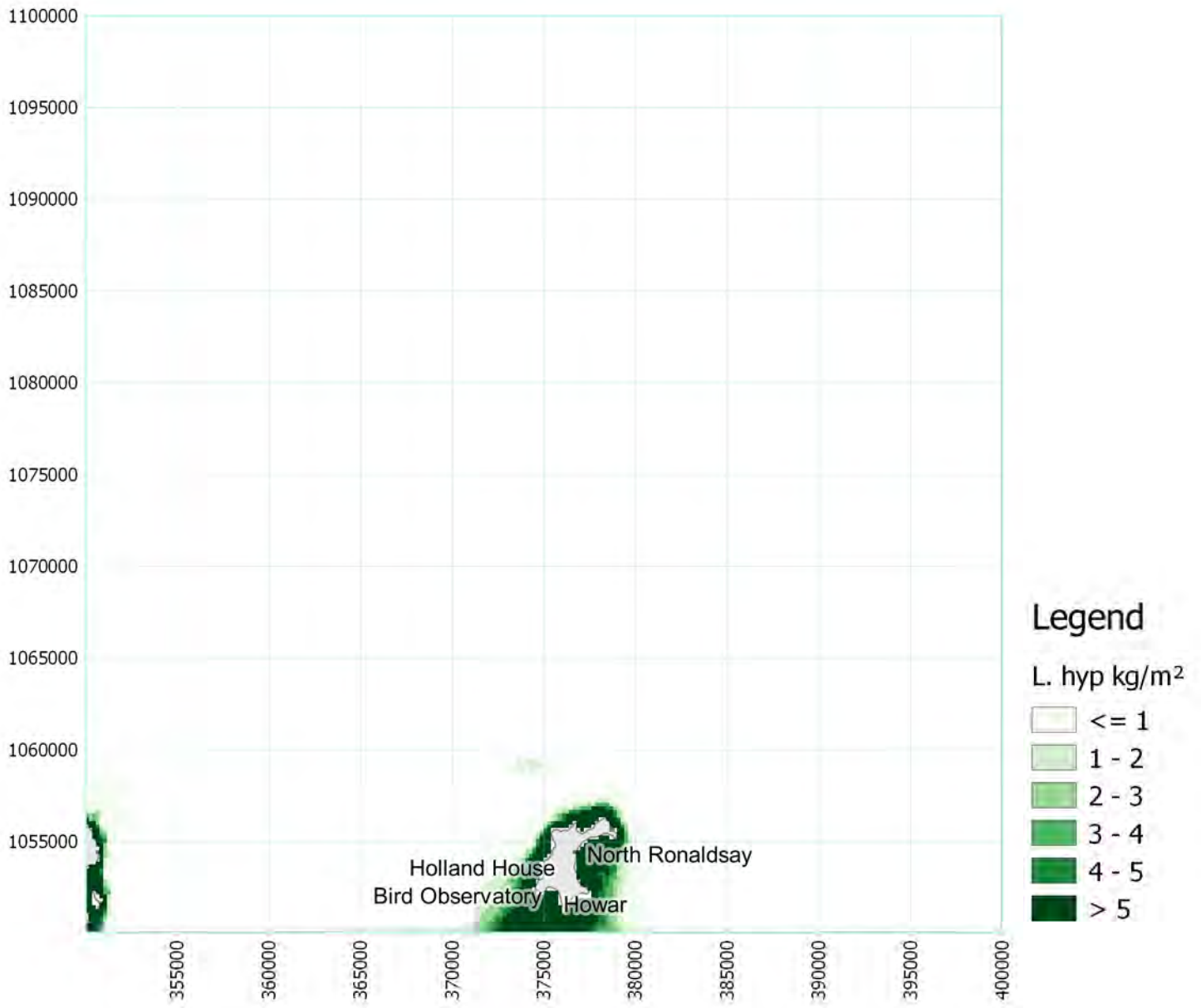


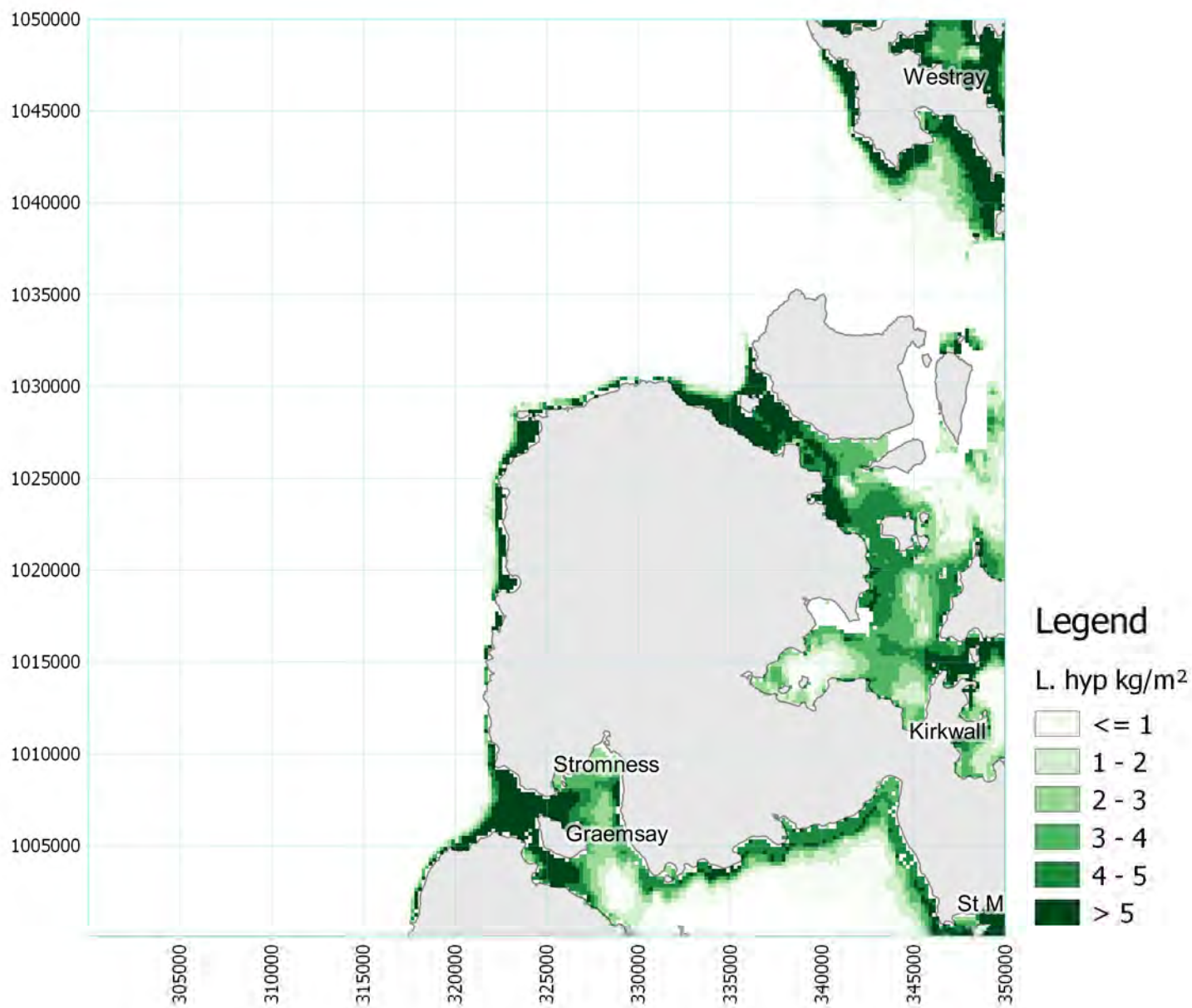


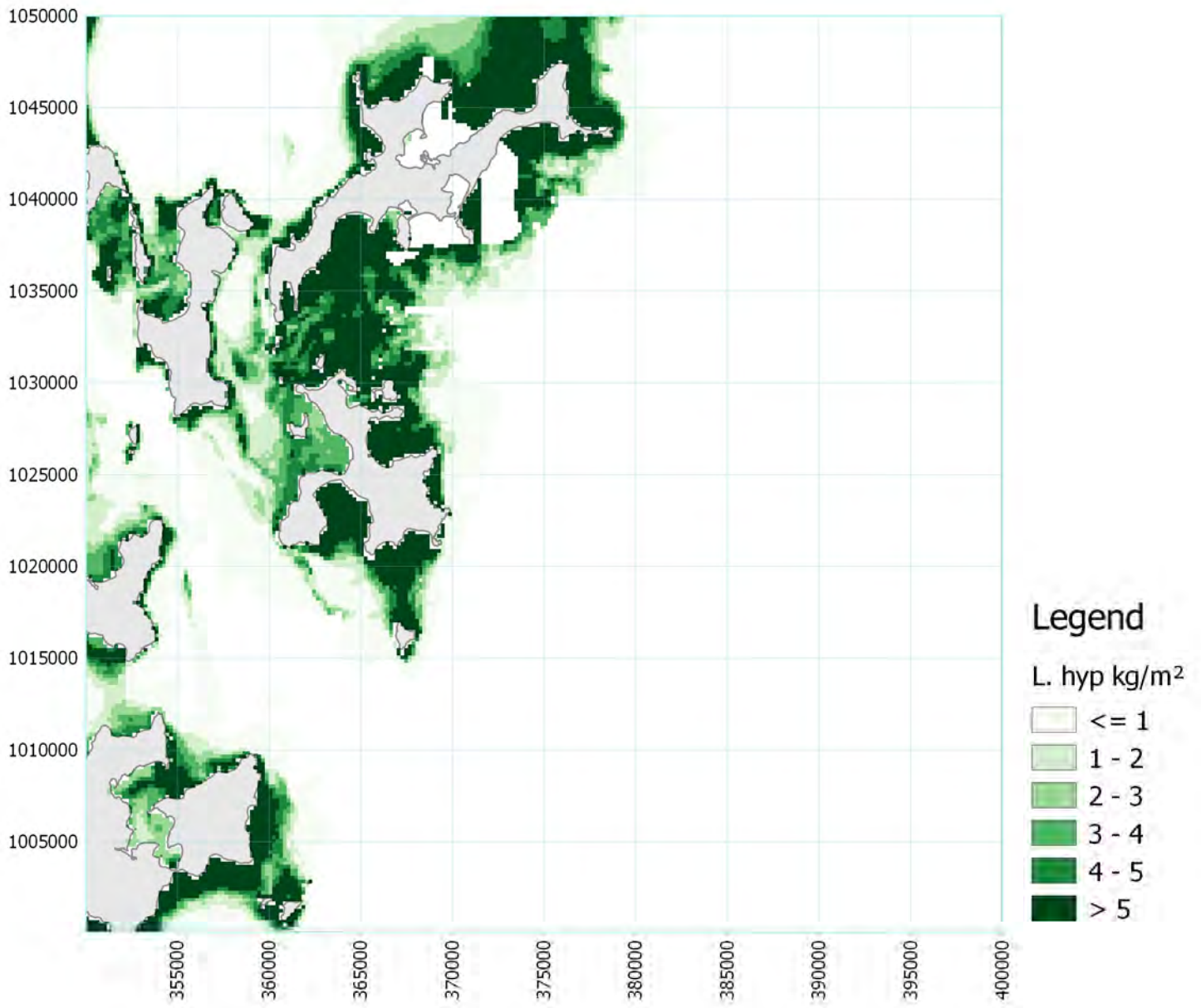


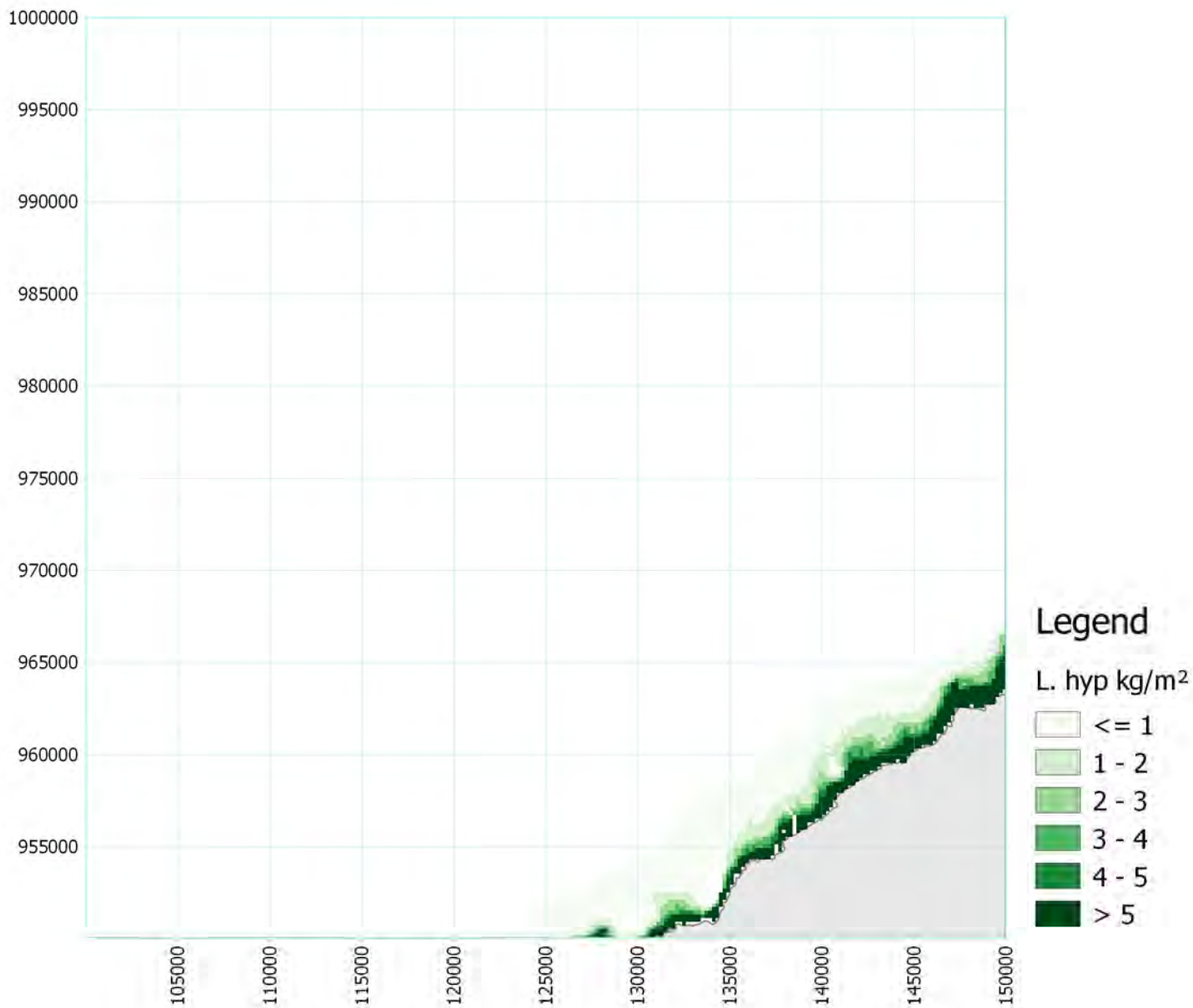


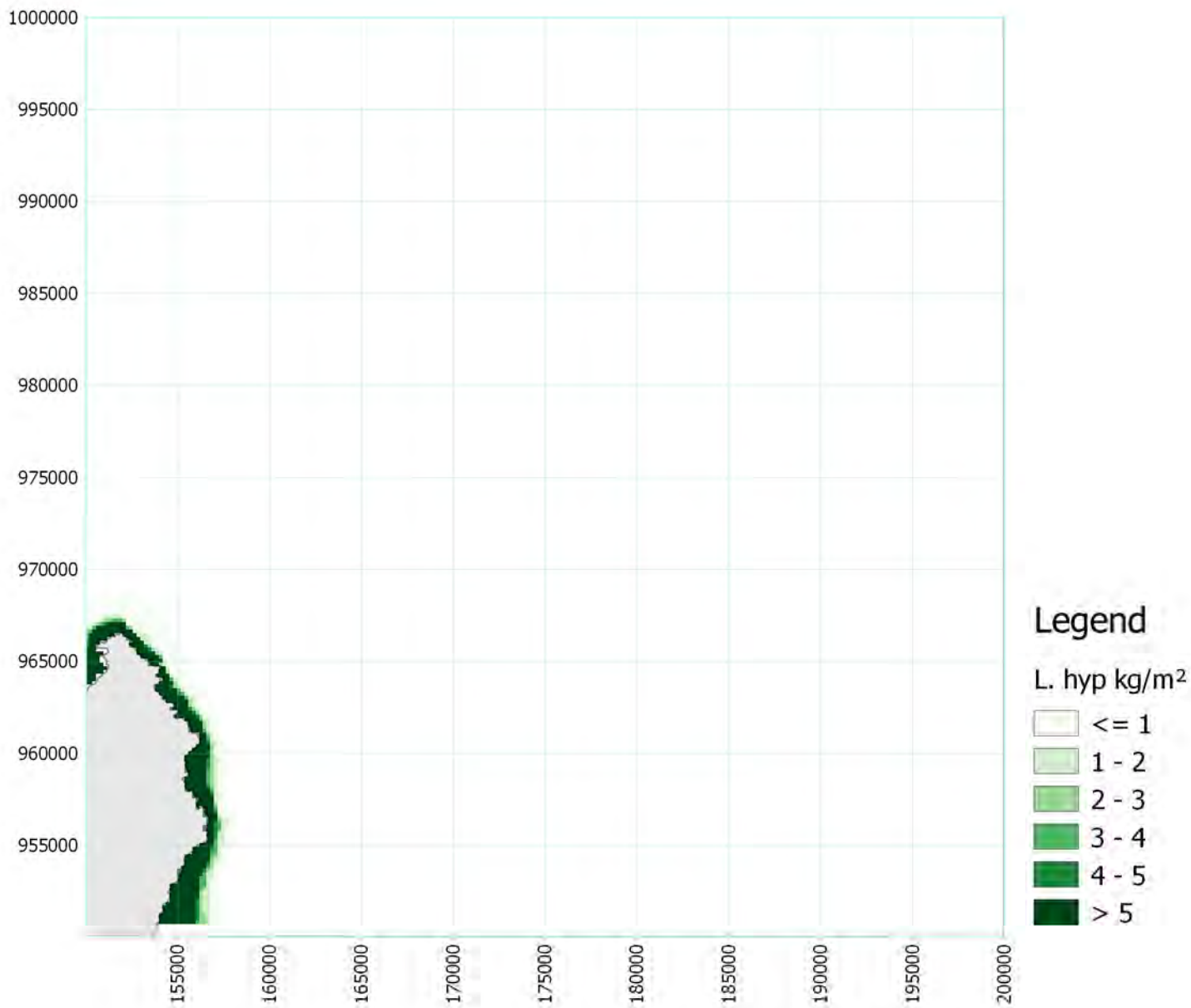


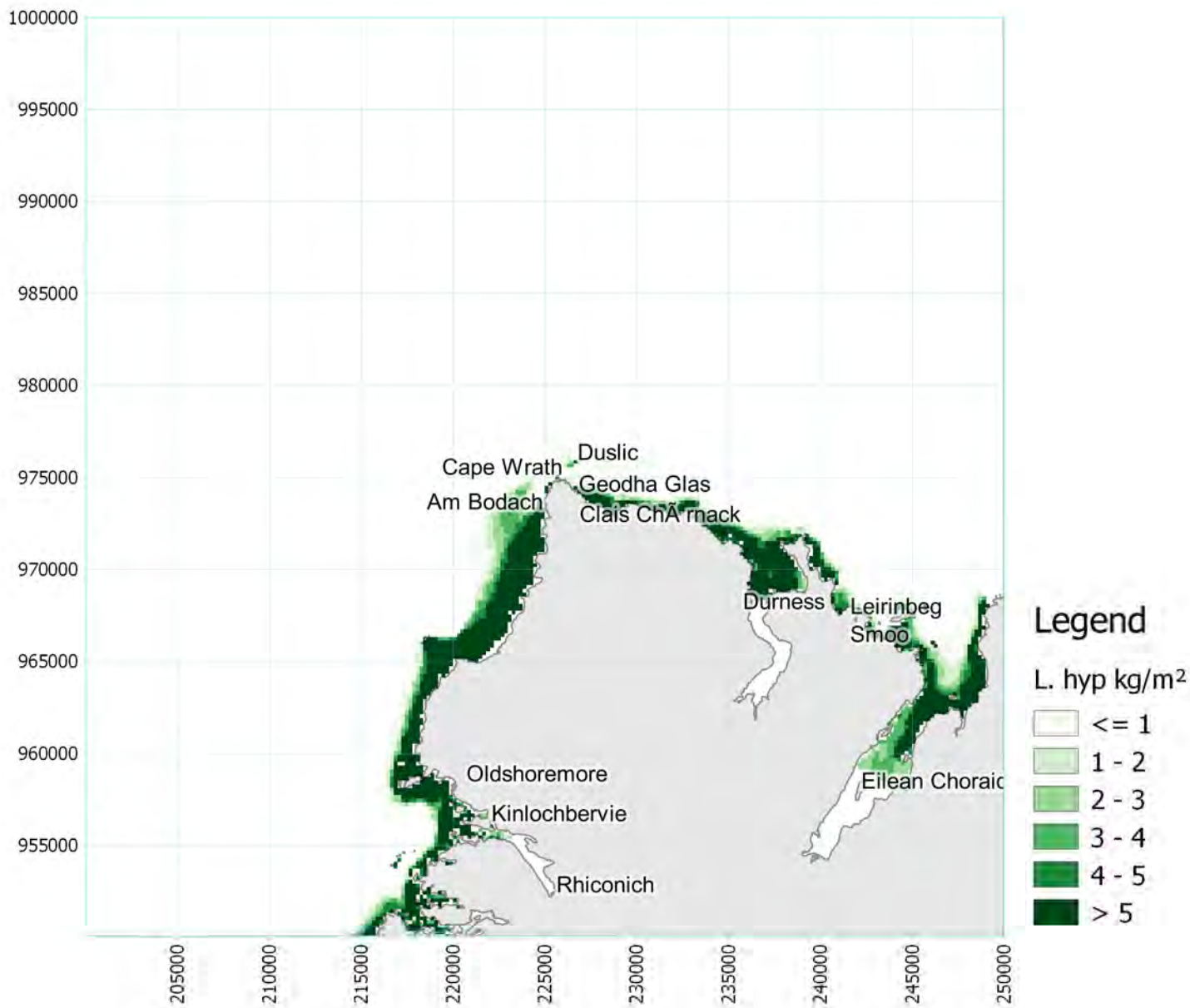


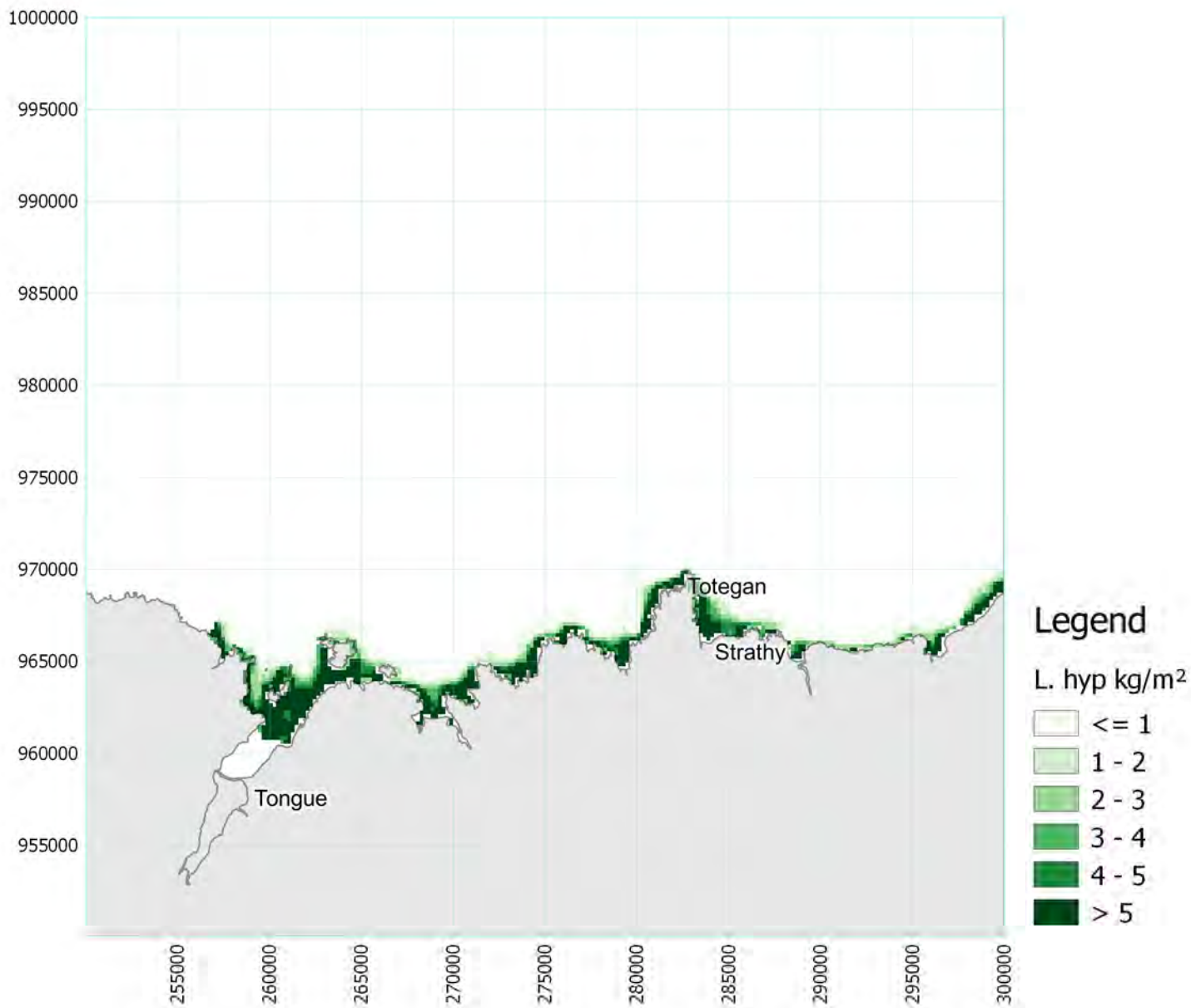


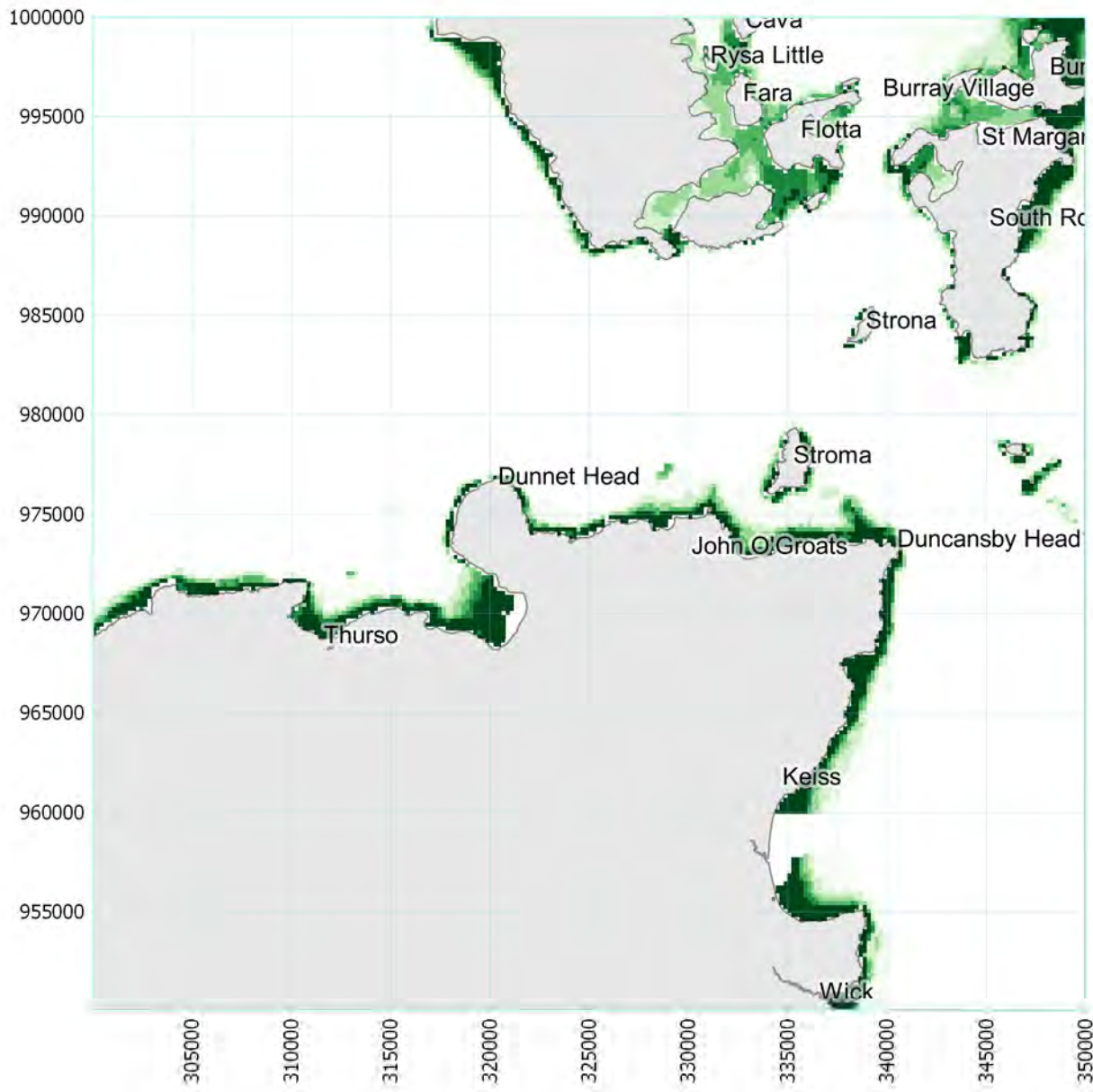








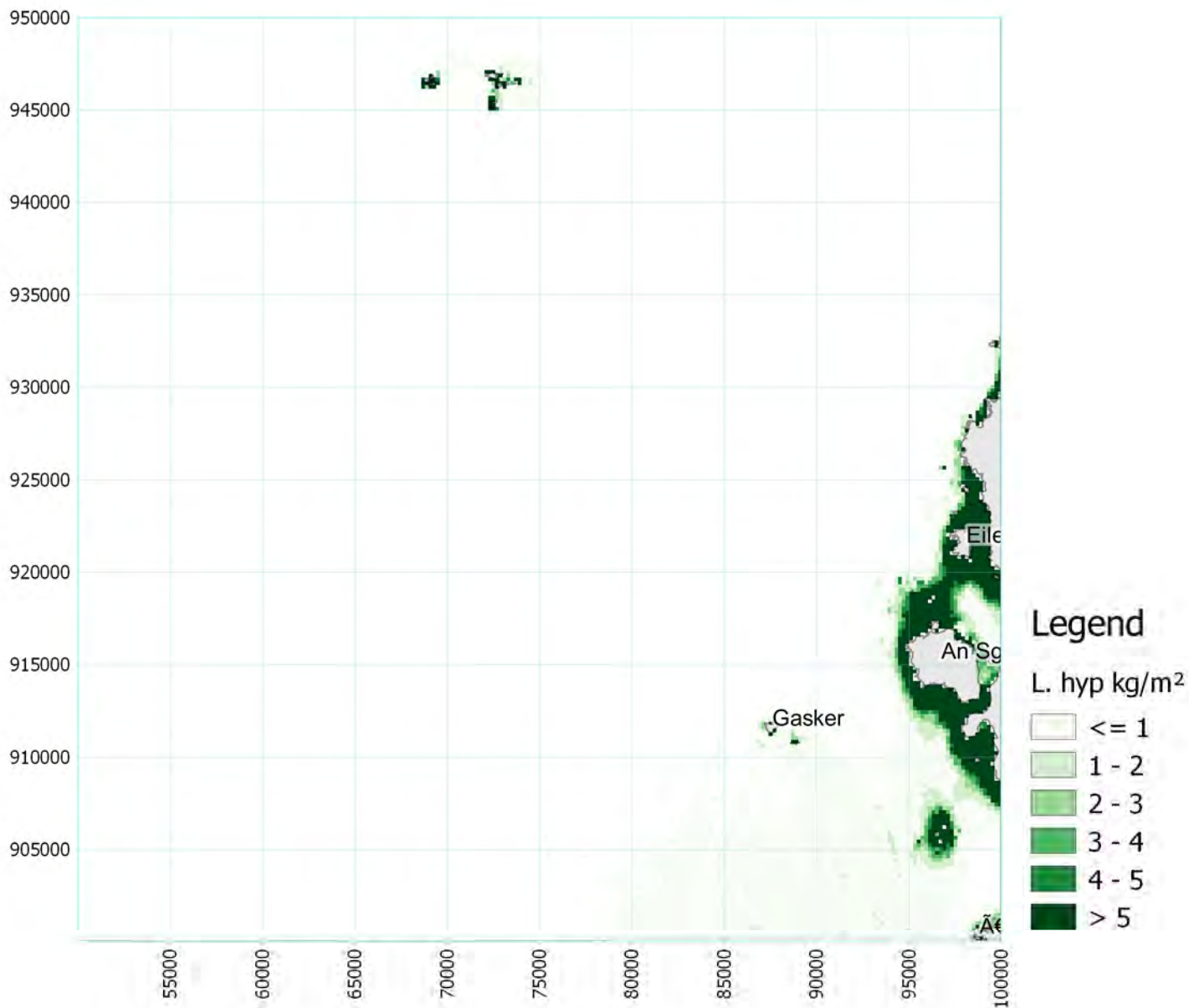


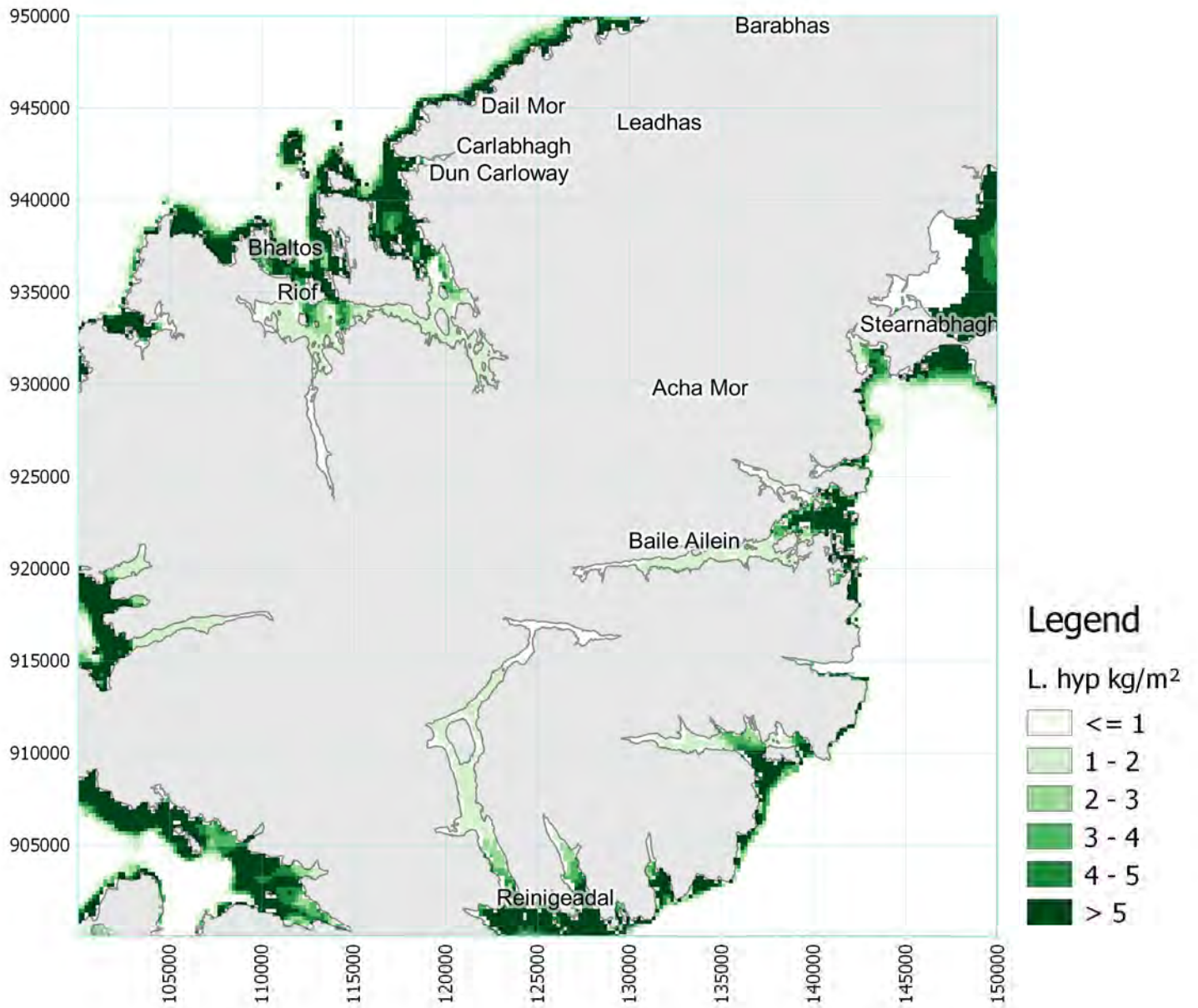


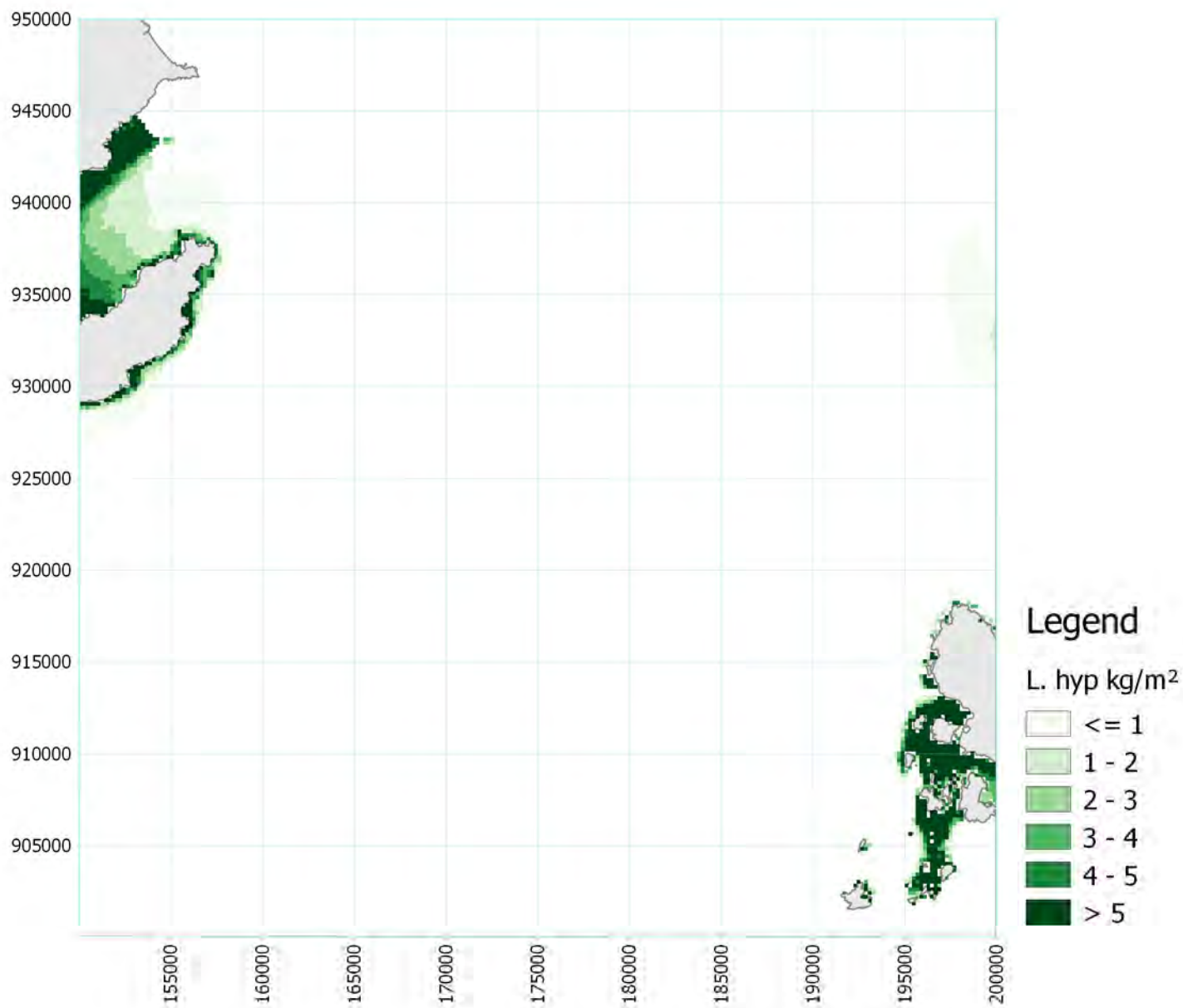
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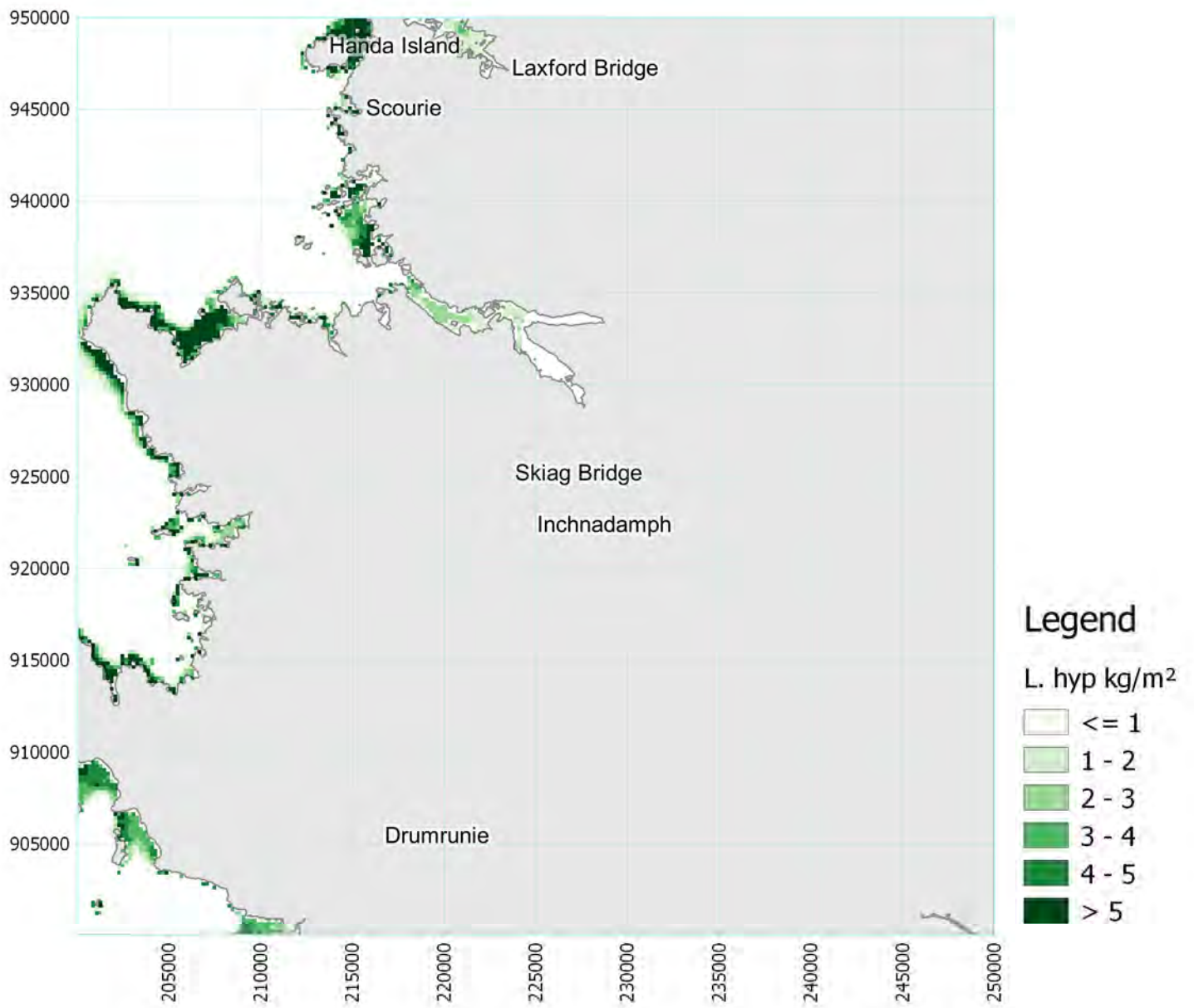
L. hyp kg/m²

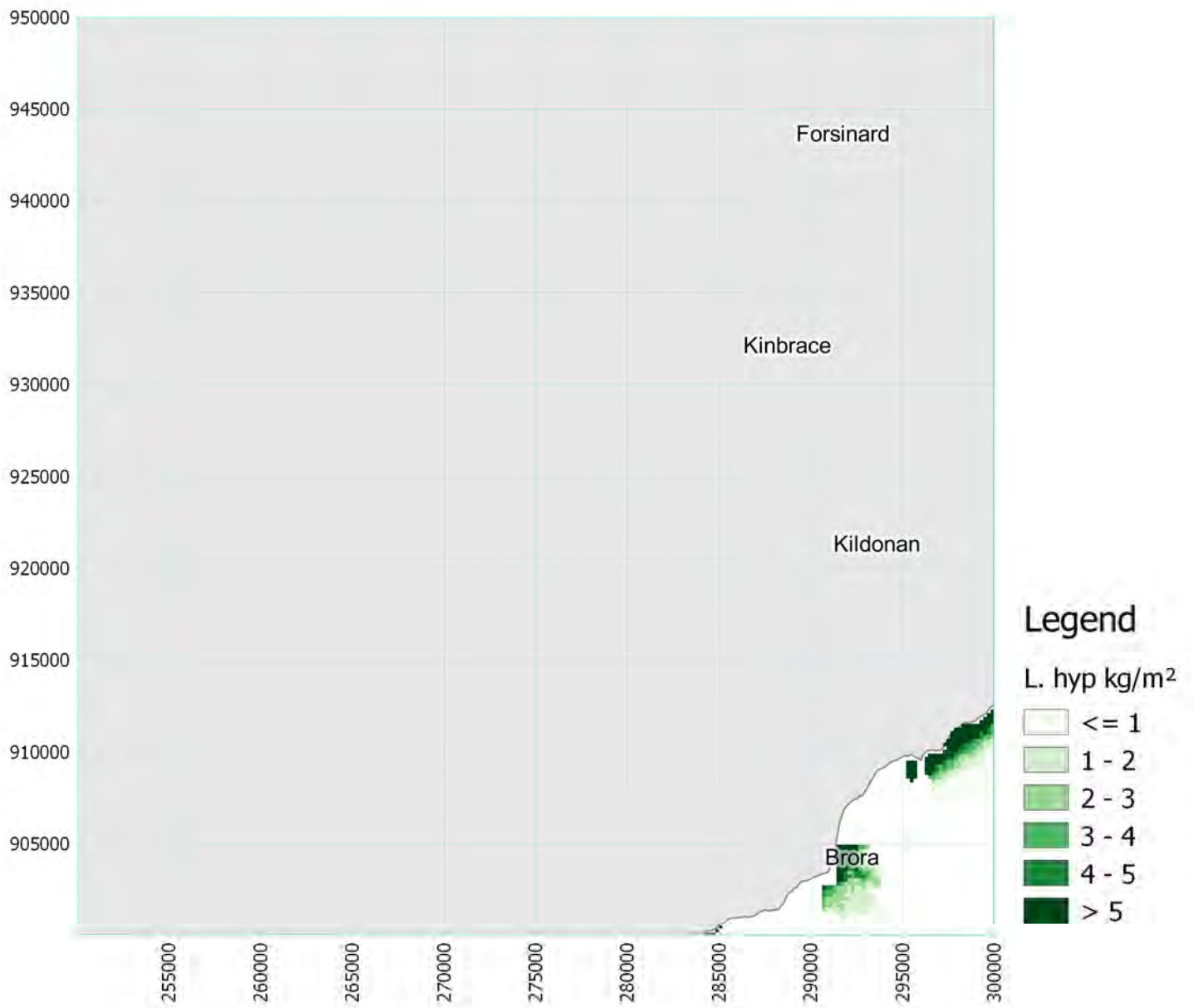
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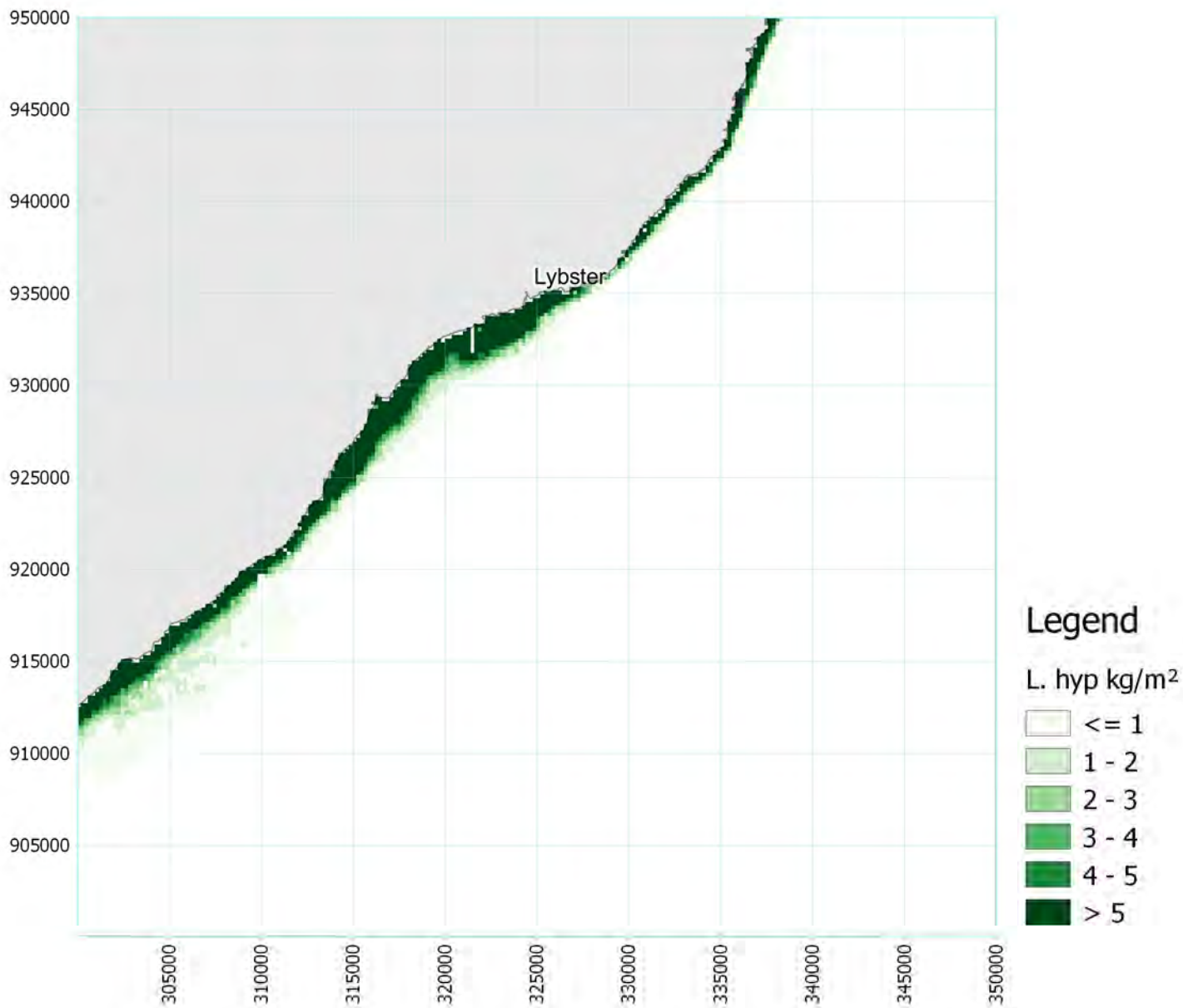


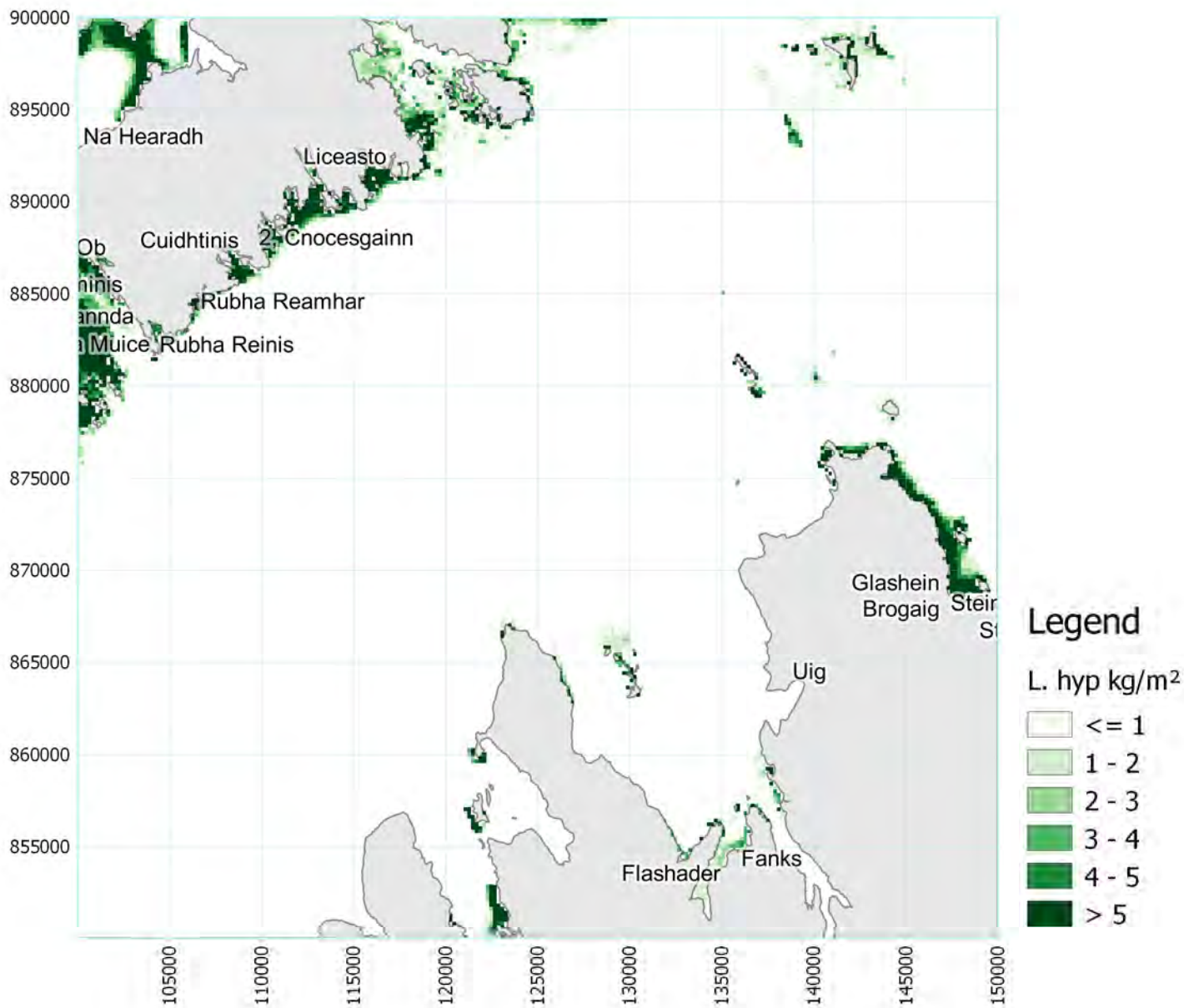


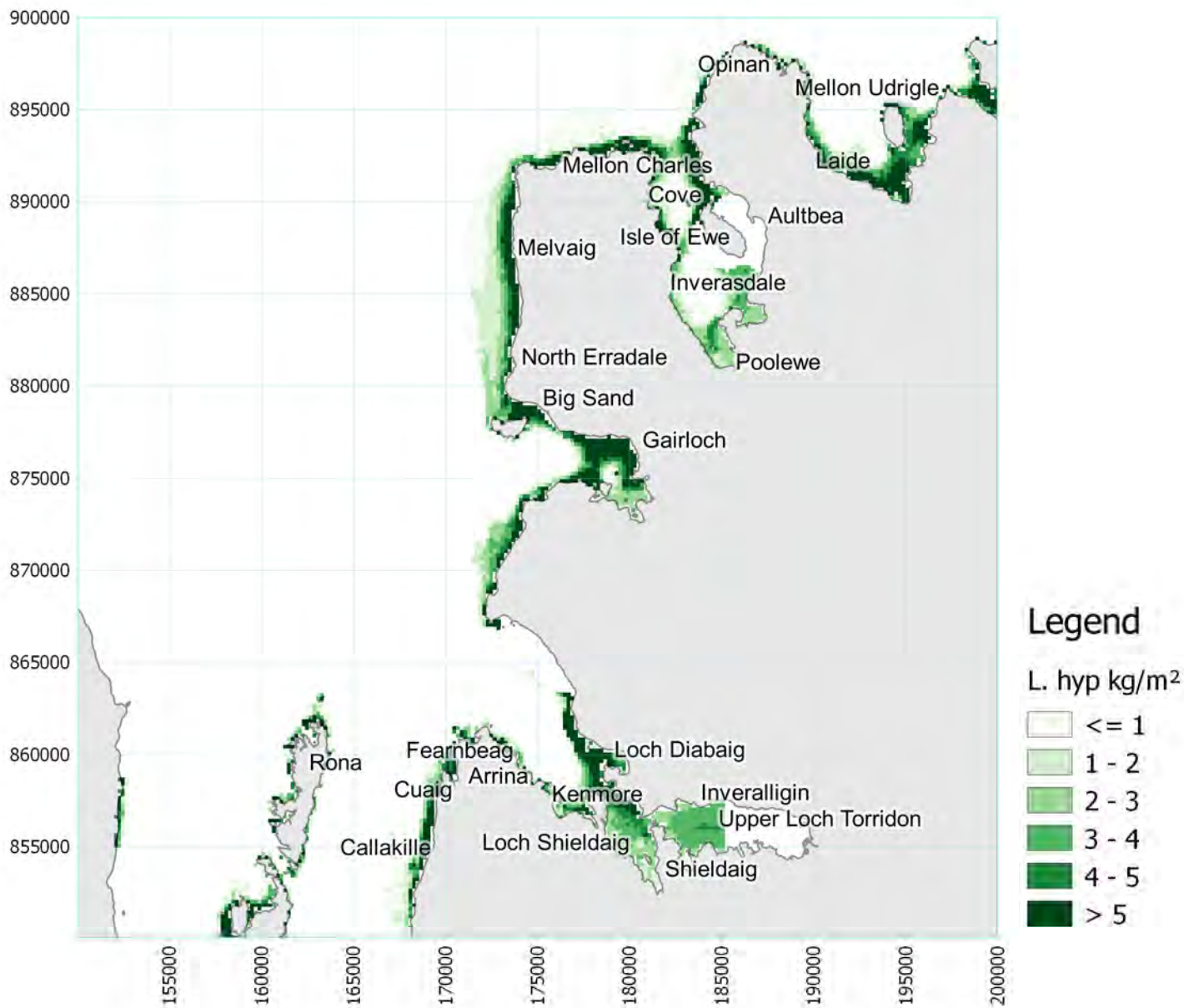


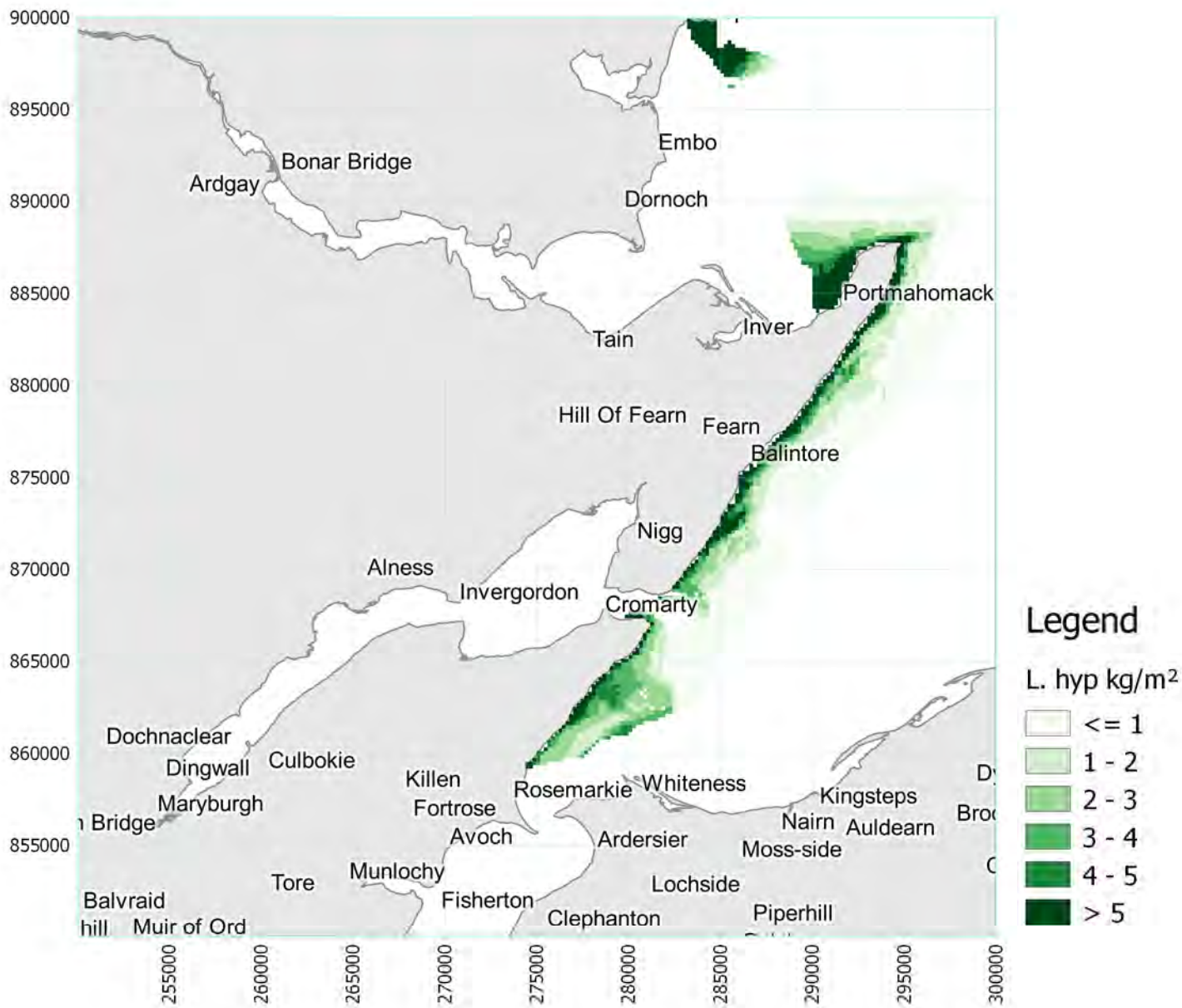


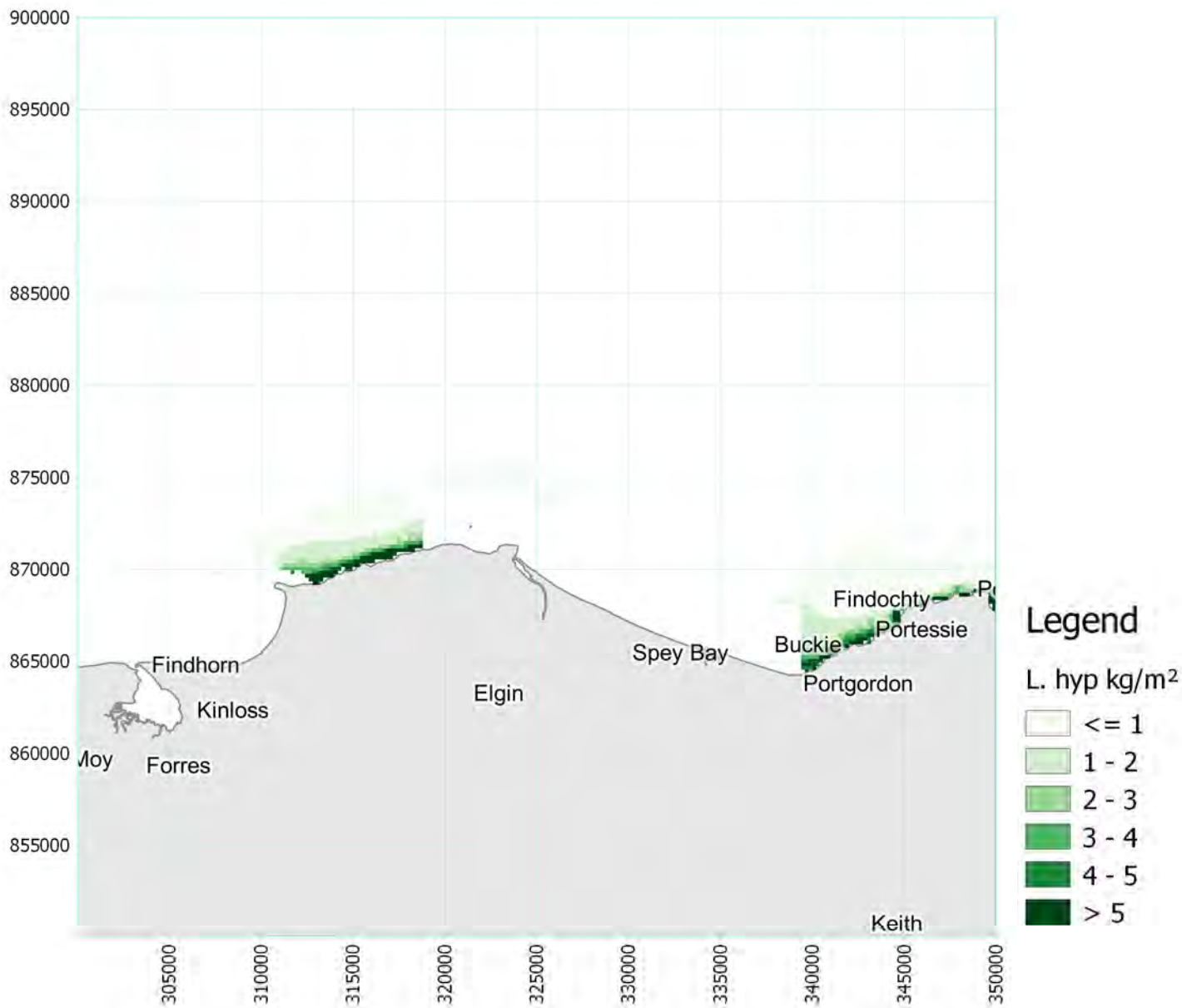


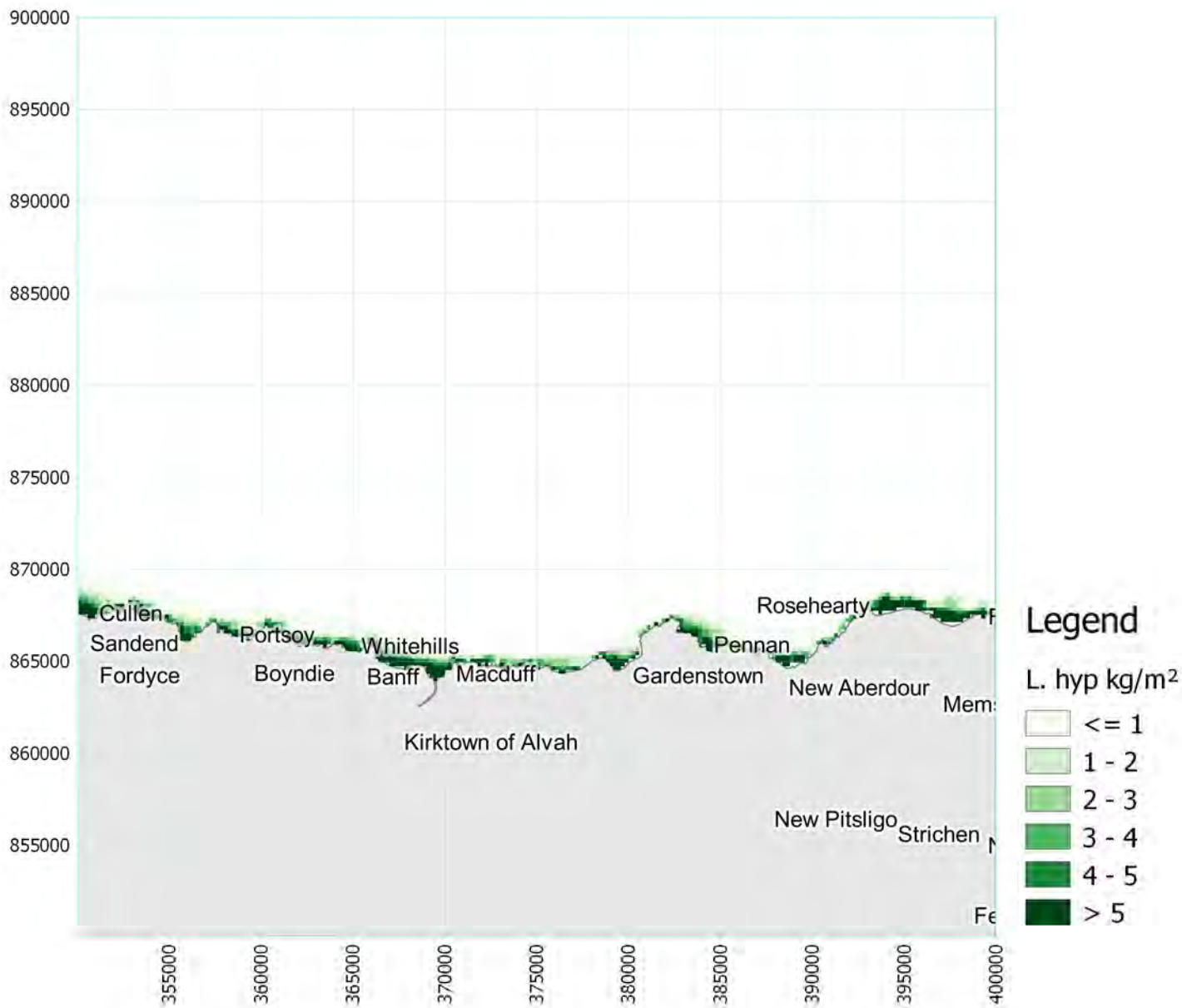


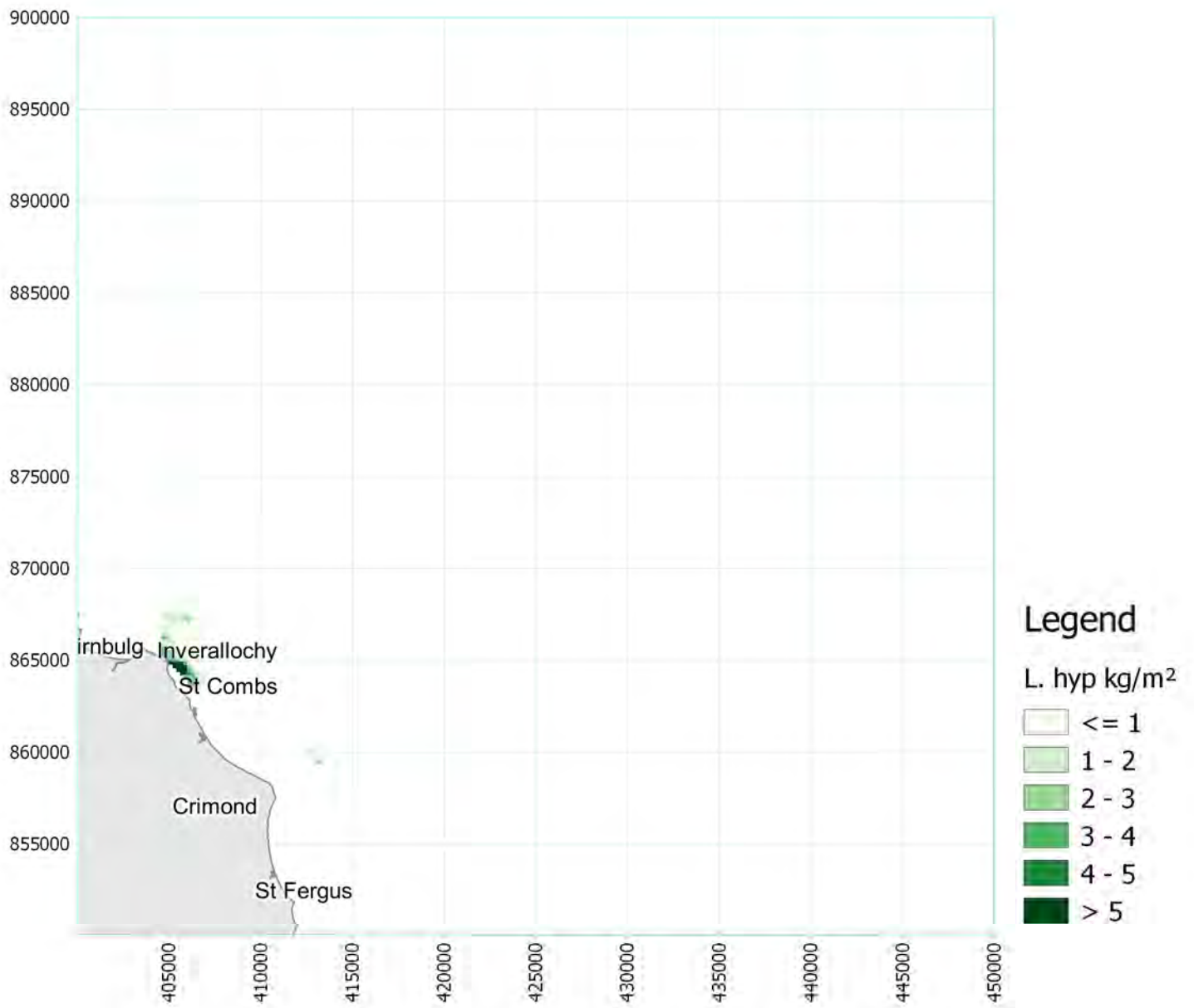


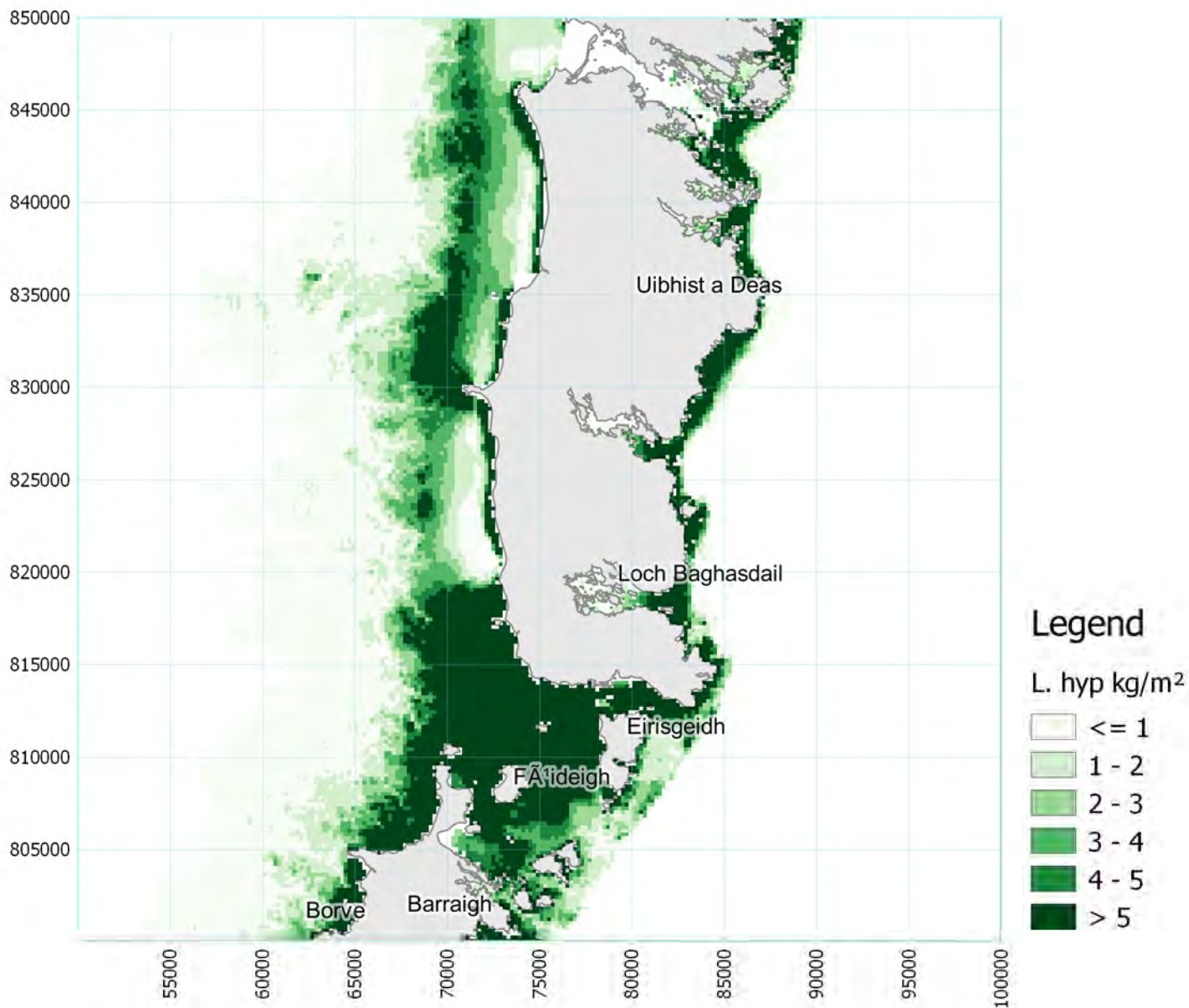


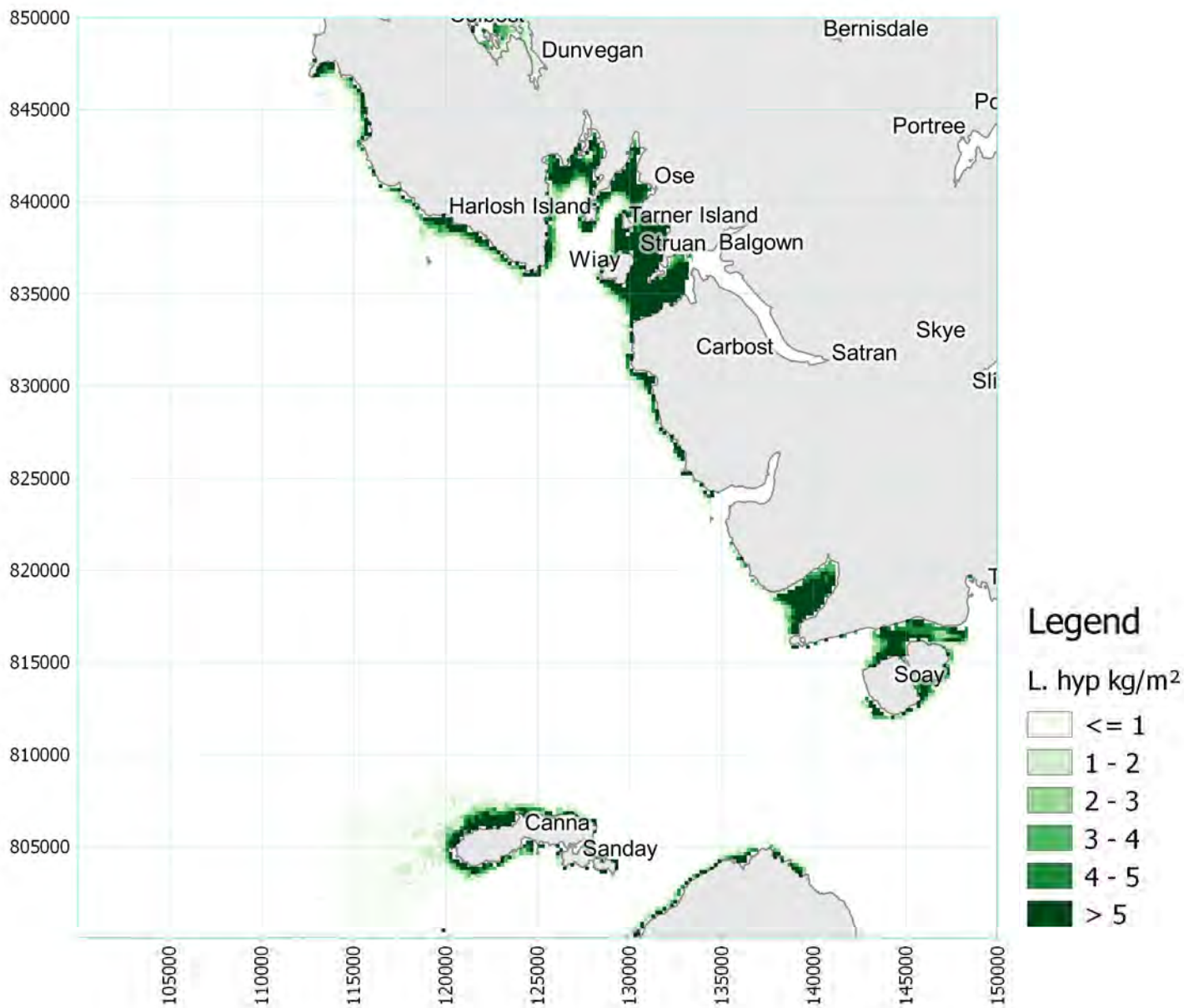


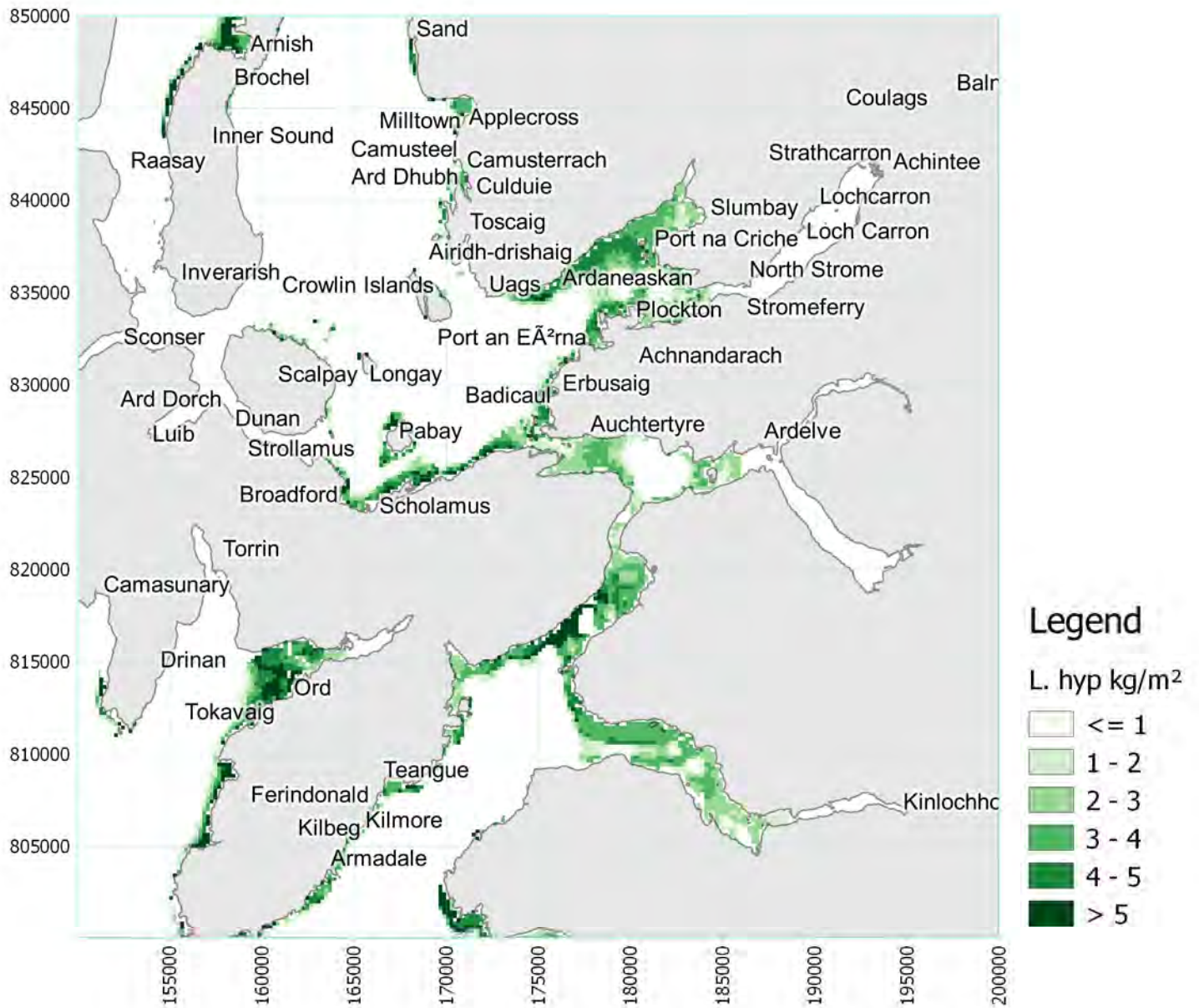


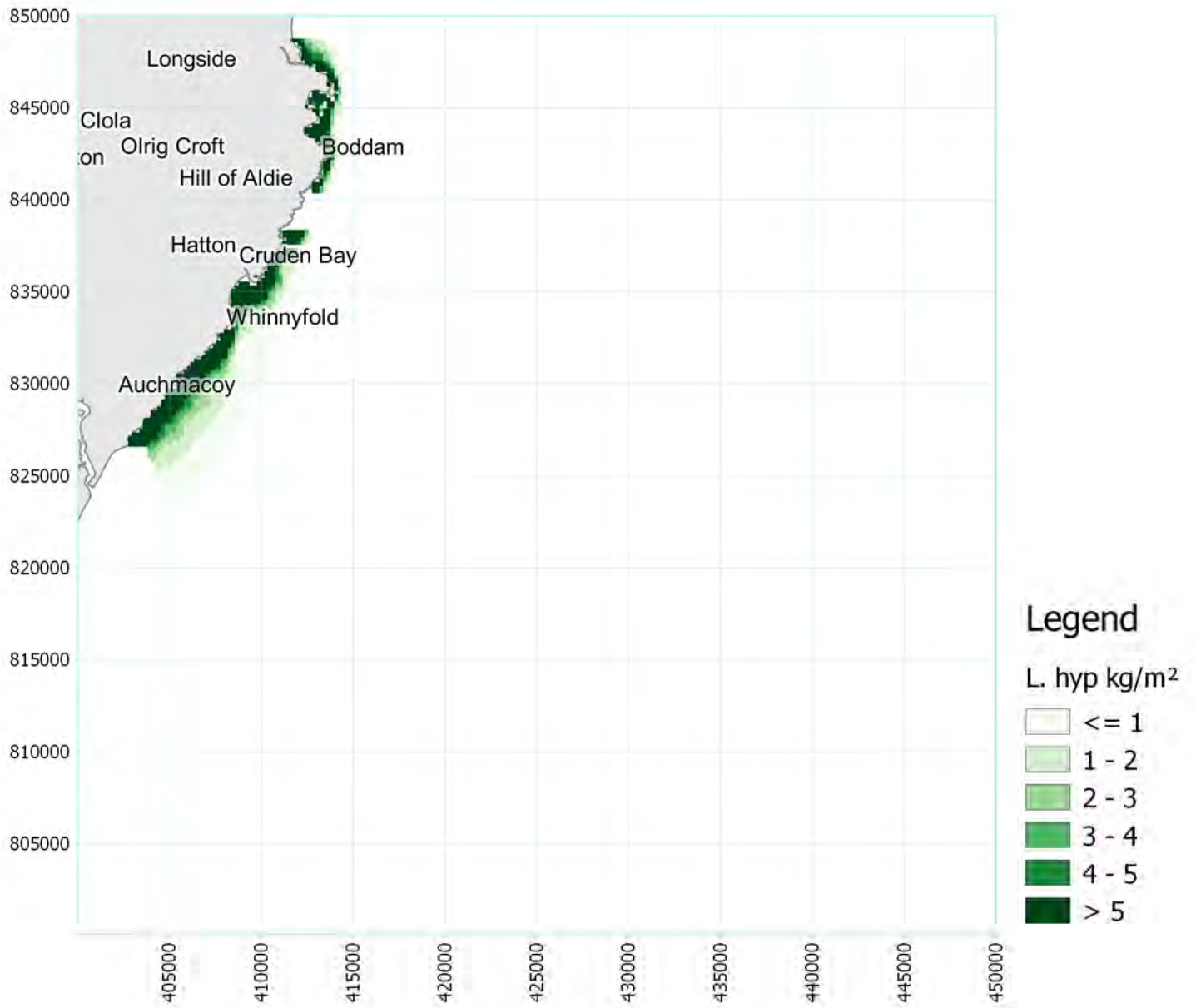


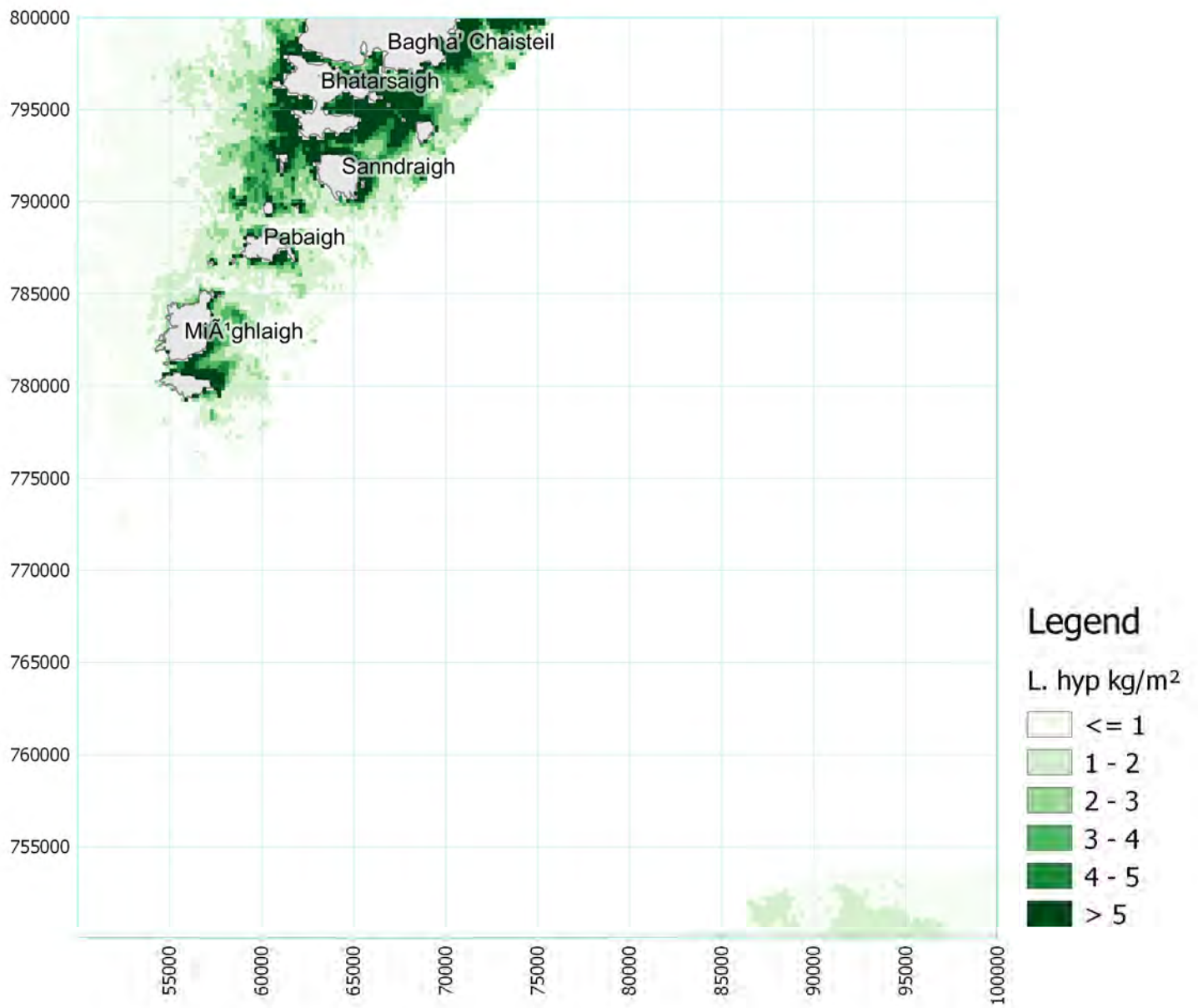


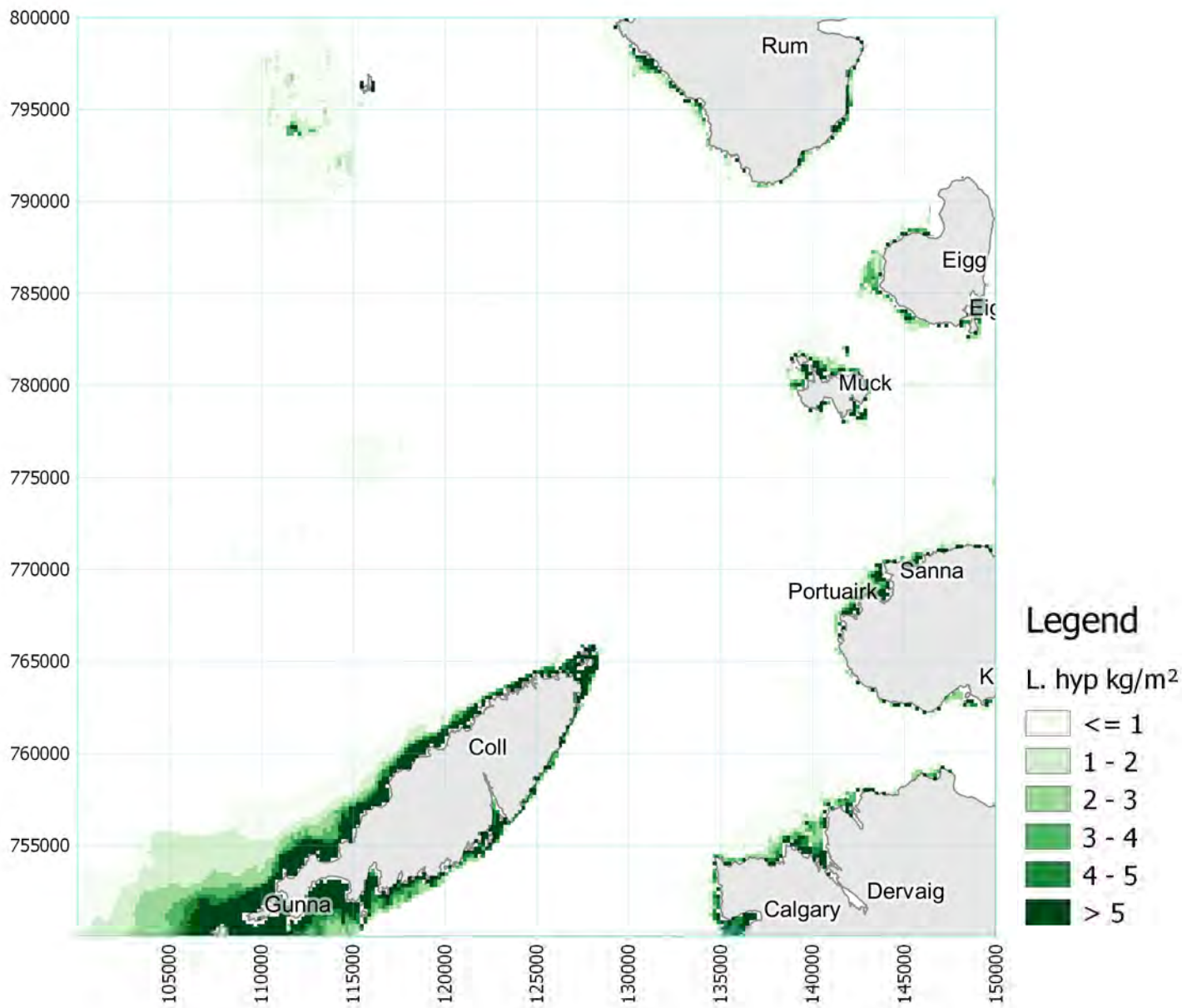


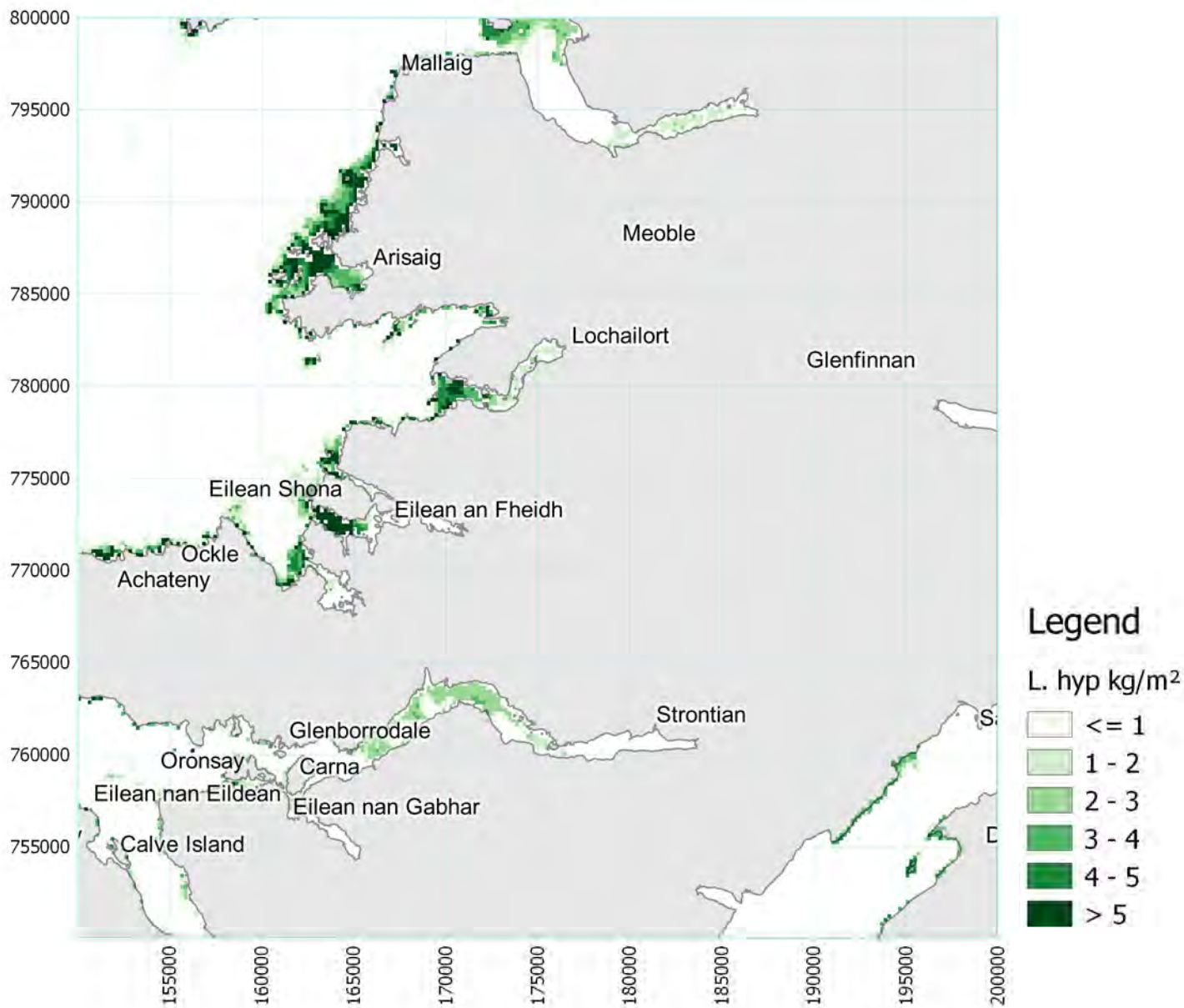


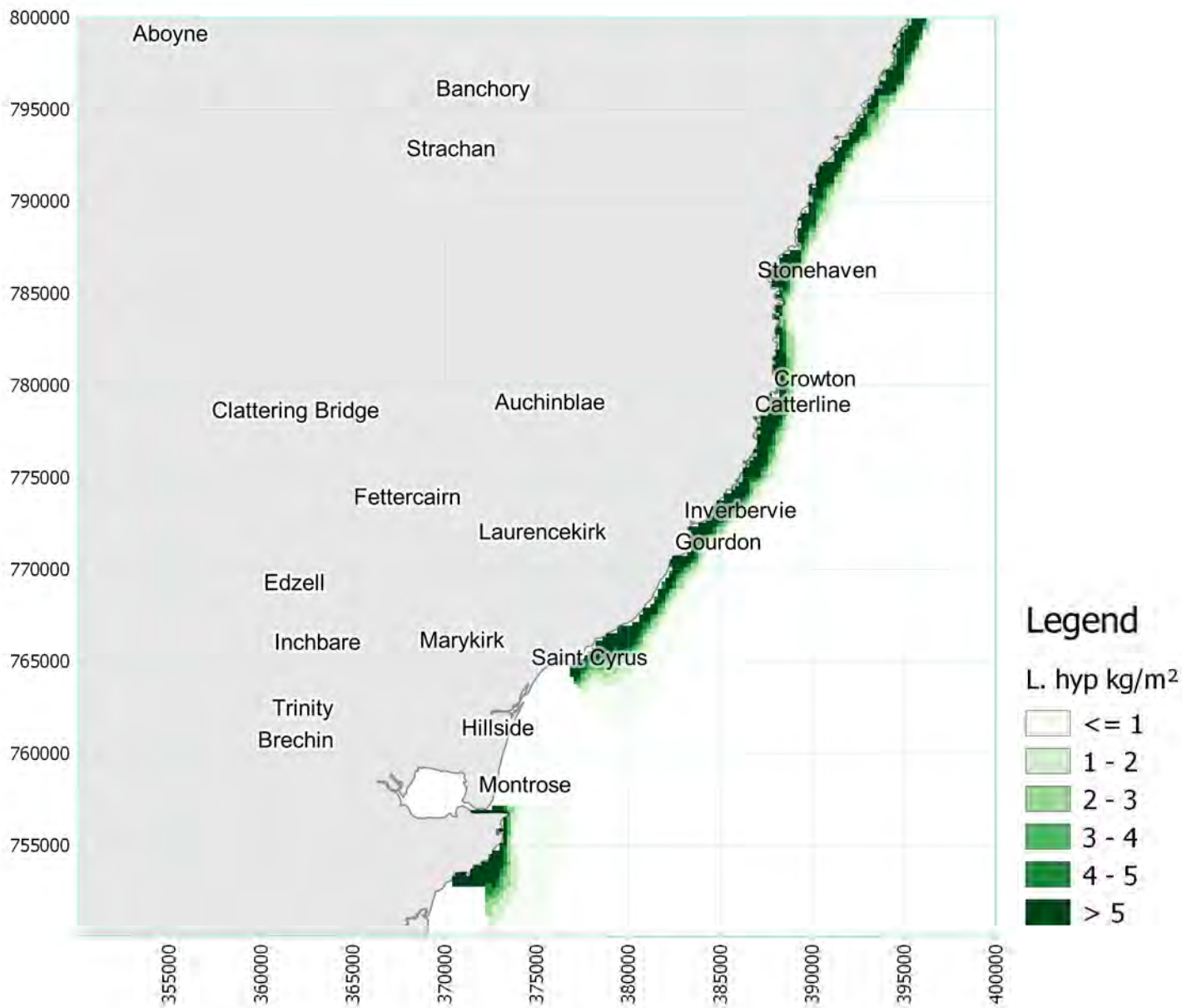


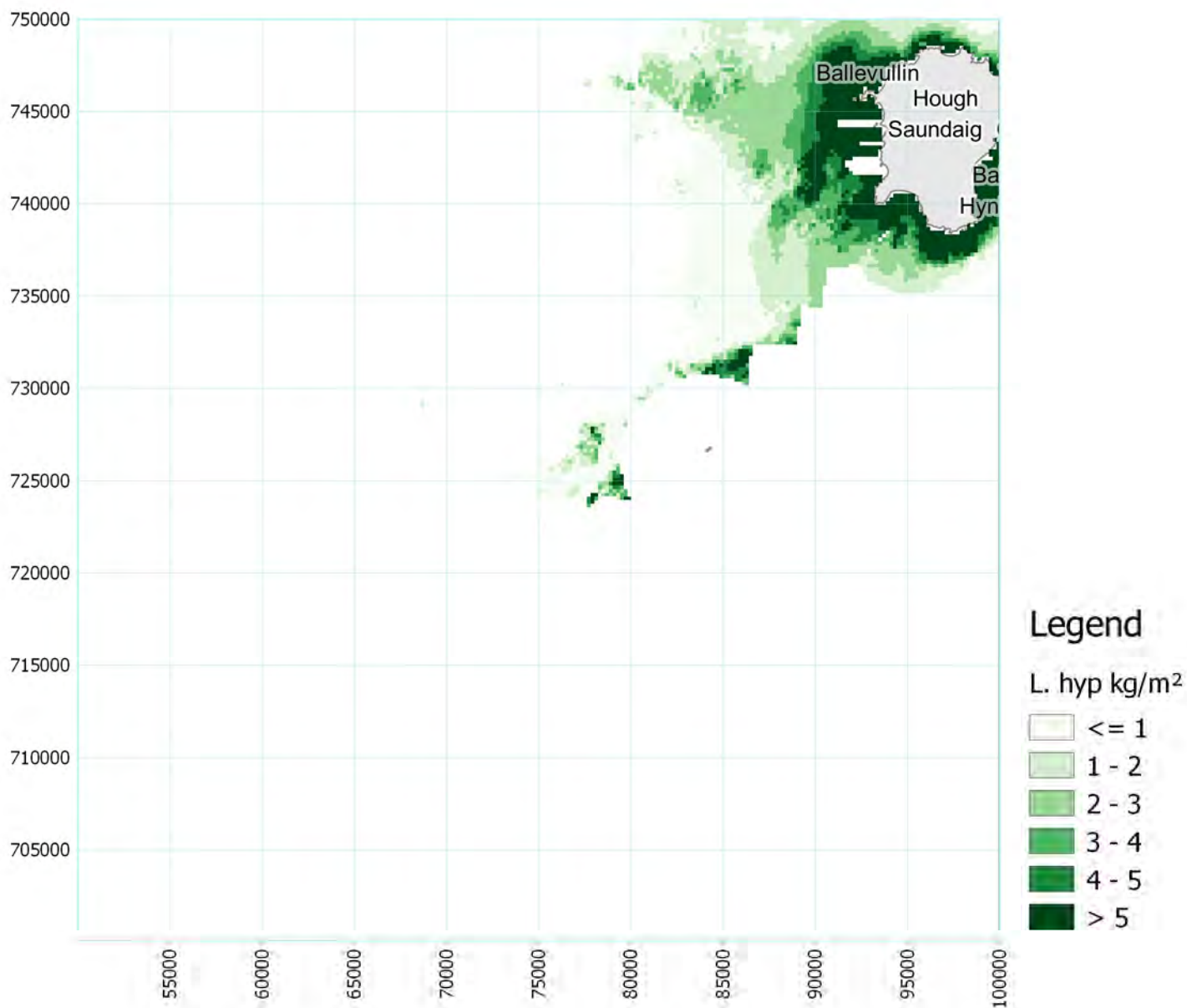


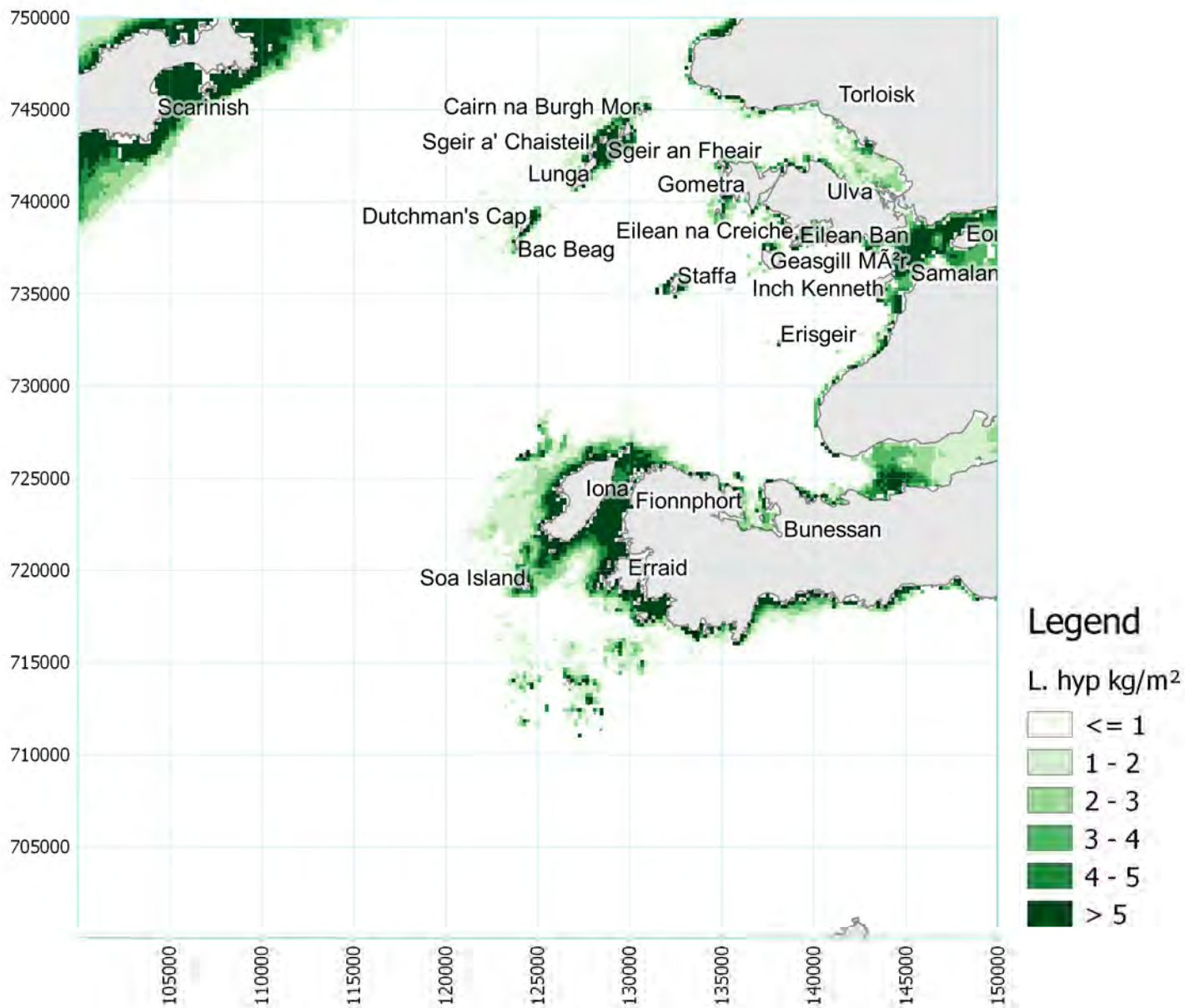


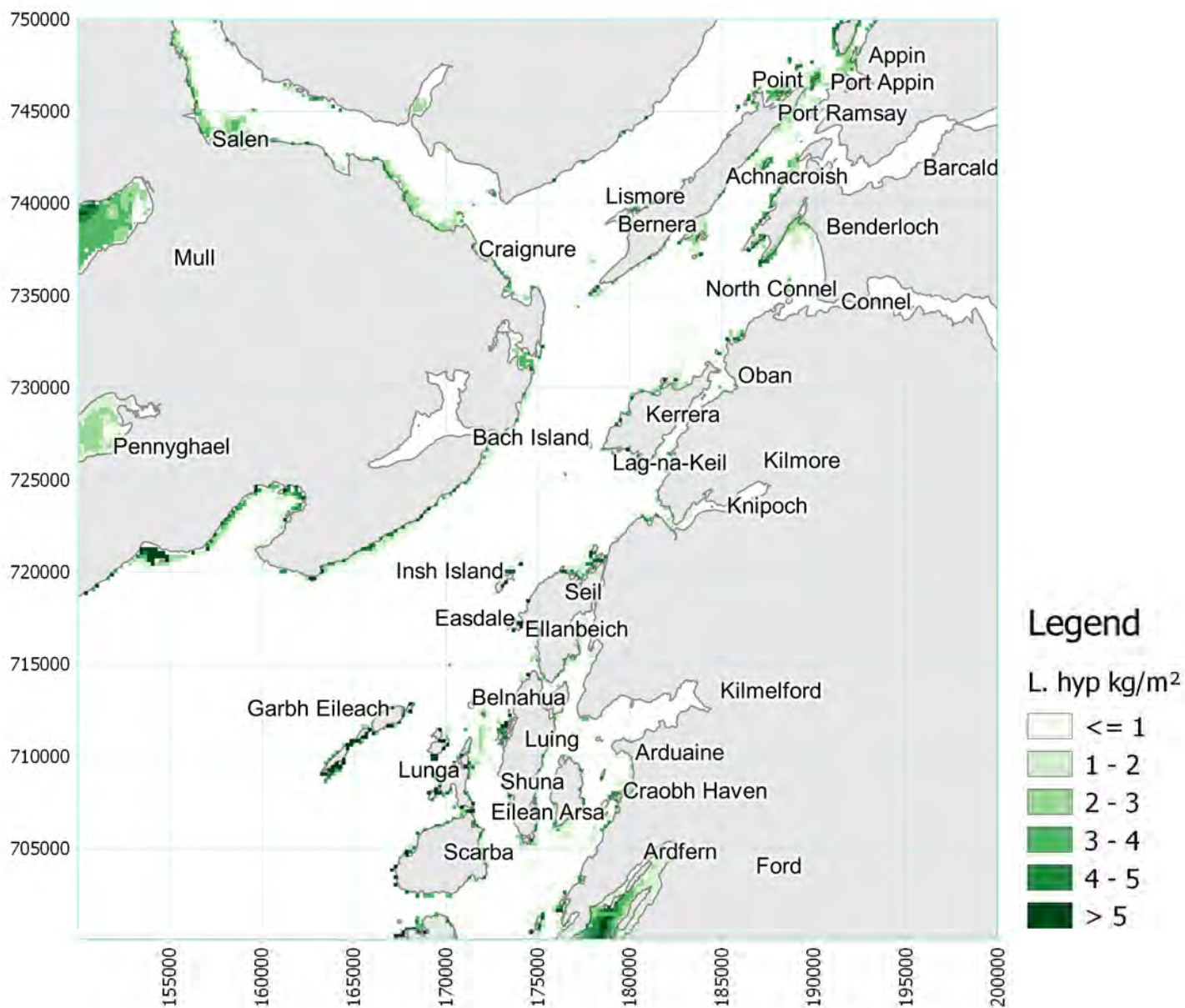


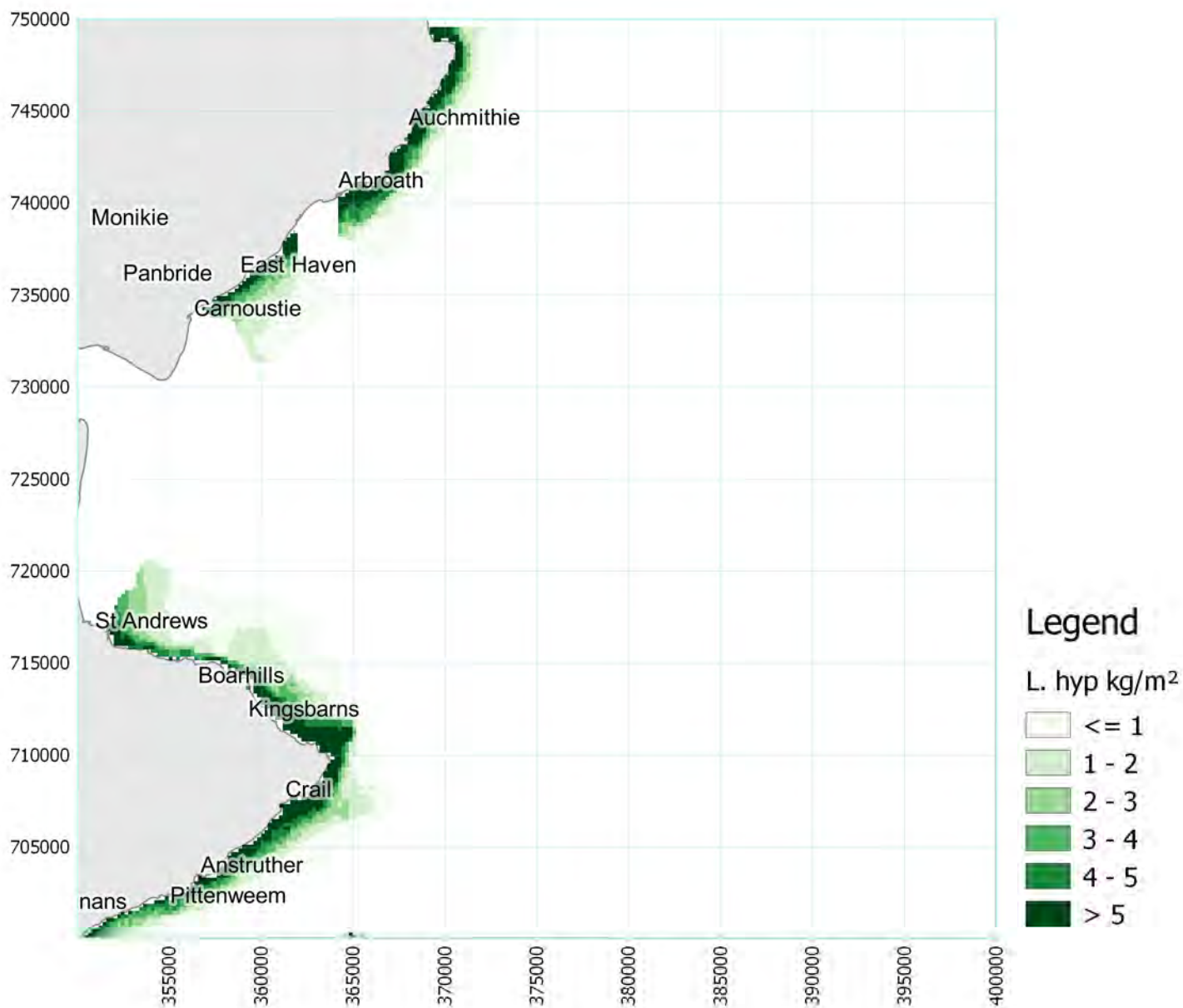


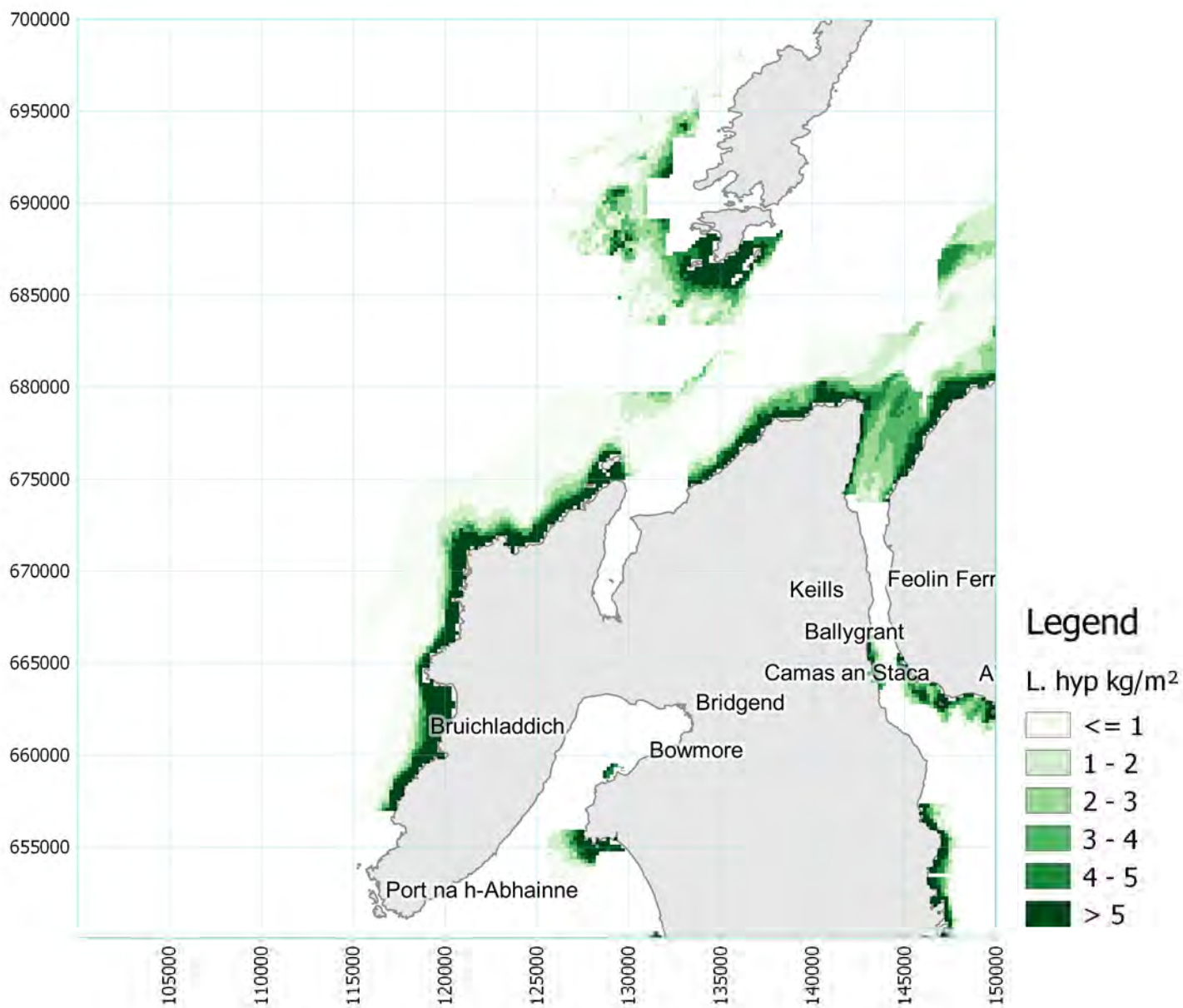


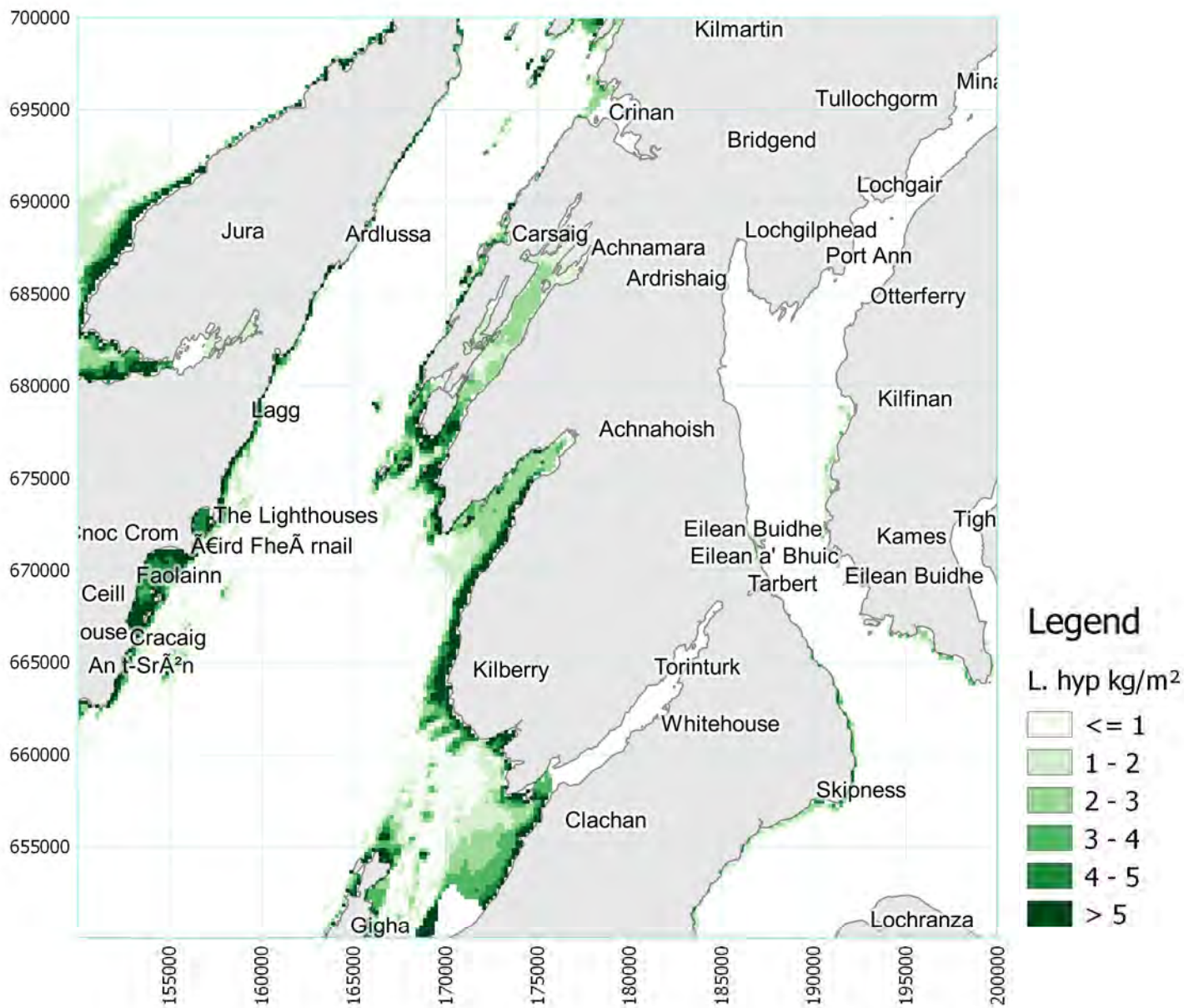


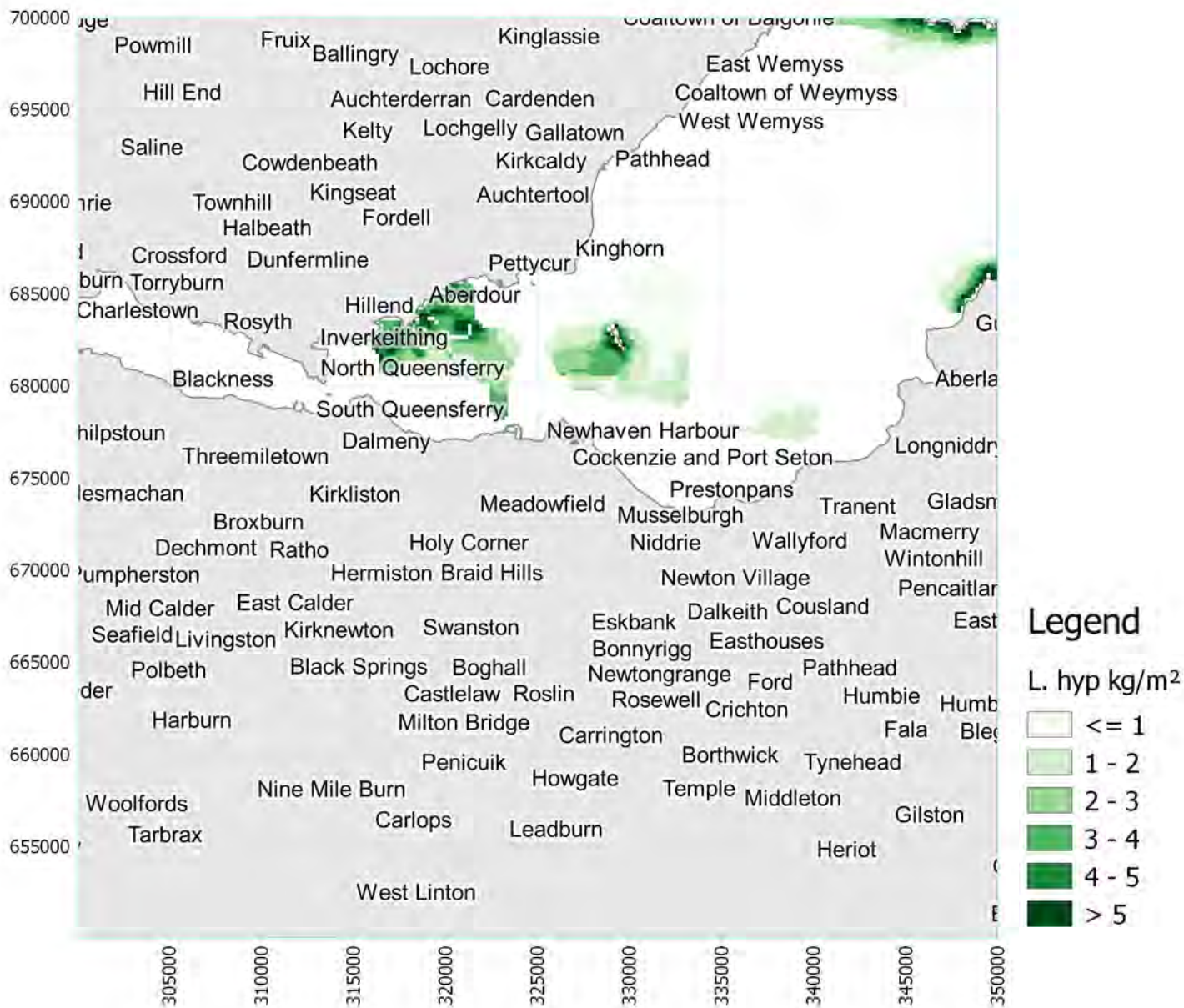


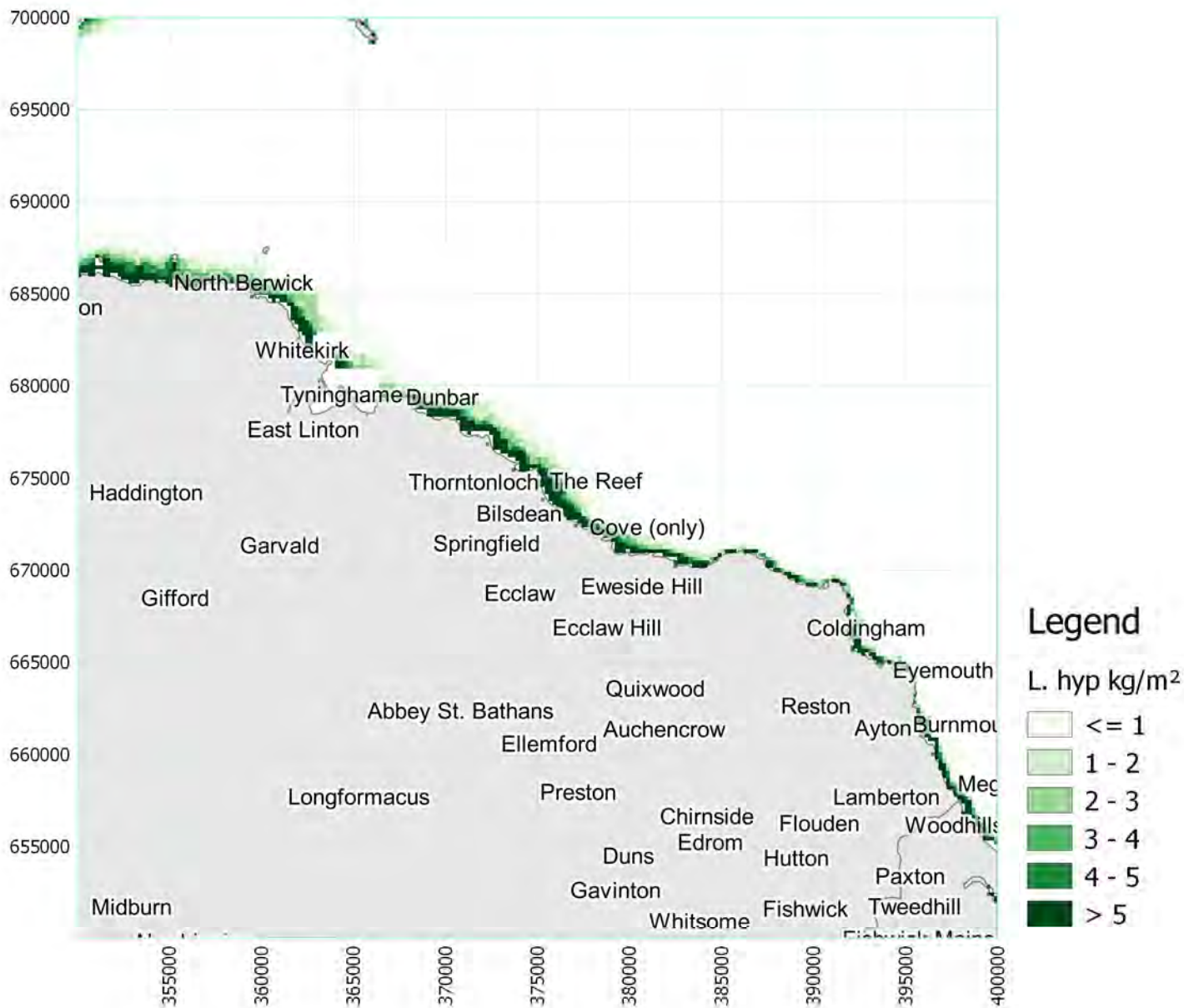


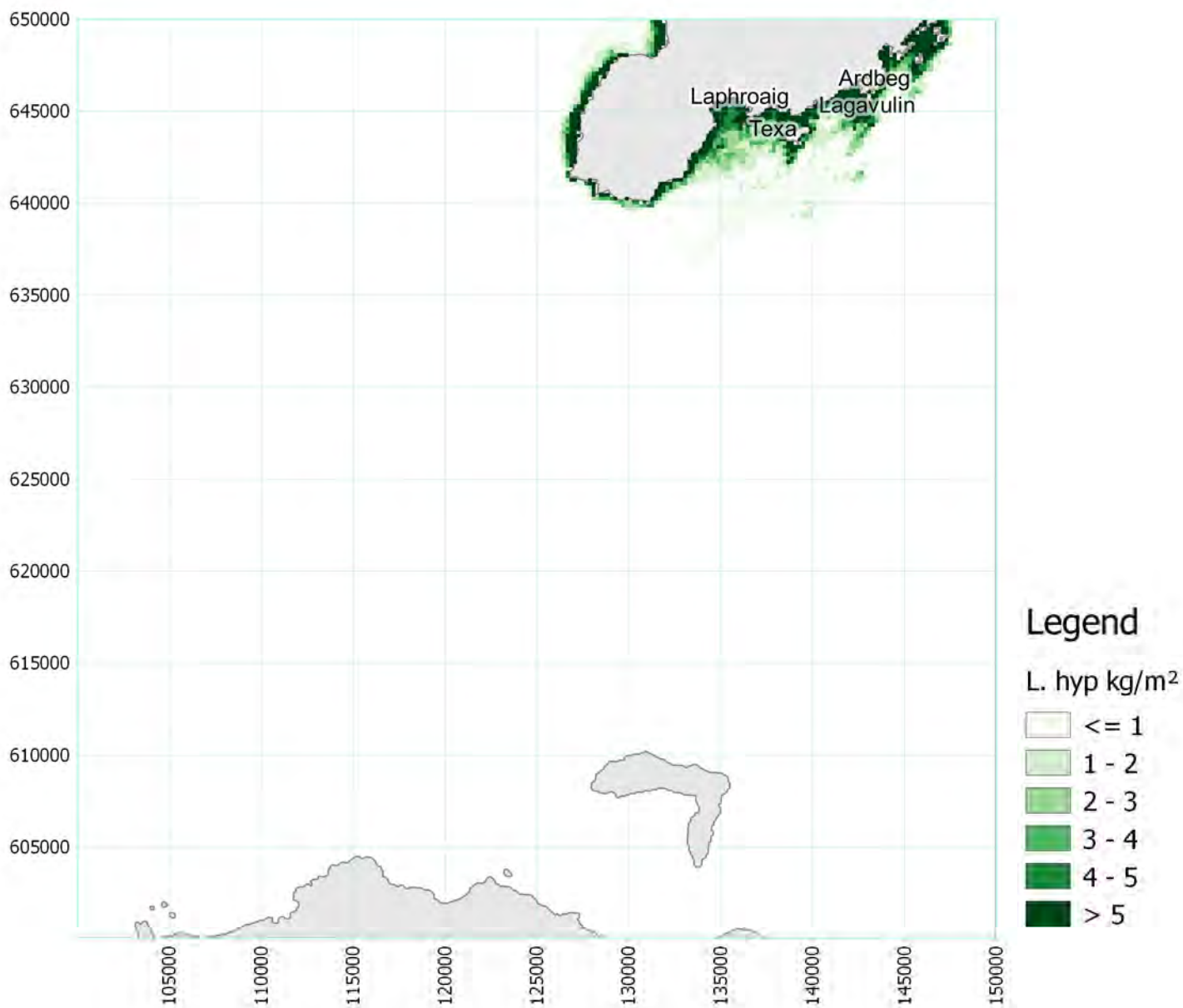


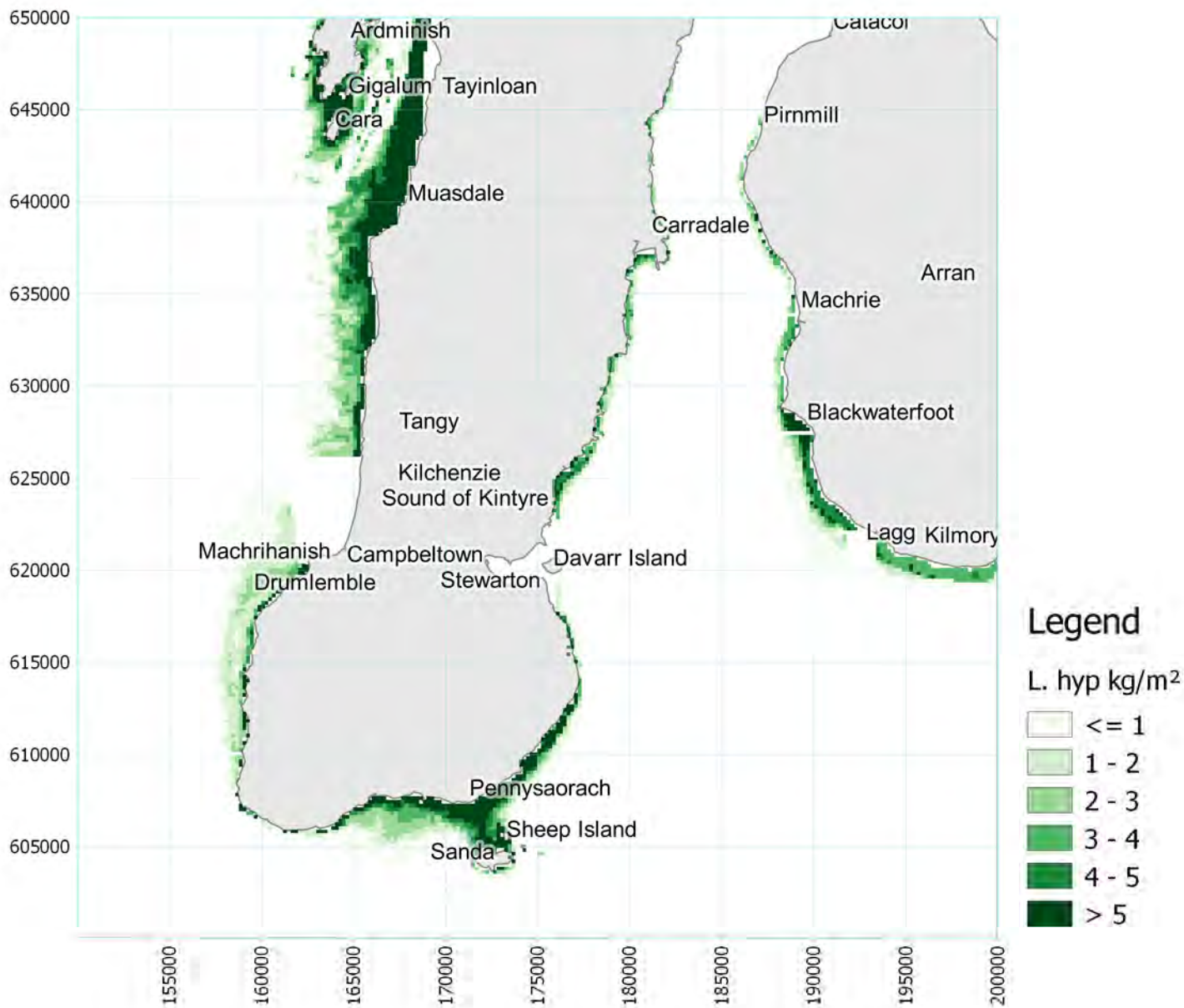


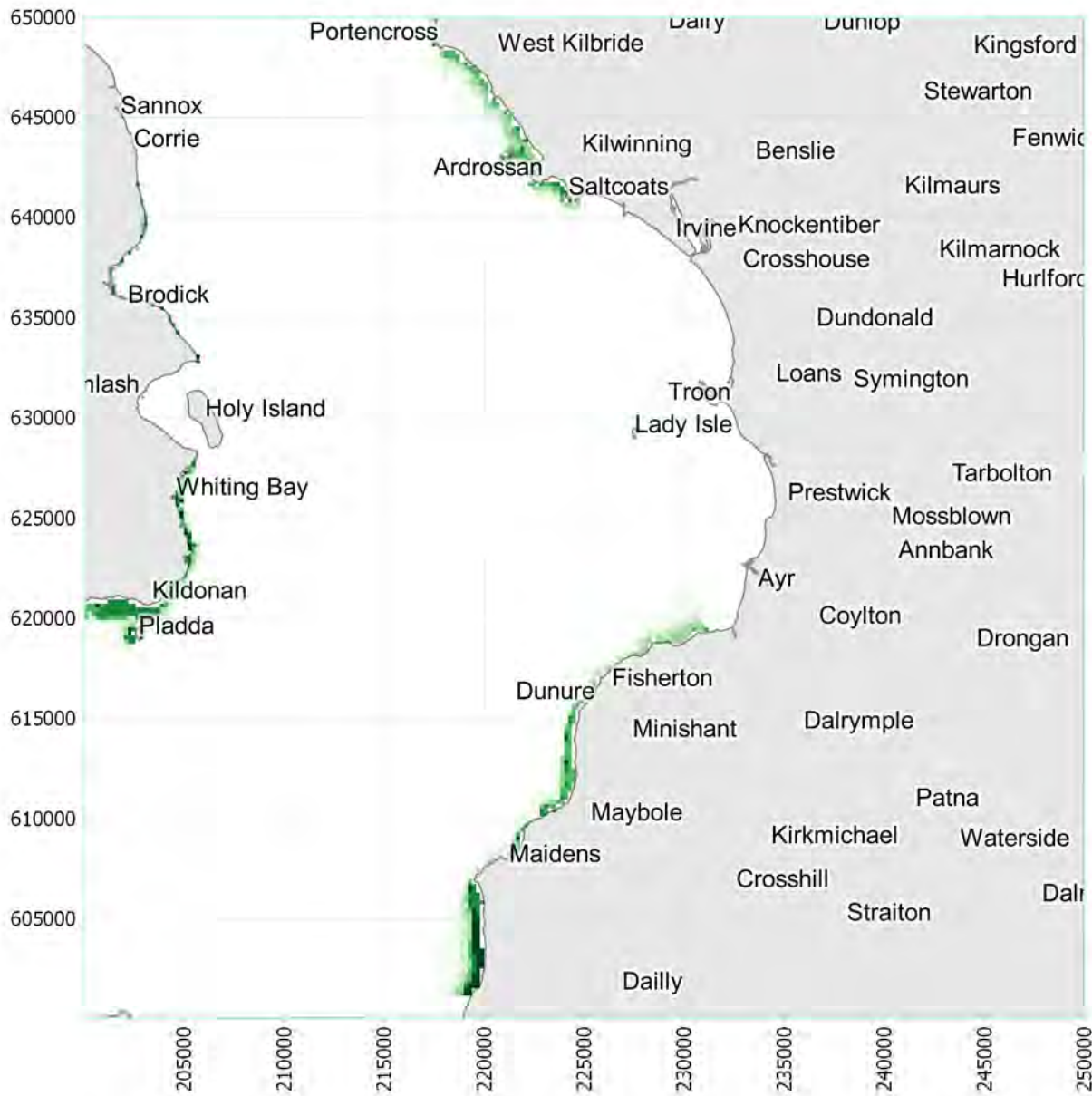
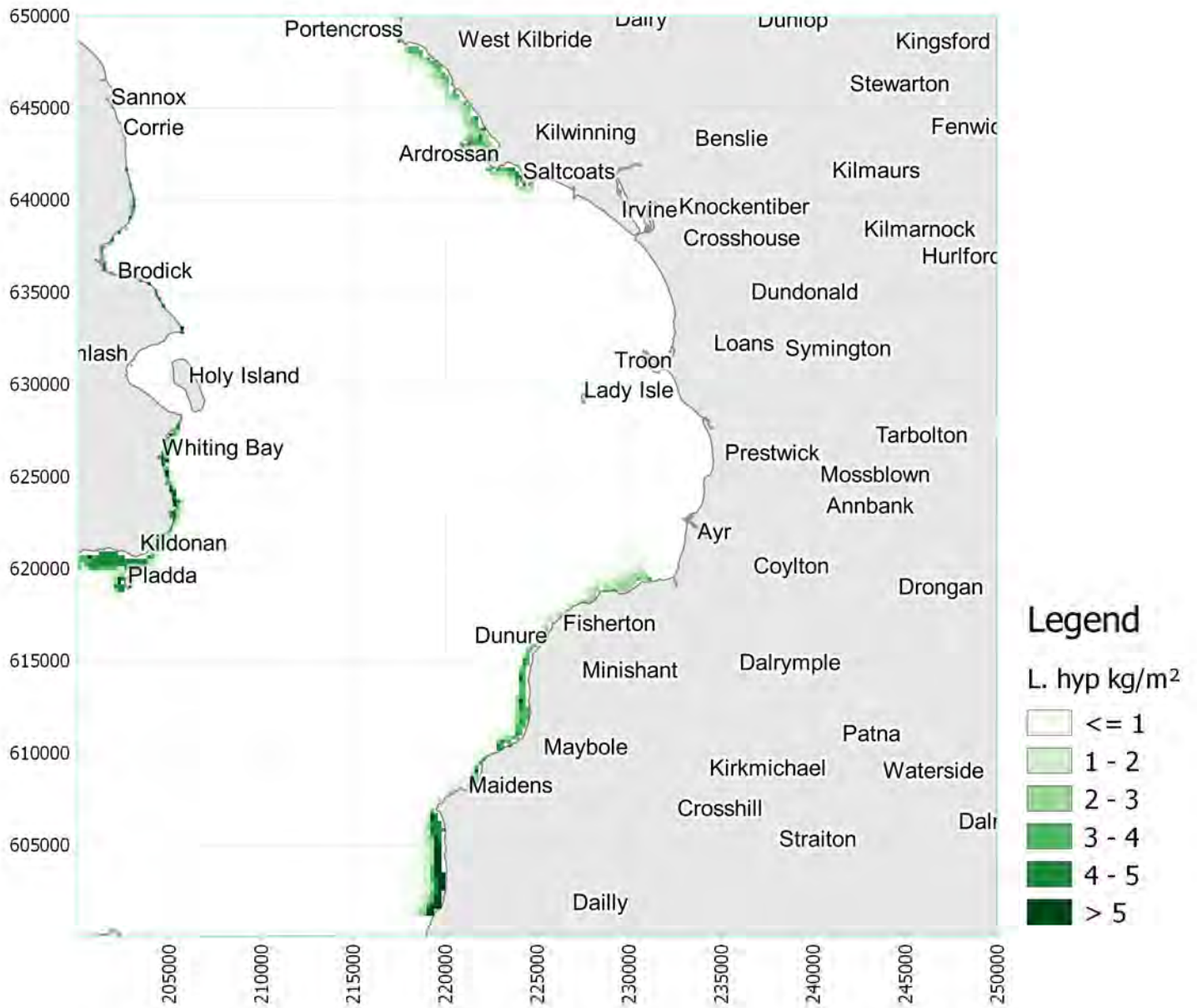


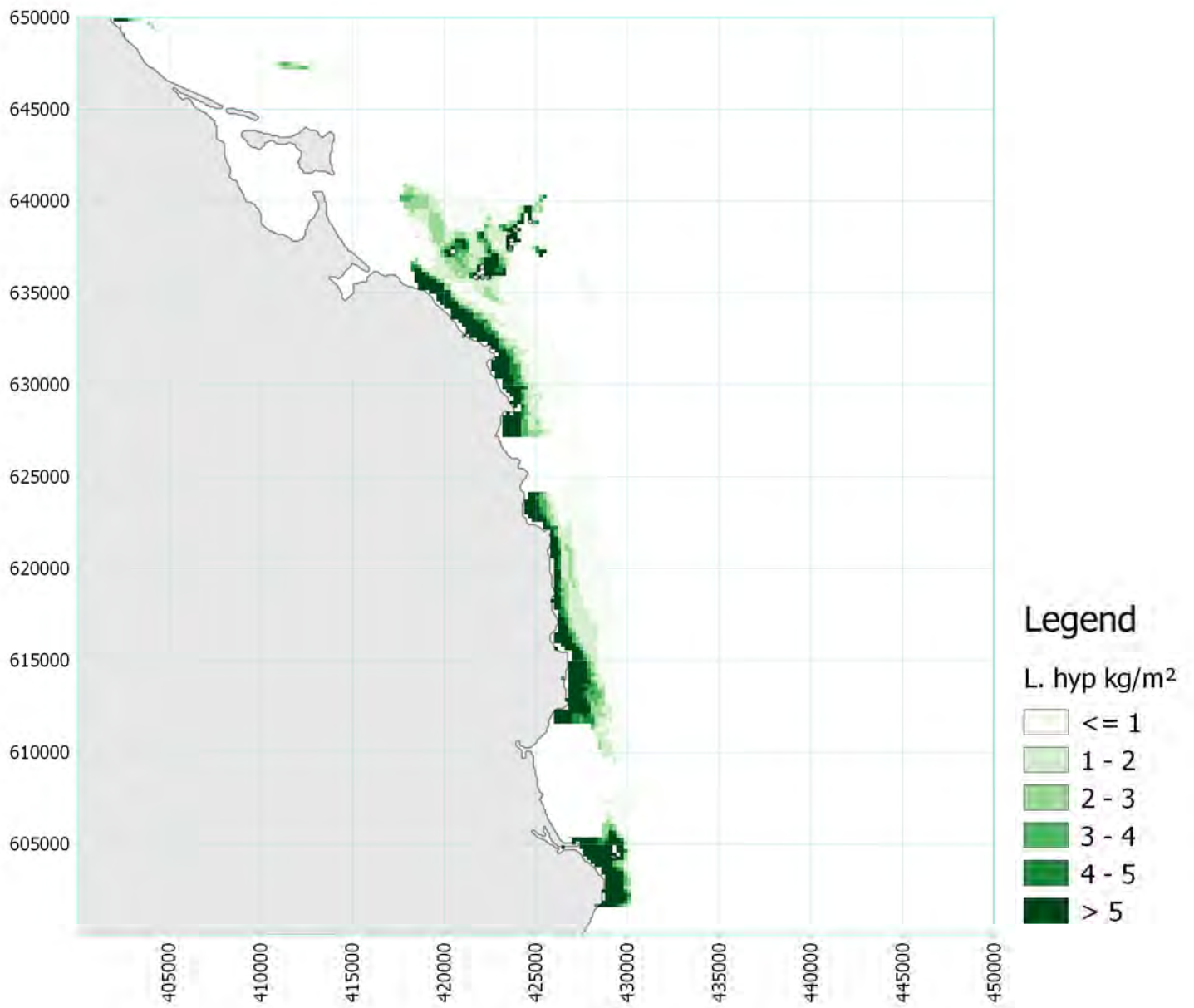


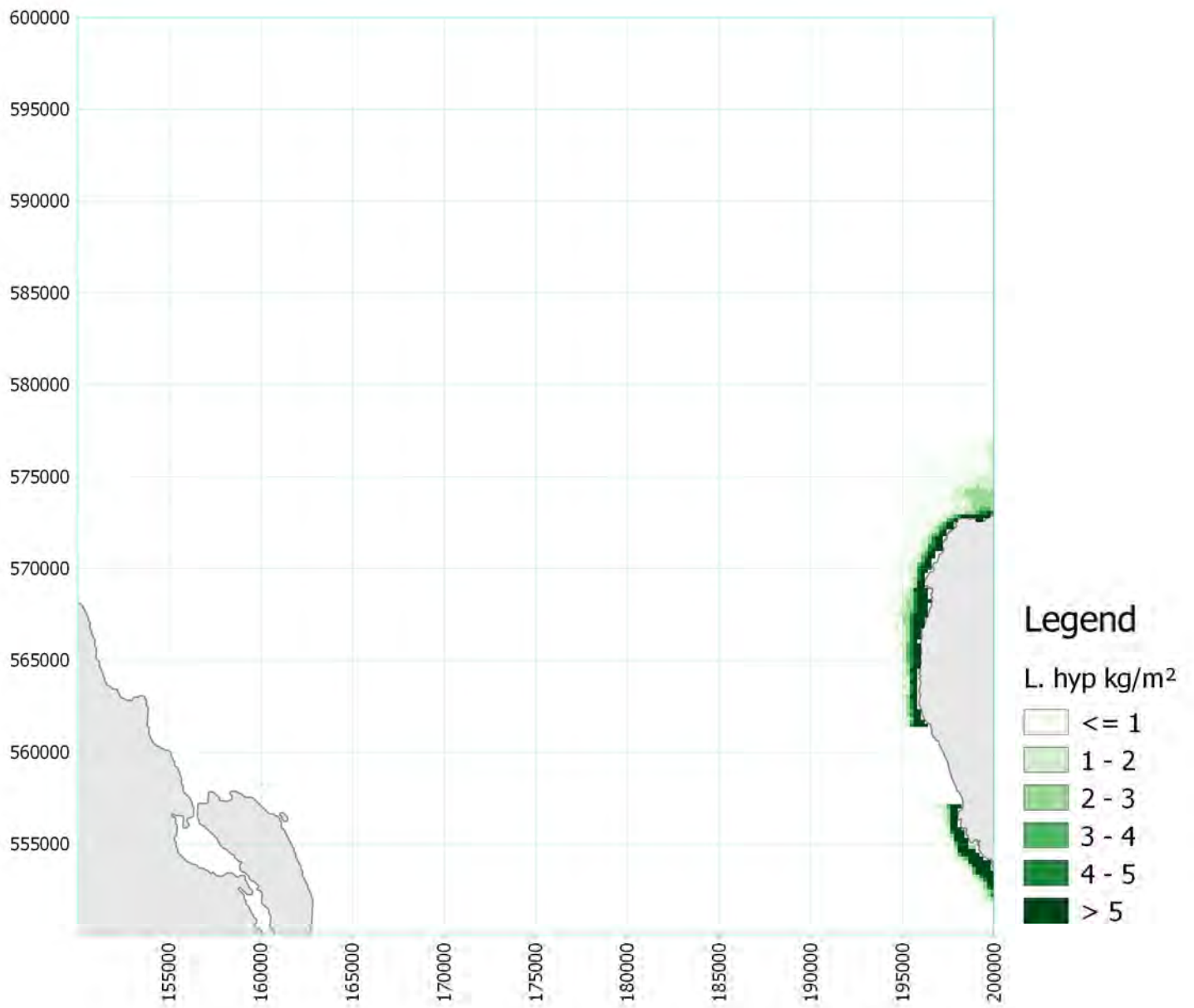


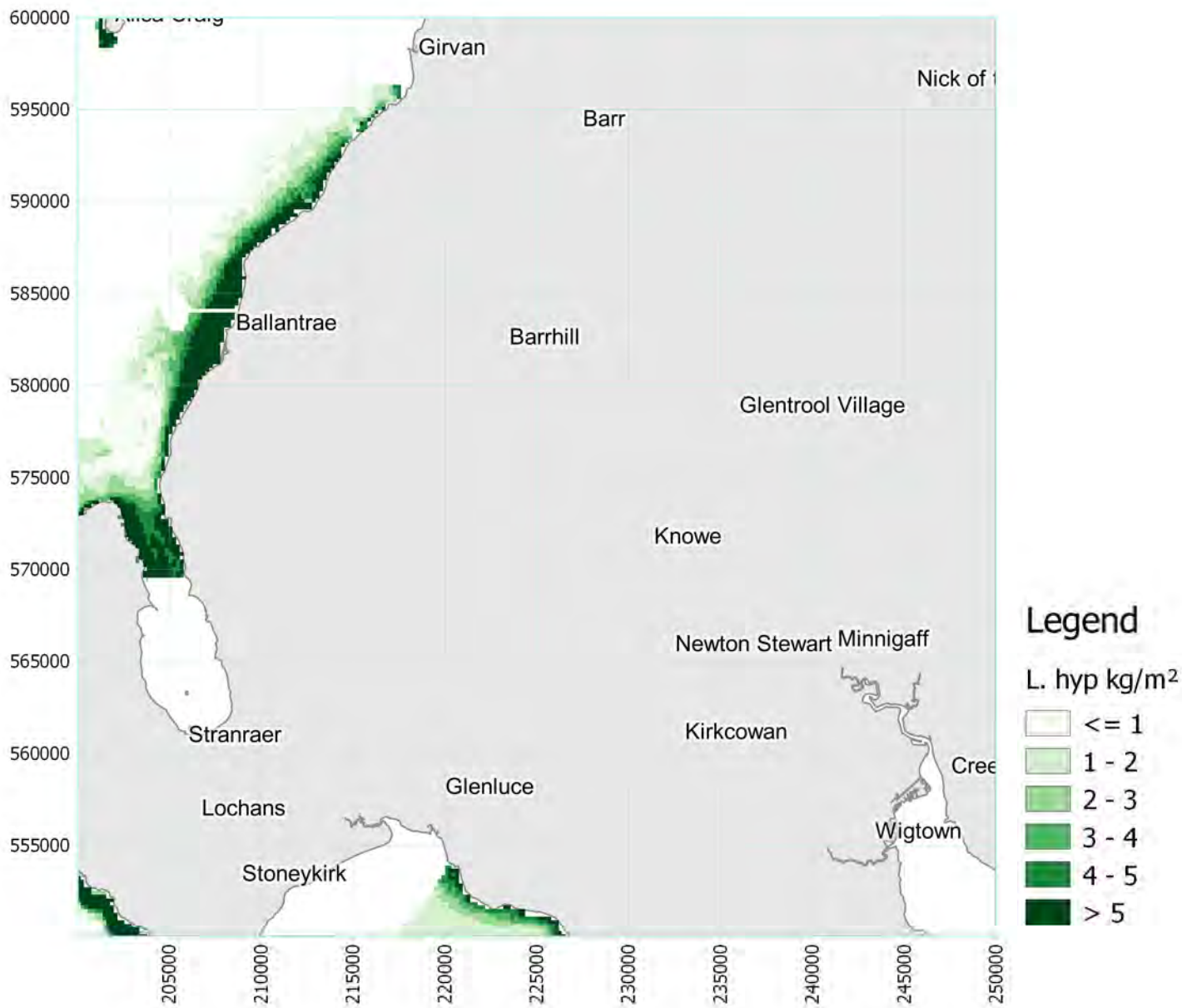


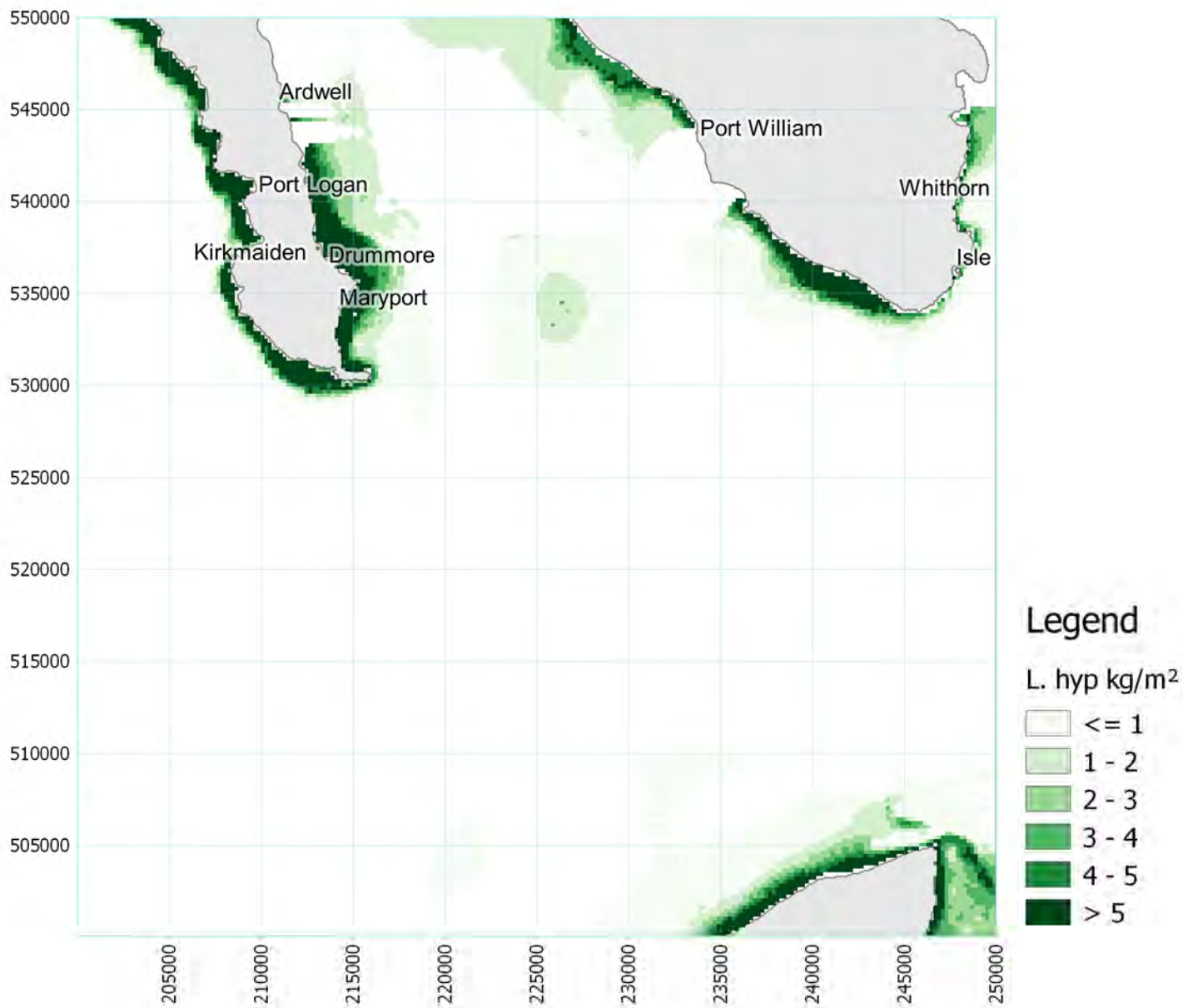


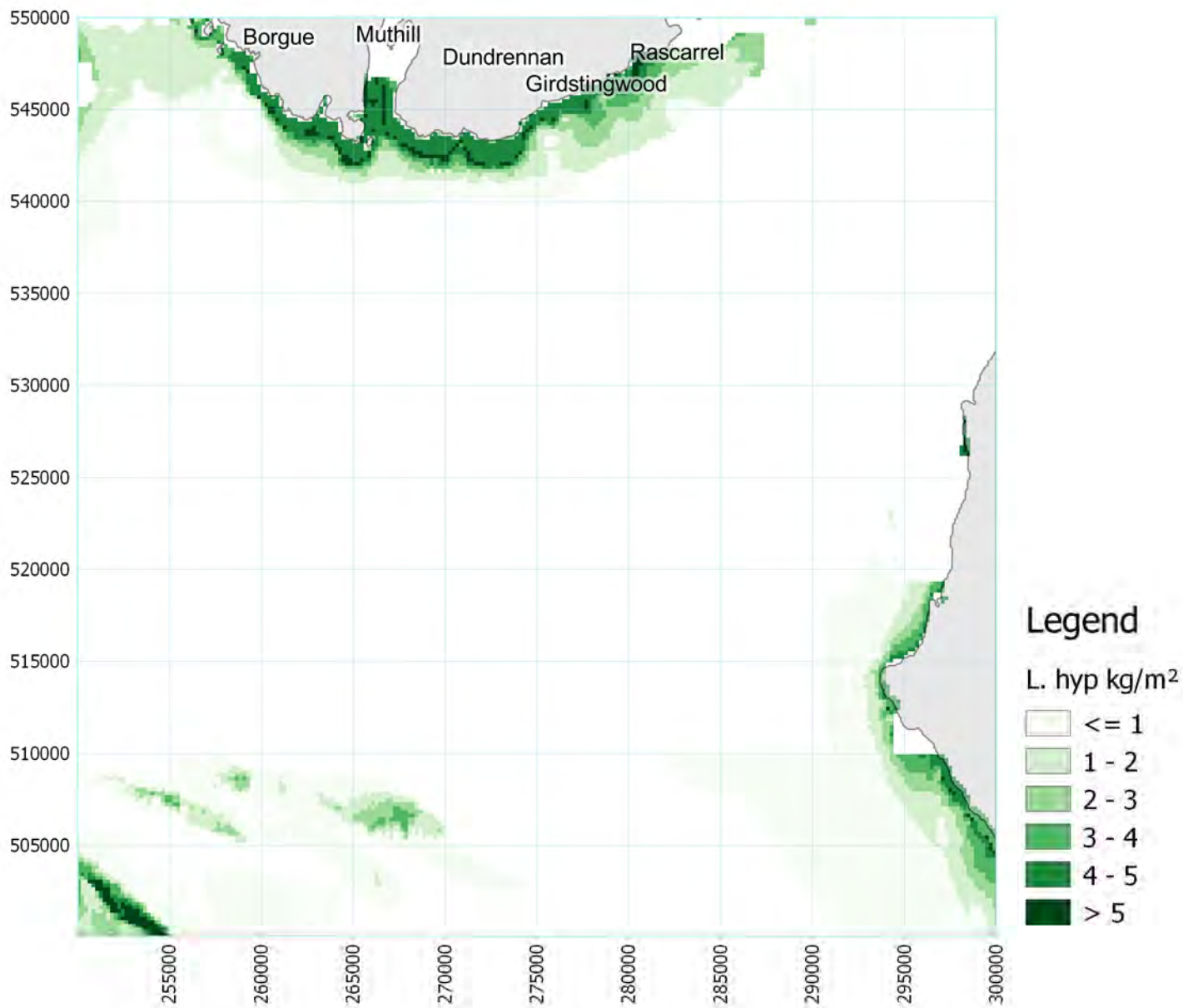




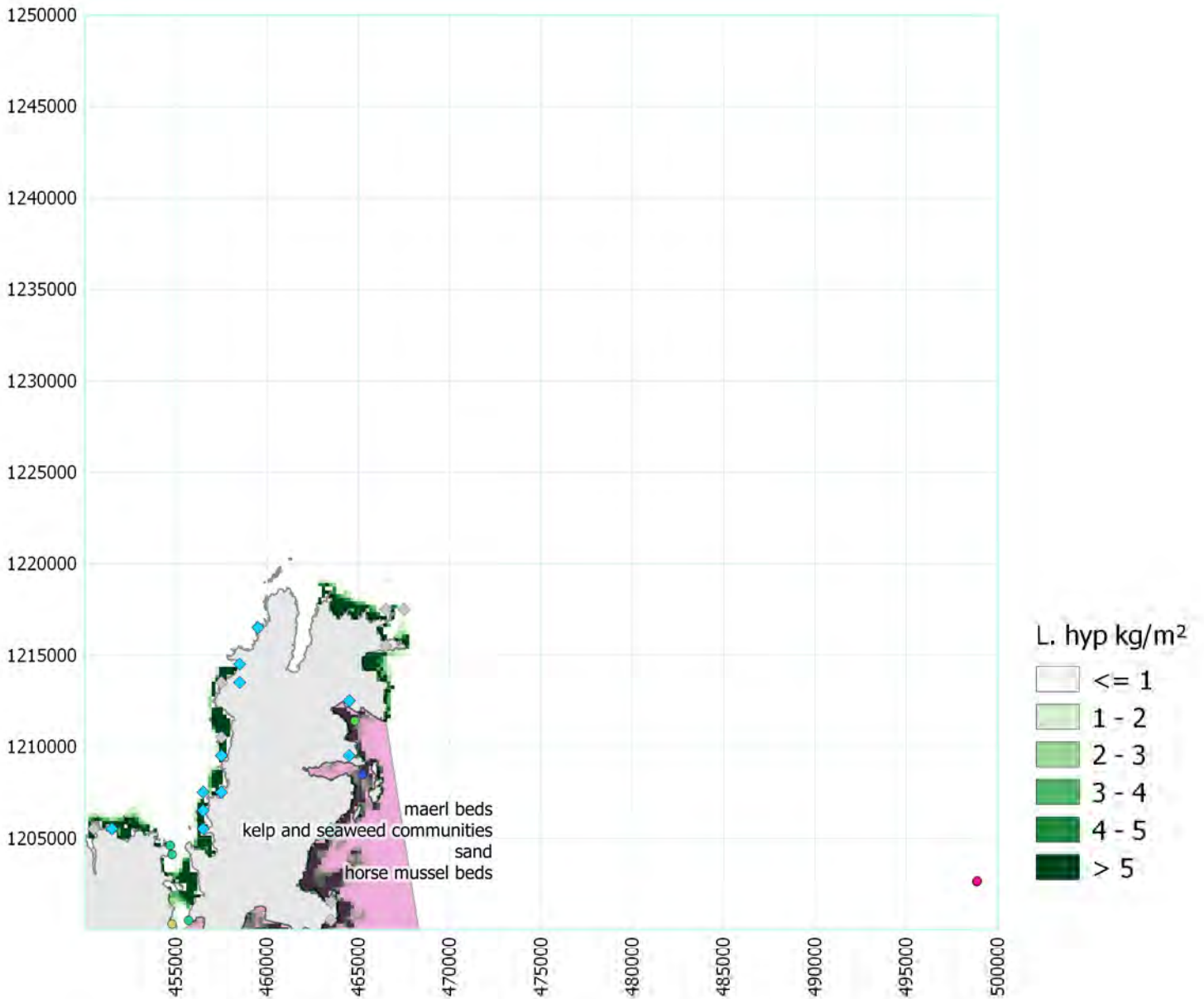








Map 1



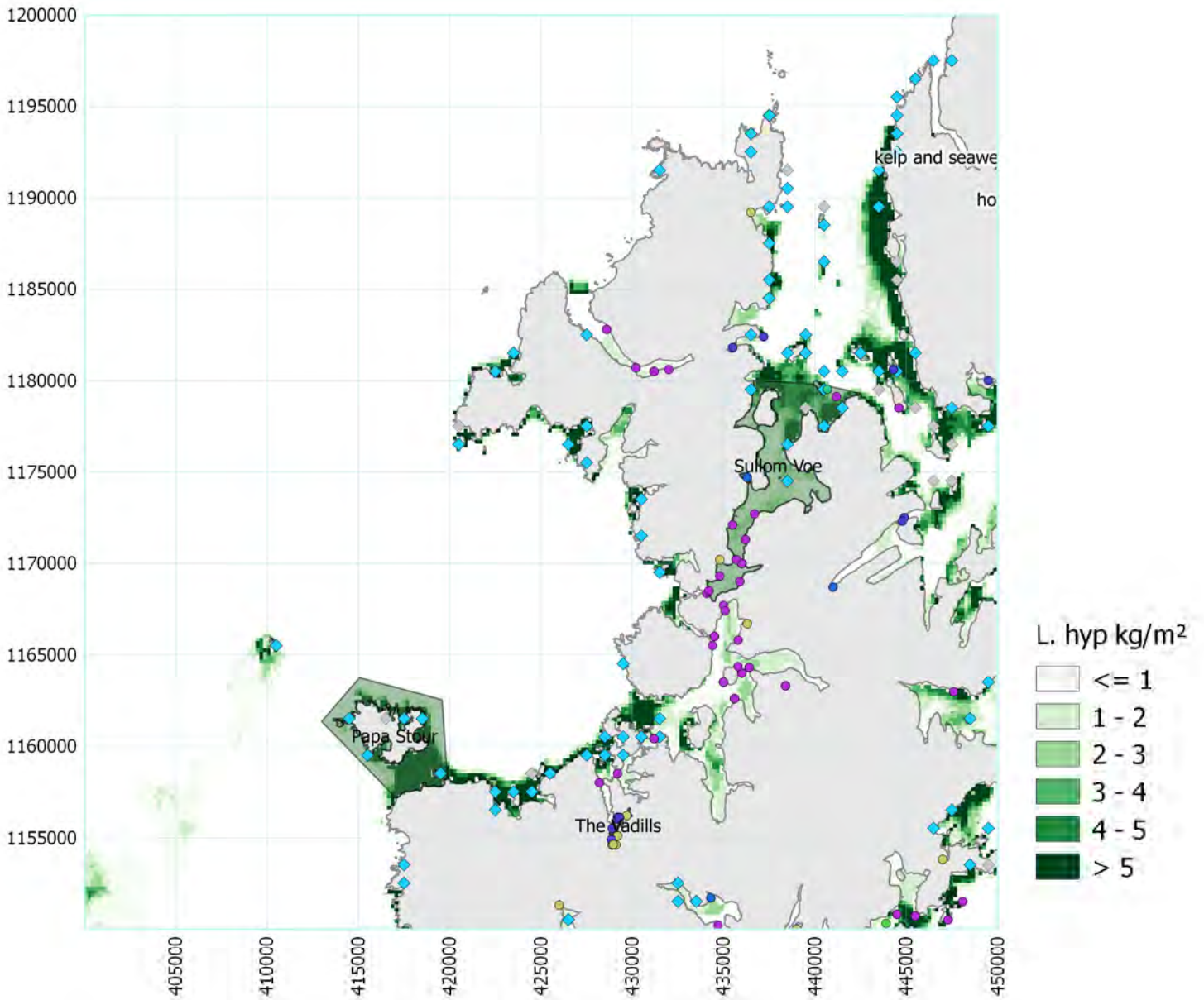
PMF biotopes

- Maerl beds
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 2



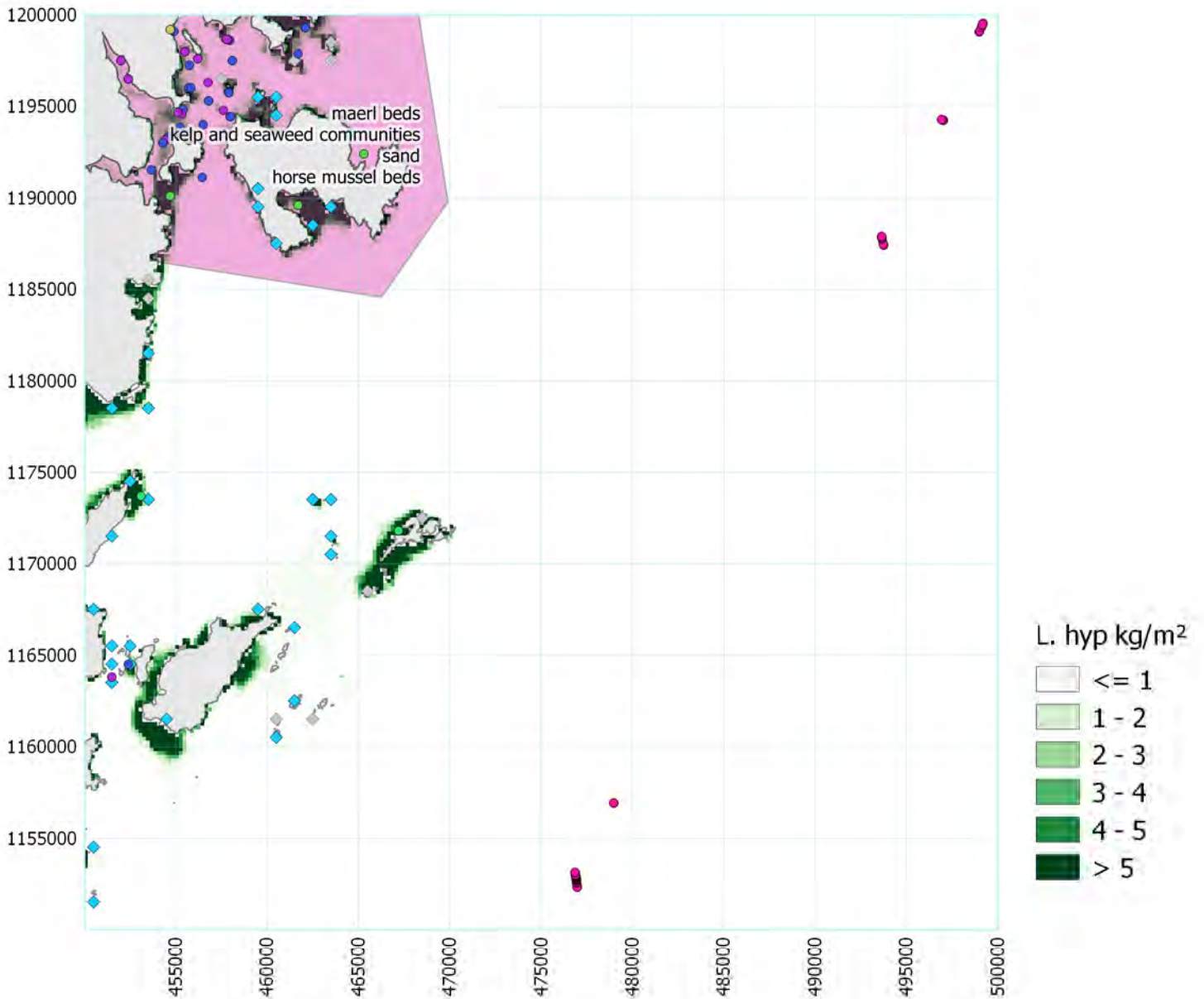
PMF biotopes

- Blue mussel beds
- Horse mussel beds
- Maerl beds
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

Map 3



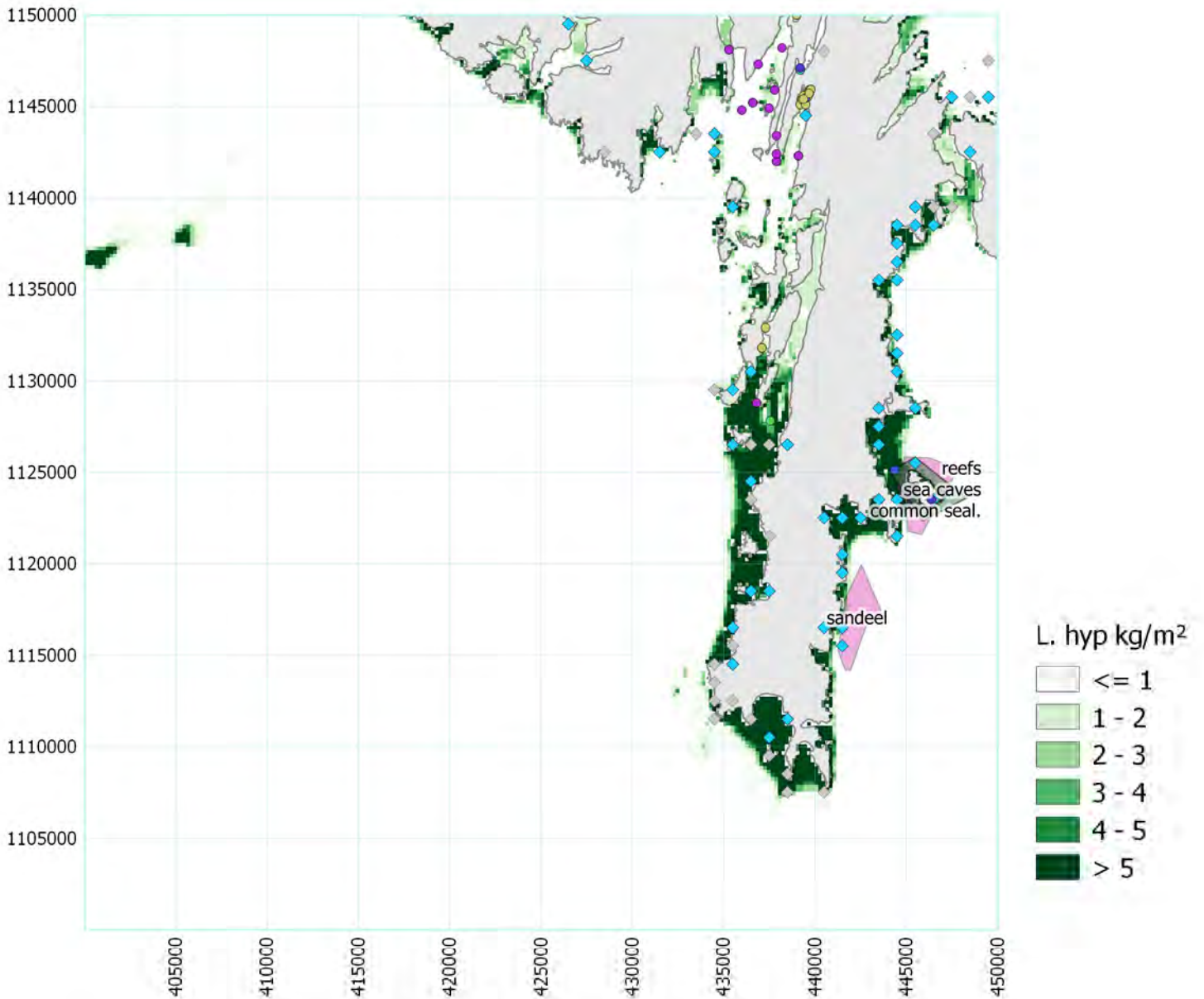
PMF biotopes

- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 4



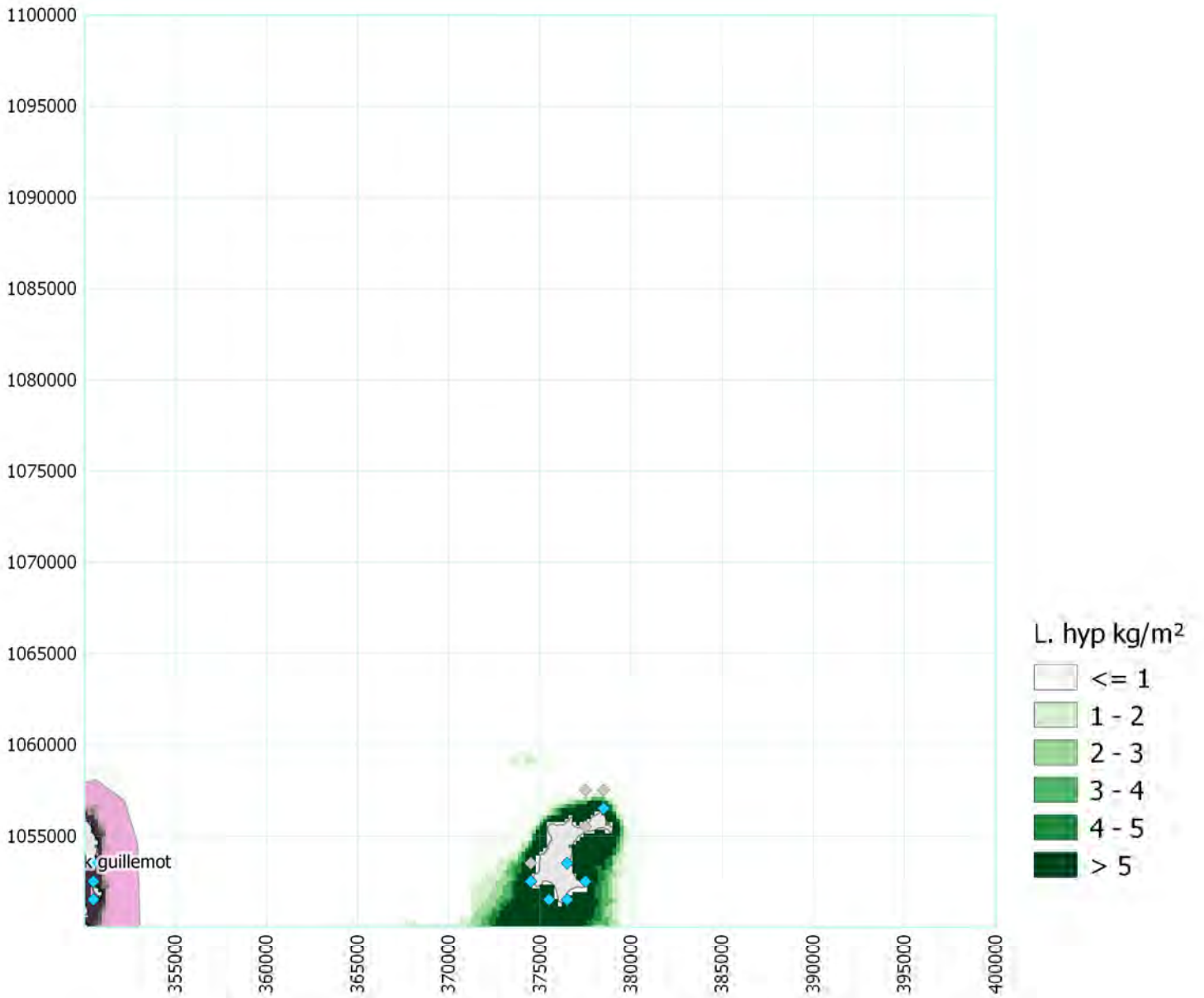
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Horse mussel beds
- Maerl beds
- Seagrass beds
- Tide-swept algal communities
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

Map 5

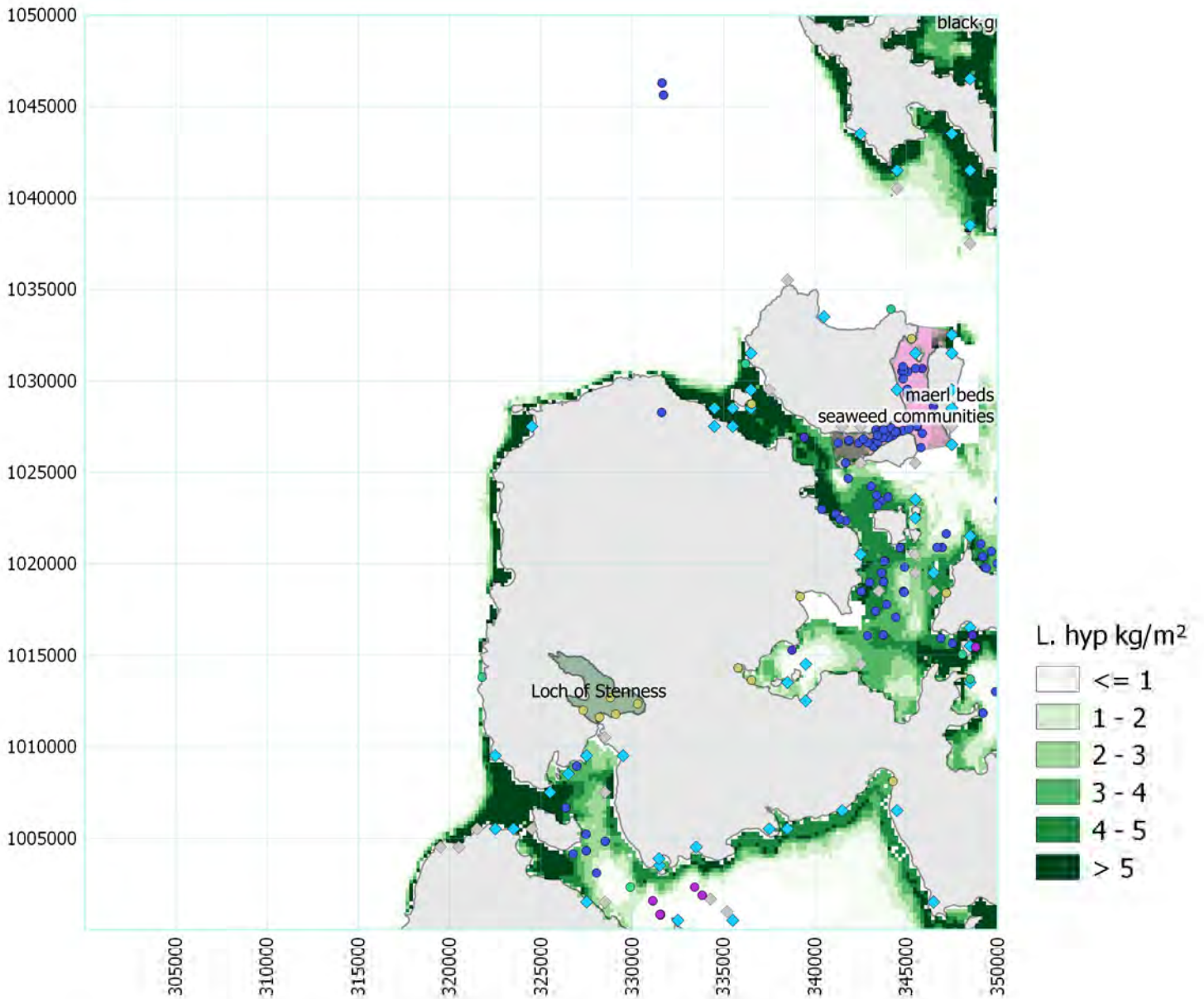


PMF species

- Grey seal
- ◆ Harbour / common seal

MPA

Map 6



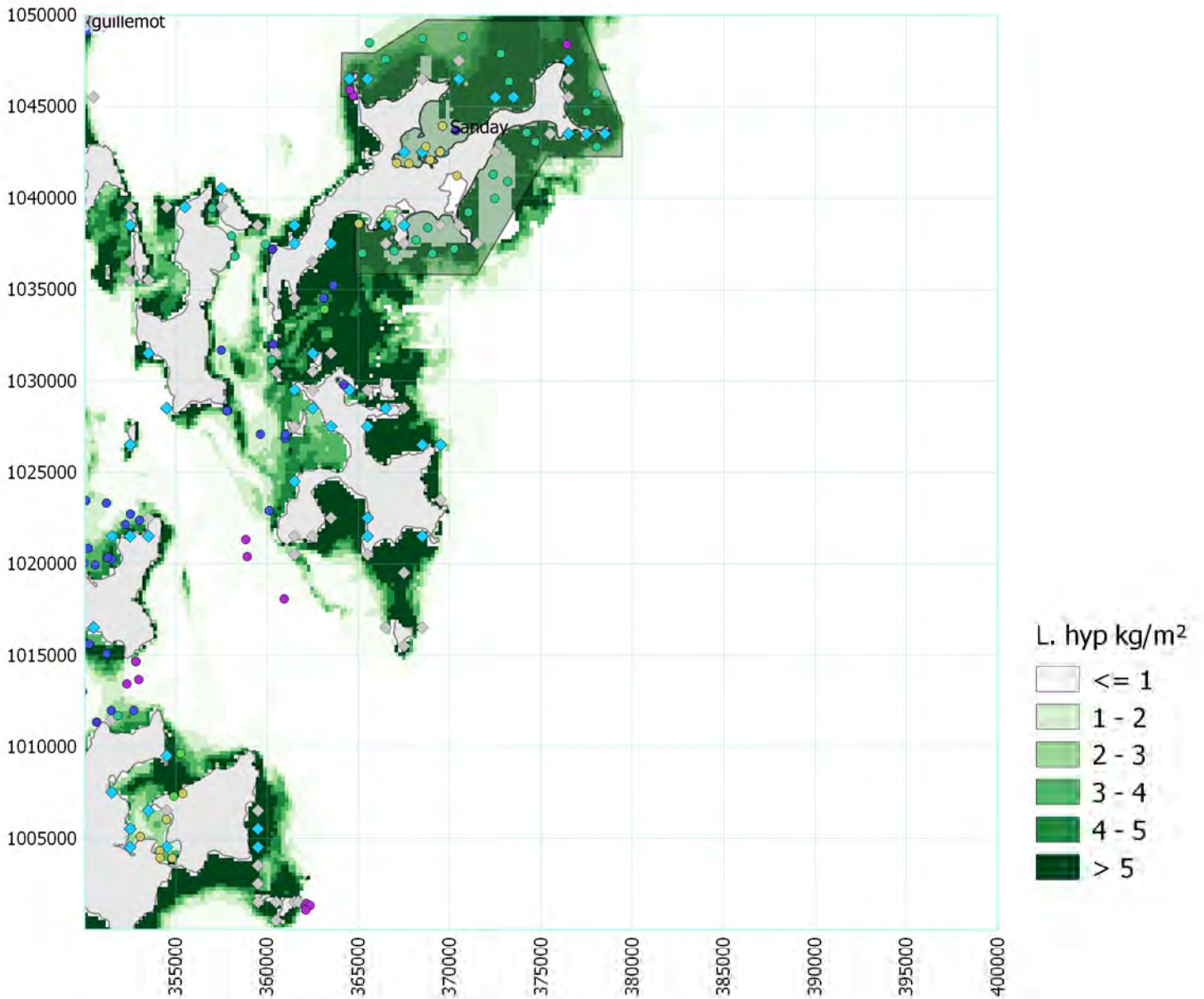
PMF biotopes

- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- MPA
- SAC

Map 7



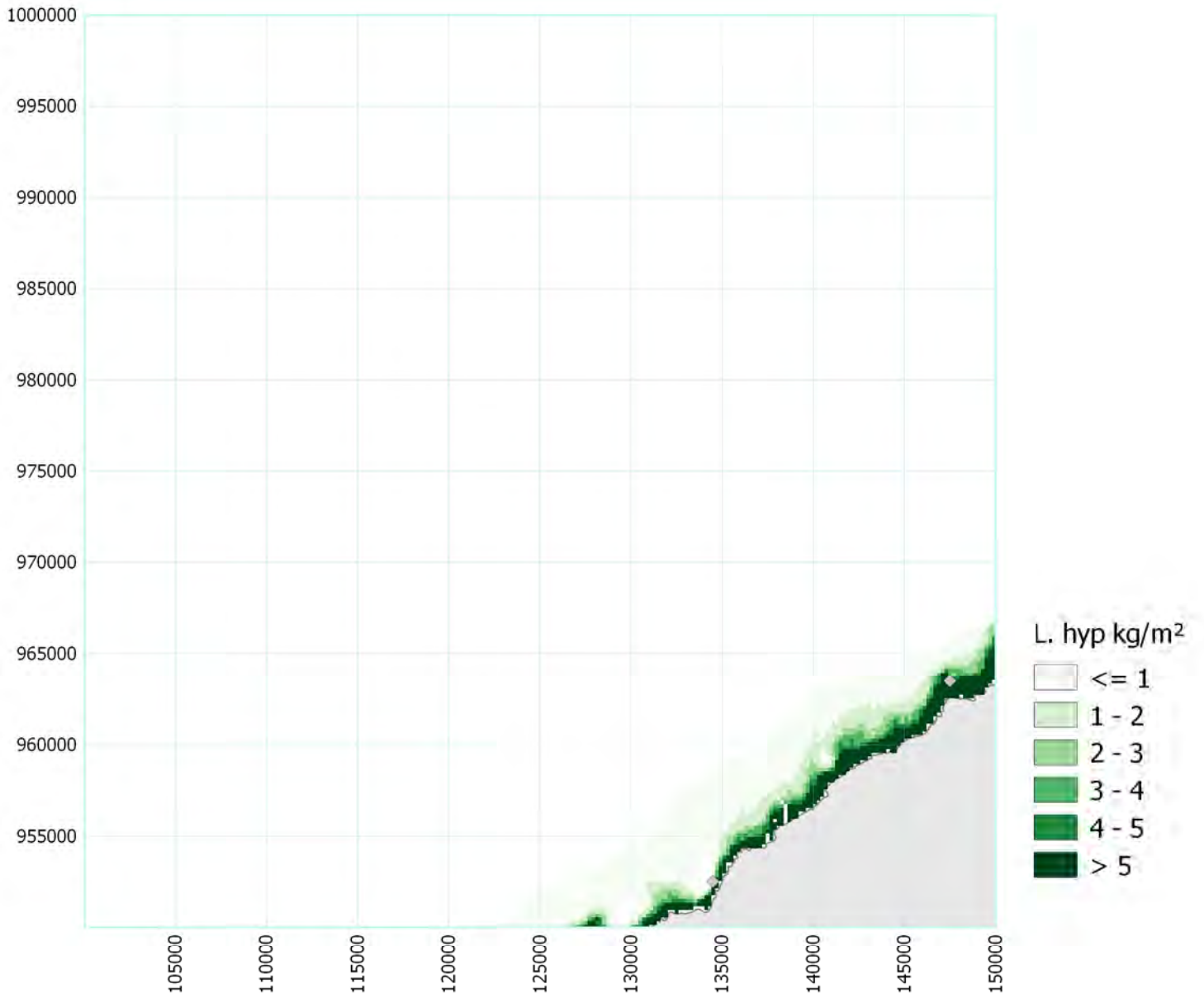
PMF biotopes

- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

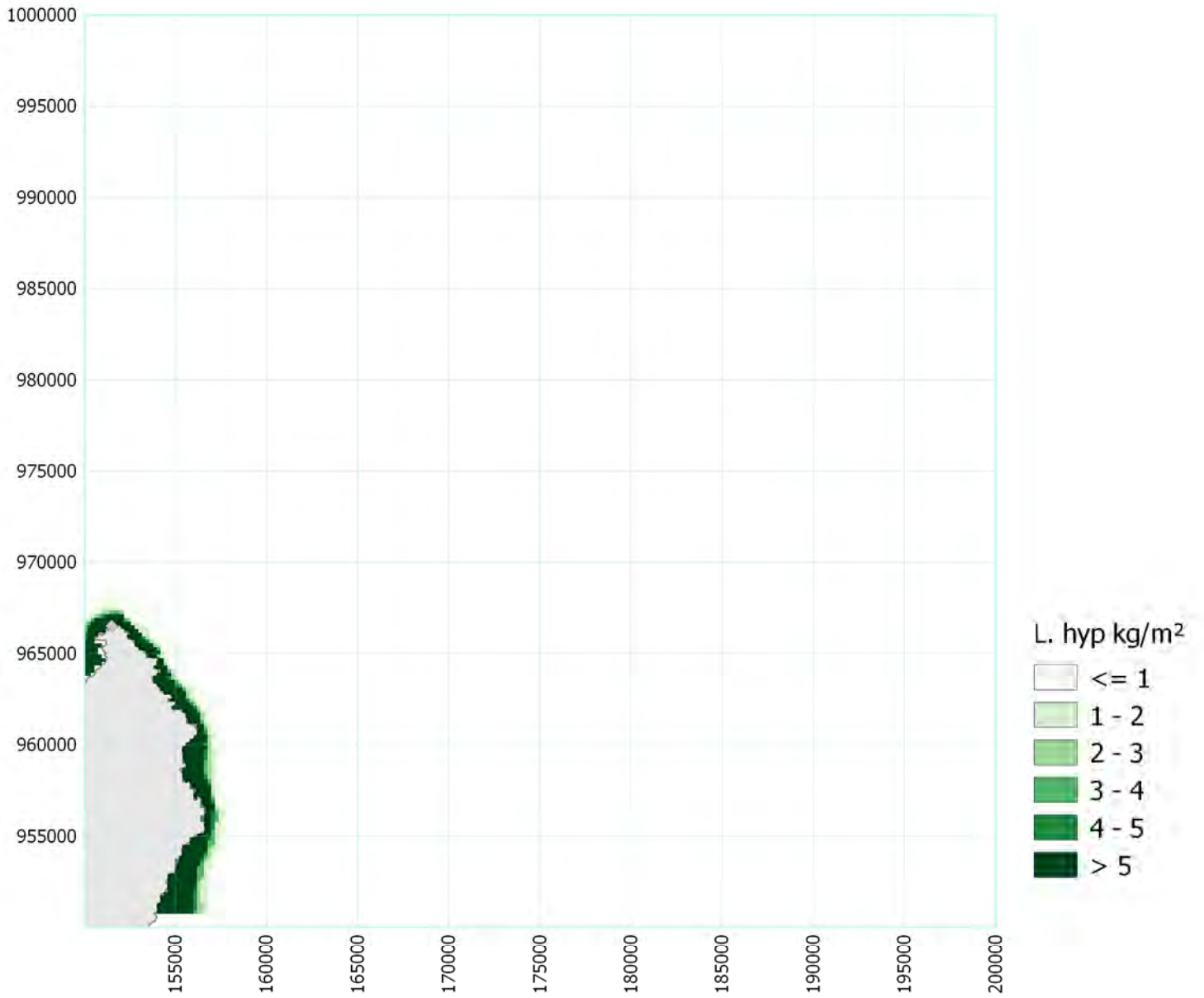
Map 8



PMF species

- ◆ Grey seal

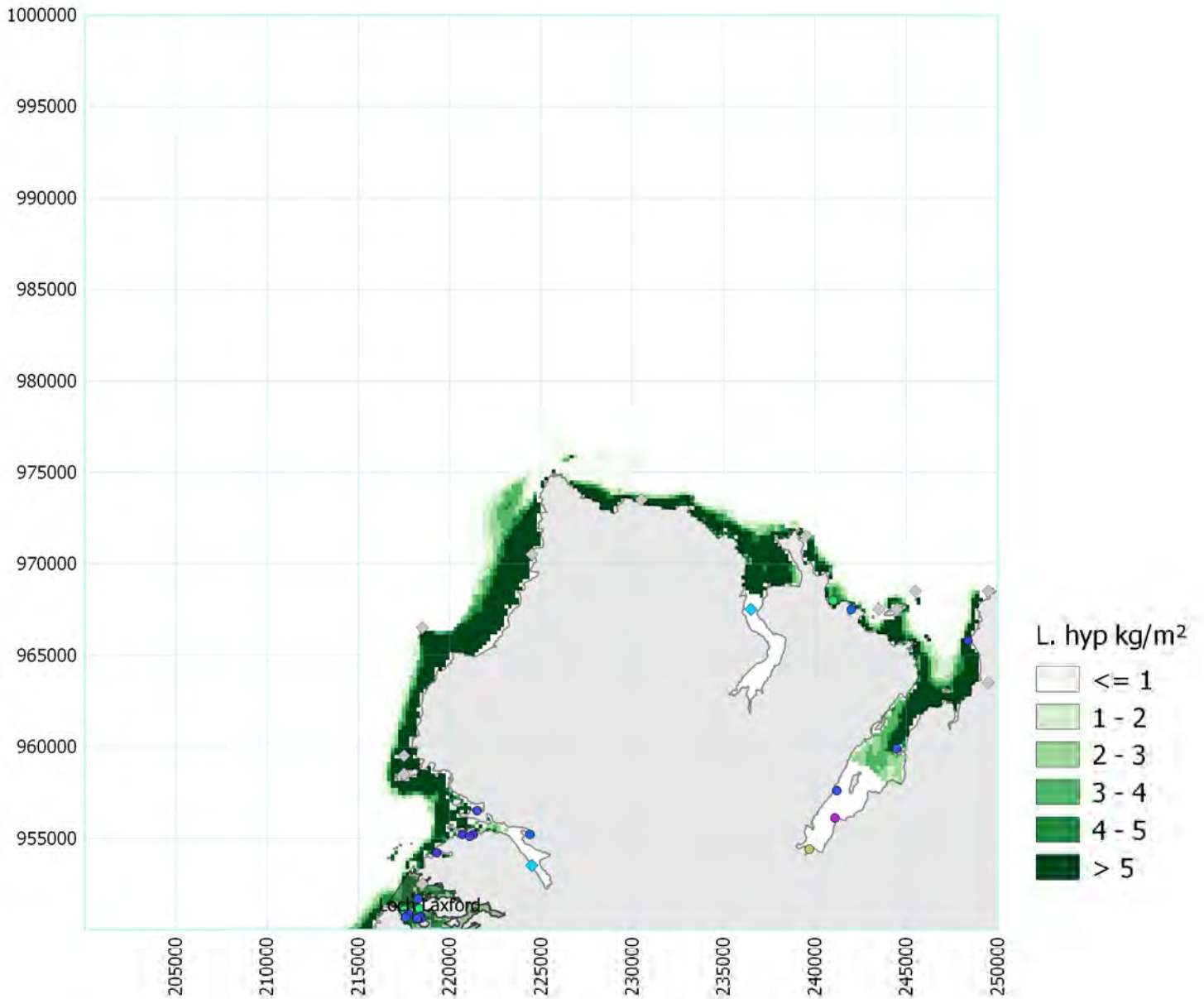
Map 9



PMF species

- ◆ Grey seal

Map 10



PMF biotopes

- Blue mussel beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities

PMF species

- Grey seal
- Harbour / common seal
- SAC

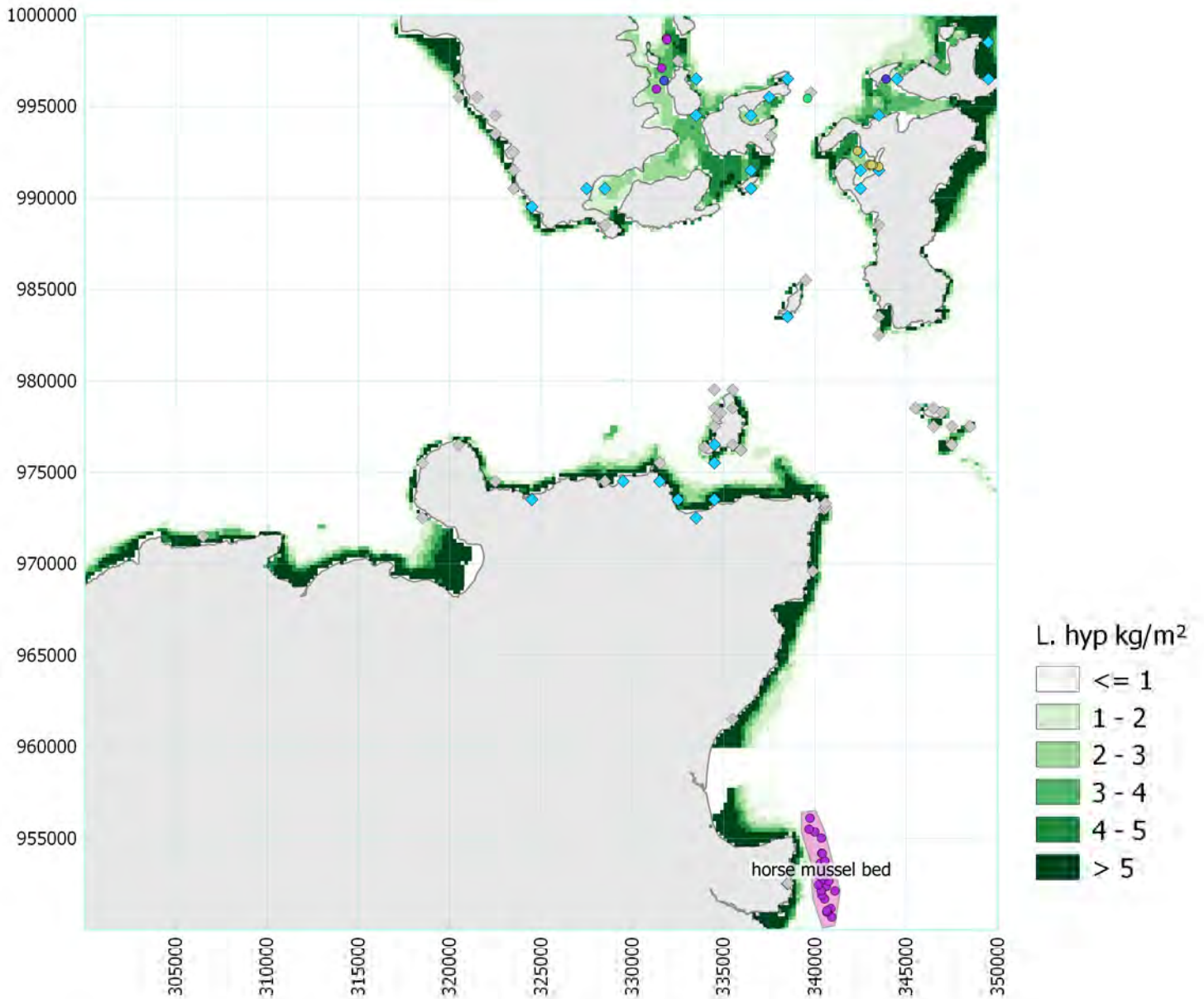
Map 11



PMF species

- Grey seal
- Harbour / common seal

Map 12



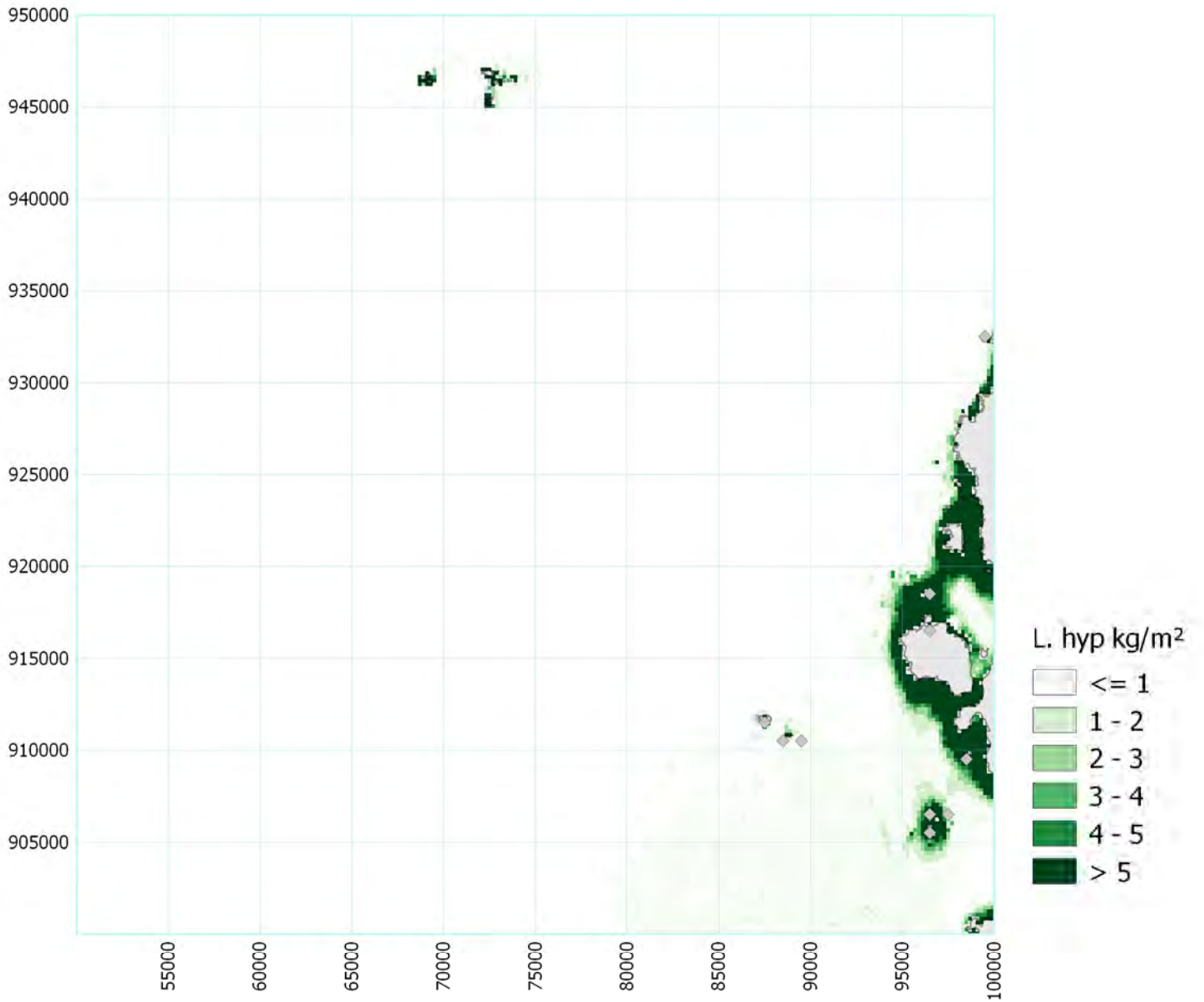
PMF biotopes

- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities

PMF species

- Grey seal
- Harbour / common seal
- MPA

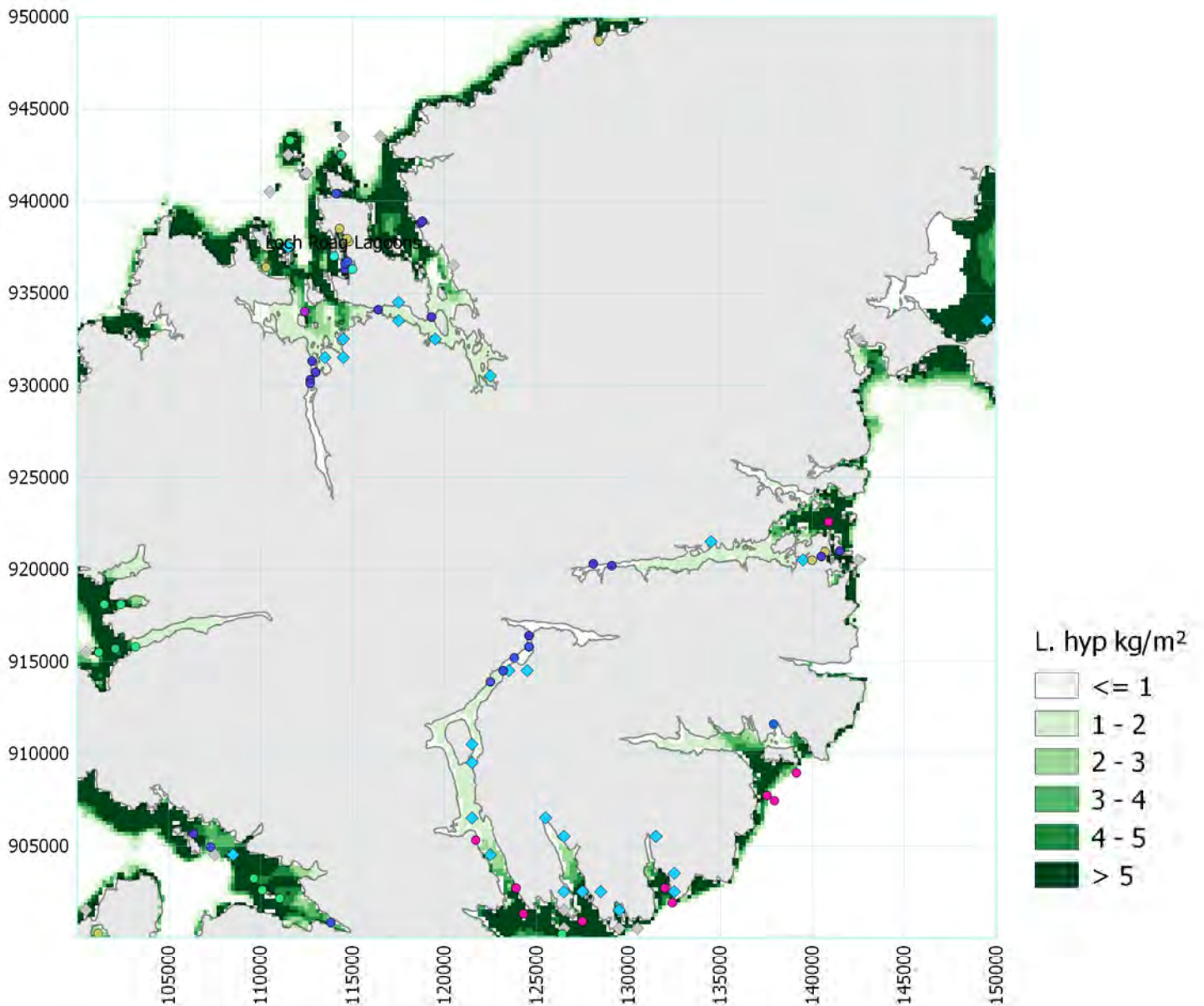
Map 13



PMF species

◆ Grey seal

Map 14



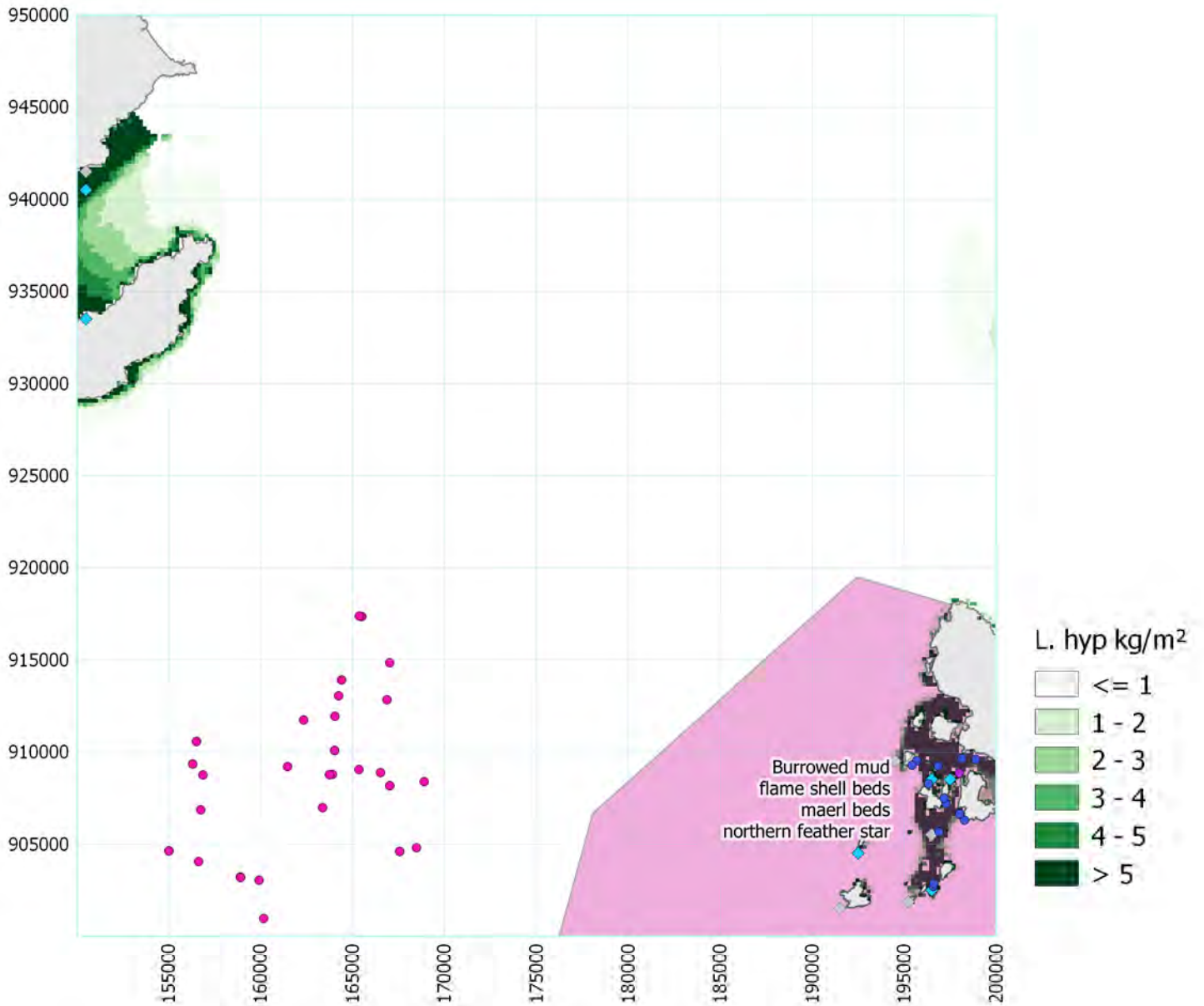
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◊ Grey seal
- ◊ Harbour / common seal
- SAC

Map 15



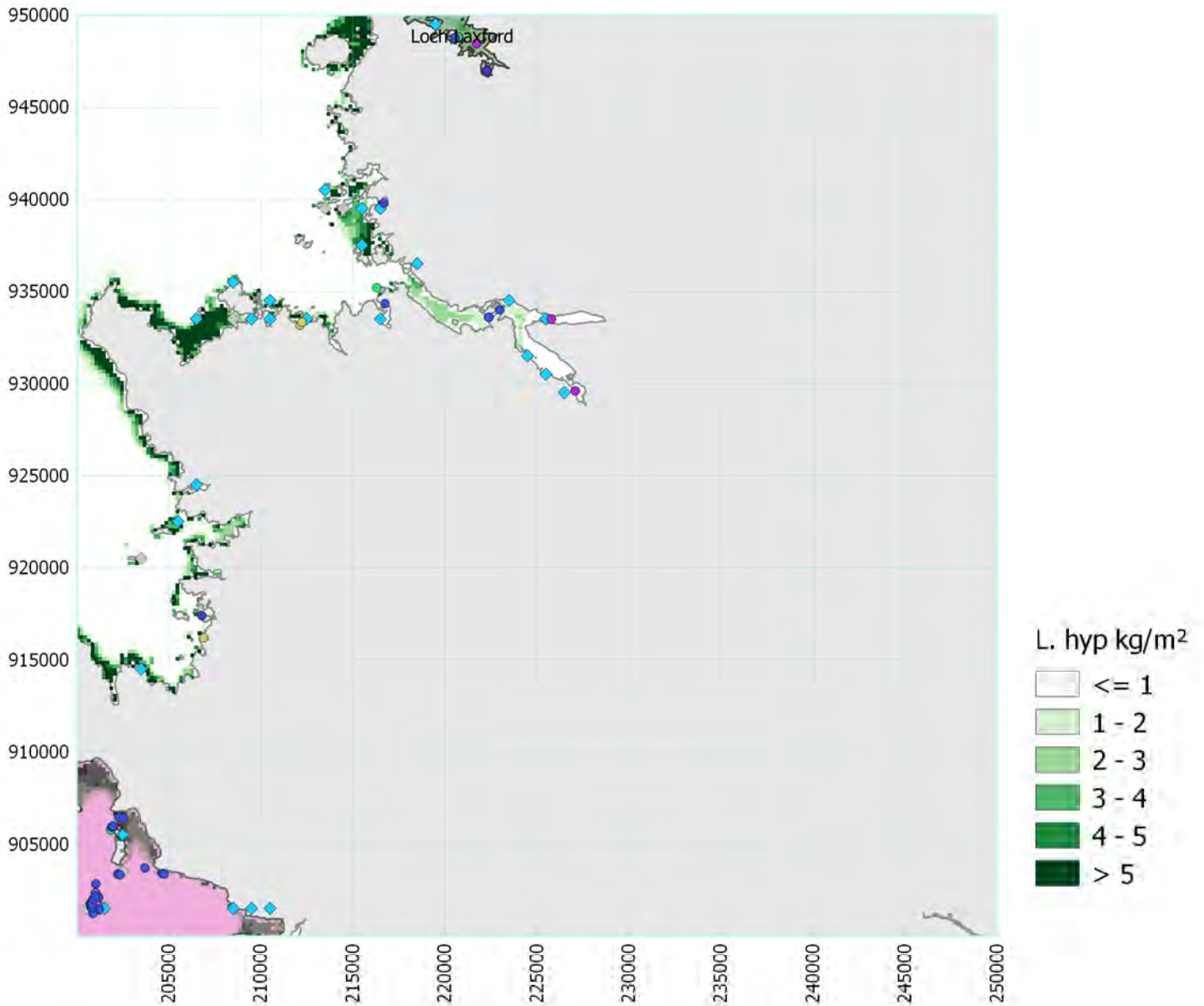
PMF biotopes

- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities

PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- MPA

Map 16



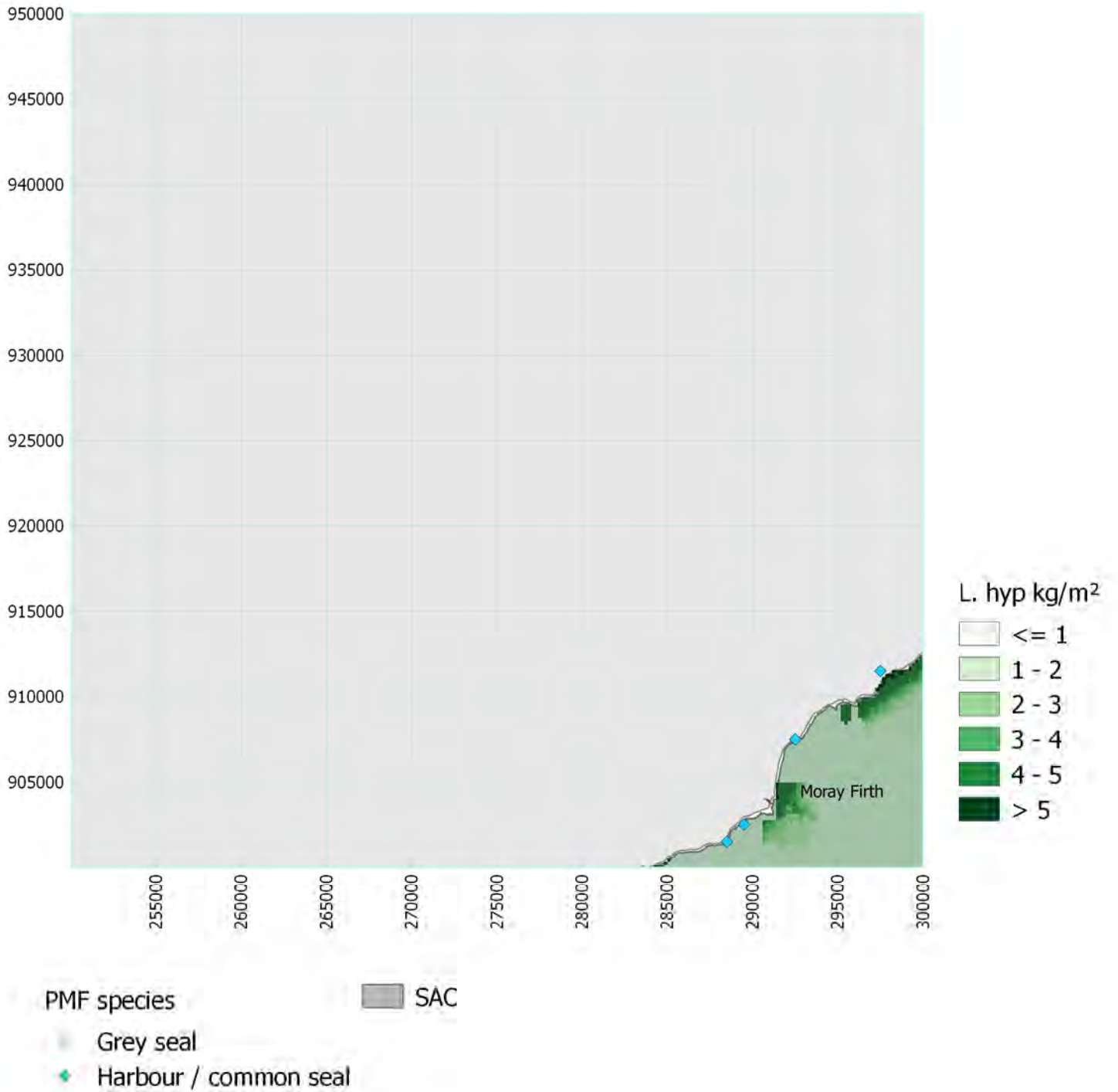
PMF biotopes

- Blue mussel beds
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

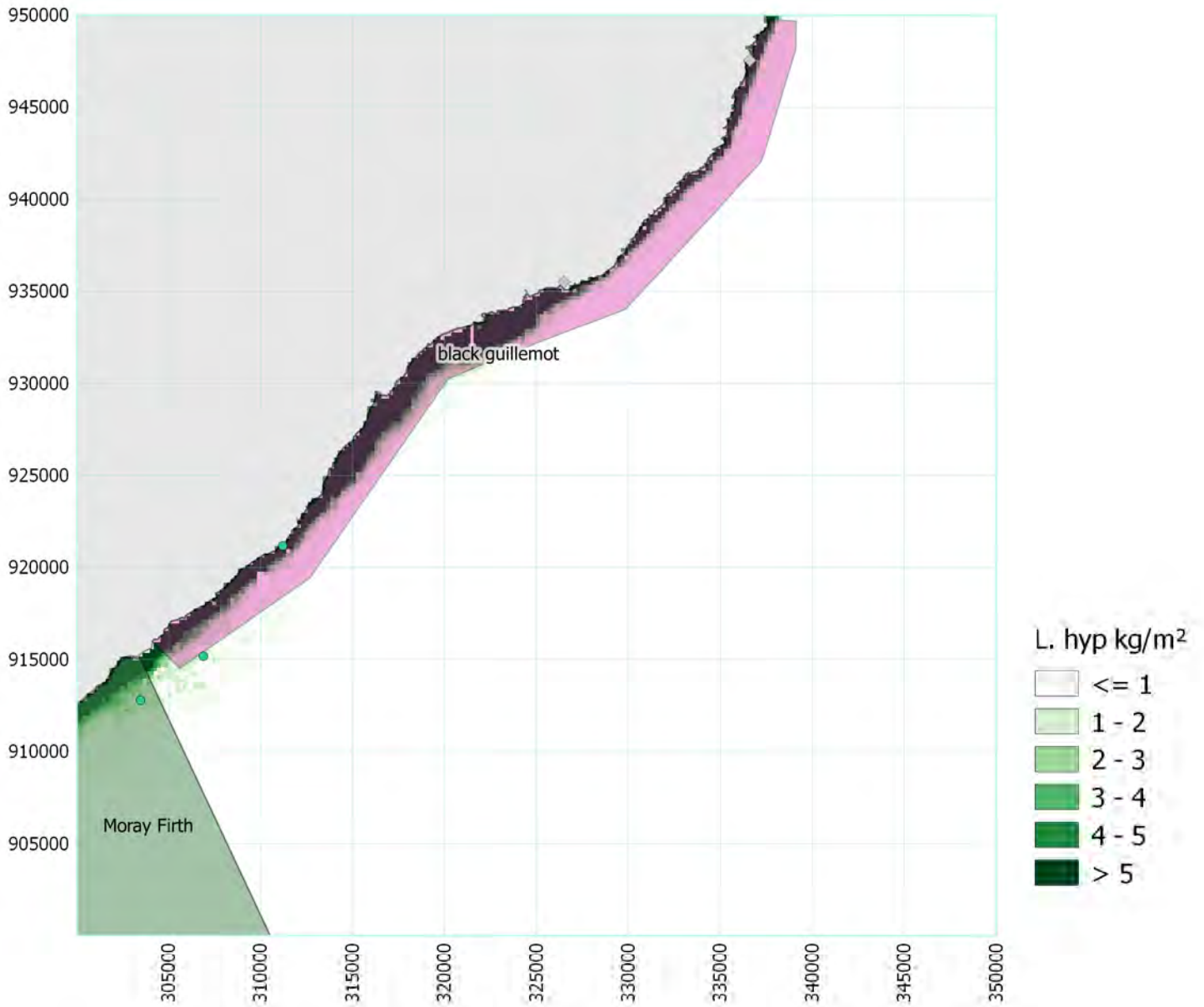
PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- MPA
- SAC

Map 17

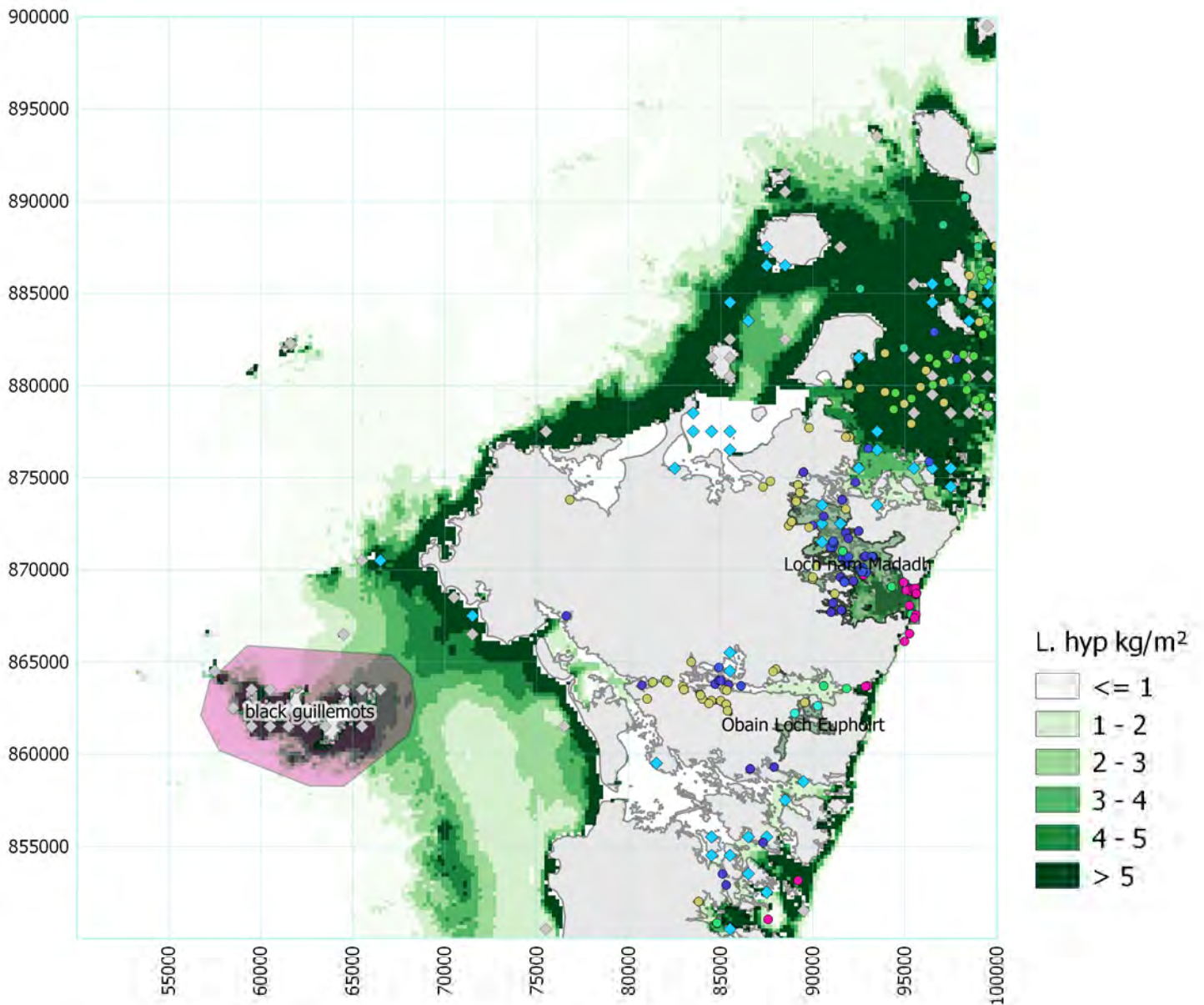


Map 18



- PMF biotopes
 - Tide-swept algal communities and Kelp beds
 - PMF species
 - Grey seal
- MPA
 SAC

Map 19



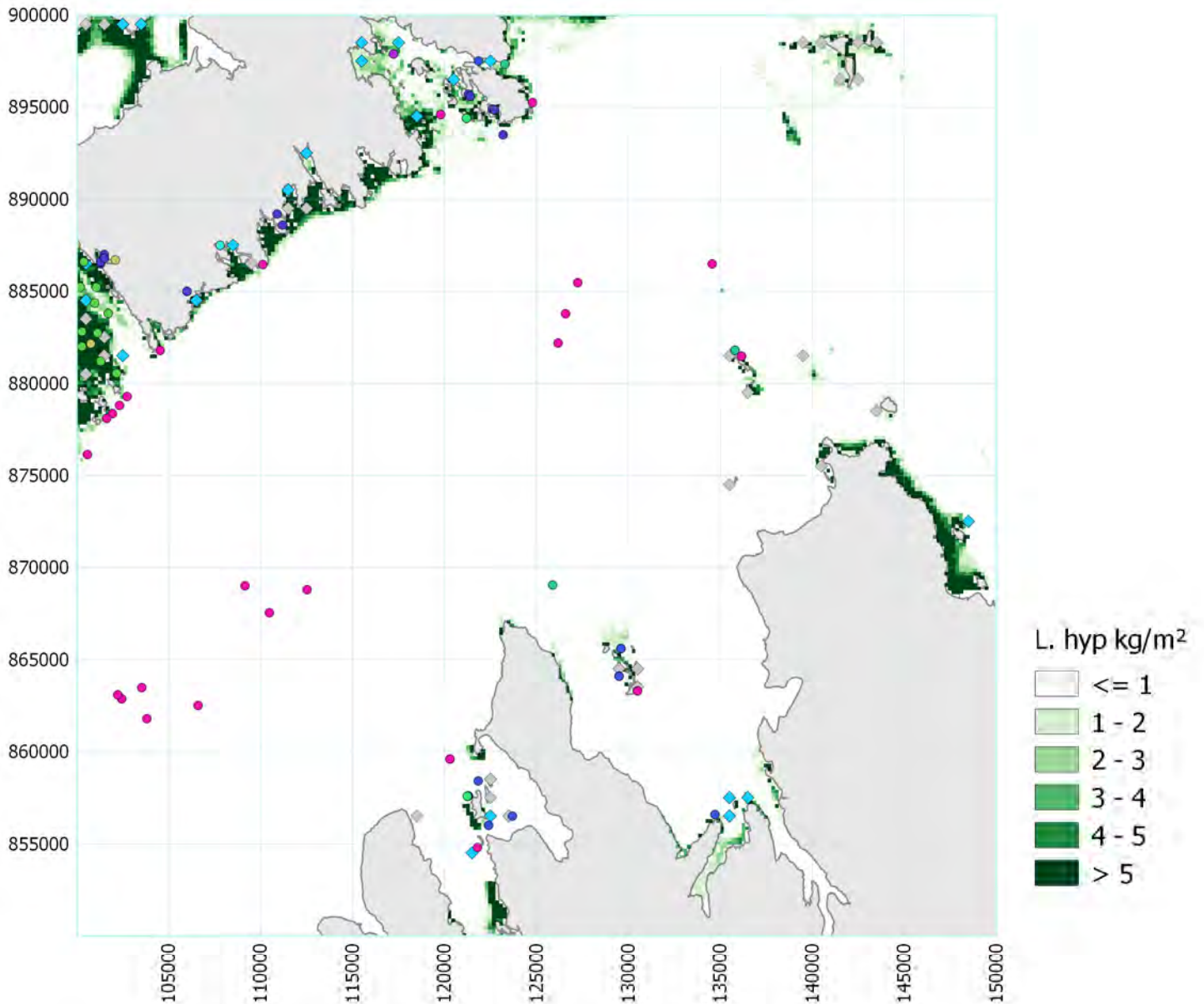
PMF biotopes

- Blue mussel beds & Low or variable salinity habitats
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

Map 20



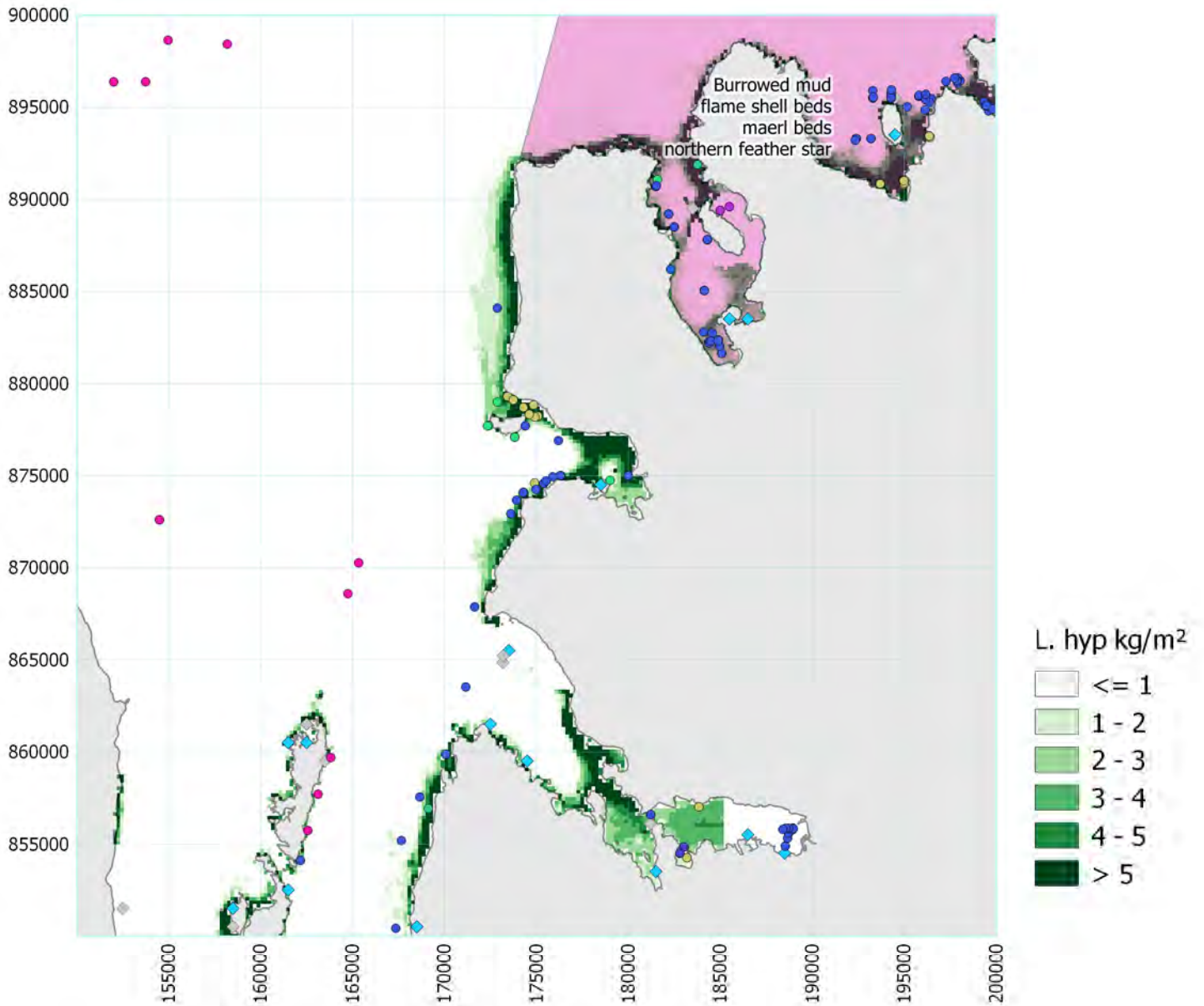
PMF biotopes

- Blue mussel beds & Low or variable salinity habitats
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal

Map 21



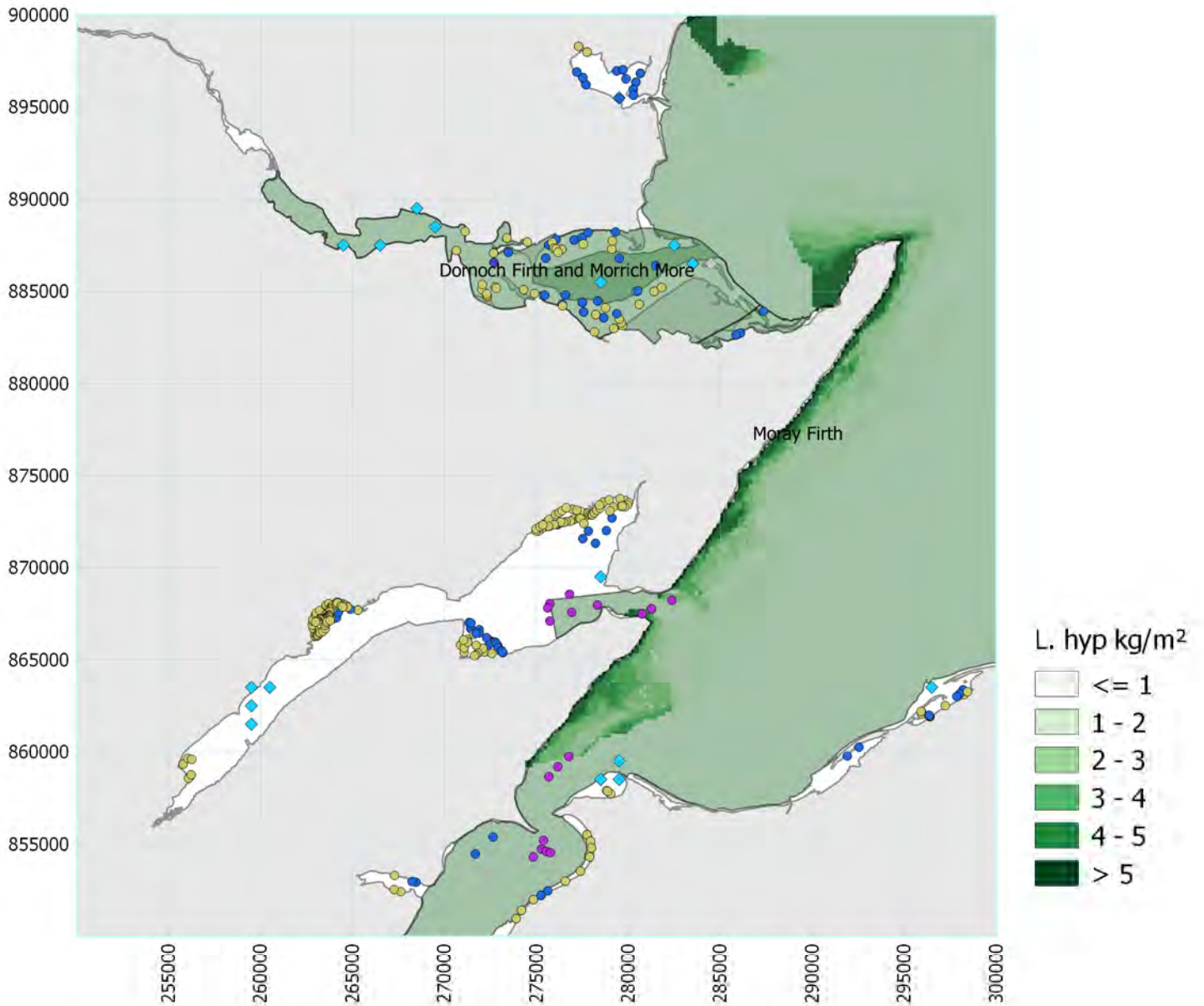
PMF biotopes

- Blue mussel beds
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 22



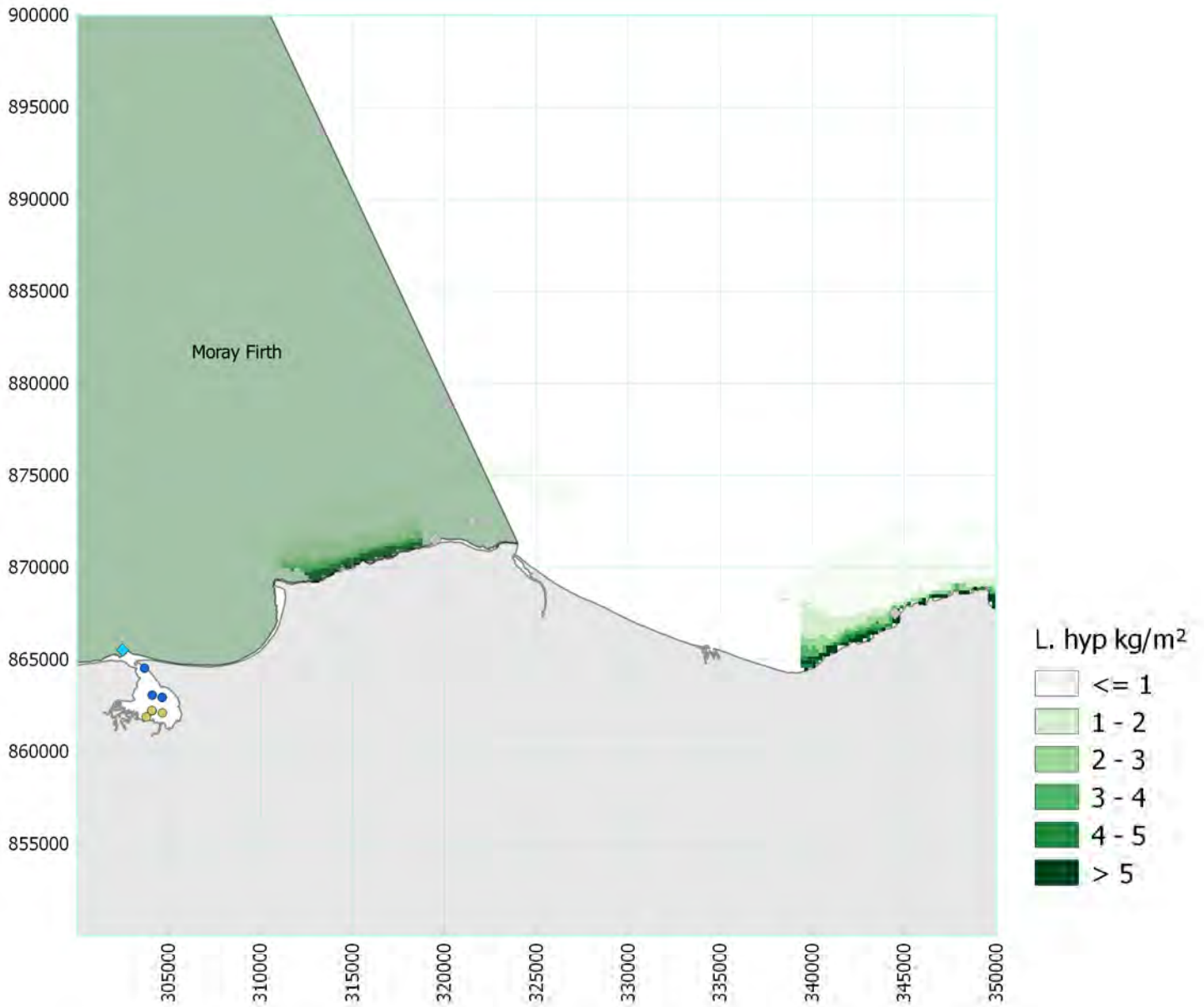
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Horse mussel beds
- Seagrass beds
- Tide-swept algal communities

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 23



PMF biotopes

- Blue mussel beds
- Seagrass beds

PMF species

- Grey seal
- Harbour / common seal
- SAC

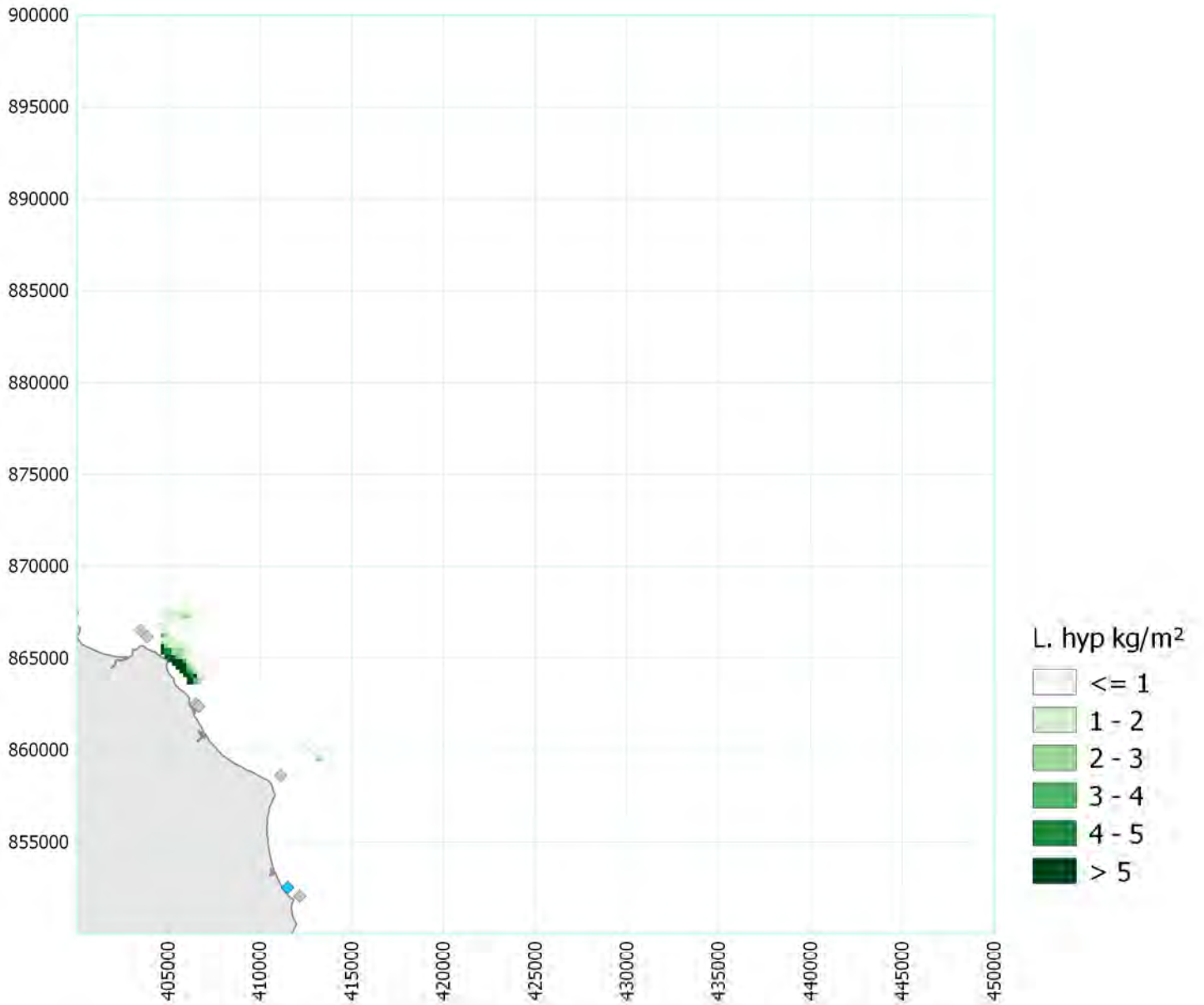
Map 24



PMF species

- ◆ Grey seal

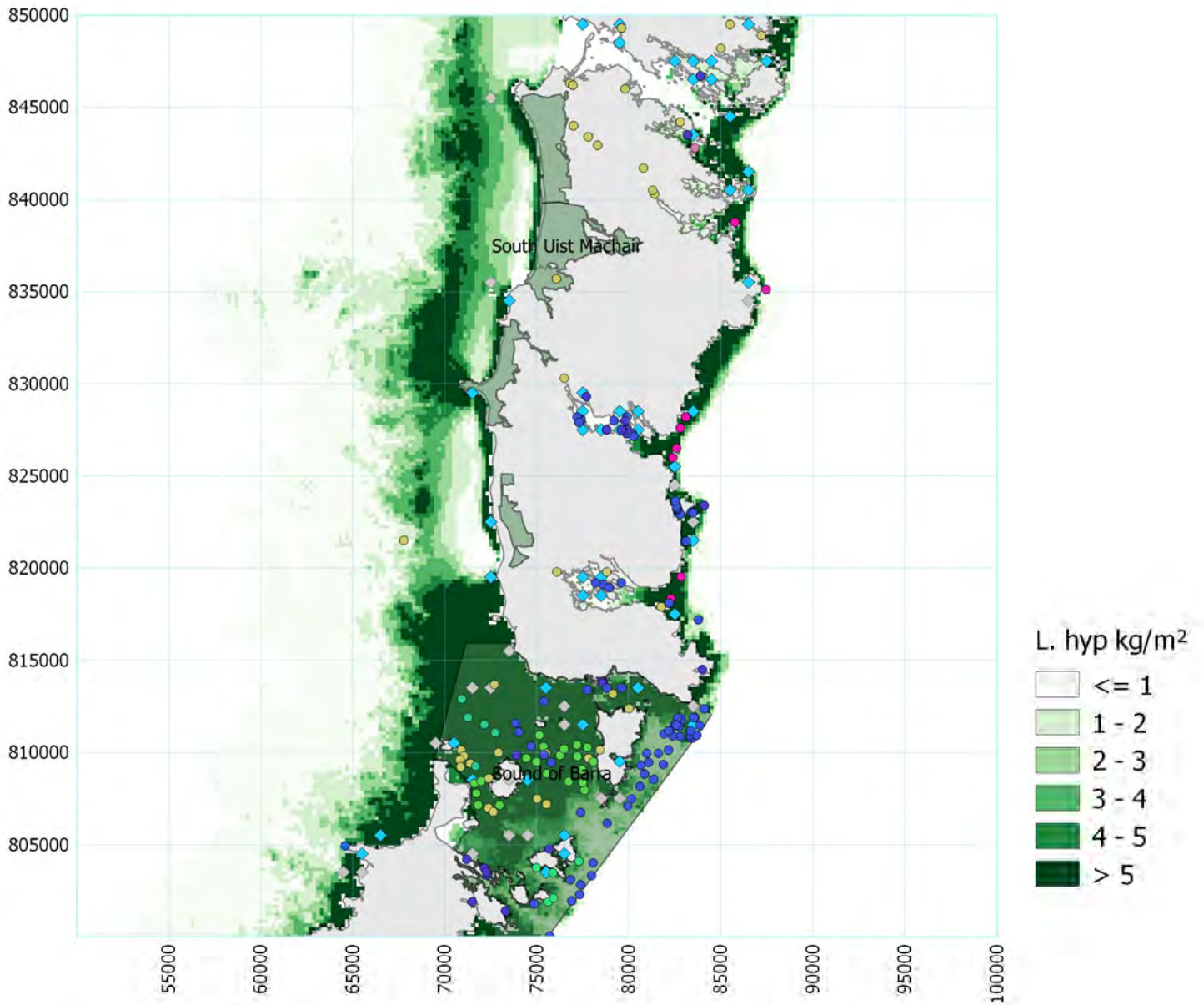
Map 25



PMF species

- Grey seal
- Harbour / common seal

Map 26



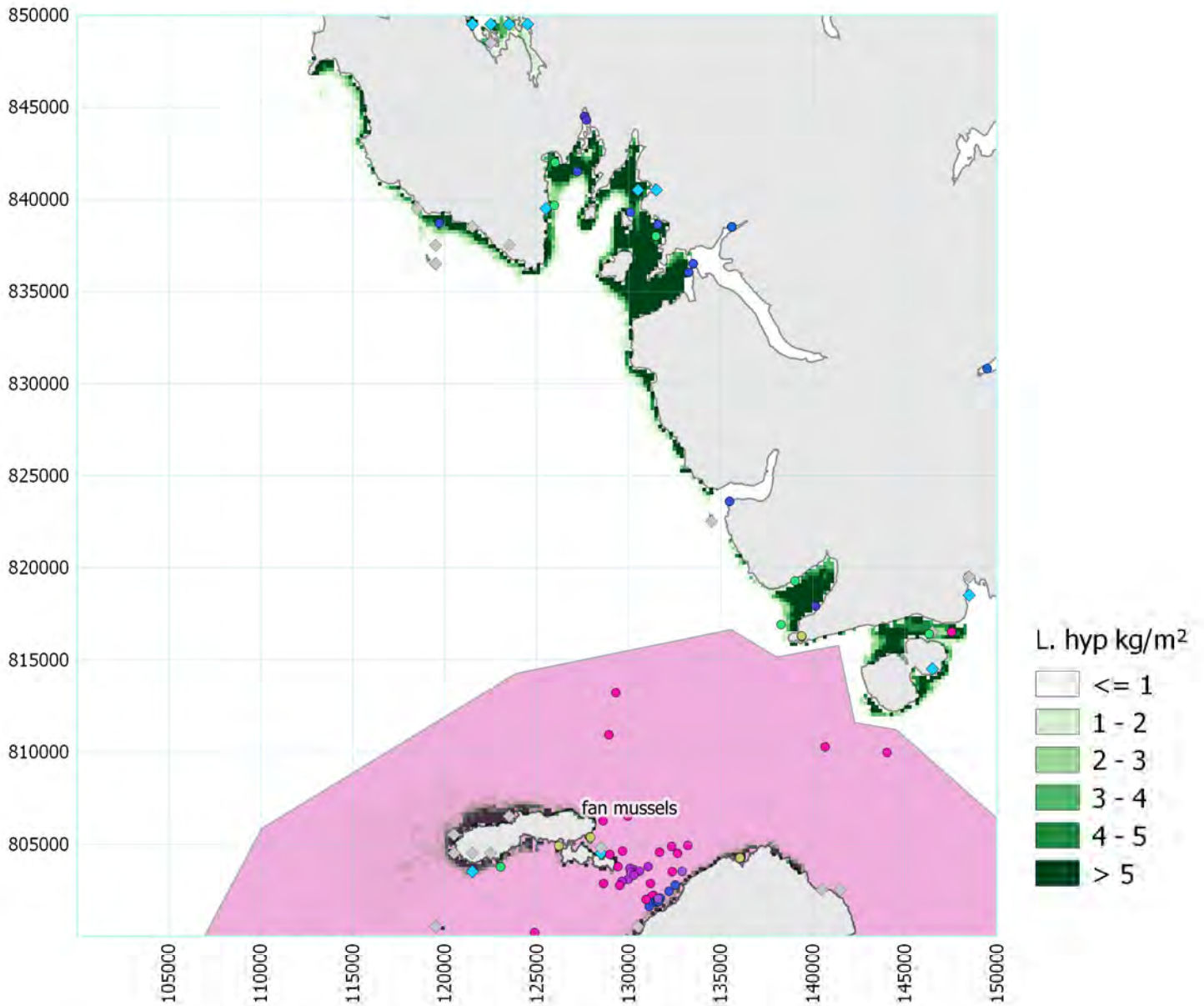
PMF biotopes

- Blue mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Native oysters
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- ◊ Grey seal
- ◊ Harbour / common seal
- SAC

Map 27



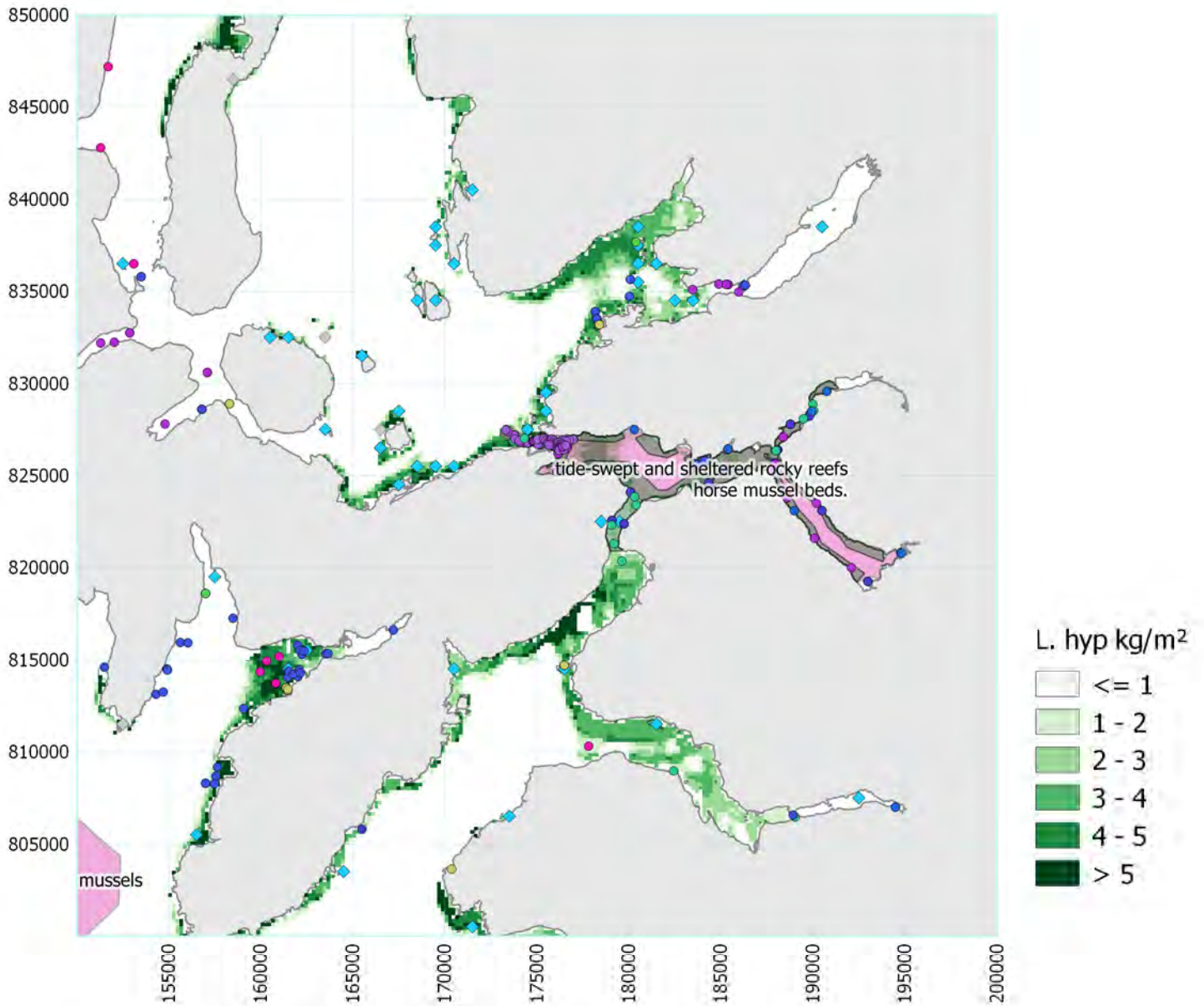
PMF biotopes

- Blue mussel beds
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- MPA

Map 28



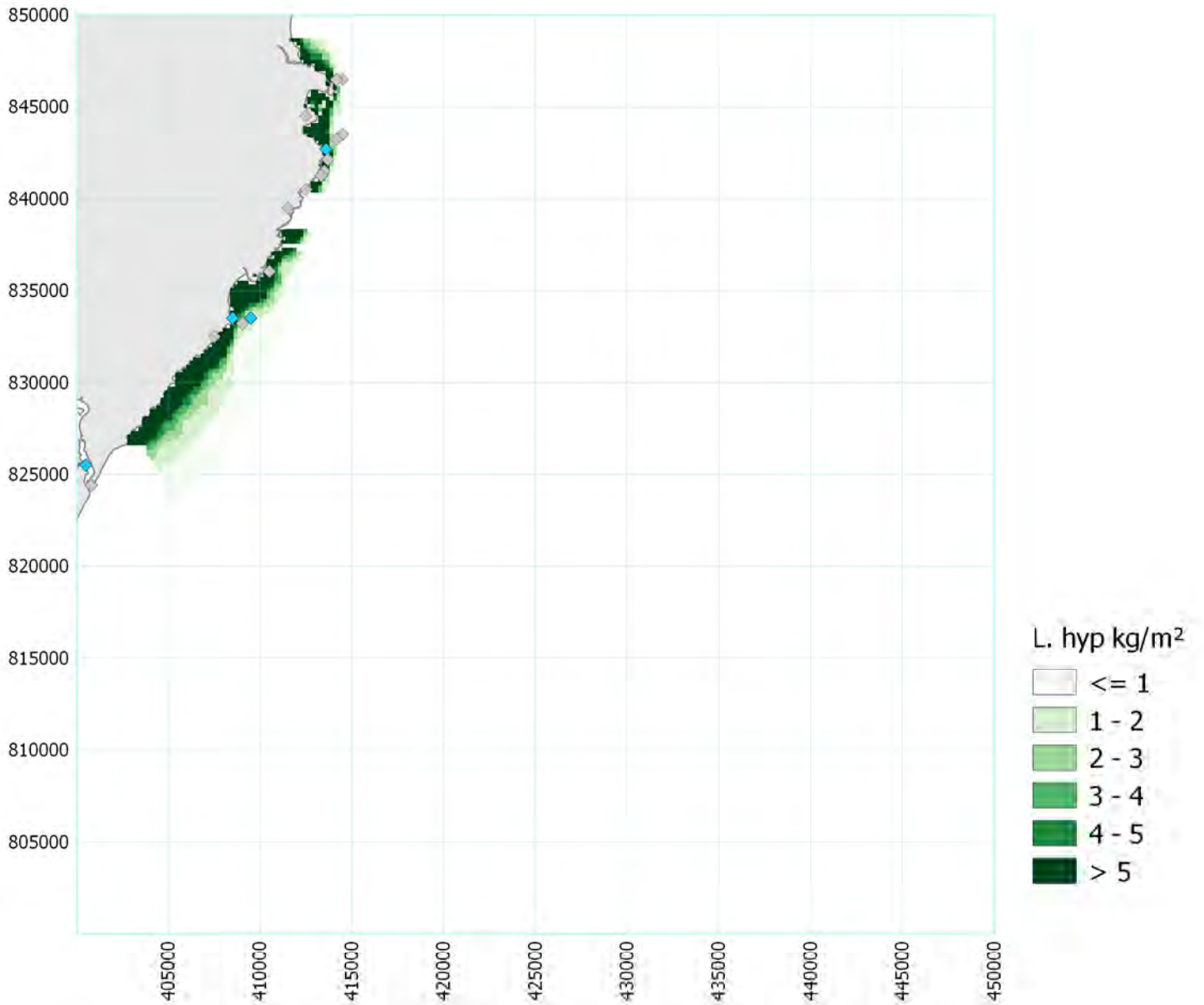
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

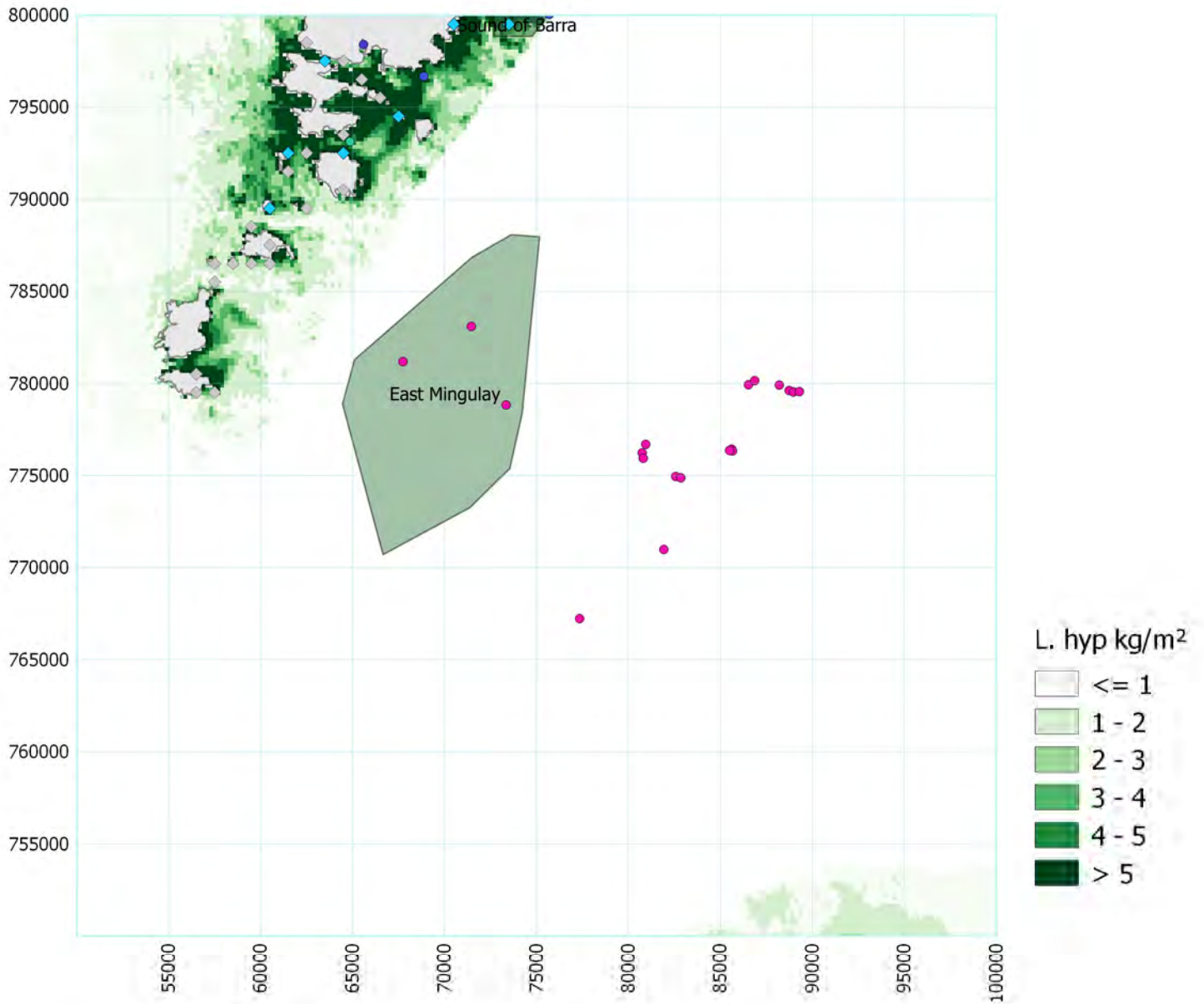
Map 29



PMF species

- Grey seal
- Harbour / common seal

Map 30



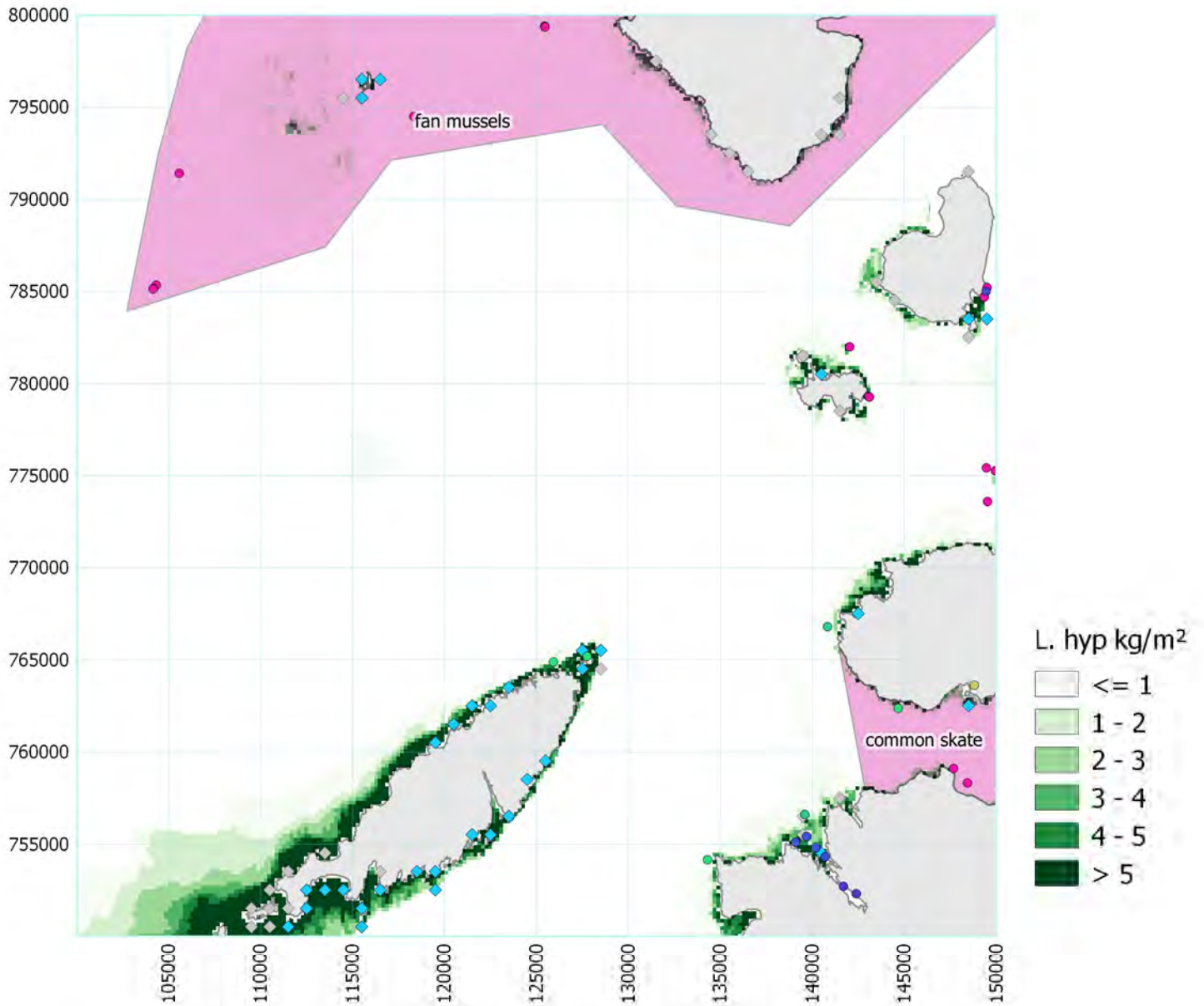
PMF biotopes

- Maerl beds
- Northern sea fan and sponge communities
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 31



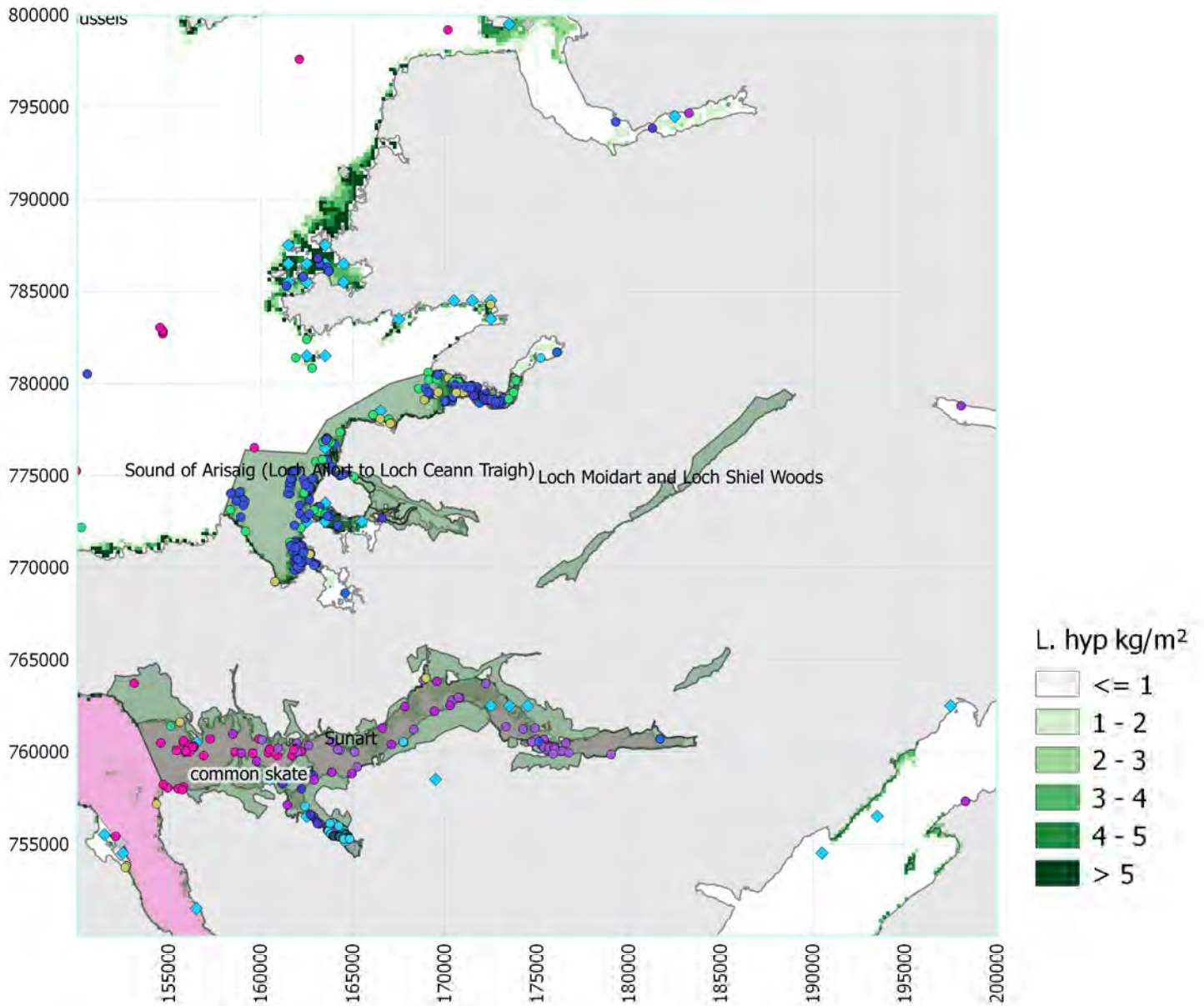
PMF biotopes

- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 32



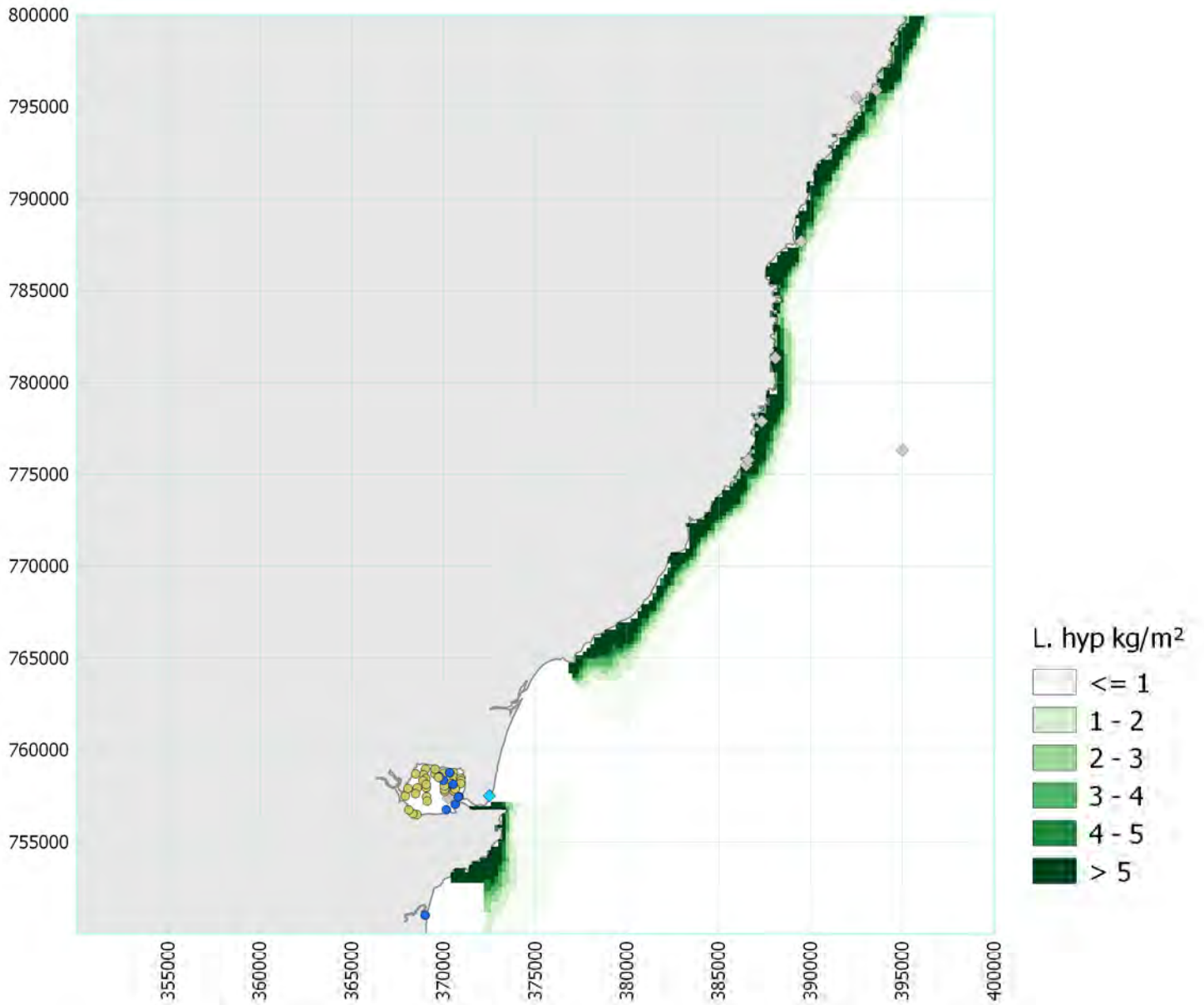
PMF biotopes

- Blue mussel beds
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Serpulid aggregations
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- MPA
- SAC

Map 33



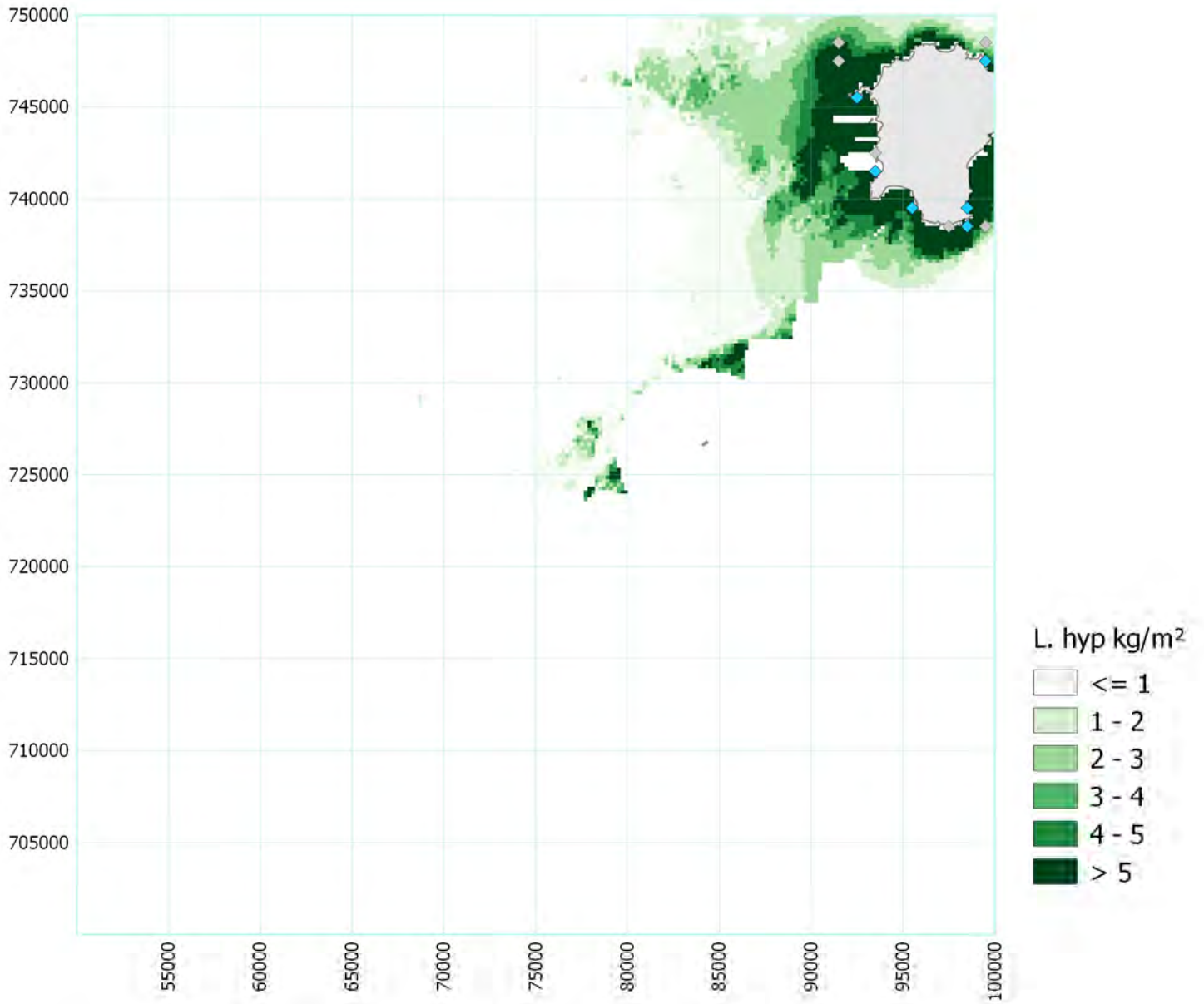
PMF biotopes

- Blue mussel beds
- Seagrass beds

PMF species

- Grey seal
- Harbour / common seal

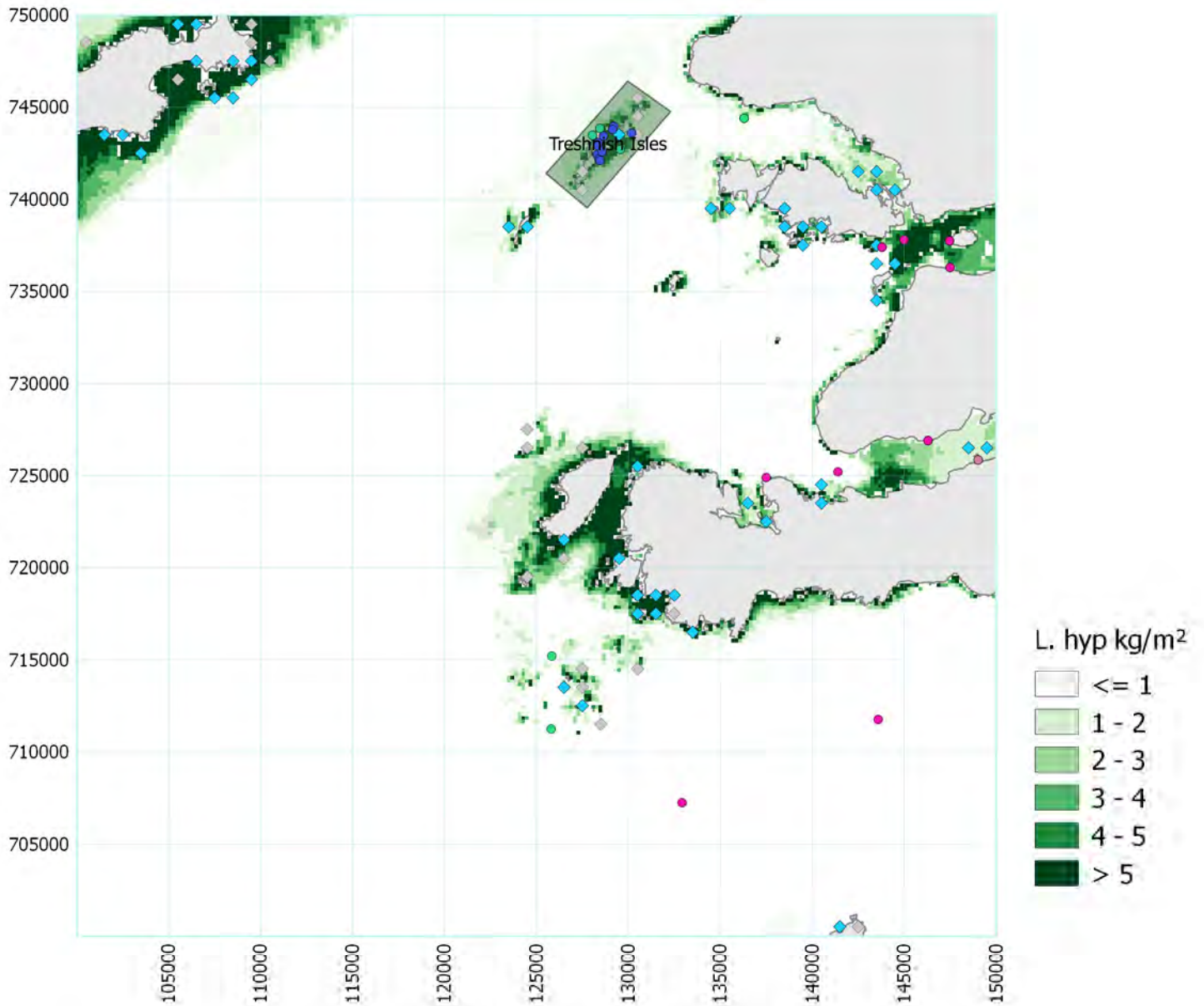
Map 34



PMF species

- Grey seal
- ◆ Harbour / common seal

Map 35



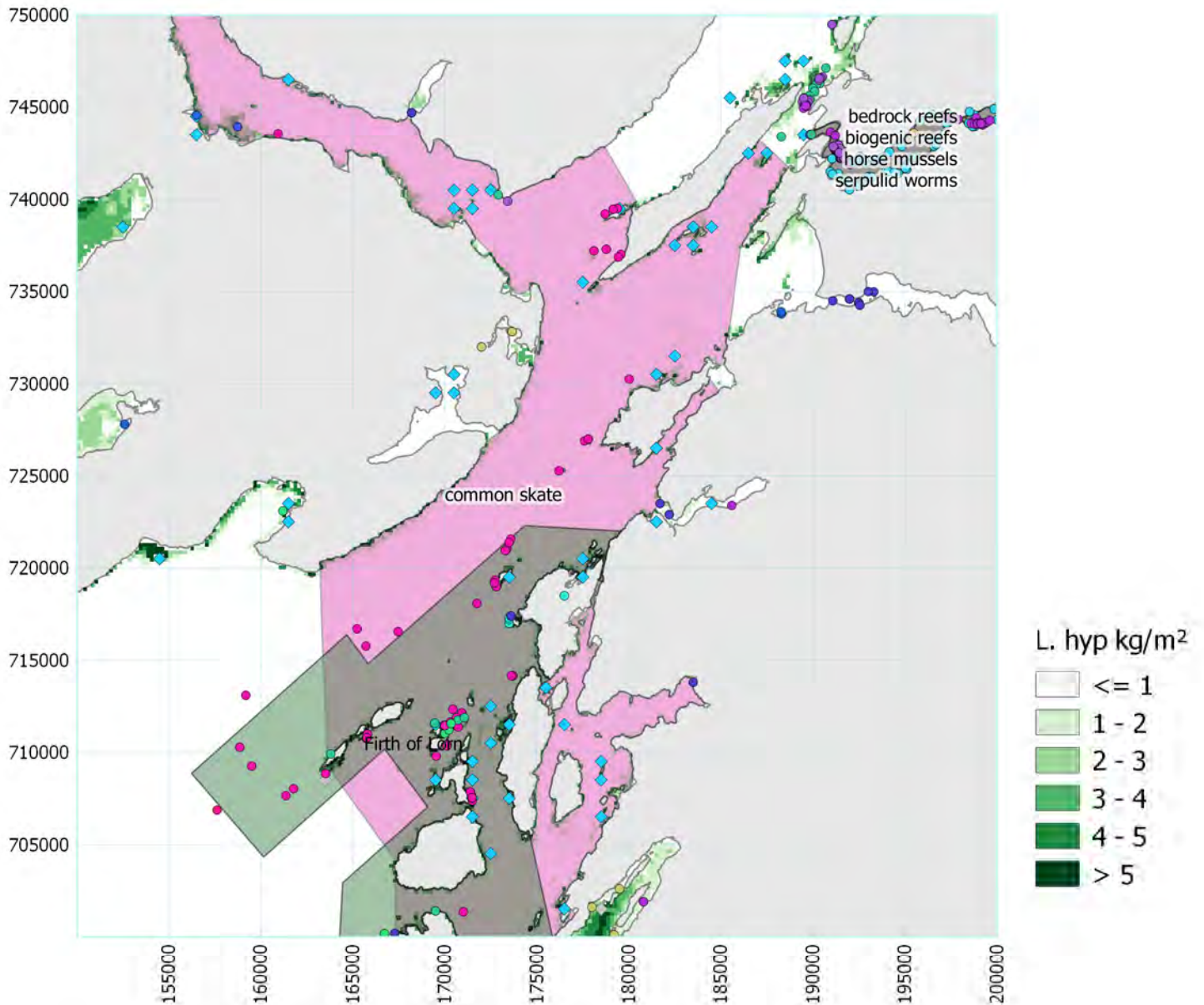
PMF biotopes

- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Native oysters
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 36



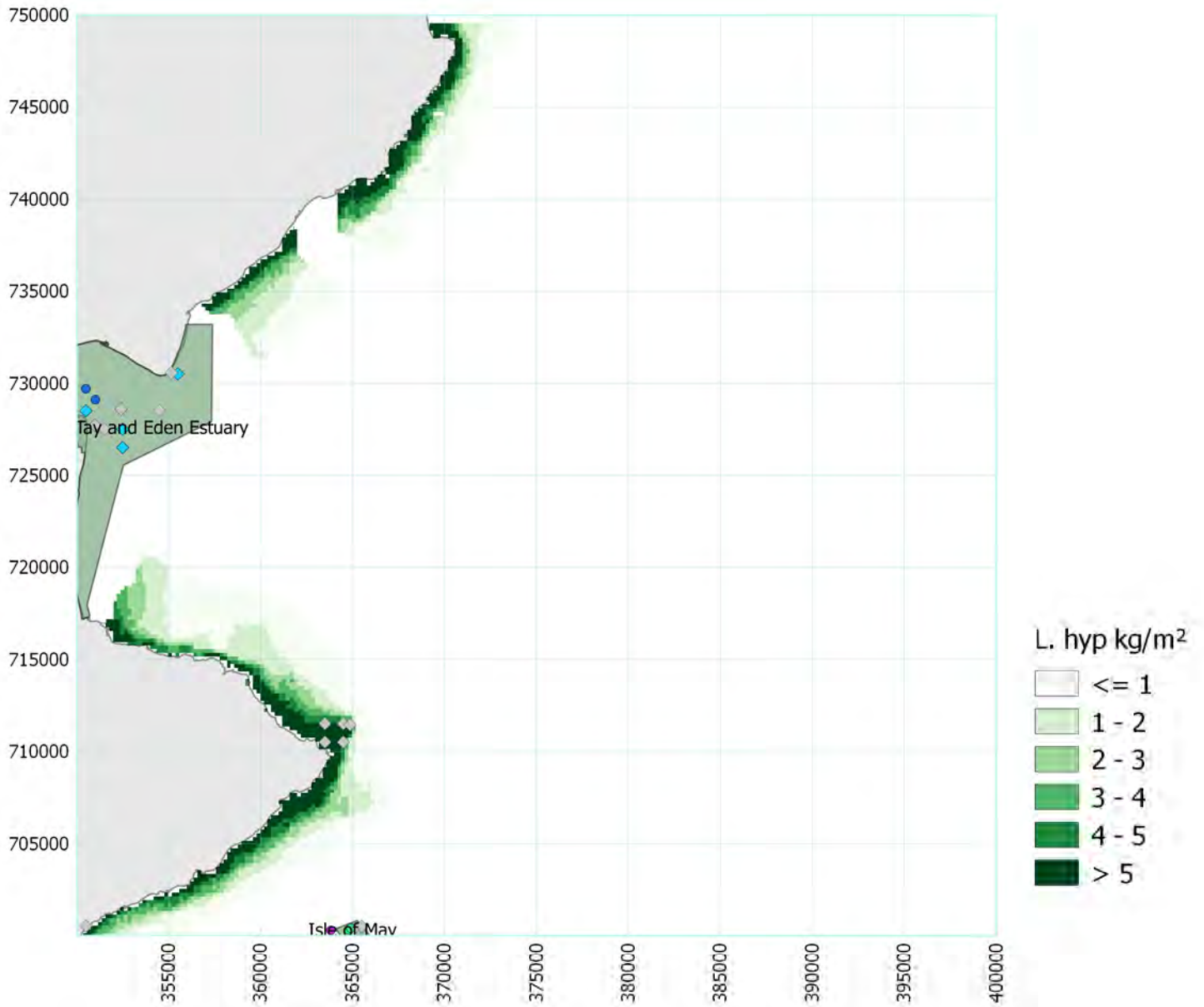
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Serpulid aggregations
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◇ Grey seal
- ◆ Harbour / common seal
- MPA
- SAC

Map 37



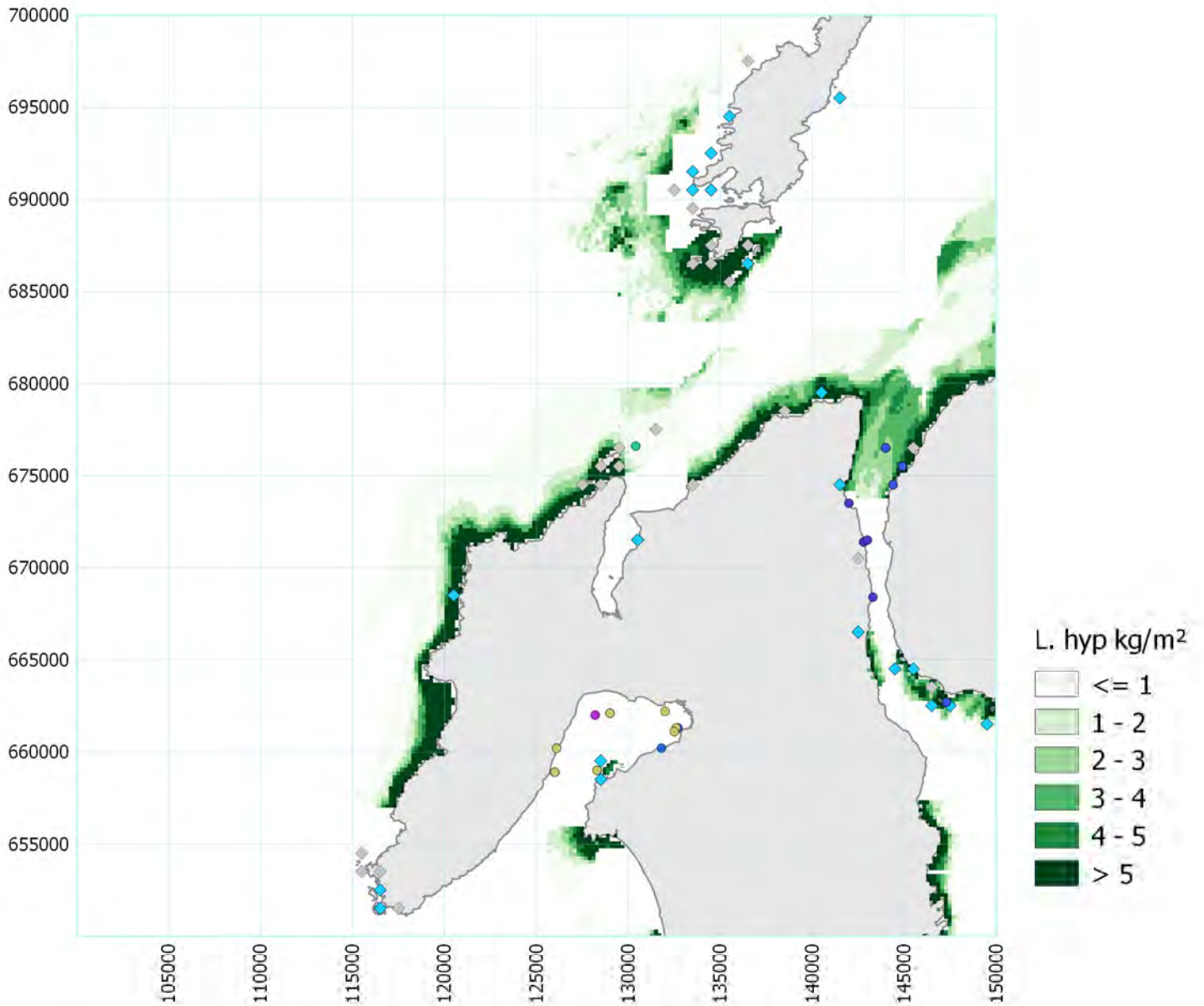
PMF biotopes

- Blue mussel beds
- Horse mussel beds
- Maerl or coarse shell gravel with burrowing sea cucumbers

PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- SAC

Map 38



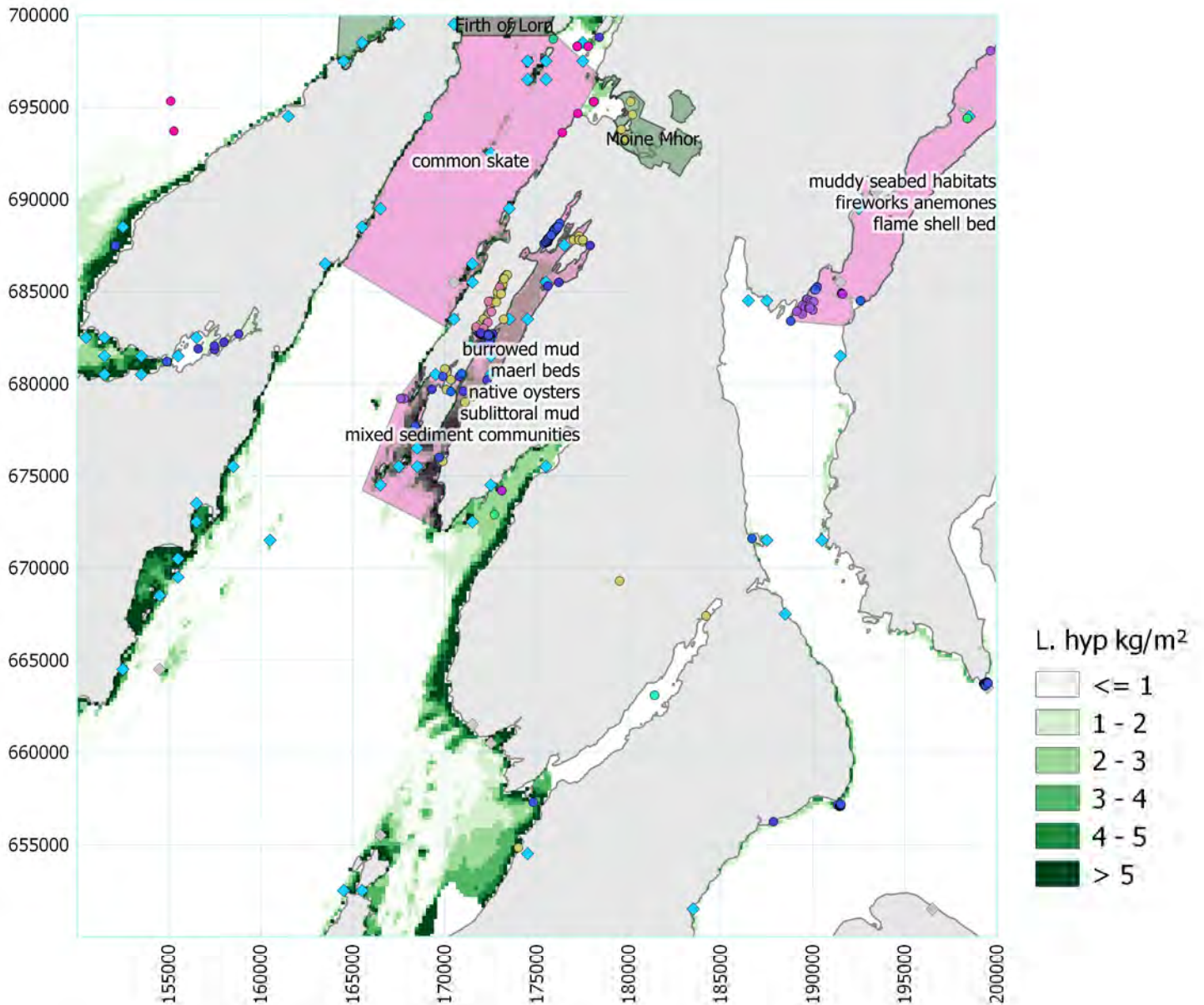
PMF biotopes

- Blue mussel beds
- Horse mussel beds
- Maerl beds
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal

Map 39



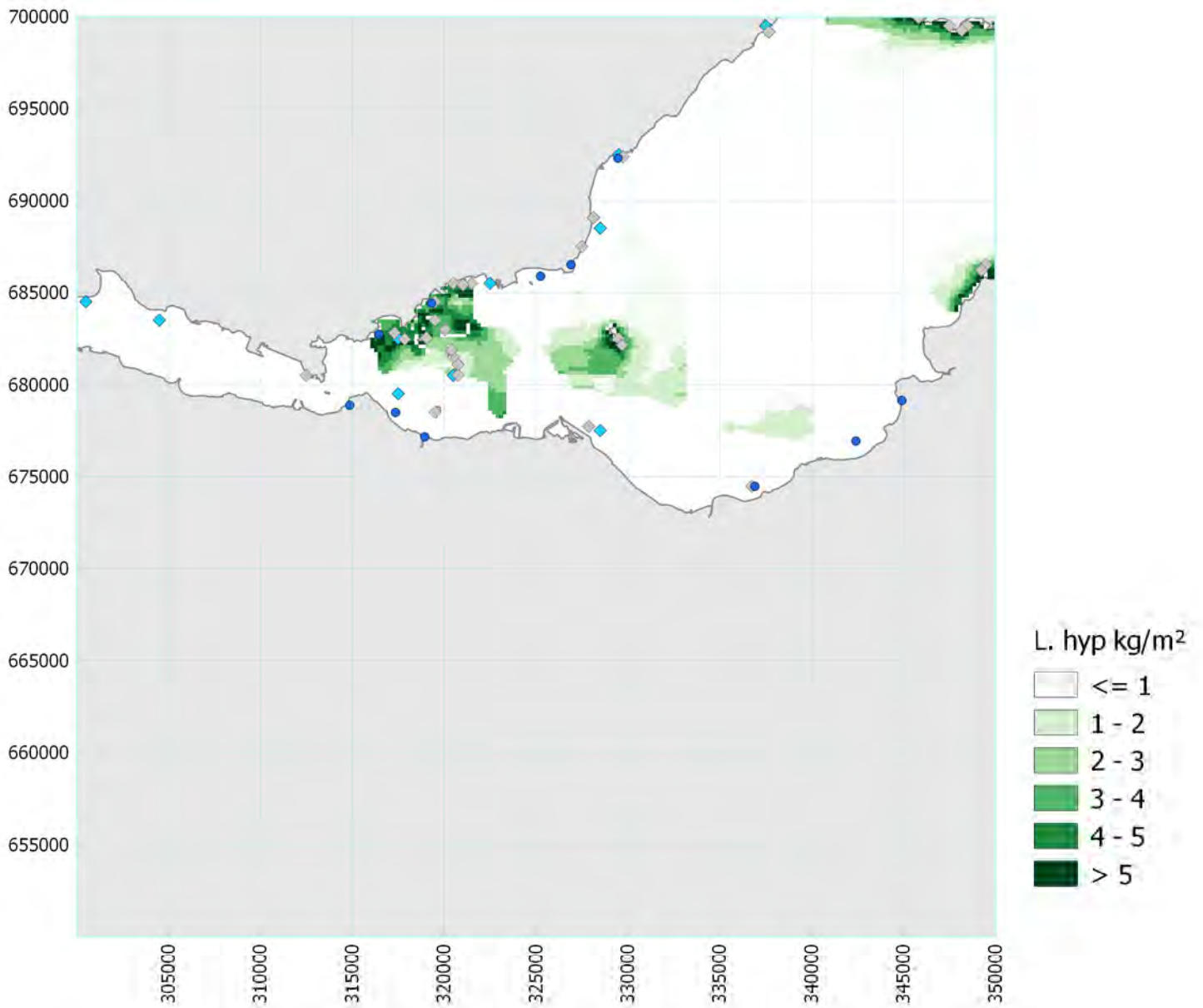
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Native oysters
- Northern sea fan and sponge communities
- Seagrass beds
- Serpulid aggregations
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◇ Grey seal
- ◆ Harbour / common seal
- MPA
- SAC

Map 40



PMF biotopes

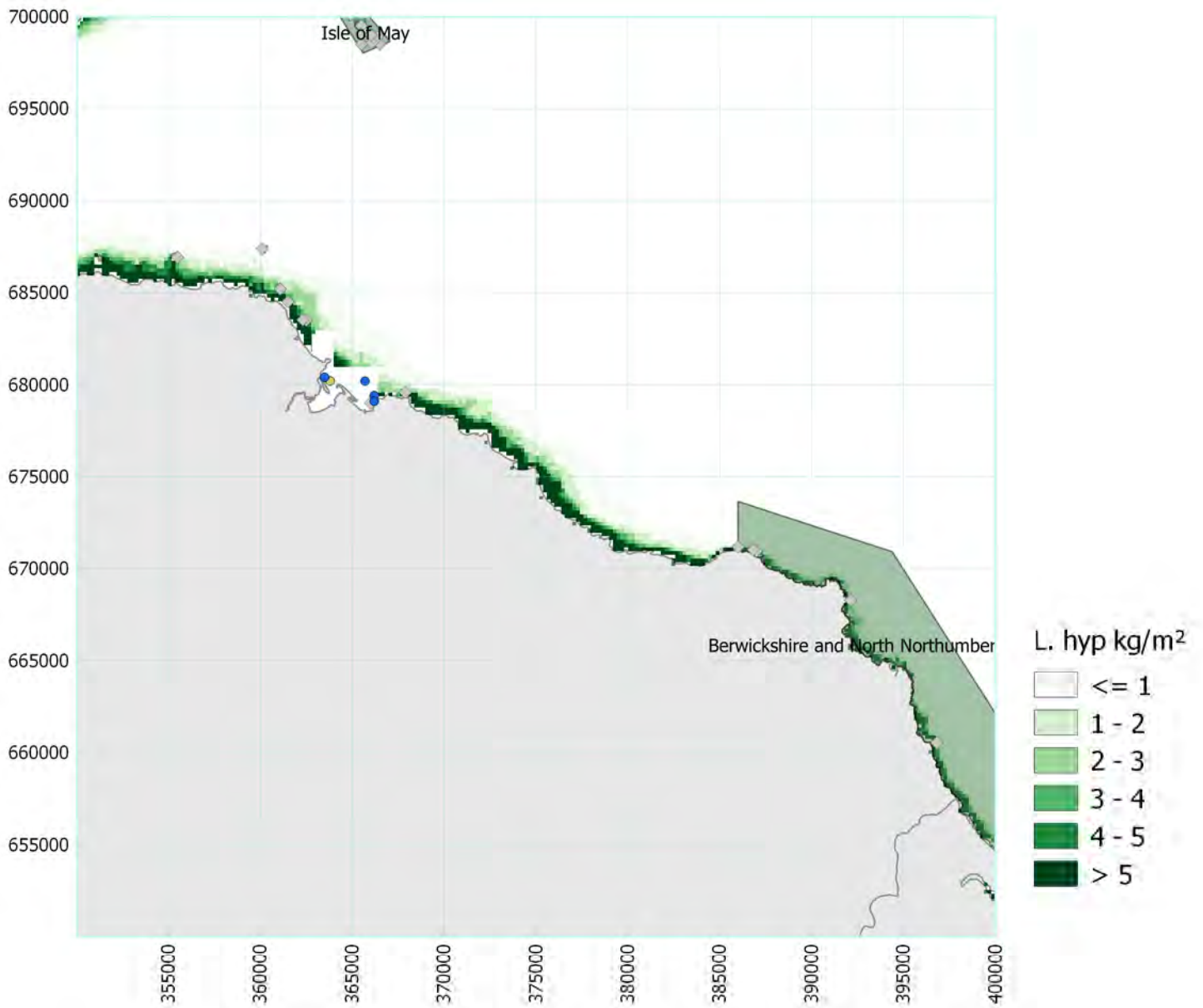
• Blue mussel beds

PMF species

• Grey seal

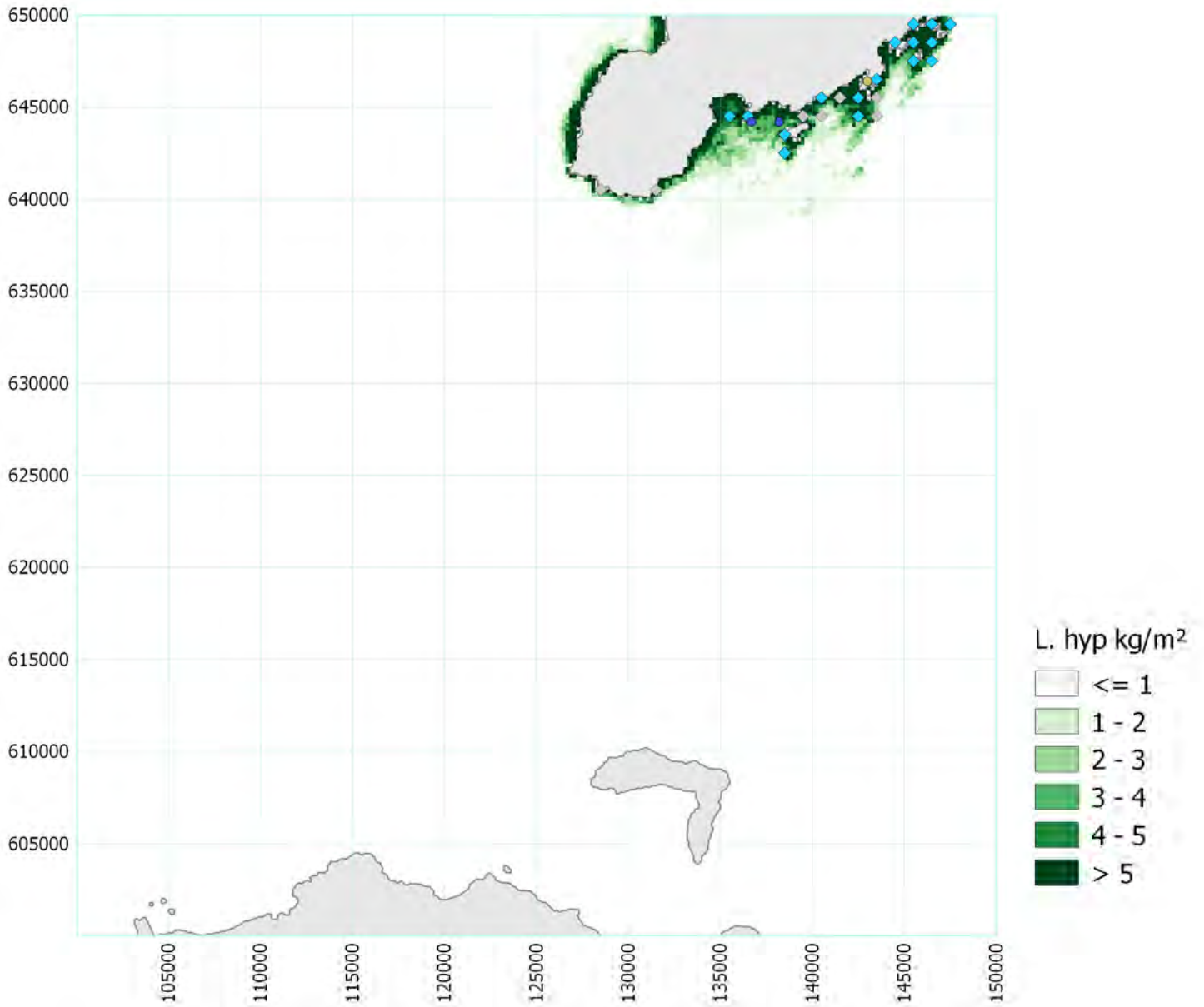
• Harbour / common seal

Map 41



- | PMF biotopes | PMF species |
|--------------------|-------------|
| • Blue mussel beds | • Grey seal |
| • Seagrass beds | ■ SAC |

Map 42



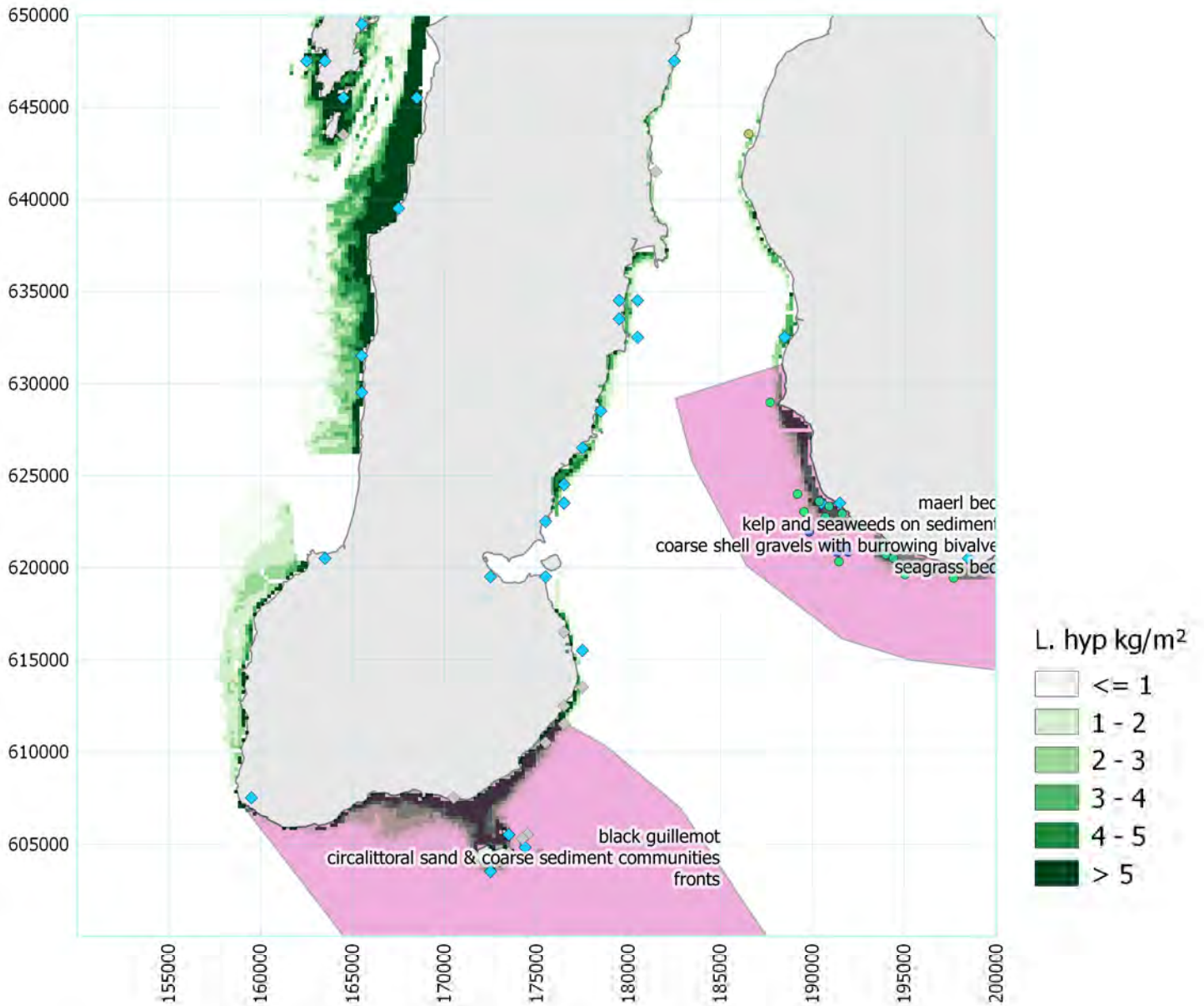
PMF biotopes

- Maerl beds
- Seagrass beds

PMF species

- Grey seal
- Harbour / common seal

Map 43



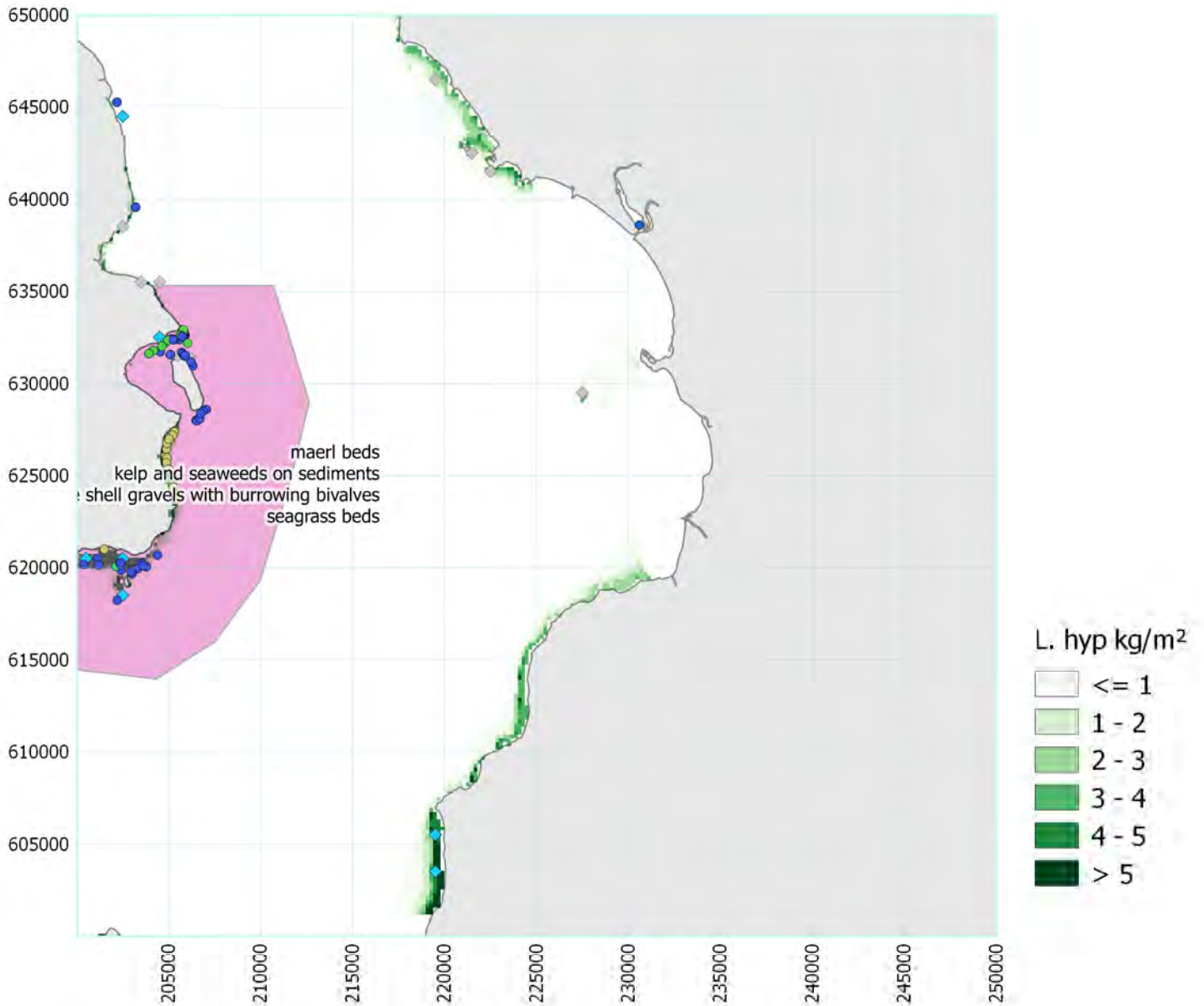
PMF biotopes

- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 44



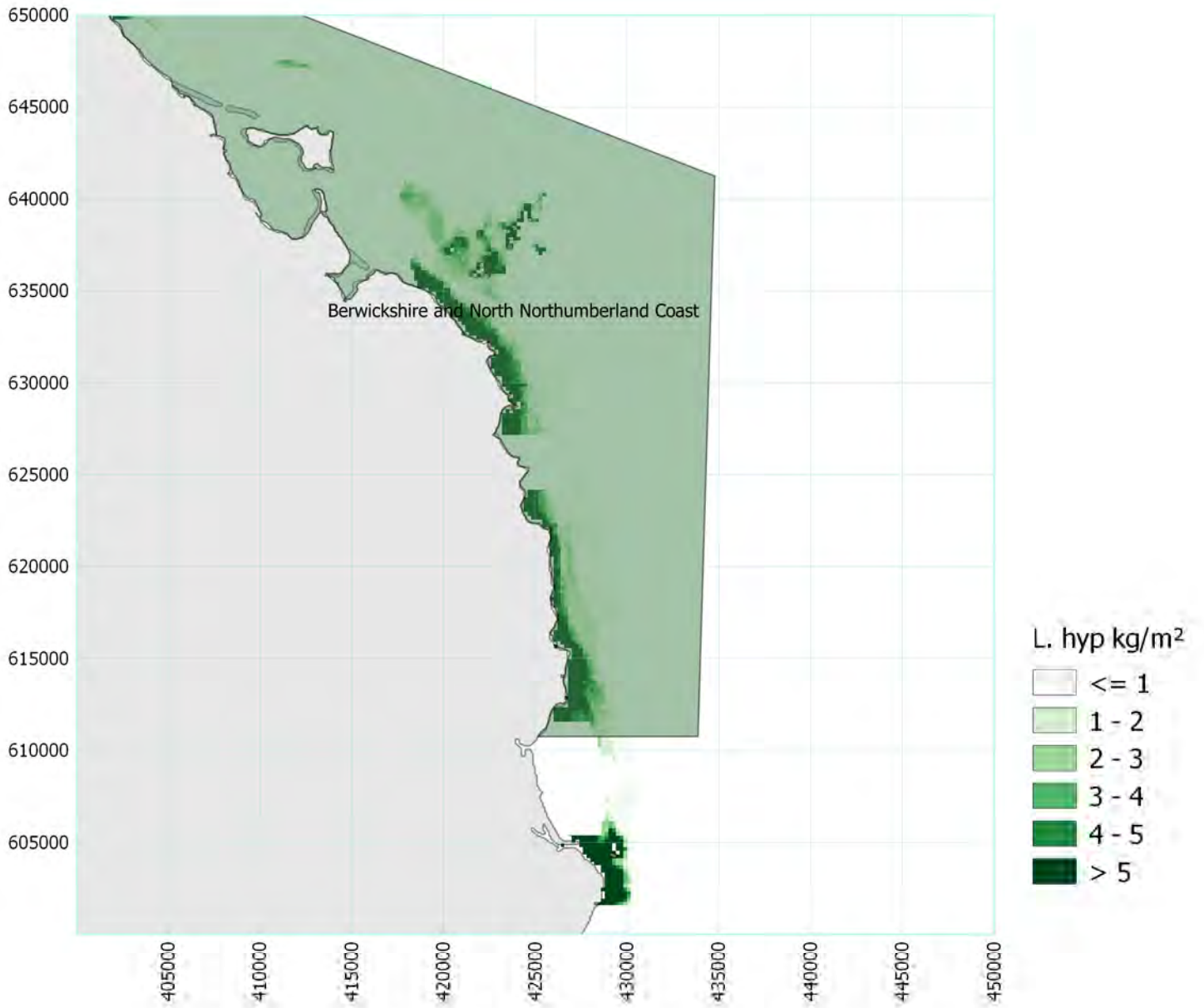
PMF biotopes

- Blue mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

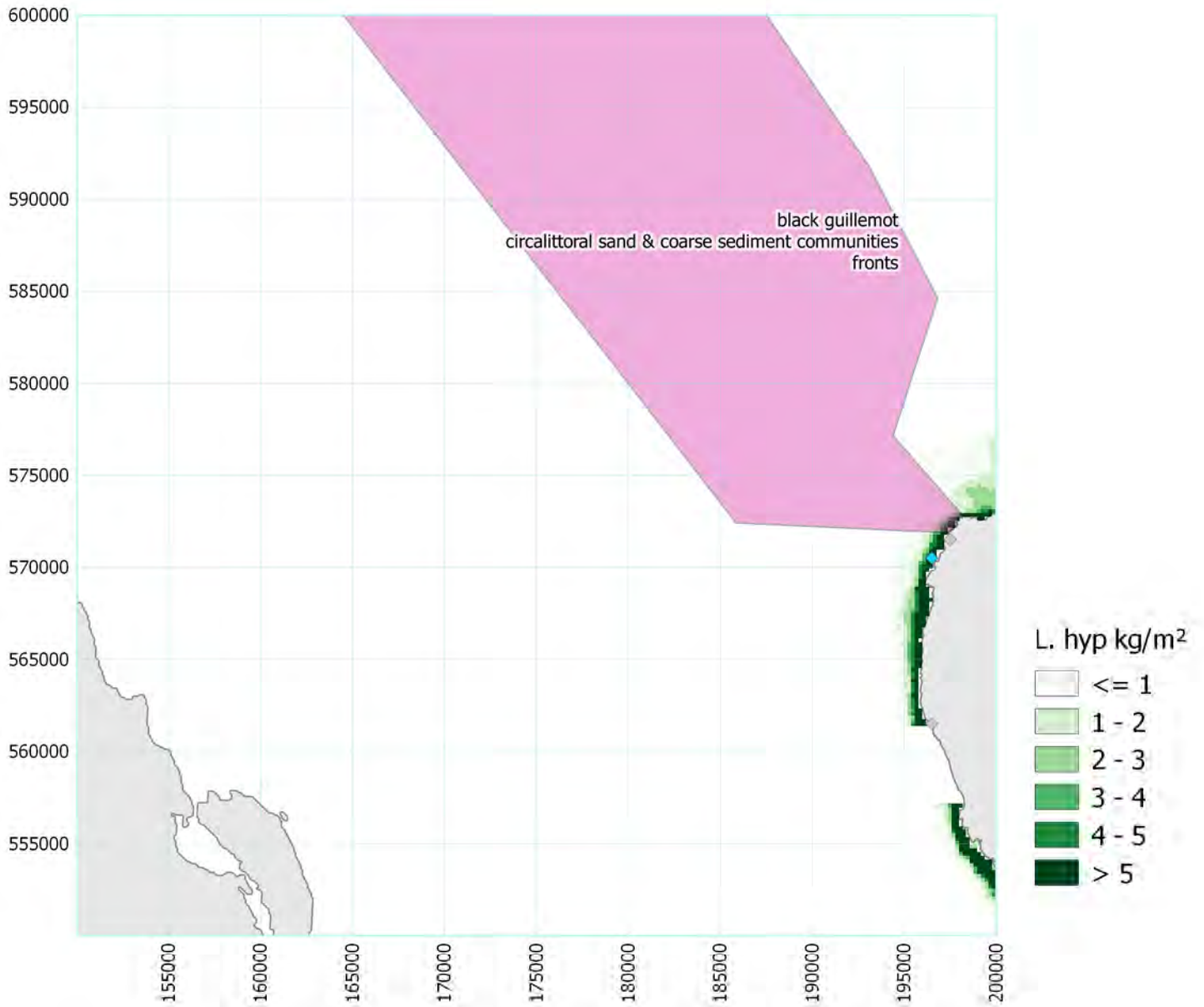
- Grey seal
- Harbour / common seal
- MPA

Map 45

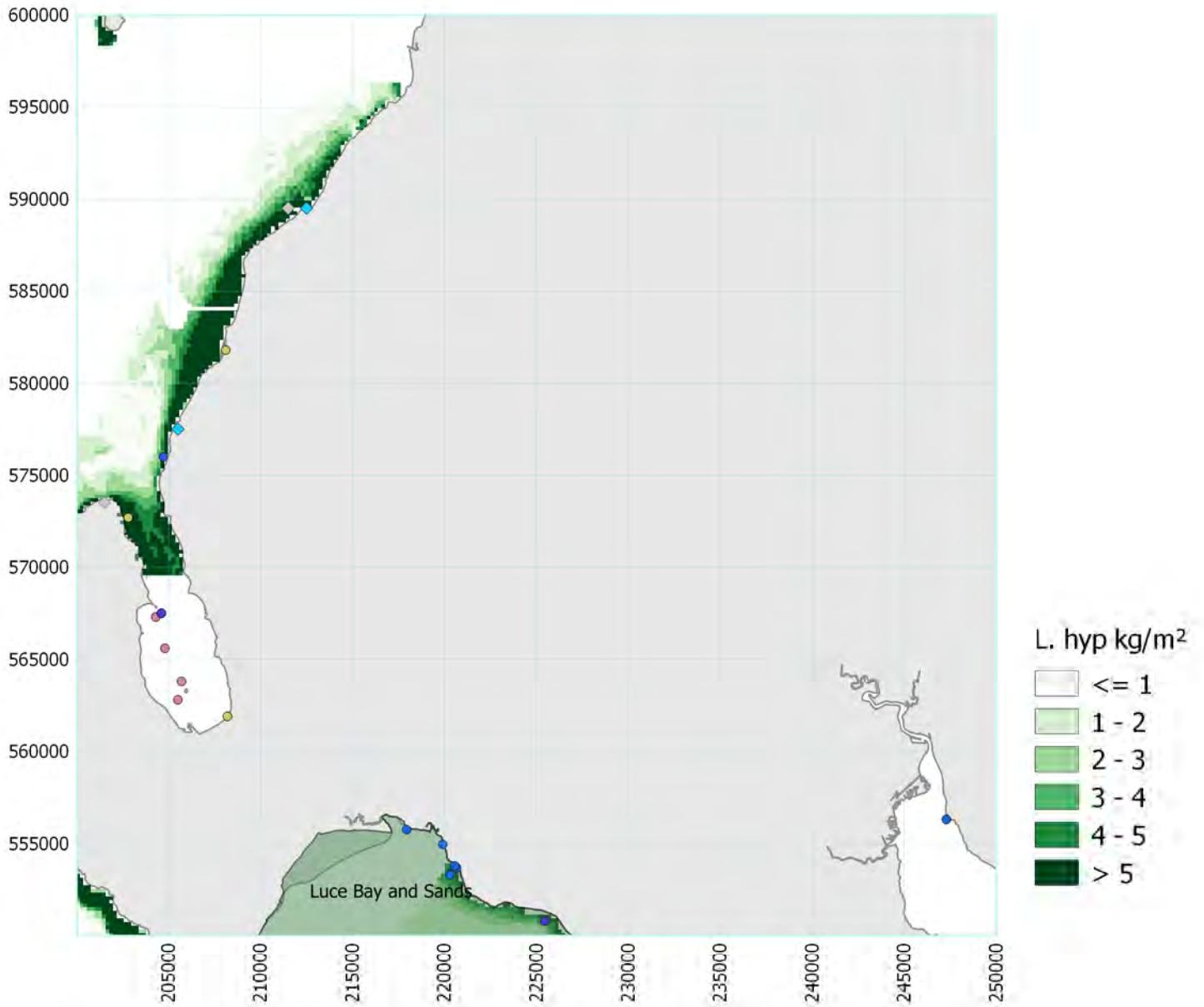


SAC

Map 46



Map 47



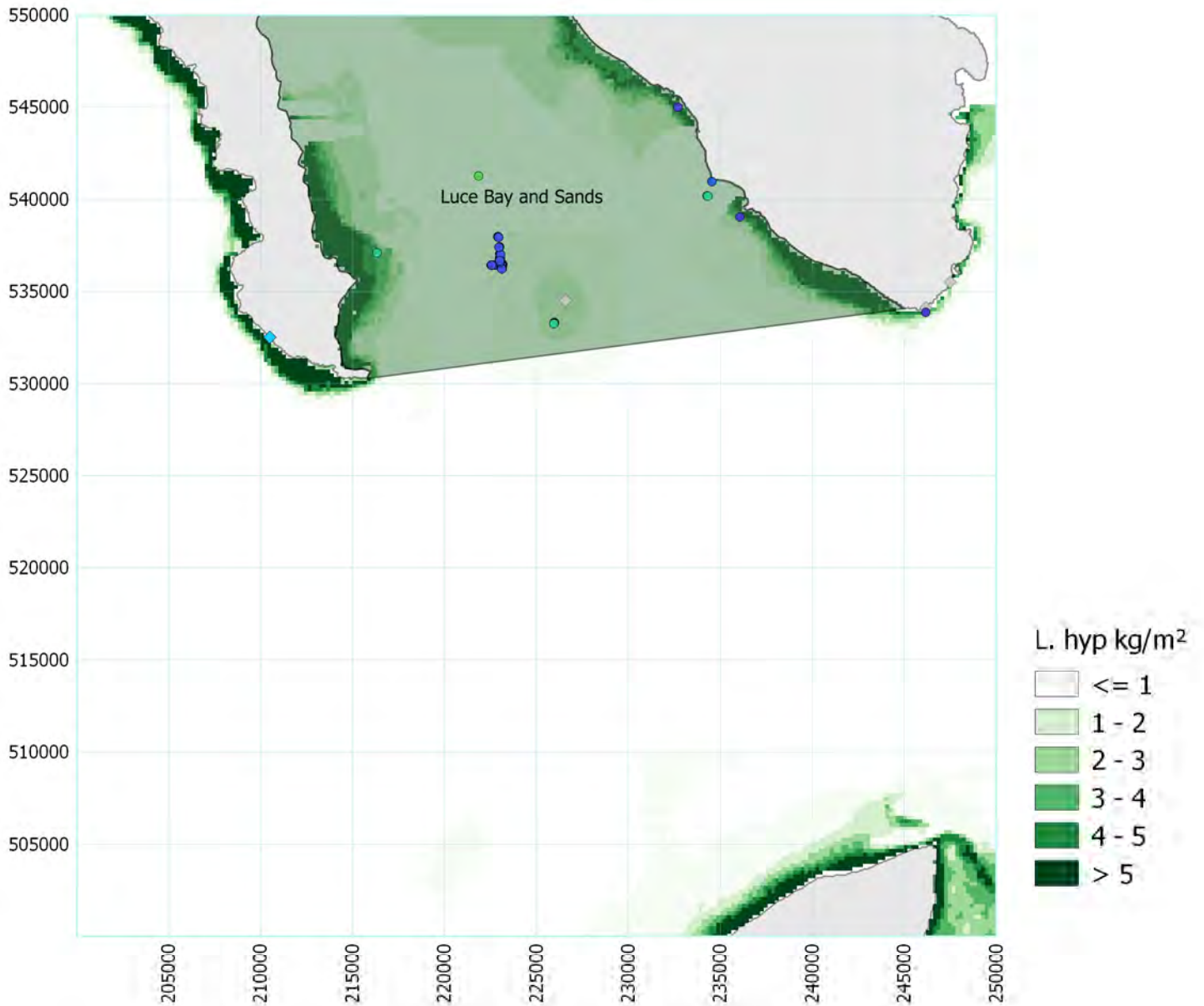
PMF biotopes

- Blue mussel beds
- Maerl beds
- Native oysters
- Seagrass beds
- Tide-swept algal communities

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 48



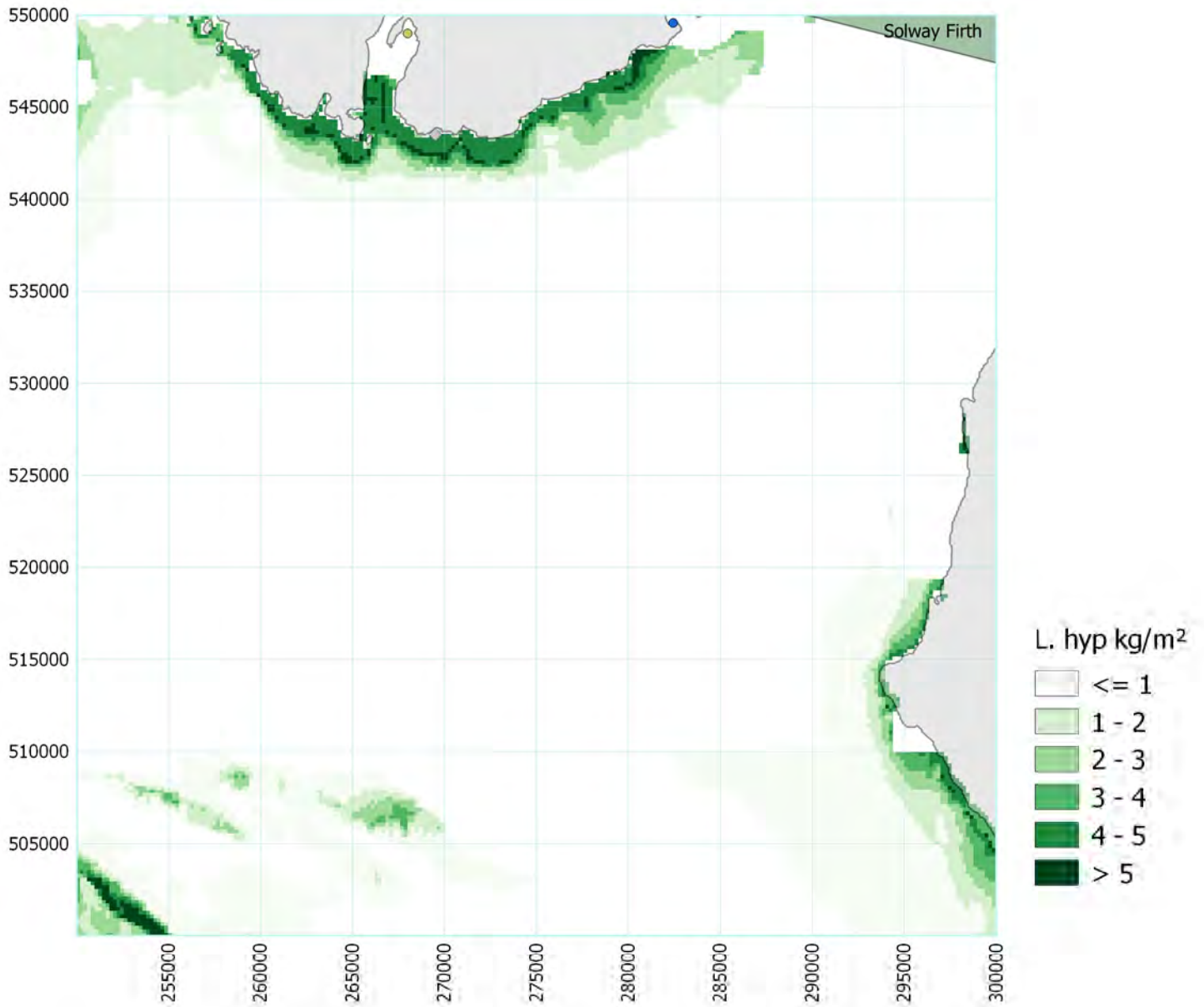
PMF biotopes

- Blue mussel beds
- Maerl beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 49

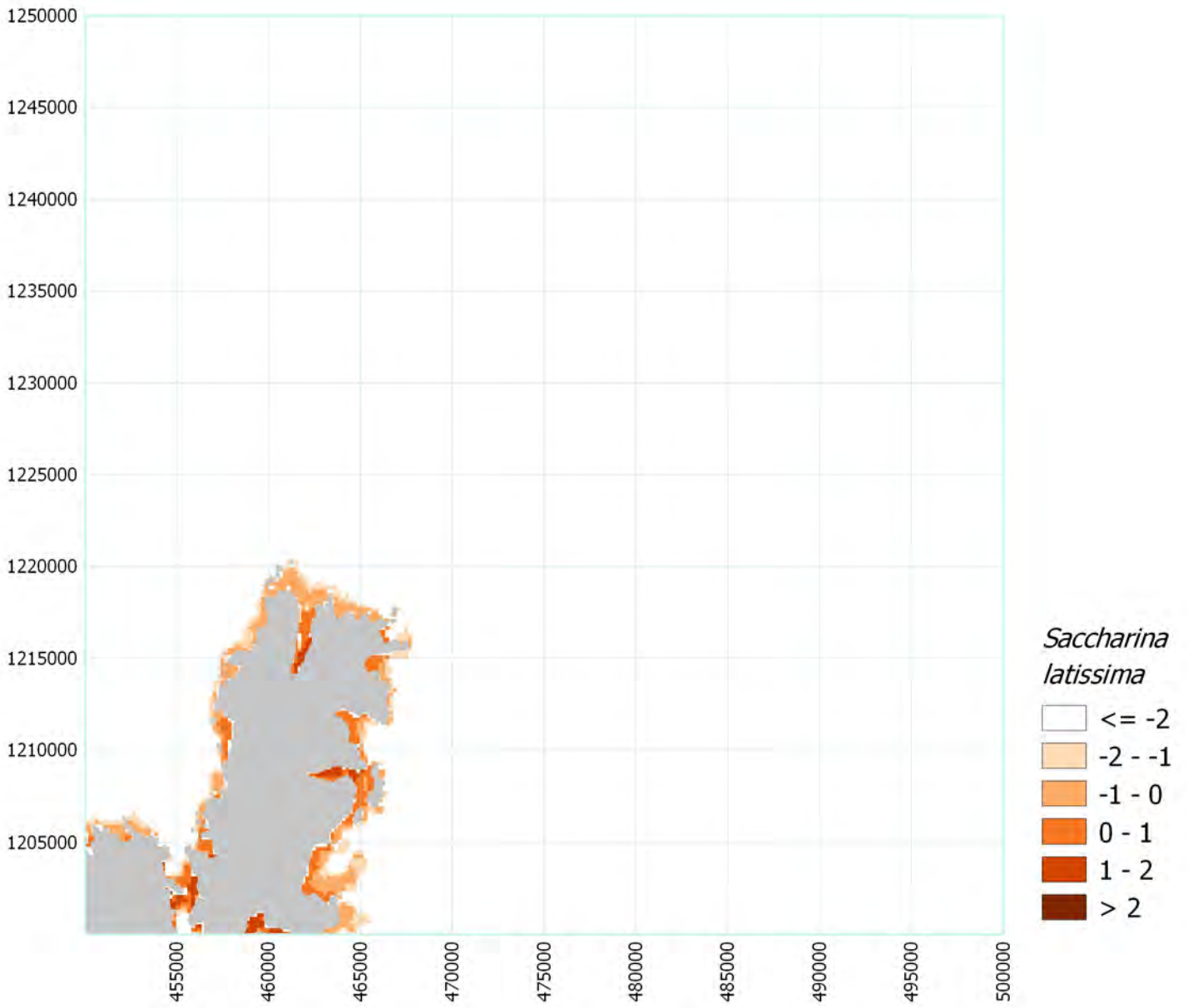


- | PMF biotopes | PMF species |
|--------------------|-------------|
| • Blue mussel beds | • Grey seal |
| • Seagrass beds | ■ SAC |

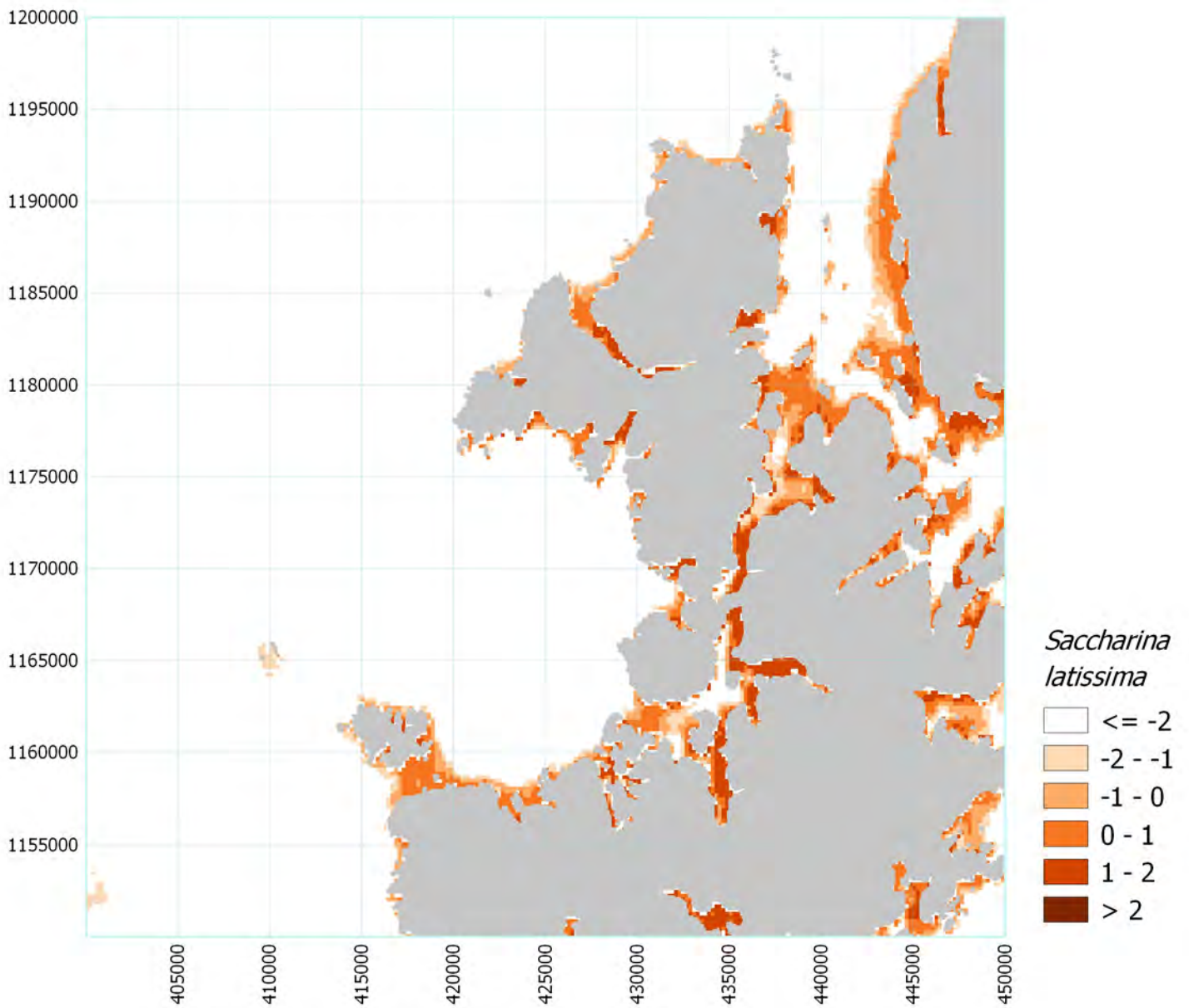
2.2 *Saccharina latissima*

The following pages show first the habitat suitability for *Saccharina latissima*, followed by maps showing predicted biomass, and finally maps showing the overlap between kelp habitats and Priority Marine Features.

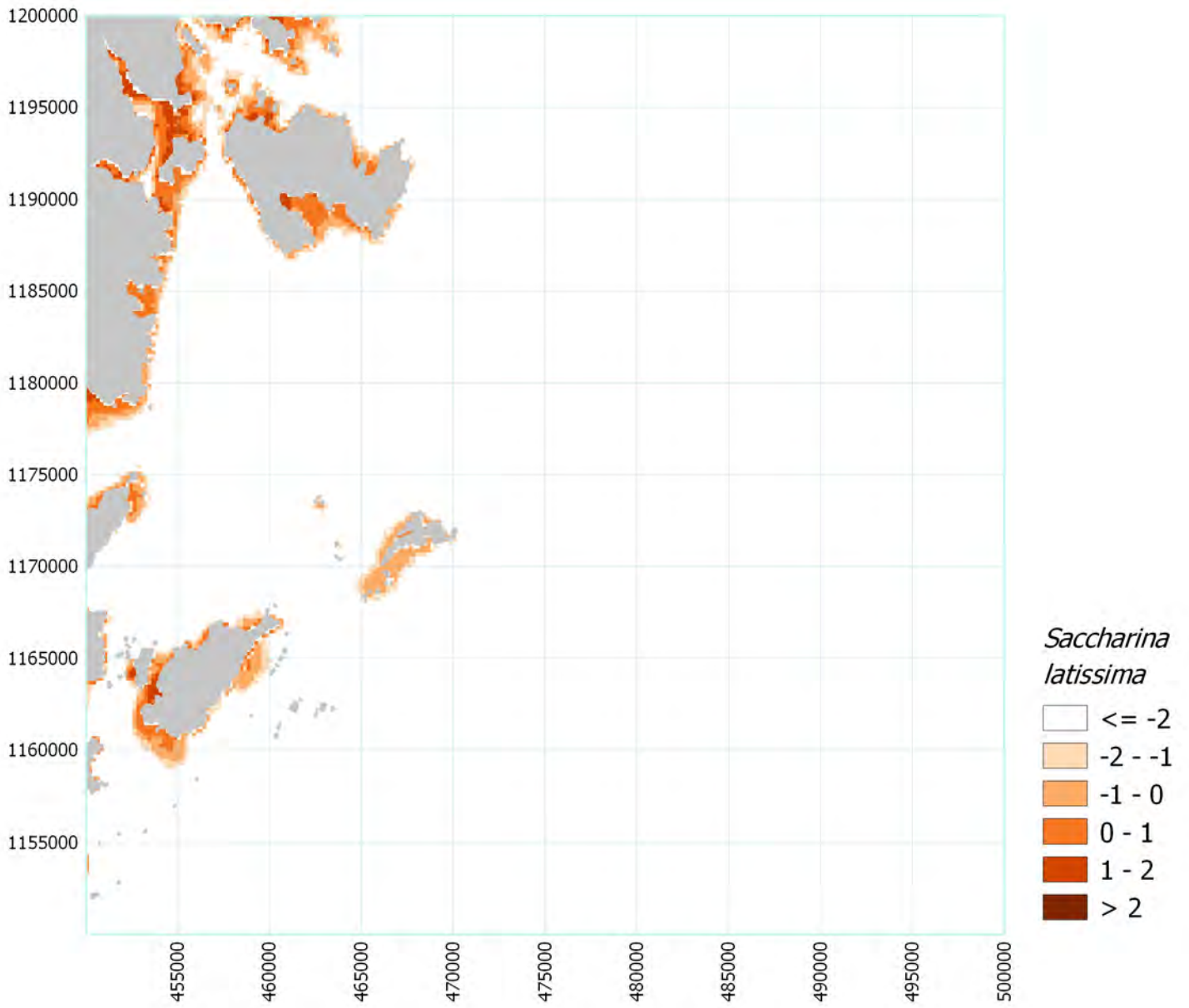
Map 1



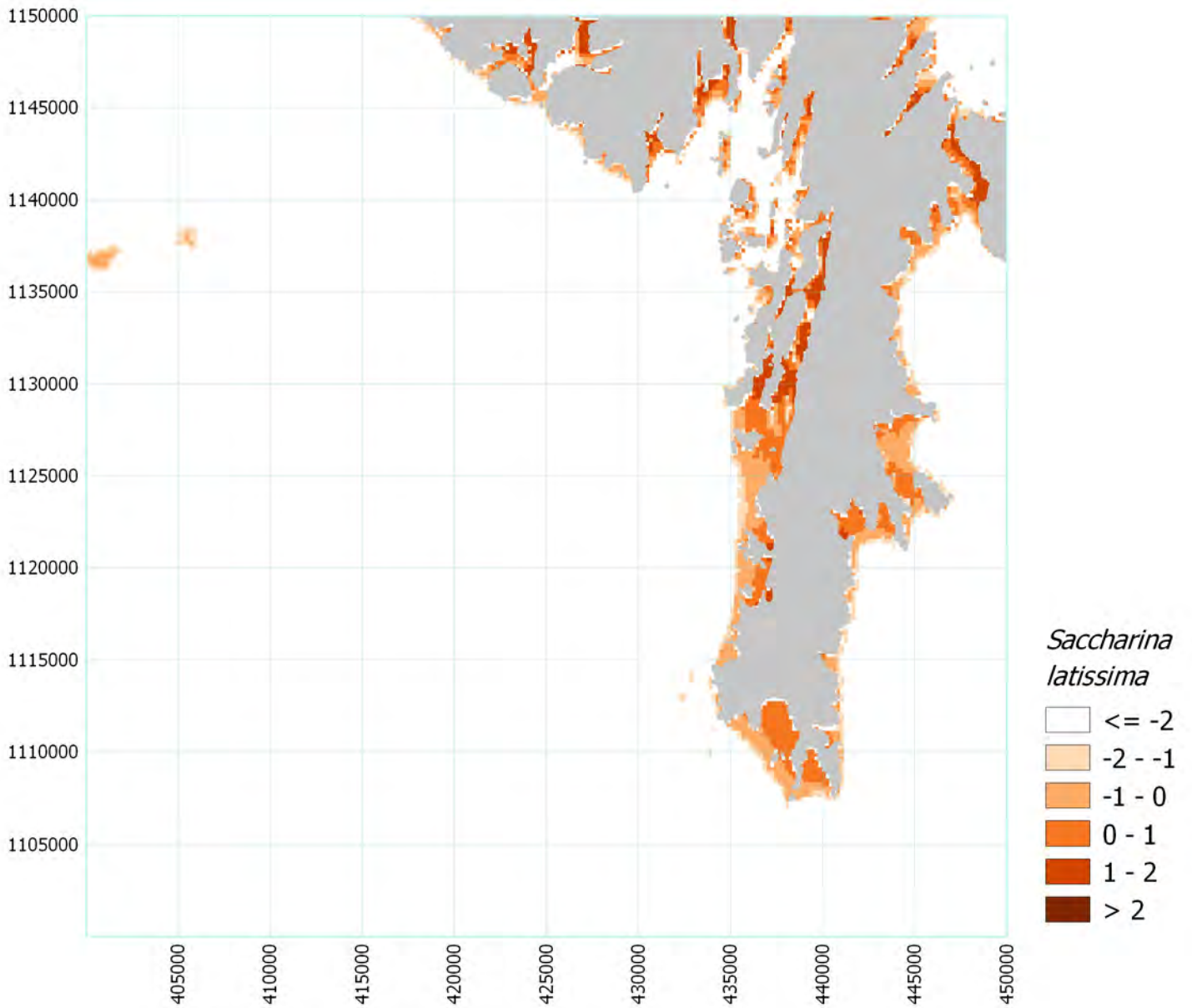
Map 2



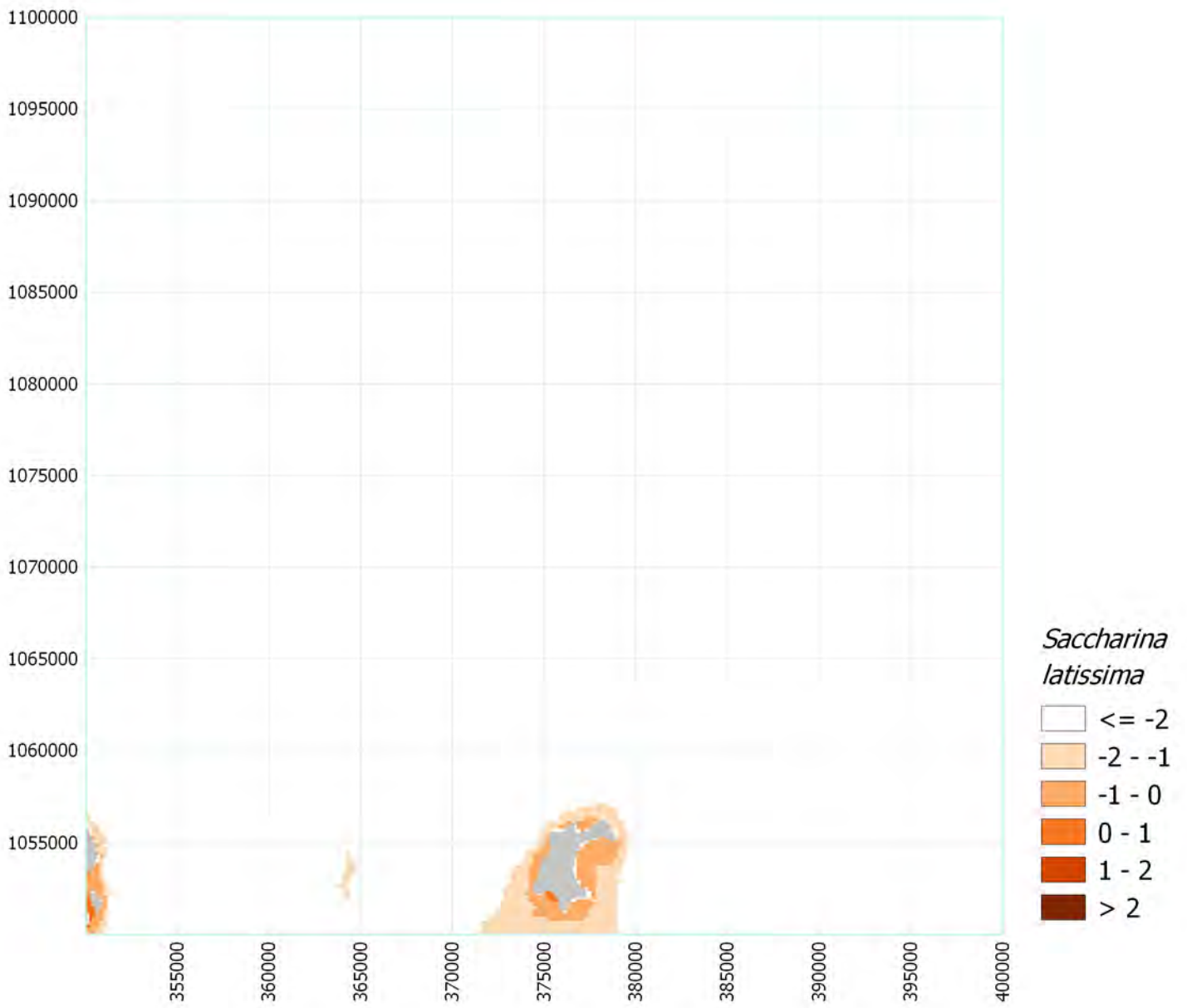
Map 3



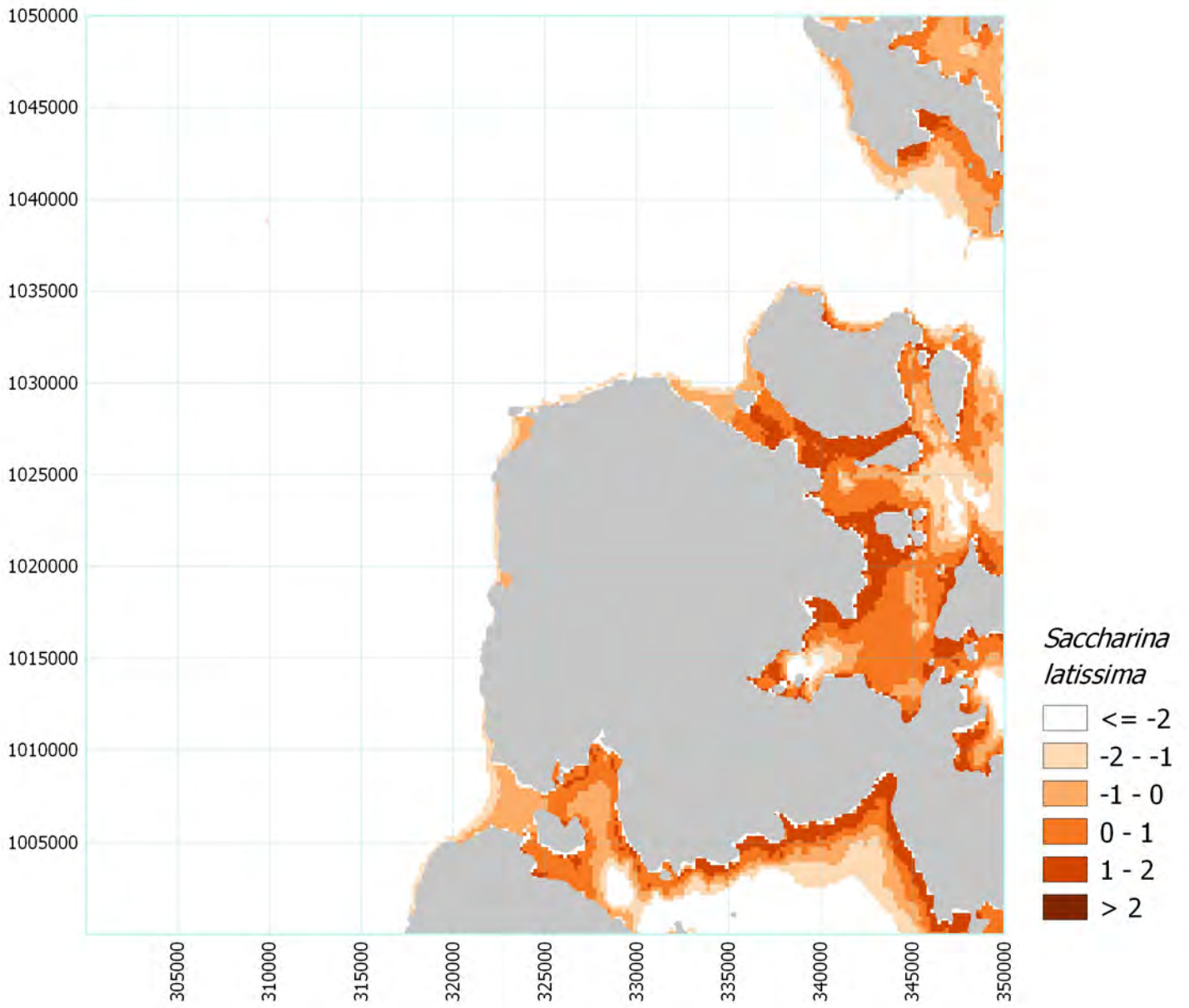
Map 4



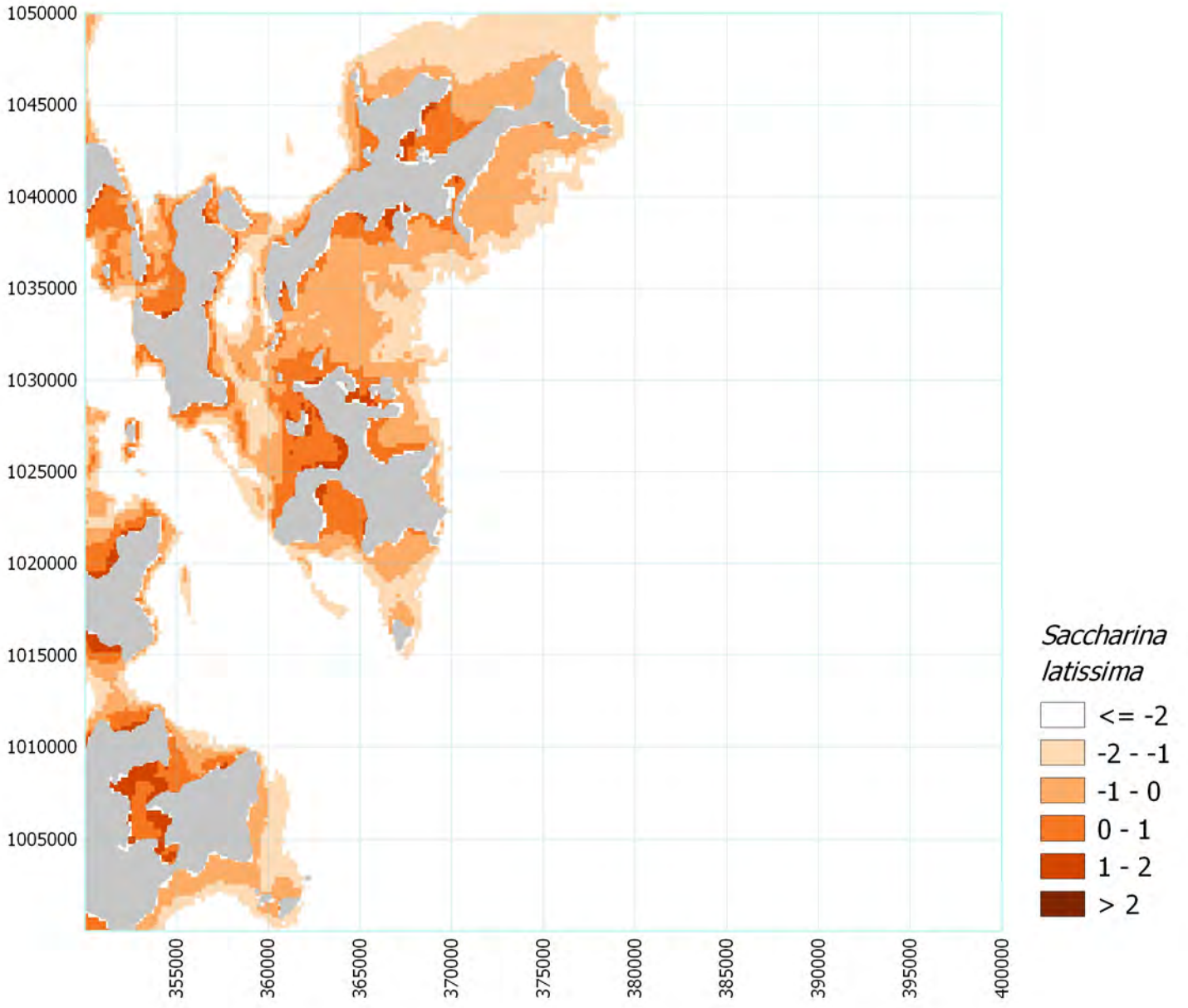
Map 5



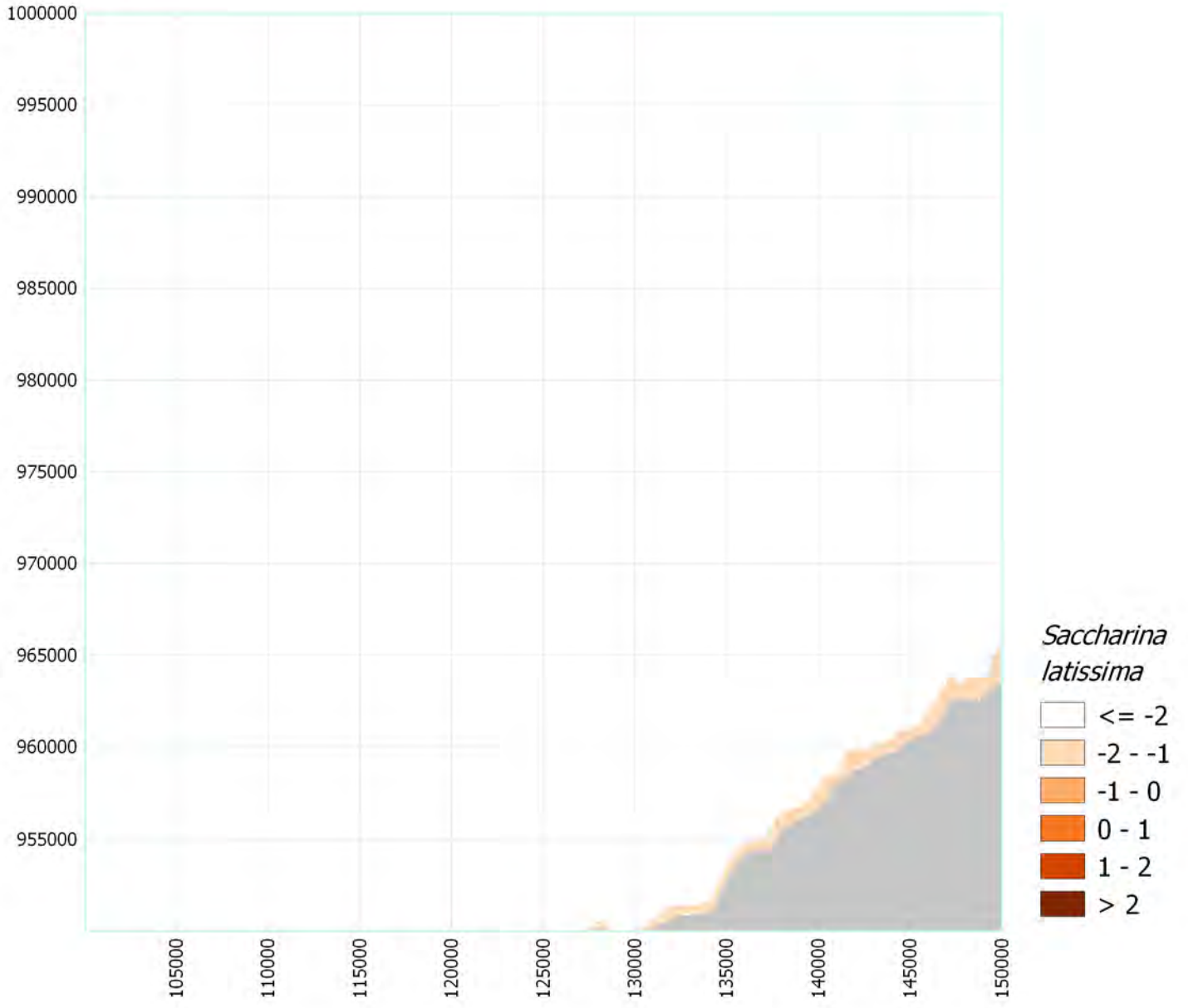
Map 6



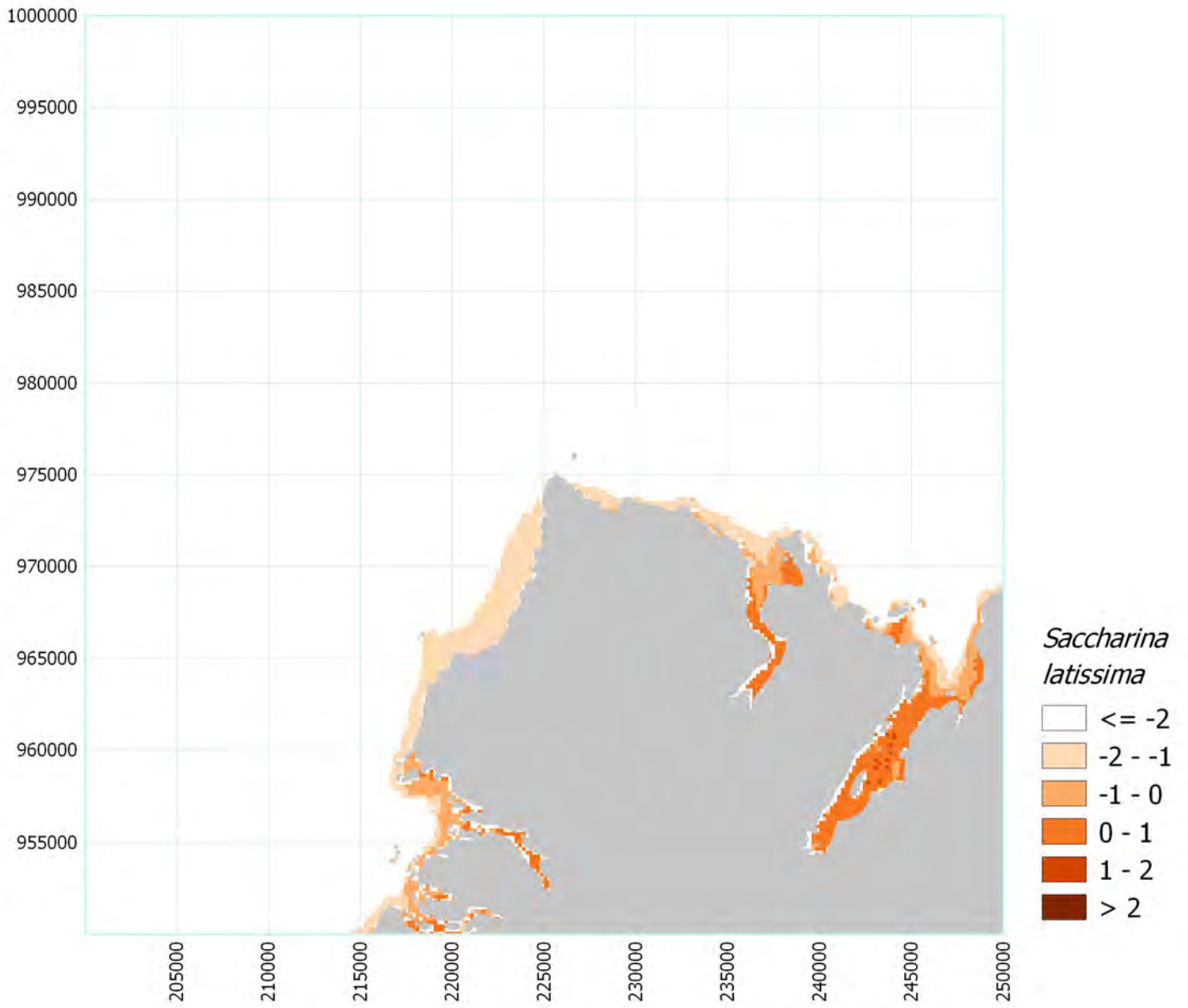
Map 7



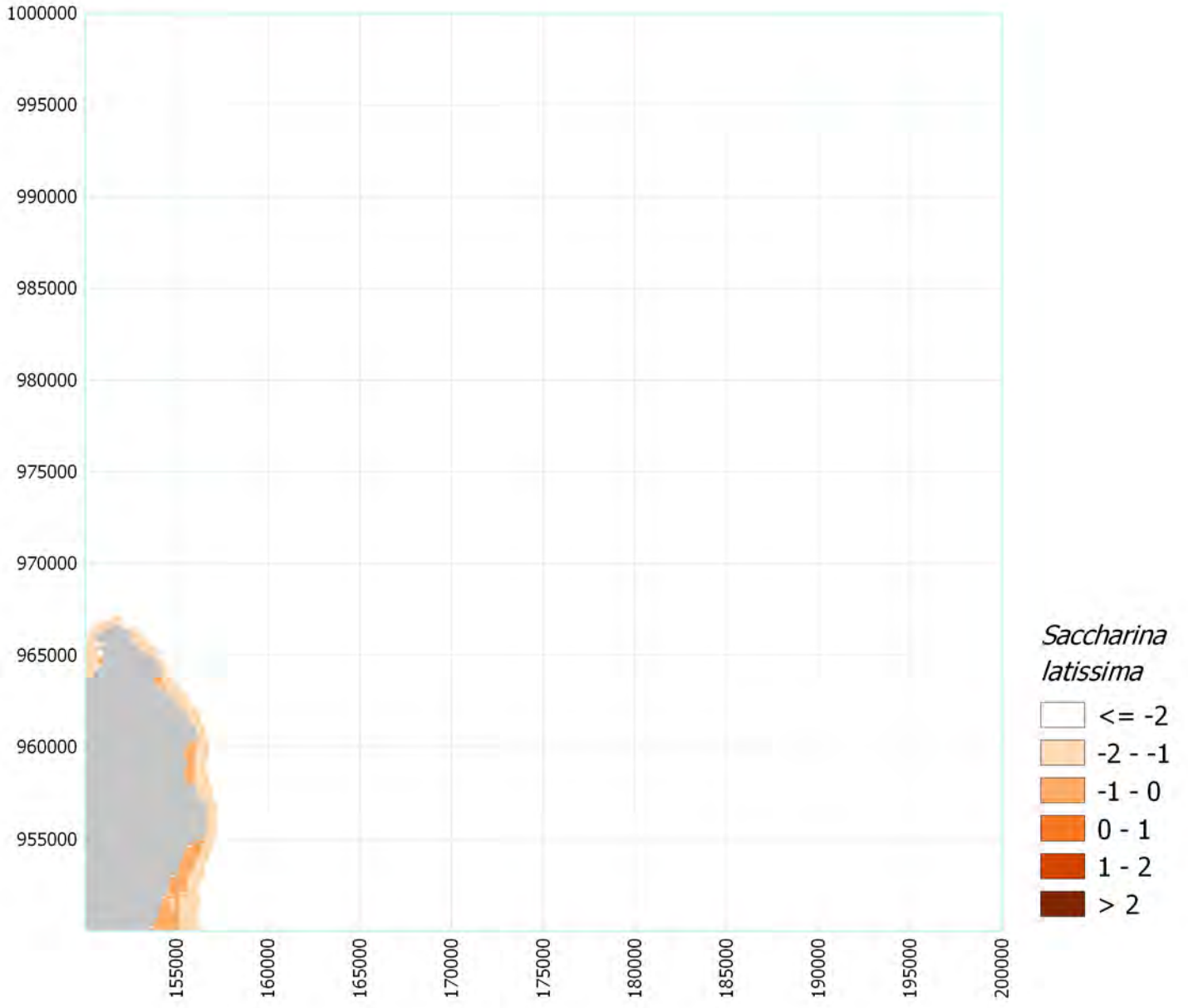
Map 8



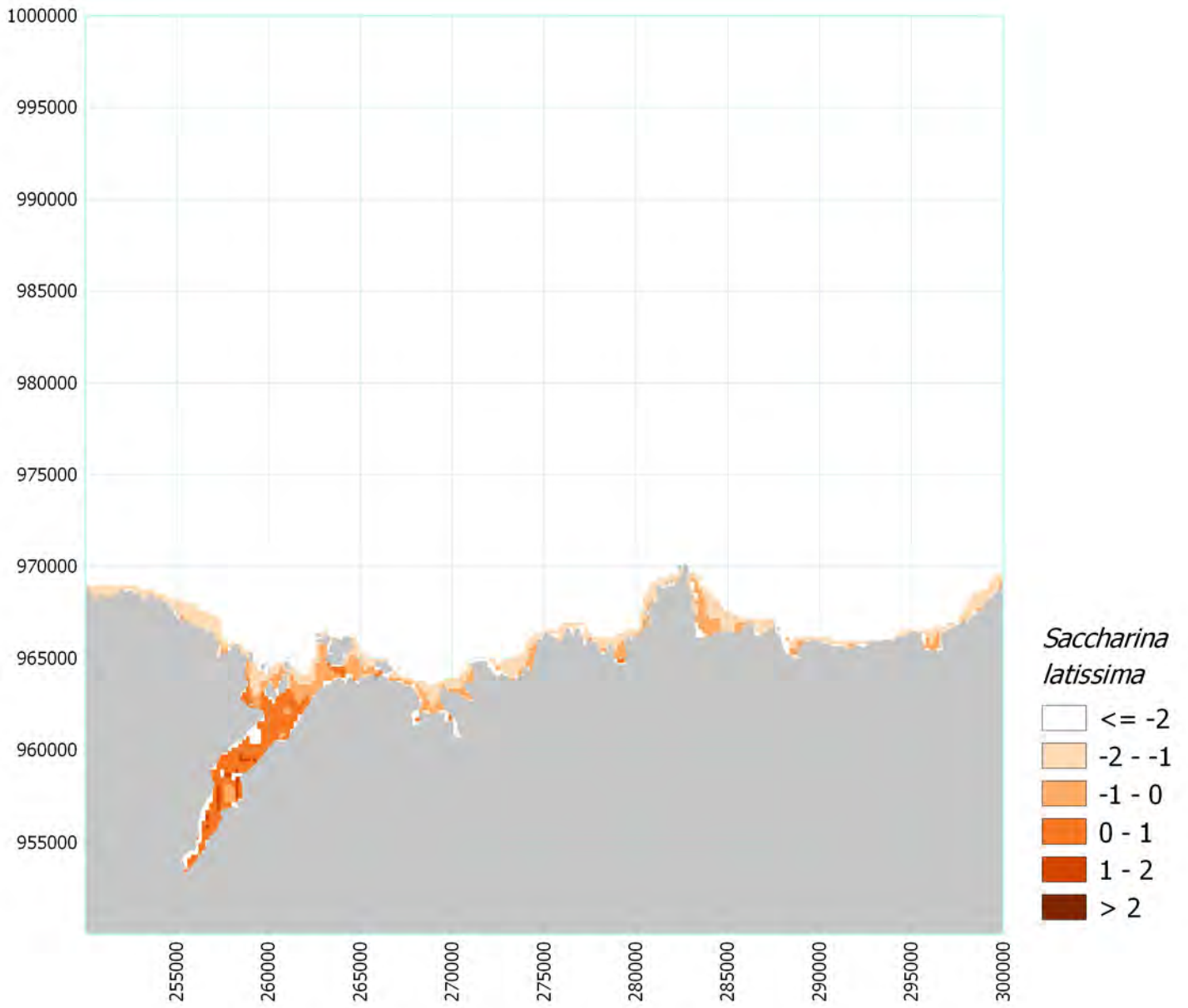
Map 10



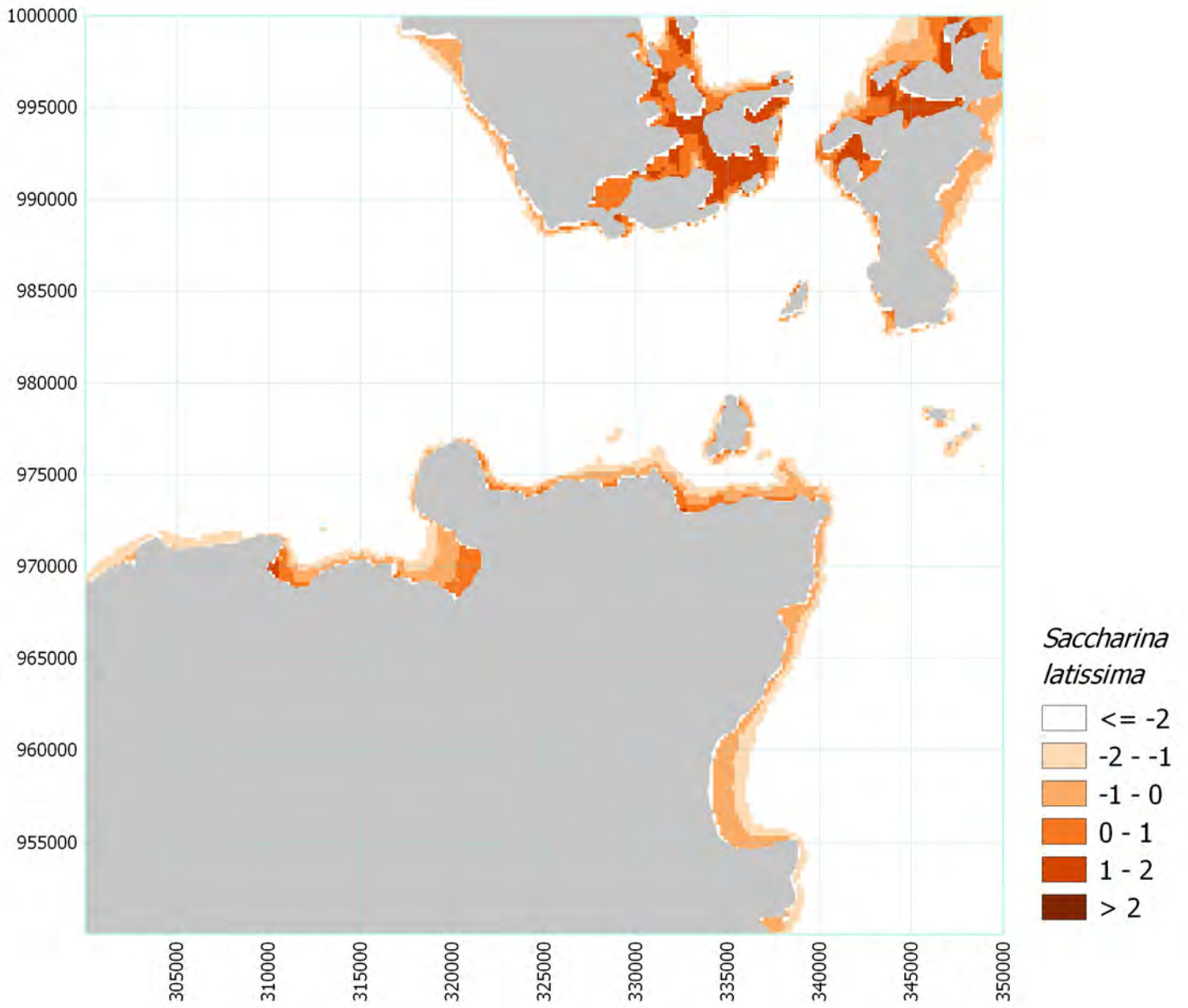
Map 9



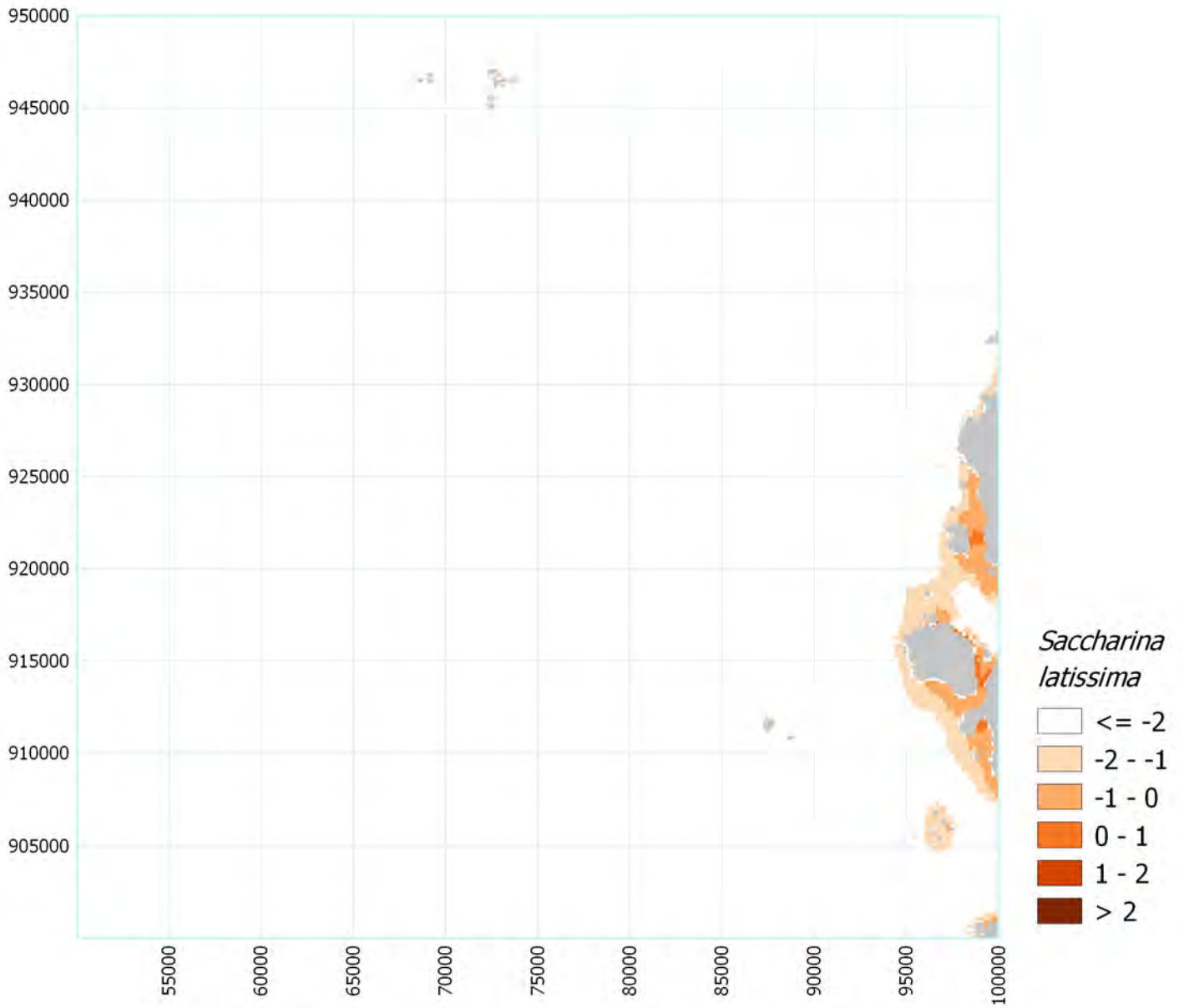
Map 11



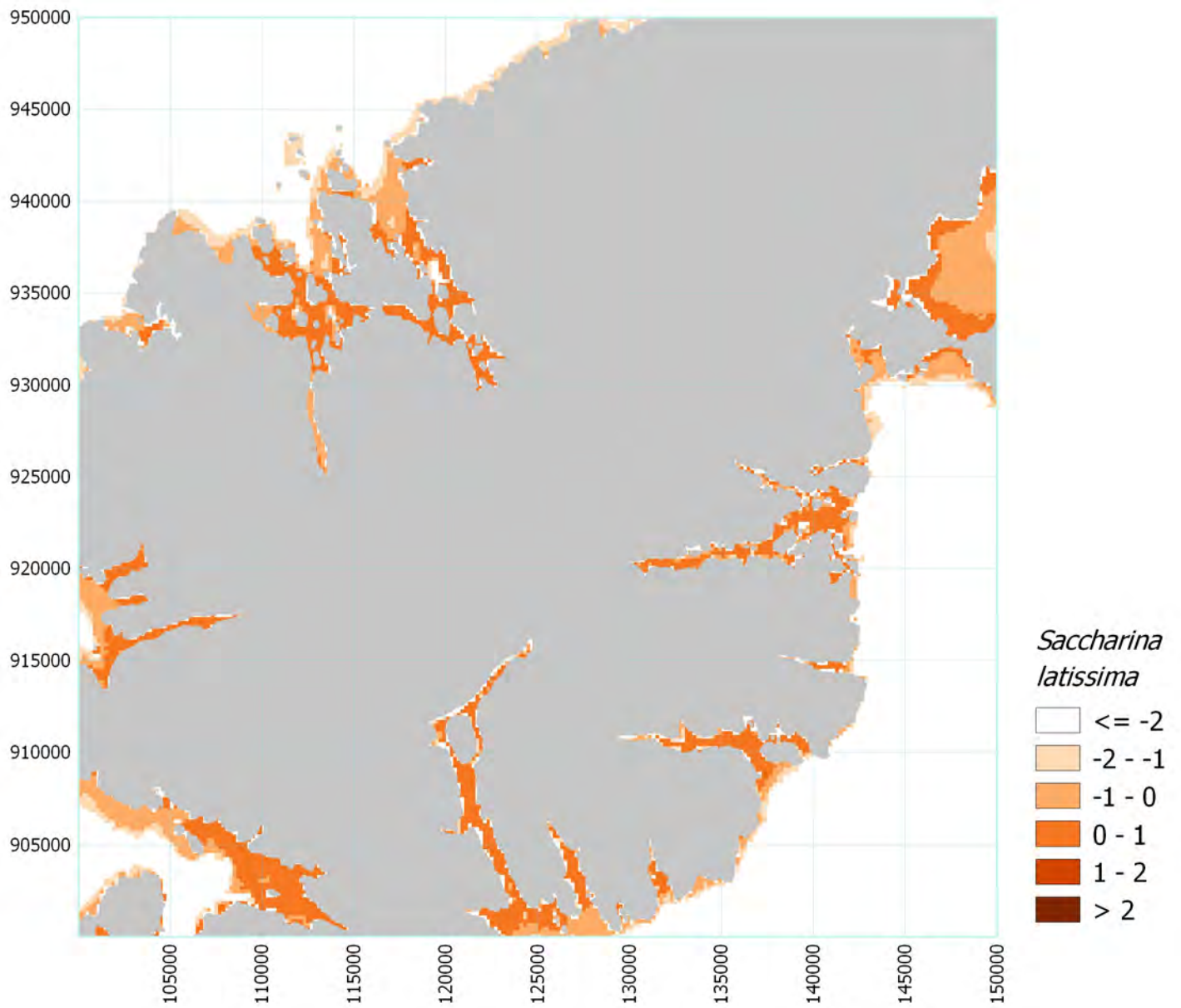
Map 12



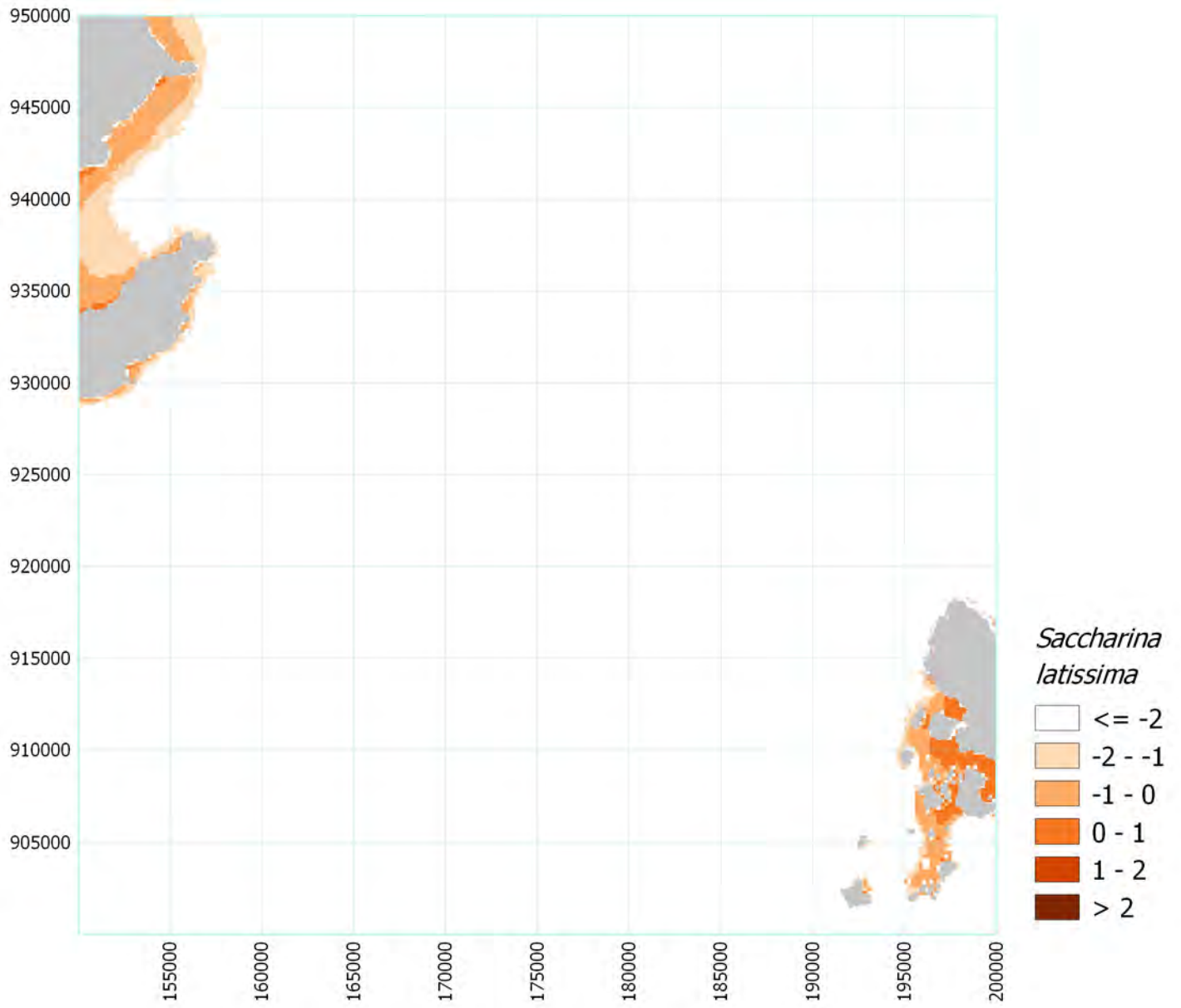
Map 13



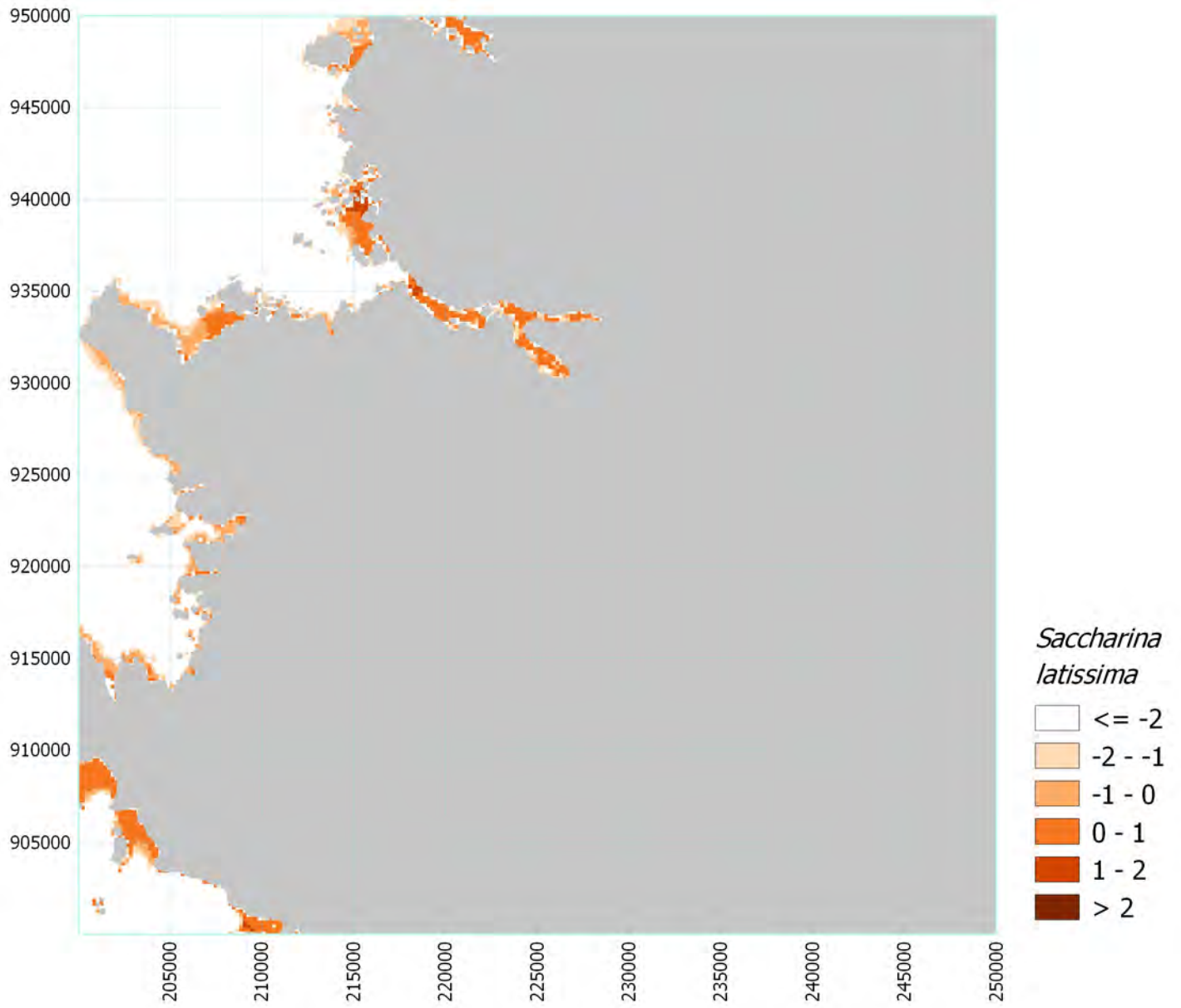
Map 14



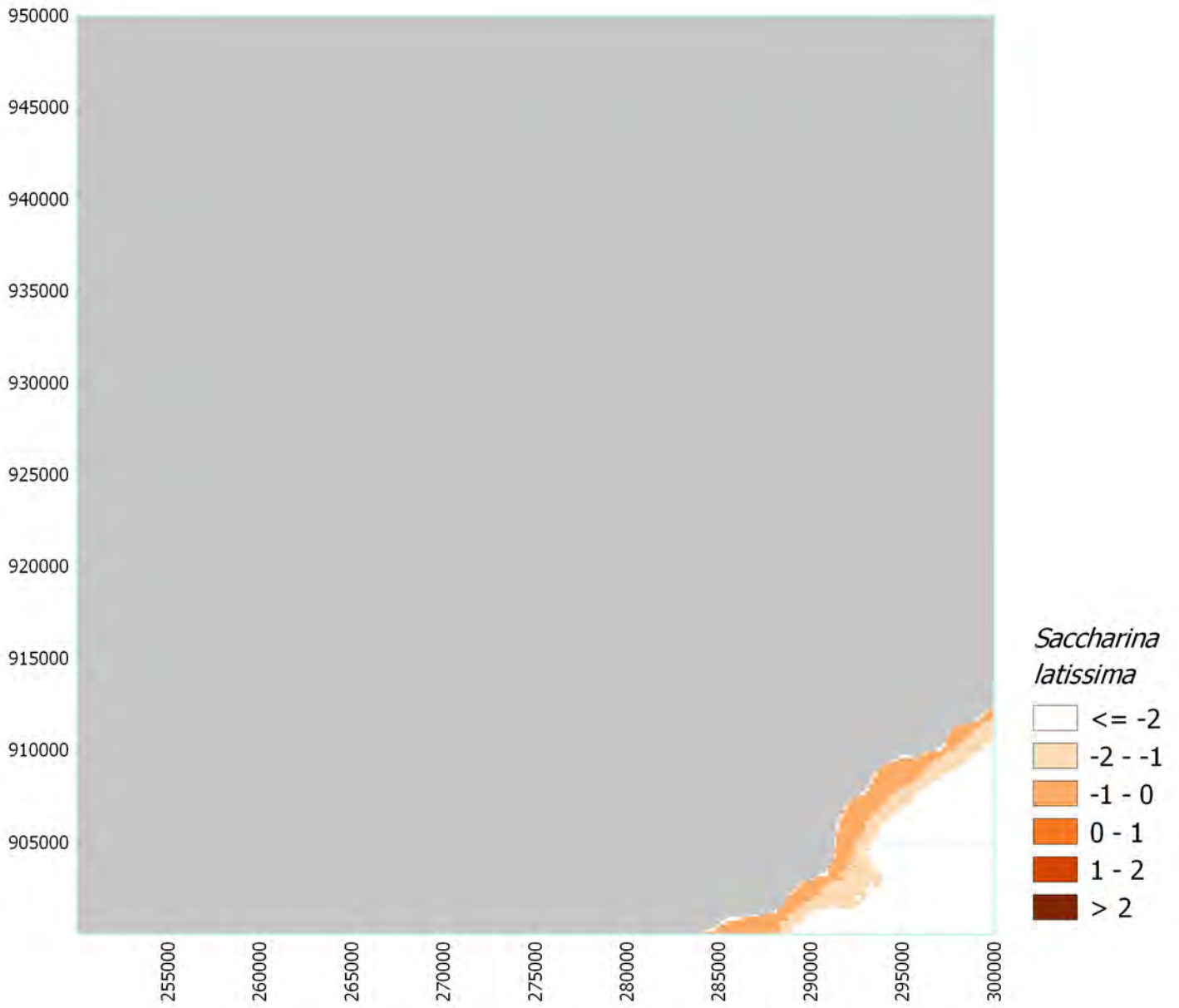
Map 15



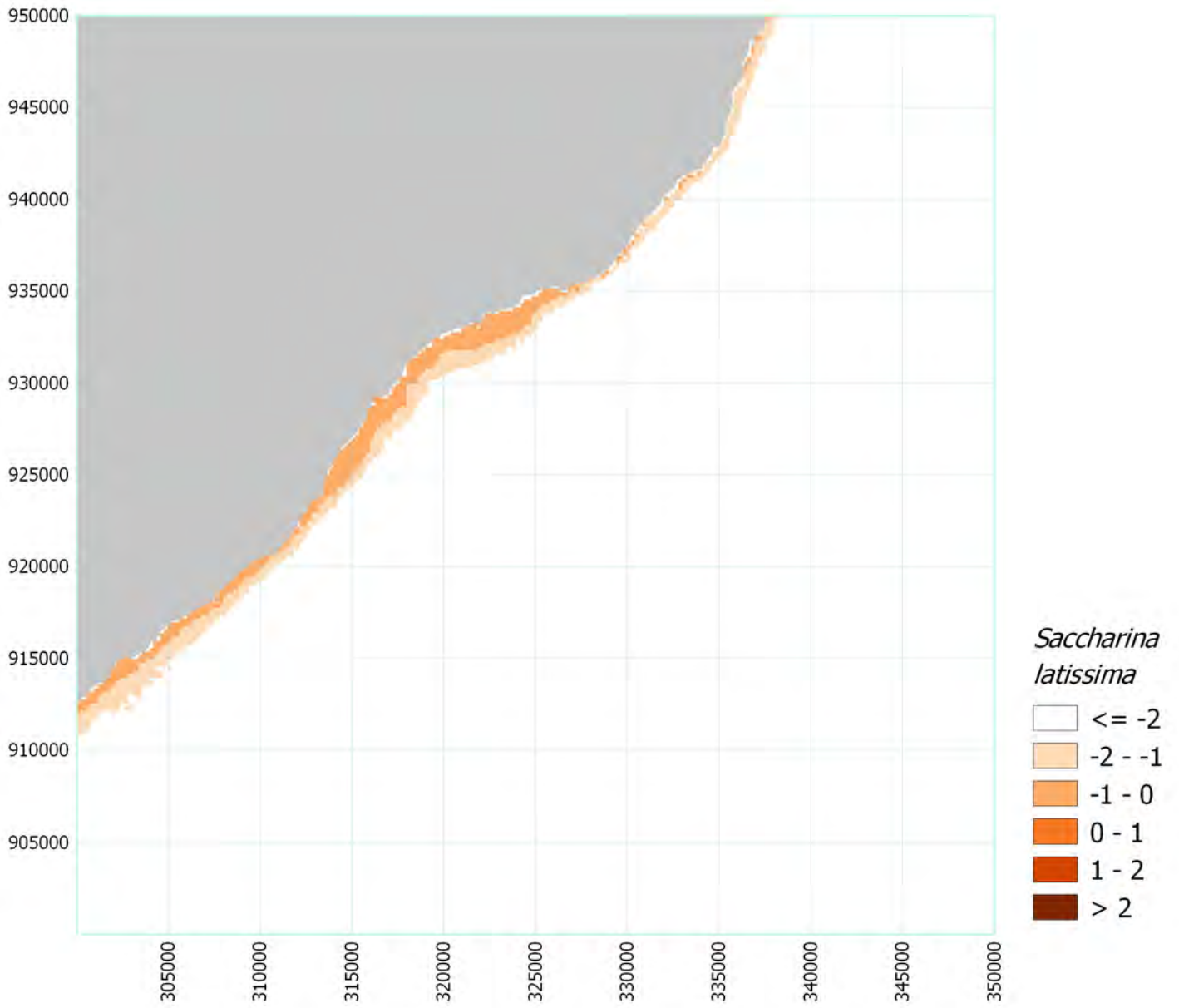
Map 16



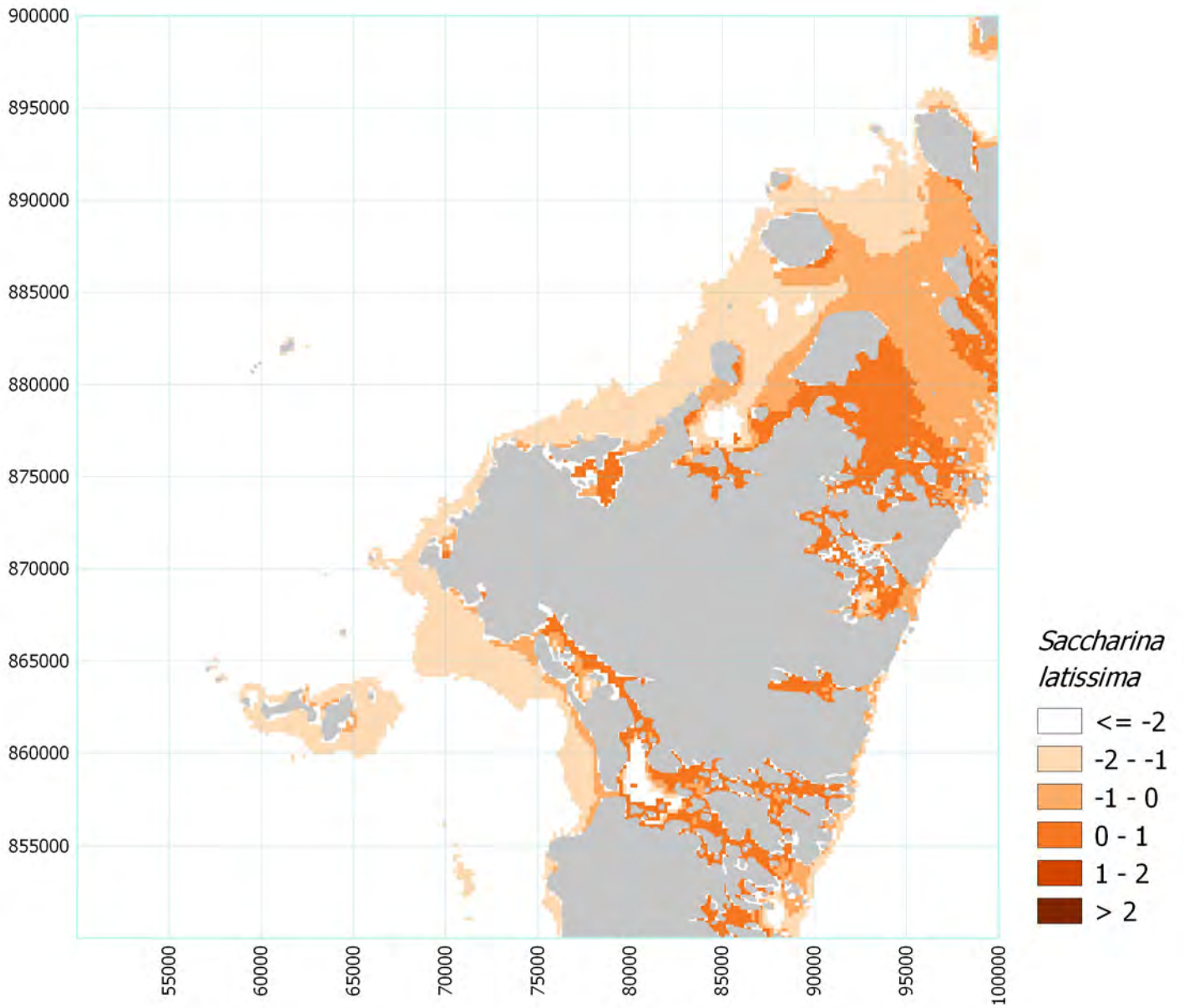
Map 17



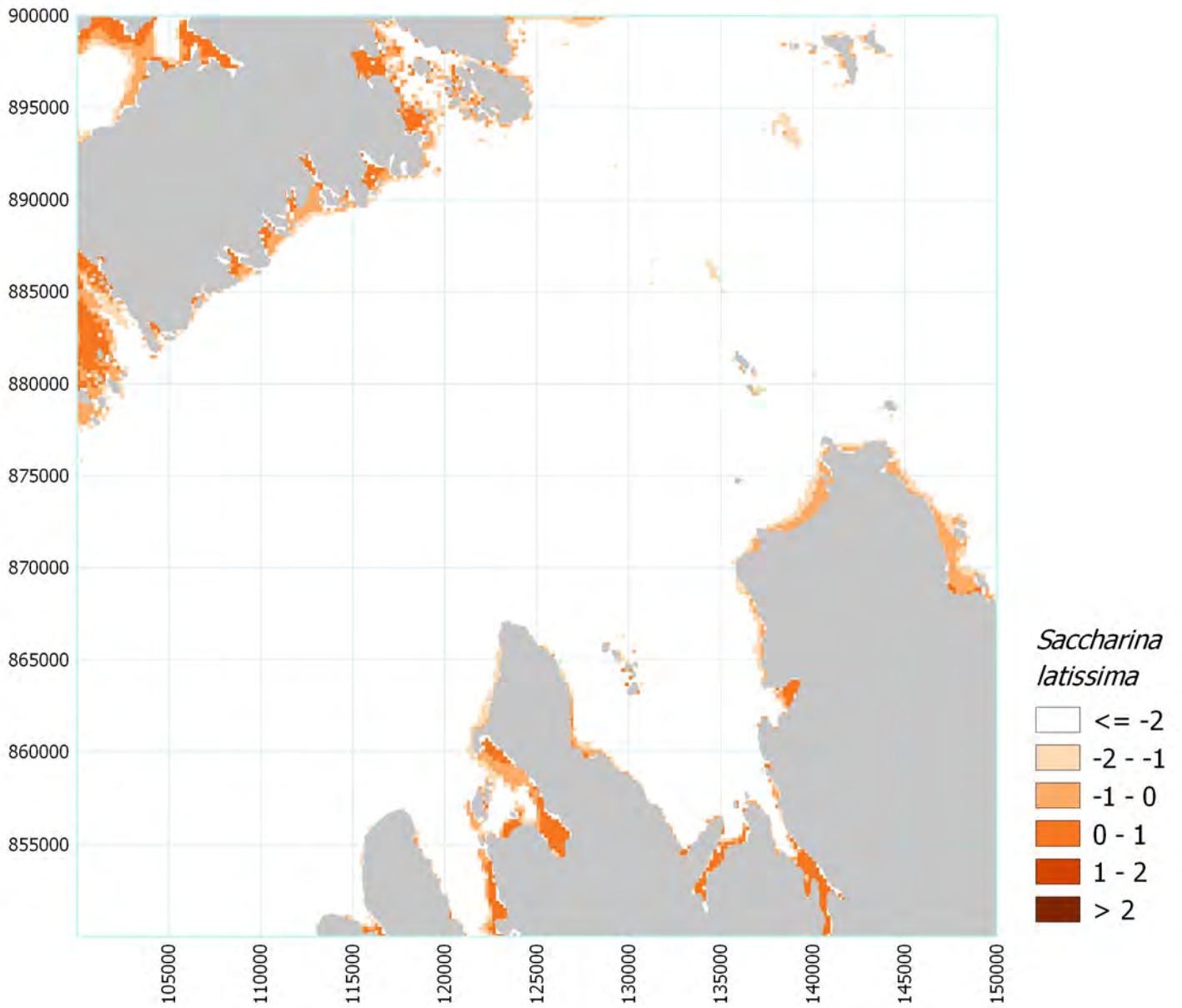
Map 18



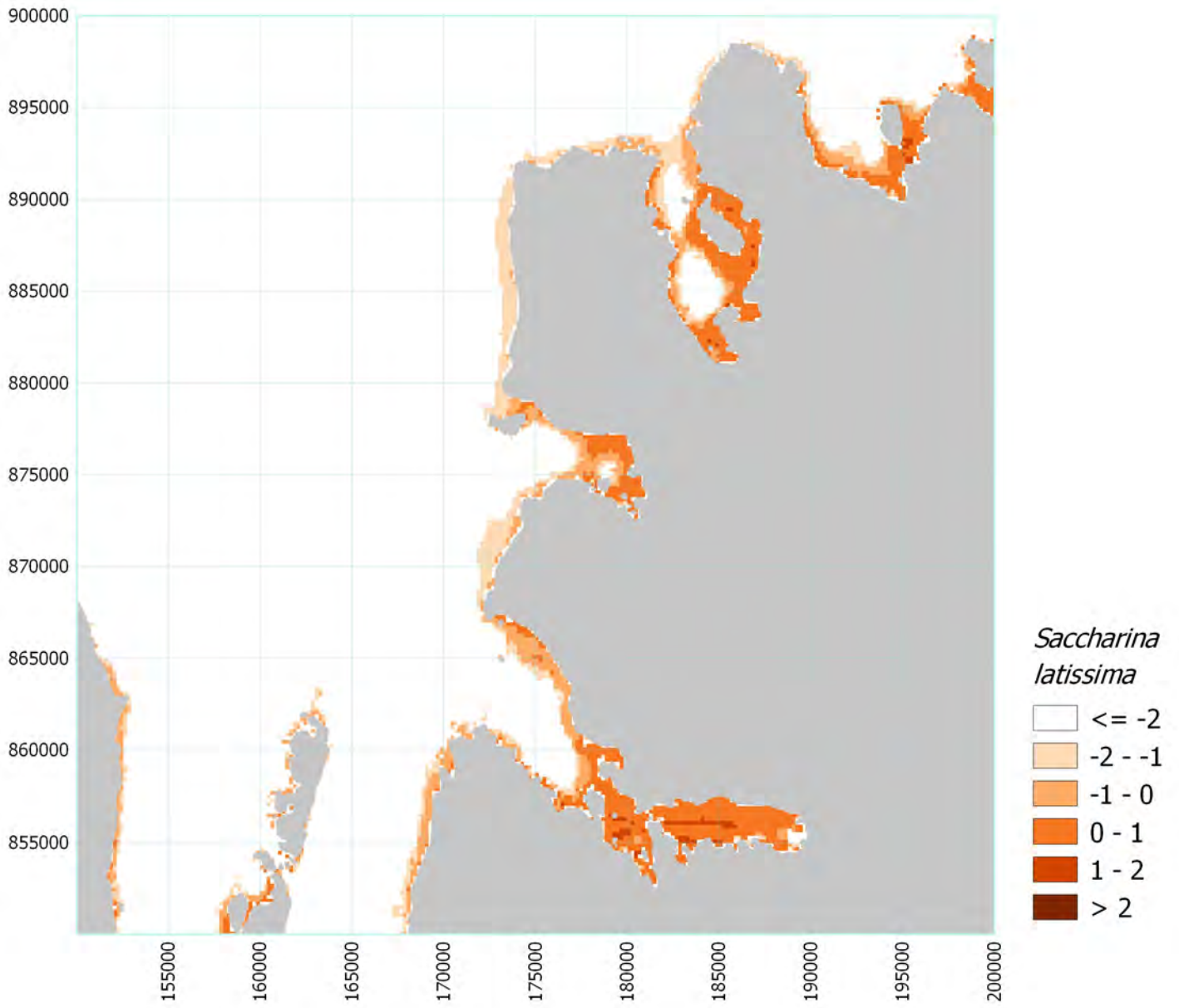
Map 19



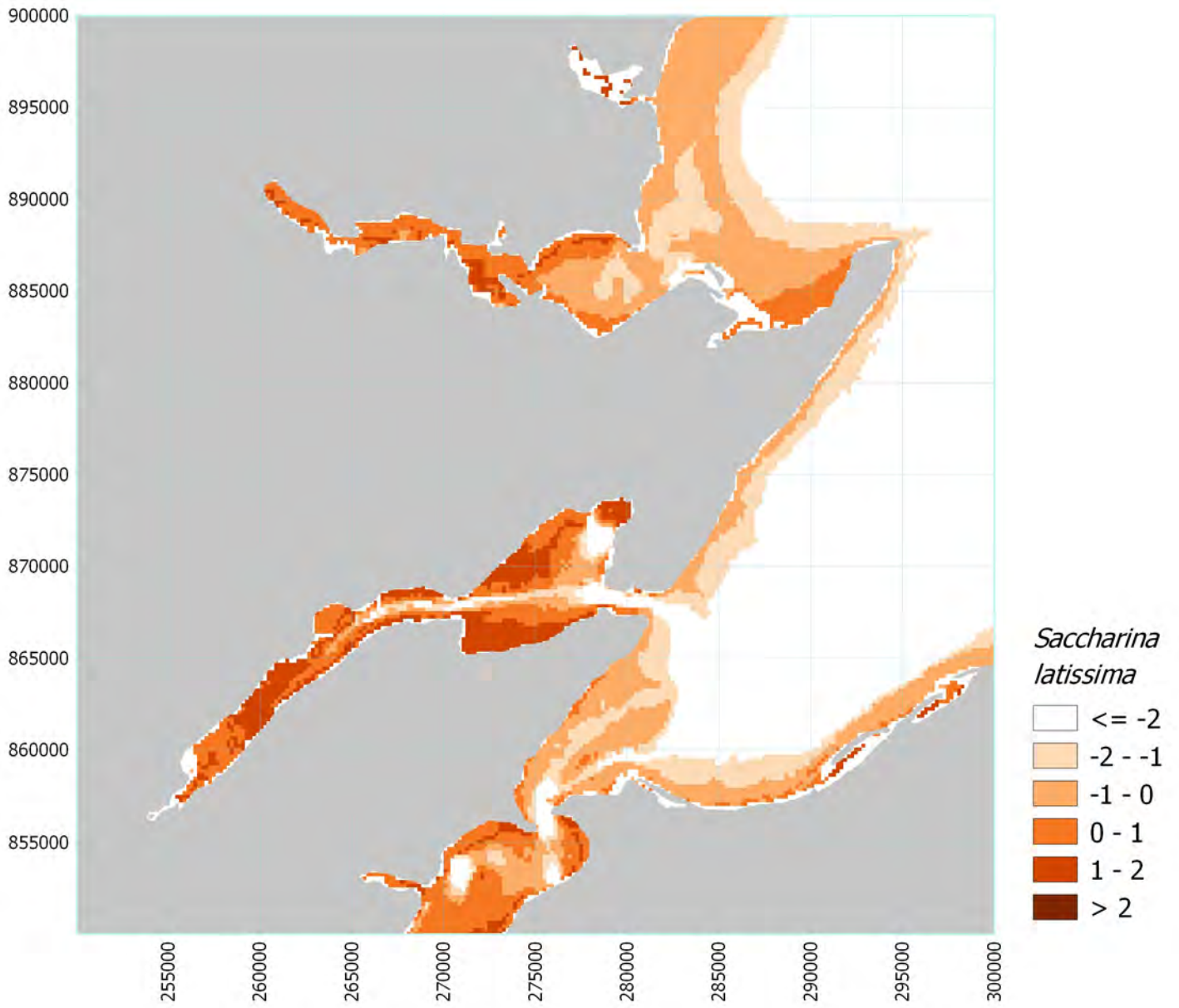
Map 20



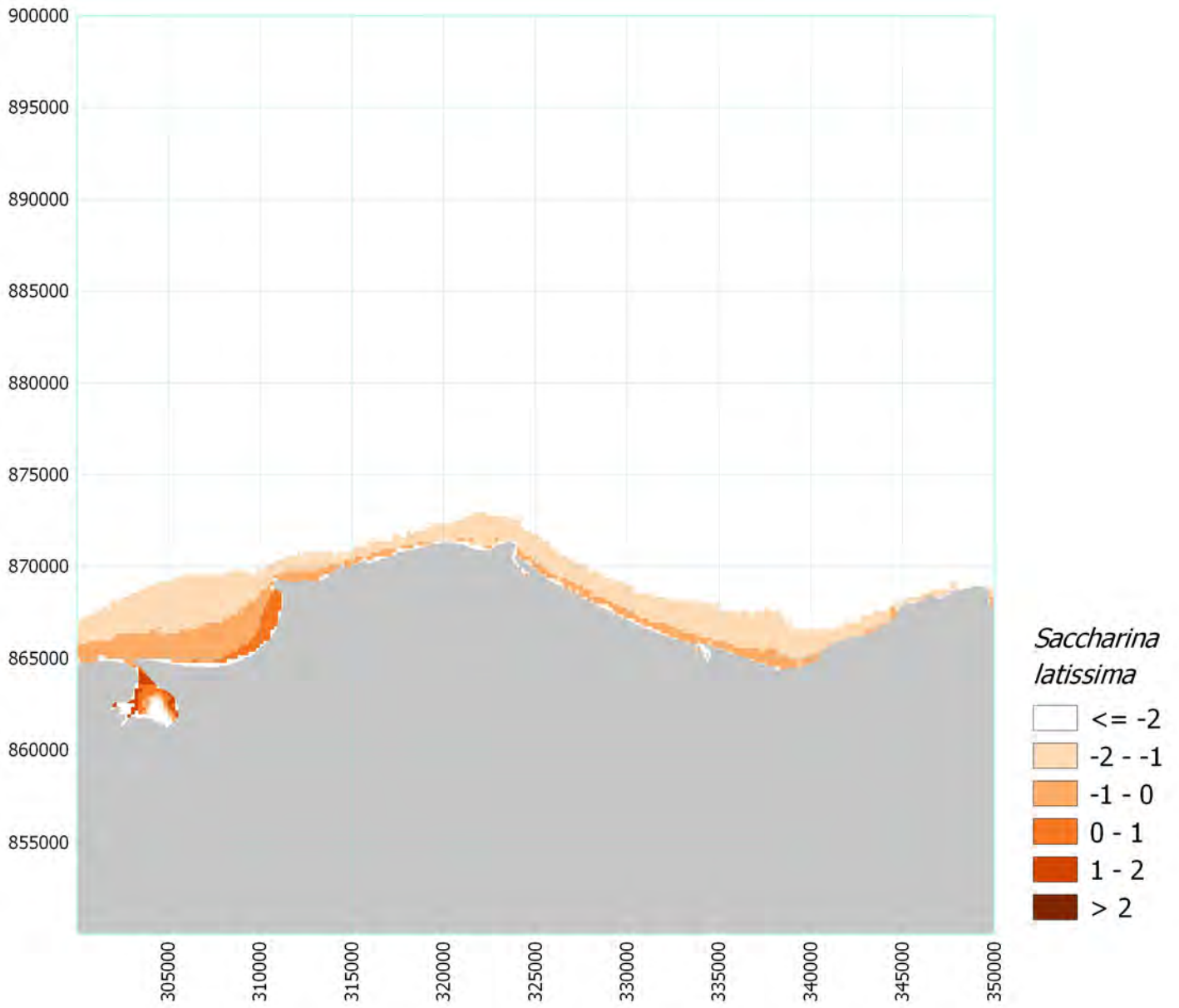
Map 21



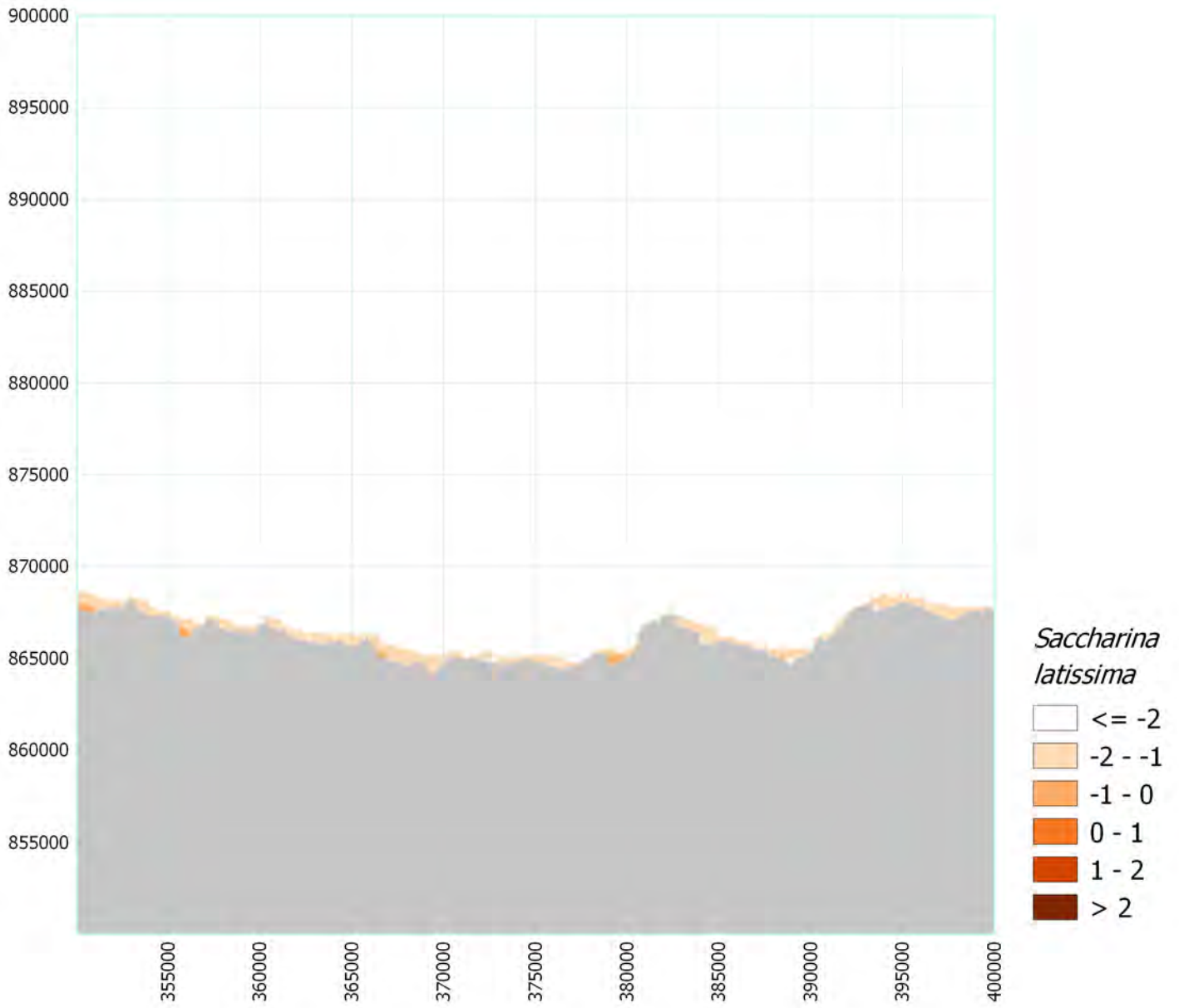
Map 22



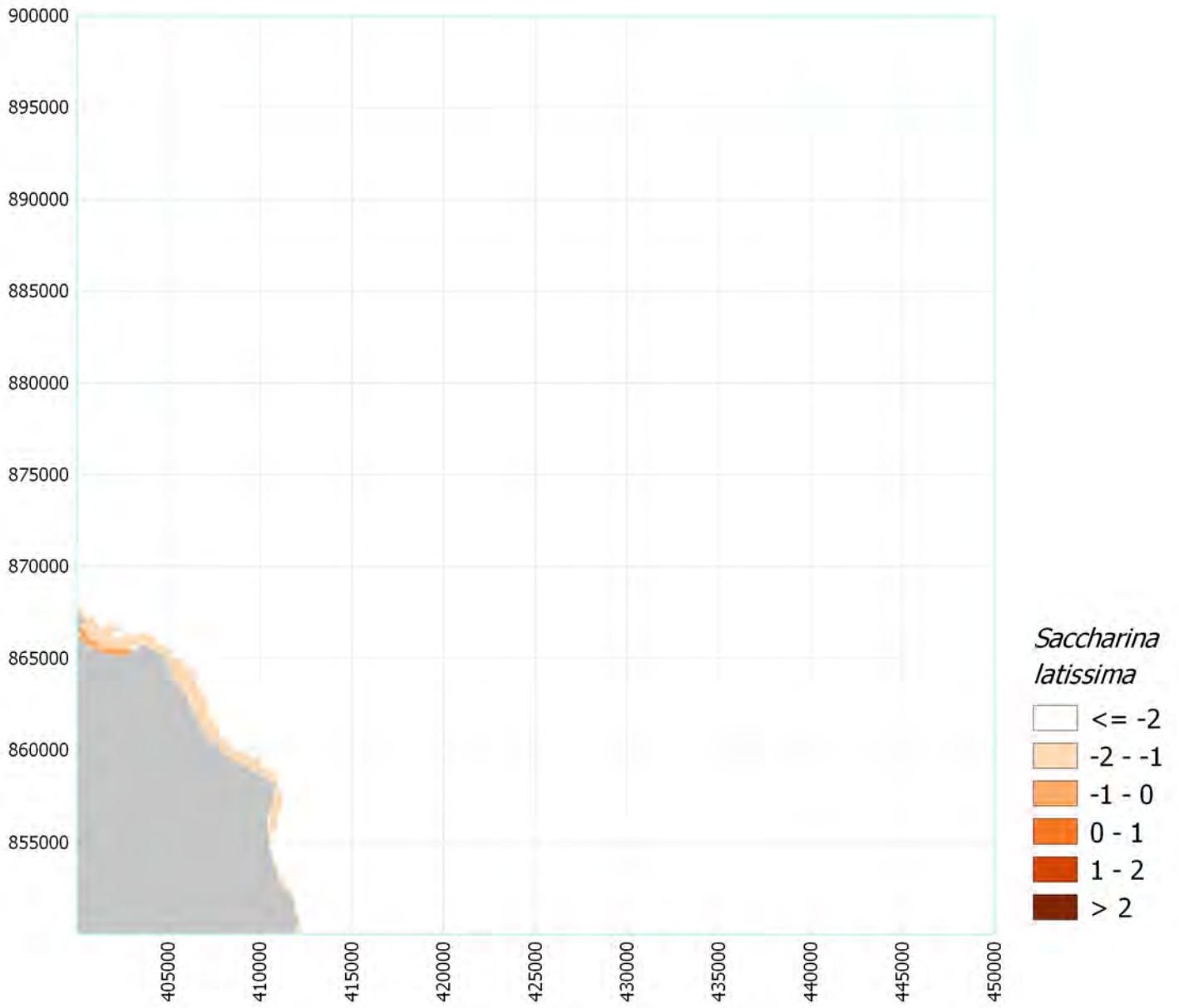
Map 23



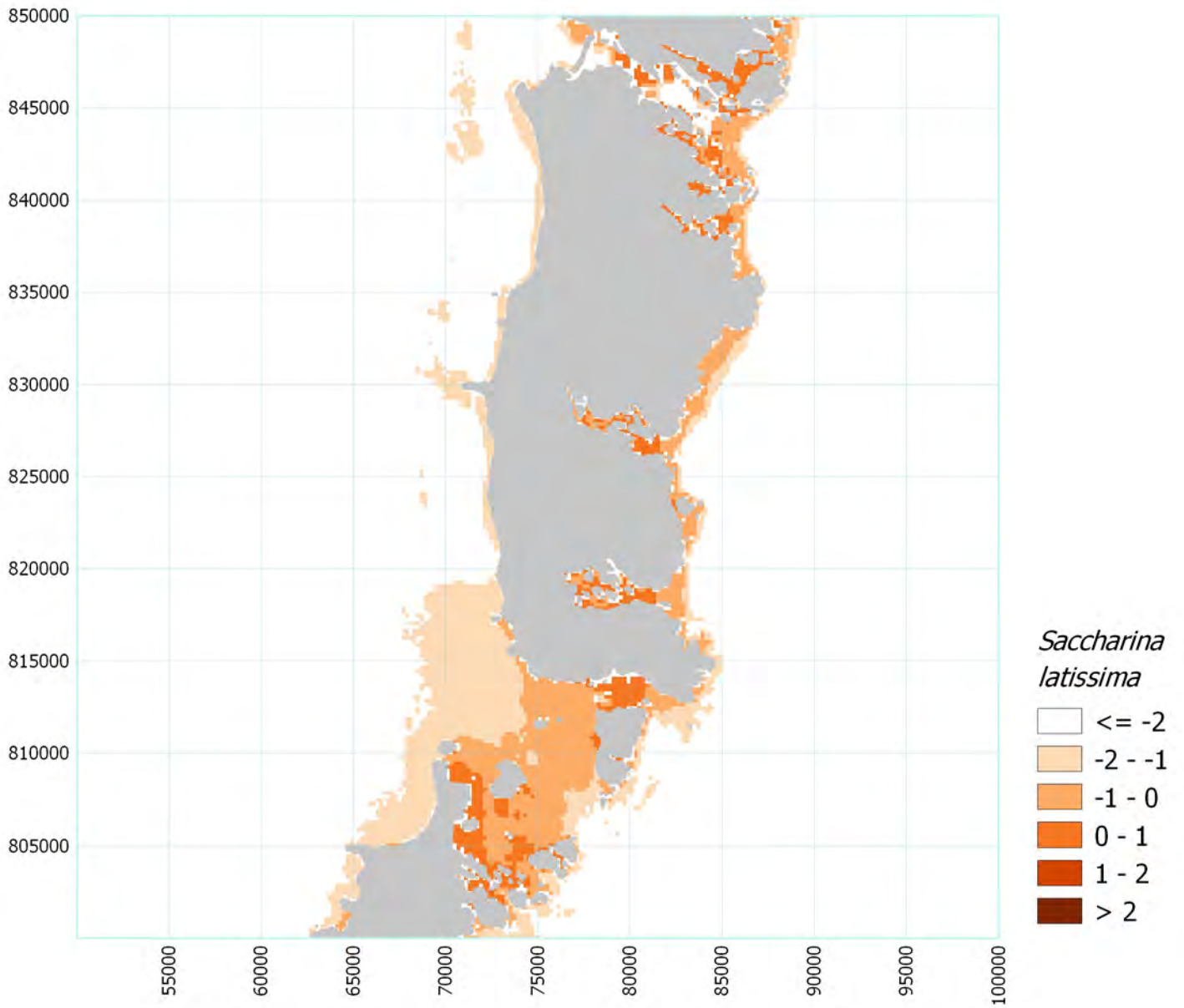
Map 24



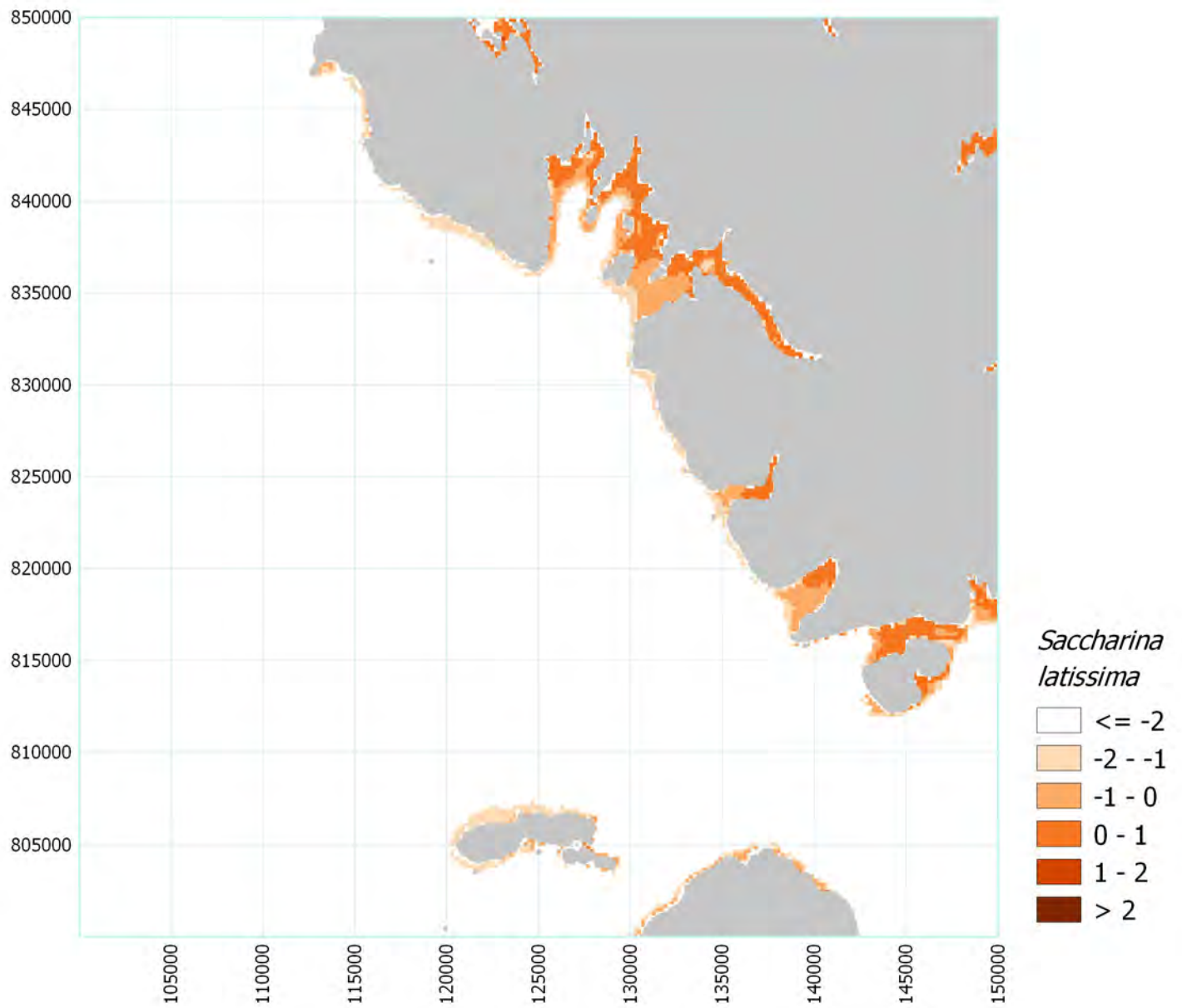
Map 25



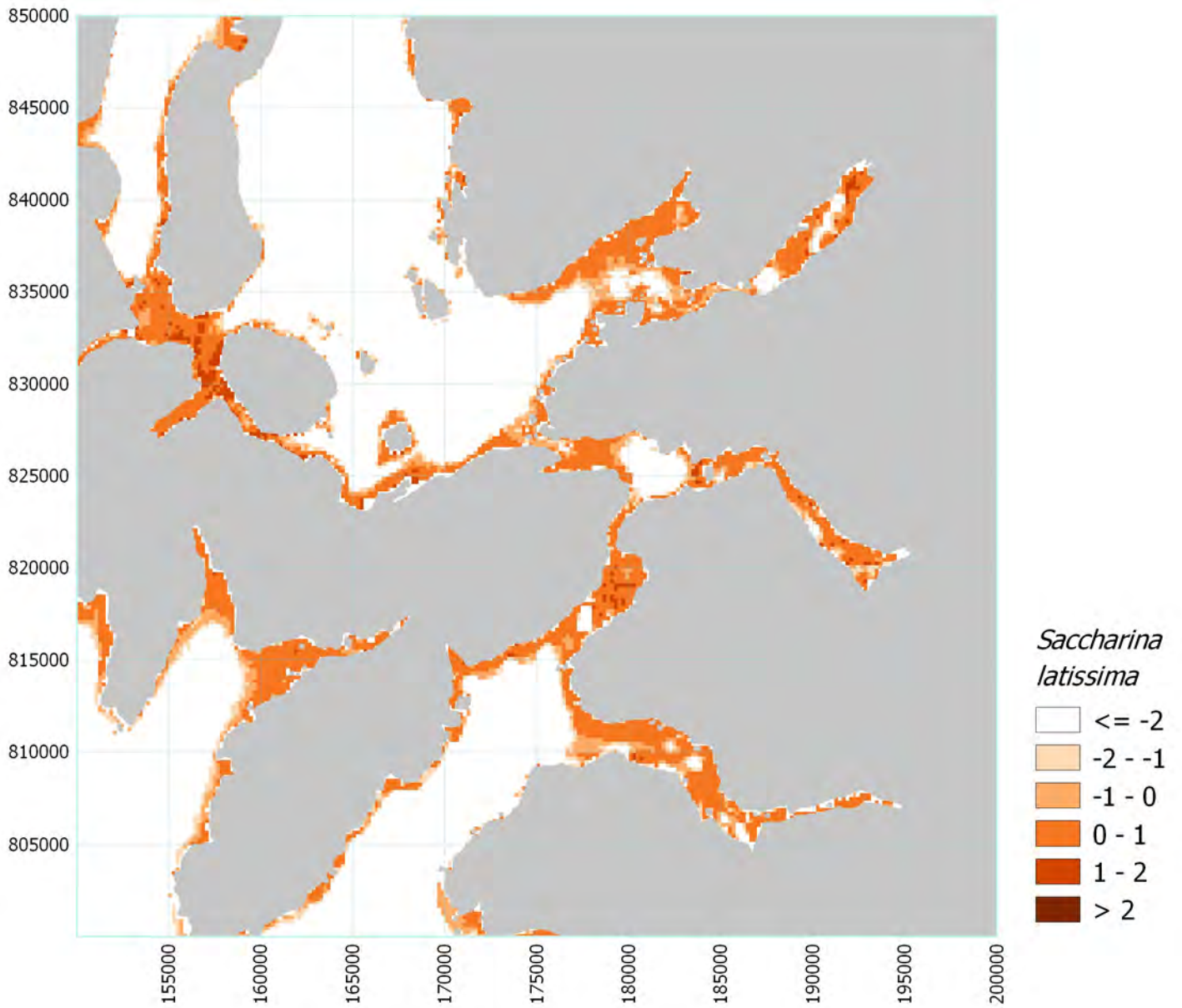
Map 26



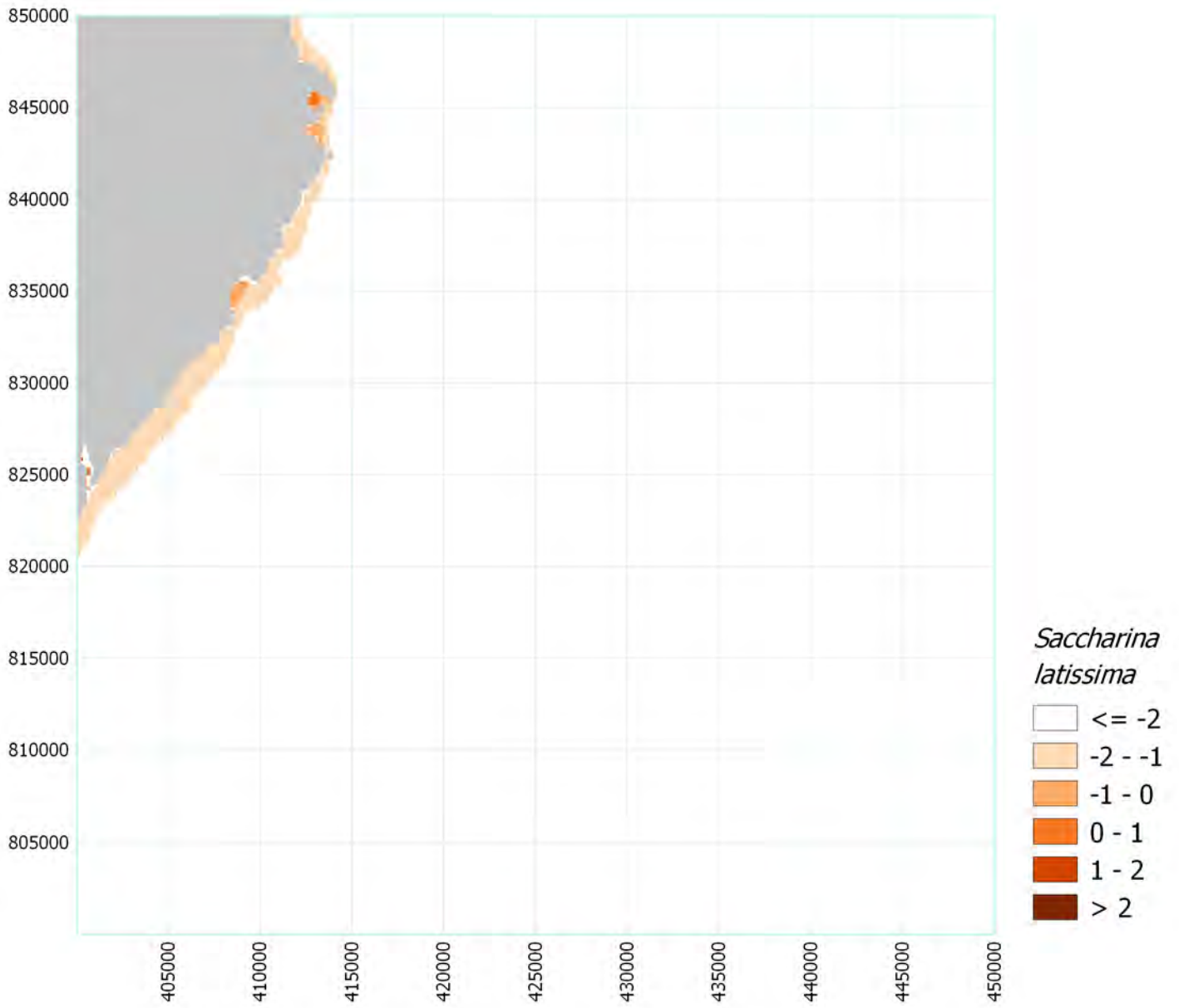
Map 27



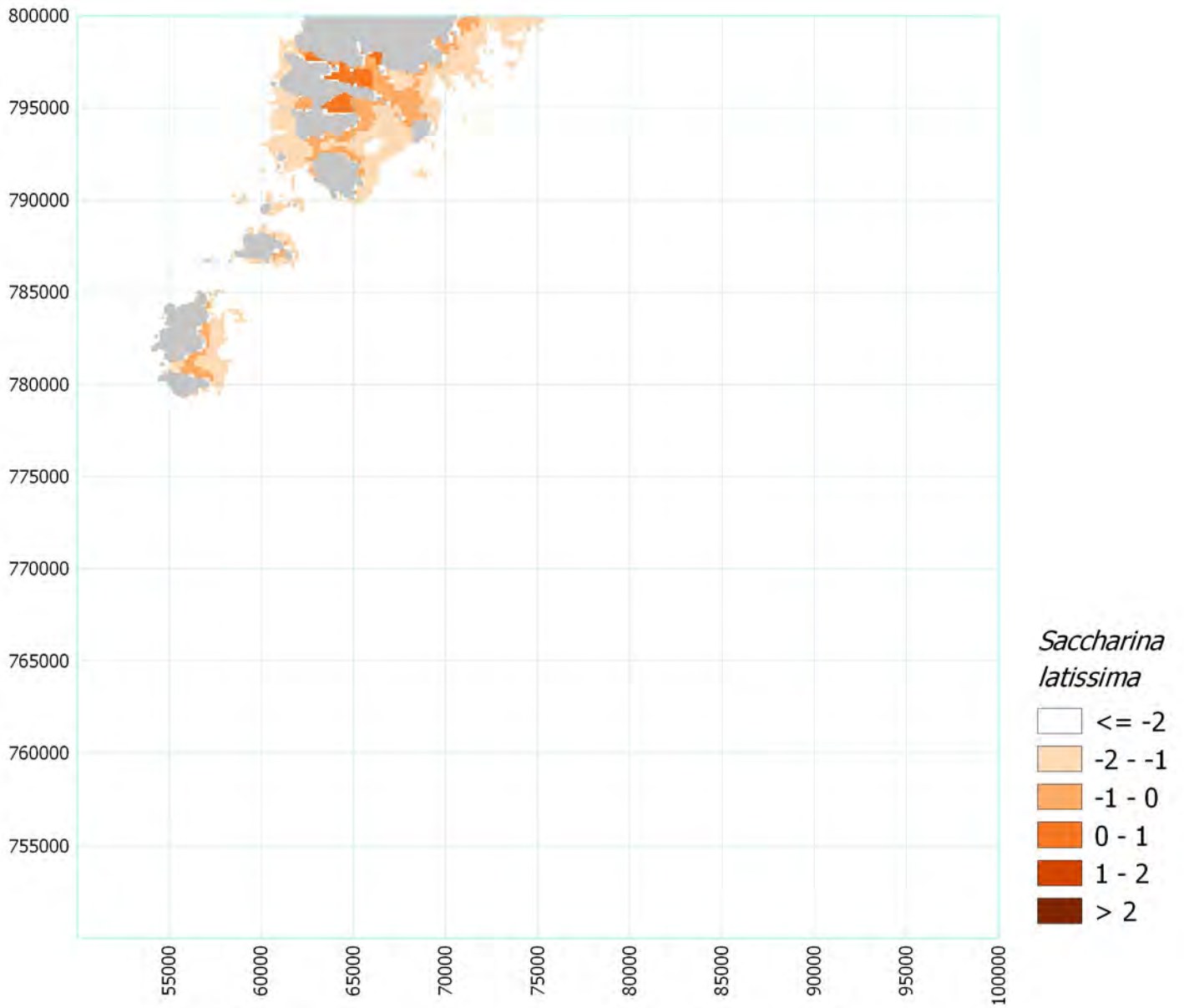
Map 28



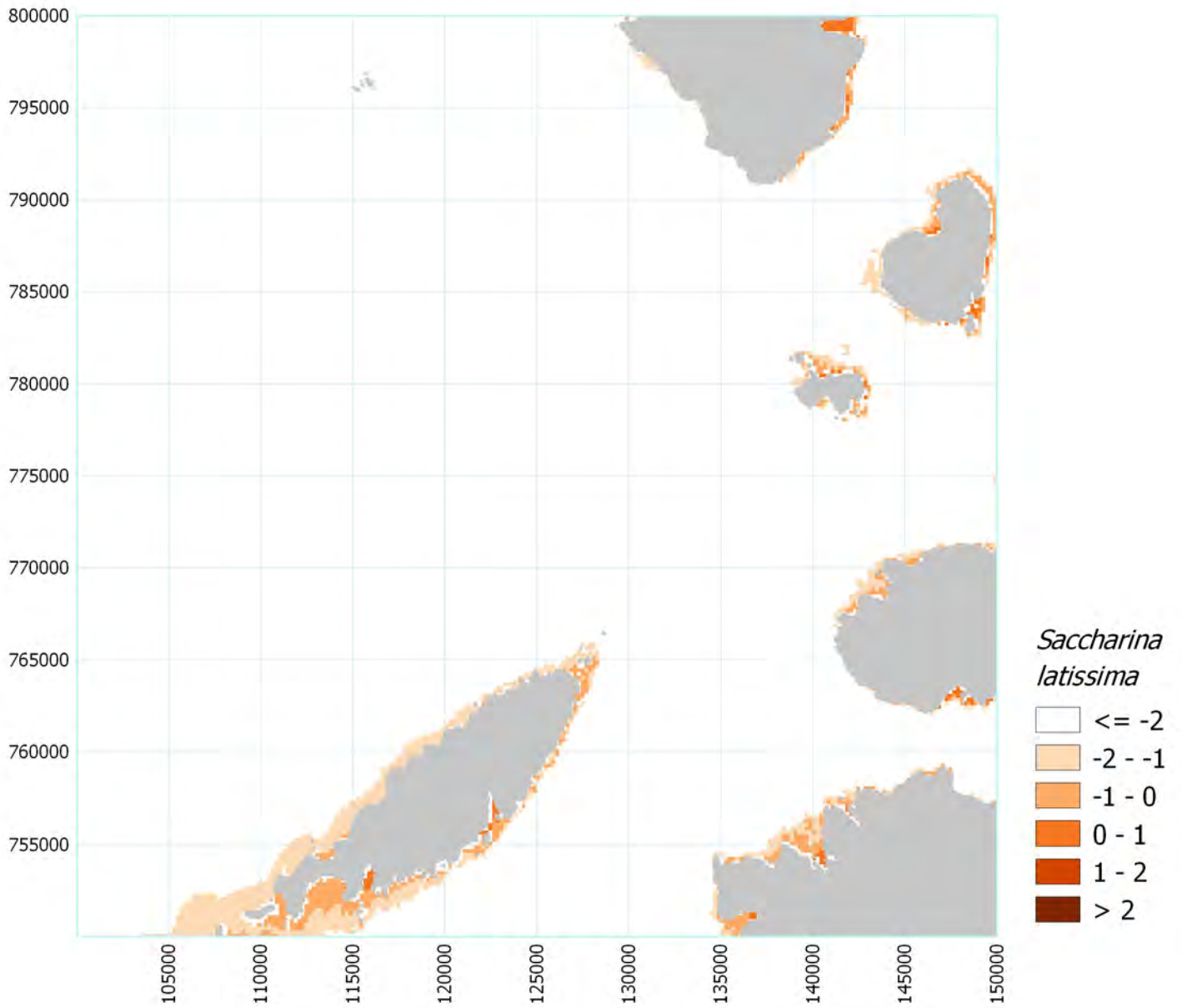
Map 29



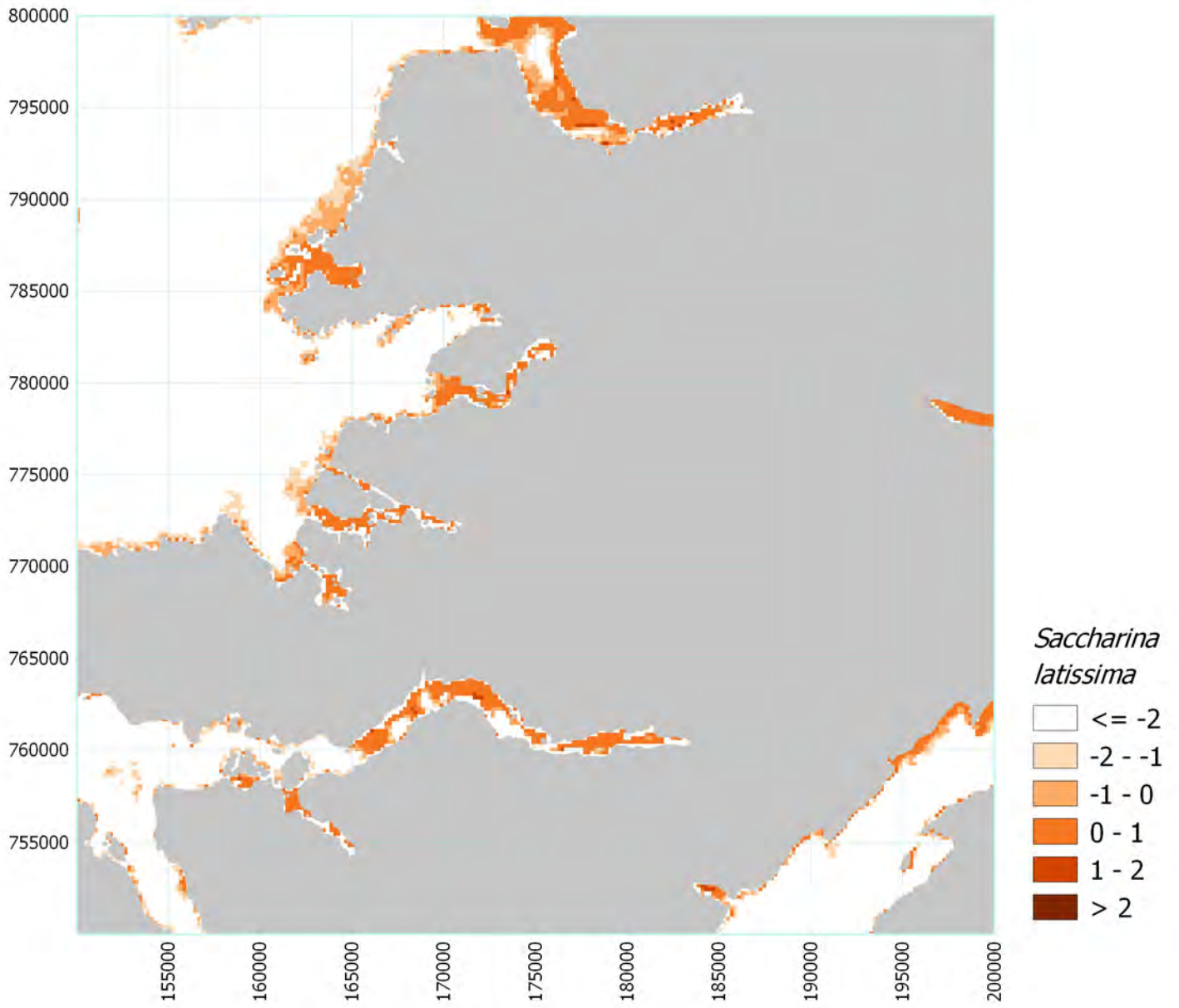
Map 30



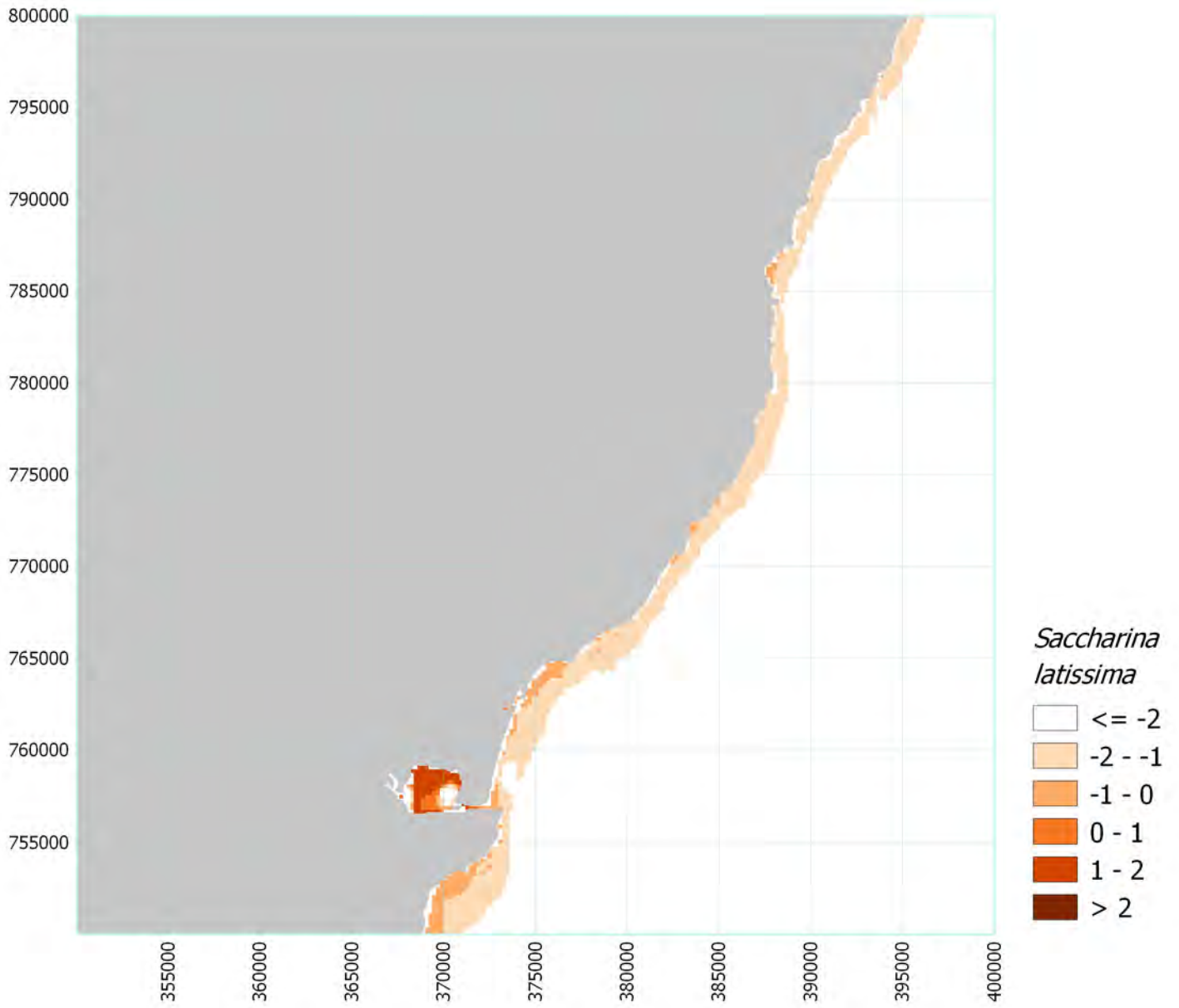
Map 31



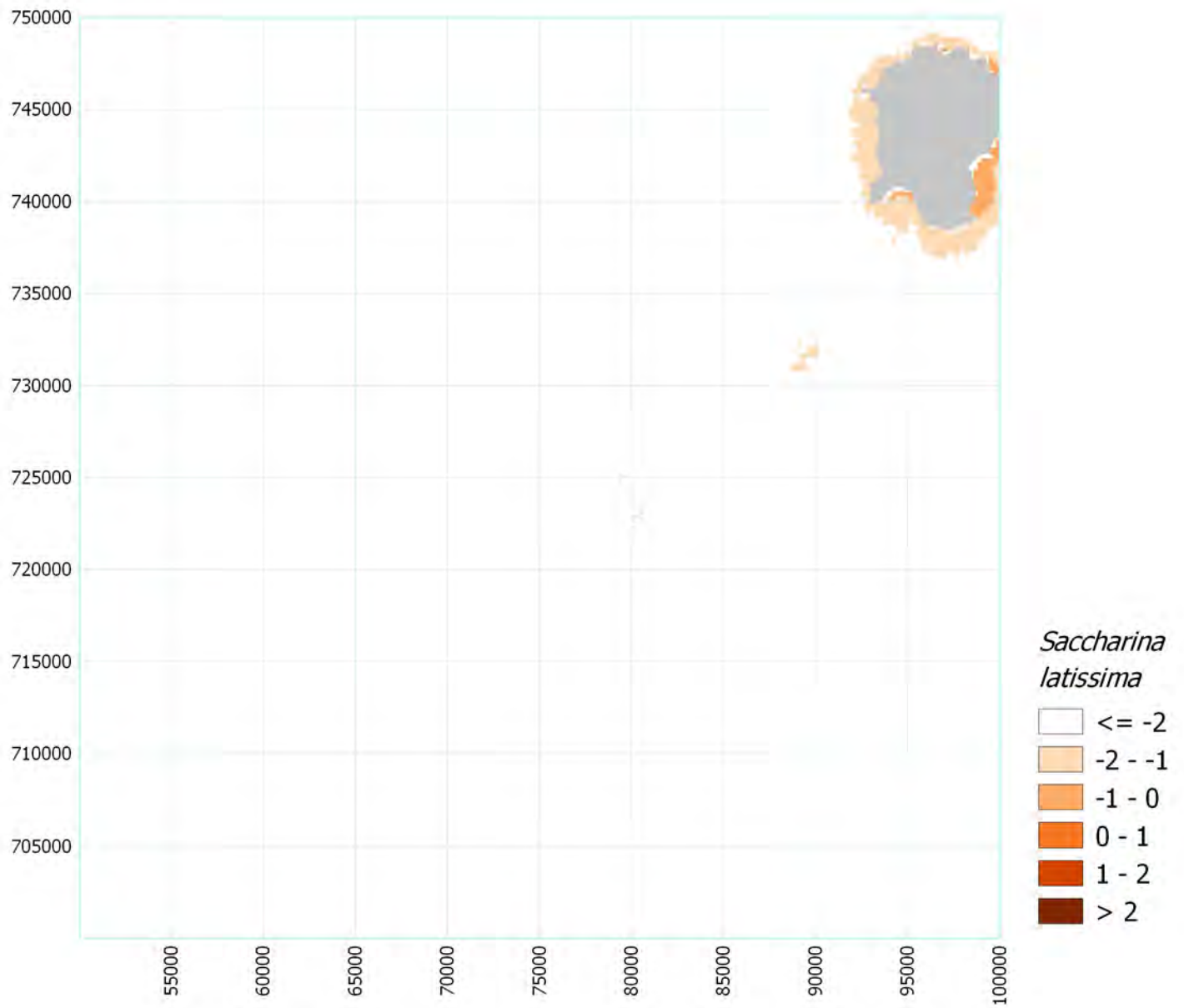
Map 32



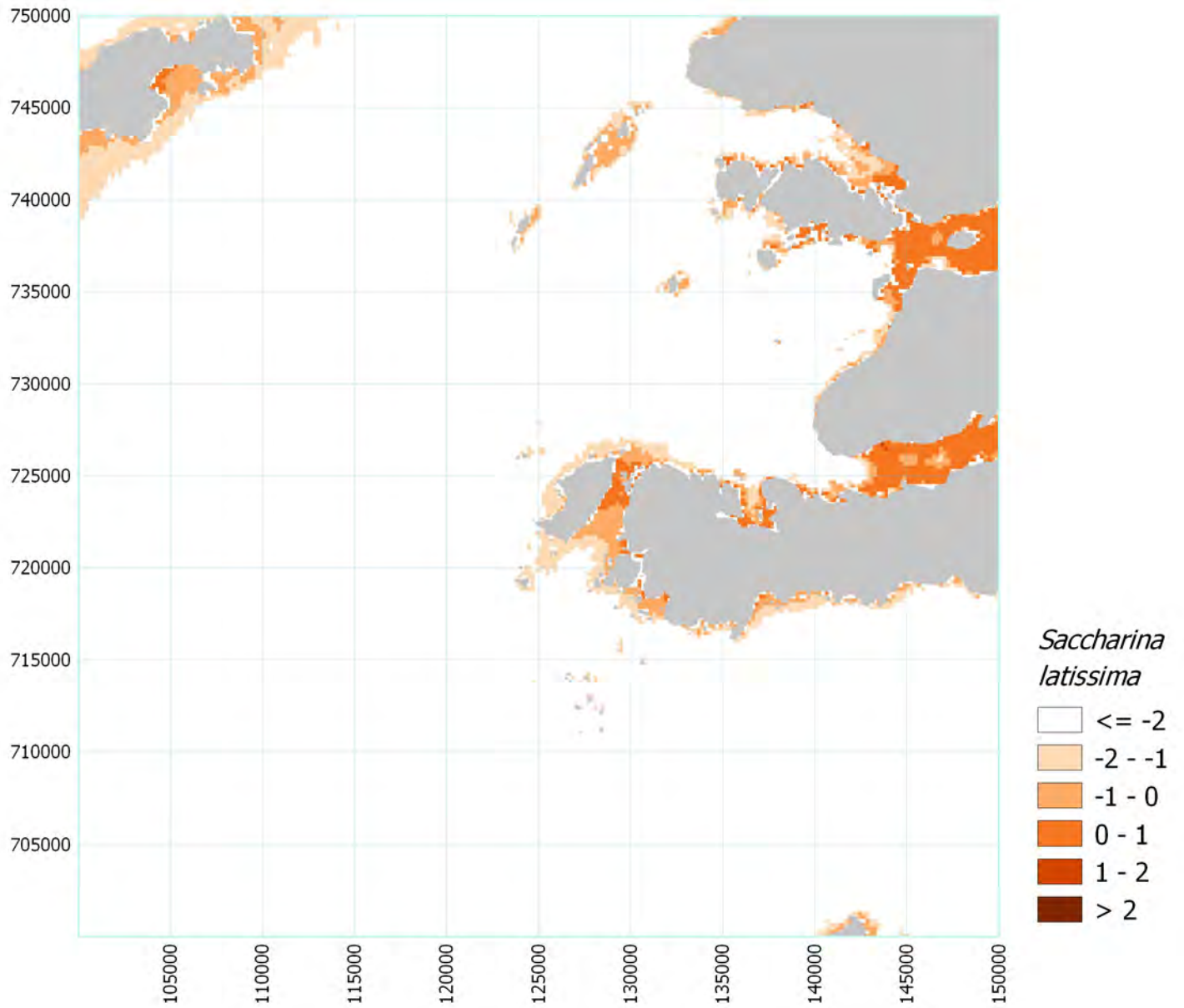
Map 33



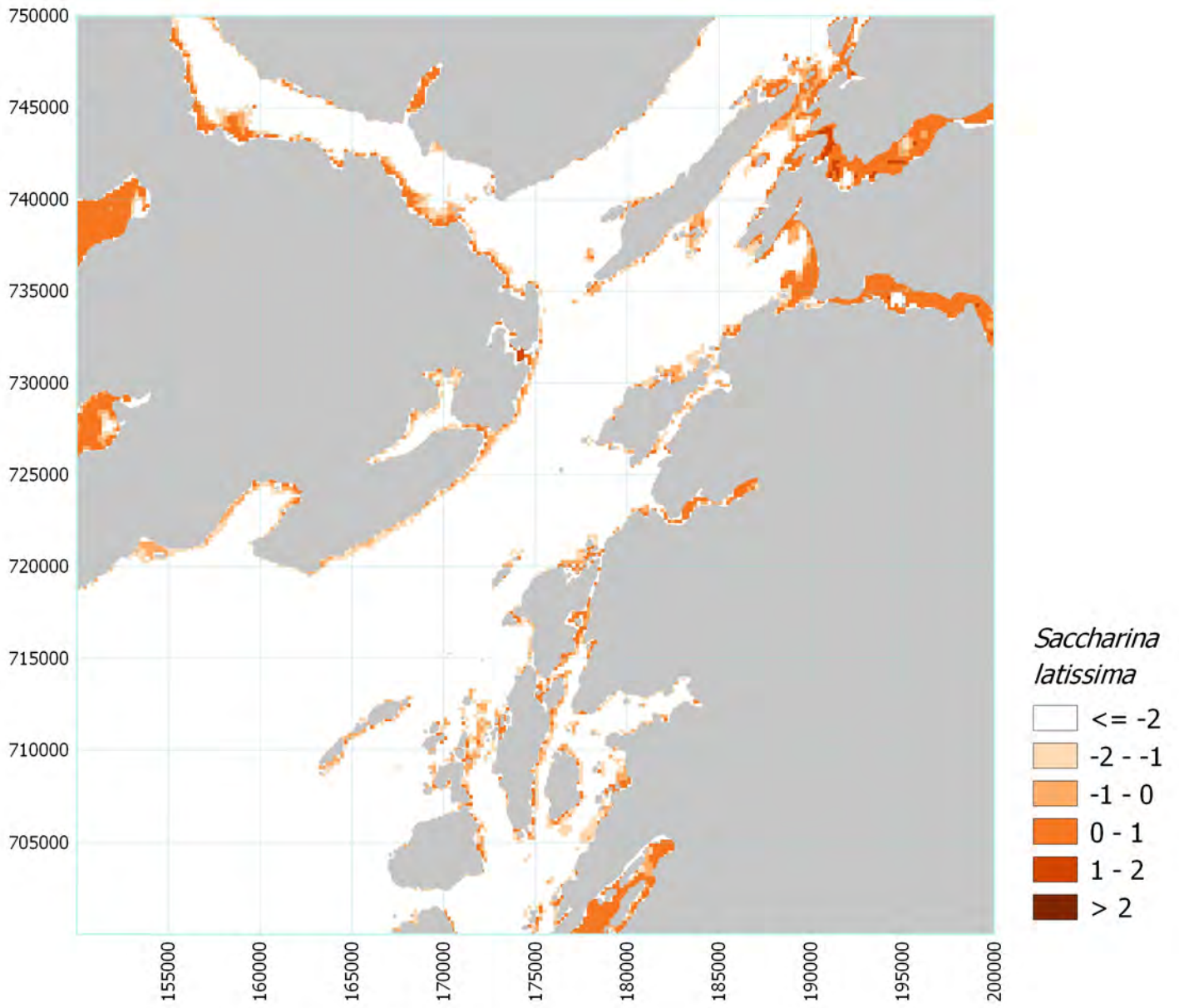
Map 34



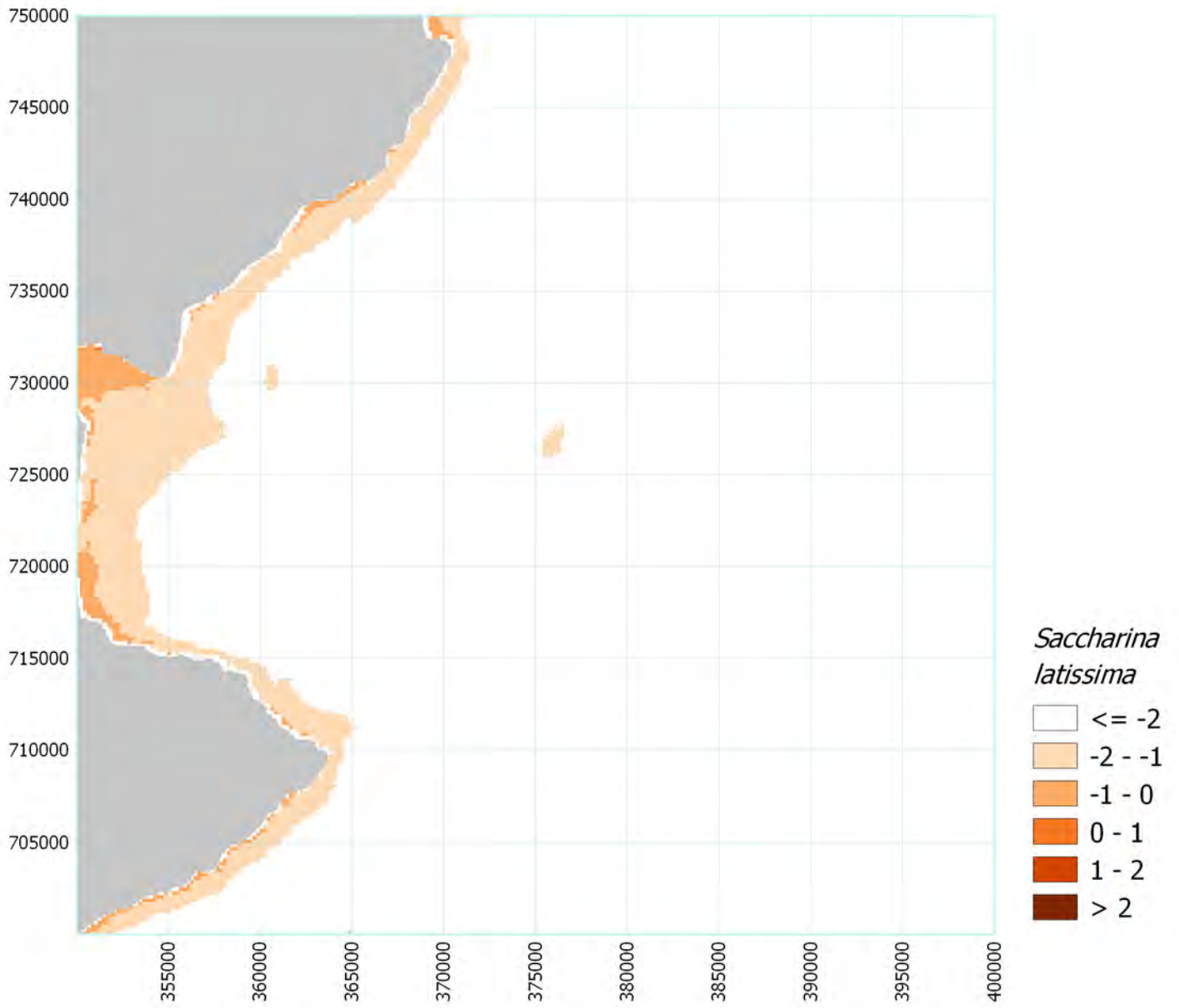
Map 35



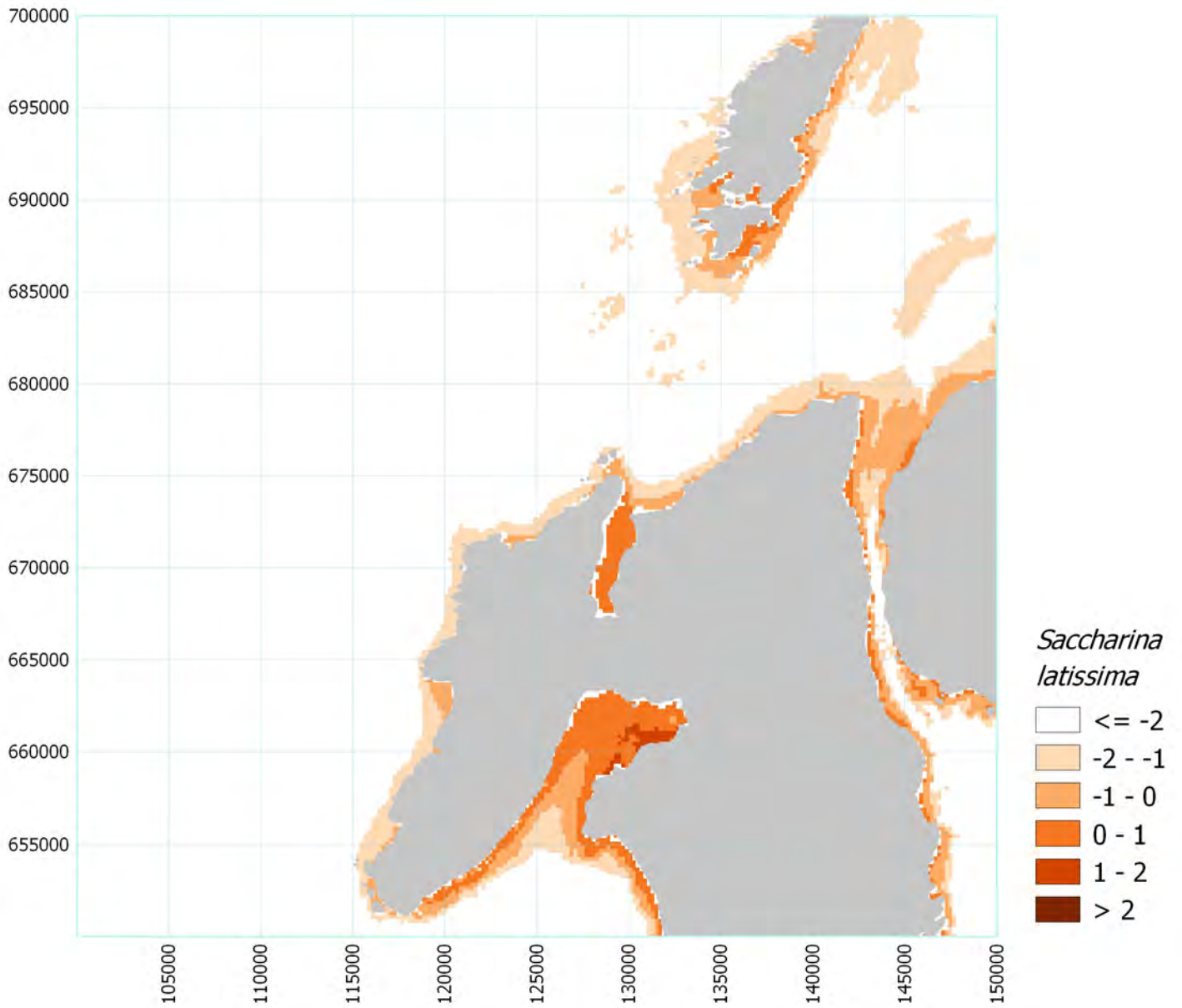
Map 36



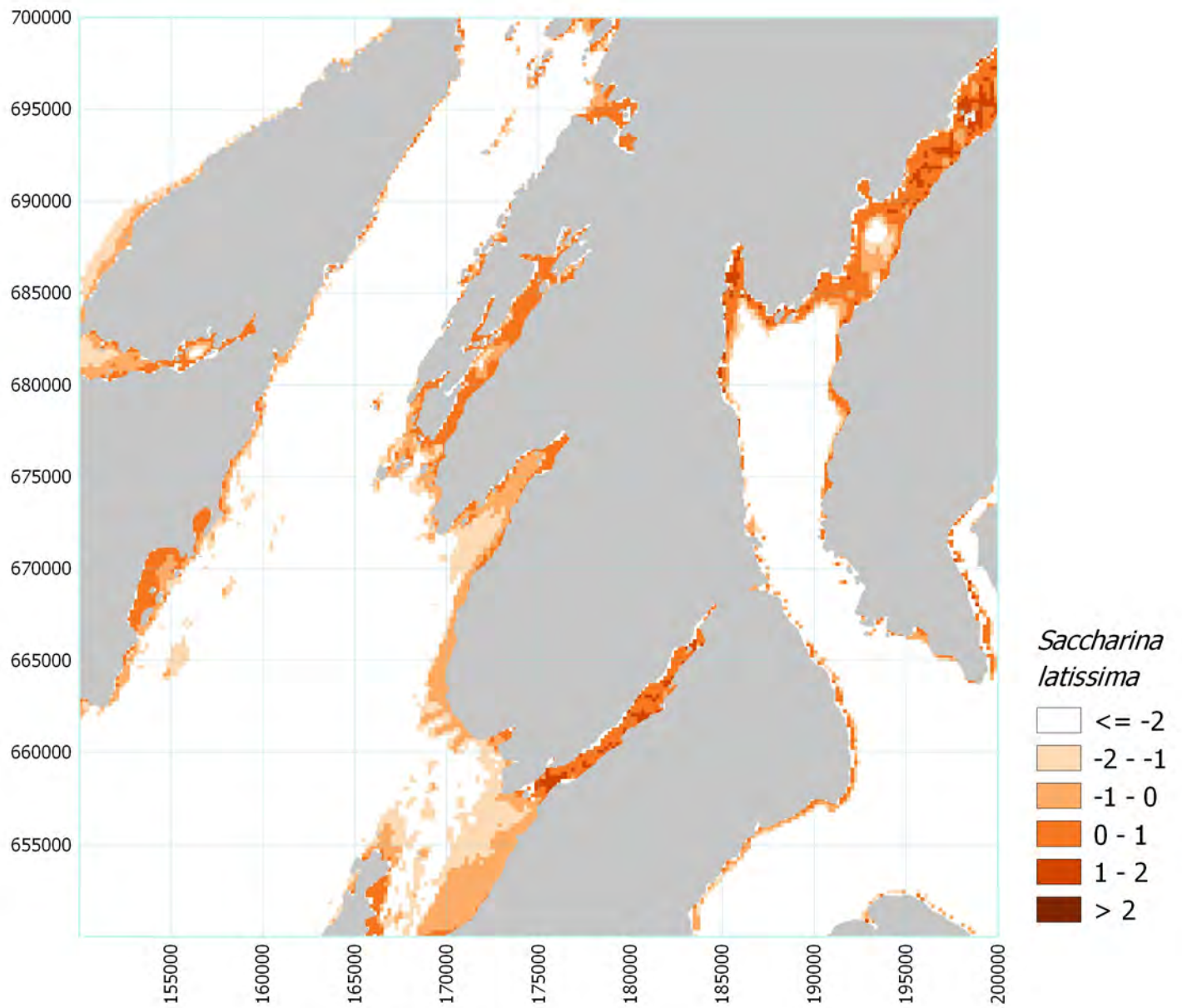
Map 37



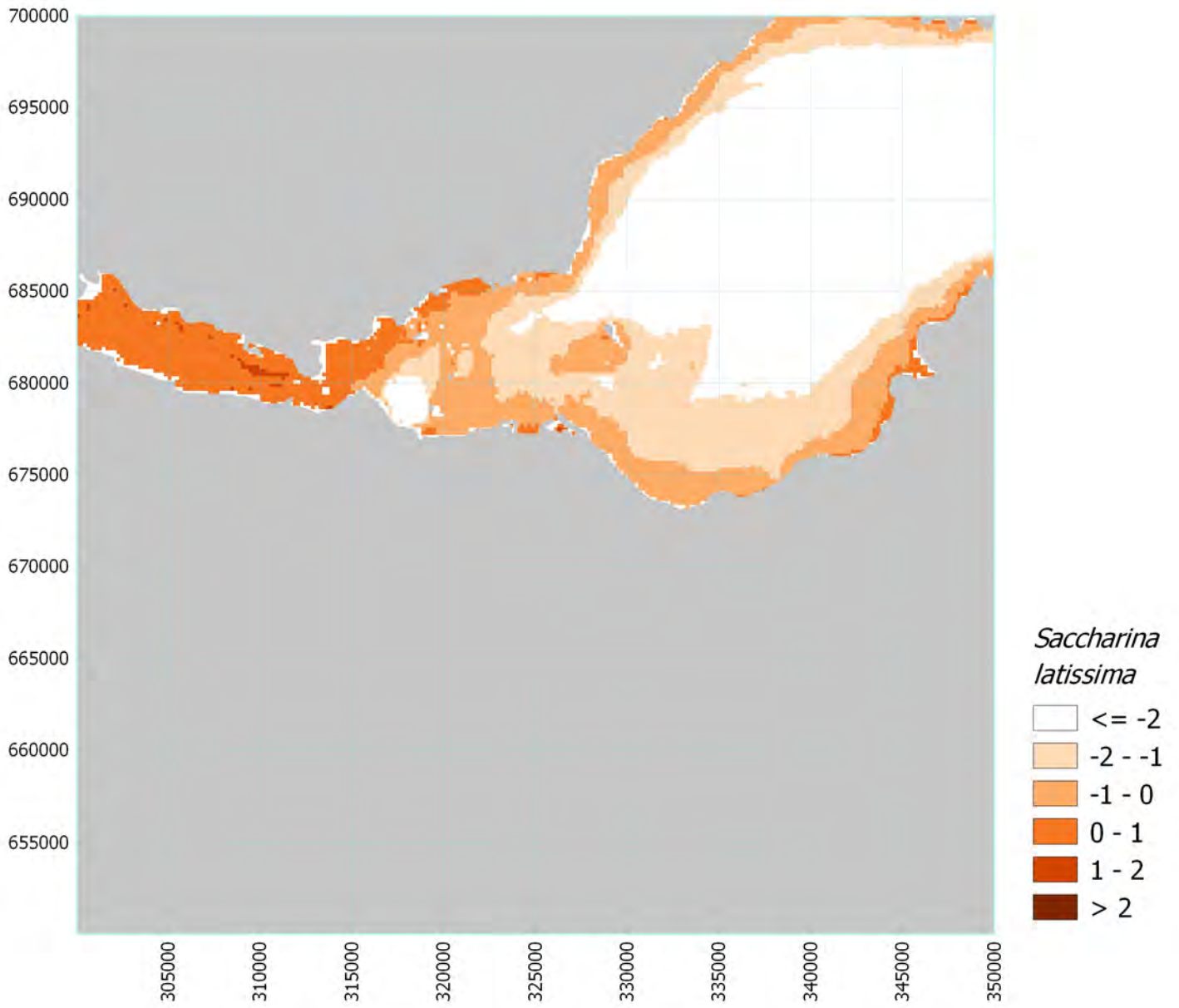
Map 38



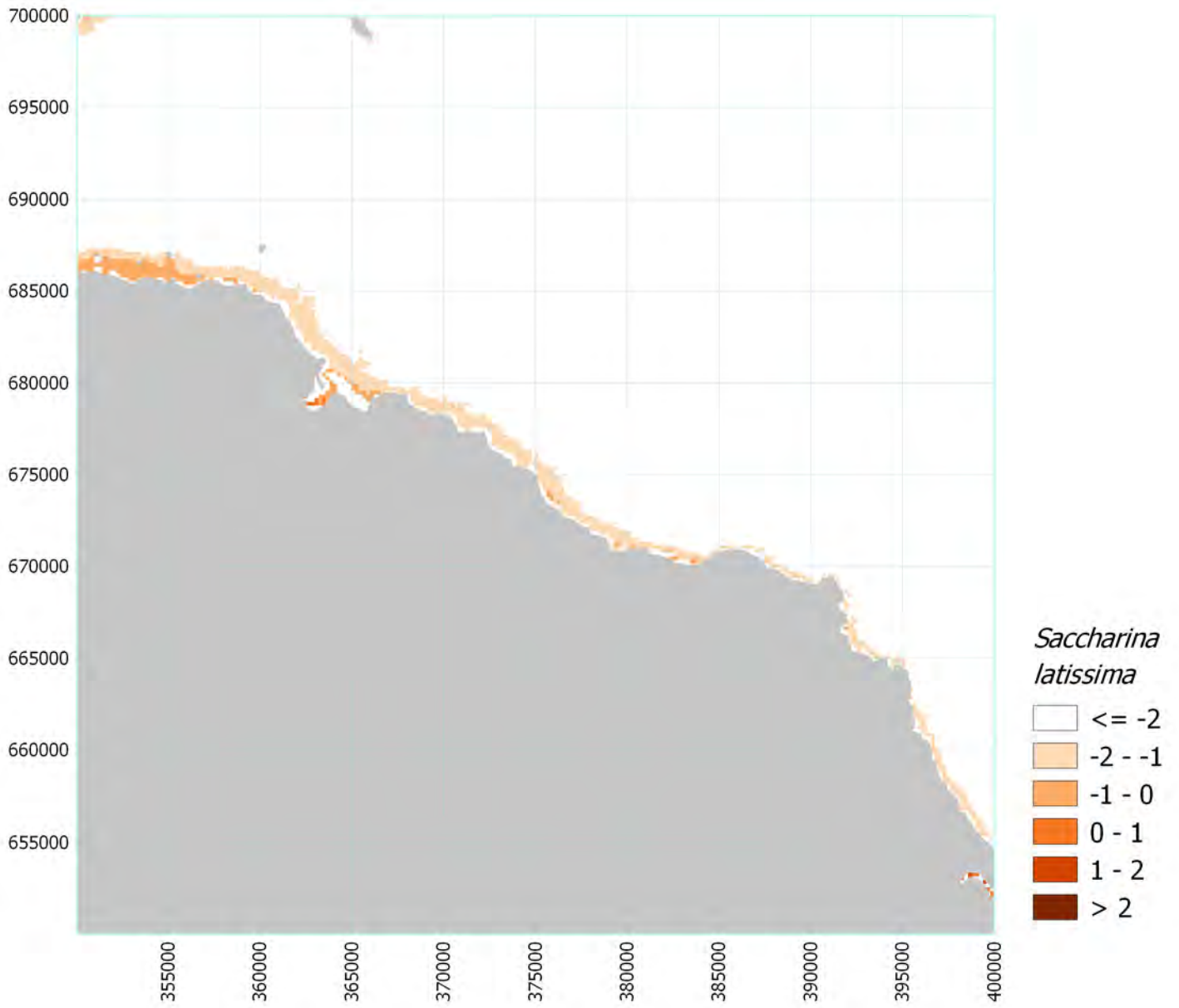
Map 39



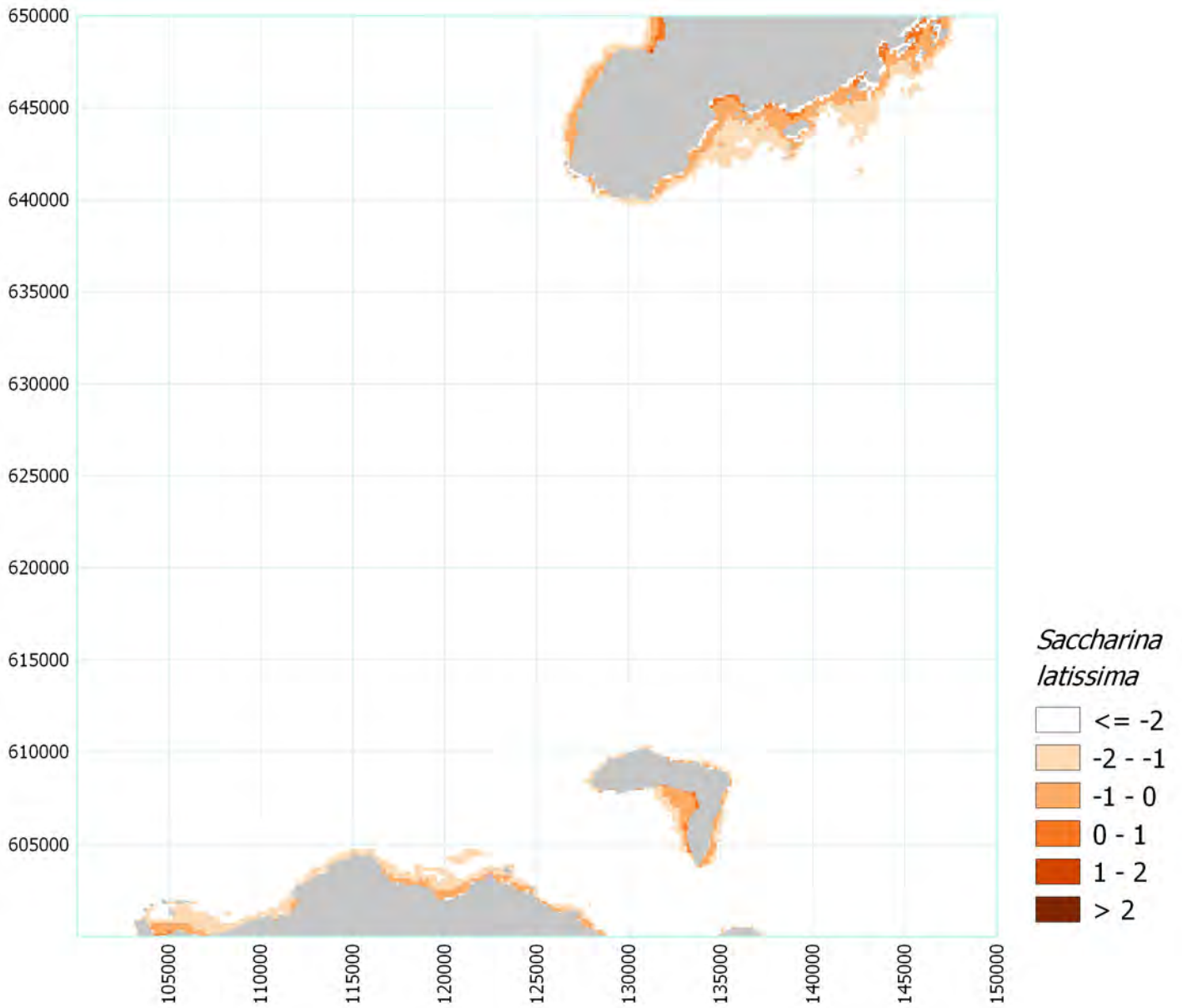
Map 40



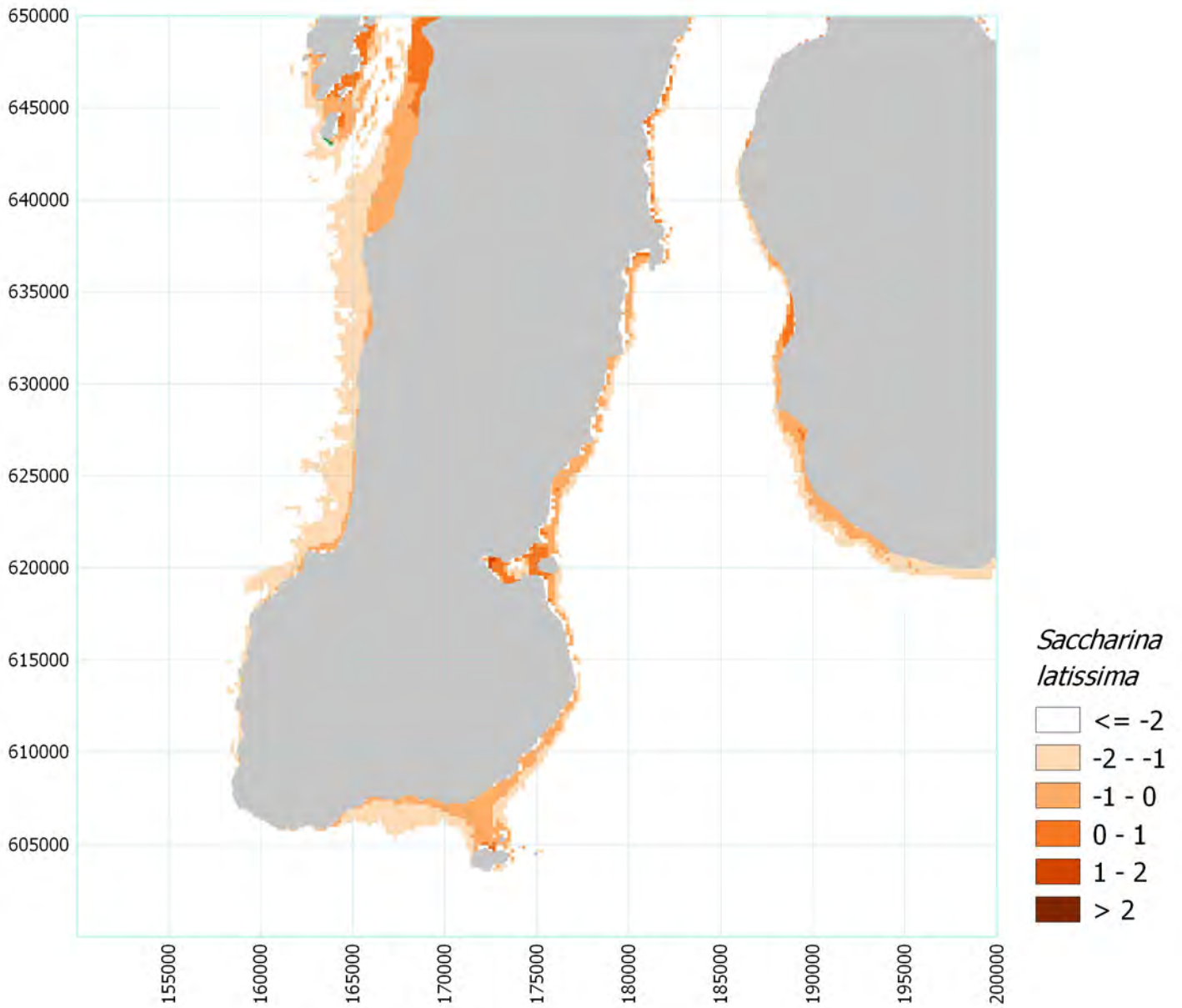
Map 41



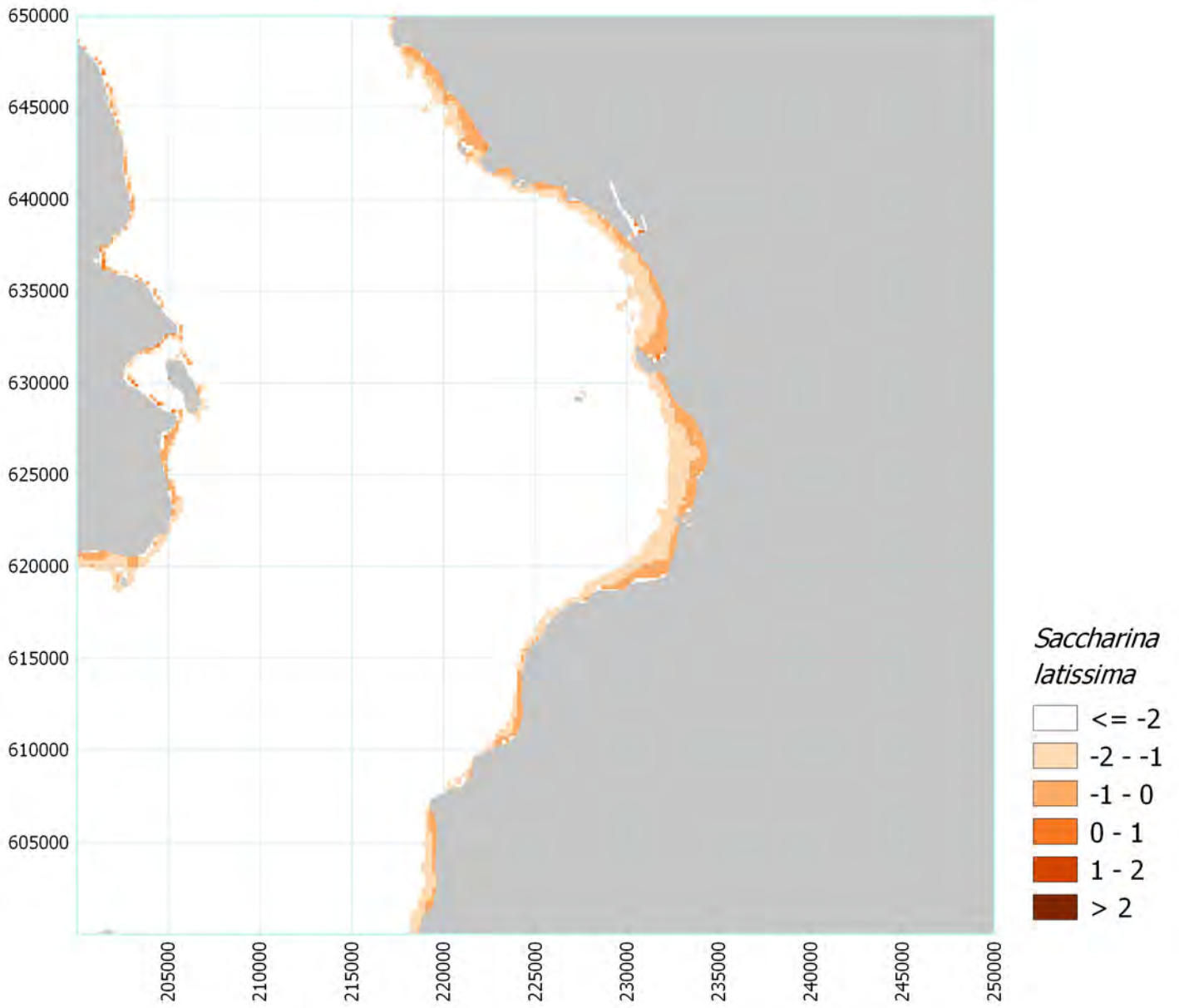
Map 42



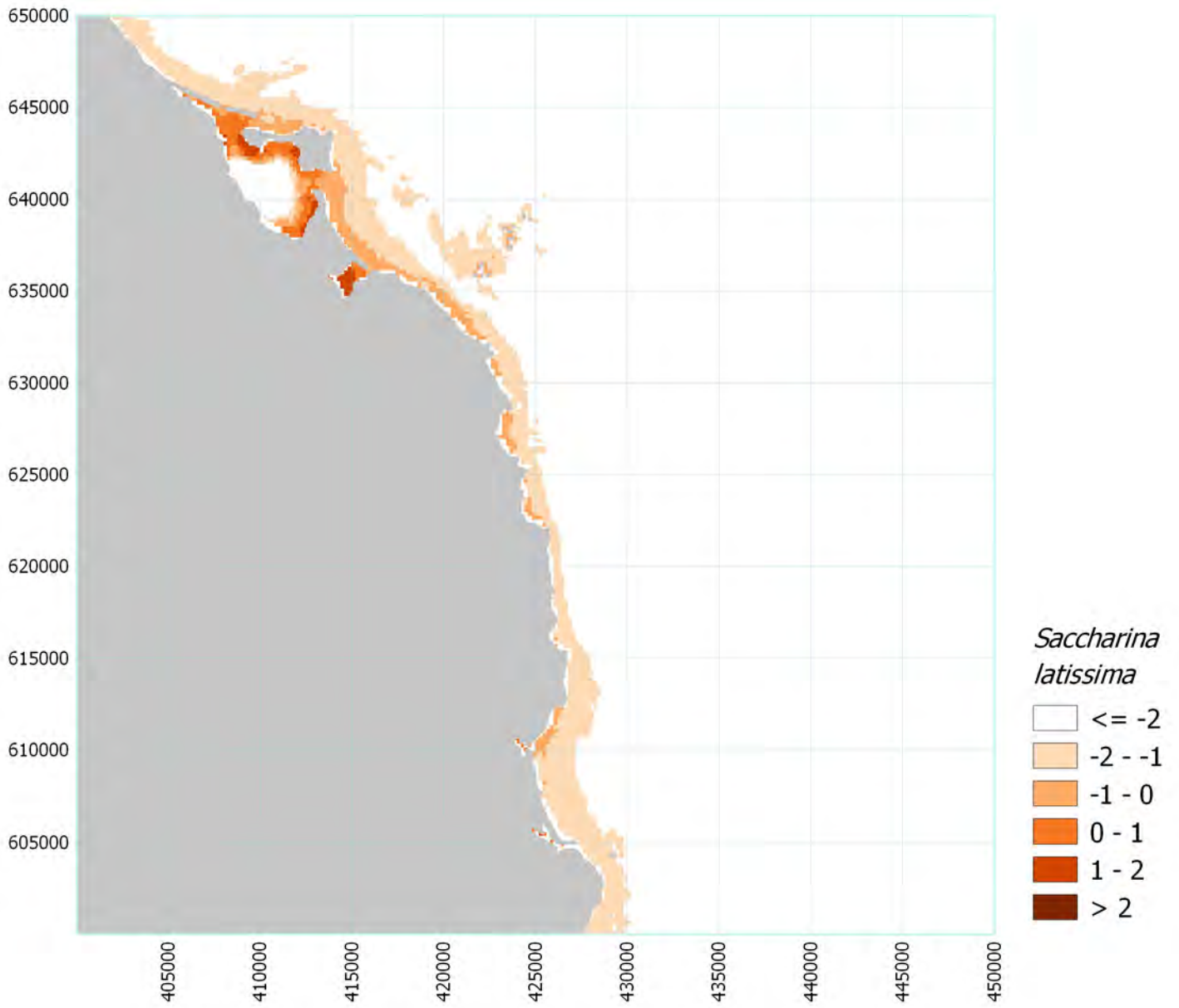
Map 43



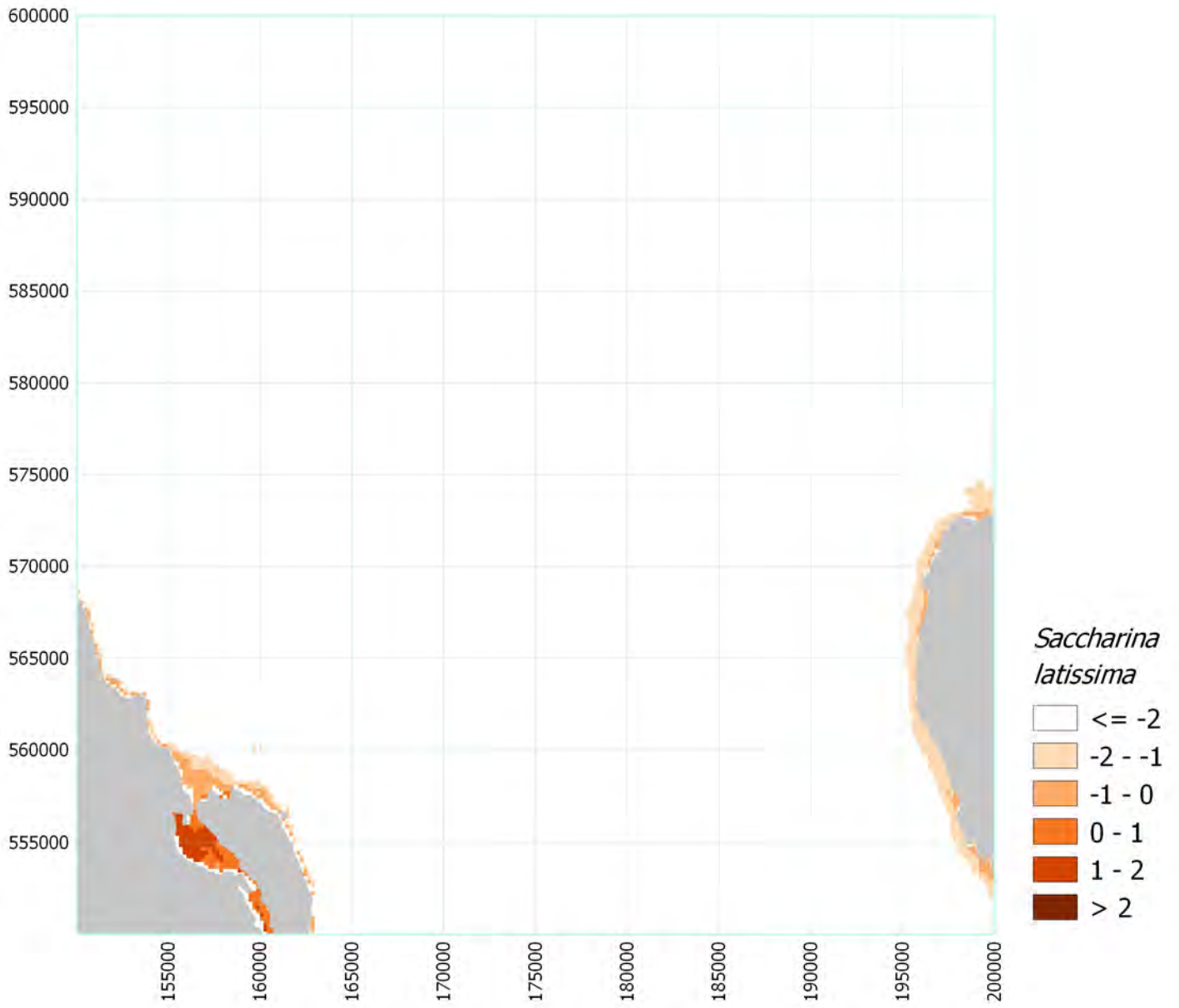
Map 44



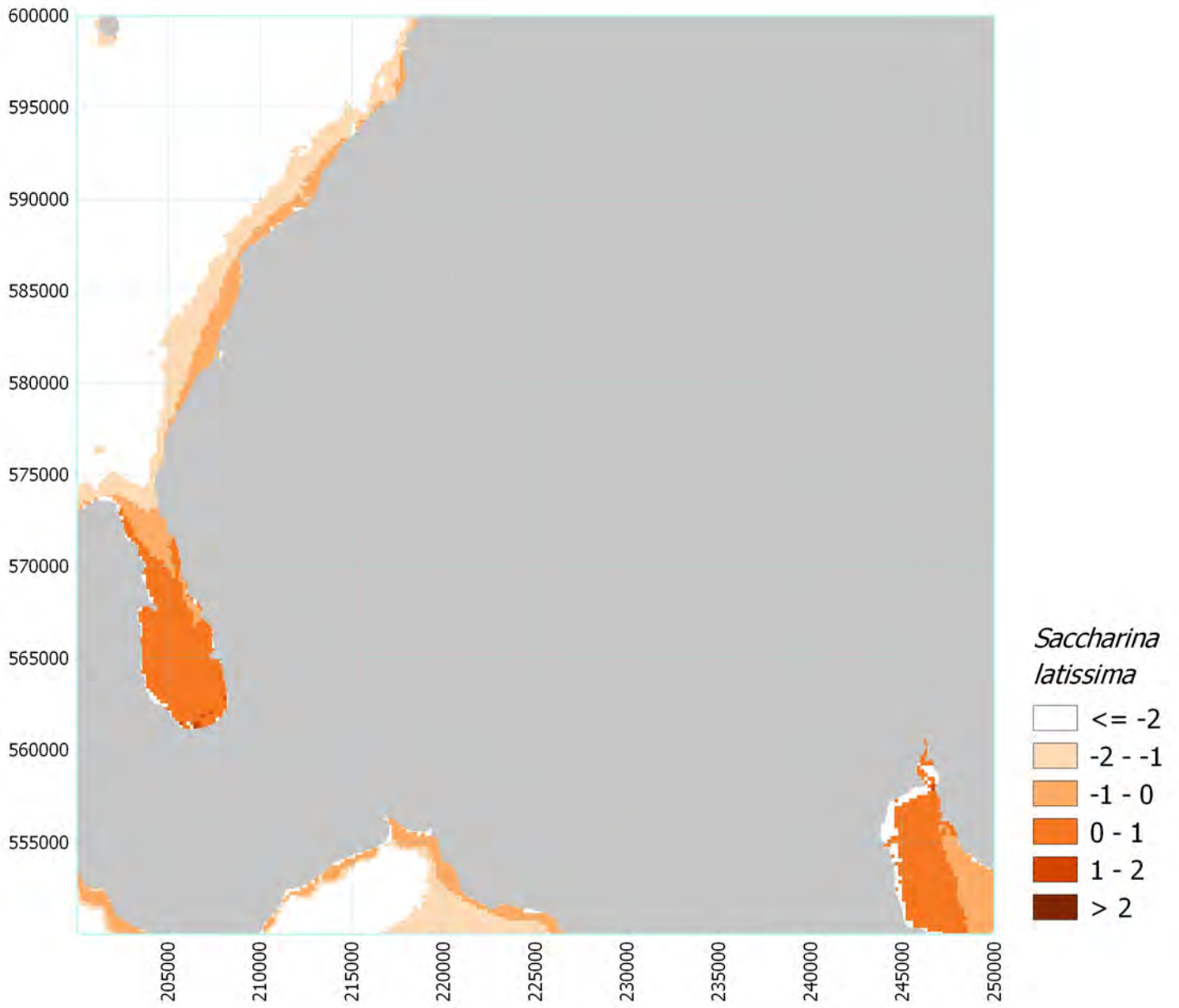
Map 45



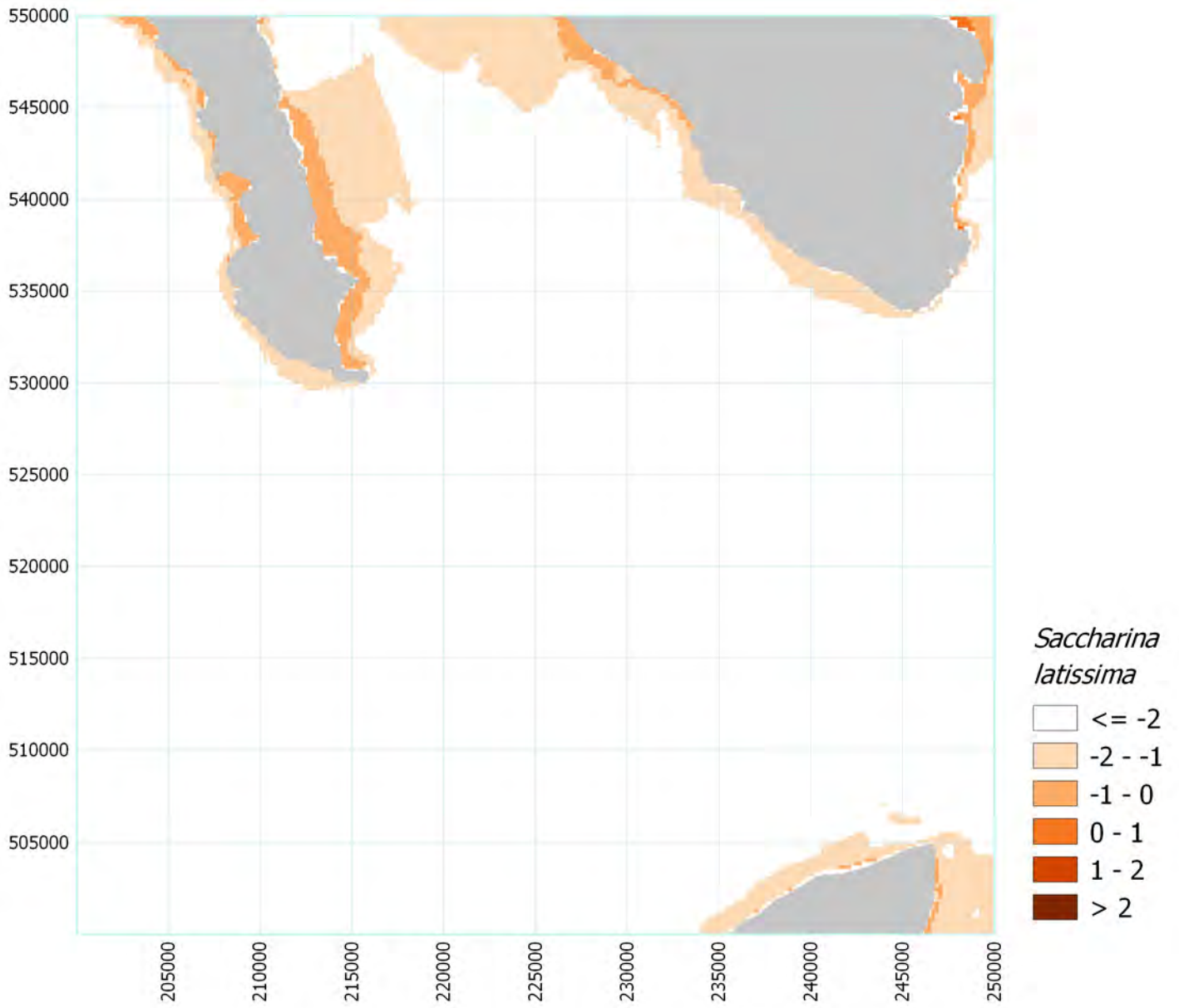
Map 46



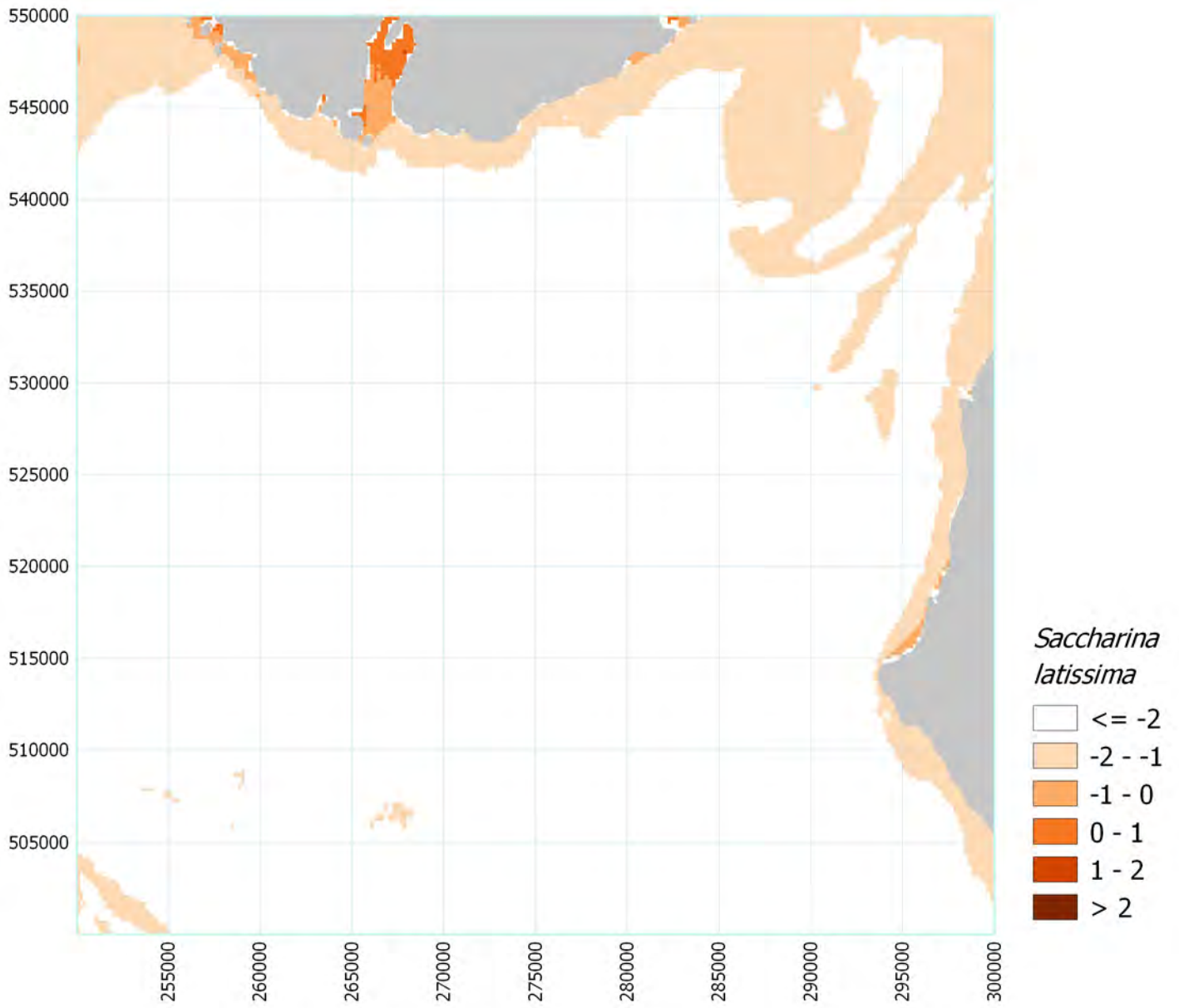
Map 47

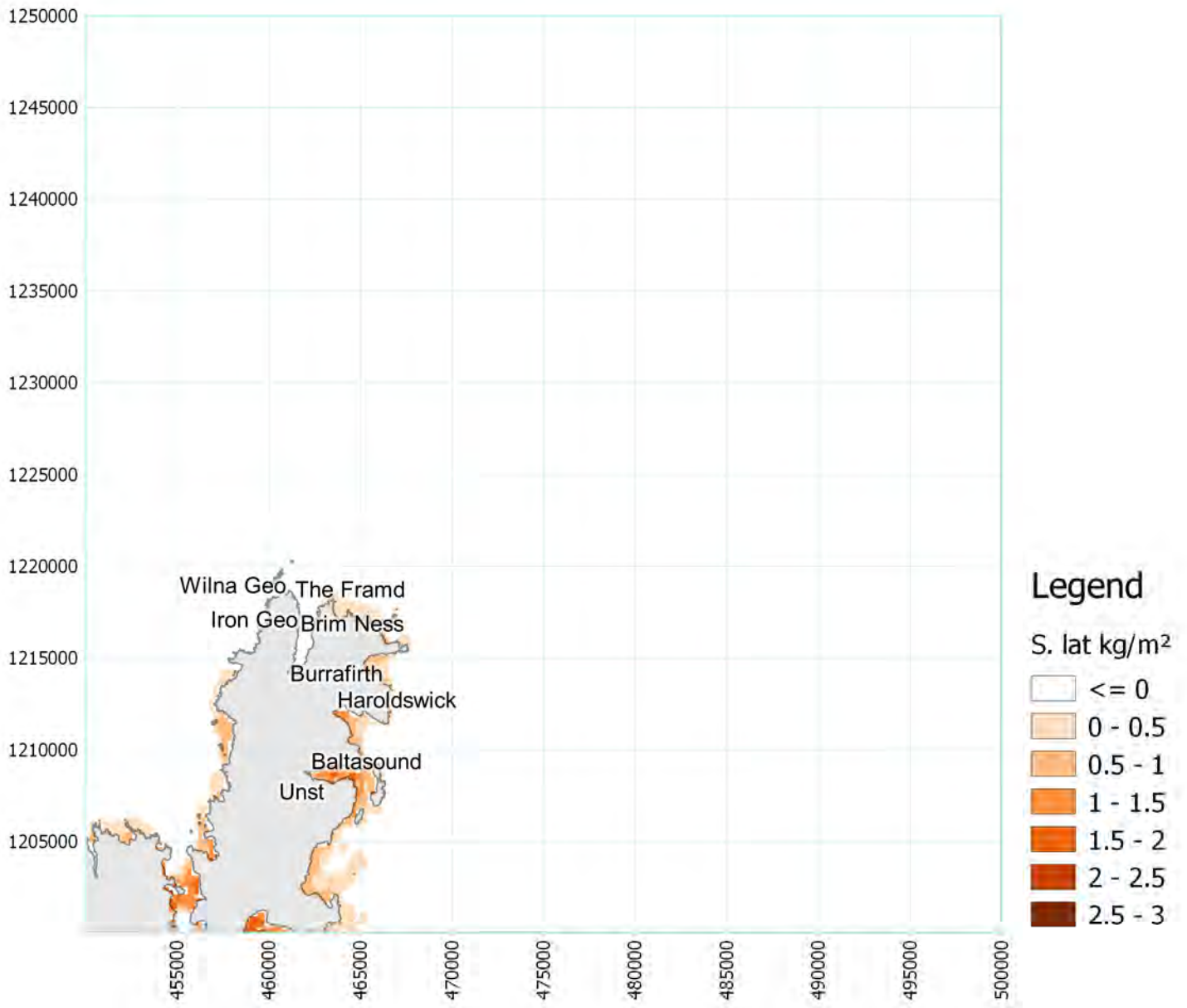


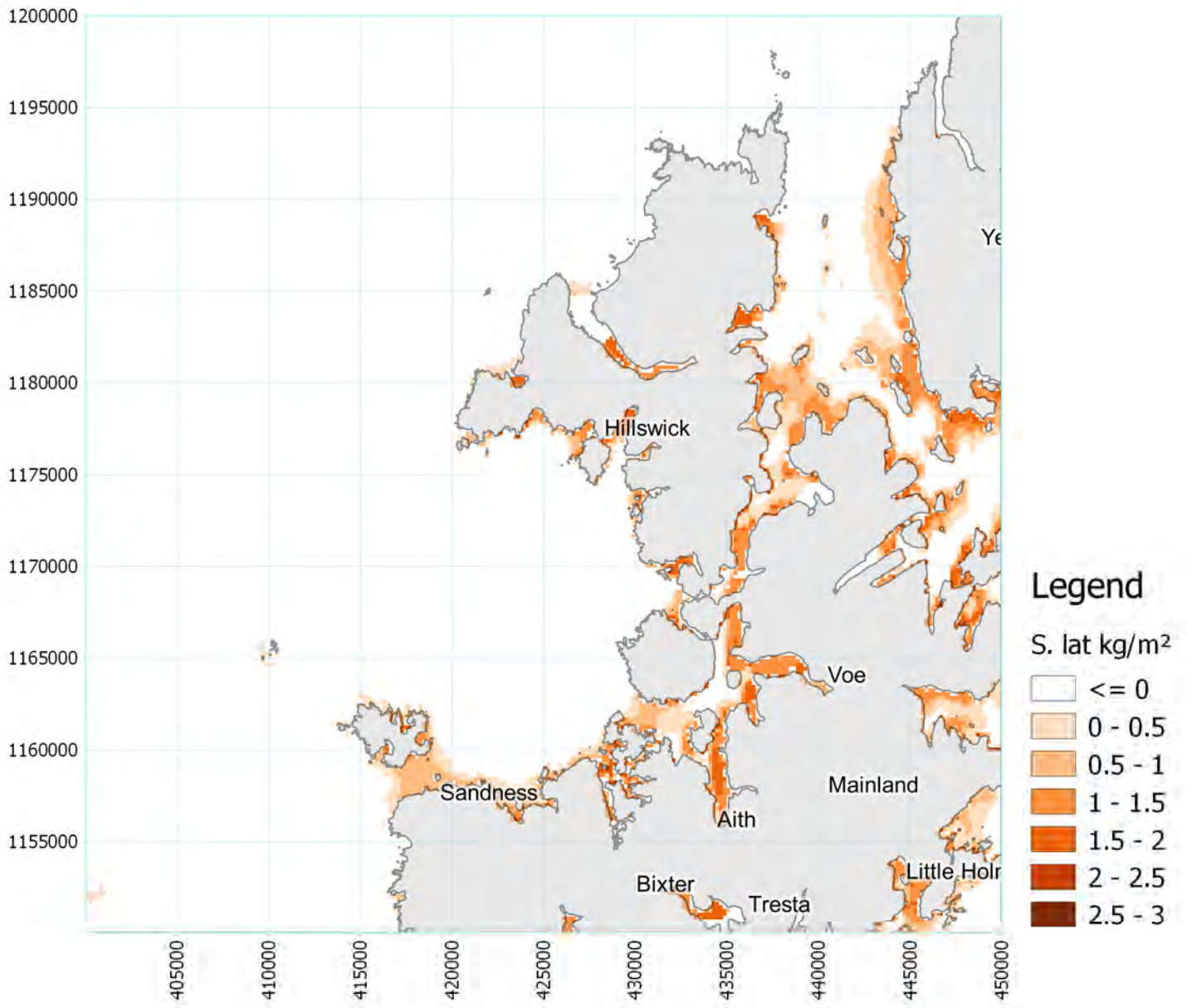
Map 48

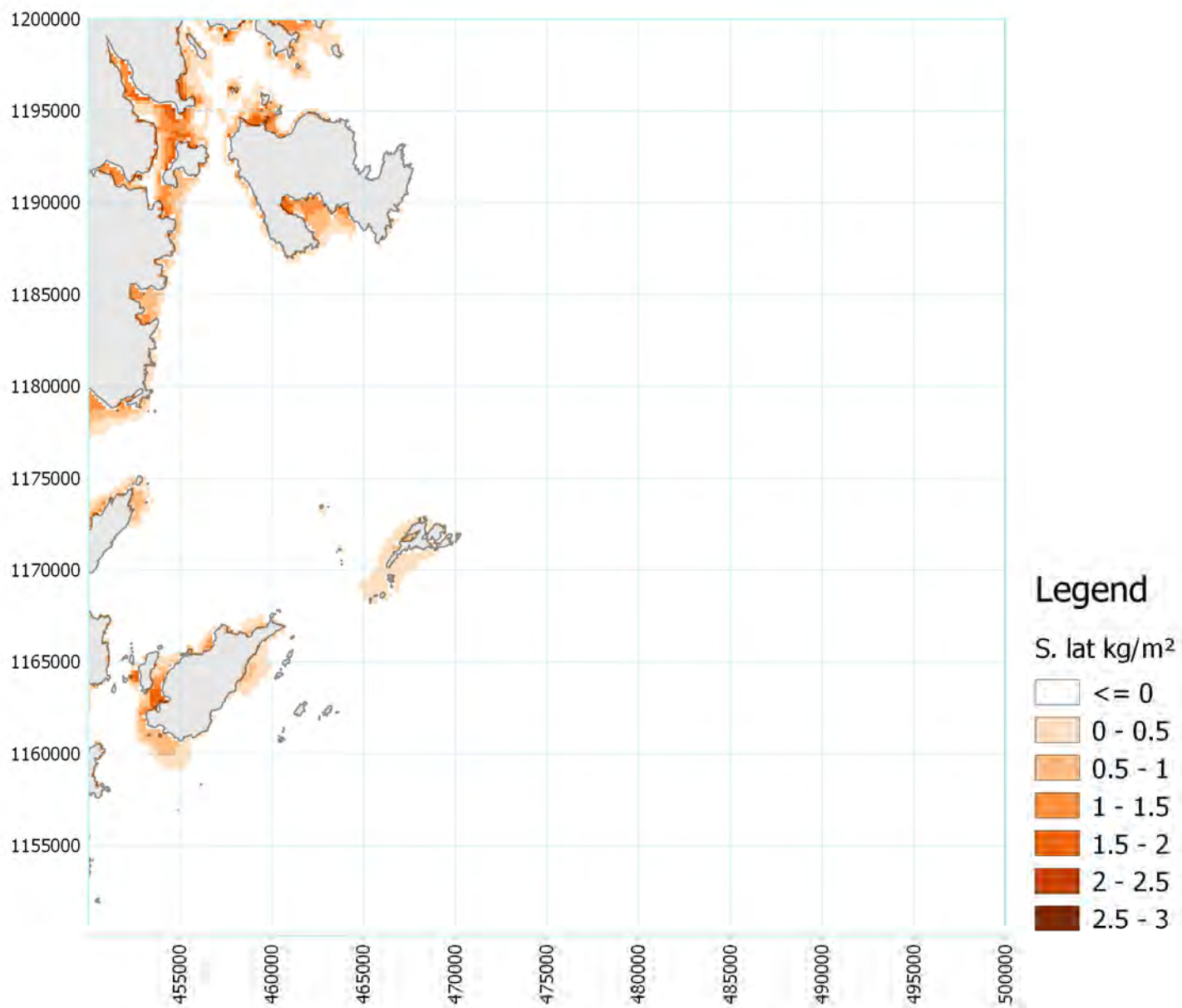


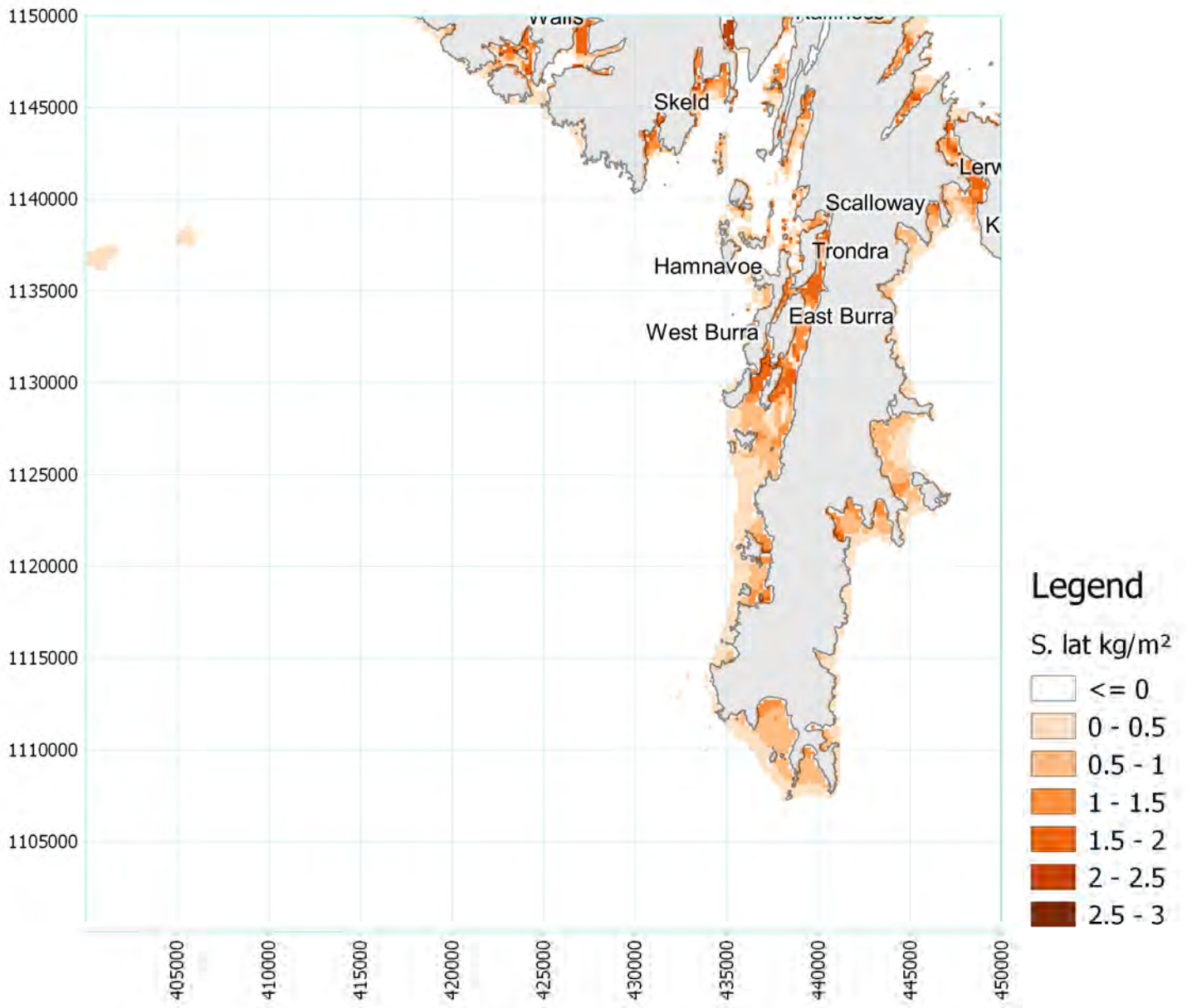
Map 49

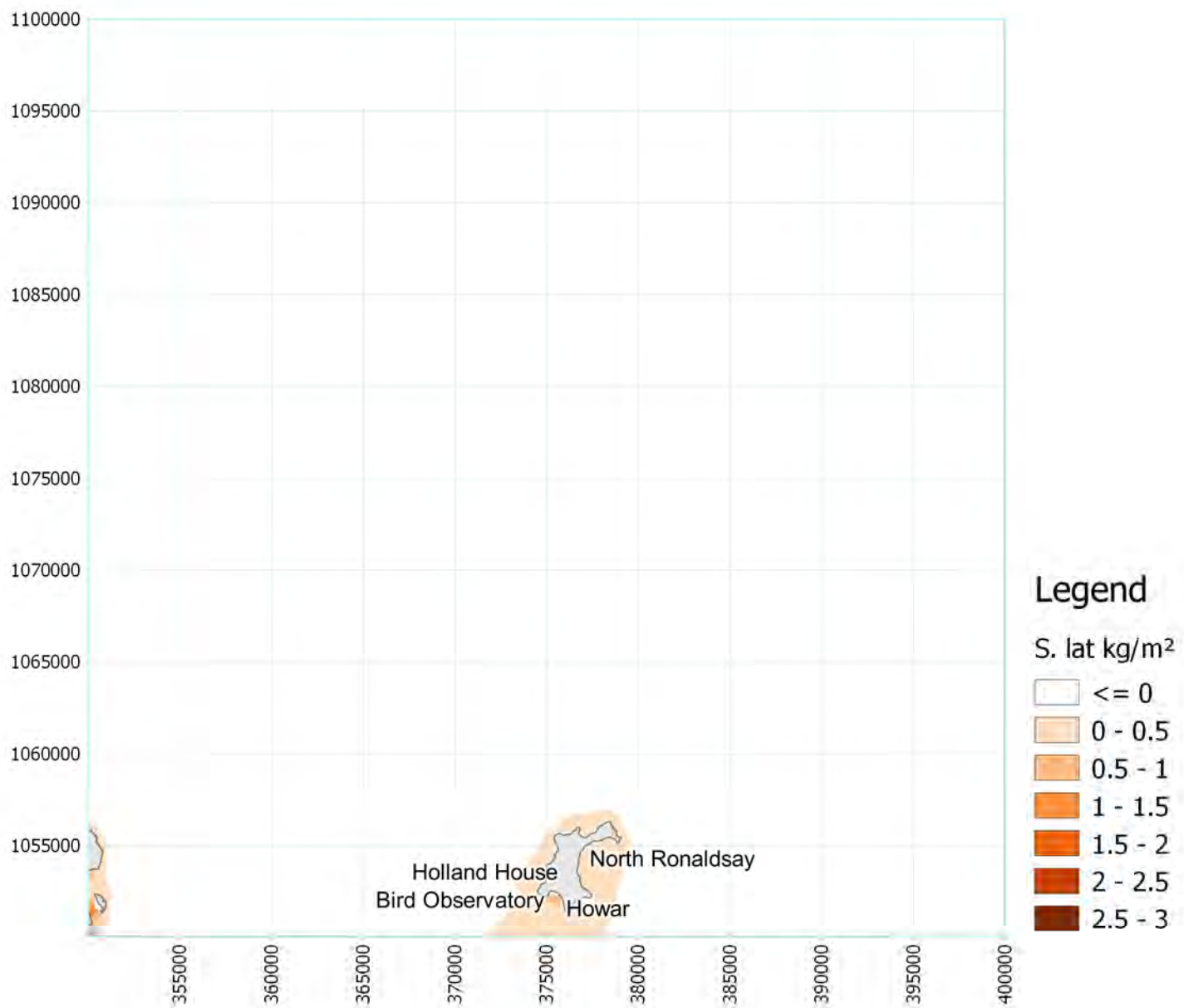


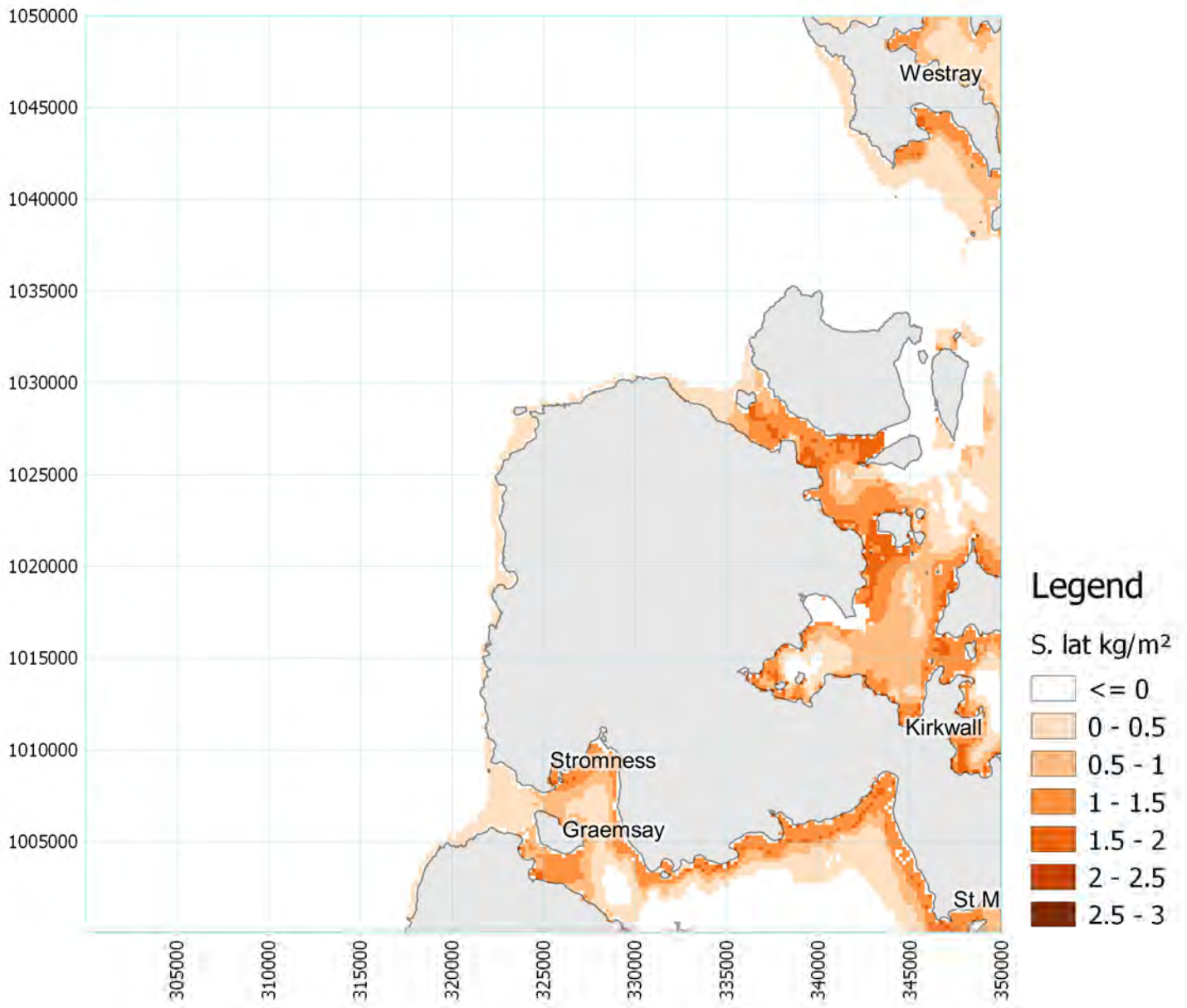


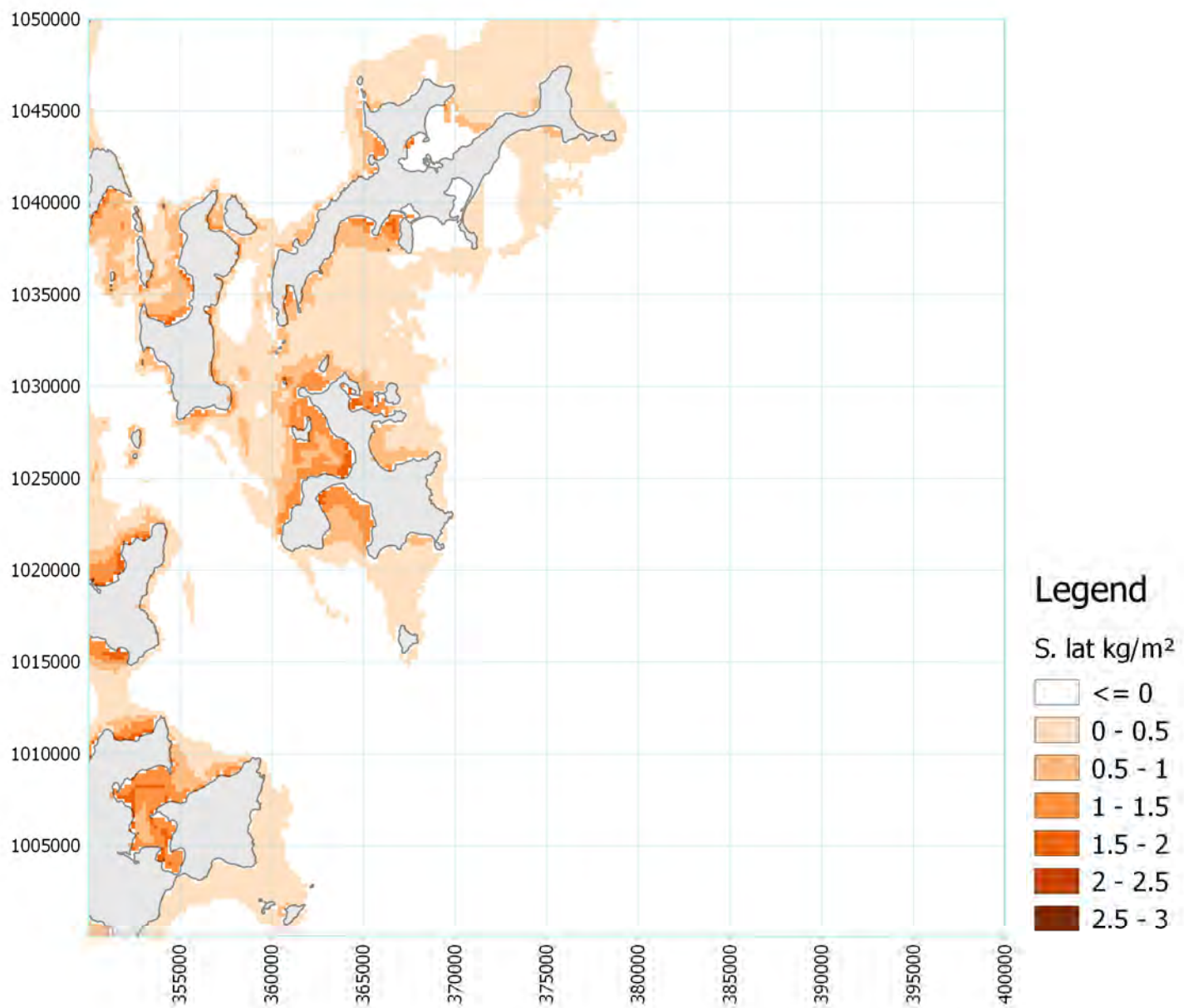


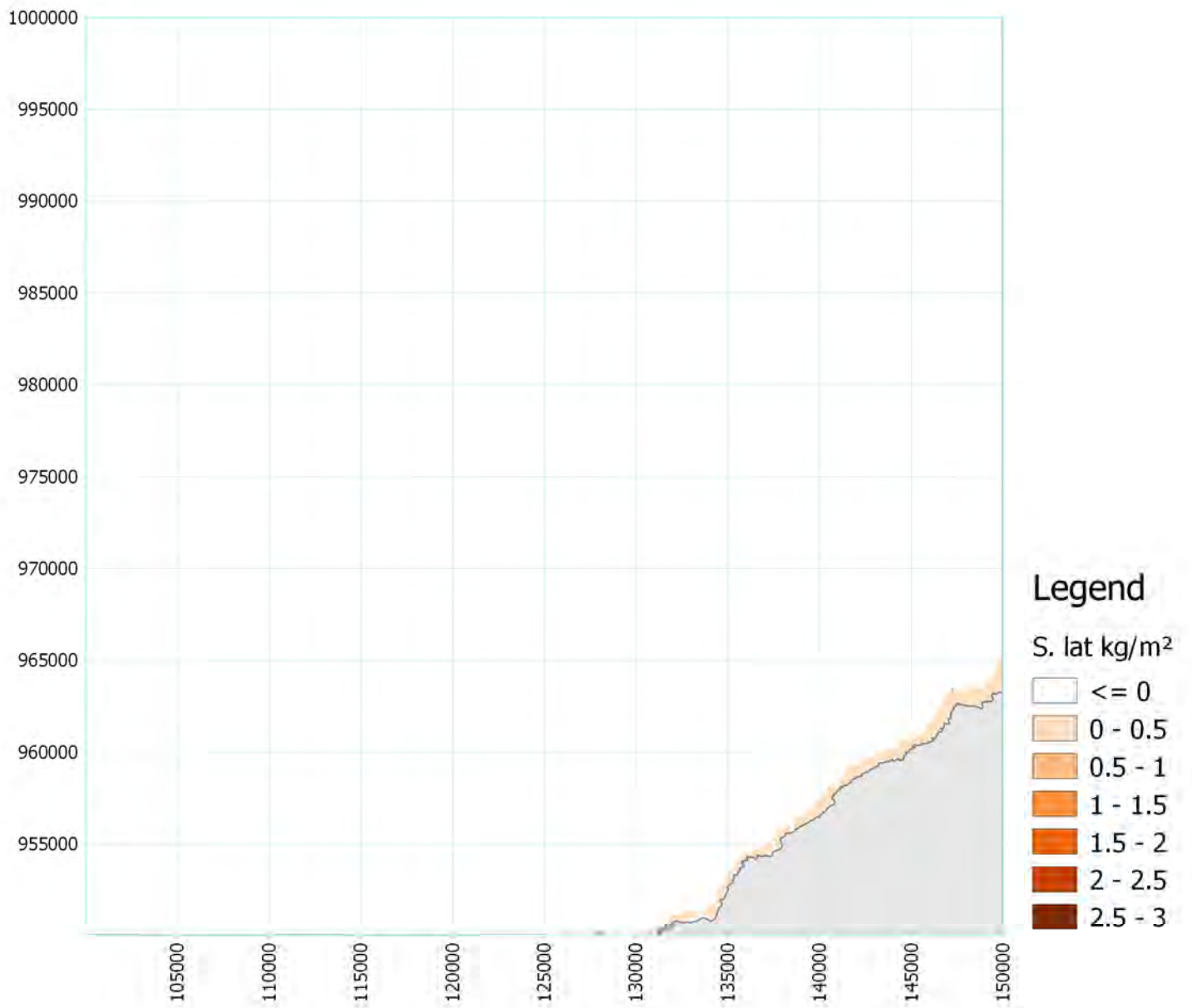


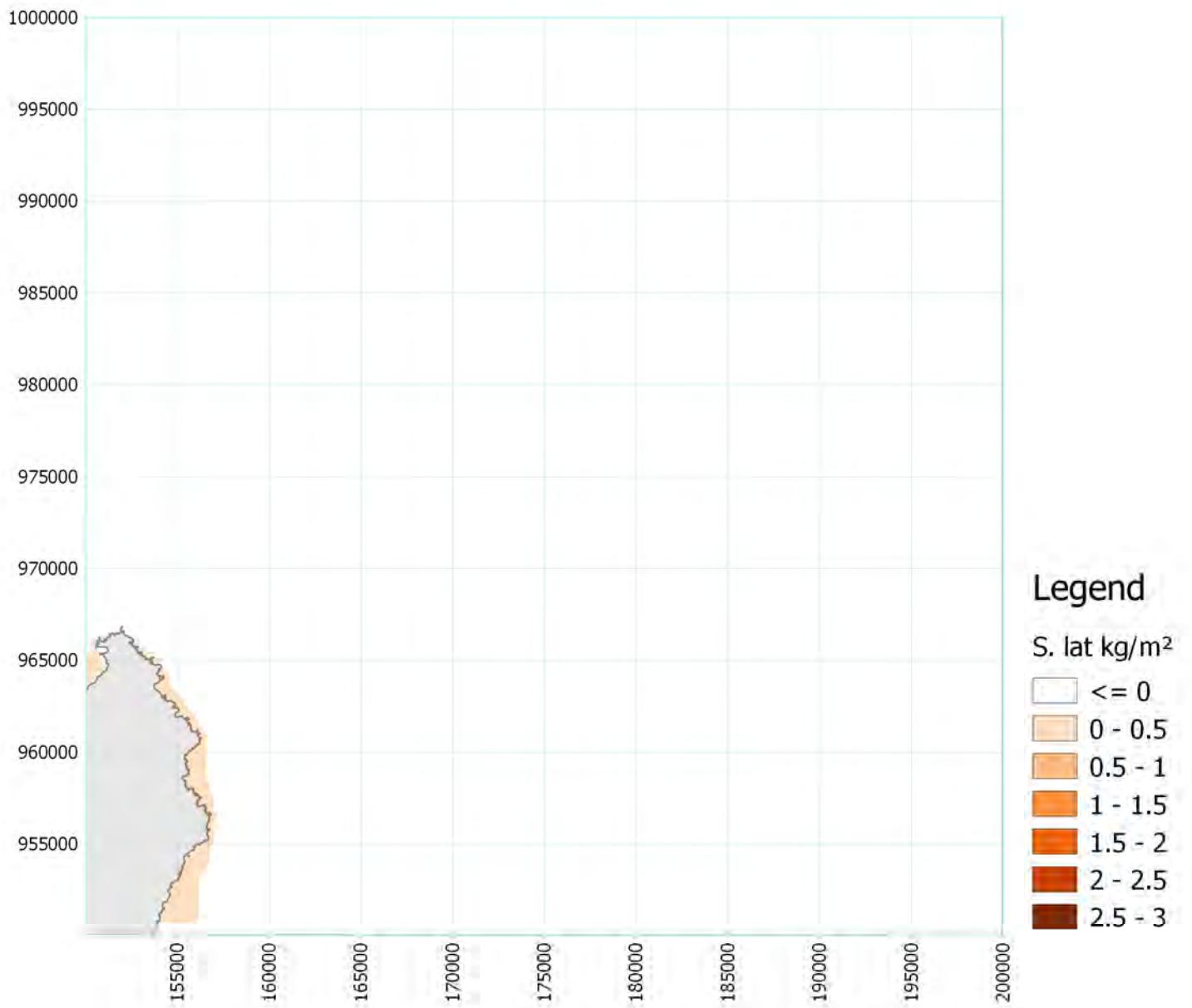


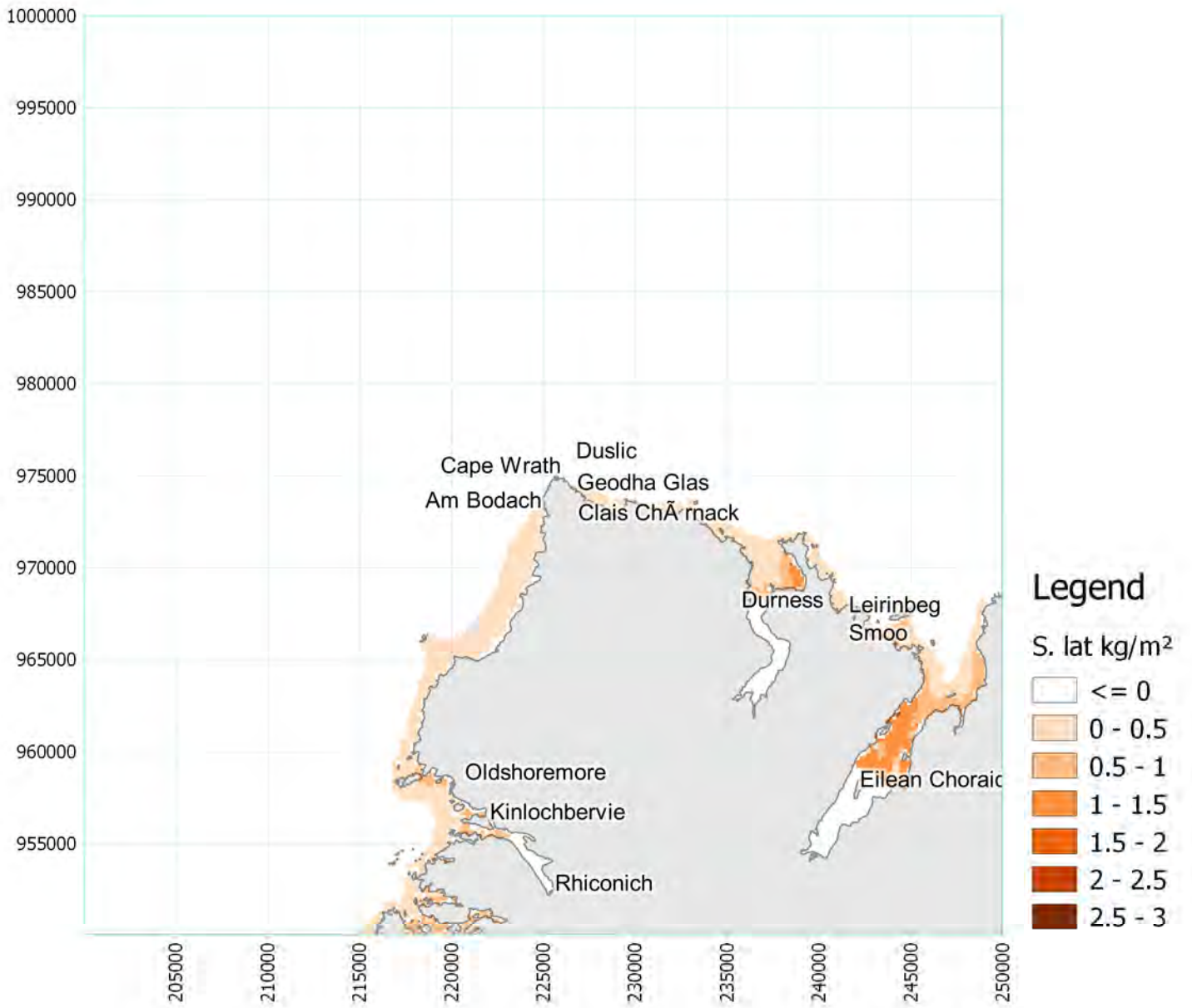


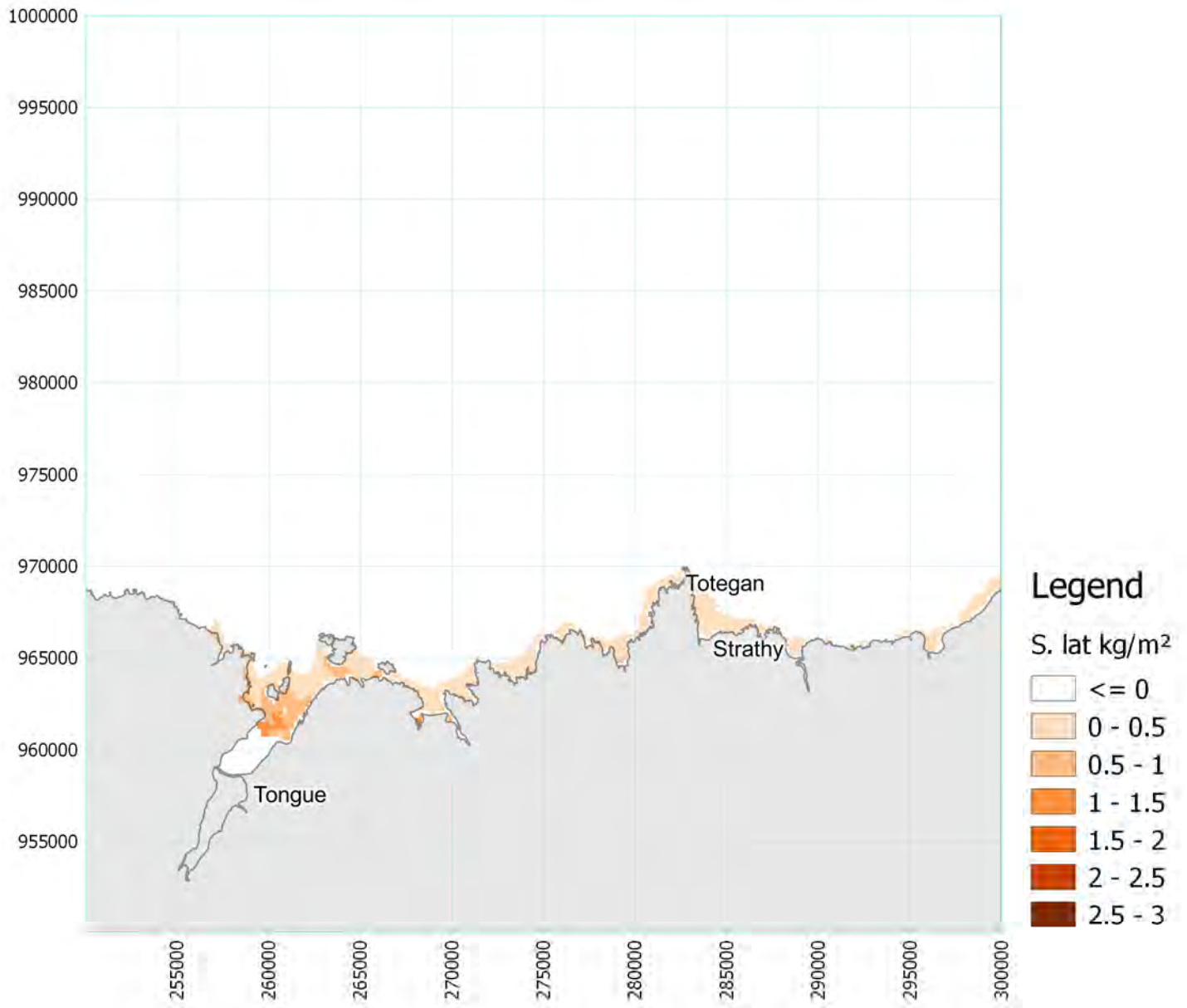


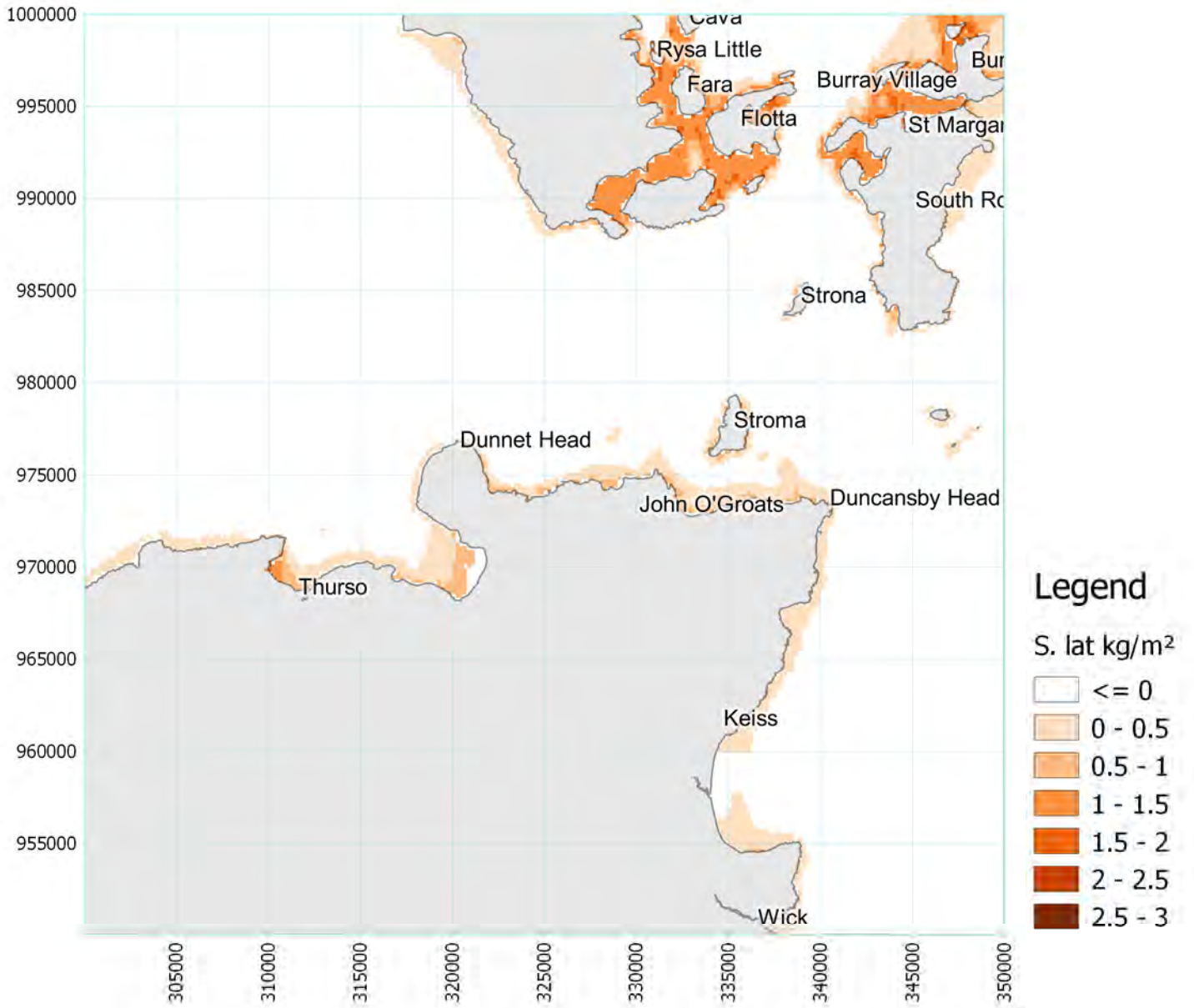


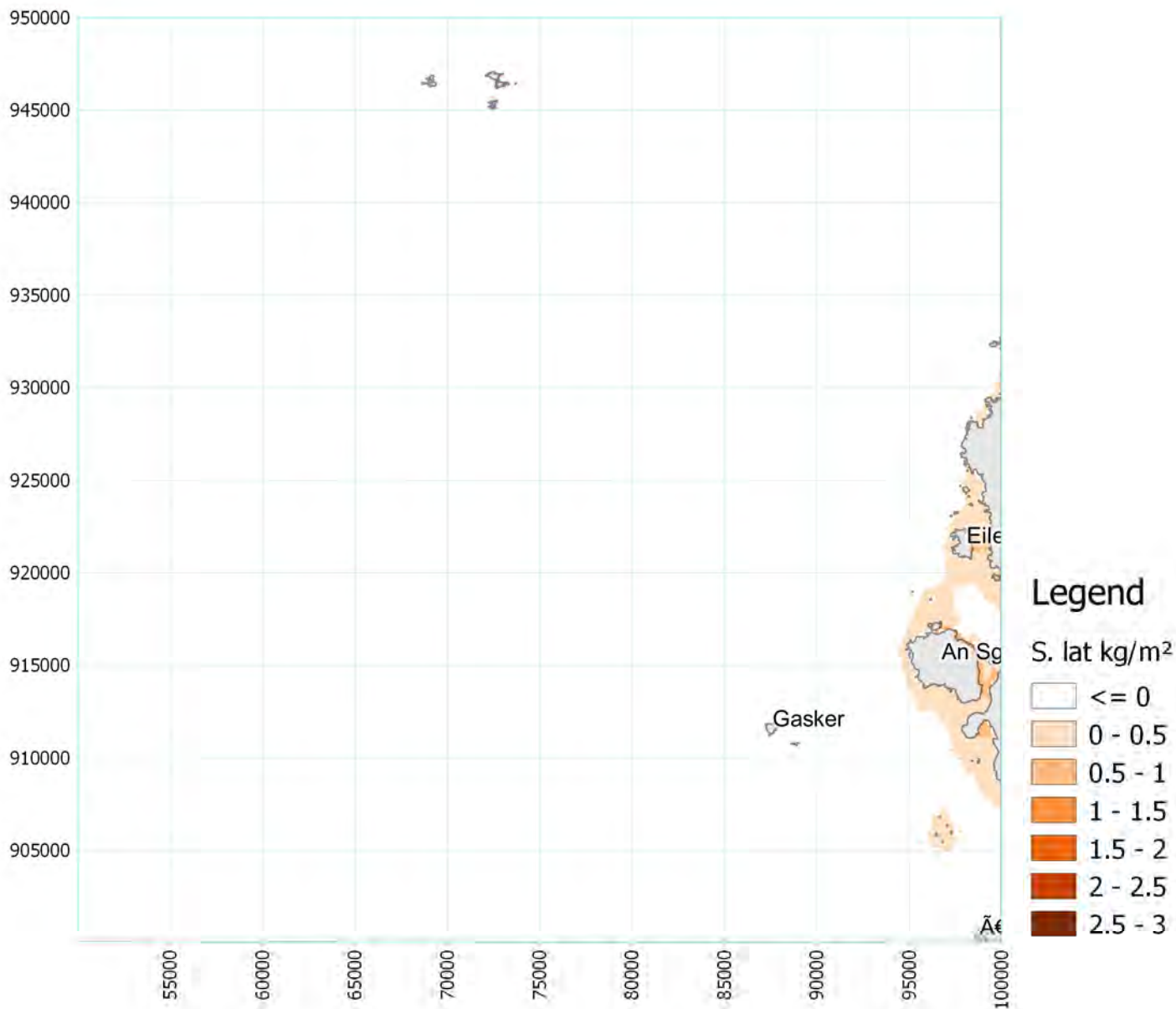


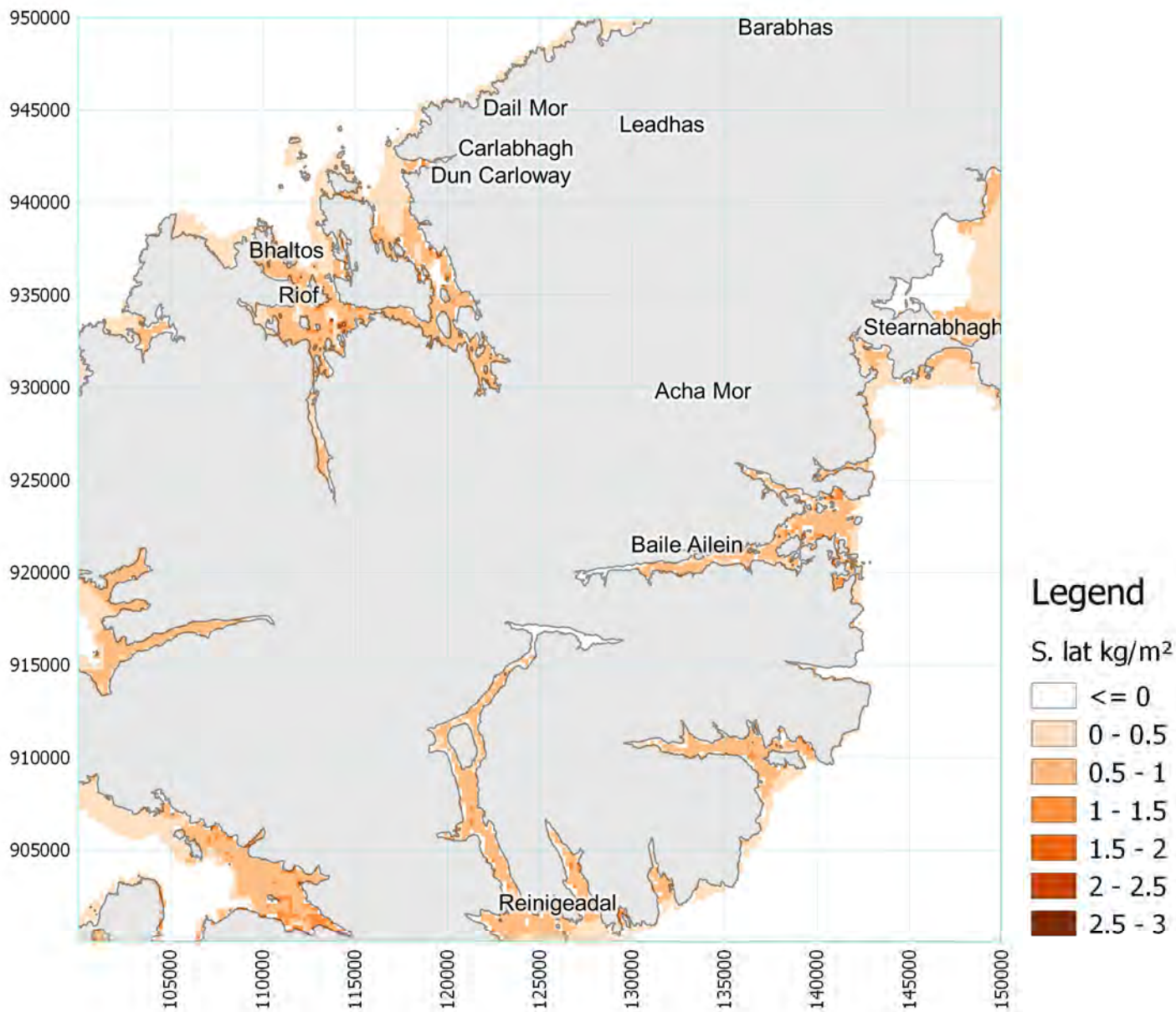


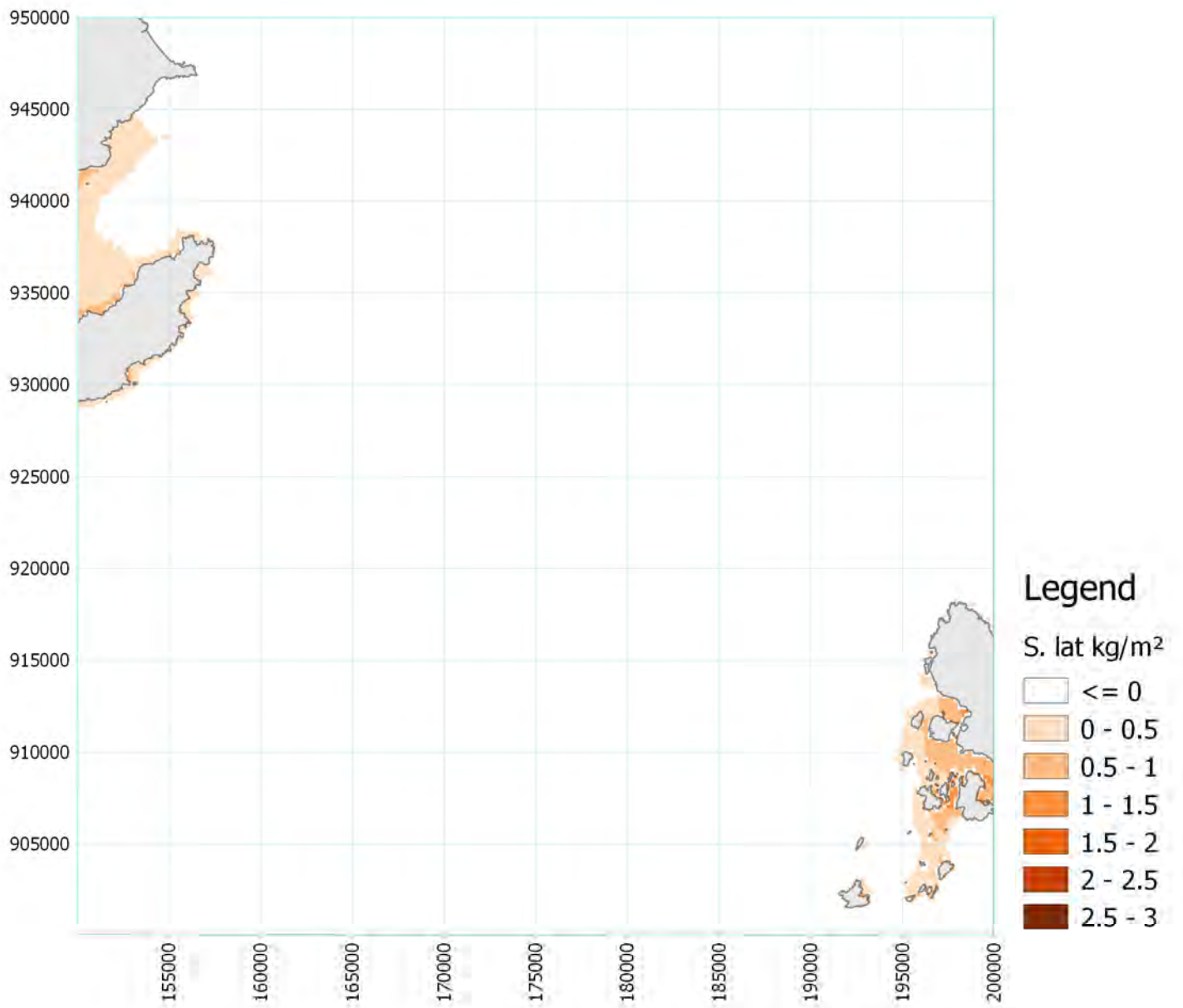


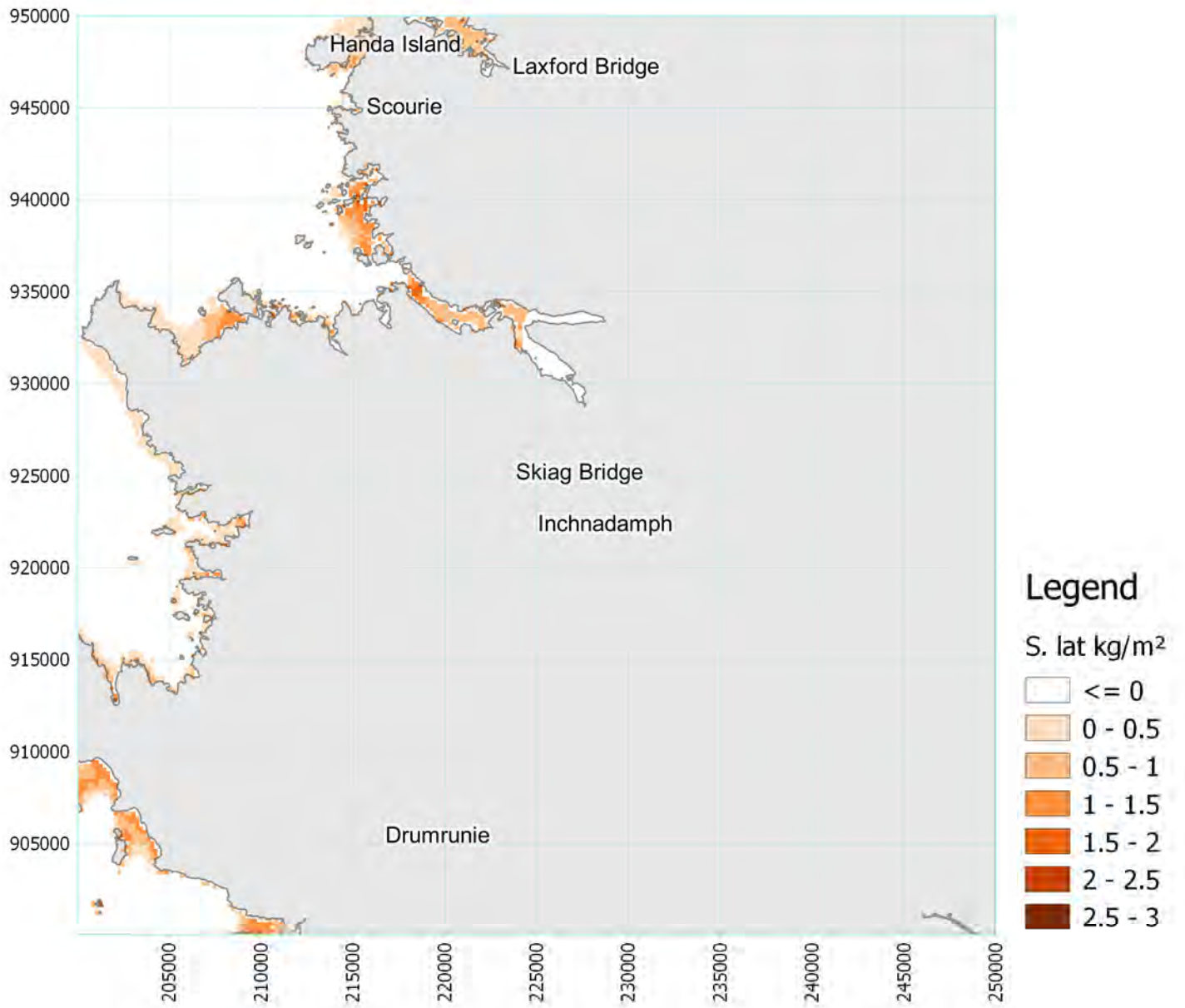


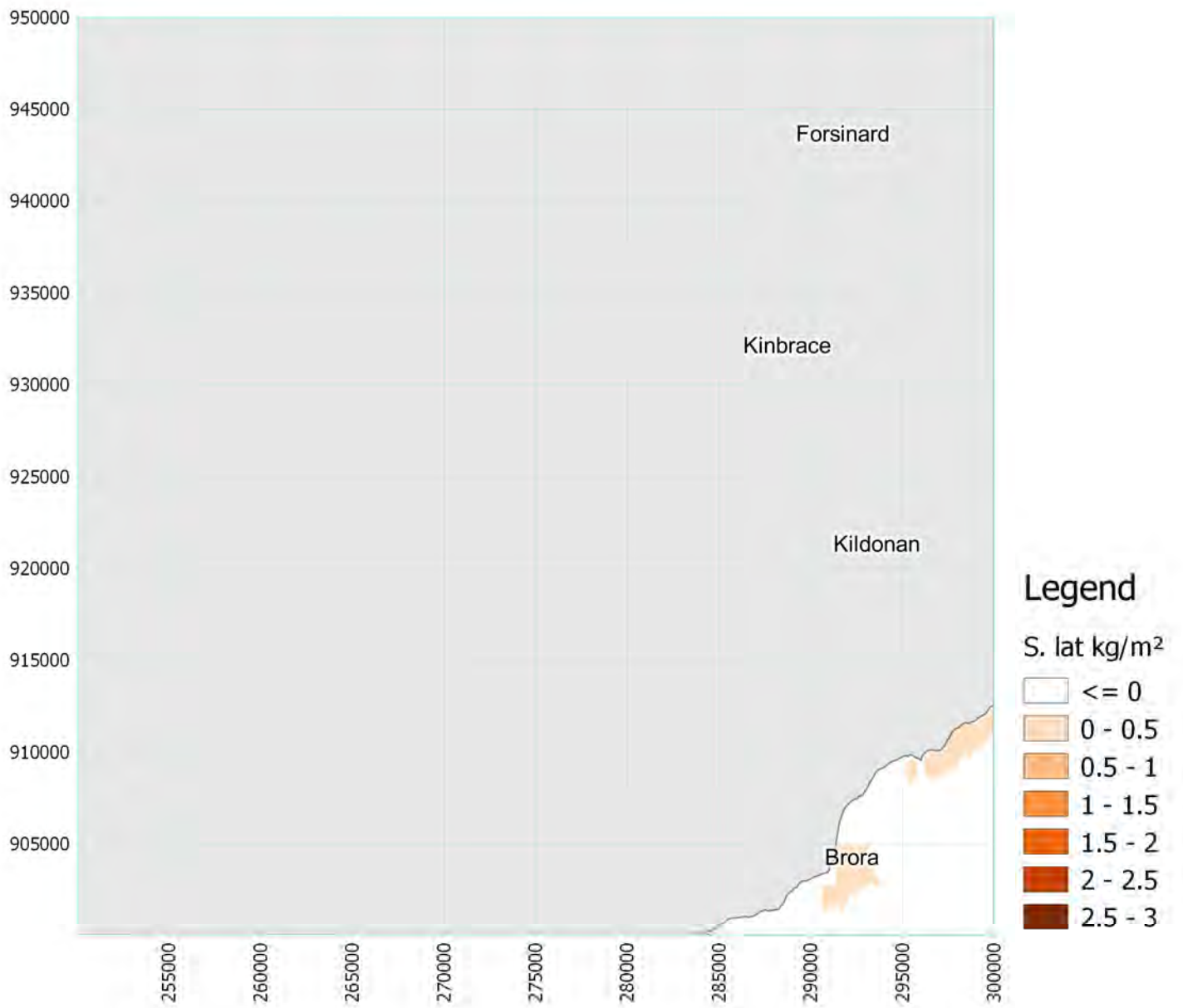


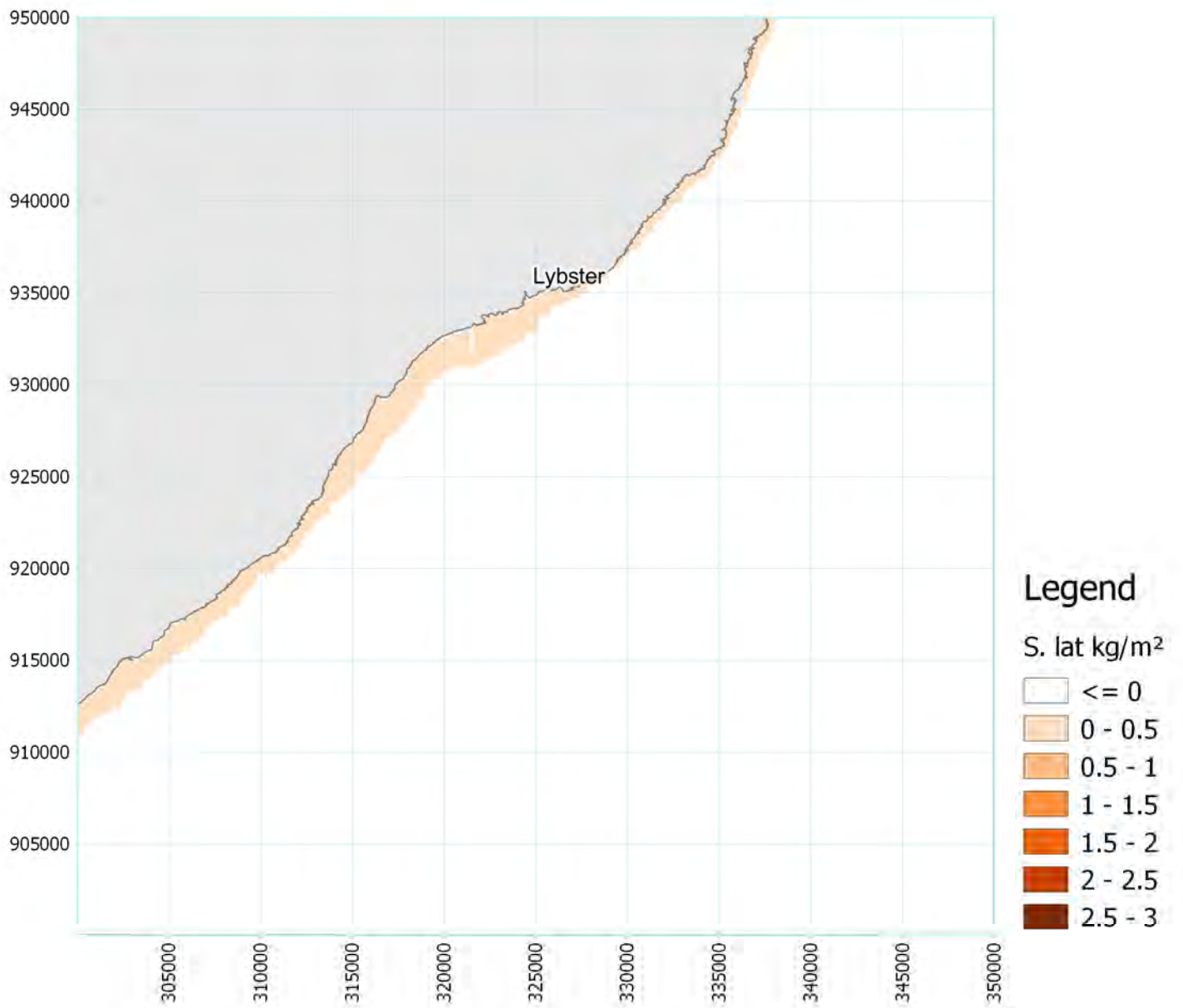


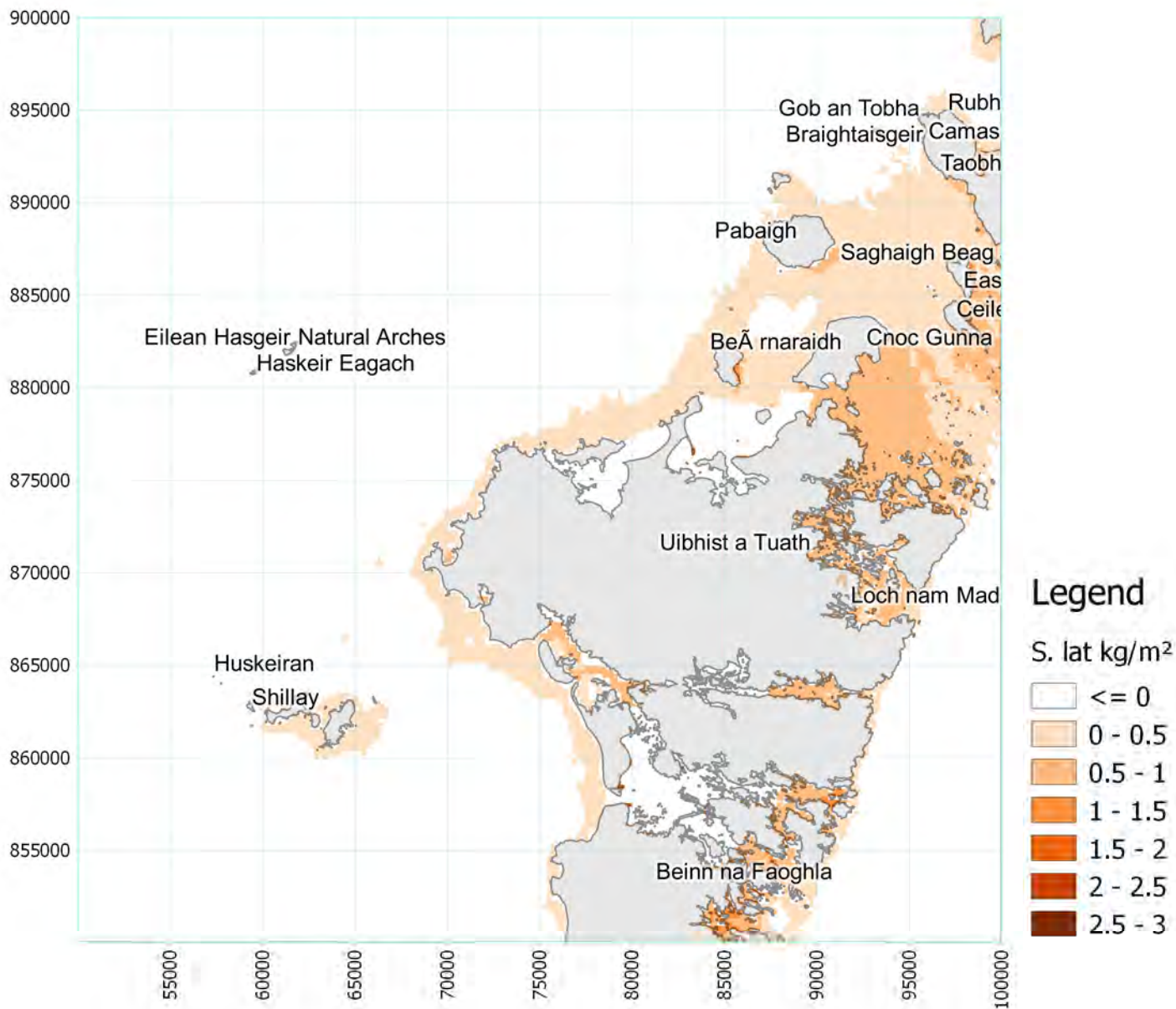


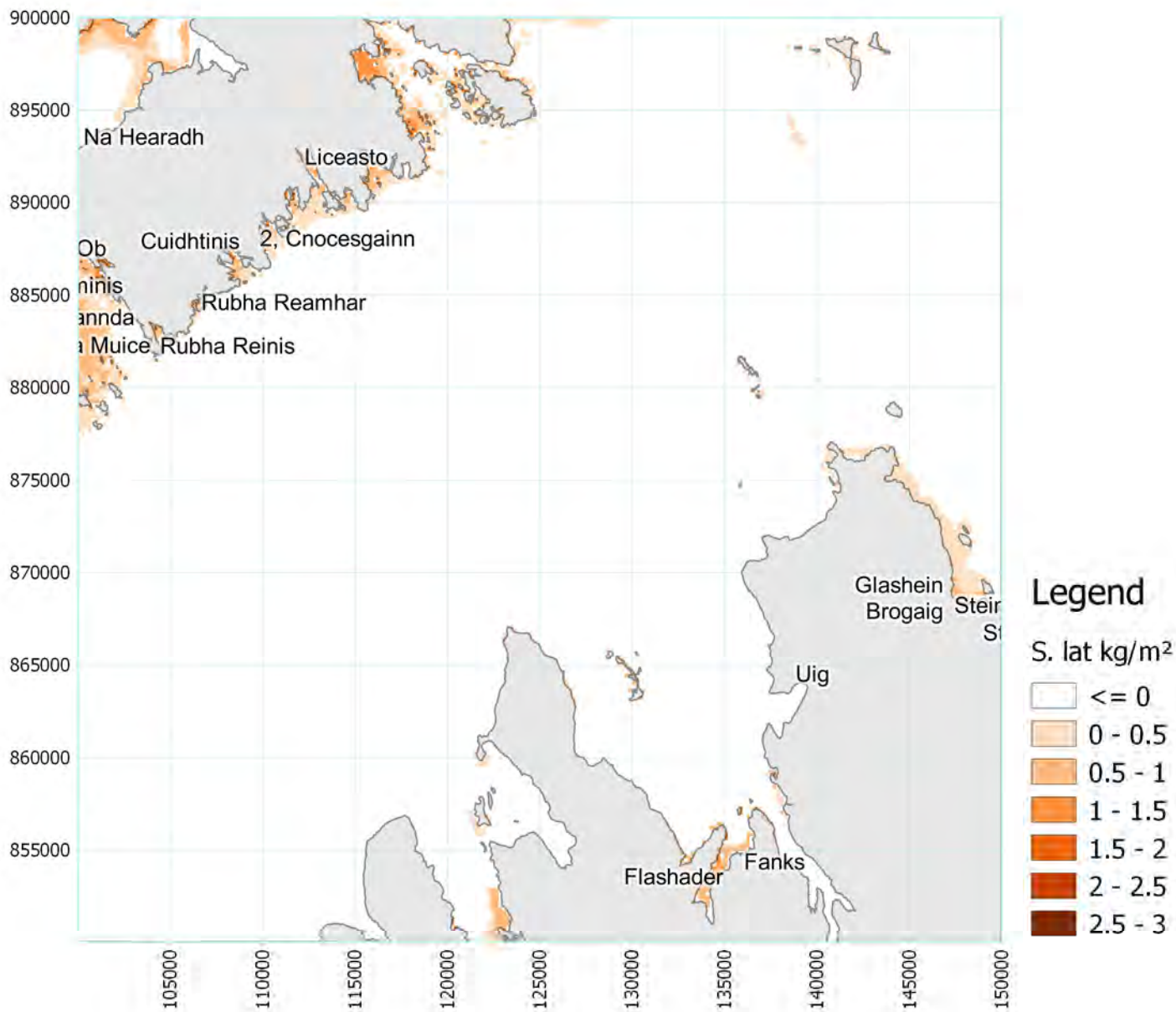


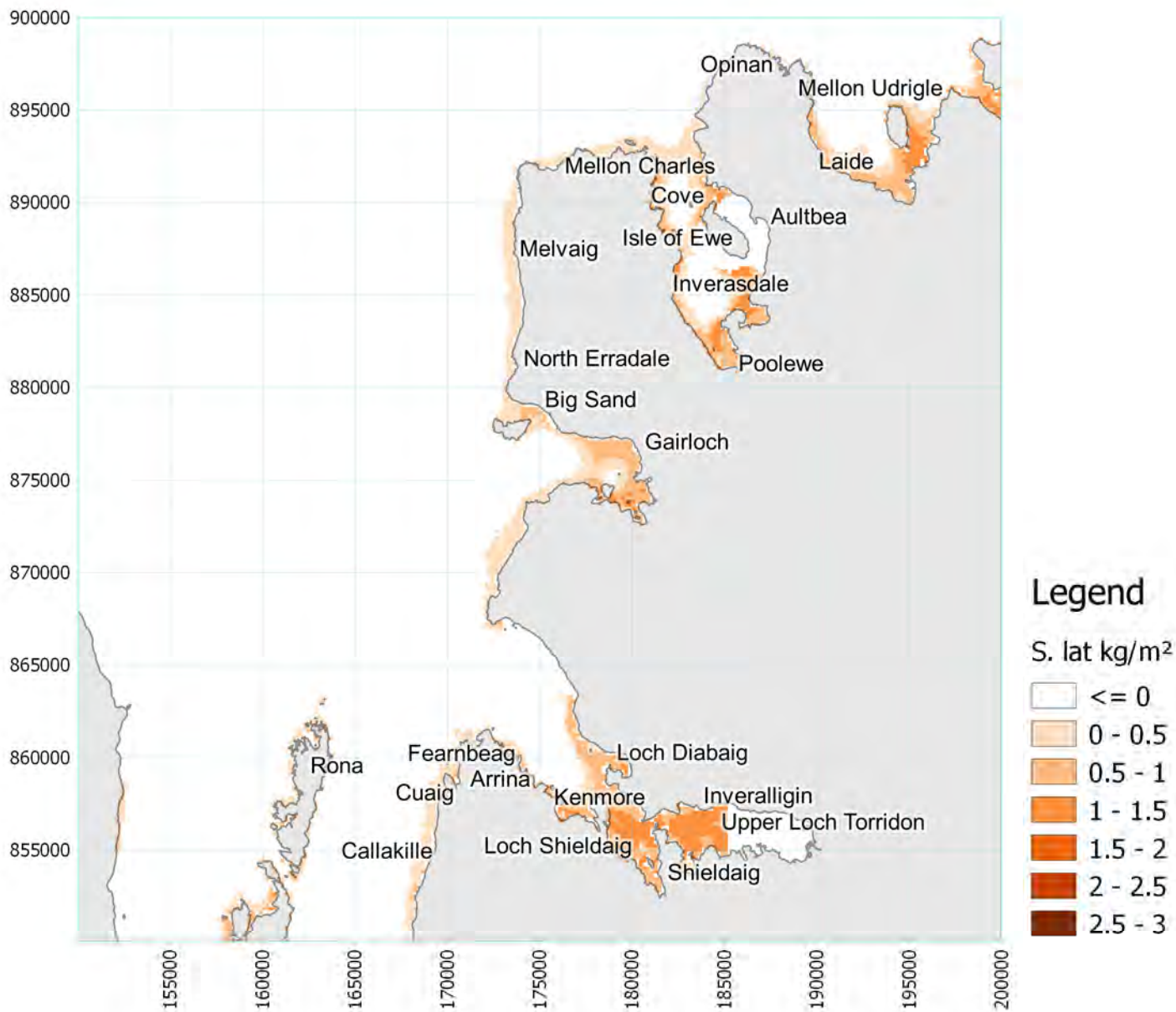


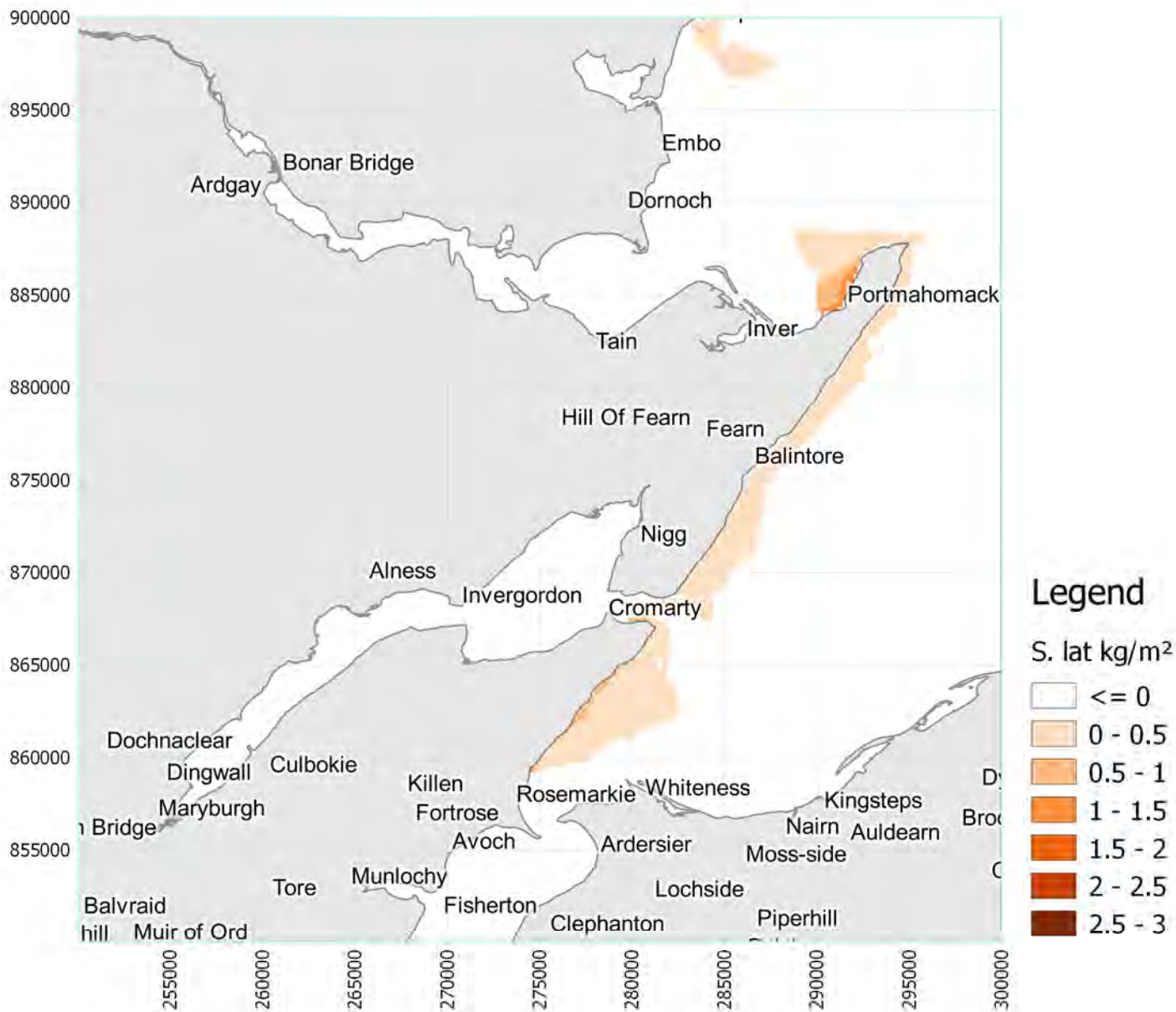


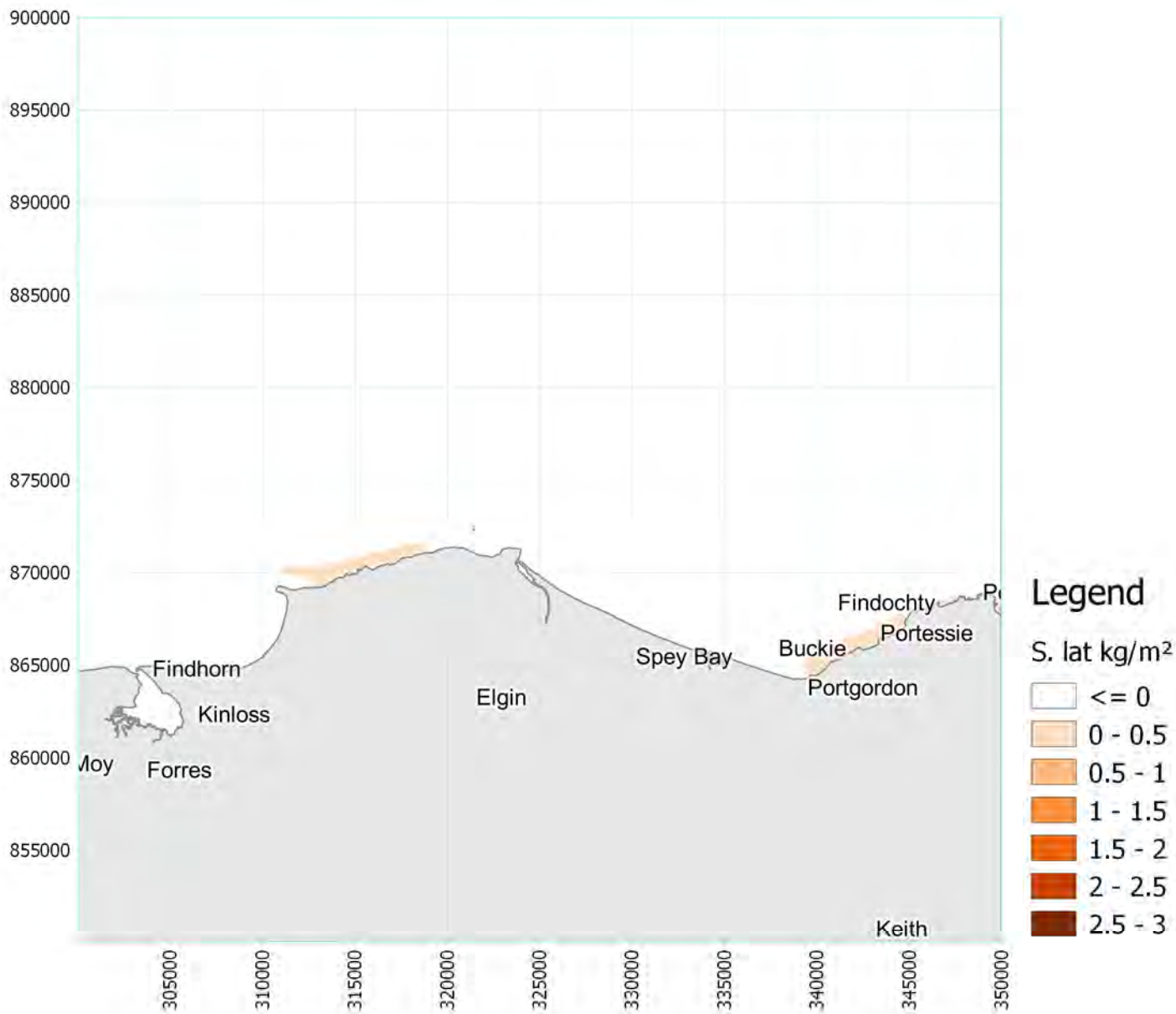


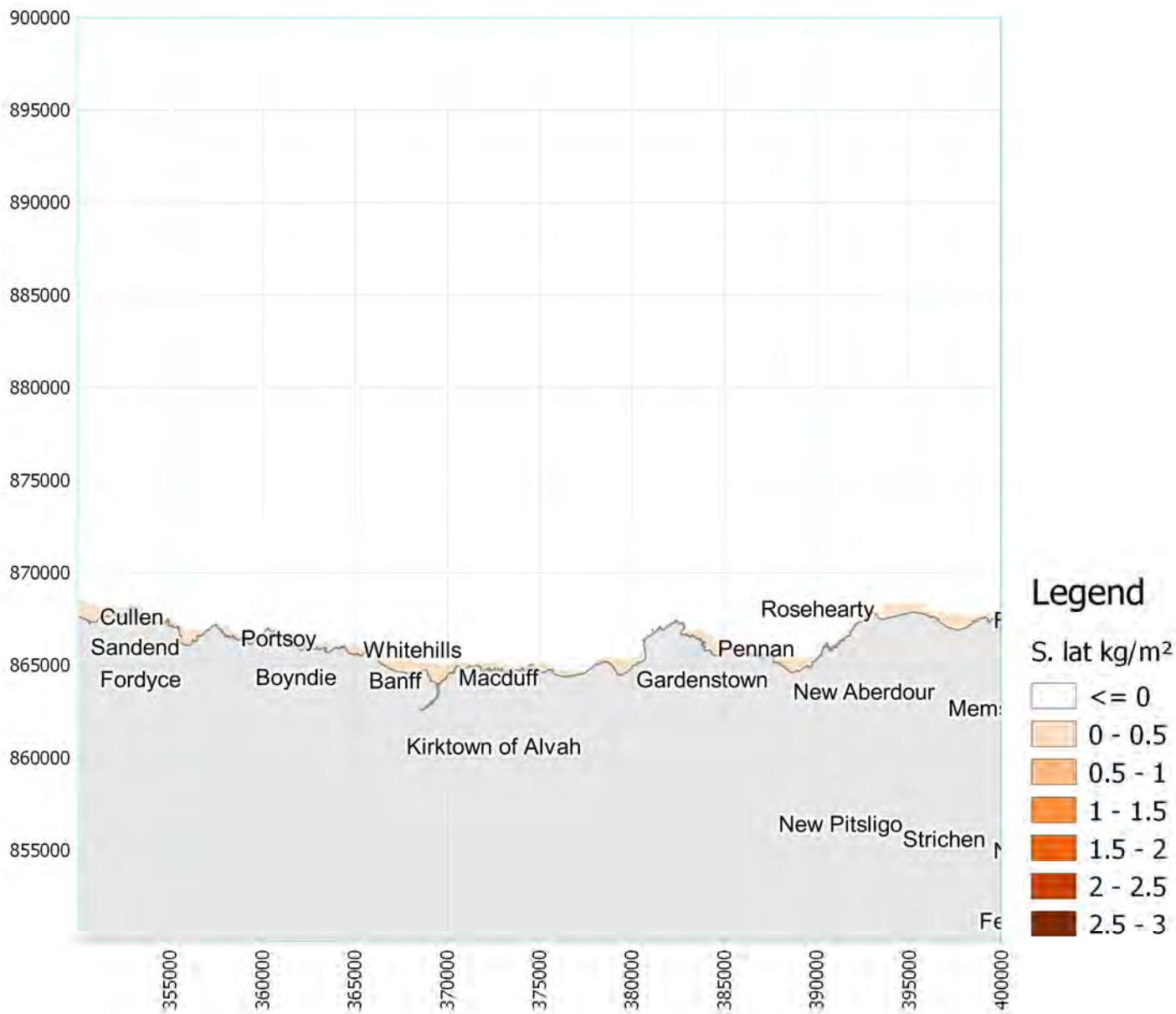


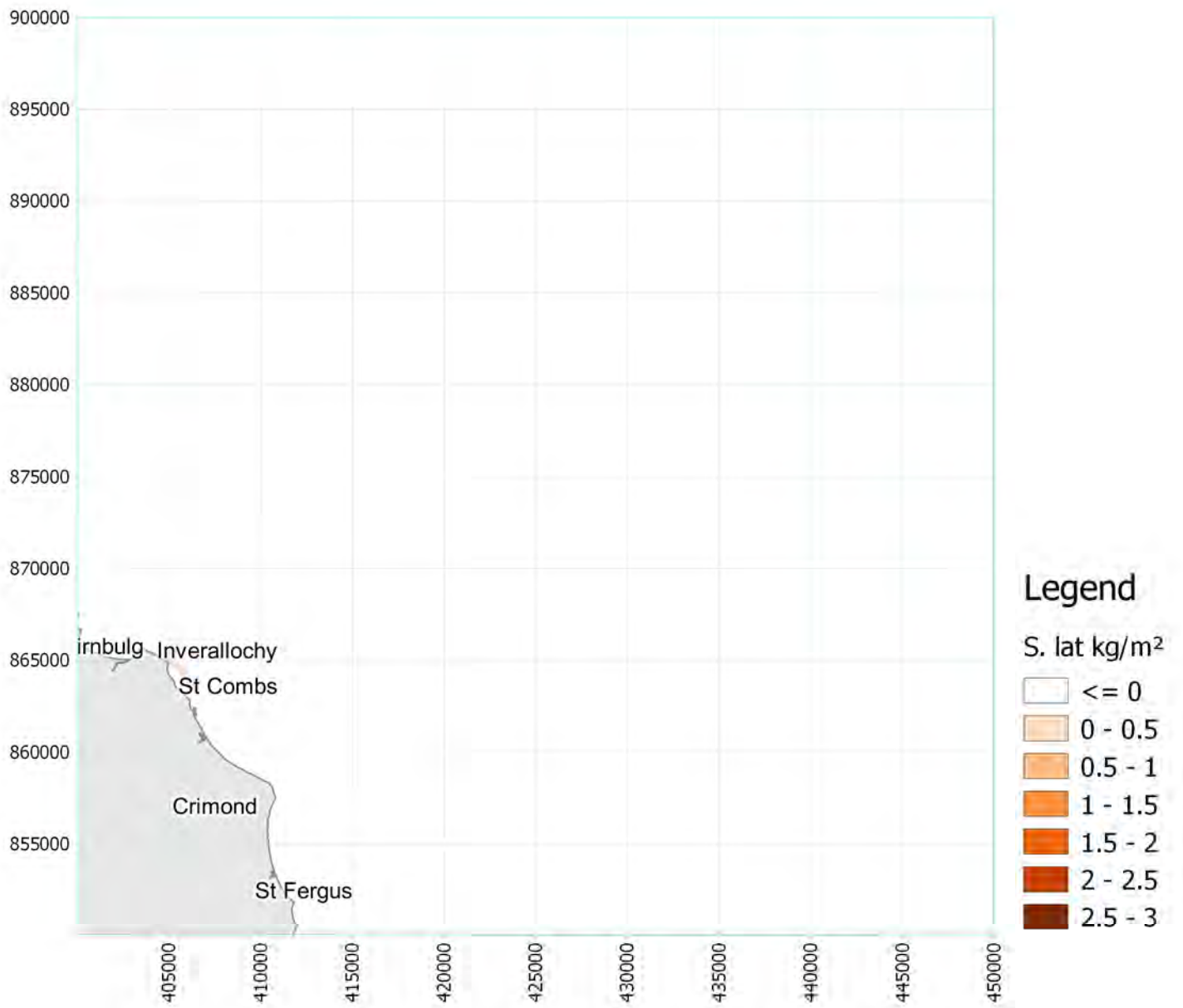


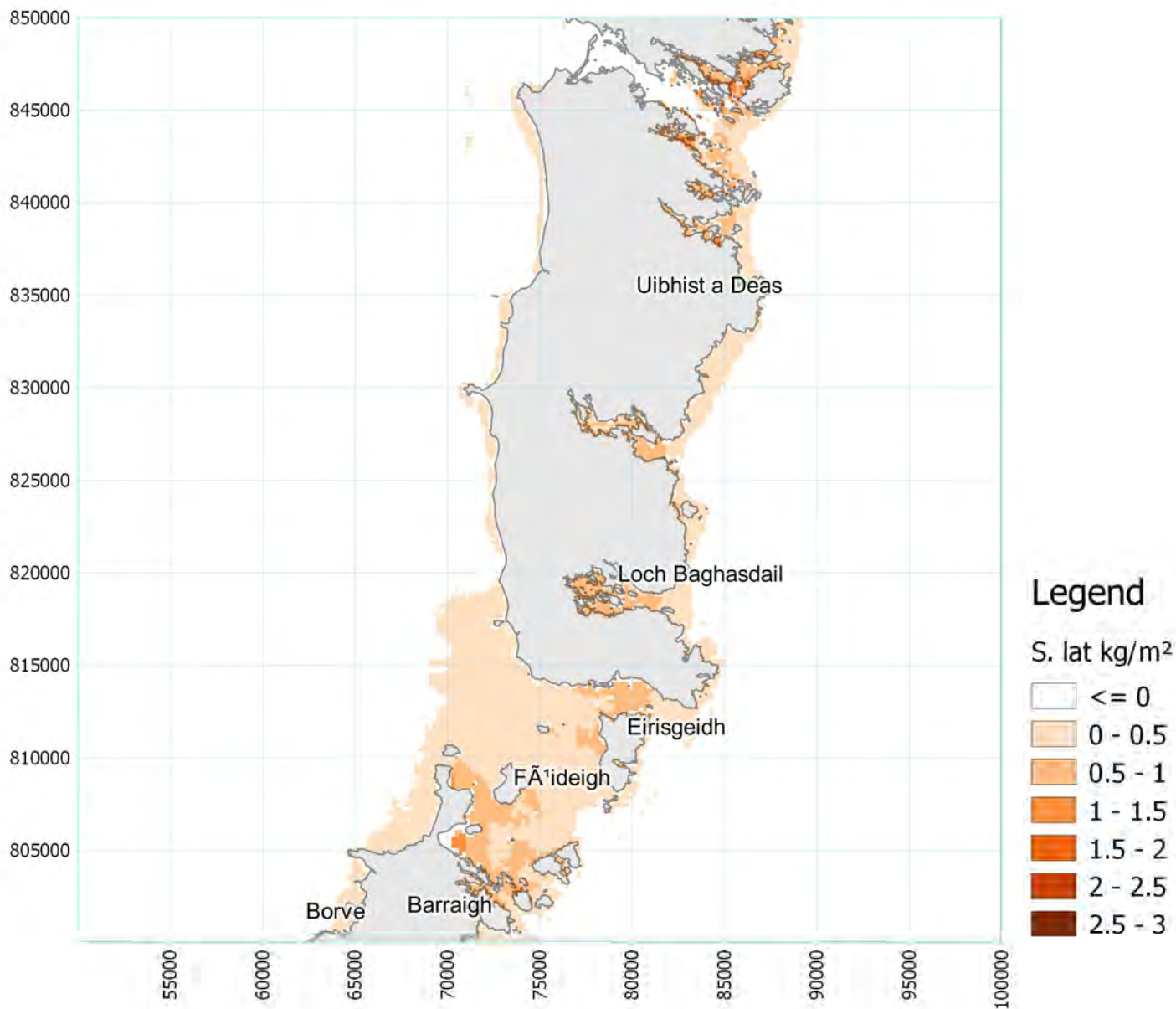


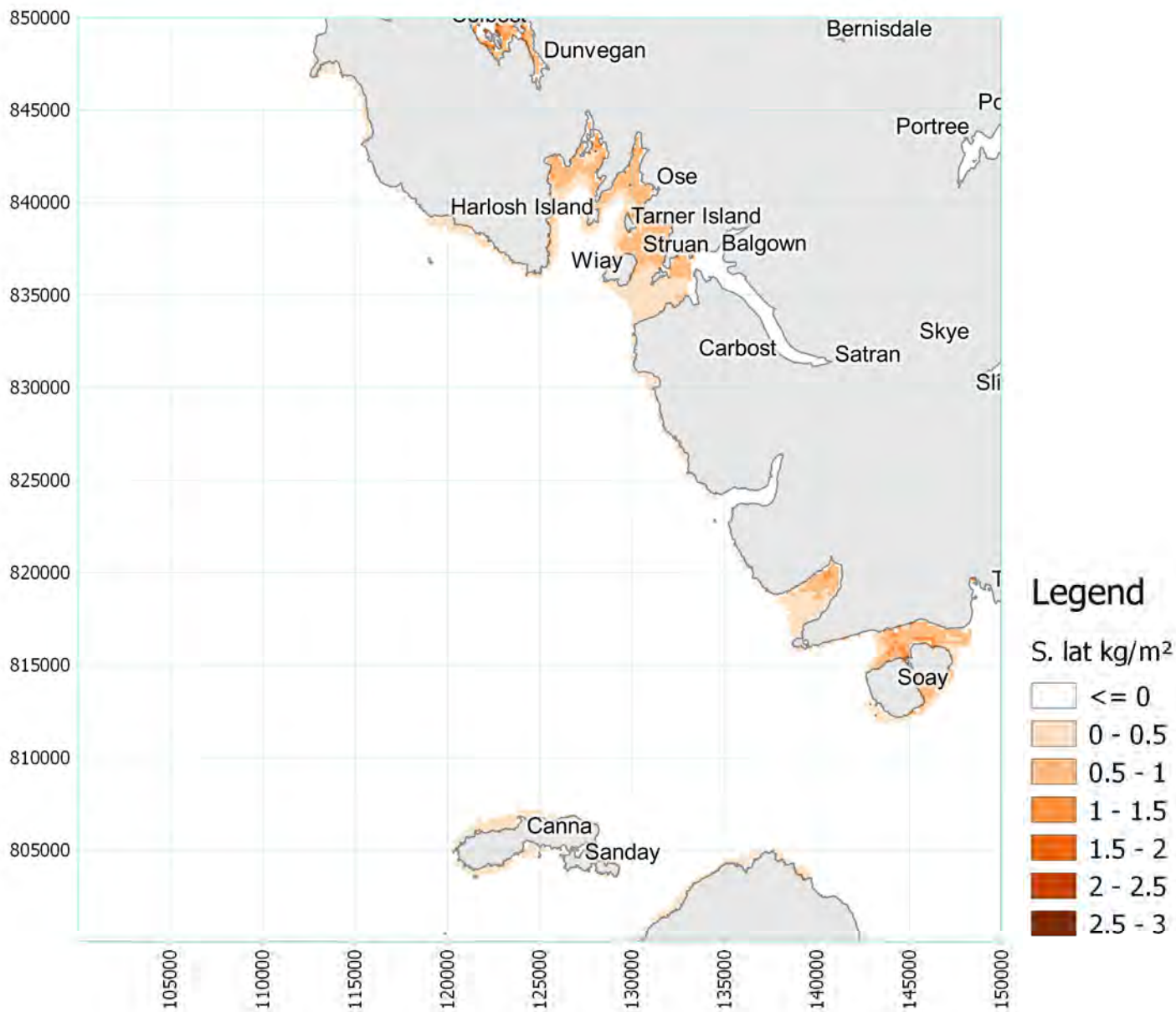


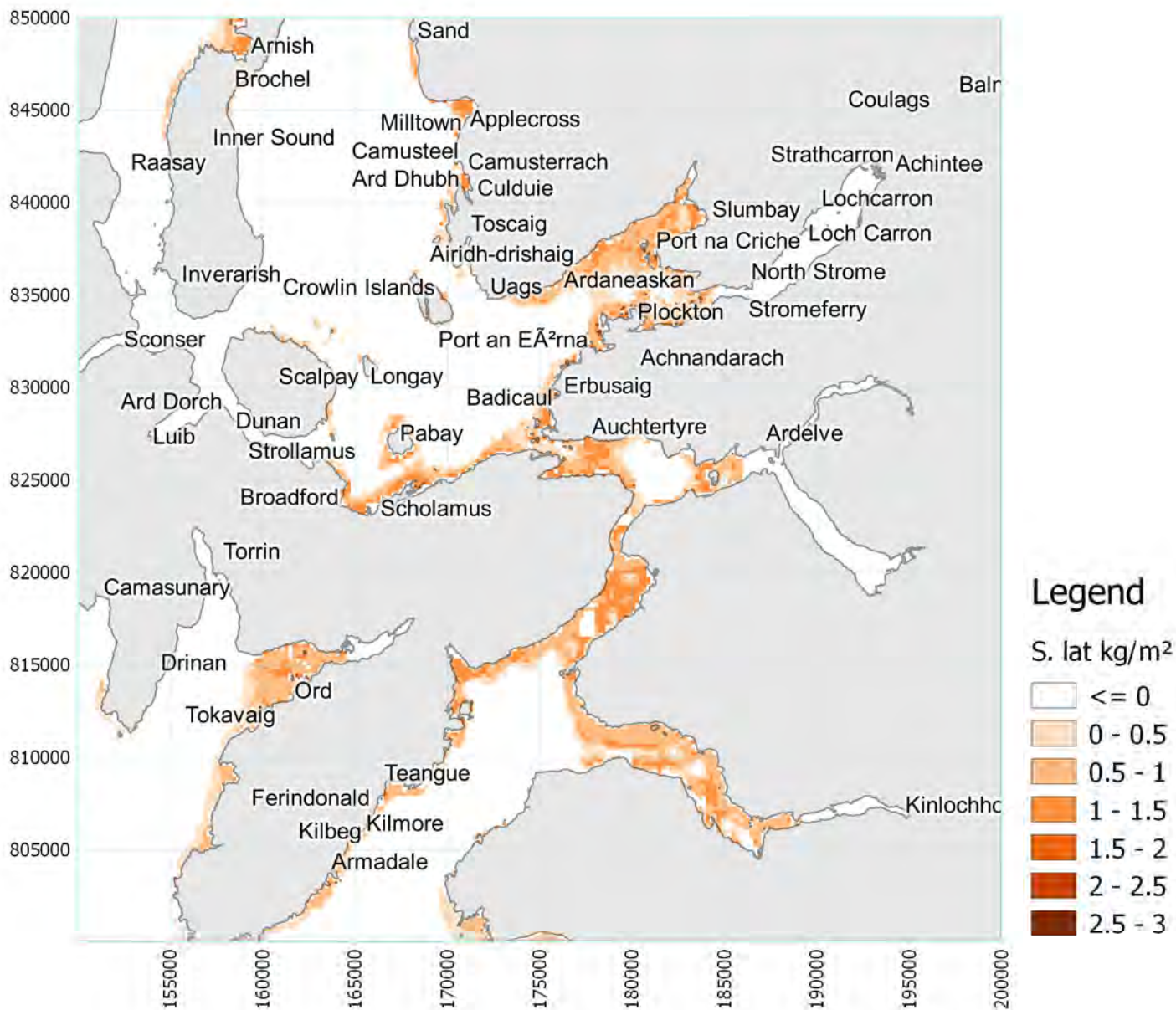


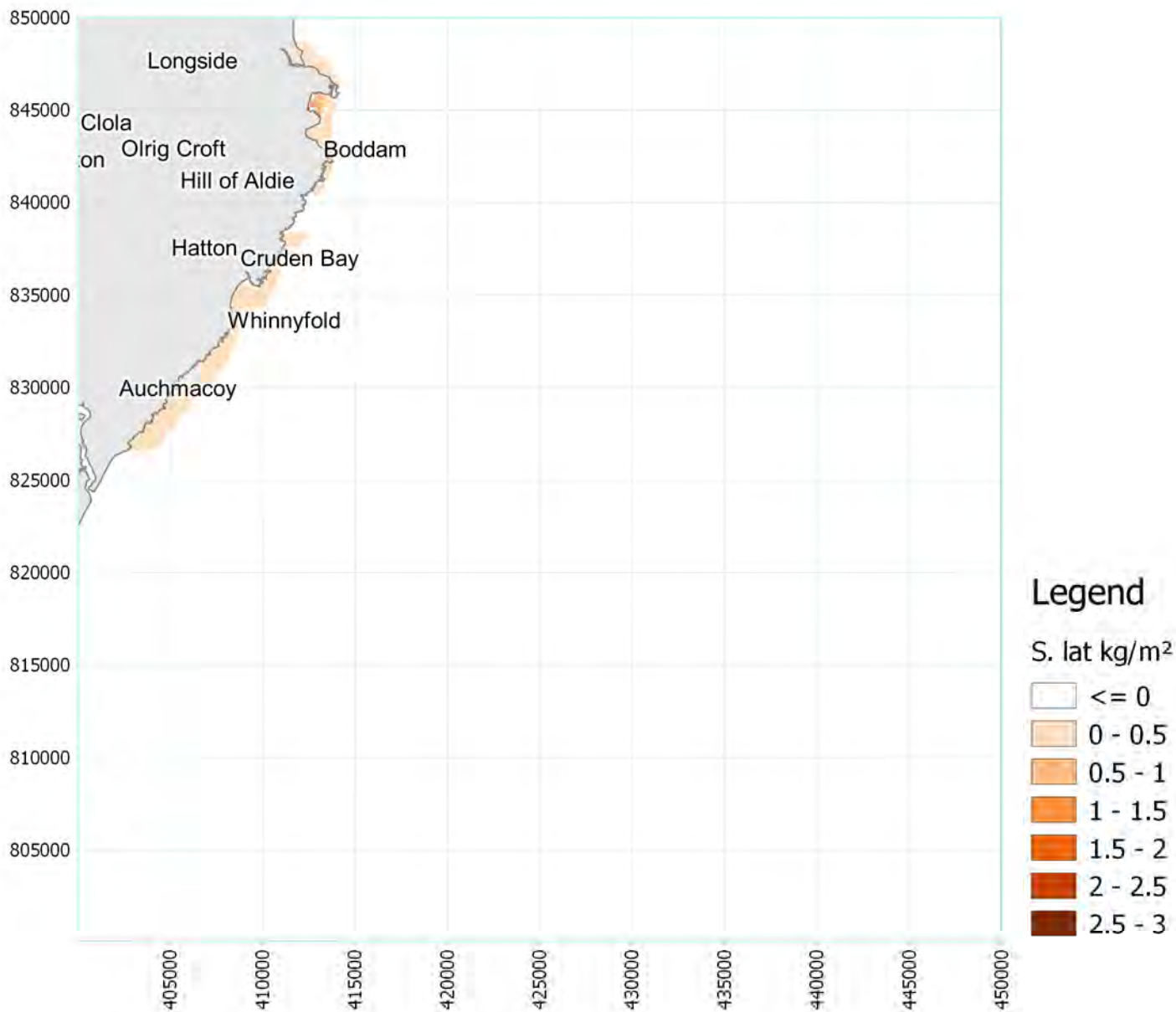


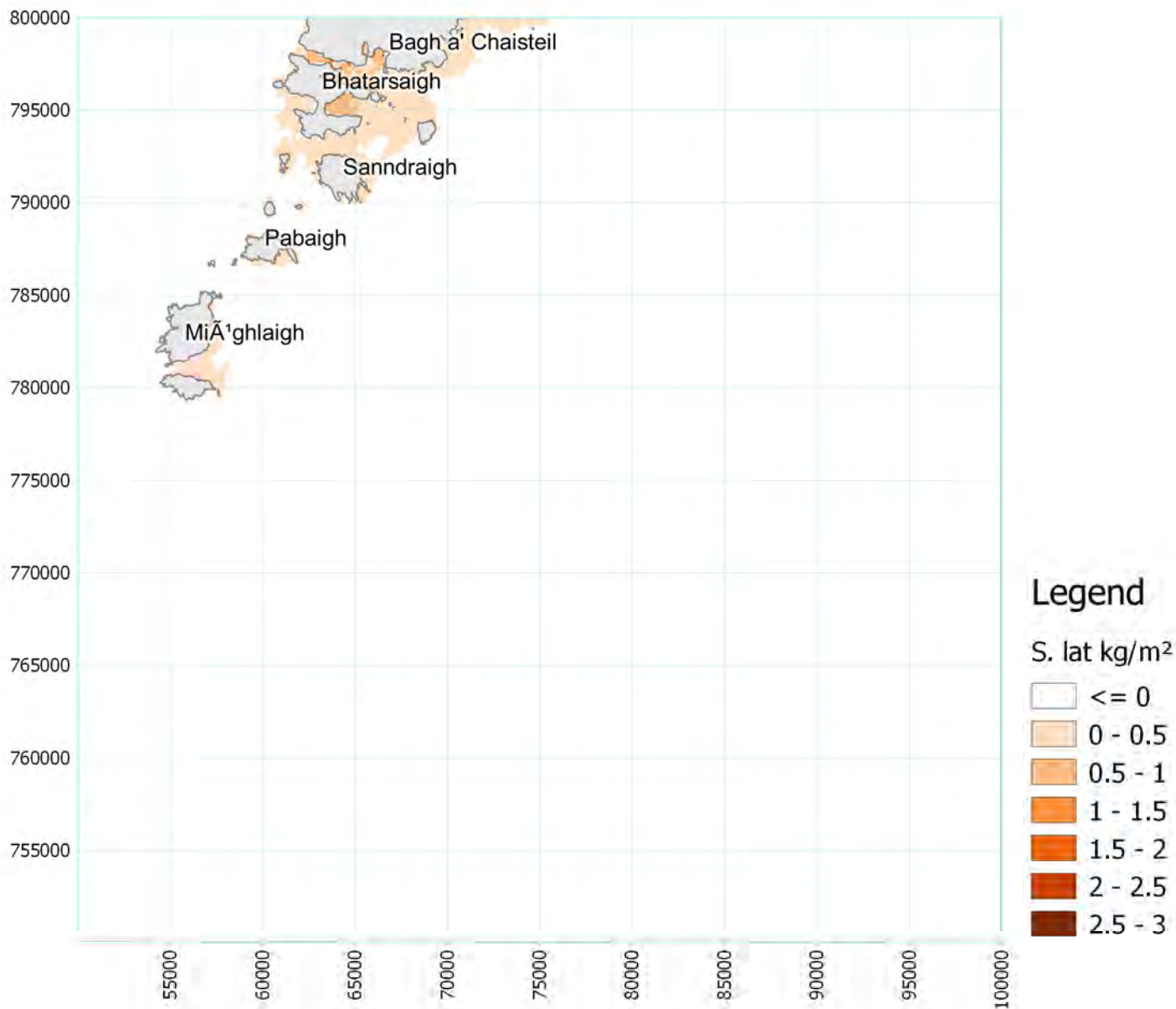


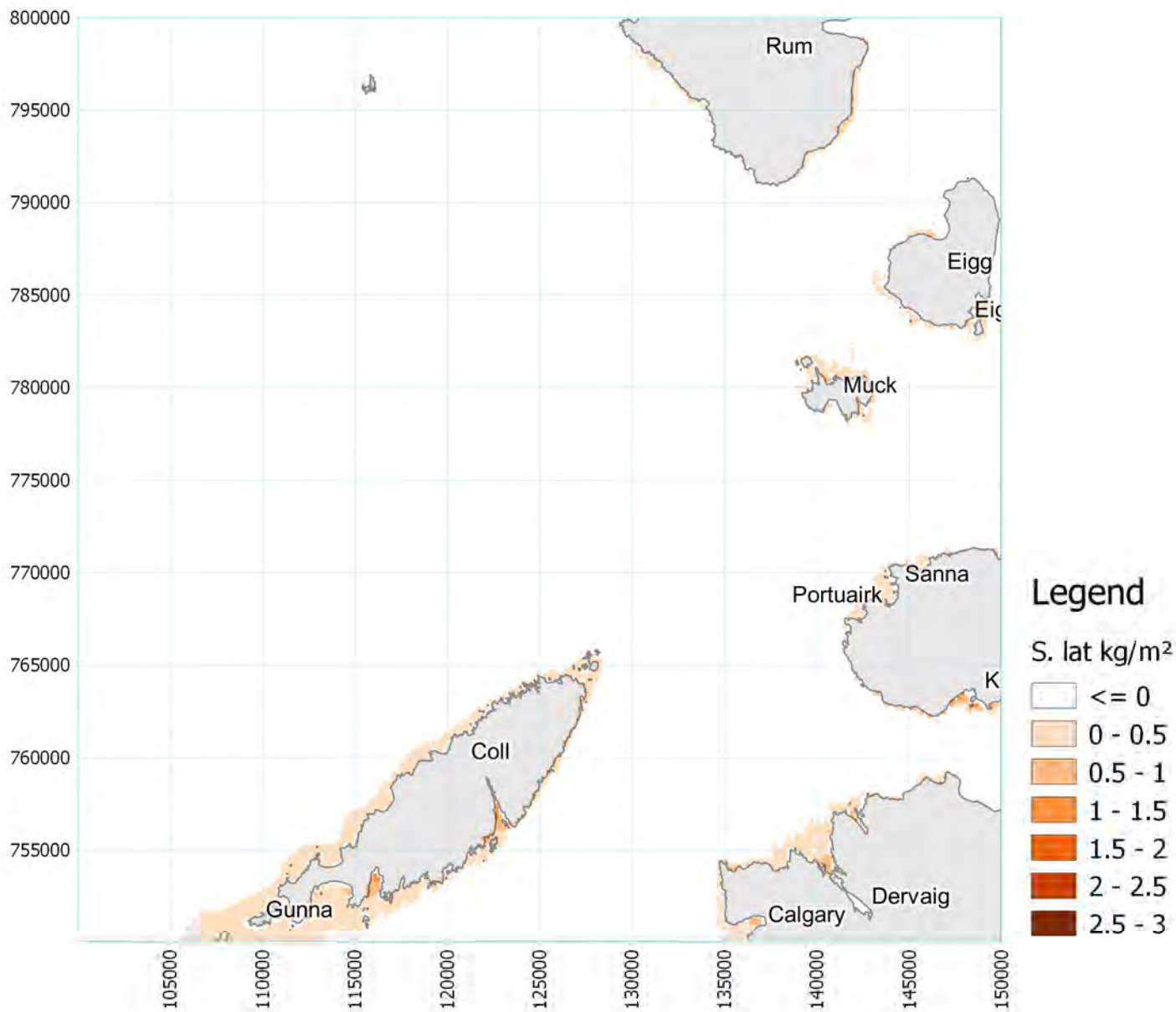


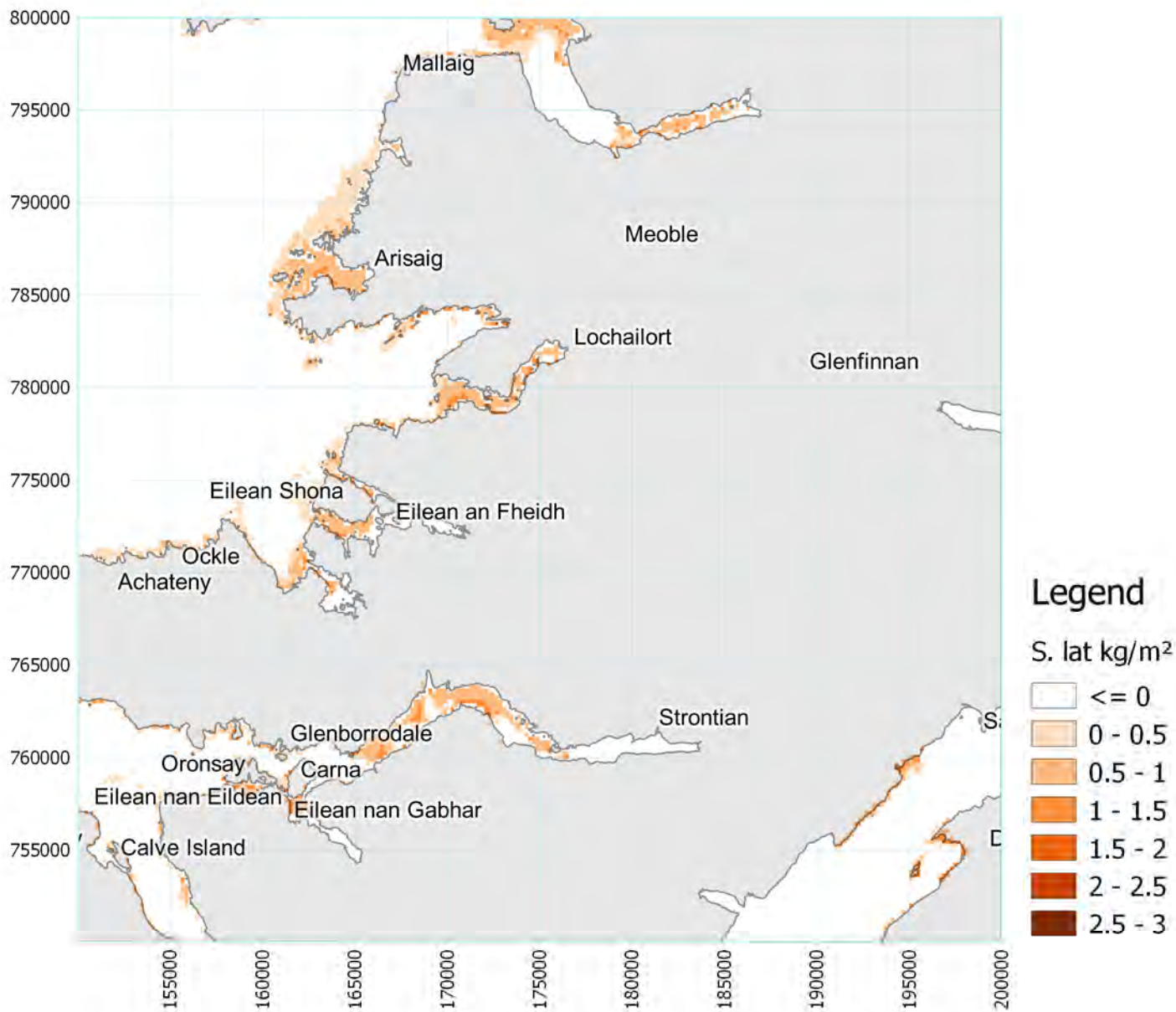


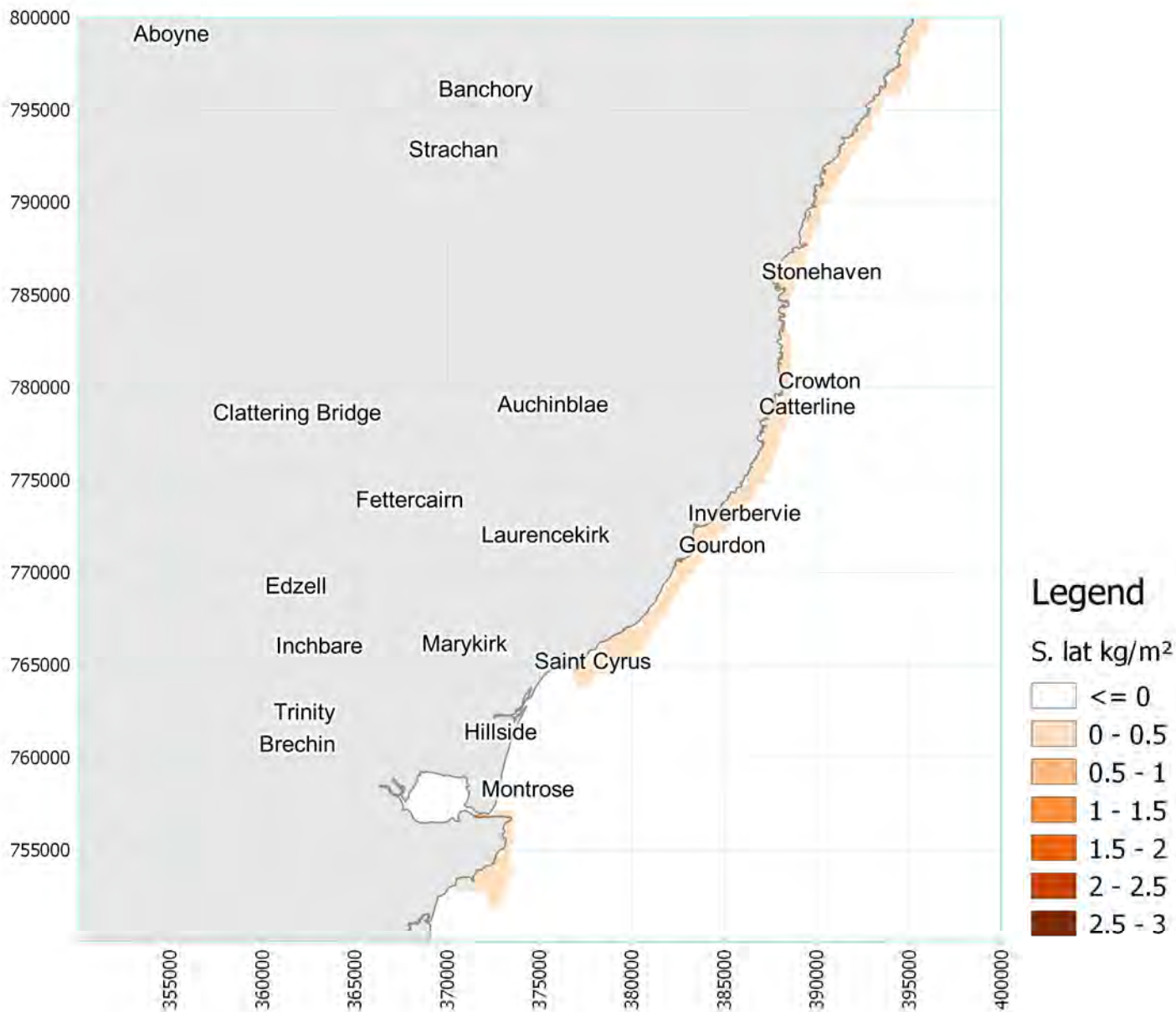


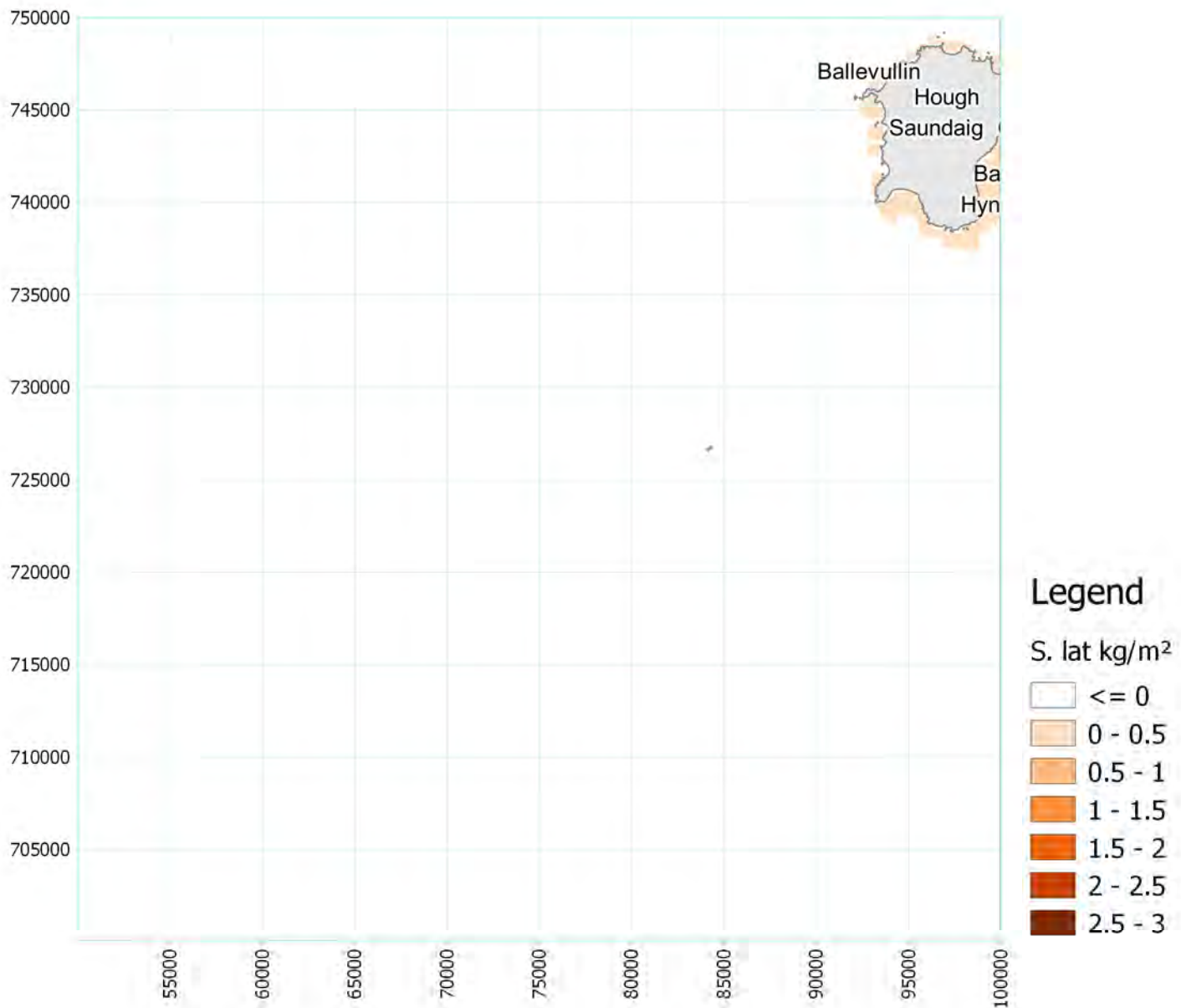


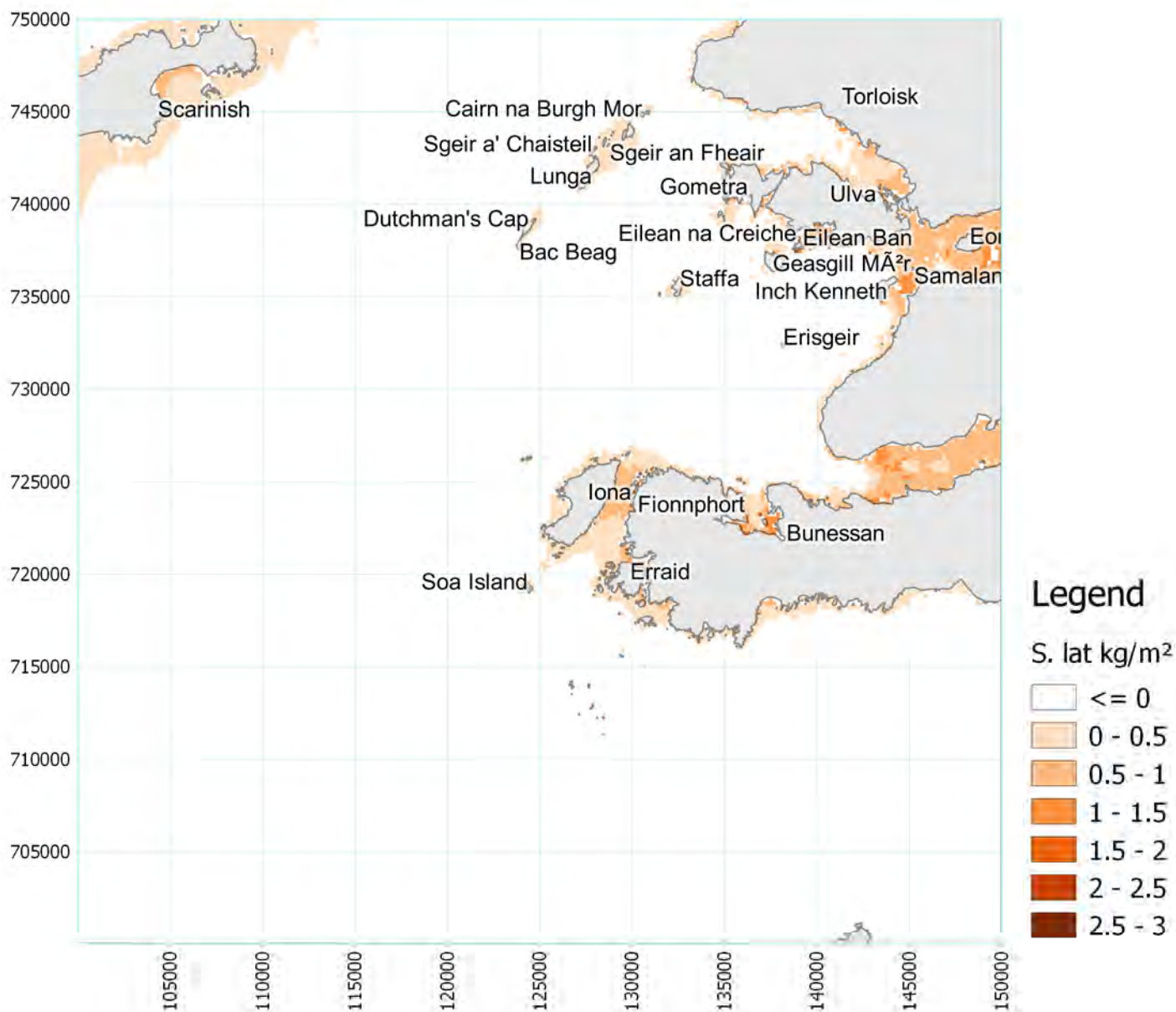


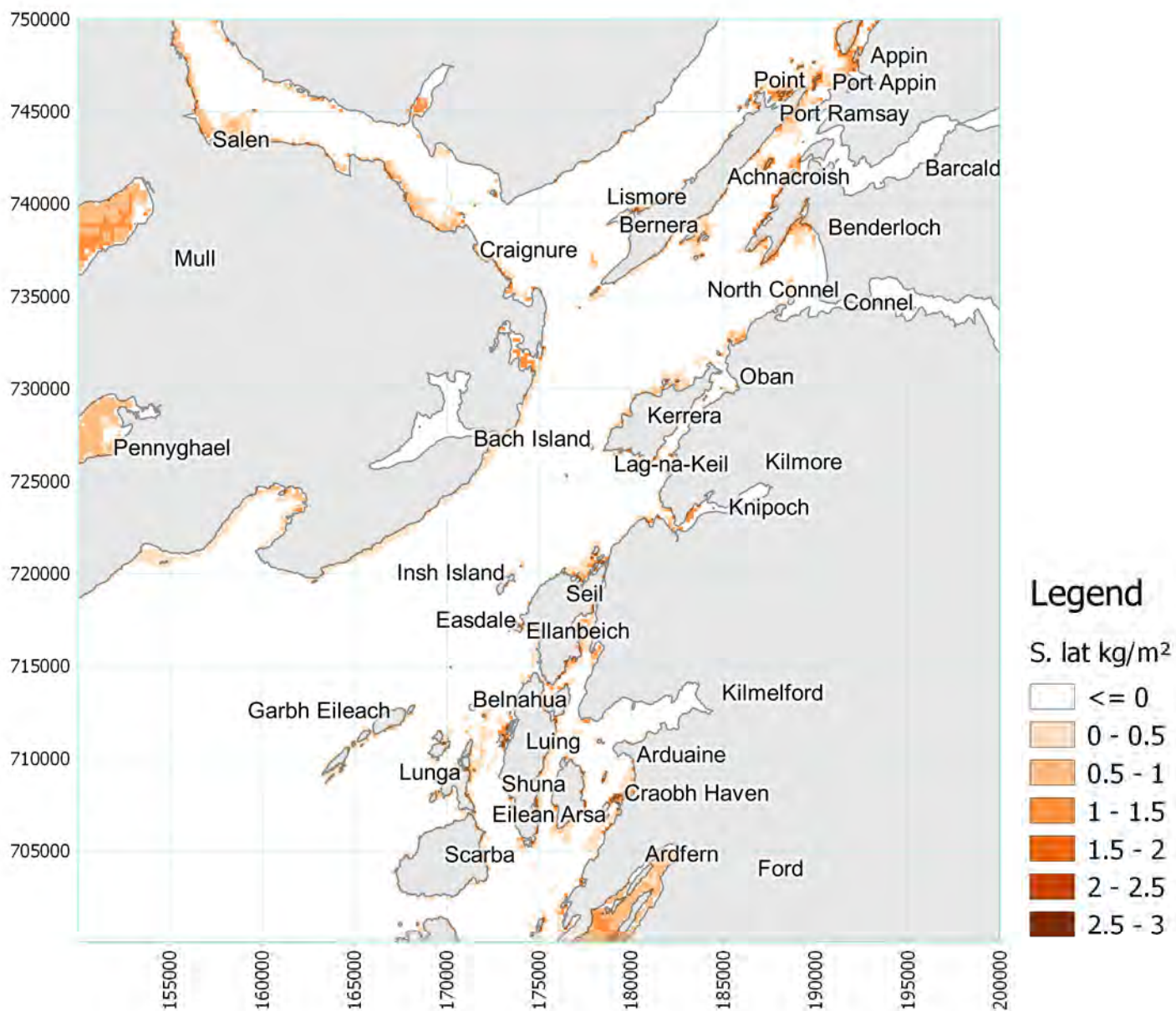


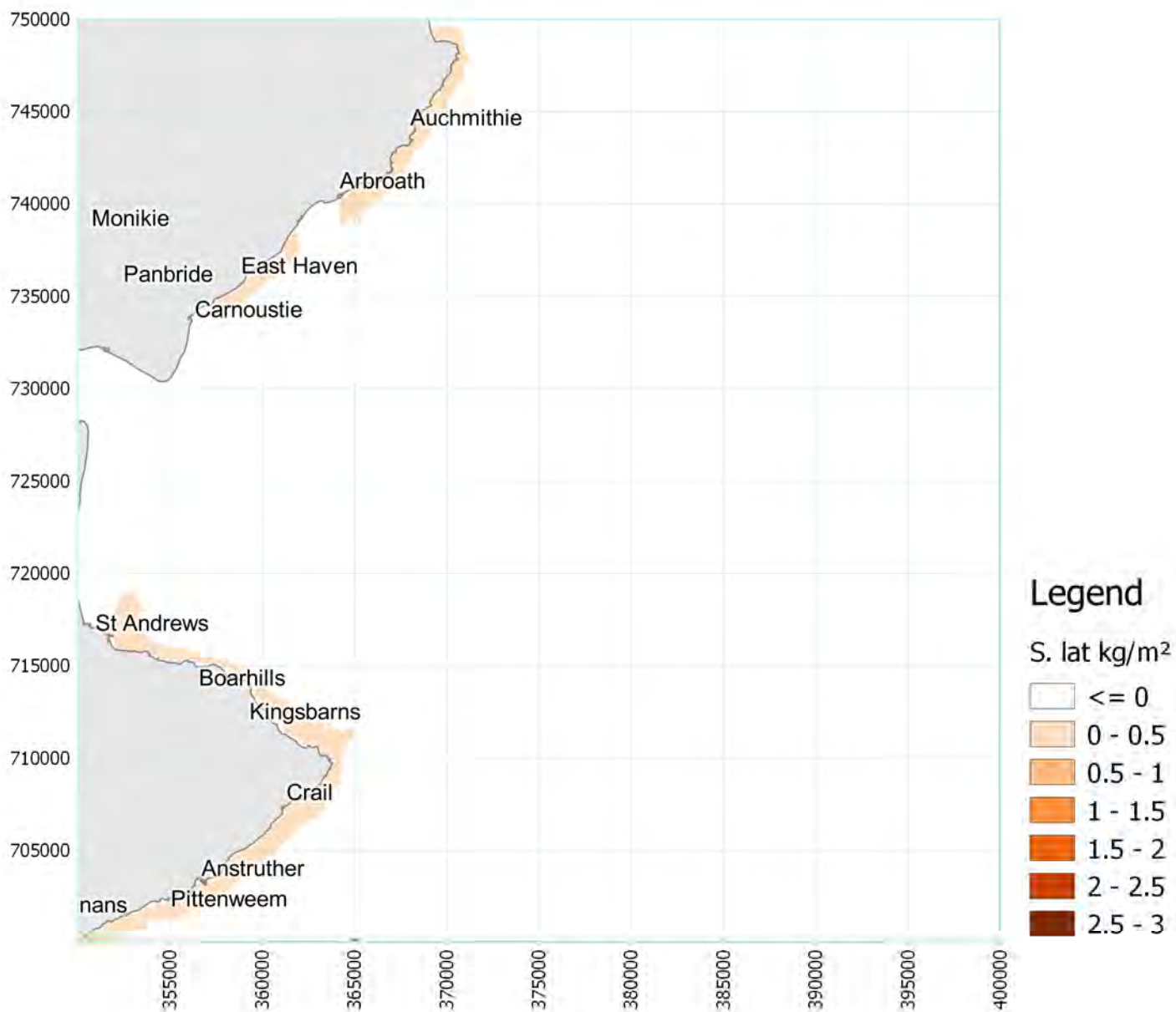


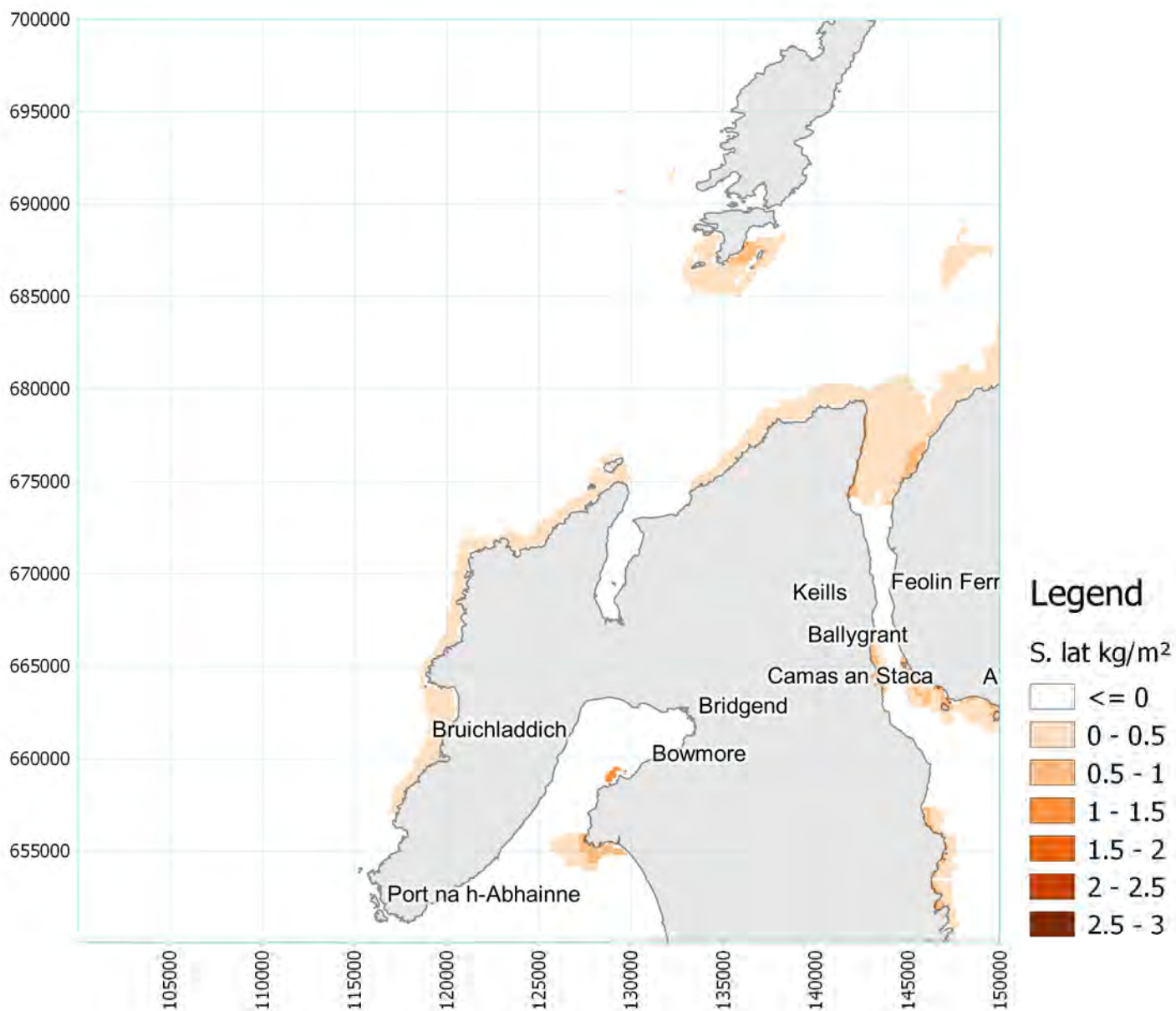


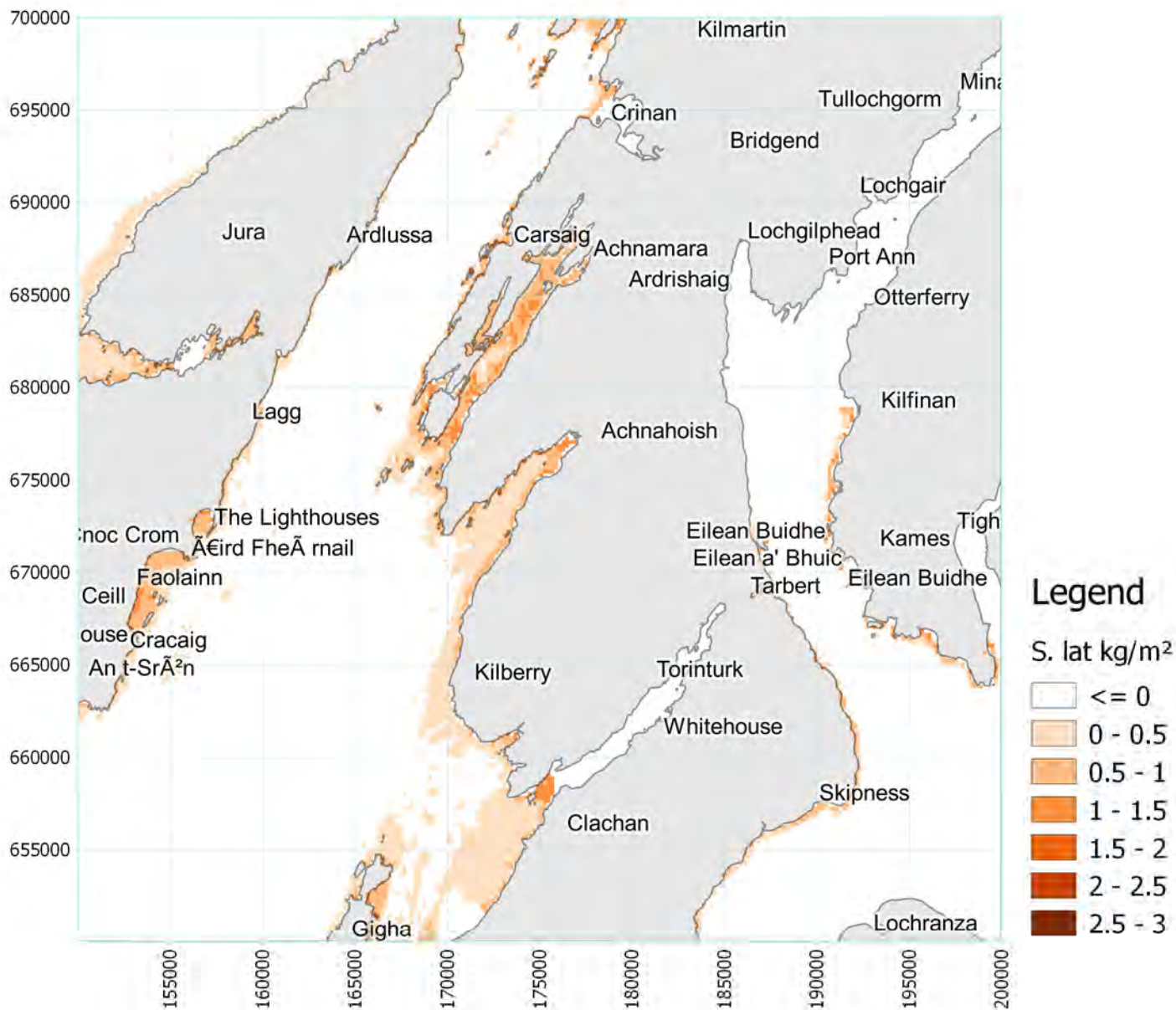


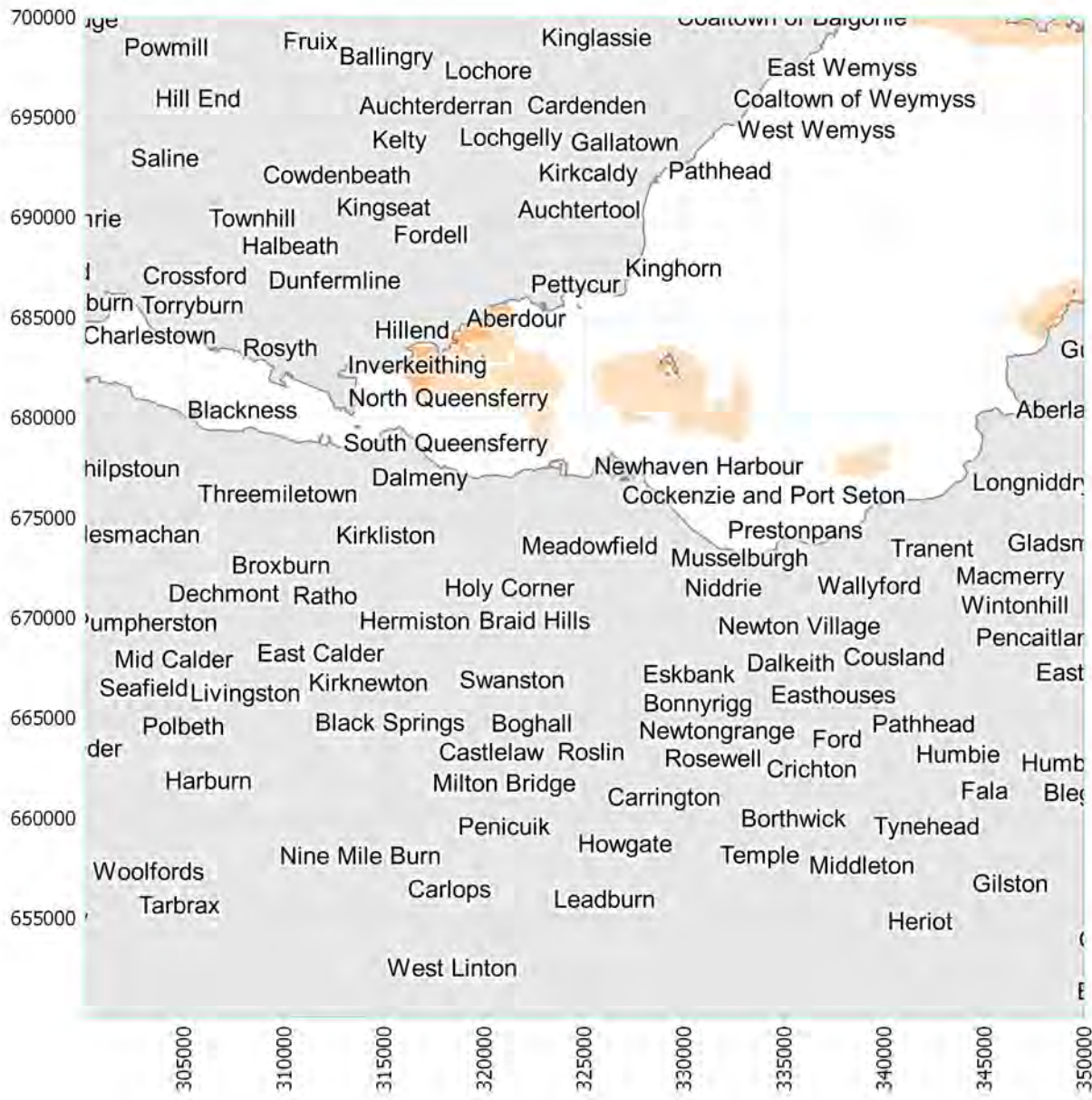


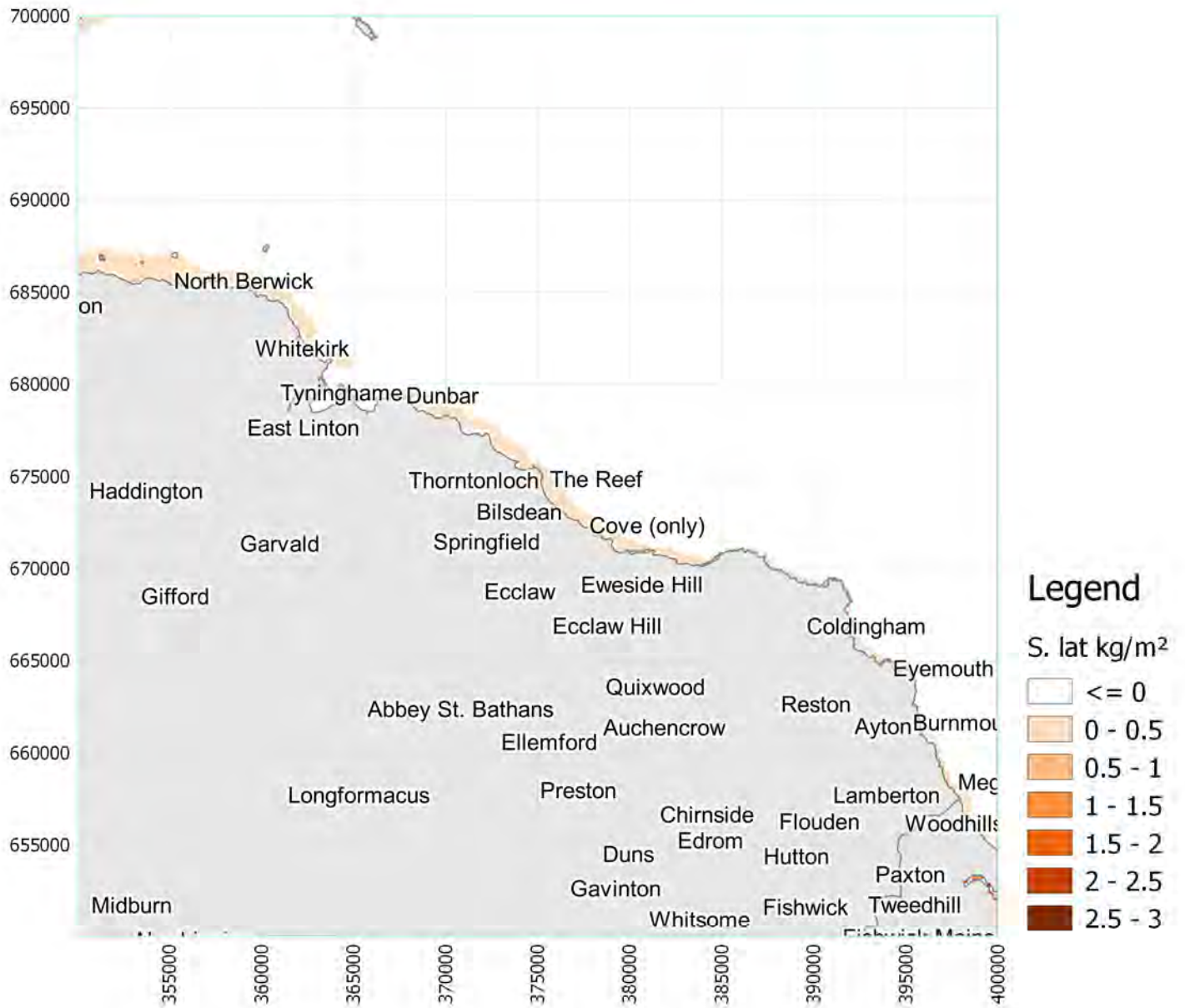








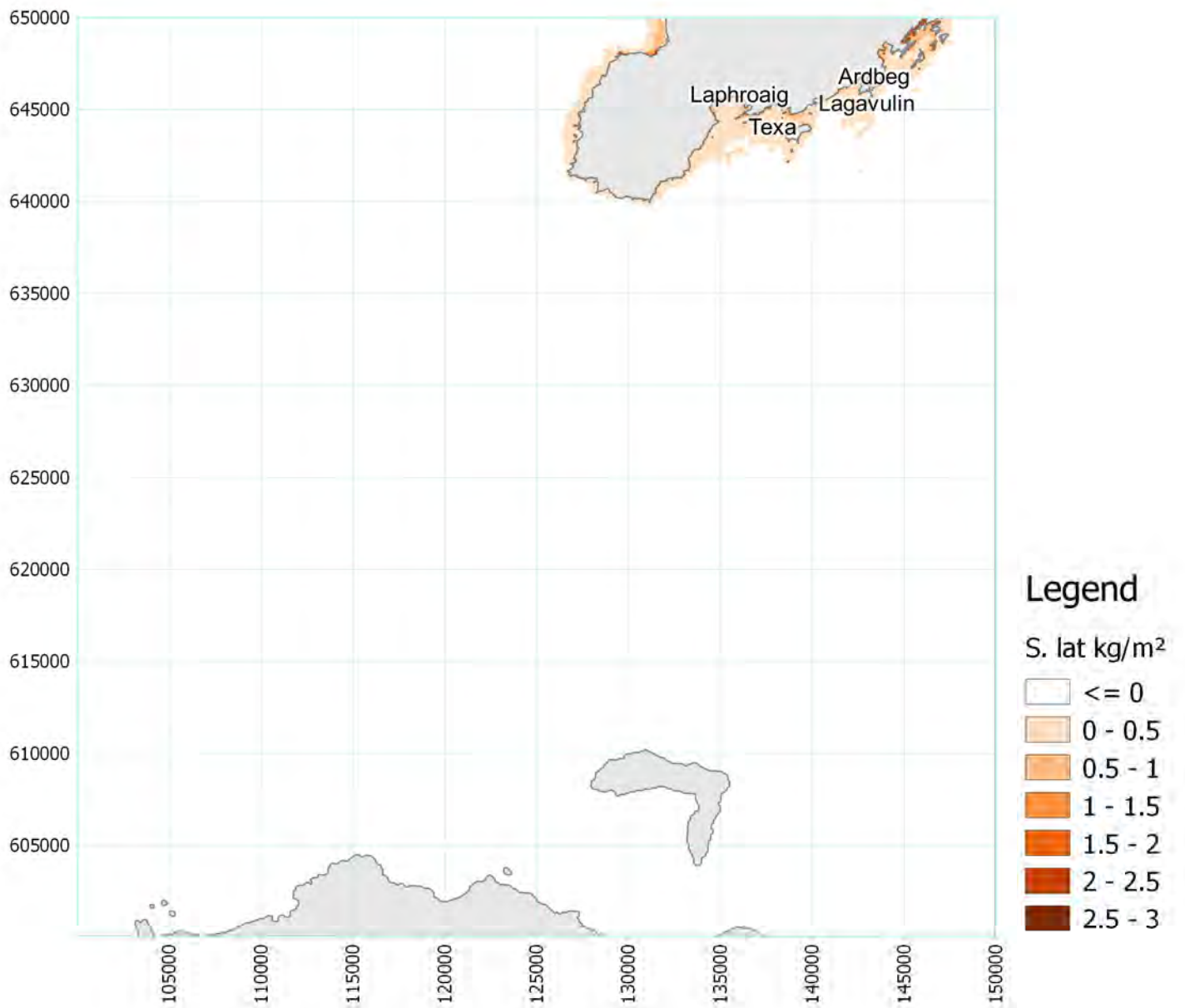


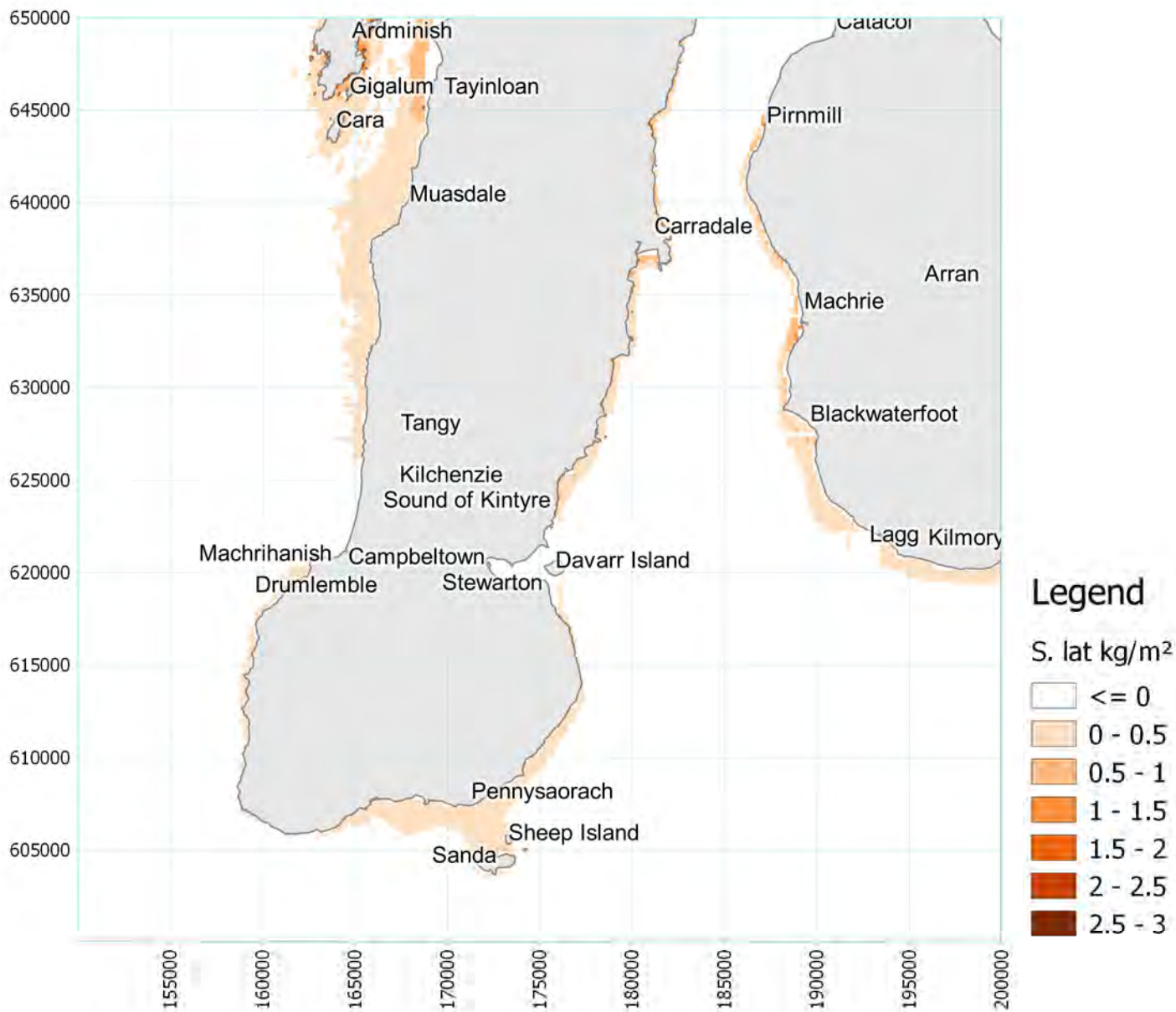


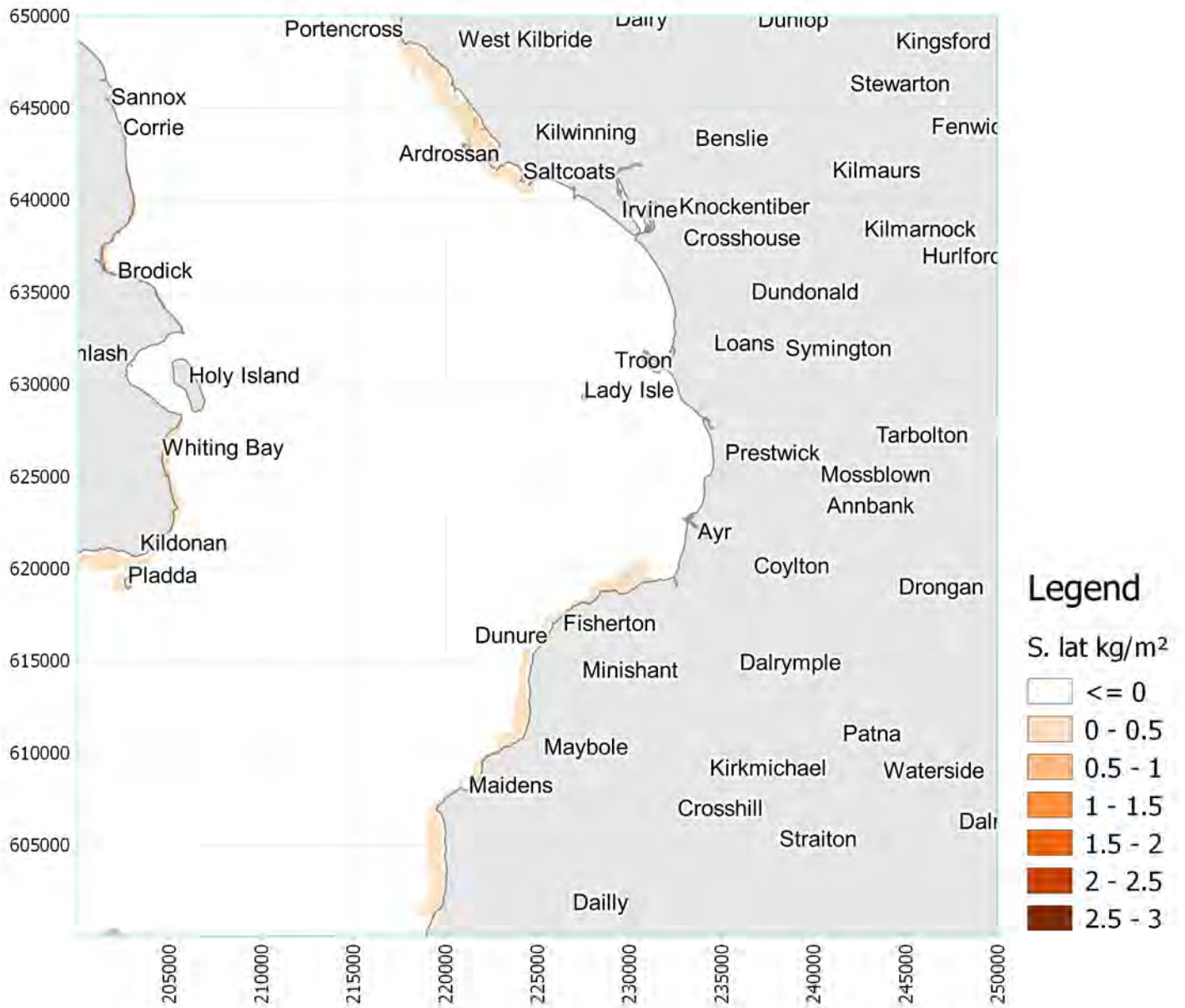
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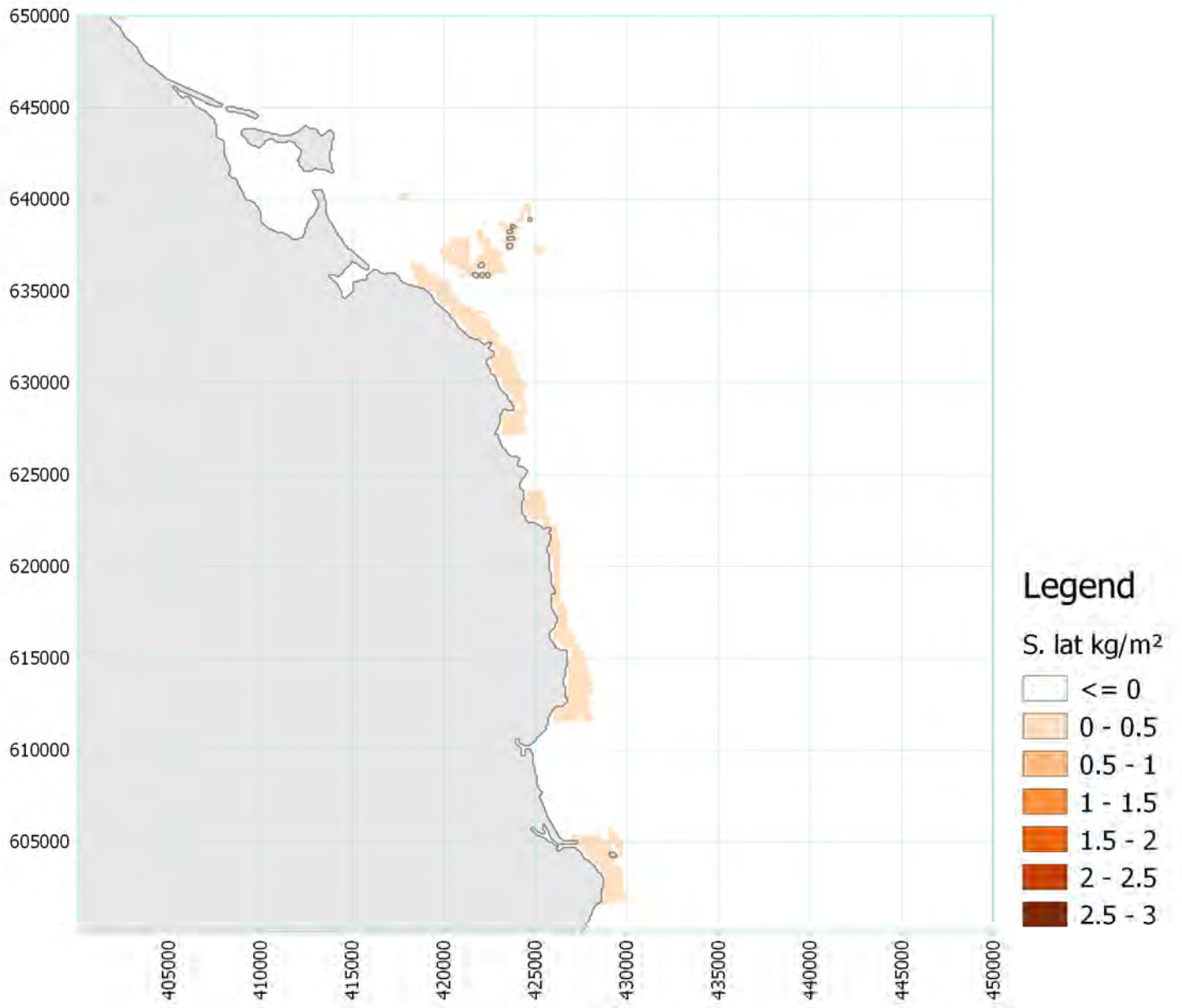
on North Berwick
Whitekirk
Tynninghame Dunbar
East Linton
Haddington
Garvald
Gifford
Thorntonloch The Reef
Bilsdean
Springfield
Cove (only)
Ecclaw Eweside Hill
Ecclaw Hill
Coldingham
Eyemouth
Abbey St. Bathans
Quixwood
Reston
Ayton Burnmo
Ellemford
Auchencrow
Longformacus
Preston
Chirnside
Edrom
Flouden
Woodhills
Duns
Hutton
Paxton
Gavinton
Whitsome
Fishwick
Tweedhill
Midburn

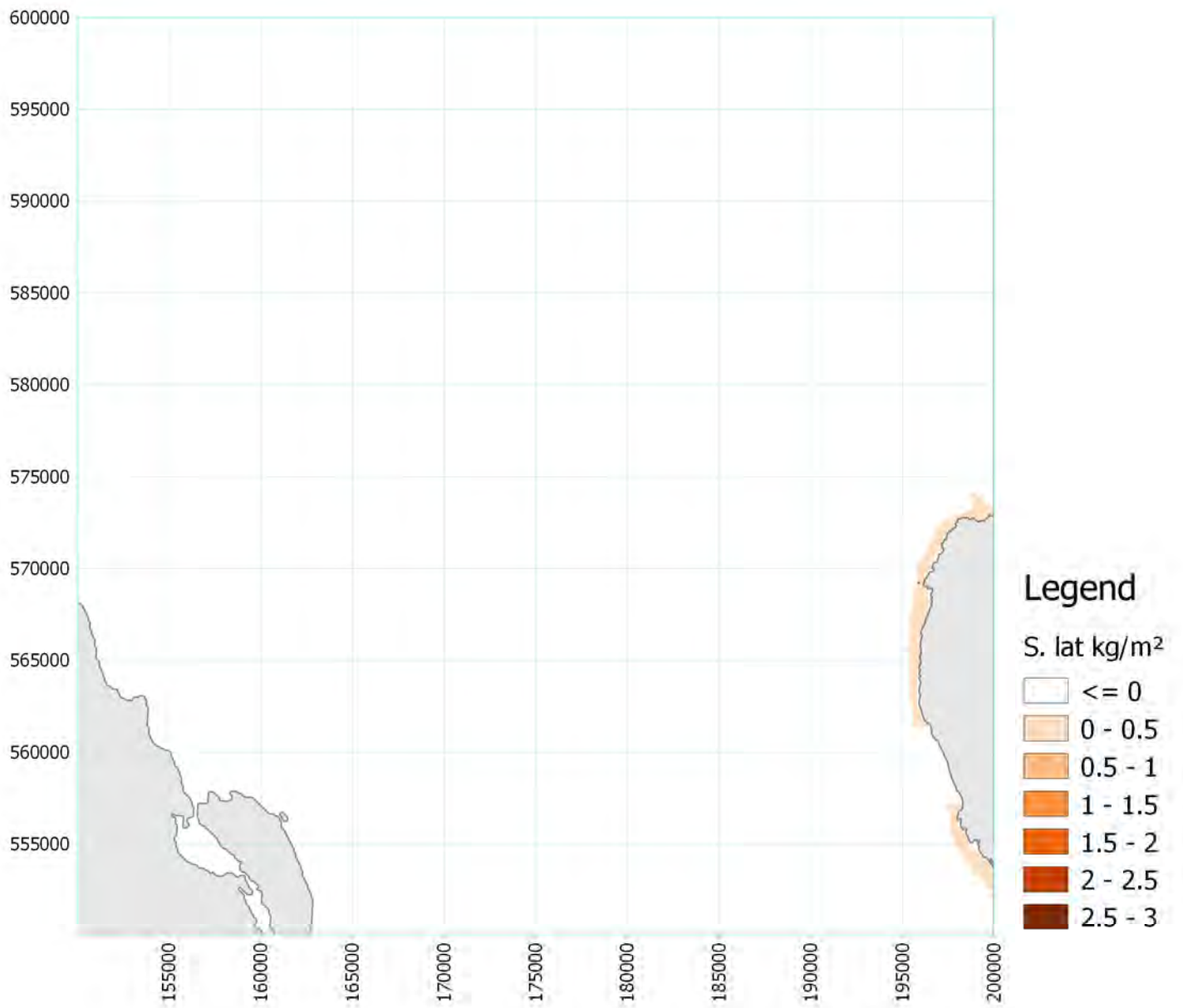
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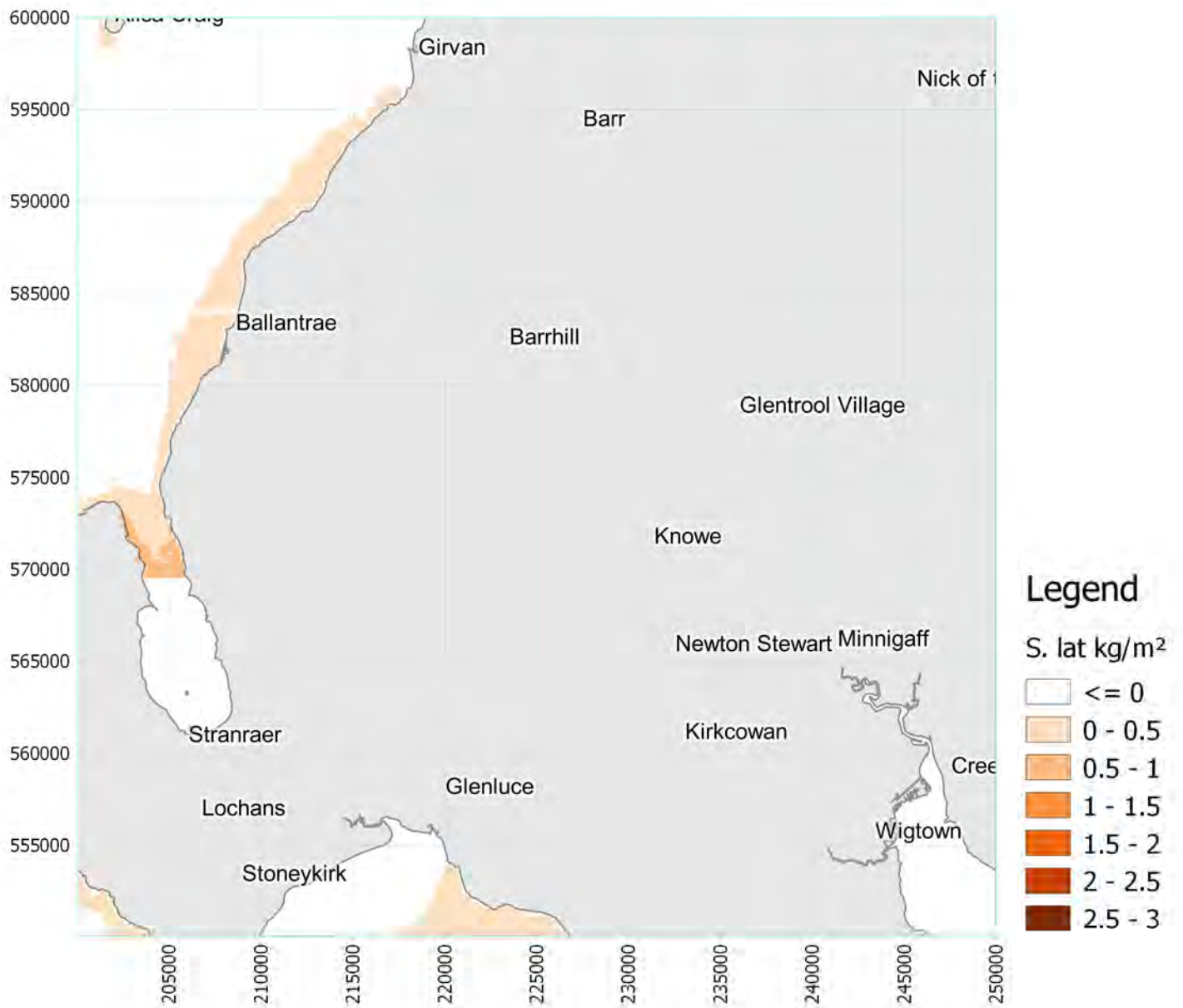


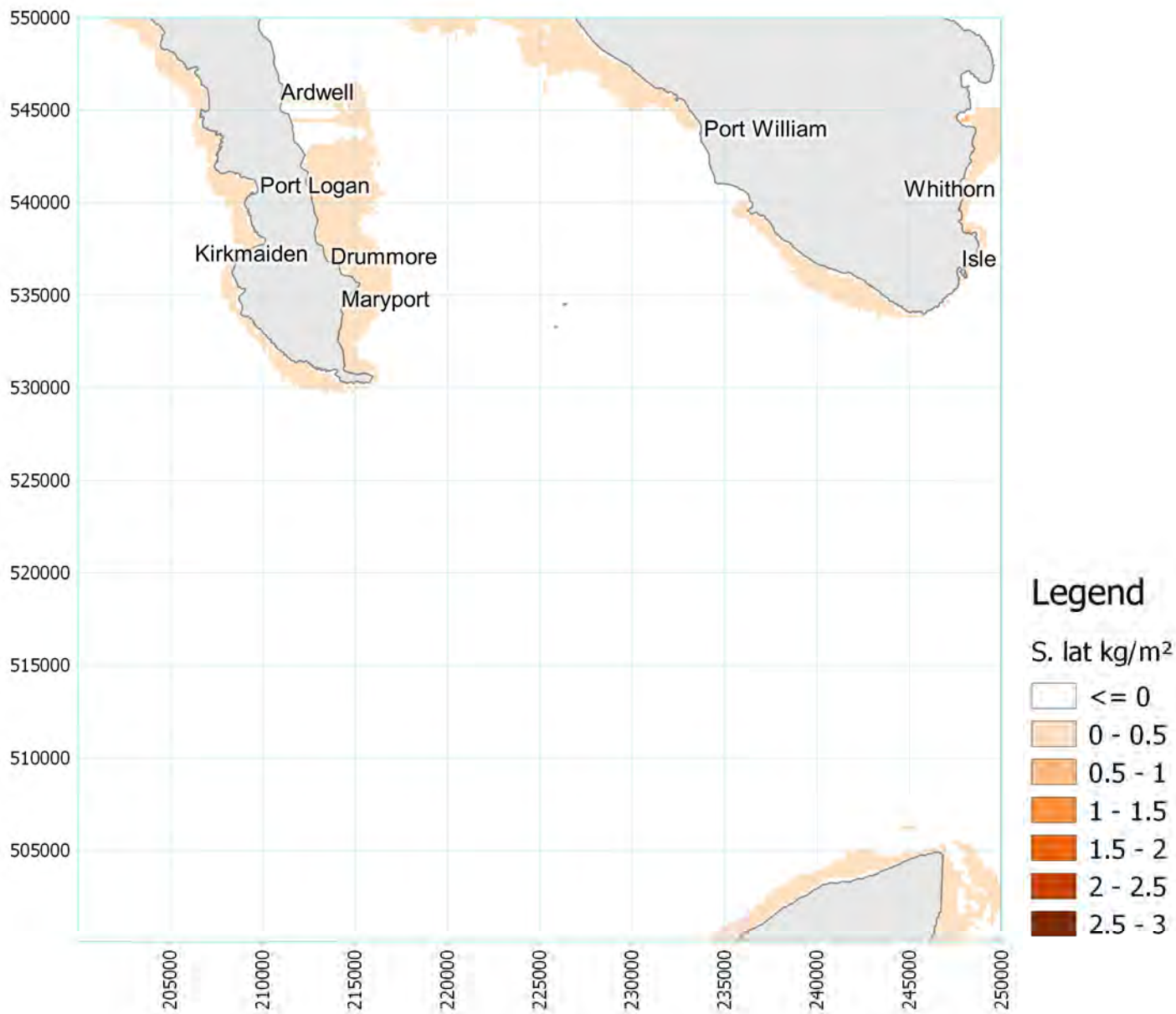


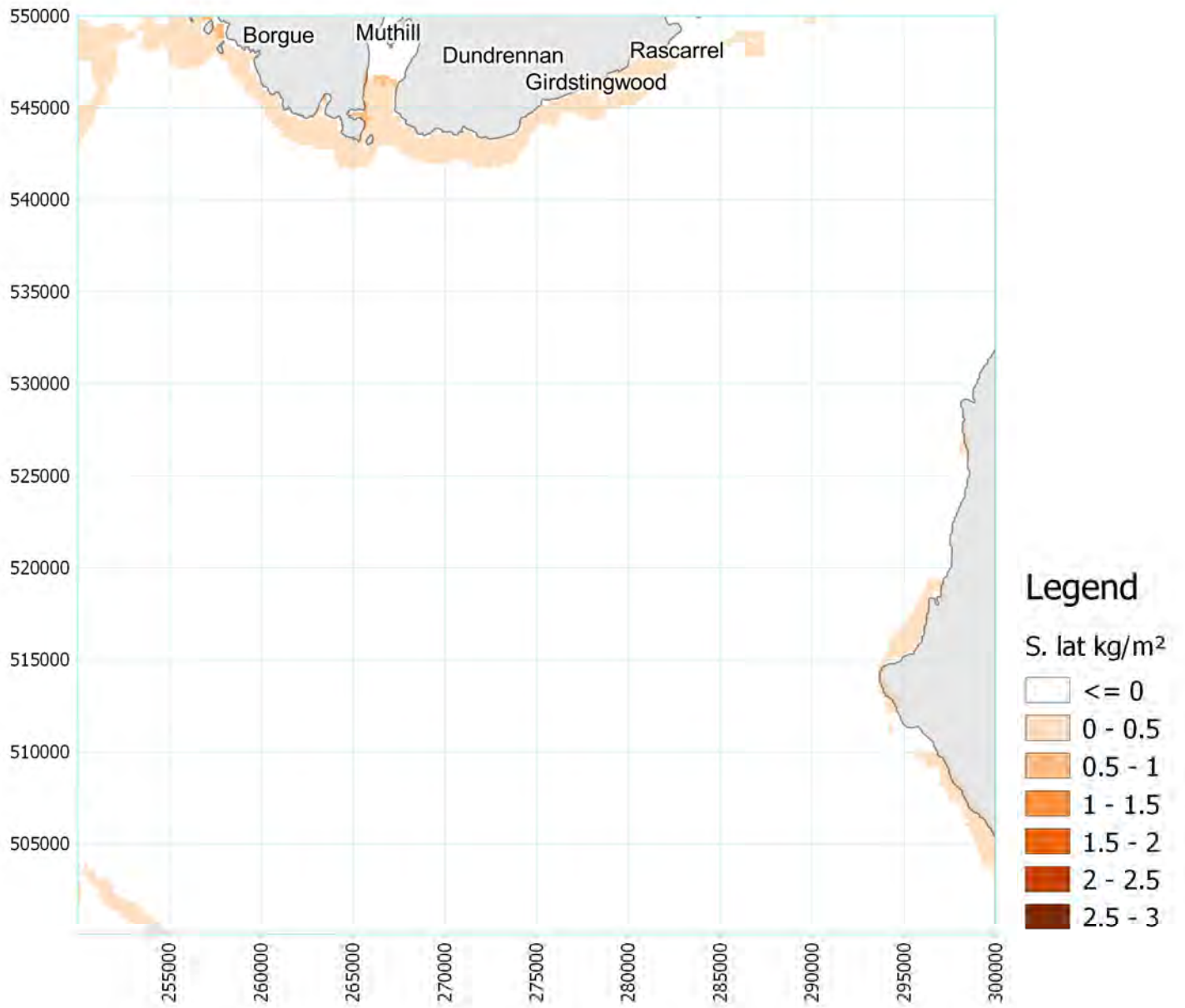




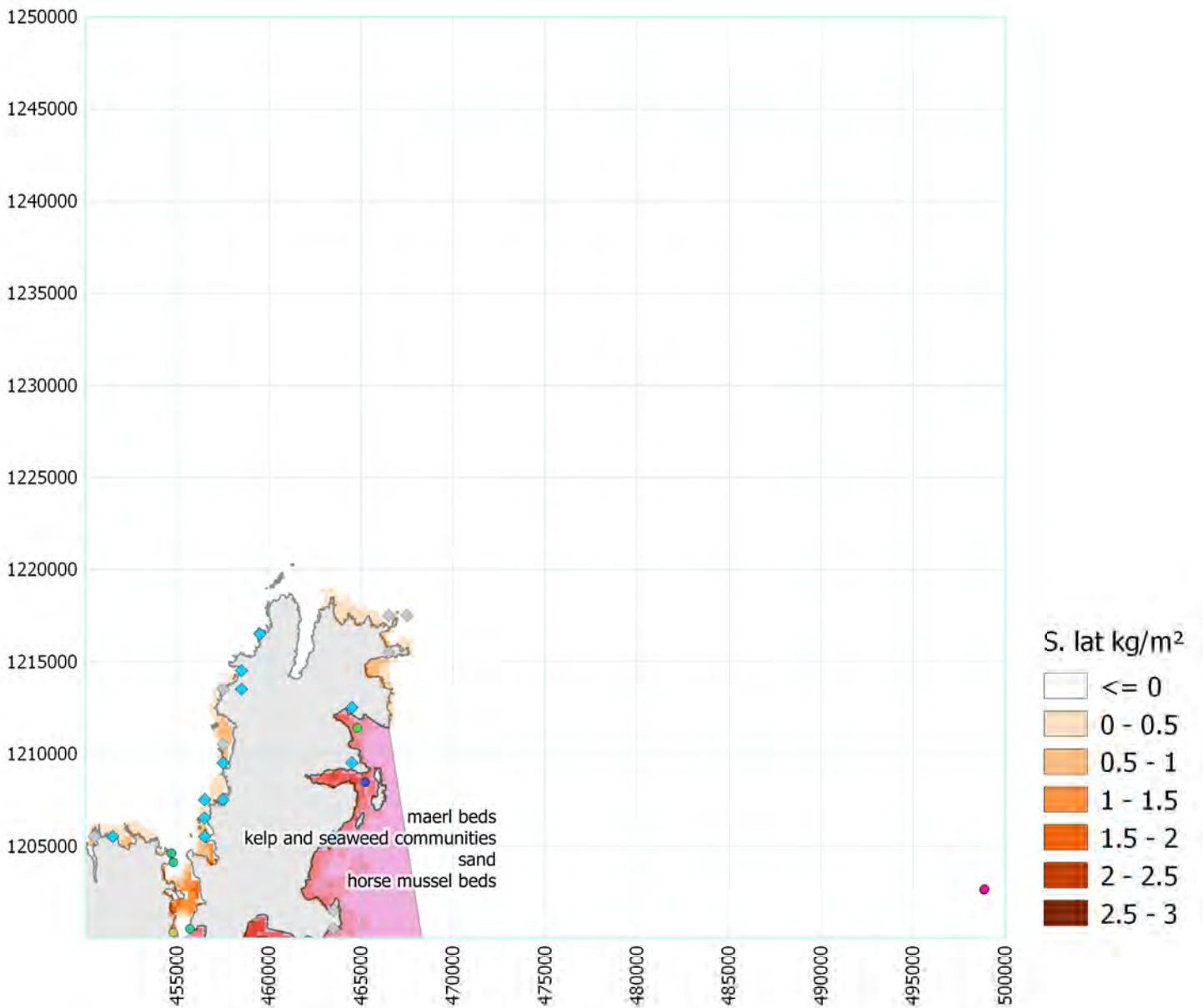








Map 1



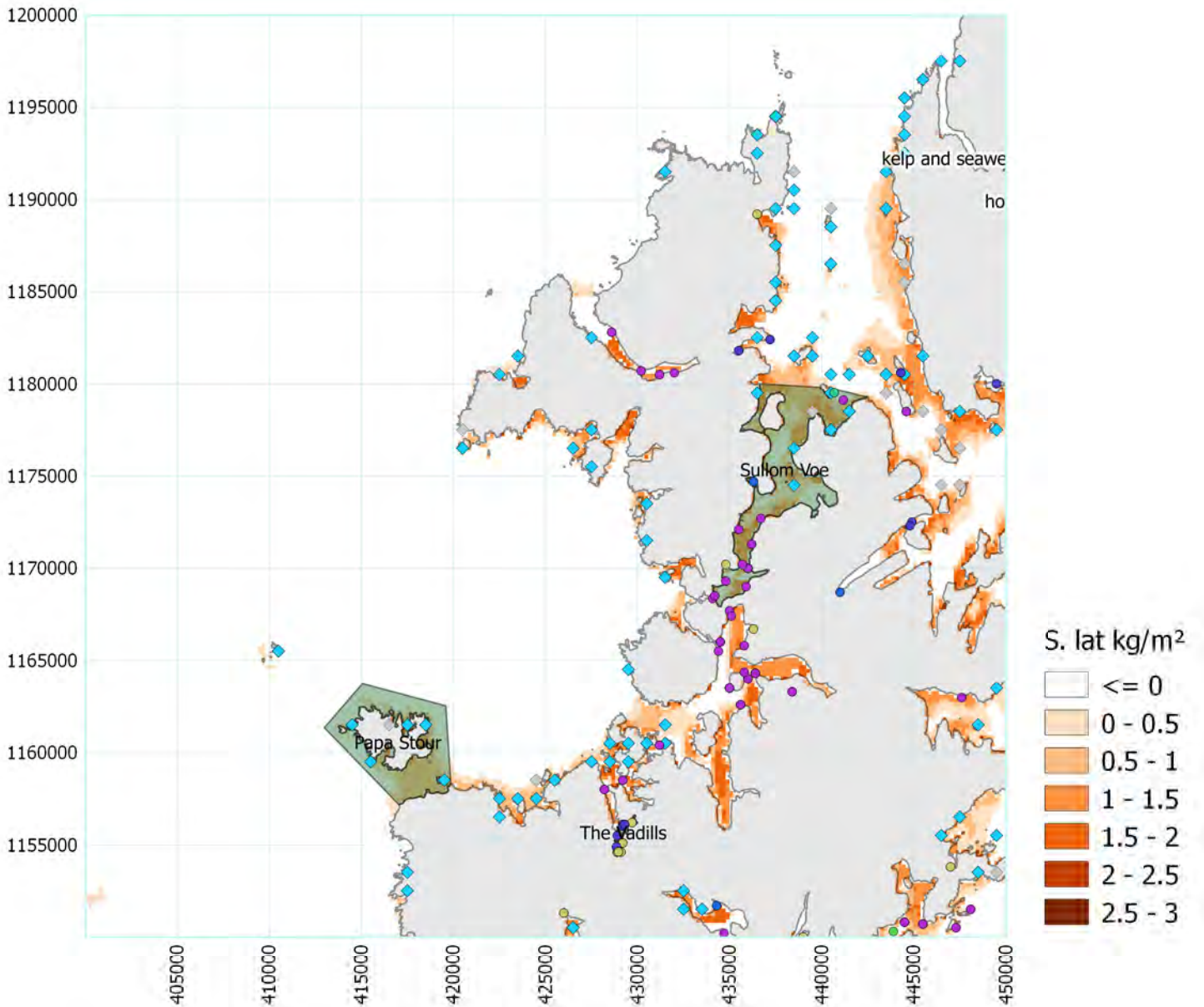
PMF biotopes

- Maerl beds
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 2



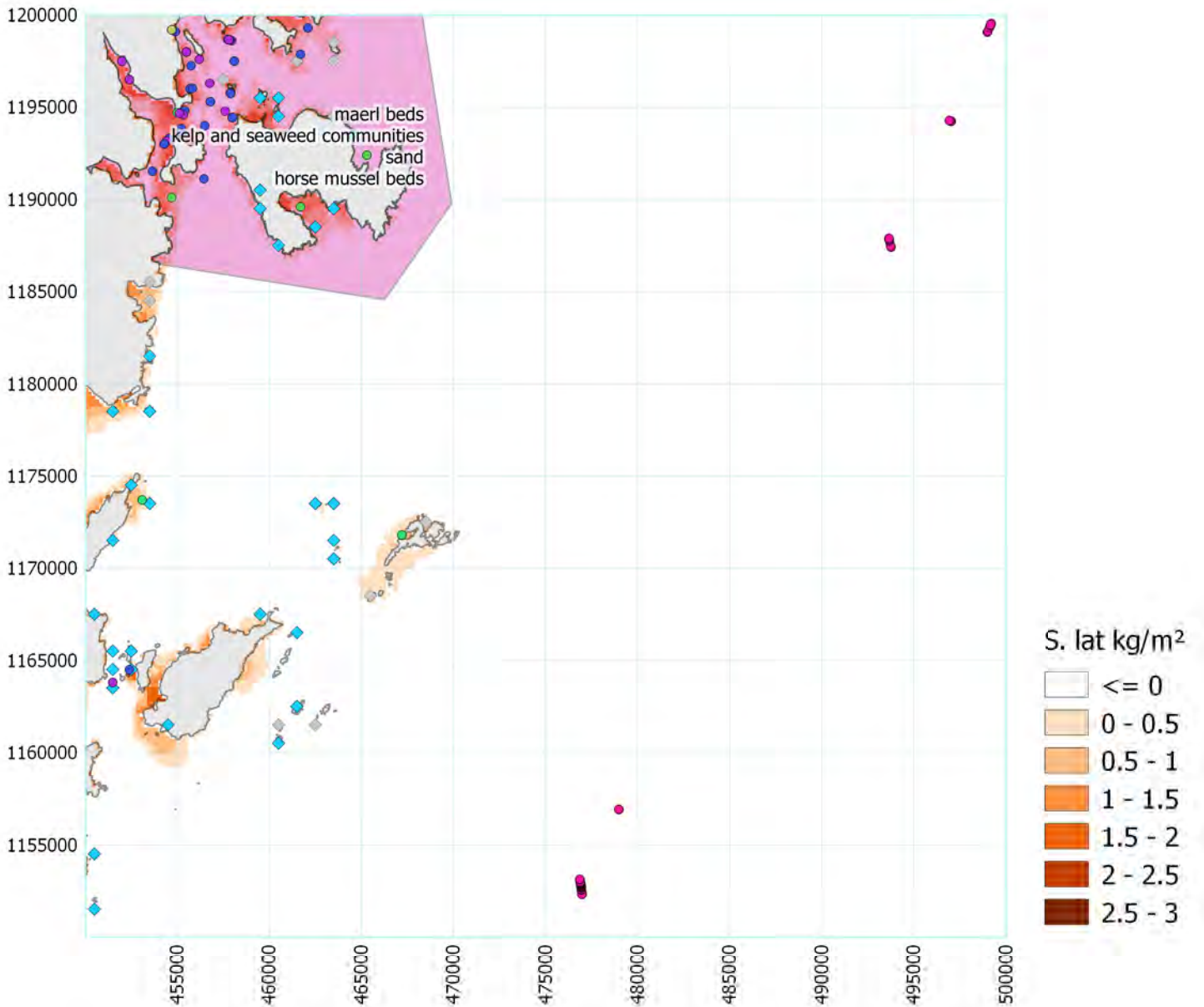
PMF biotopes

- Blue mussel beds
- Horse mussel beds
- Maerl beds
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

Map 3



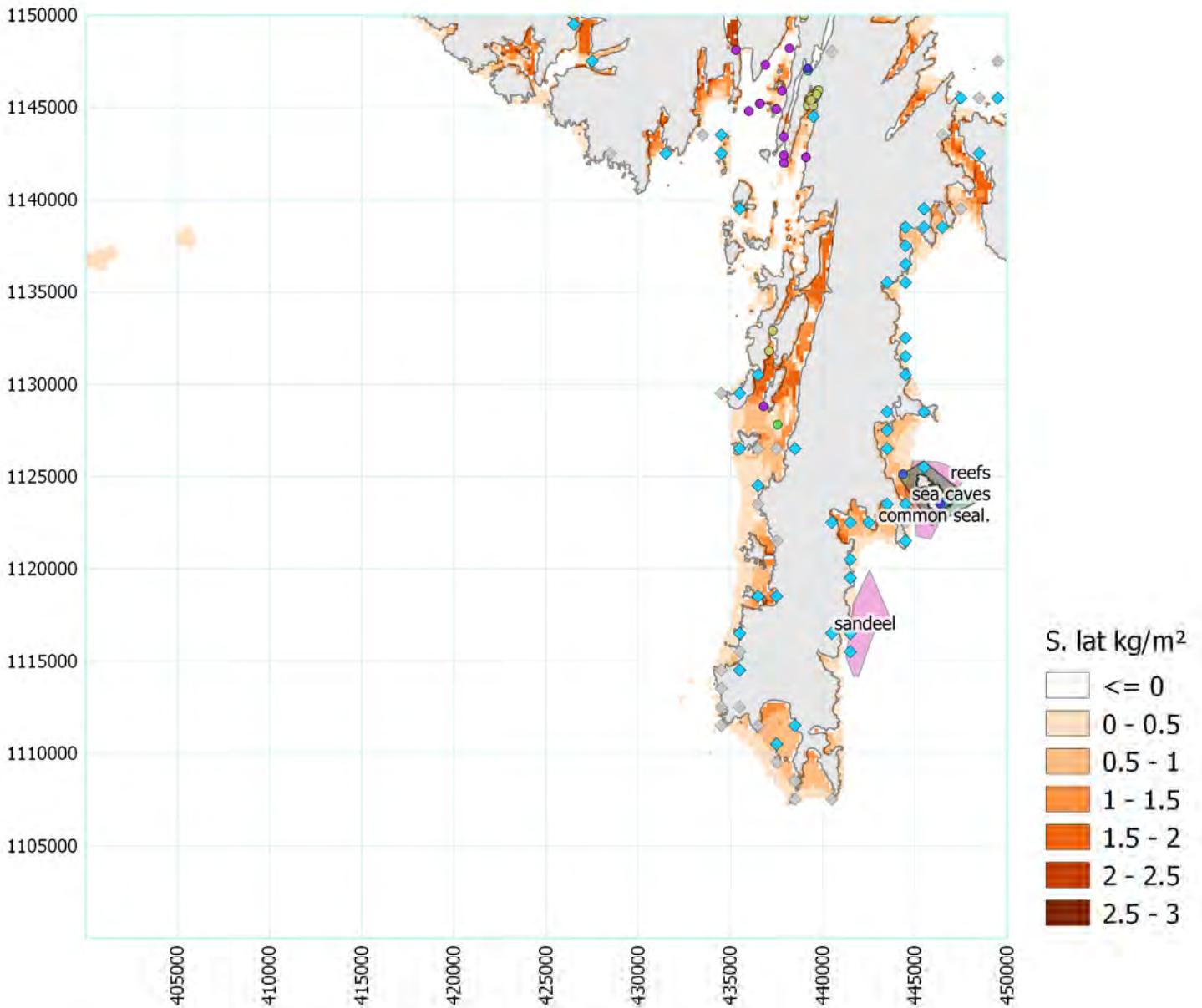
PMF biotopes

- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 4



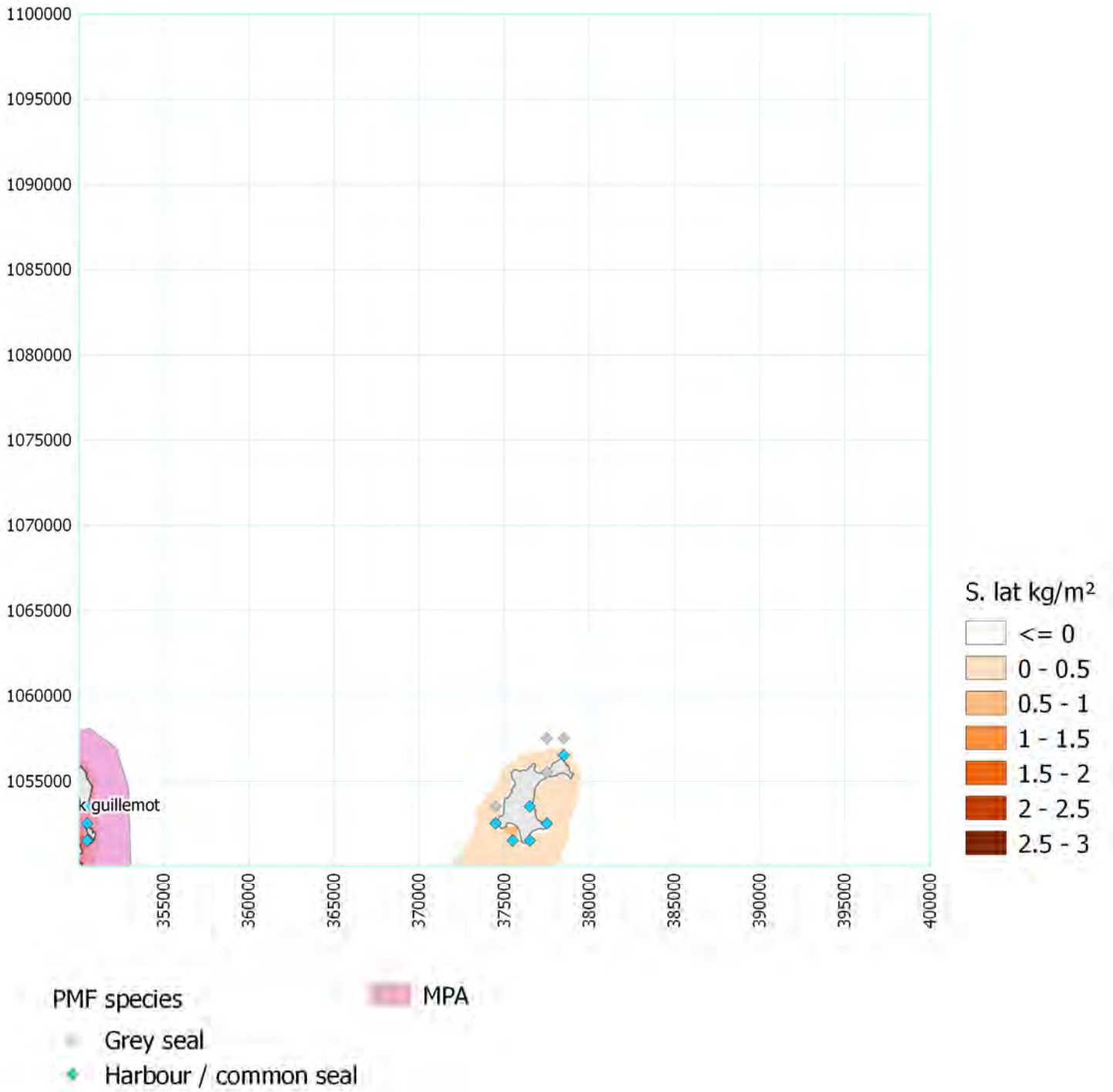
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Horse mussel beds
- Maerl beds
- Seagrass beds
- Tide-swept algal communities
- Tide-swept coarse sands with burrowing bivalves

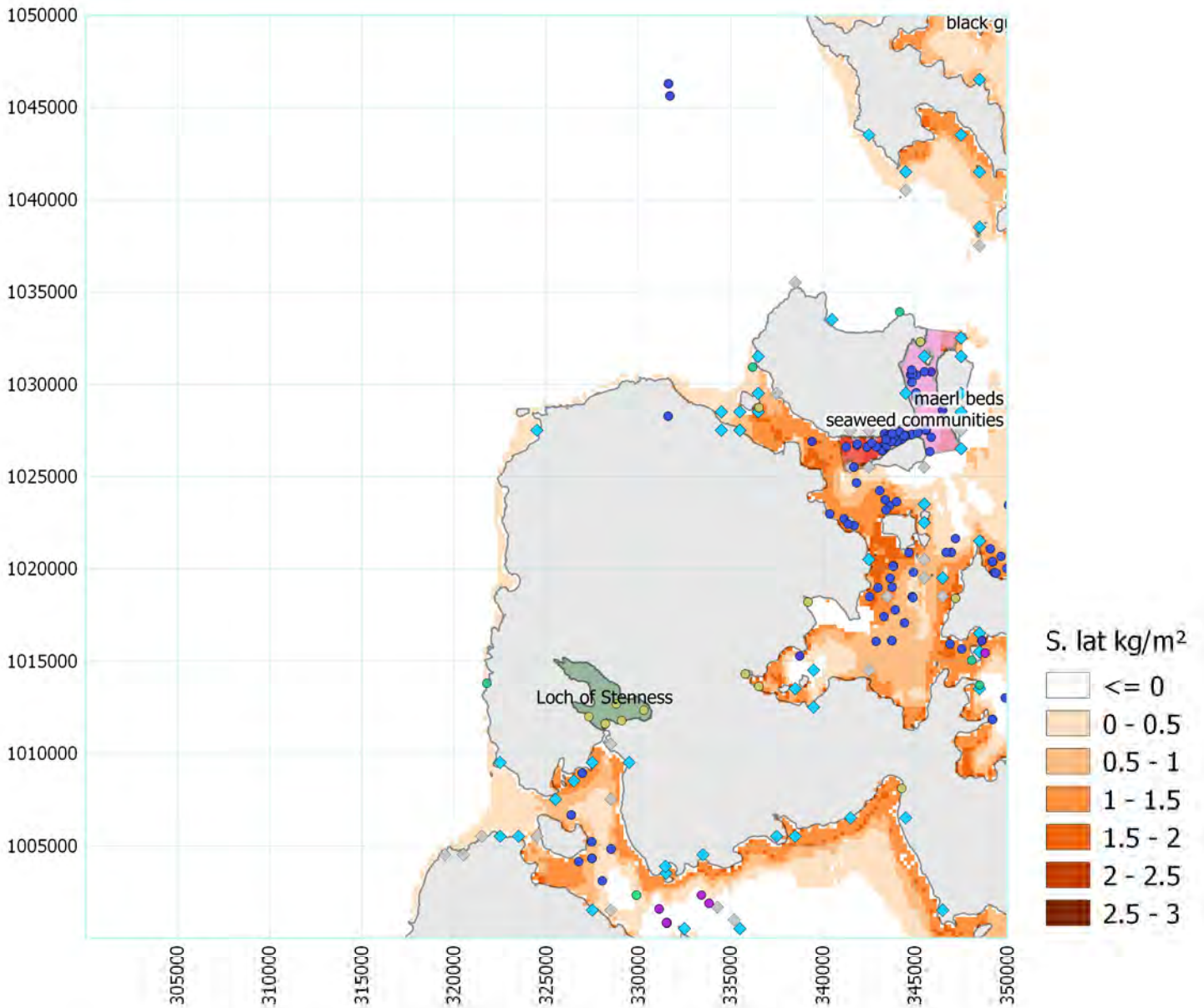
PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

Map 5



Map 6



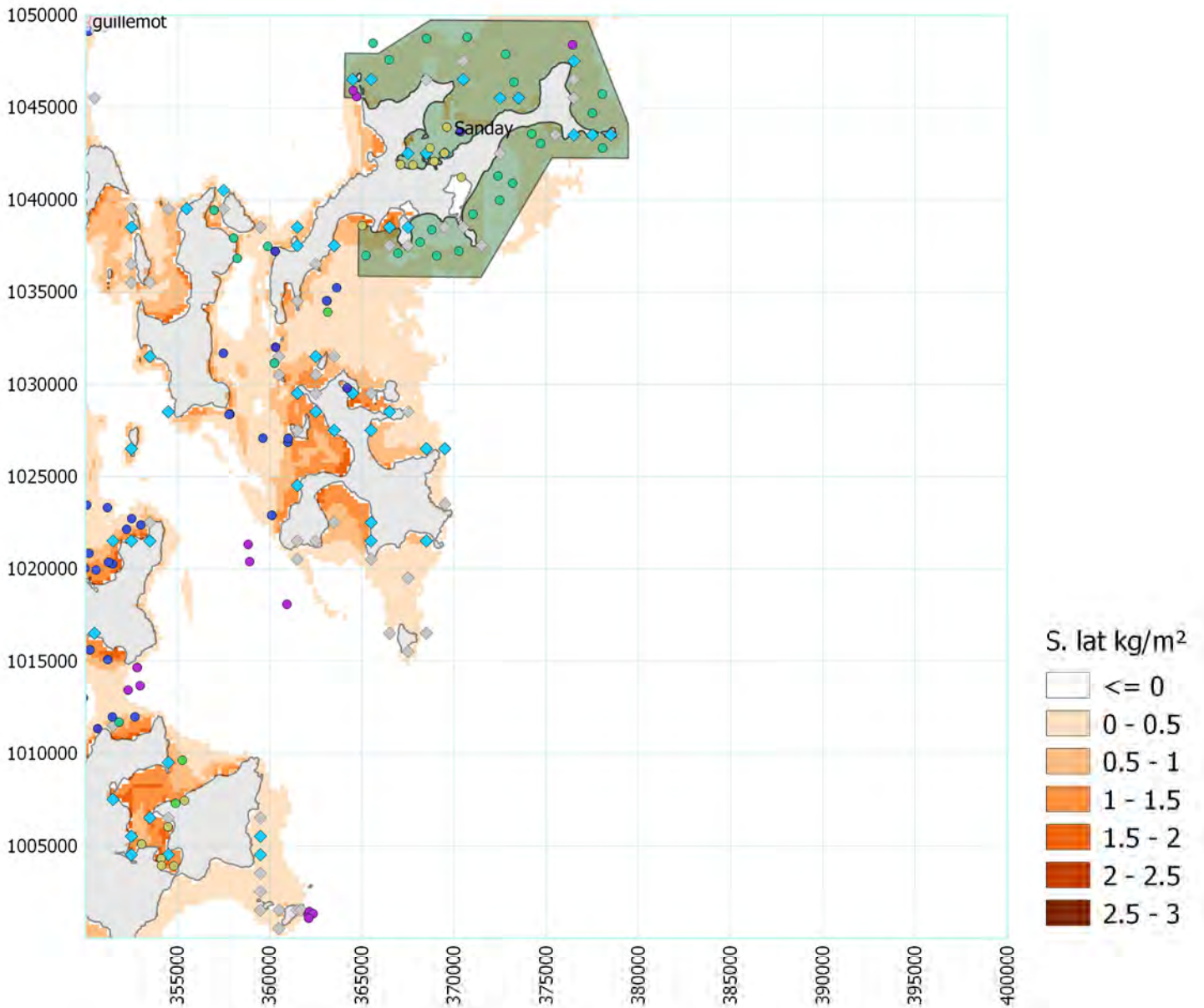
PMF biotopes

- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

Map 7



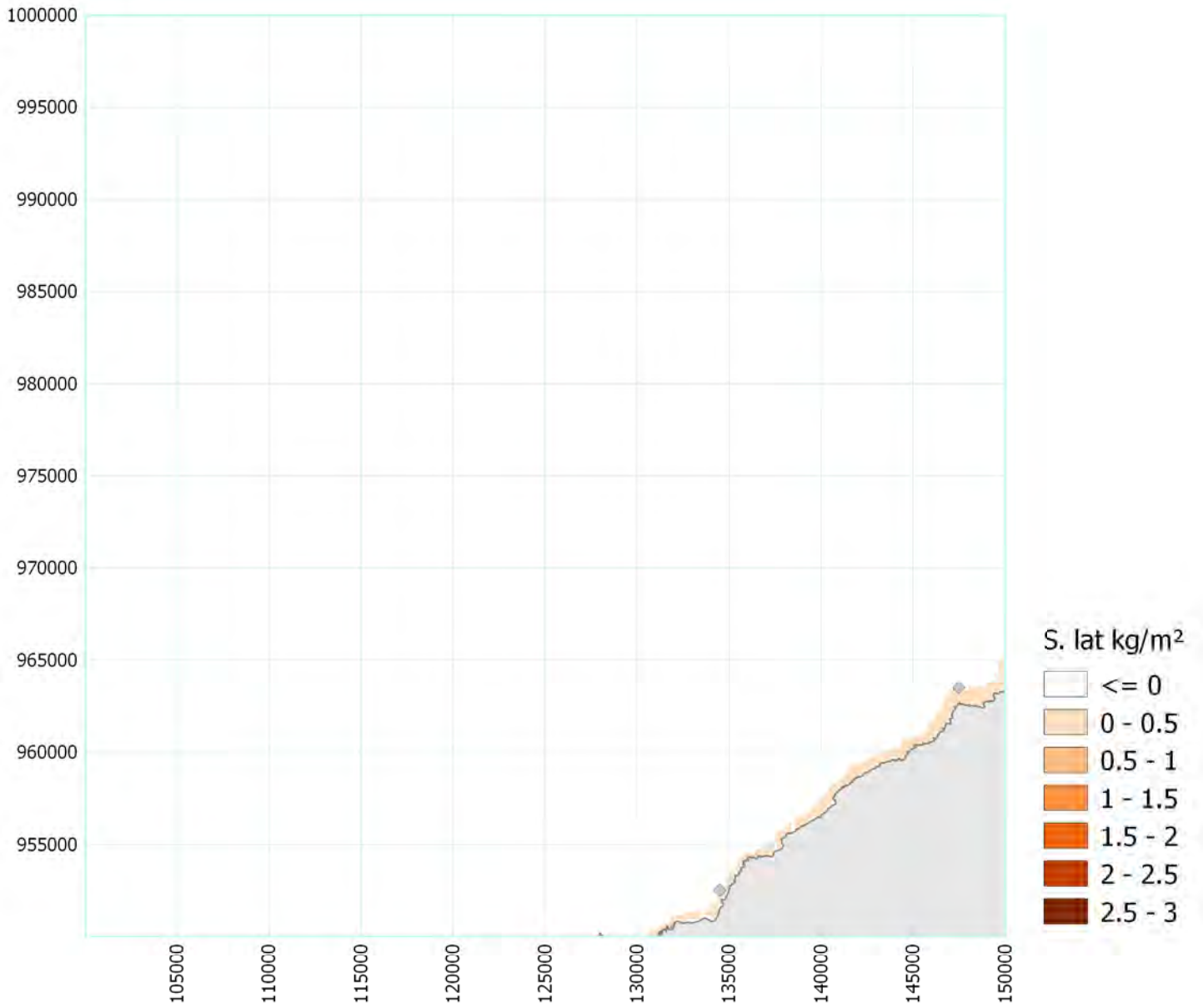
PMF biotopes

- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

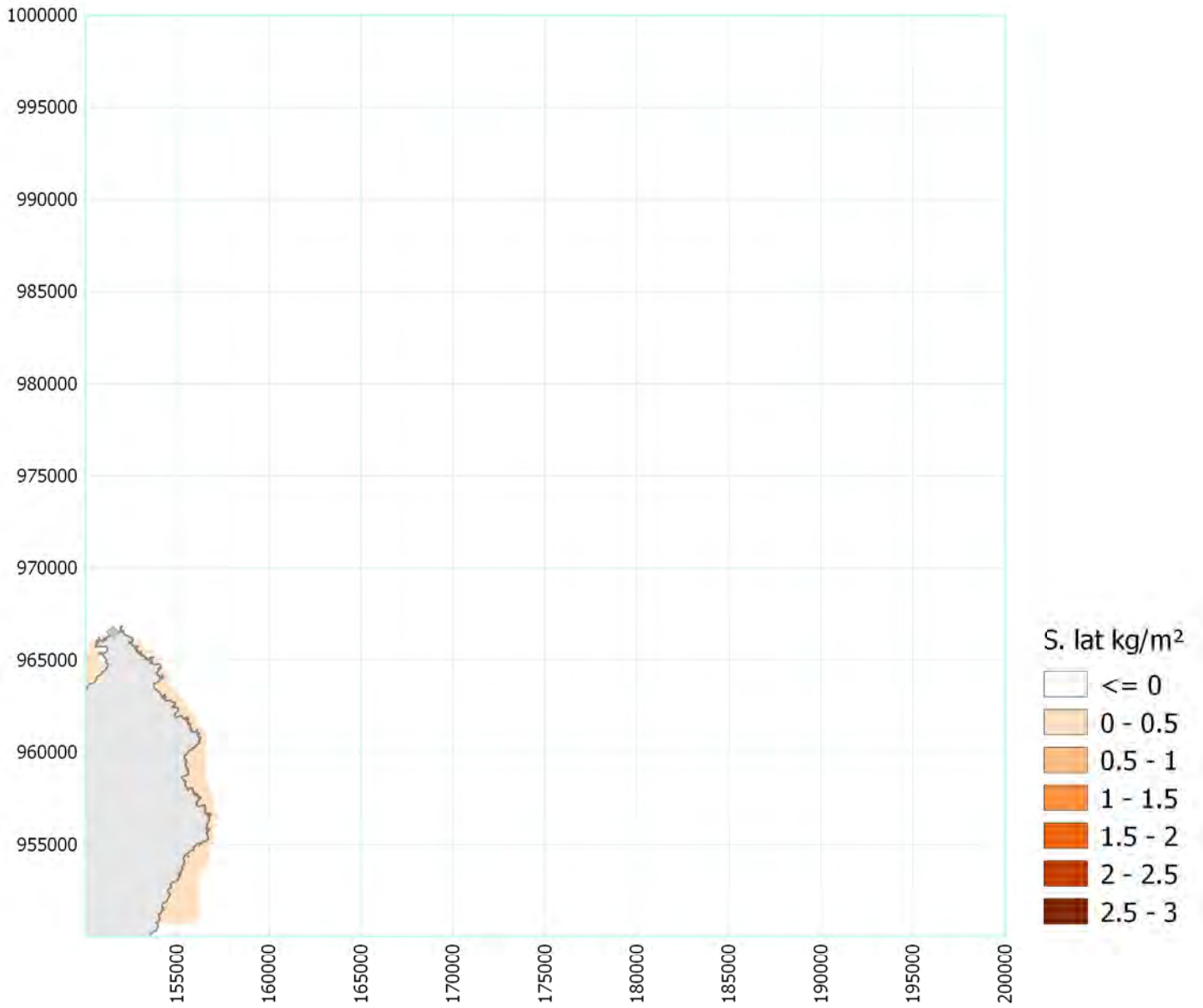
Map 8



PMF species

- ◆ Grey seal

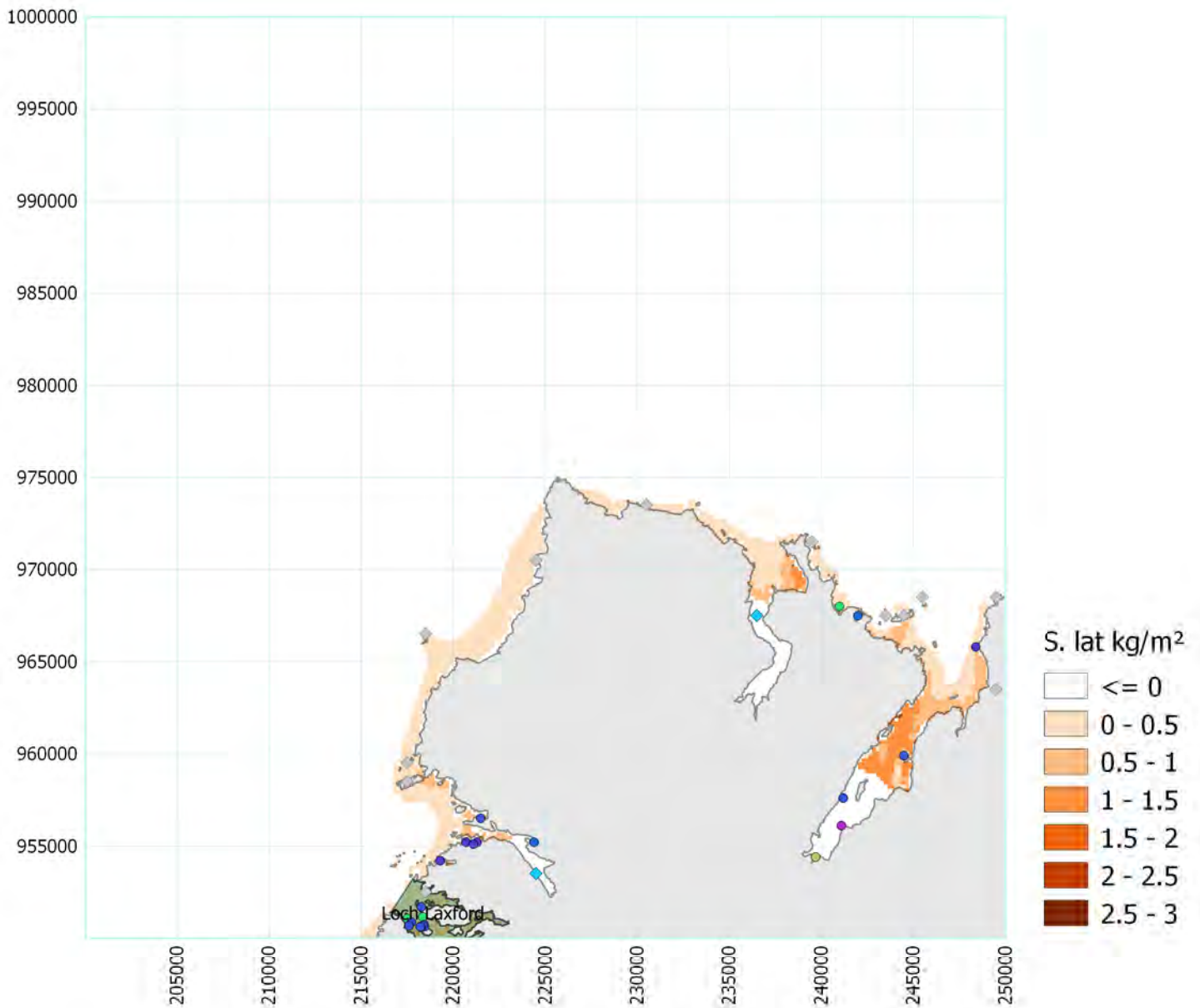
Map 9



PMF species

- ◆ Grey seal

Map 10



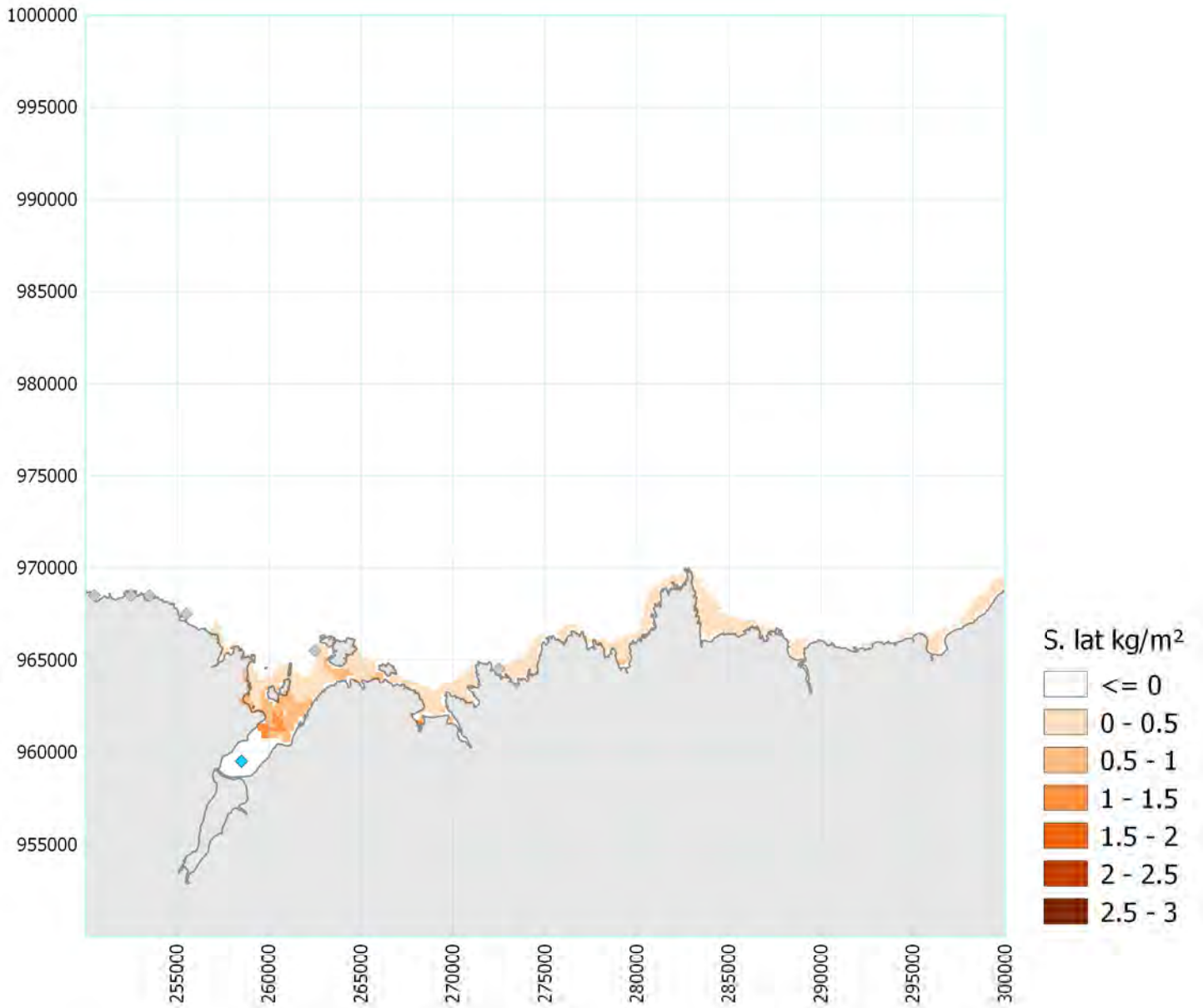
PMF biotopes

- Blue mussel beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities

PMF species

- ◊ Grey seal
- ◊ Harbour / common seal
- ◻ SAC

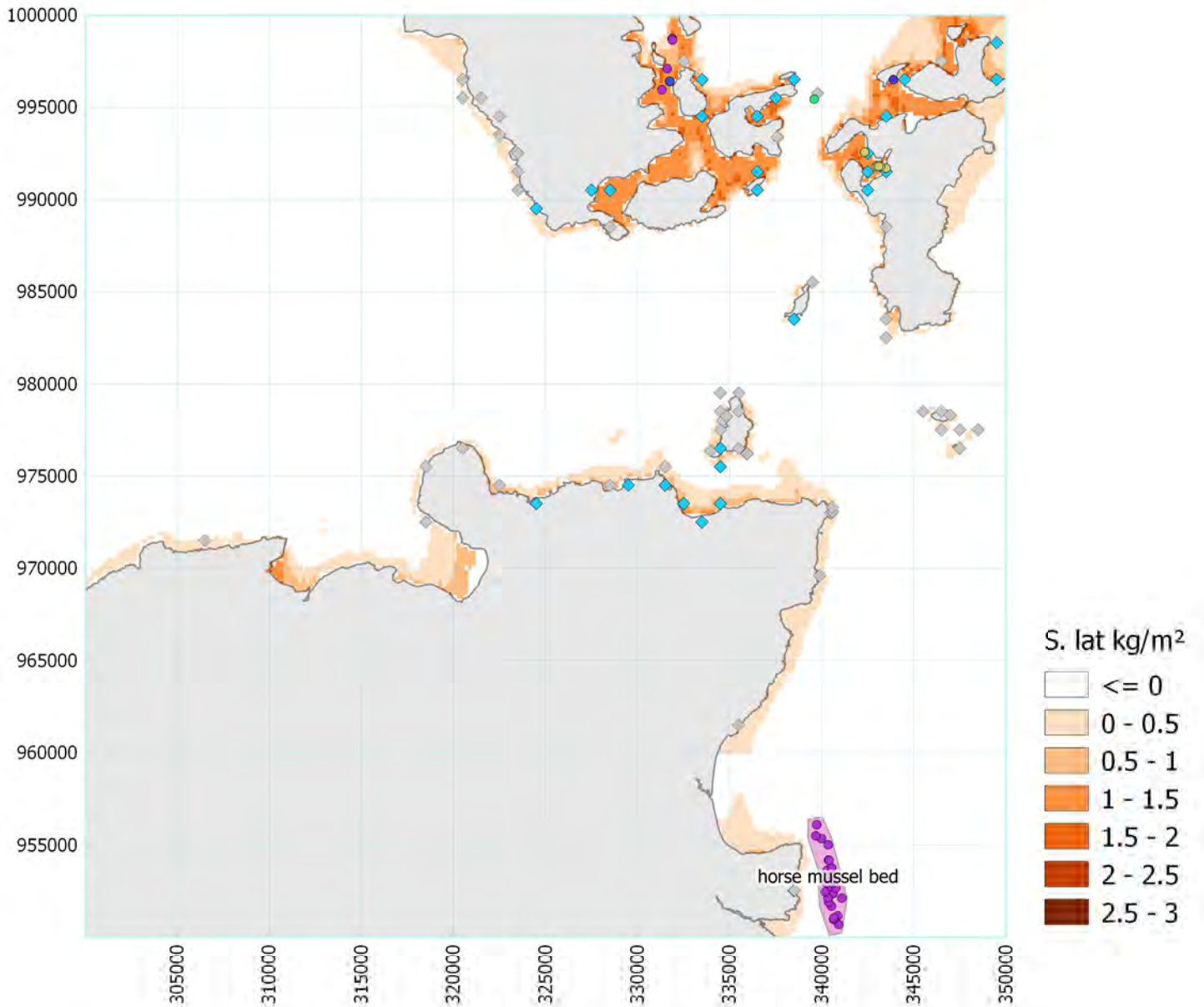
Map 11



PMF species

- Grey seal
- Harbour / common seal

Map 12



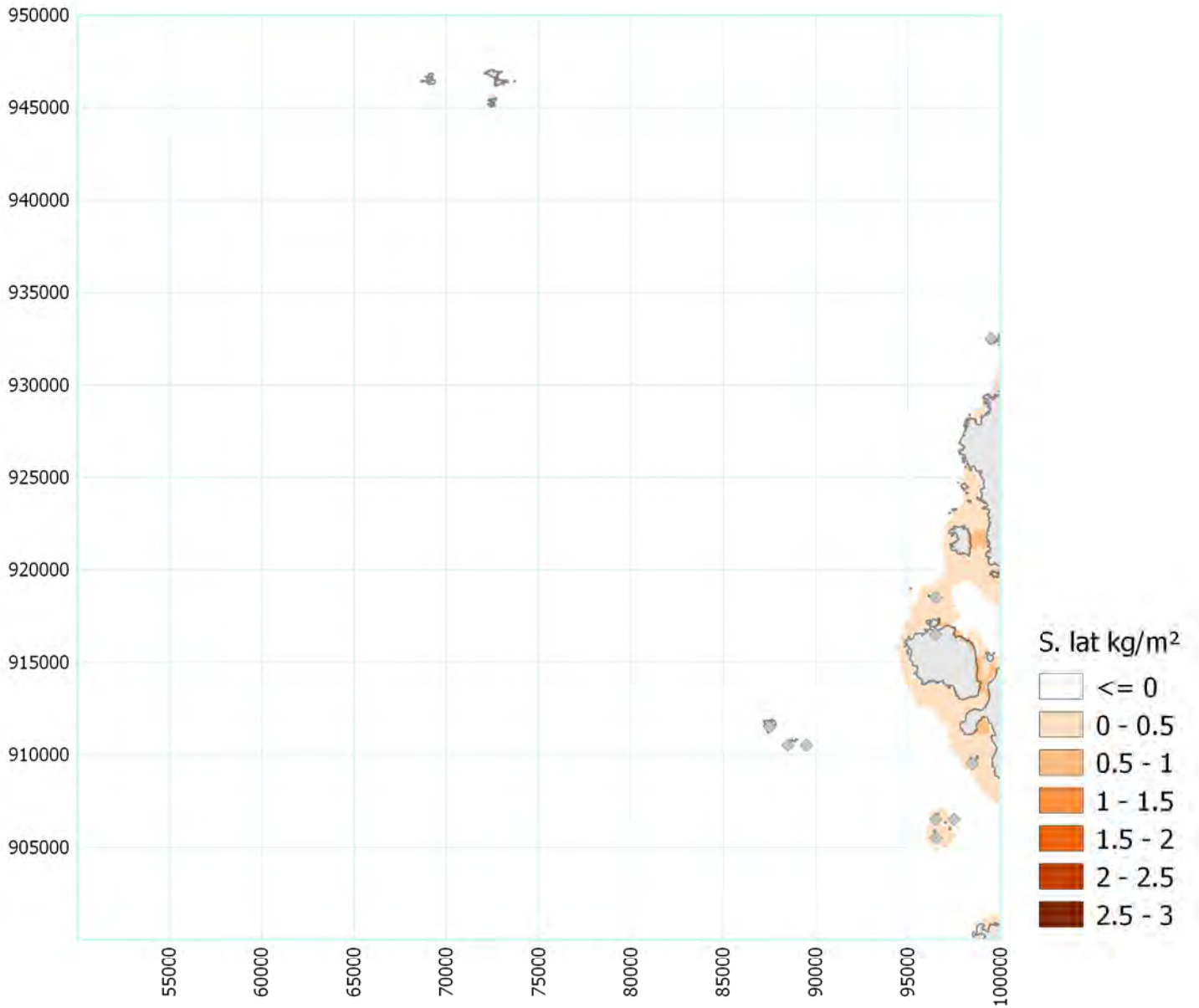
PMF biotopes

- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities

PMF species

- Grey seal
- Harbour / common seal
- MPA

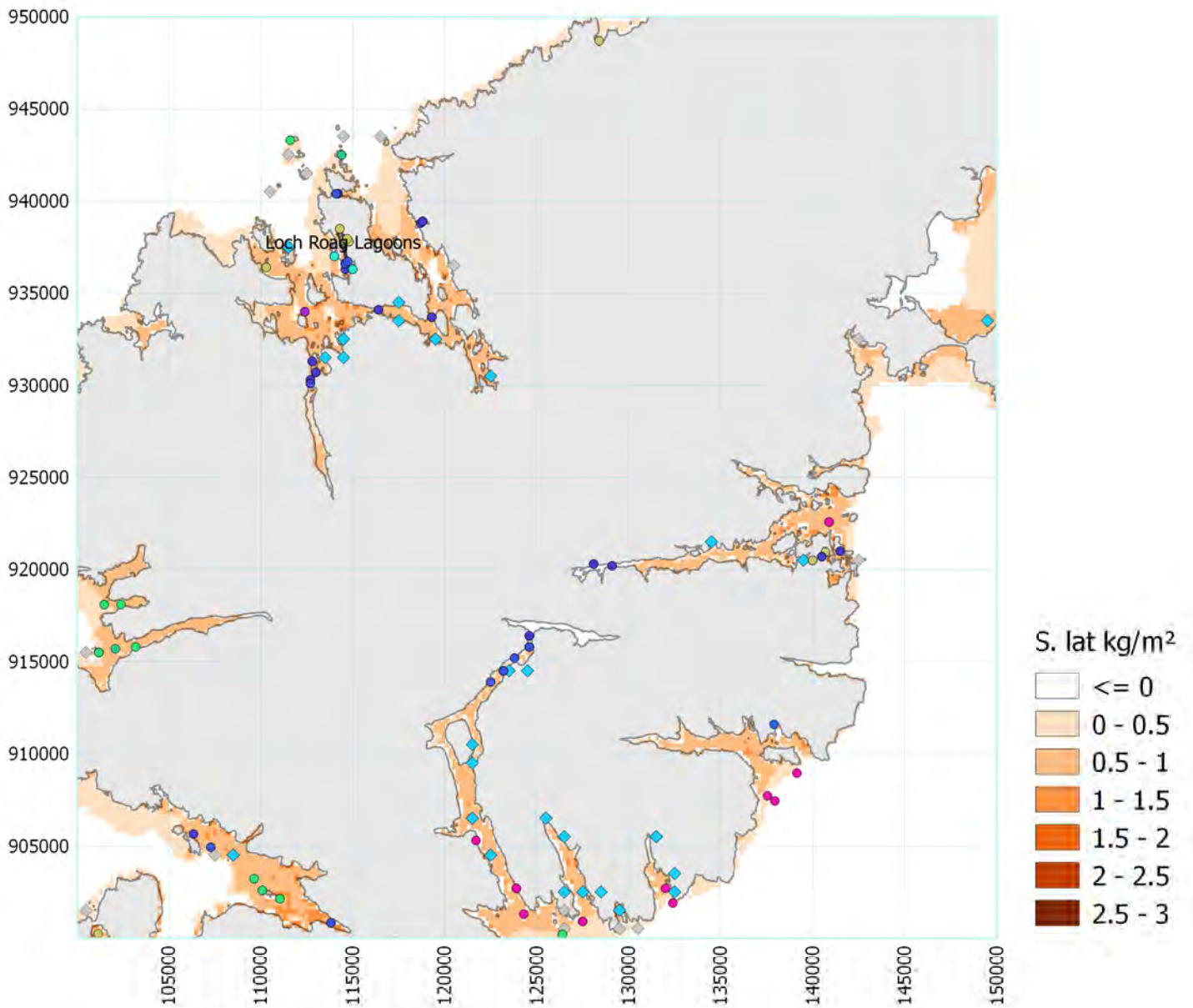
Map 13



PMF species

- ◆ Grey seal

Map 14



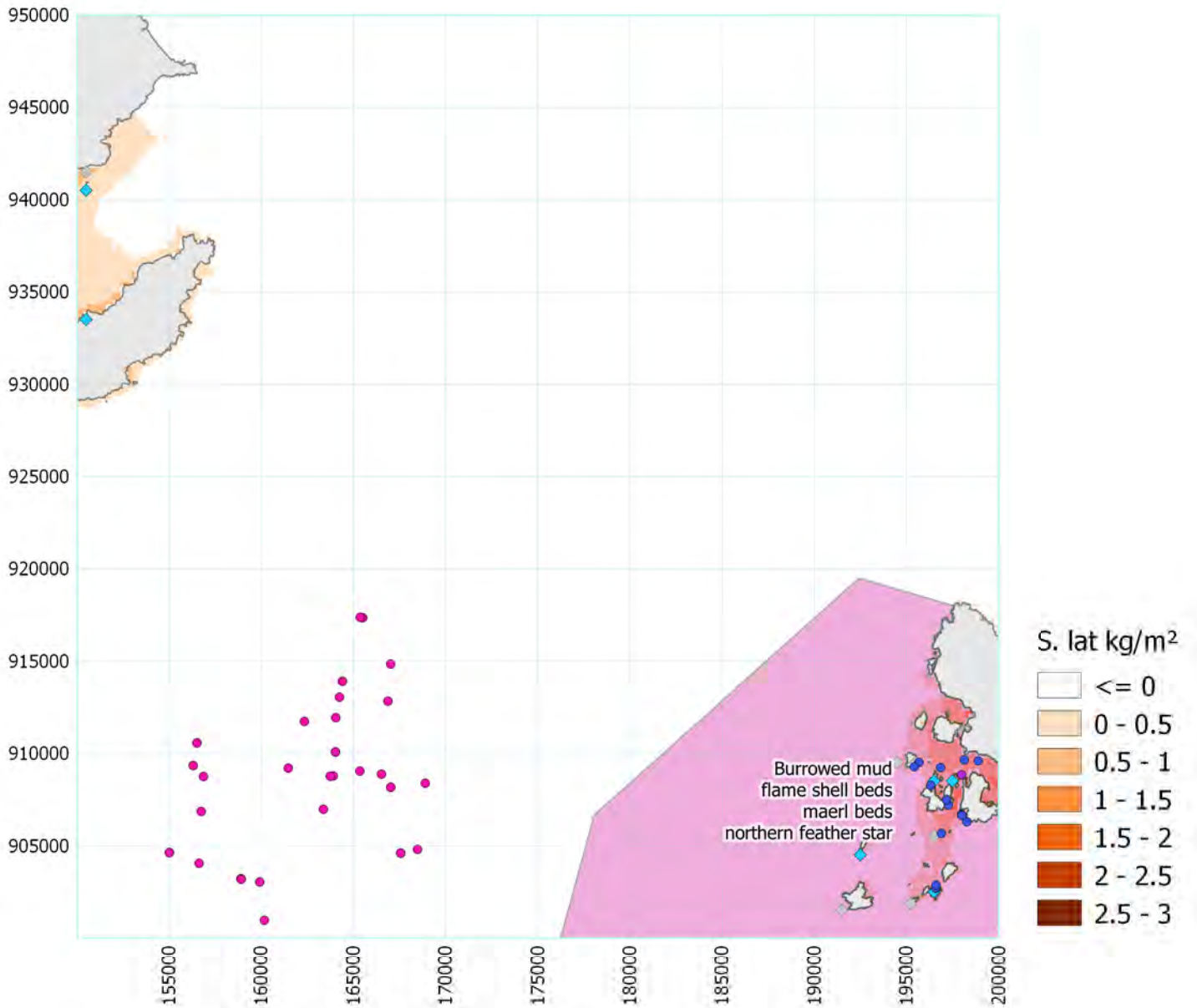
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◊ Grey seal
- ◊ Harbour / common seal
- SAC

Map 15



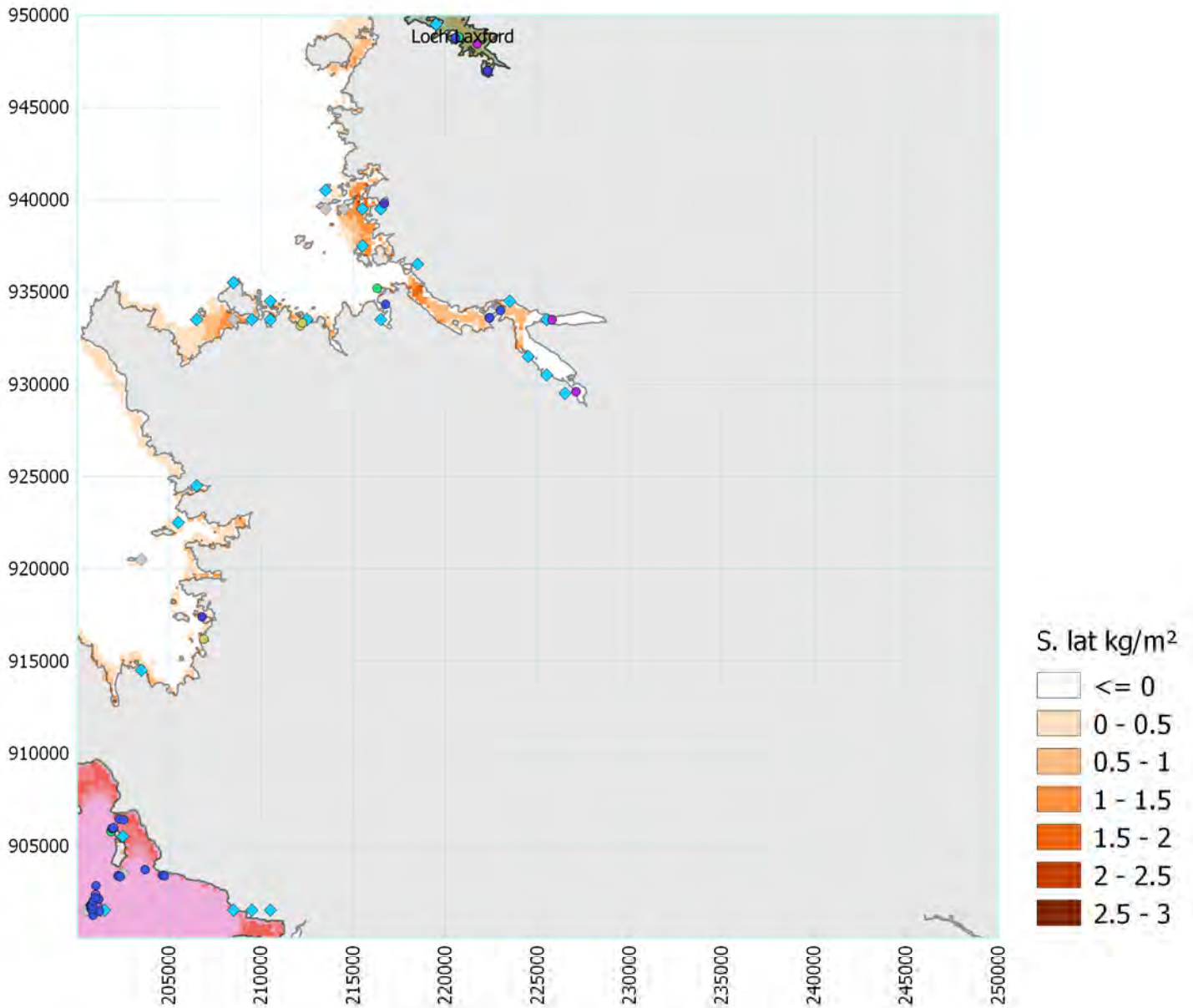
PMF biotopes

- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 16



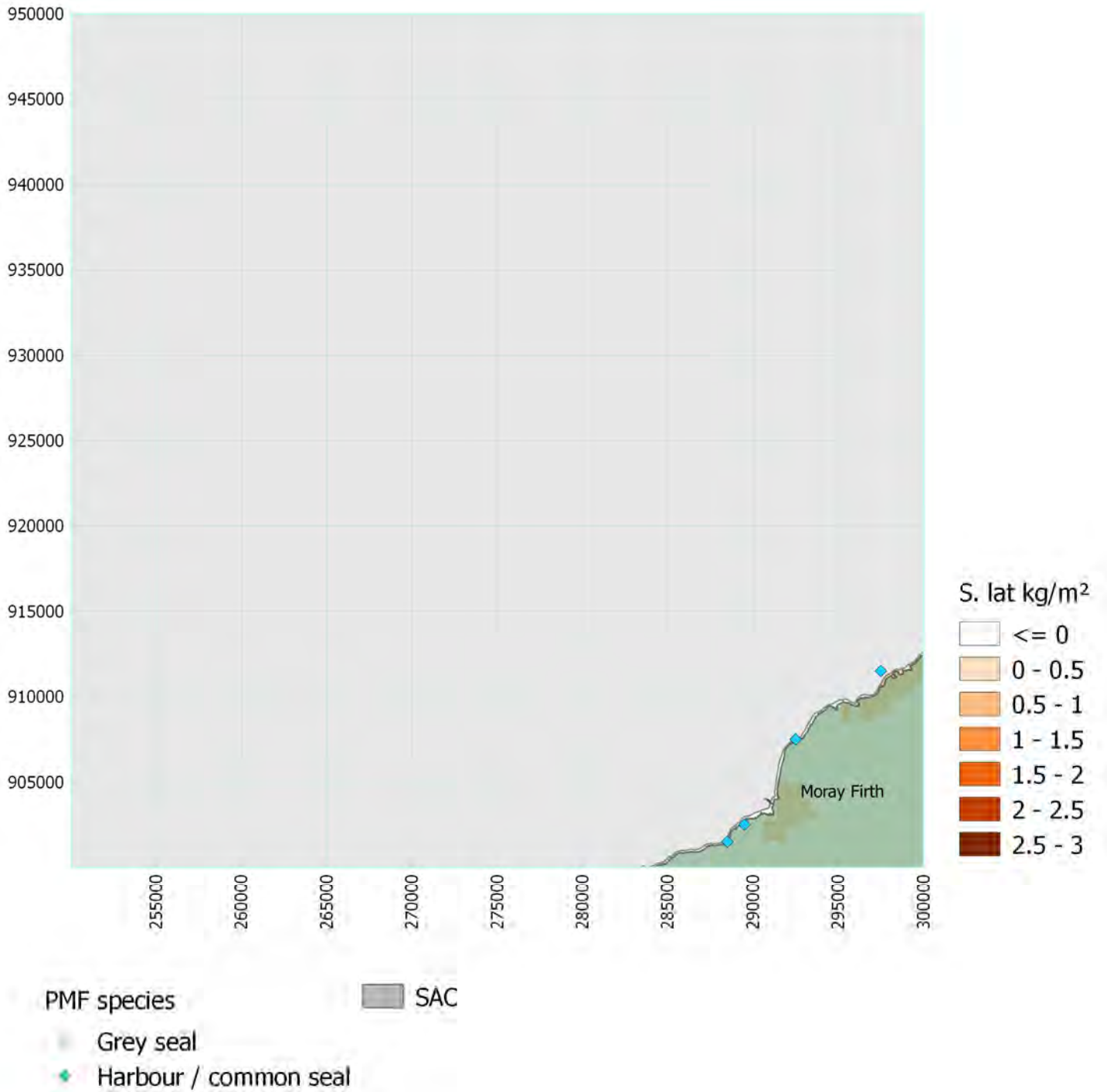
PMF biotopes

- Blue mussel beds
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

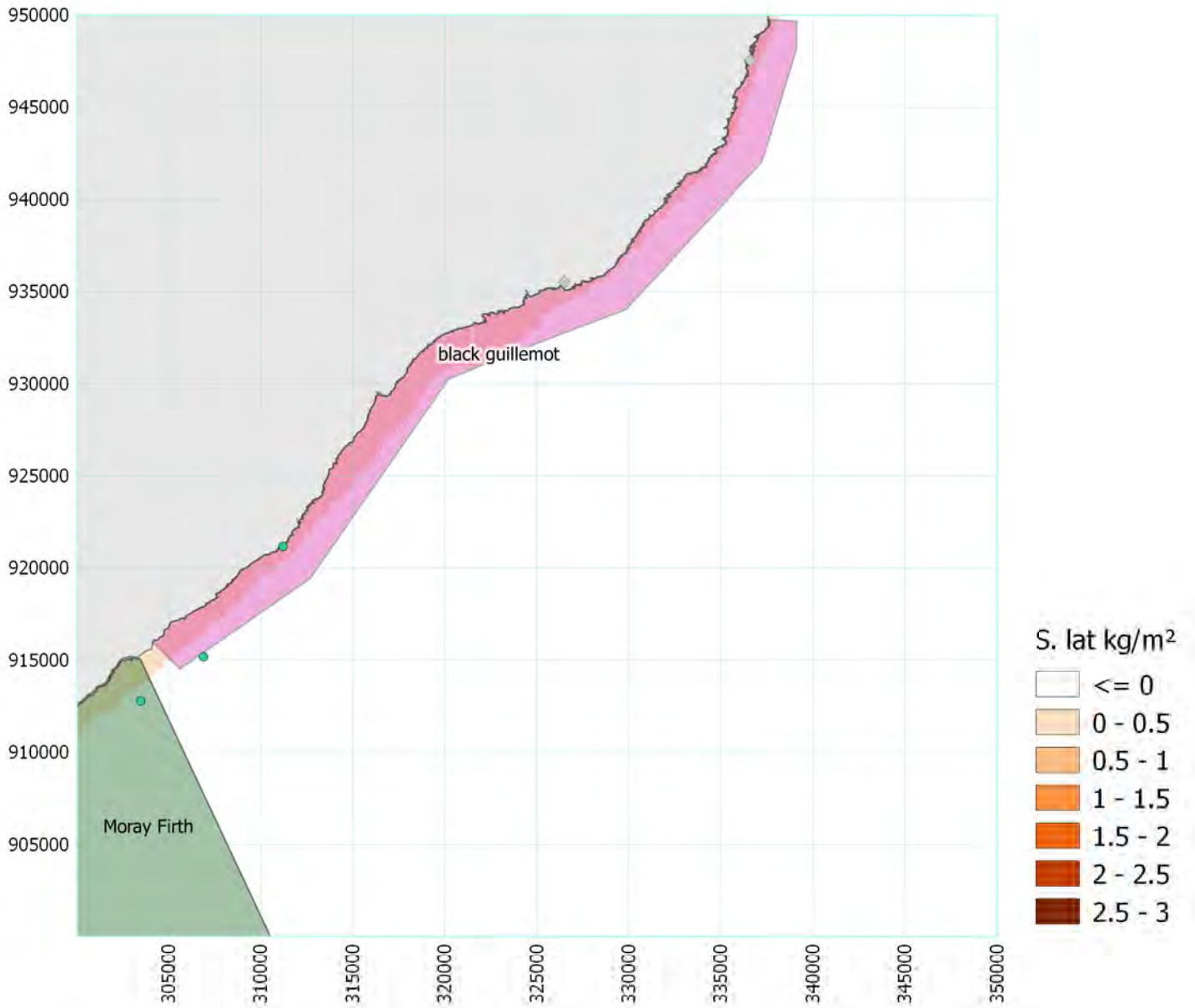
PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

Map 17

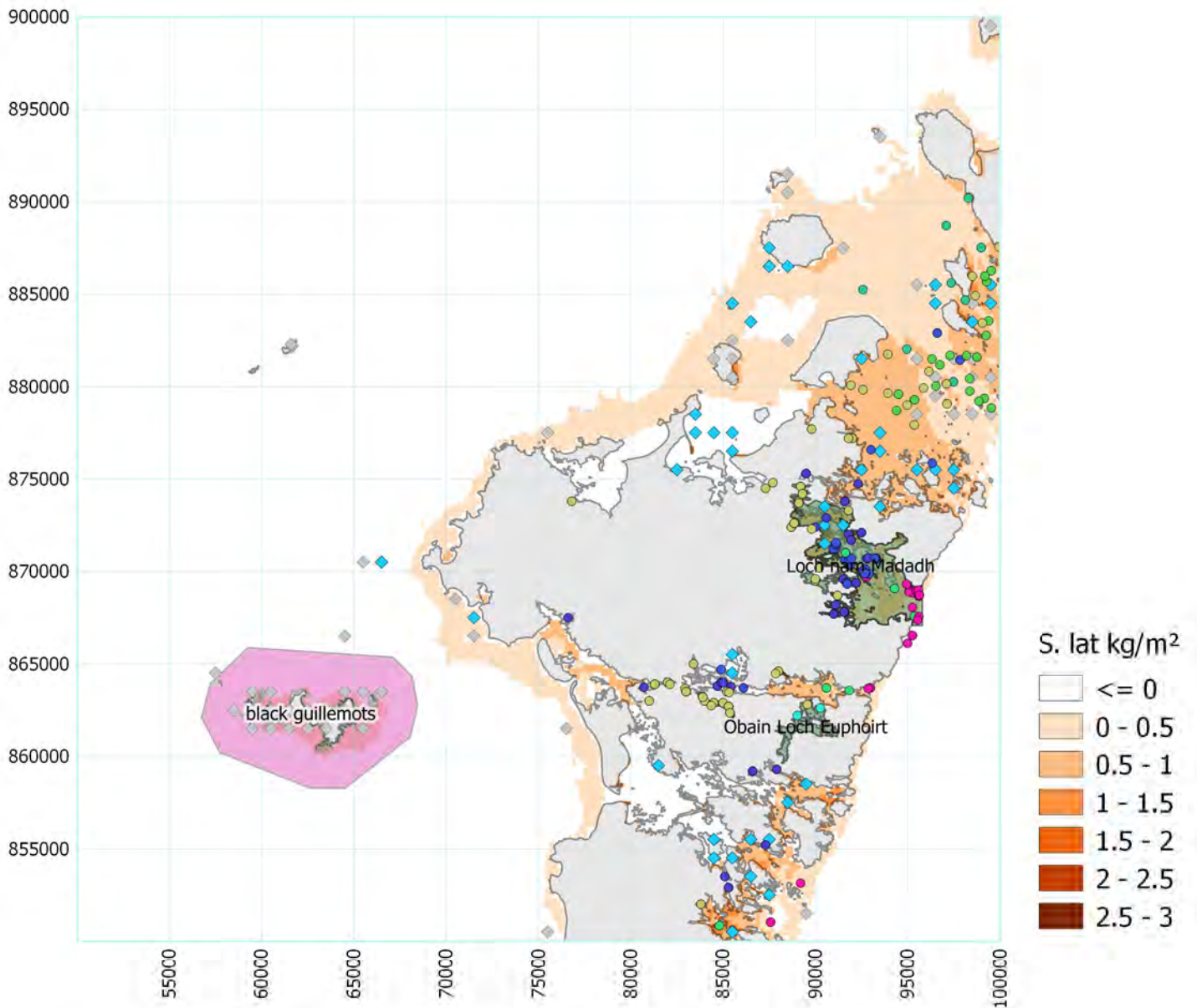


Map 18



- PMF biotopes
- Tide-swept algal communities and Kelp beds
- PMF species
- Grey seal
- MPA
- SAC

Map 19



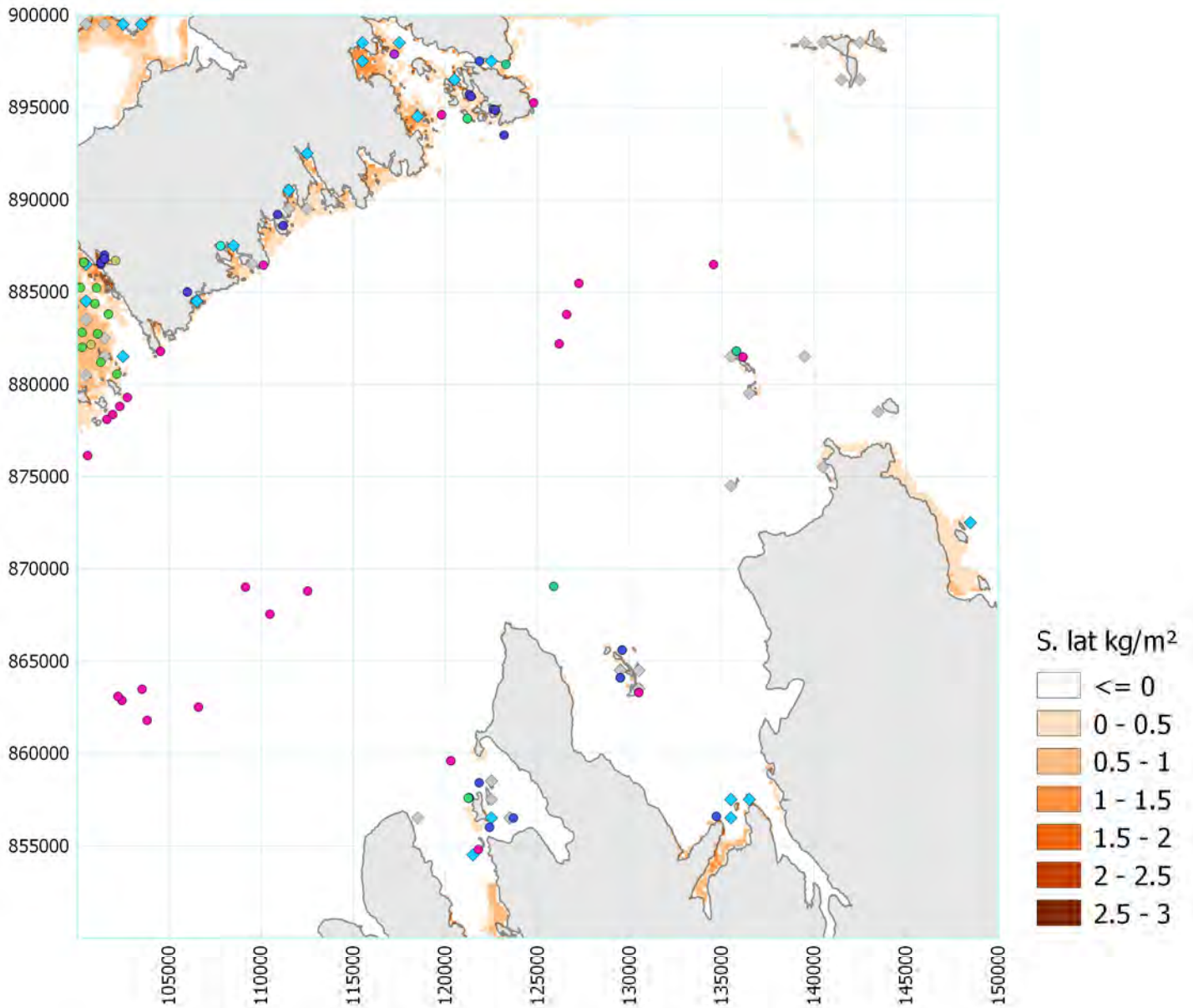
PMF biotopes

- Blue mussel beds & Low or variable salinity habitats
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- ◇ Grey seal
- ◇ Harbour / common seal
- MPA
- SAC

Map 20



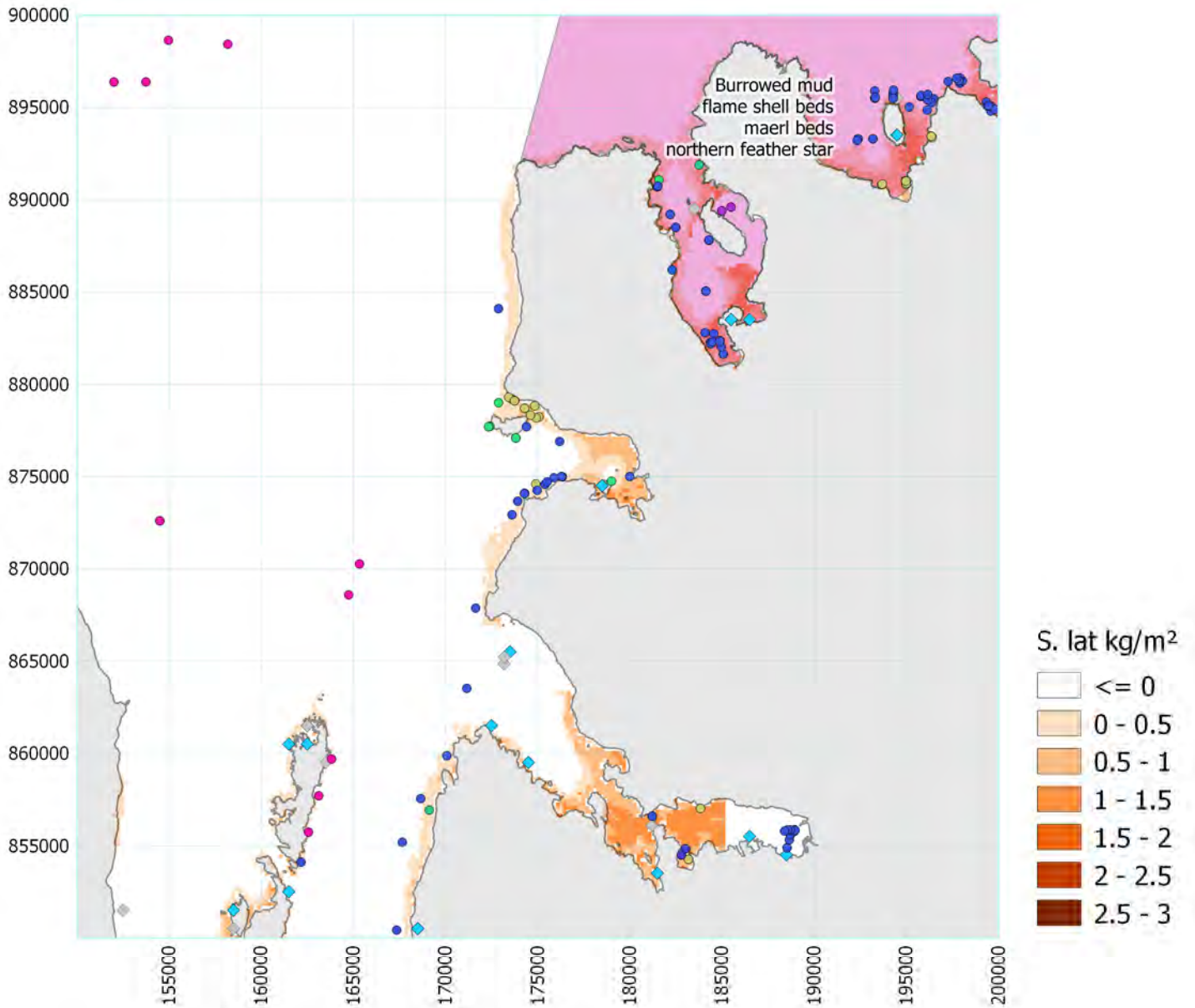
PMF biotopes

- Blue mussel beds & Low or variable salinity habitats
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal

Map 21



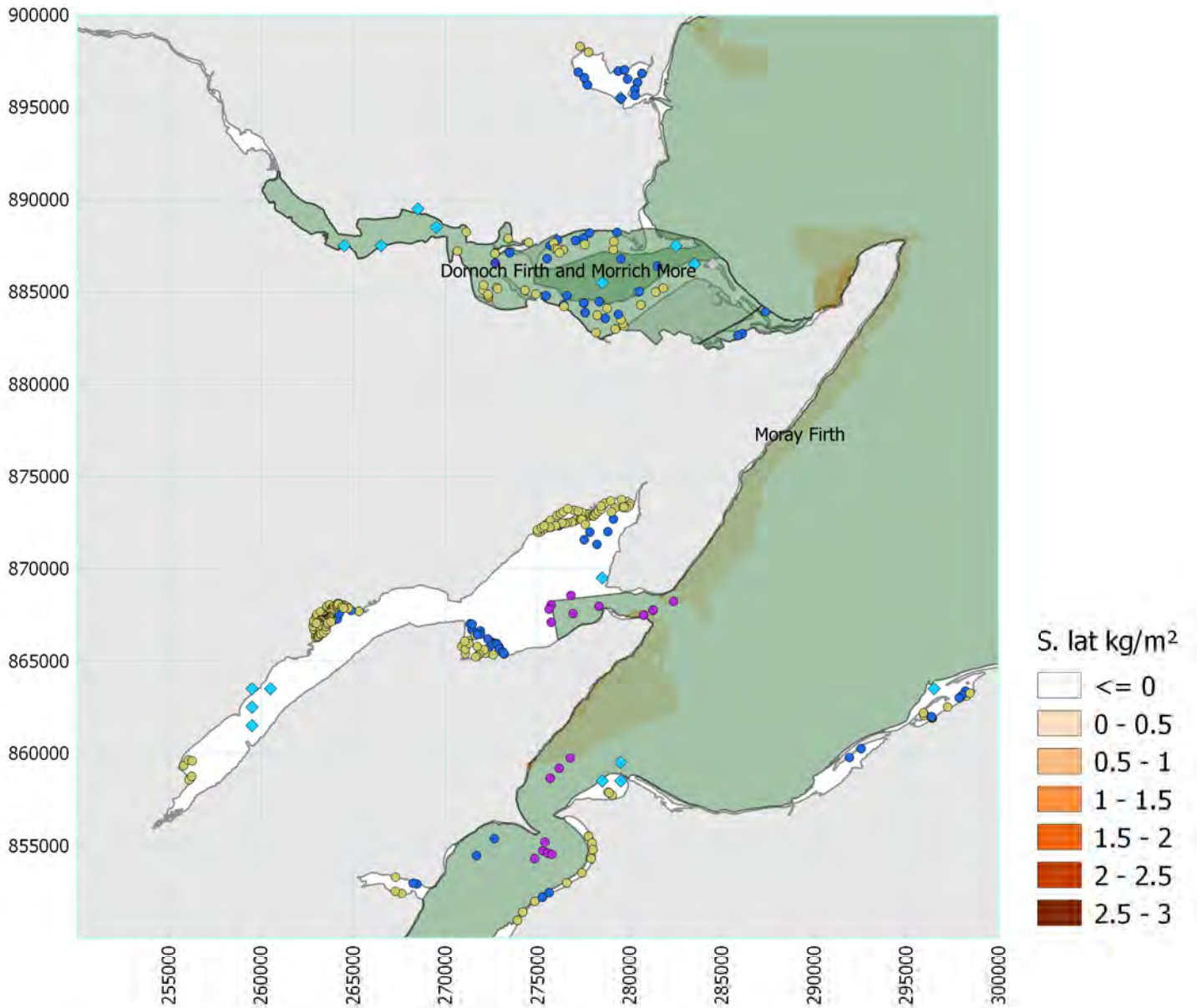
PMF biotopes

- Blue mussel beds
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- MPA

Map 22



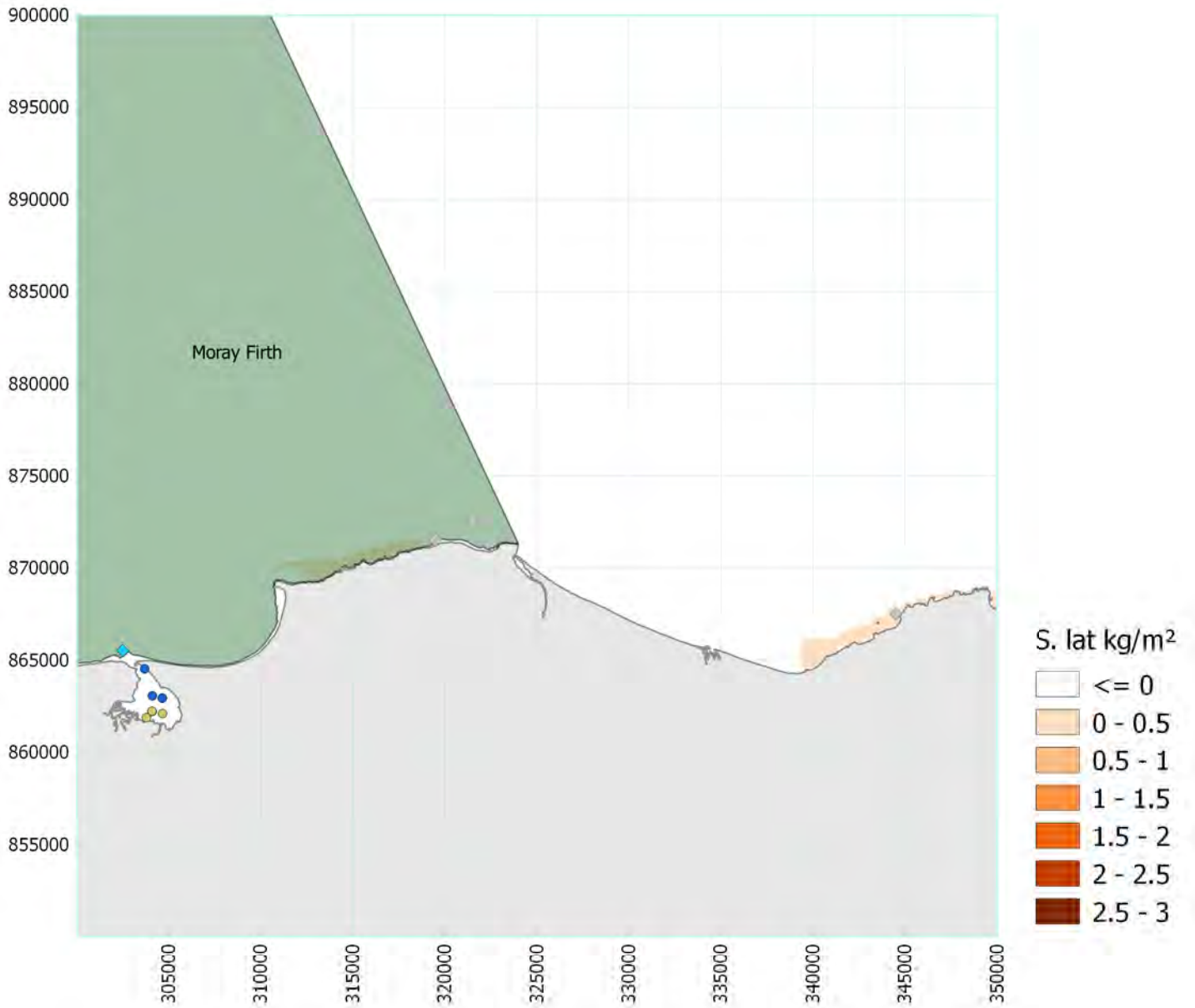
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Horse mussel beds
- Seagrass beds
- Tide-swept algal communities

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 23



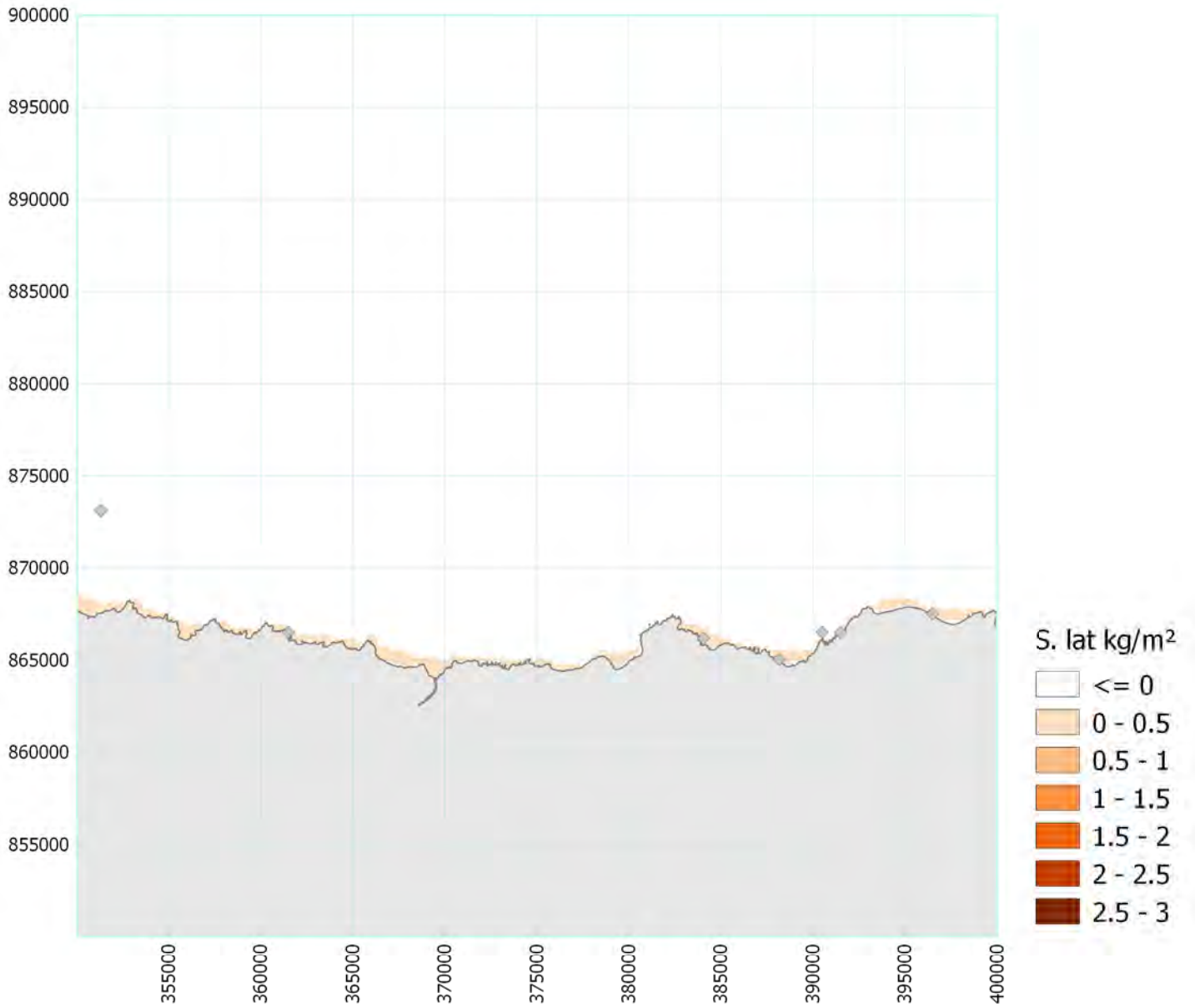
PMF biotopes

- Blue mussel beds
- Seagrass beds

PMF species

- Grey seal
- Harbour / common seal
- SAC

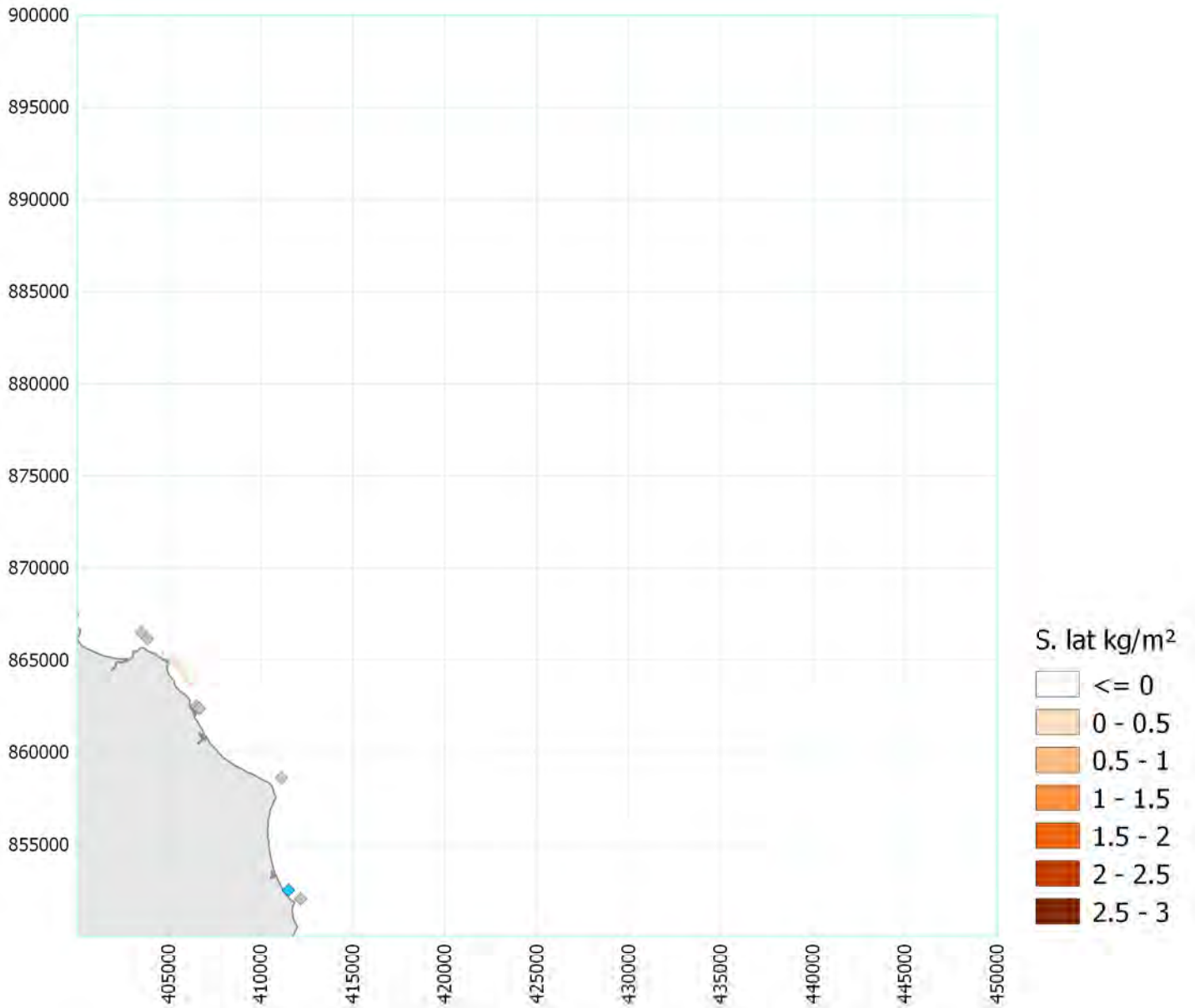
Map 24



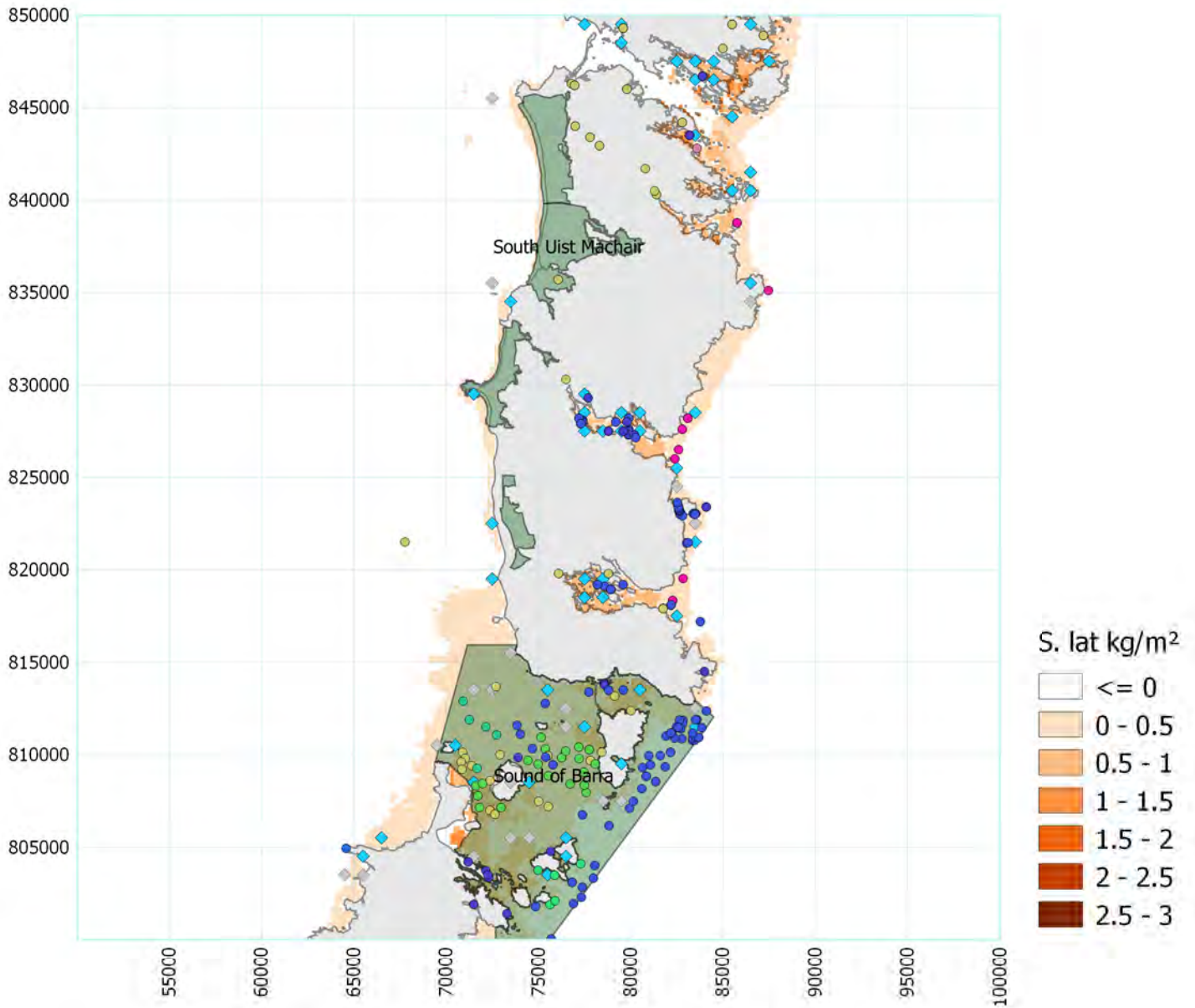
PMF species

- ◆ Grey seal

Map 25



Map 26



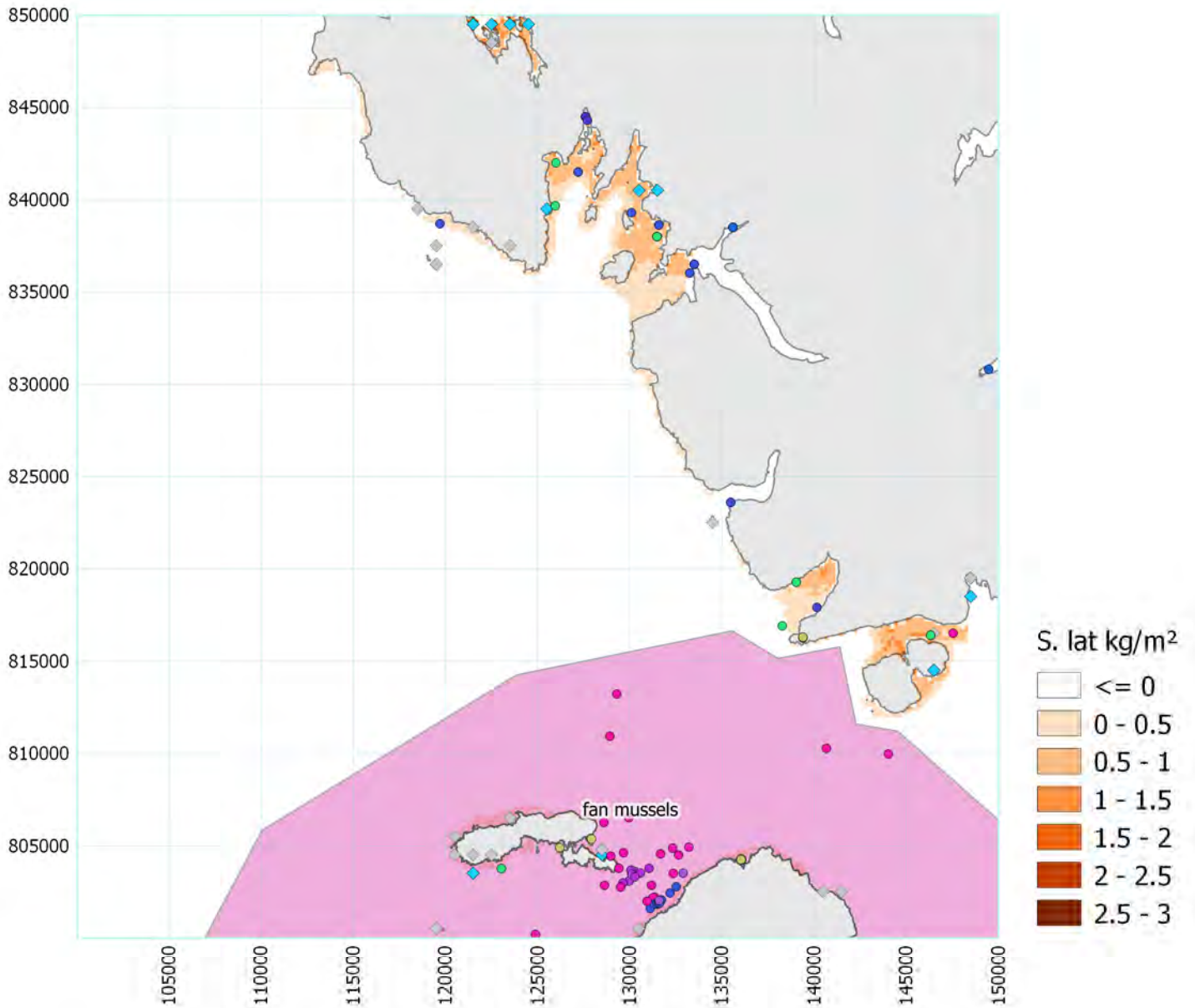
PMF biotopes

- Blue mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Native oysters
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

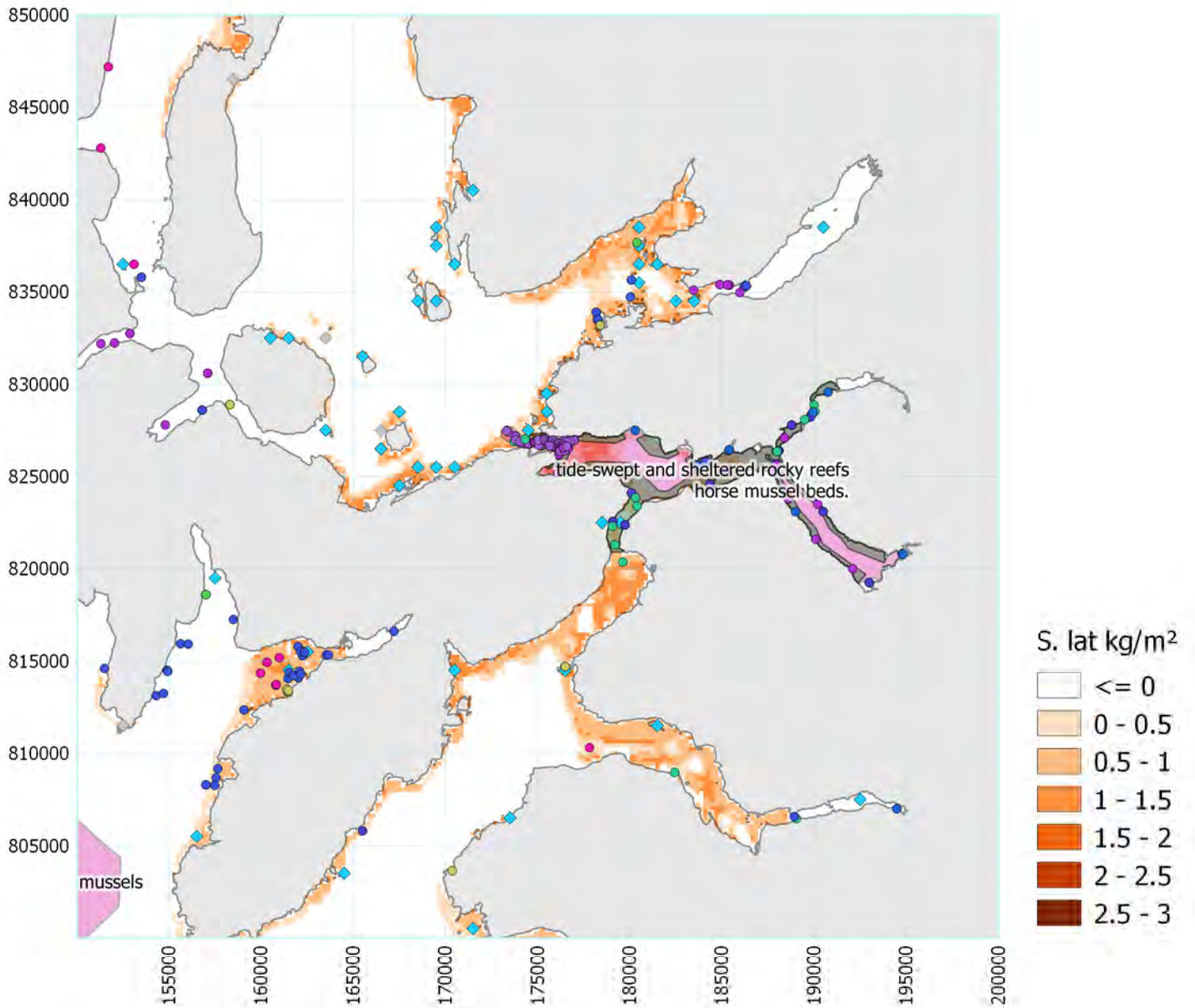
- Grey seal
- Harbour / common seal
- SAC

Map 27



fan mussels

Map 28



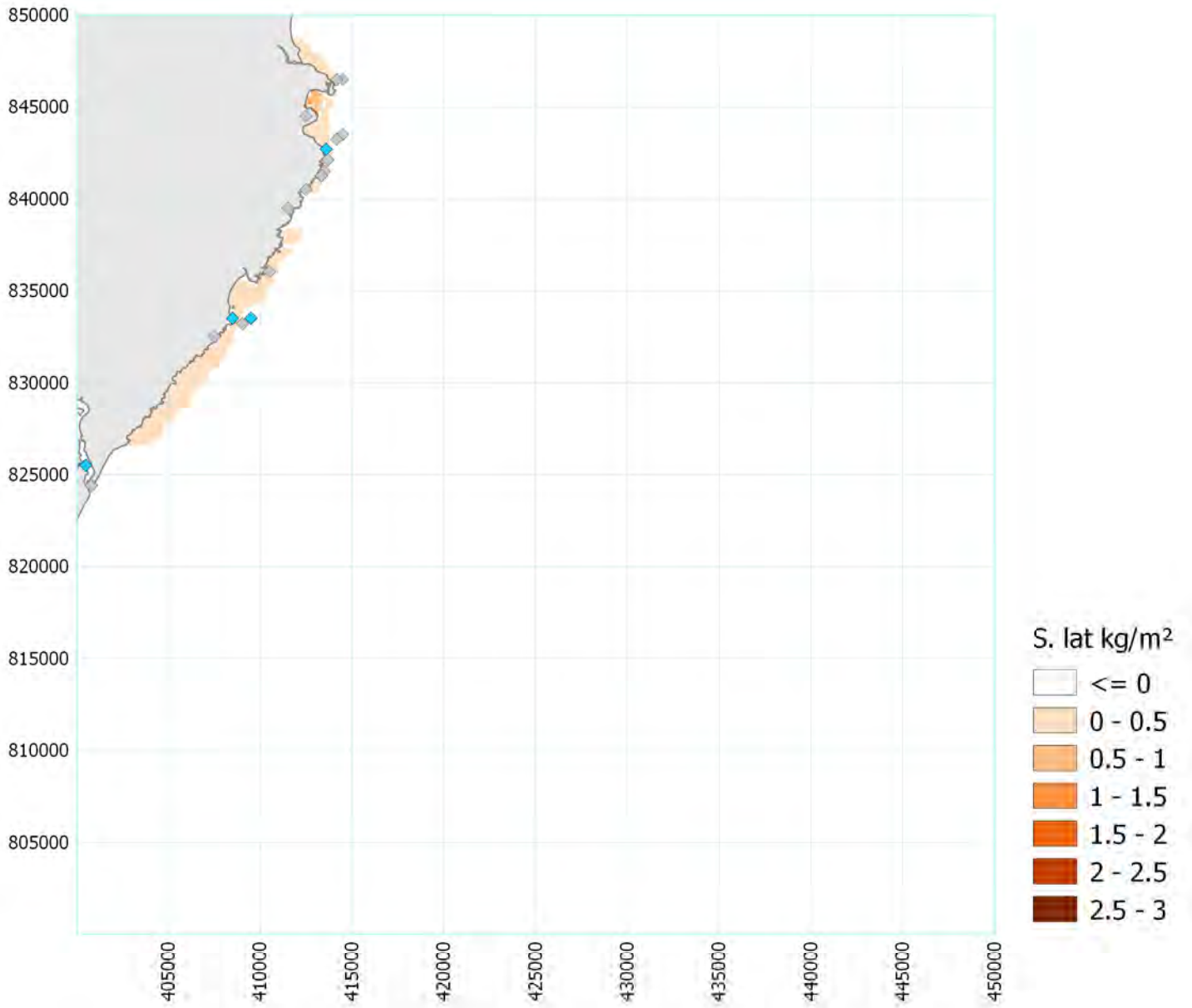
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

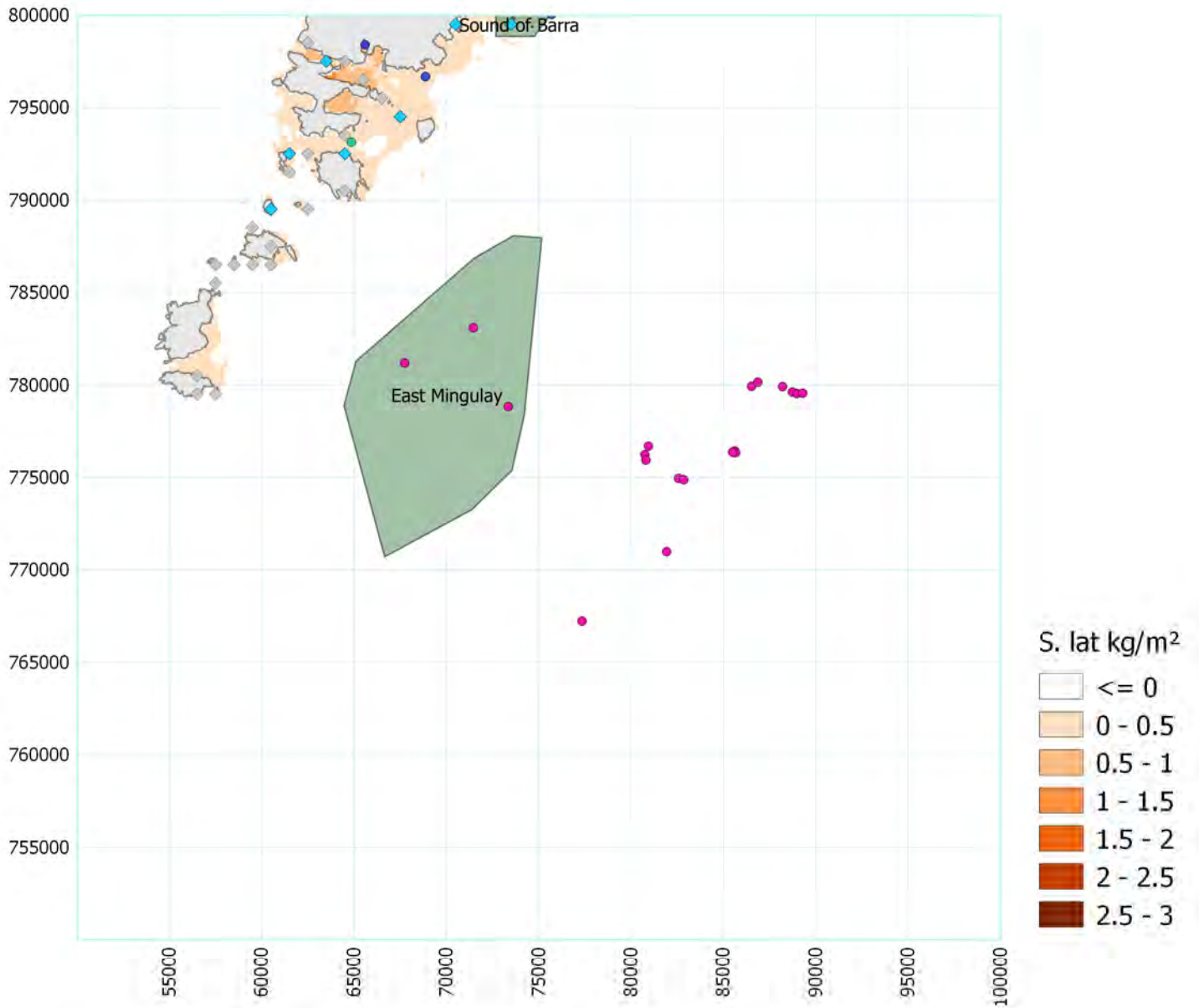
Map 29



PMF species

- Grey seal
- Harbour / common seal

Map 30



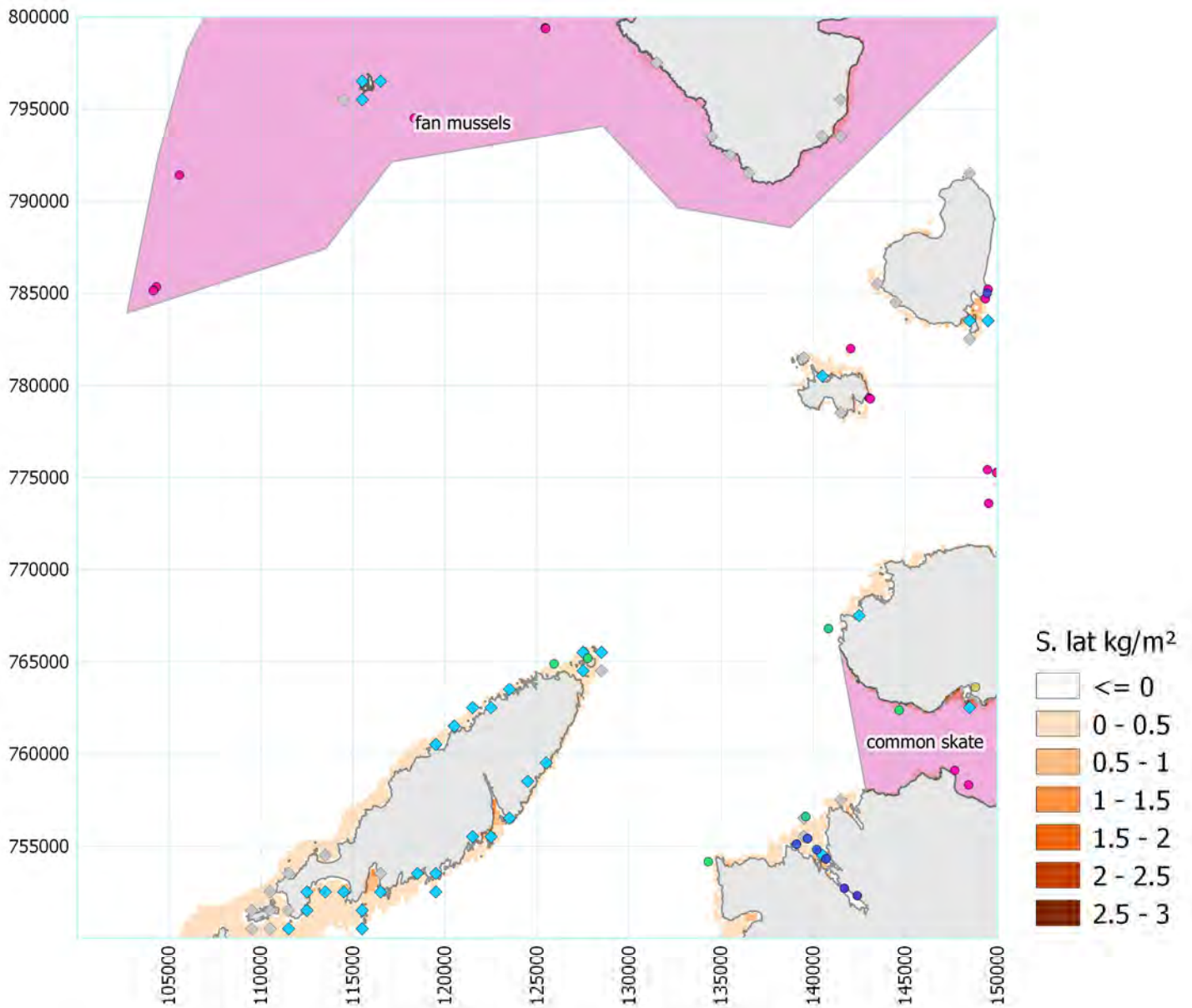
PMF biotopes

- Maerl beds
- Northern sea fan and sponge communities
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 31



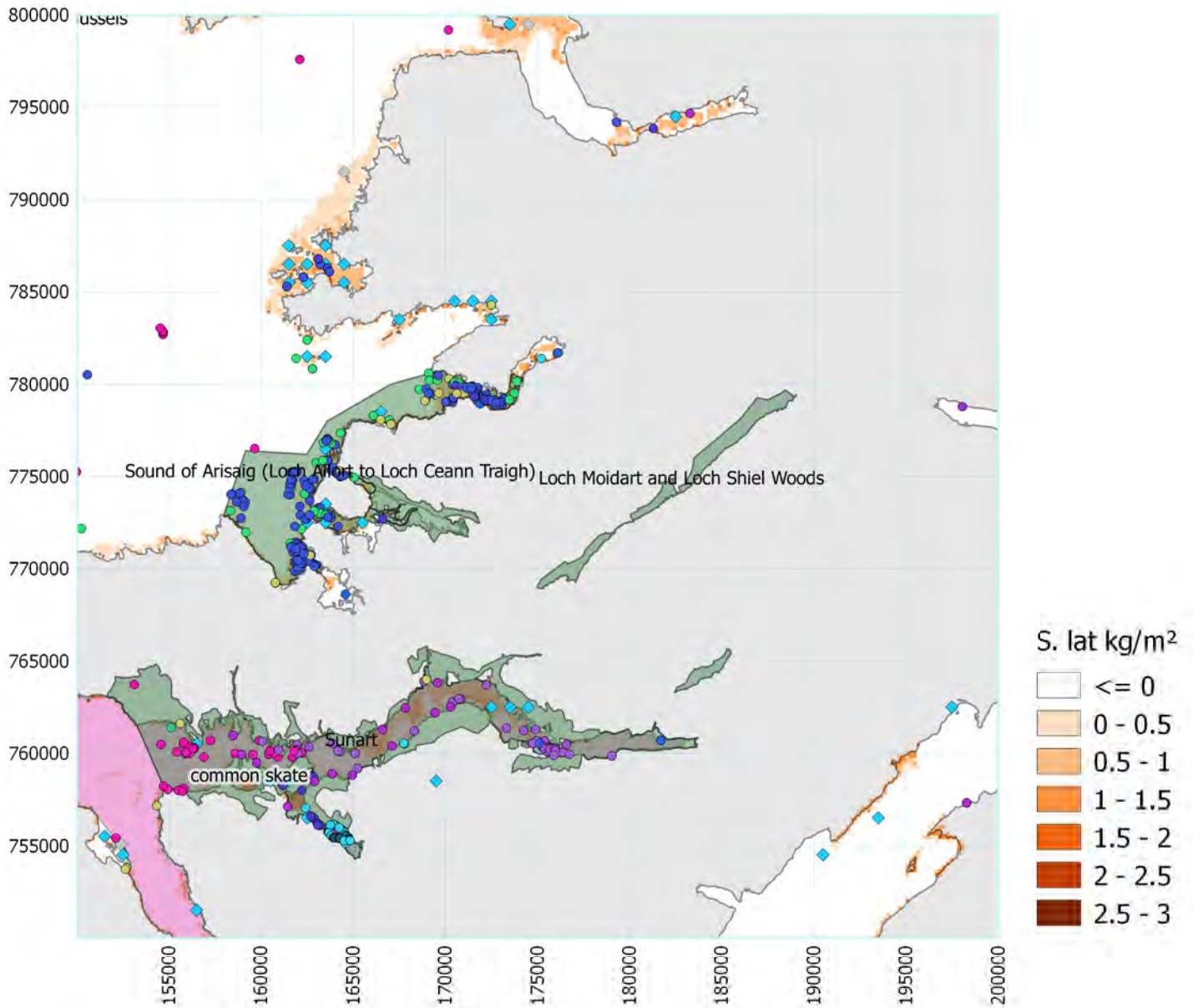
PMF biotopes

- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 32



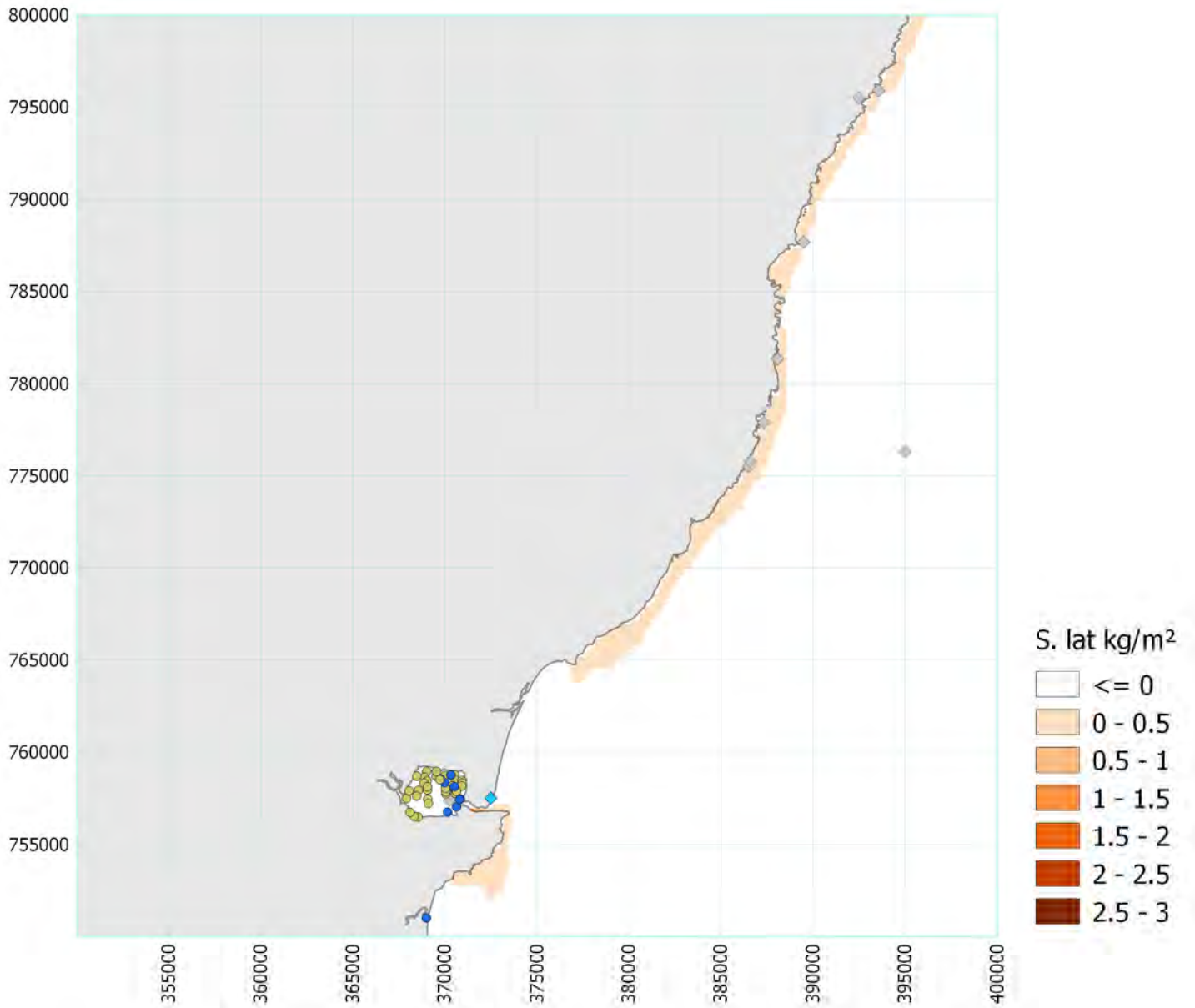
PMF biotopes

- Blue mussel beds
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Serpulid aggregations
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal
- MPA
- SAC

Map 33



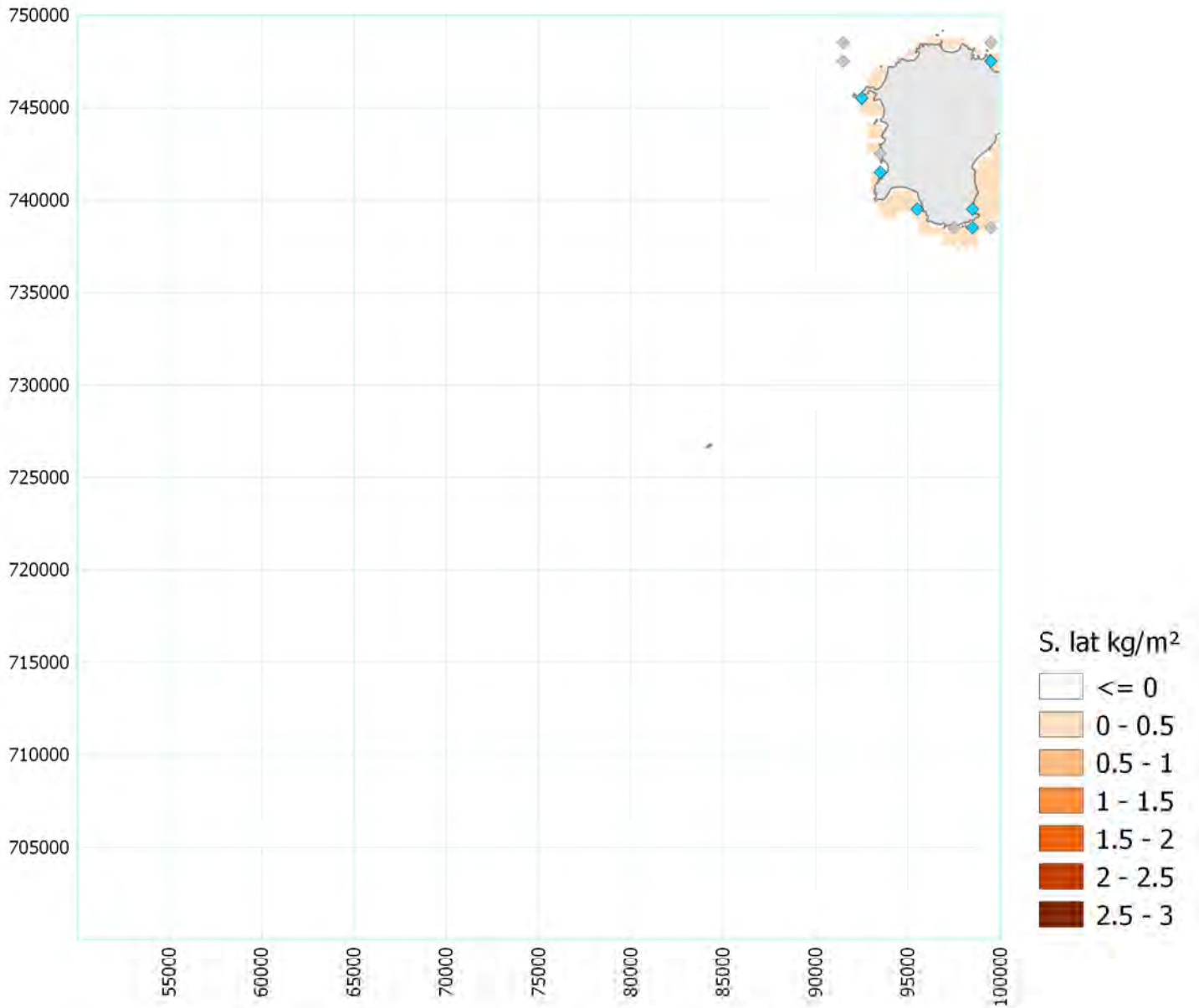
PMF biotopes

- Blue mussel beds
- Seagrass beds

PMF species

- Grey seal
- Harbour / common seal

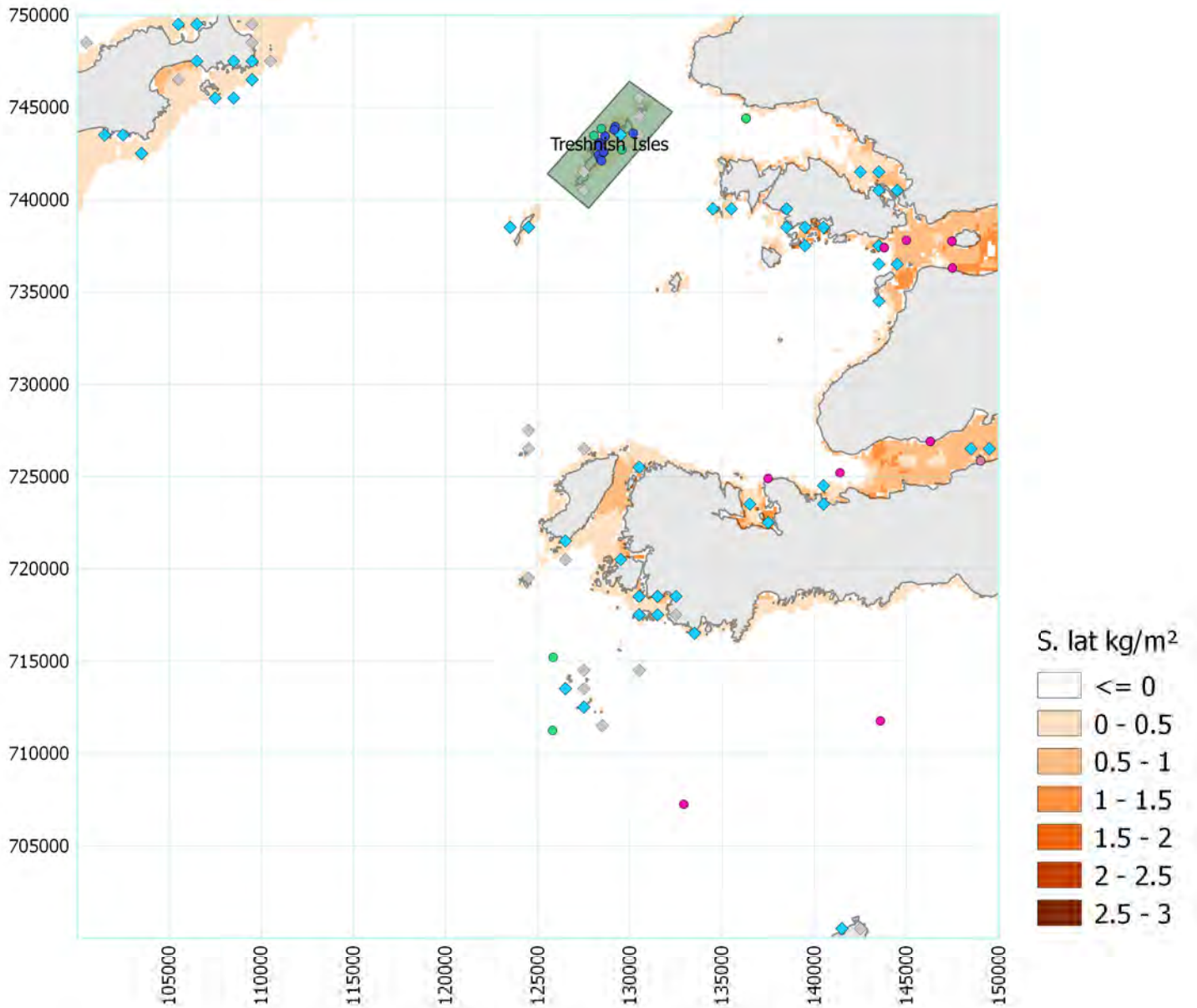
Map 34



PMF species

- Grey seal
- Harbour / common seal

Map 35



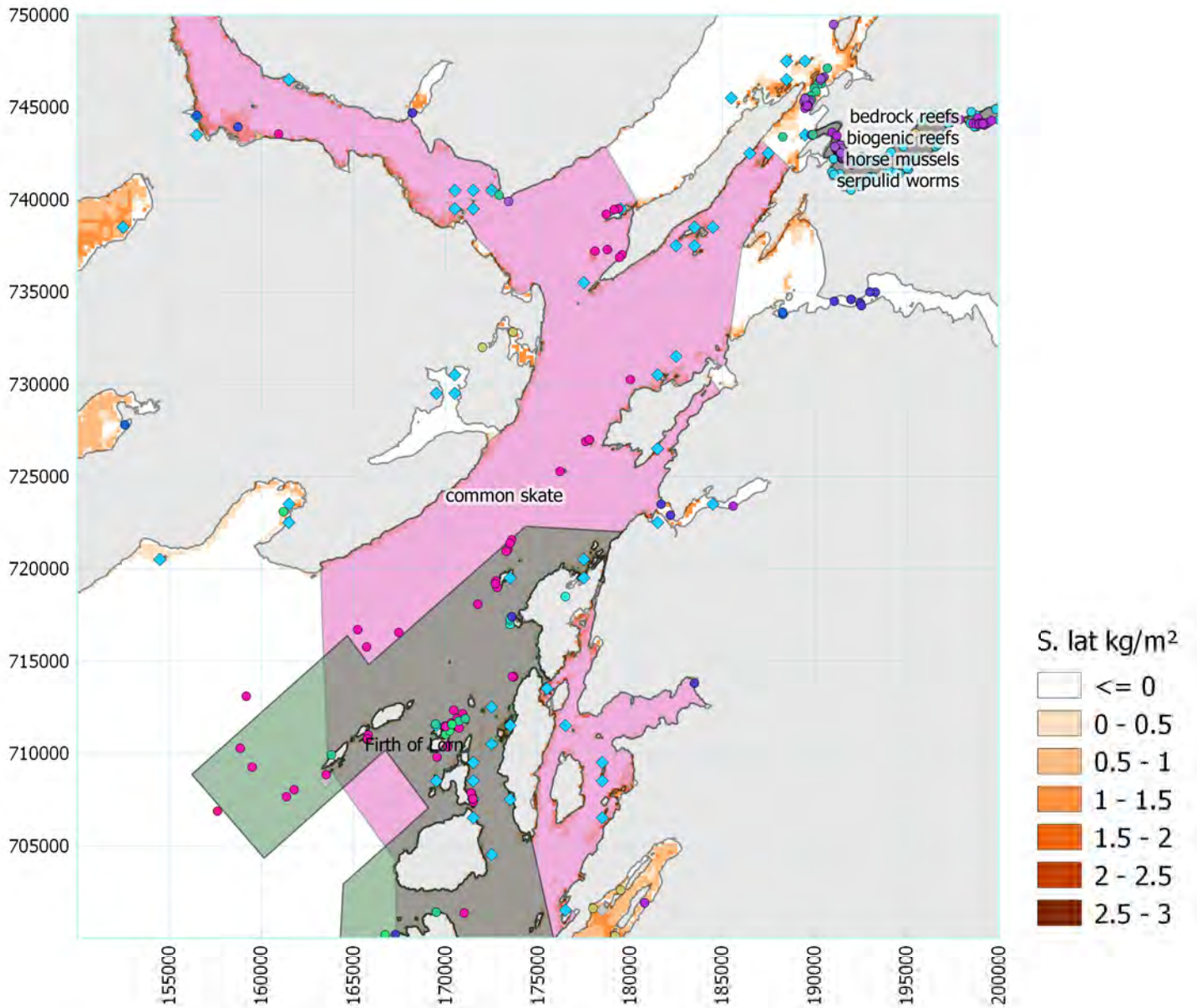
PMF biotopes

- ★ Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- ★ Native oysters
- Northern sea fan and sponge communities
- ★ Seagrass beds
- Tide-swept algal communities and Kelp beds

PMF species

- ◇ Grey seal
- ◇ Harbour / common seal
- SAC

Map 36



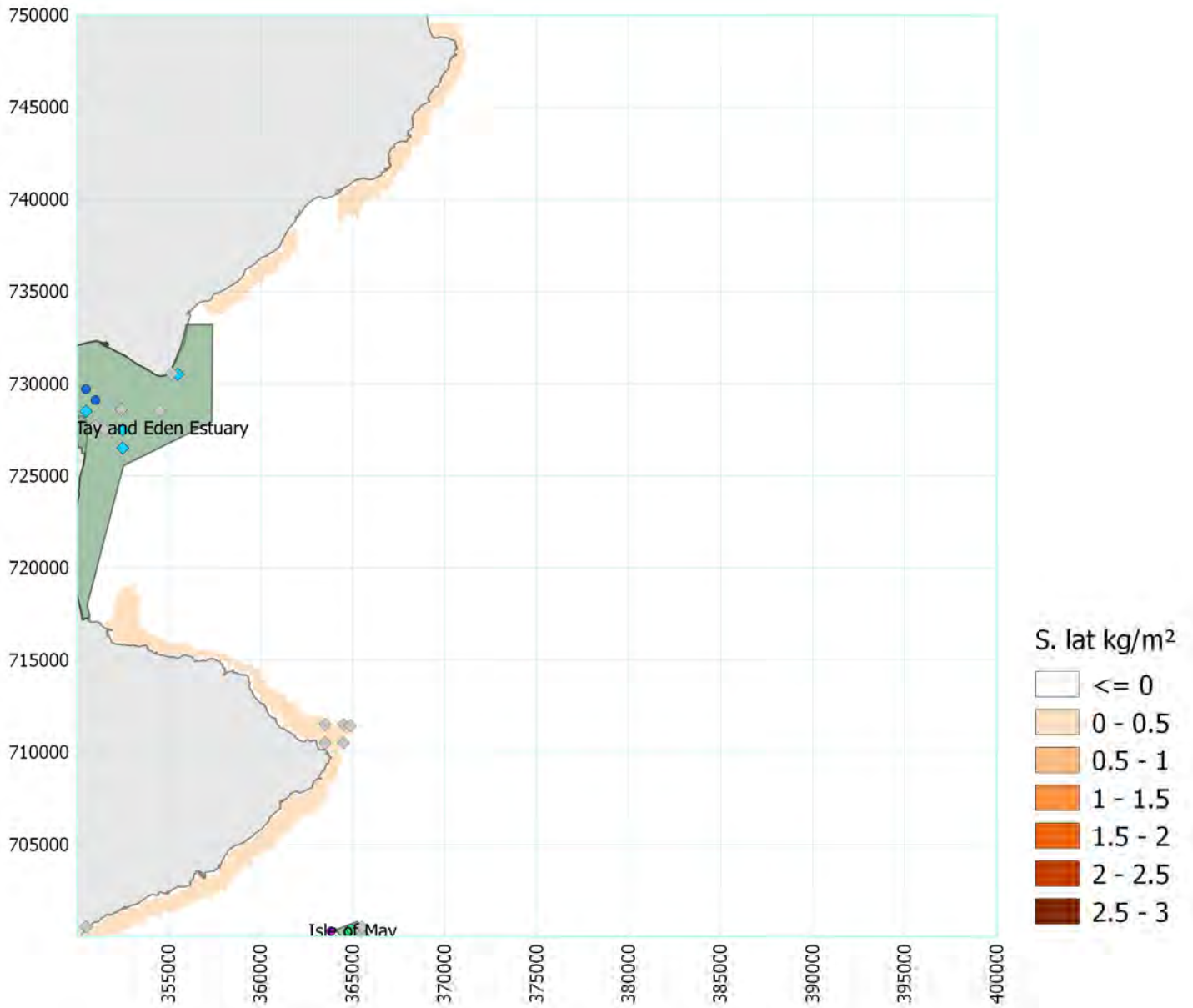
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Serpulid aggregations
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- MPA
- SAC

Map 37



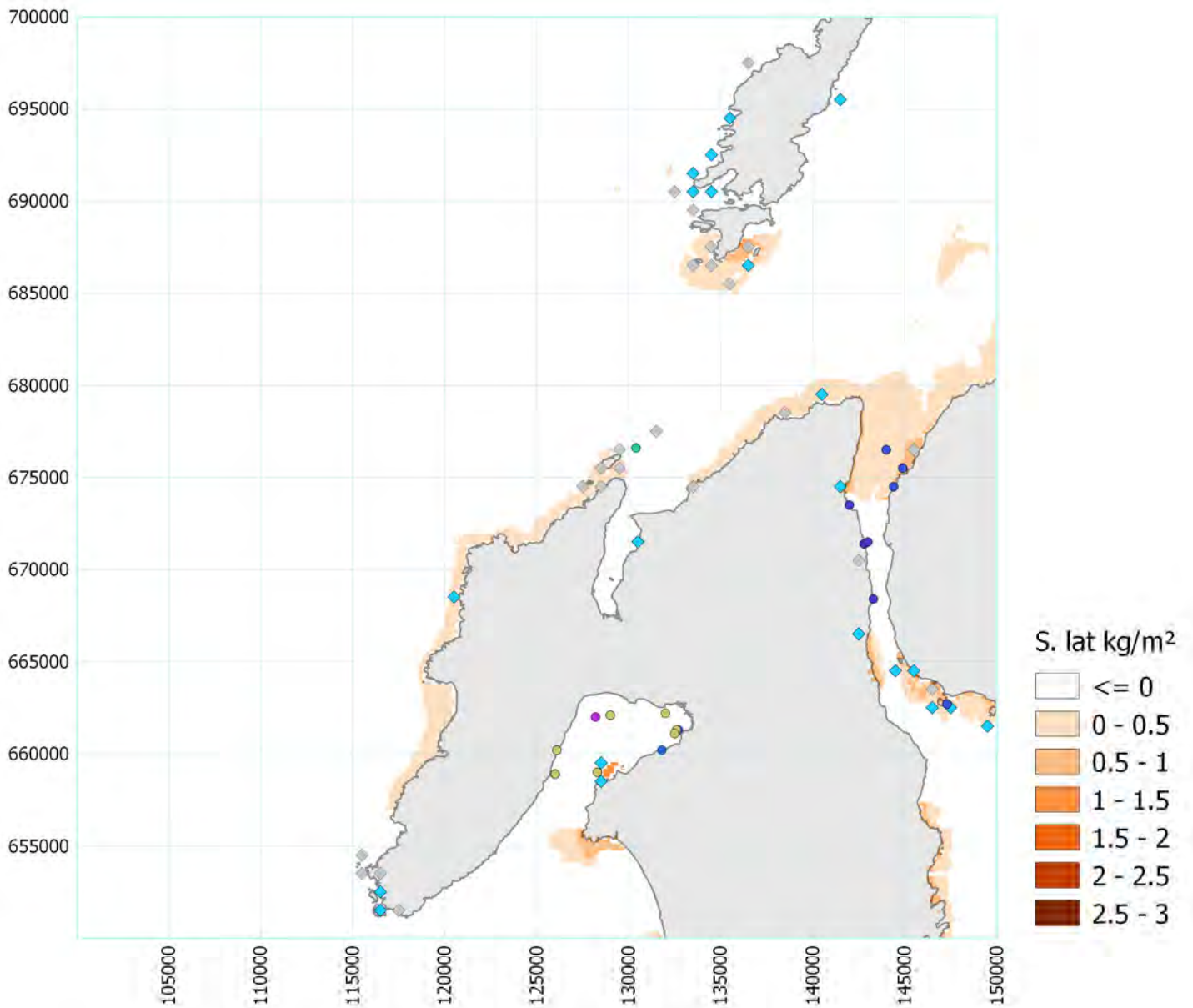
PMF biotopes

- Blue mussel beds
- Horse mussel beds
- Maerl or coarse shell gravel with burrowing sea cucumbers

PMF species

- ◊ Grey seal
- ◆ Harbour / common seal
- SAC

Map 38



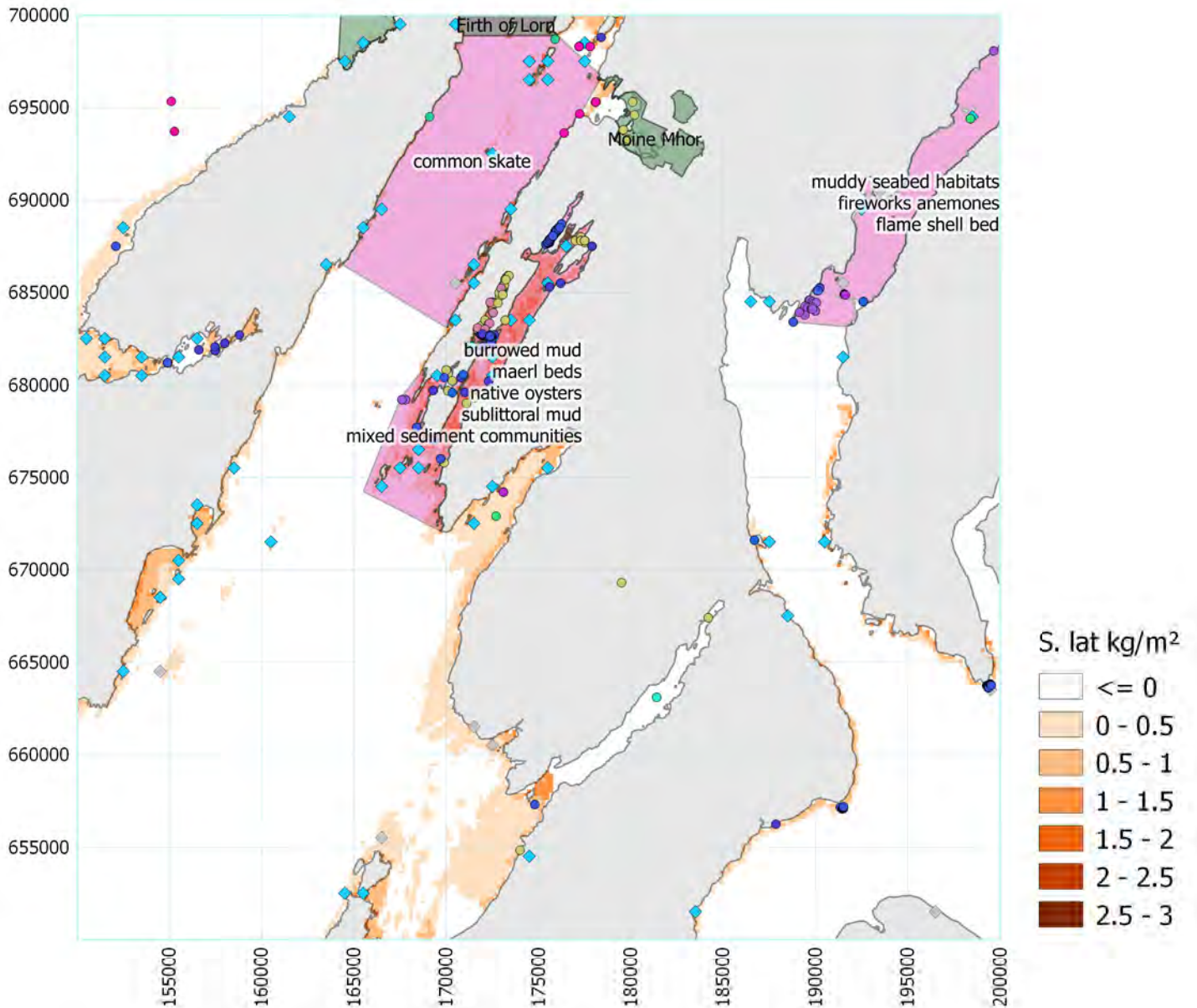
PMF biotopes

- Blue mussel beds
- Horse mussel beds
- Maerl beds
- Seagrass beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- Grey seal
- Harbour / common seal

Map 39



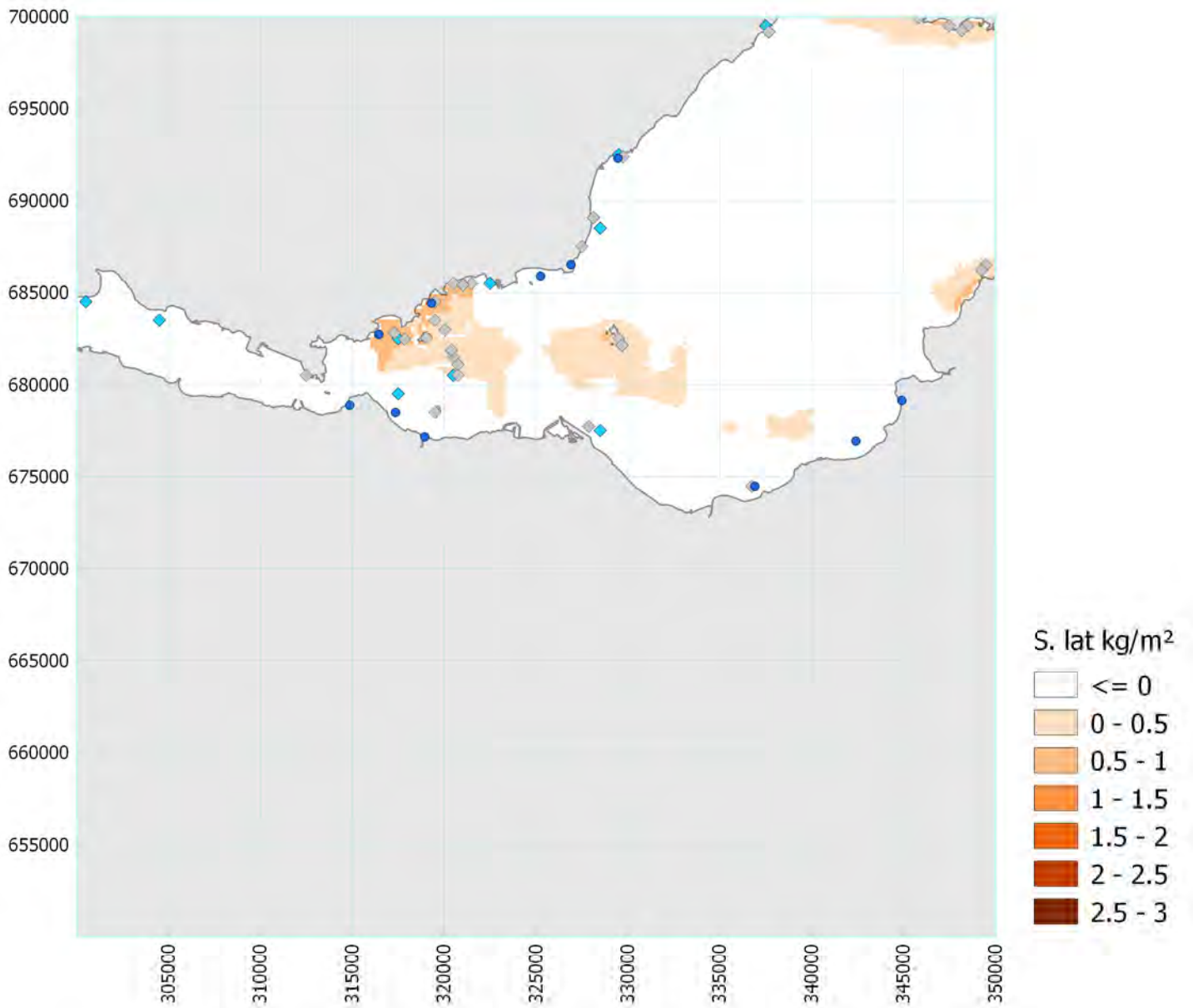
PMF biotopes

- Blue mussel beds
- Blue mussel beds & Low or variable salinity habitats
- Flame shell beds
- Horse mussel beds
- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Native oysters
- Northern sea fan and sponge communities
- Seagrass beds
- Serpulid aggregations
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds

PMF species

- ◇ Grey seal
- ◆ Harbour / common seal
- MPA
- SAC

Map 40



PMF biotopes

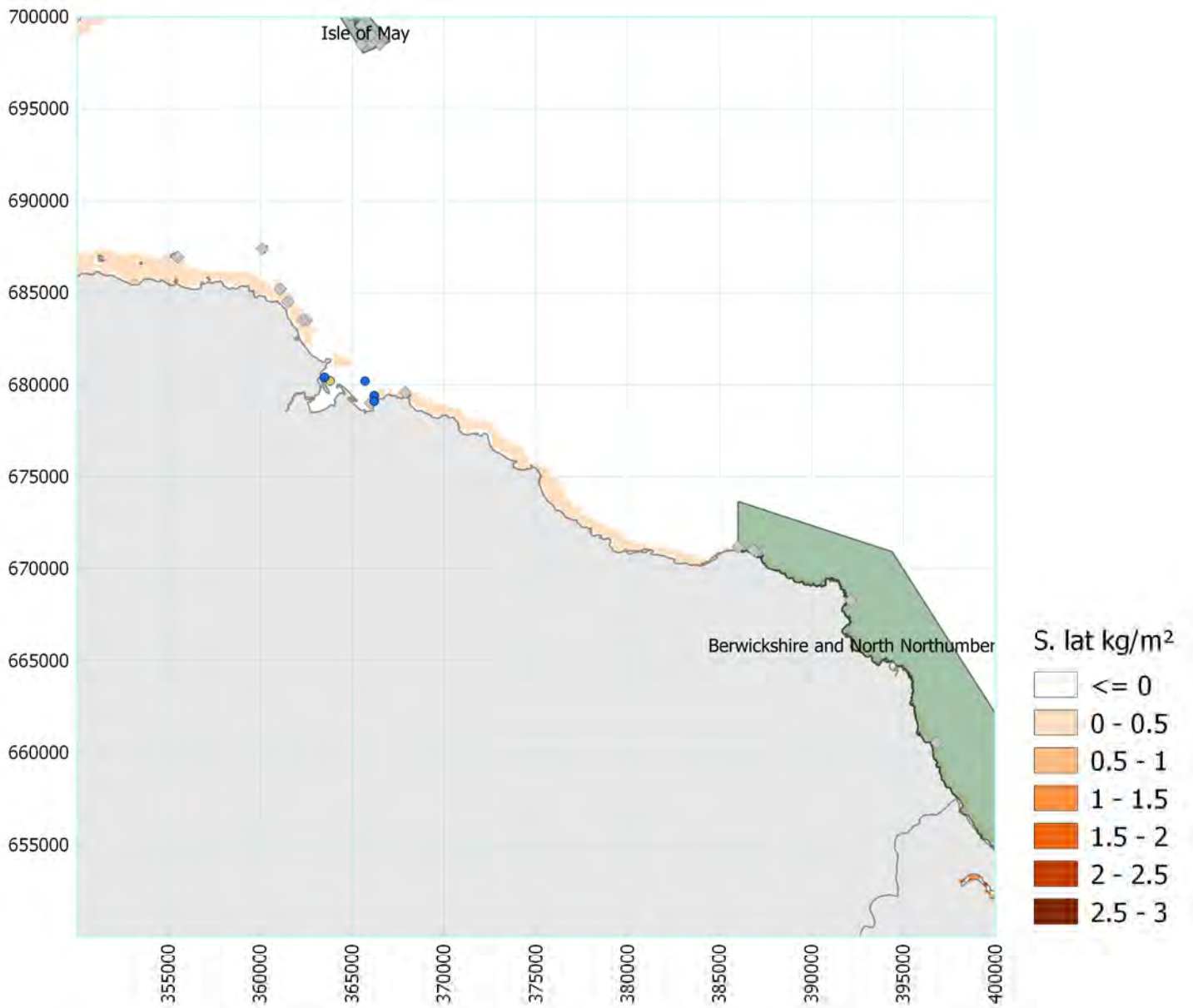
◆ Blue mussel beds

PMF species

◆ Grey seal

◆ Harbour / common seal

Map 41



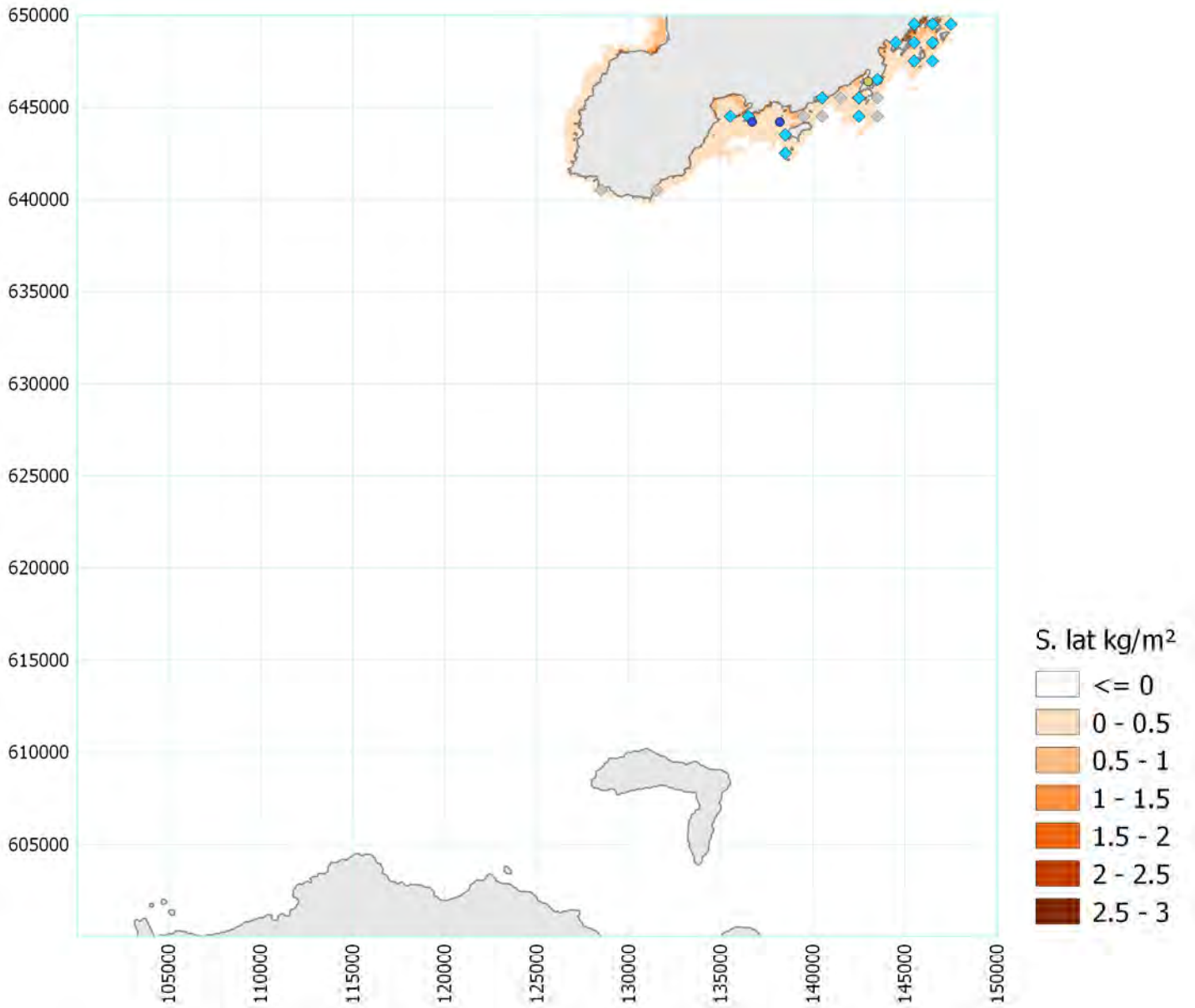
PMF biotopes

- Blue mussel beds
- Seagrass beds

PMF species

- Grey seal
- SAC

Map 42



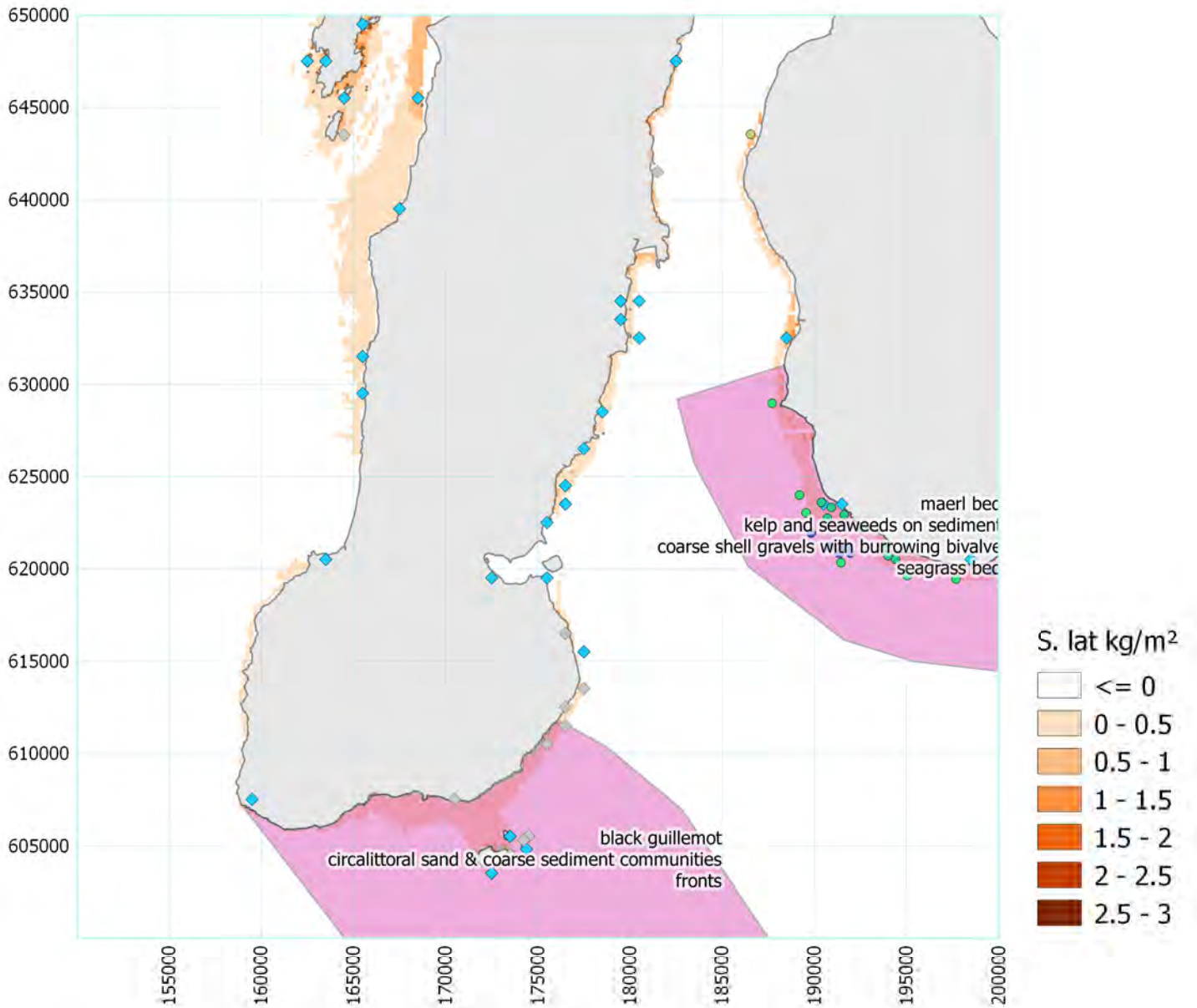
PMF biotopes

- Maerl beds
- Seagrass beds

PMF species

- Grey seal
- Harbour / common seal

Map 43



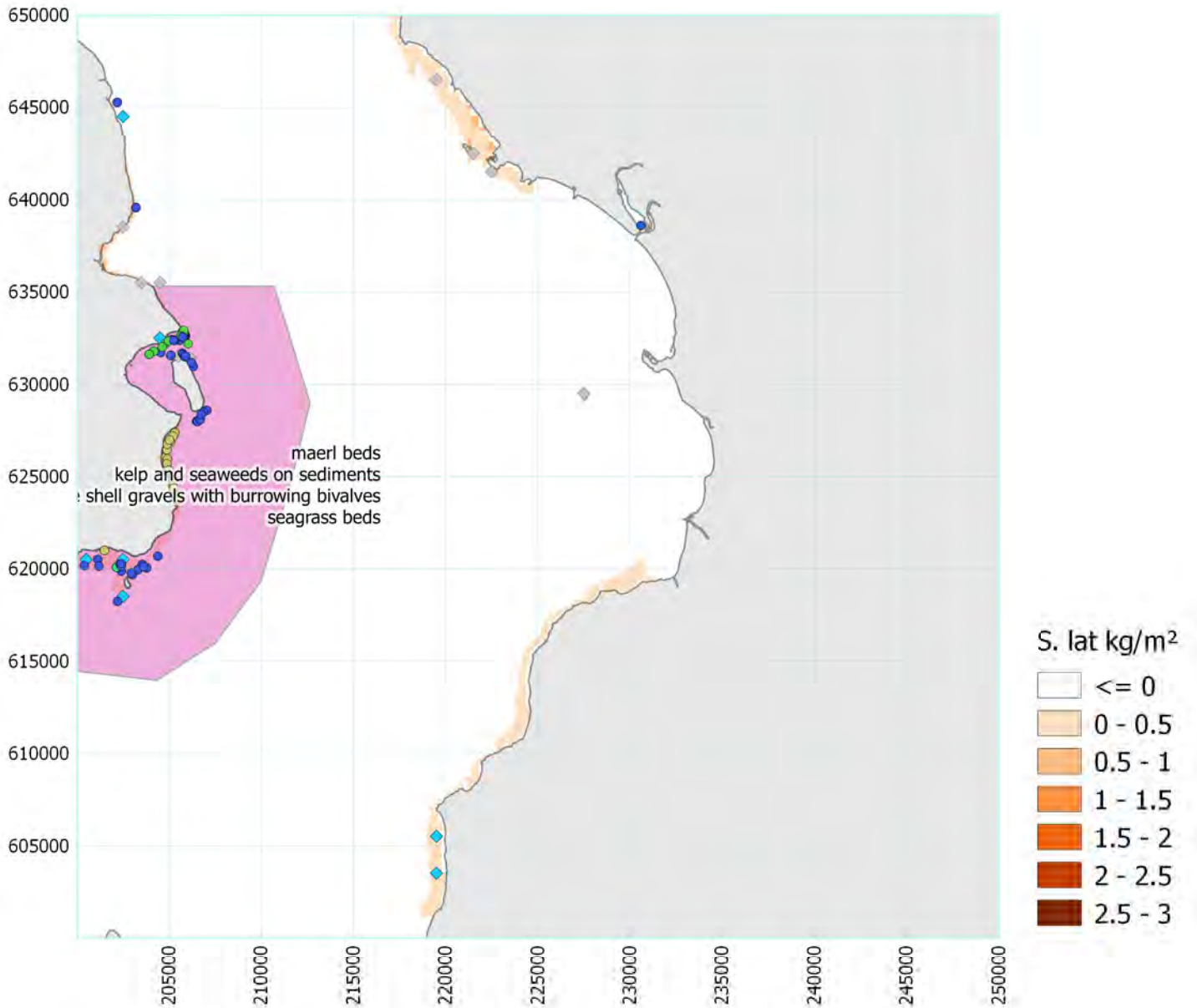
PMF biotopes

- Maerl beds
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Seagrass beds
- Tide-swept algal communities and Kelp beds

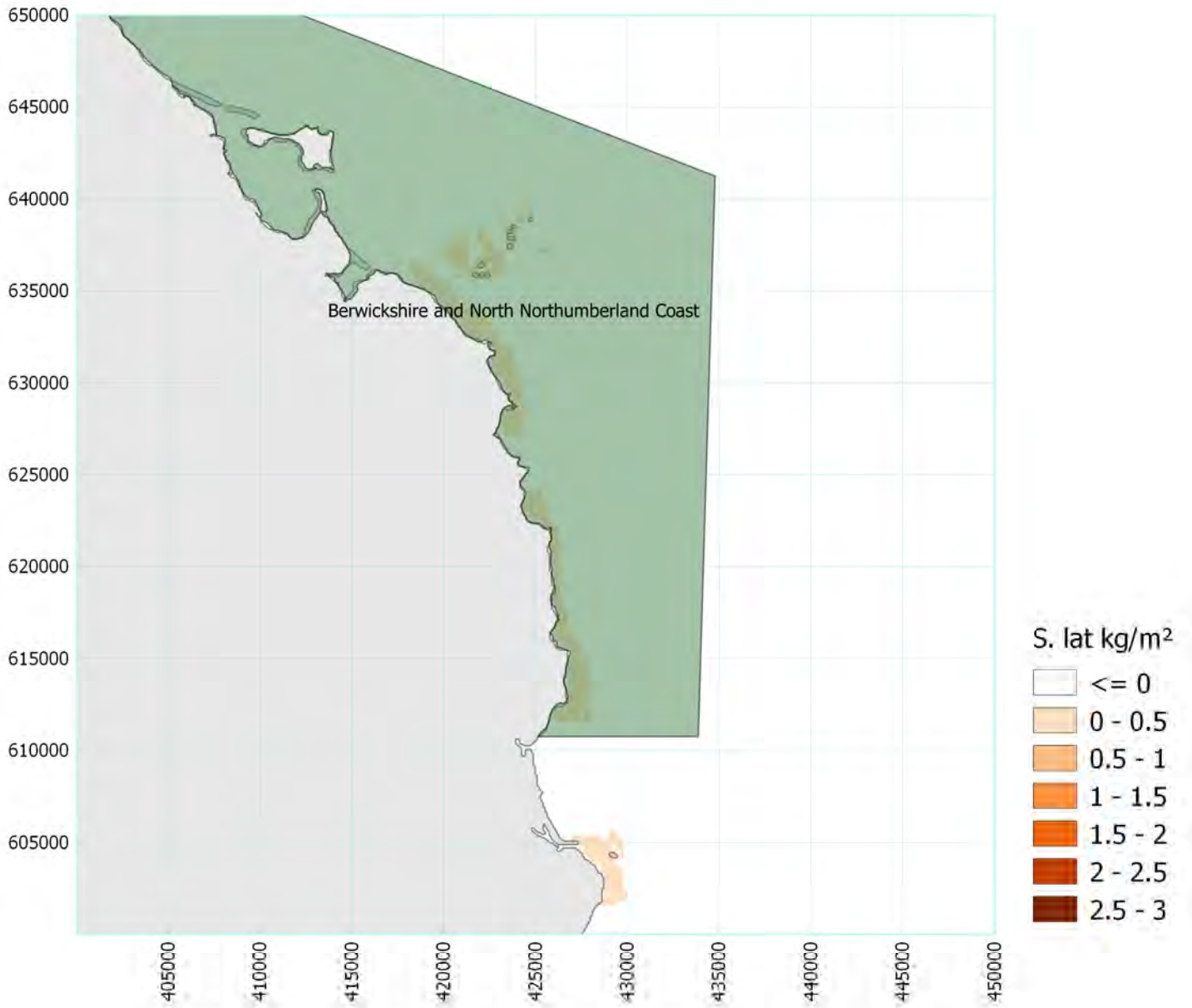
PMF species

- Grey seal
- Harbour / common seal
- MPA

Map 44

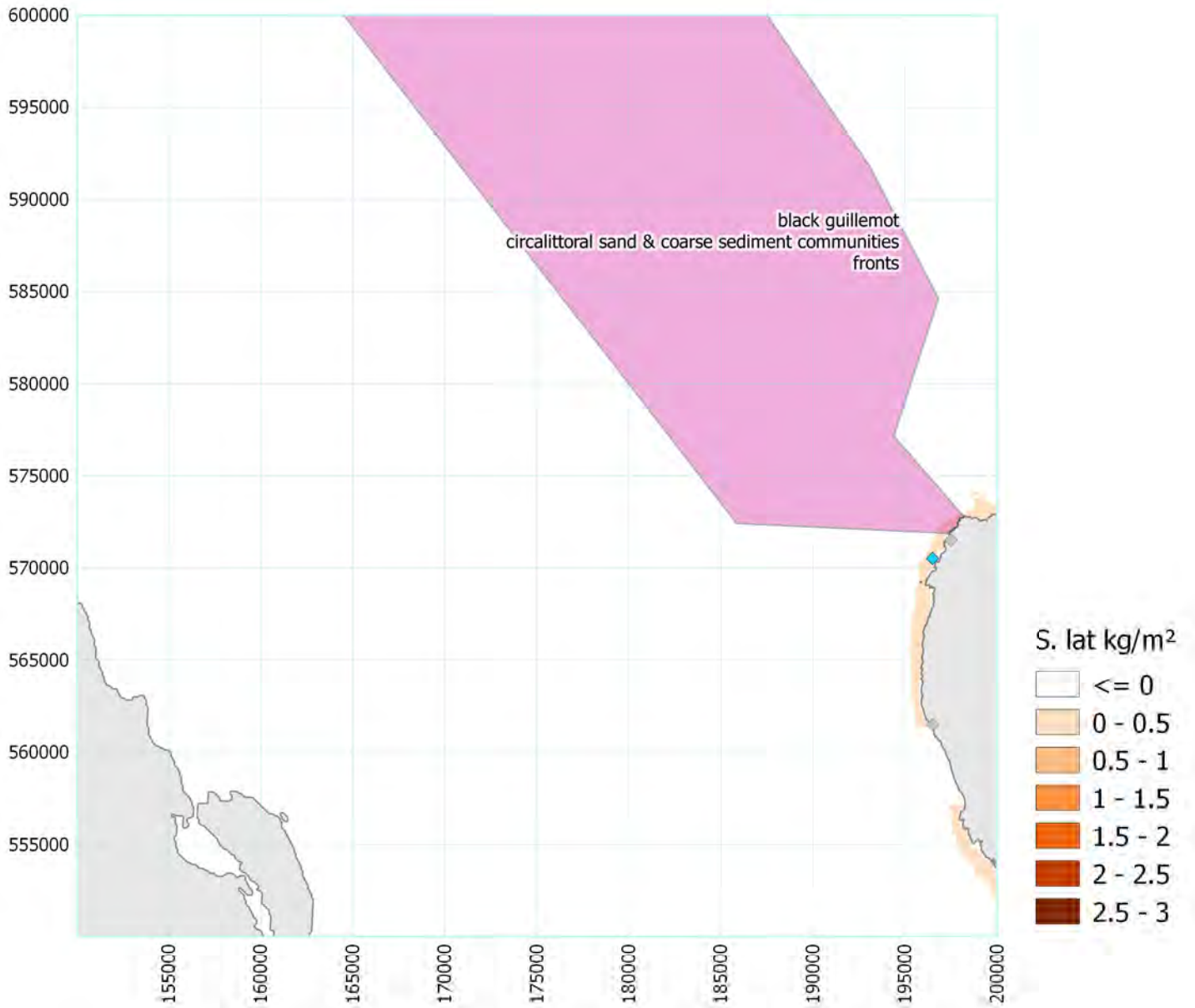


Map 45



■ SAC

Map 46

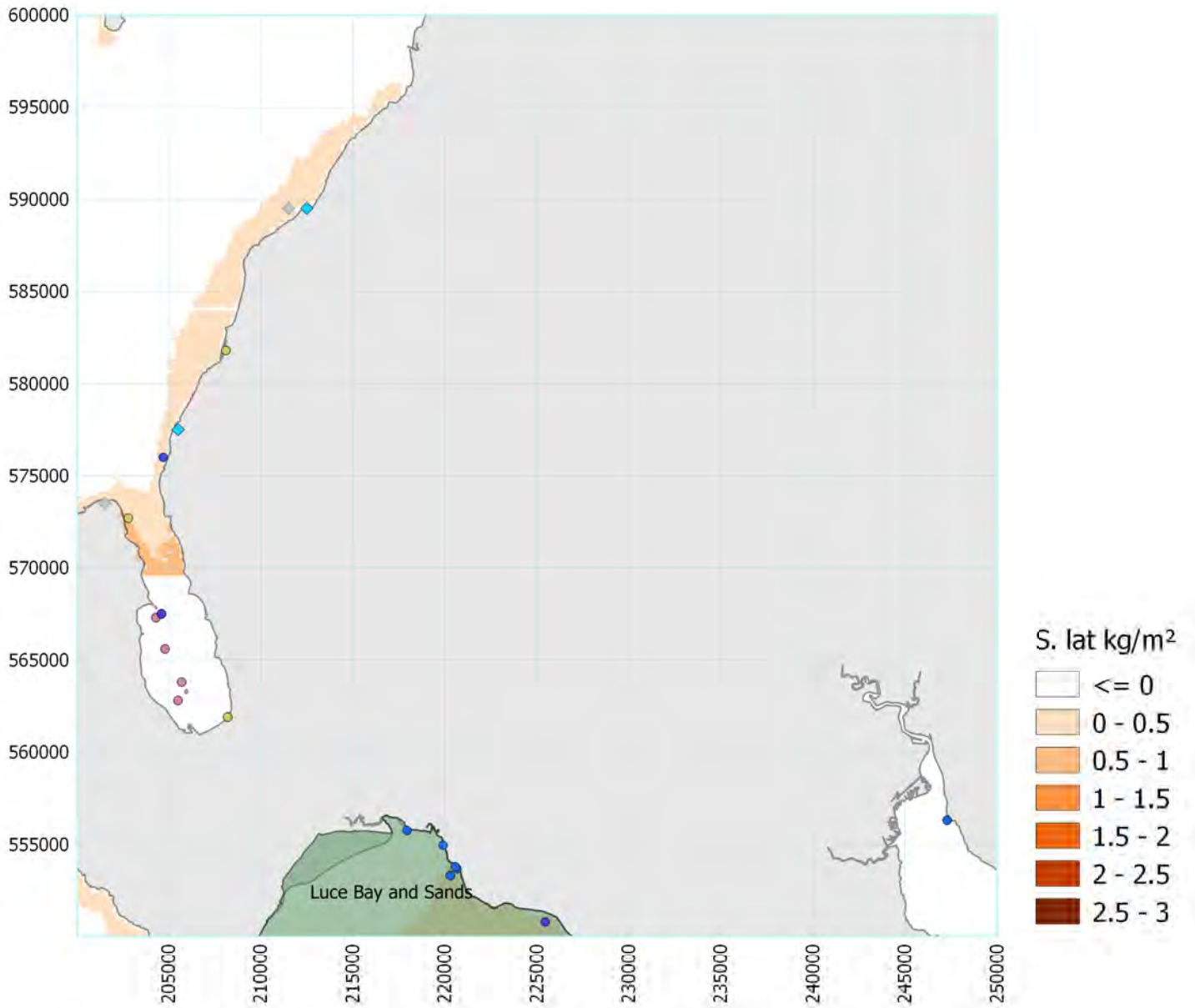


PMF species

- Grey seal
- ◆ Harbour / common seal

MPA

Map 47



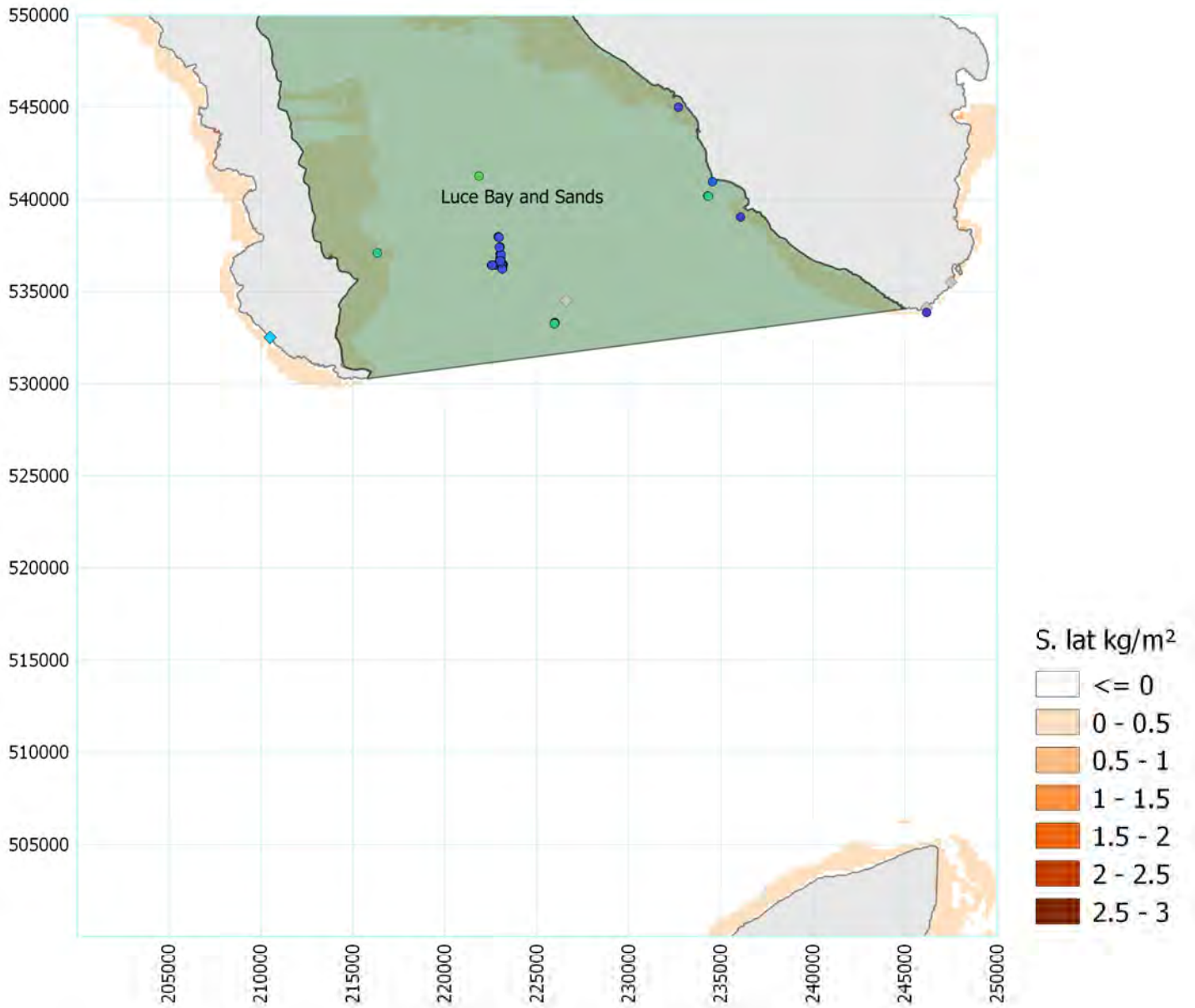
PMF biotopes

- Blue mussel beds
- Maerl beds
- Native oysters
- Seagrass beds
- Tide-swept algal communities

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 48



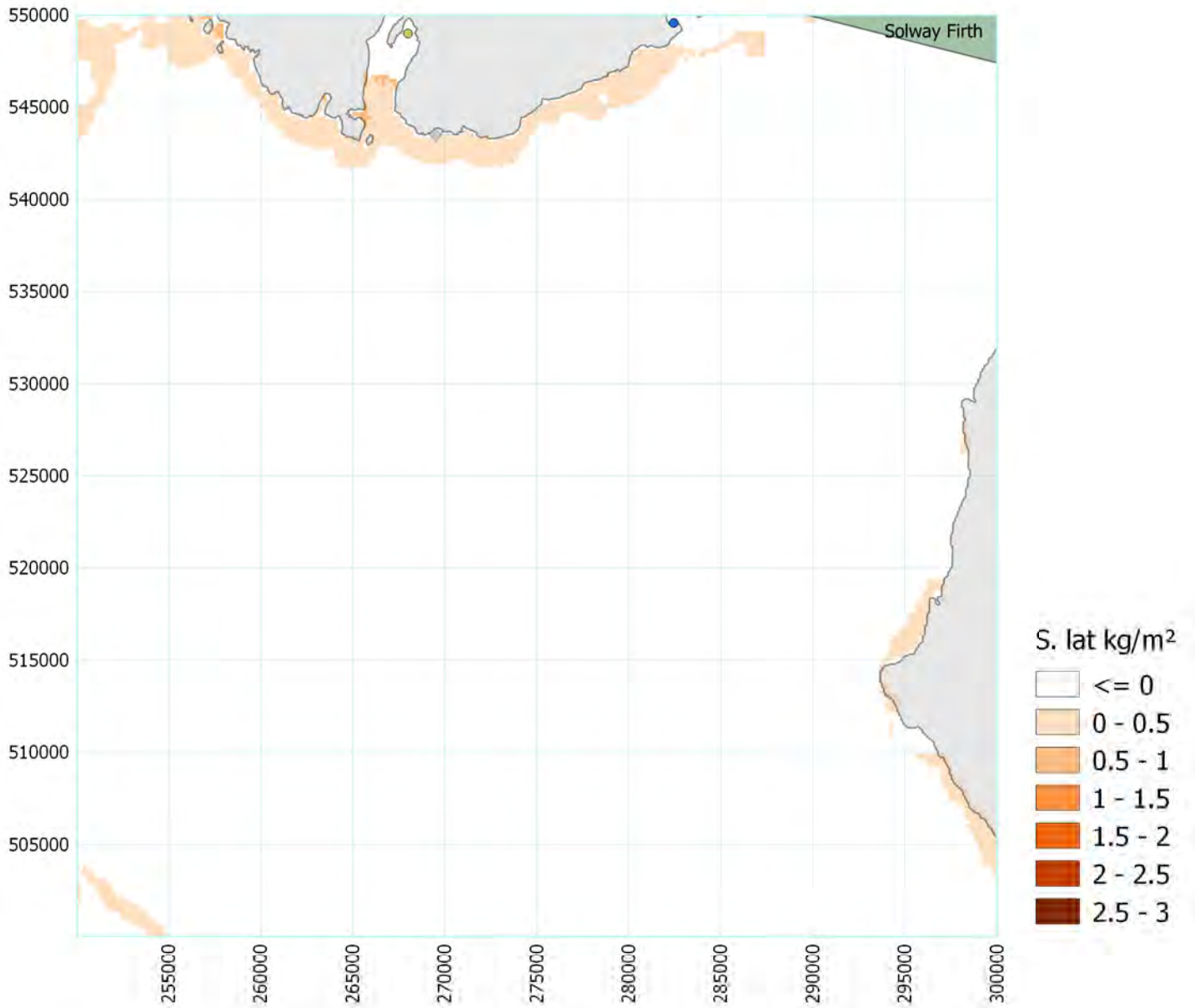
PMF biotopes

- Blue mussel beds
- Maerl beds
- Tide-swept algal communities
- Tide-swept algal communities and Kelp beds
- Tide-swept coarse sands with burrowing bivalves

PMF species

- Grey seal
- Harbour / common seal
- SAC

Map 49



PMF biotopes

- Blue mussel beds
- Seagrass beds

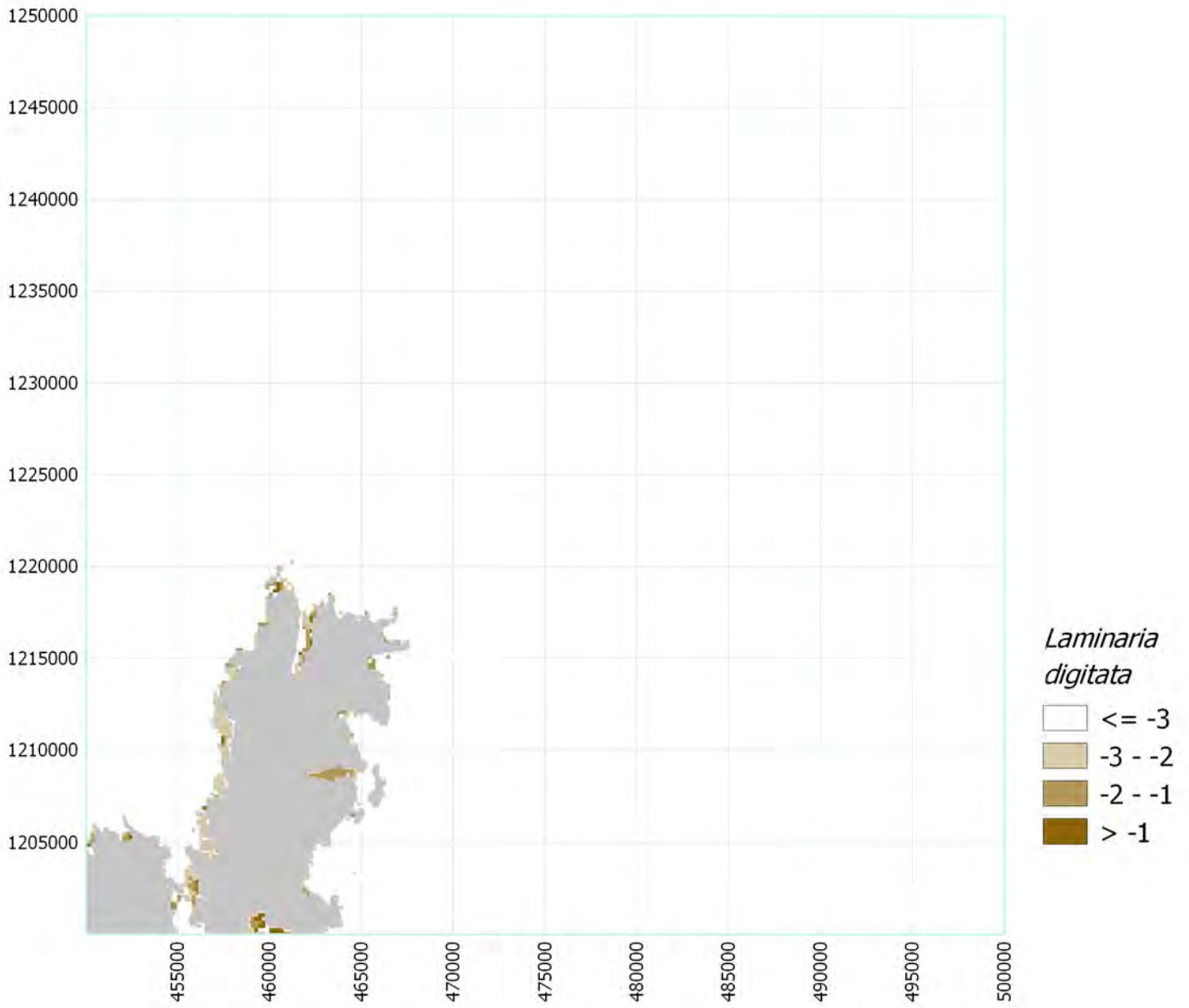
PMF species

- Grey seal
- SAC

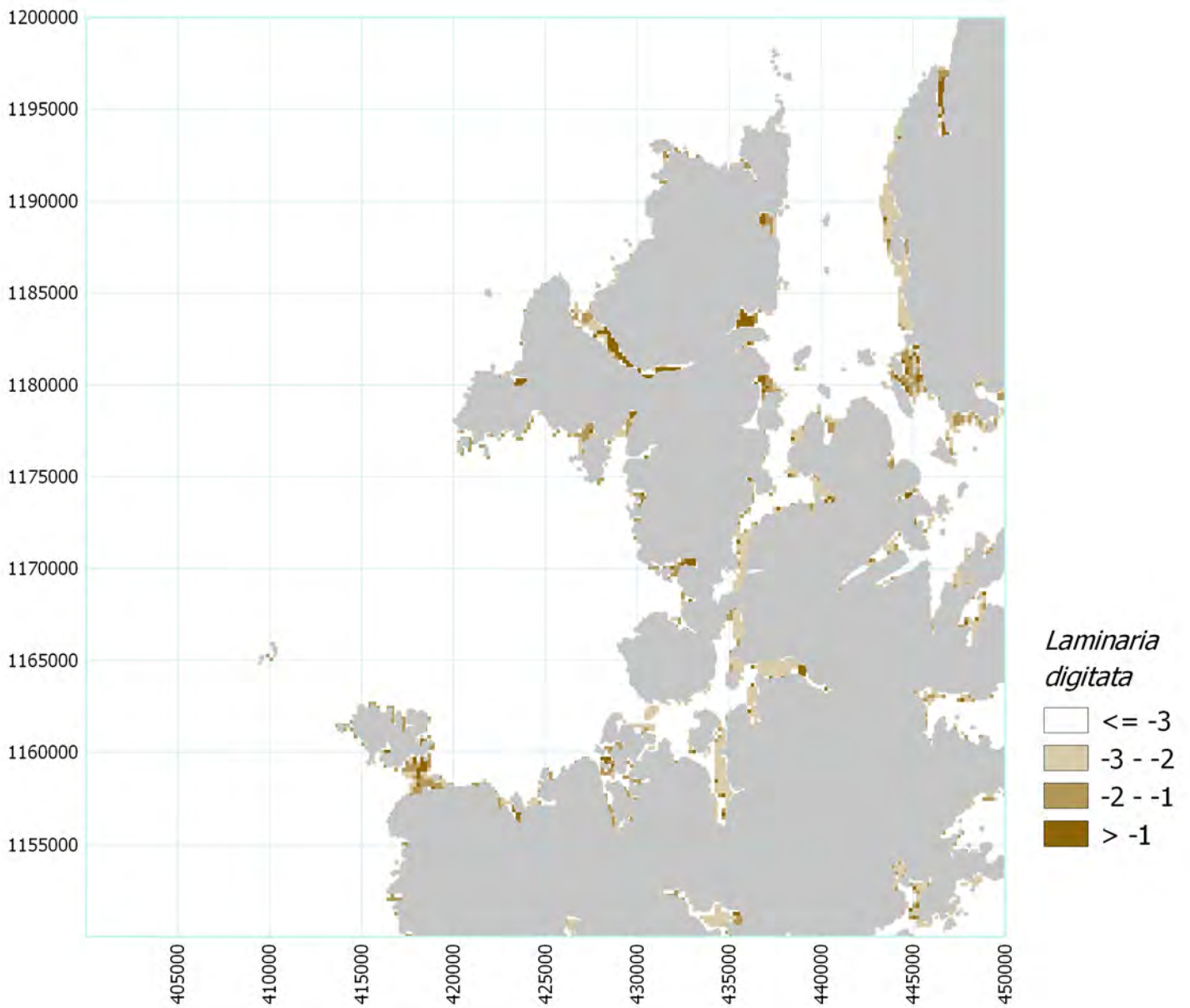
2.3 *Laminaria digitata*

The following pages show the habitat suitability for *Laminaria digitata*.

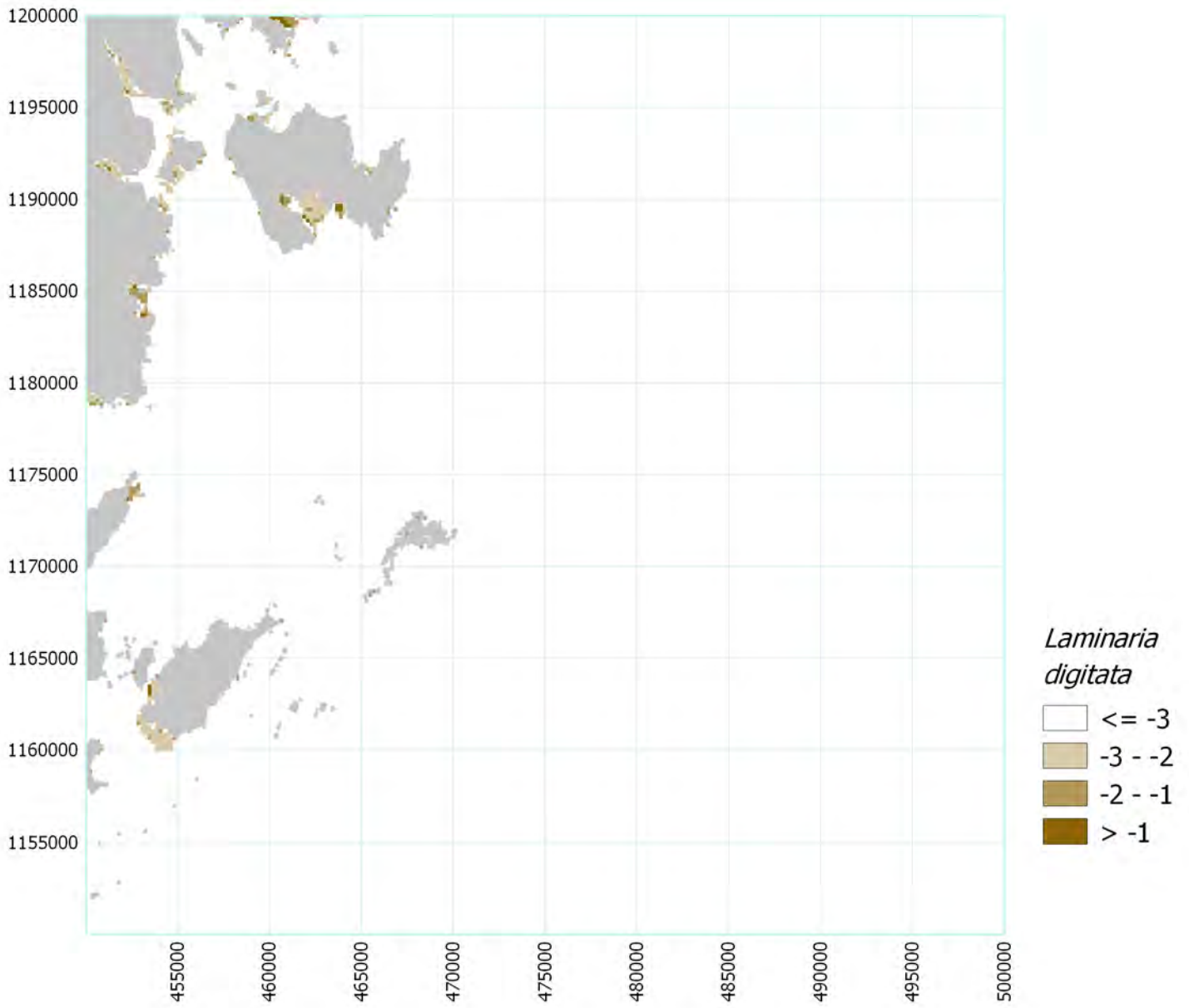
Map 1



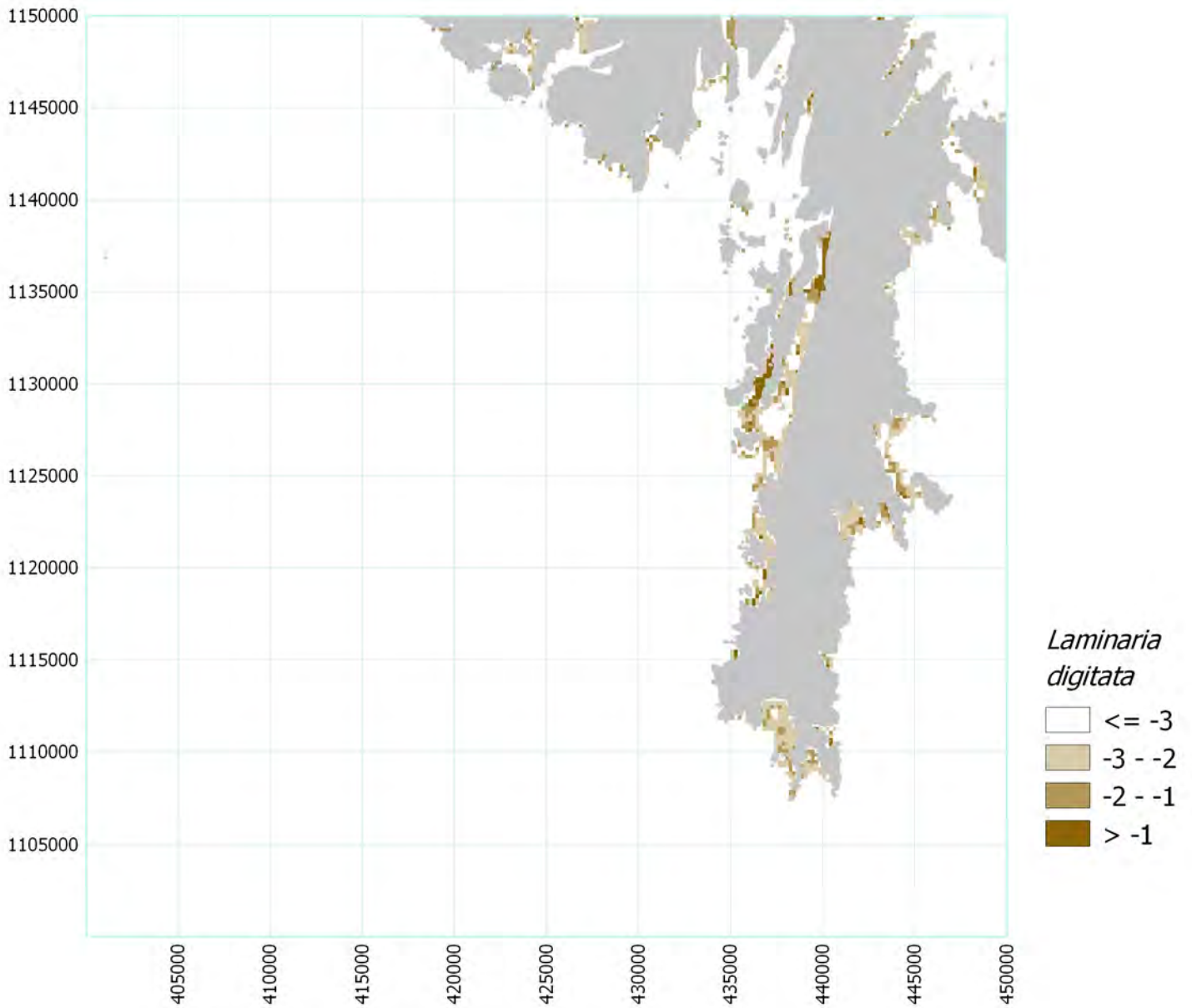
Map 2



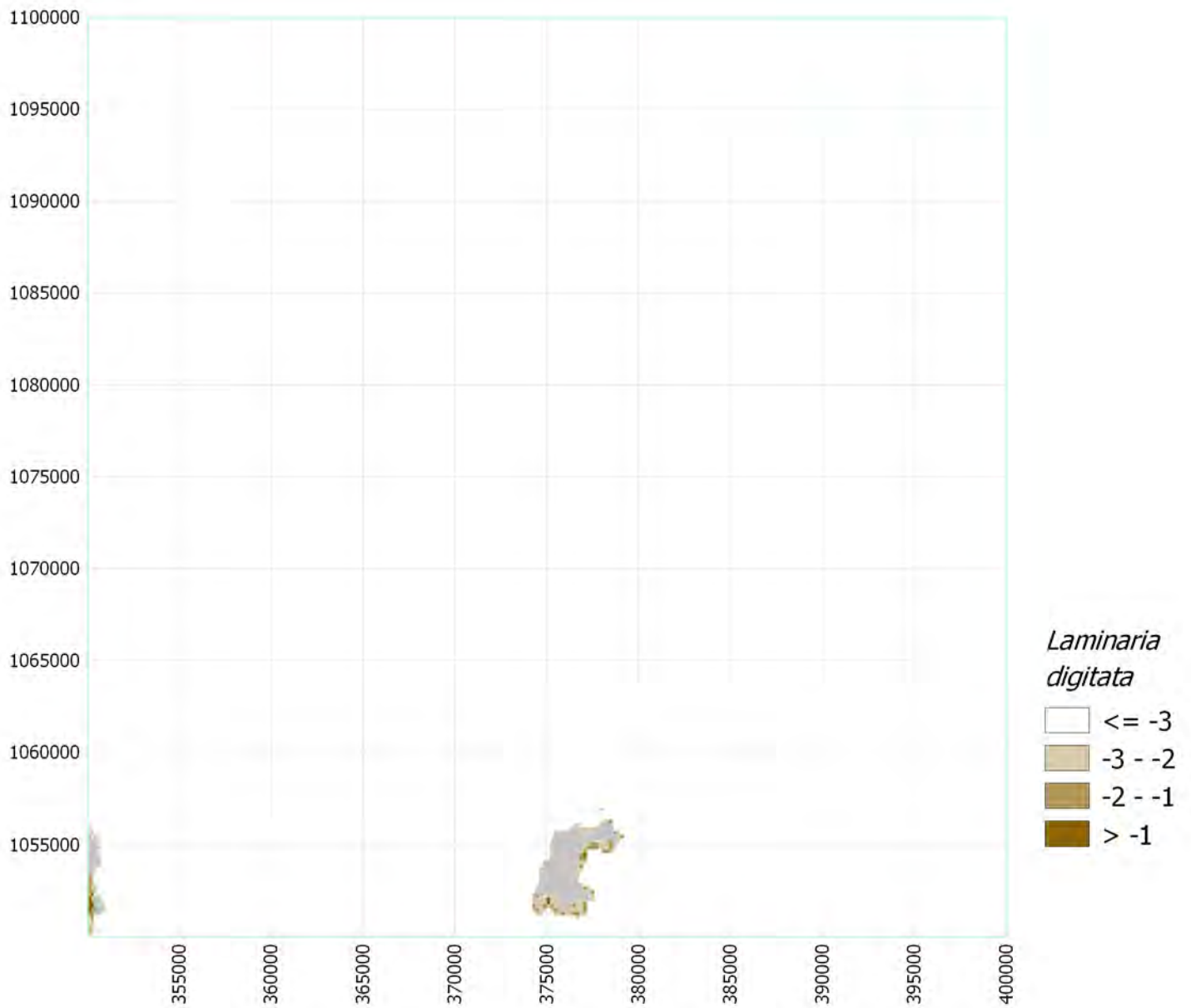
Map 3



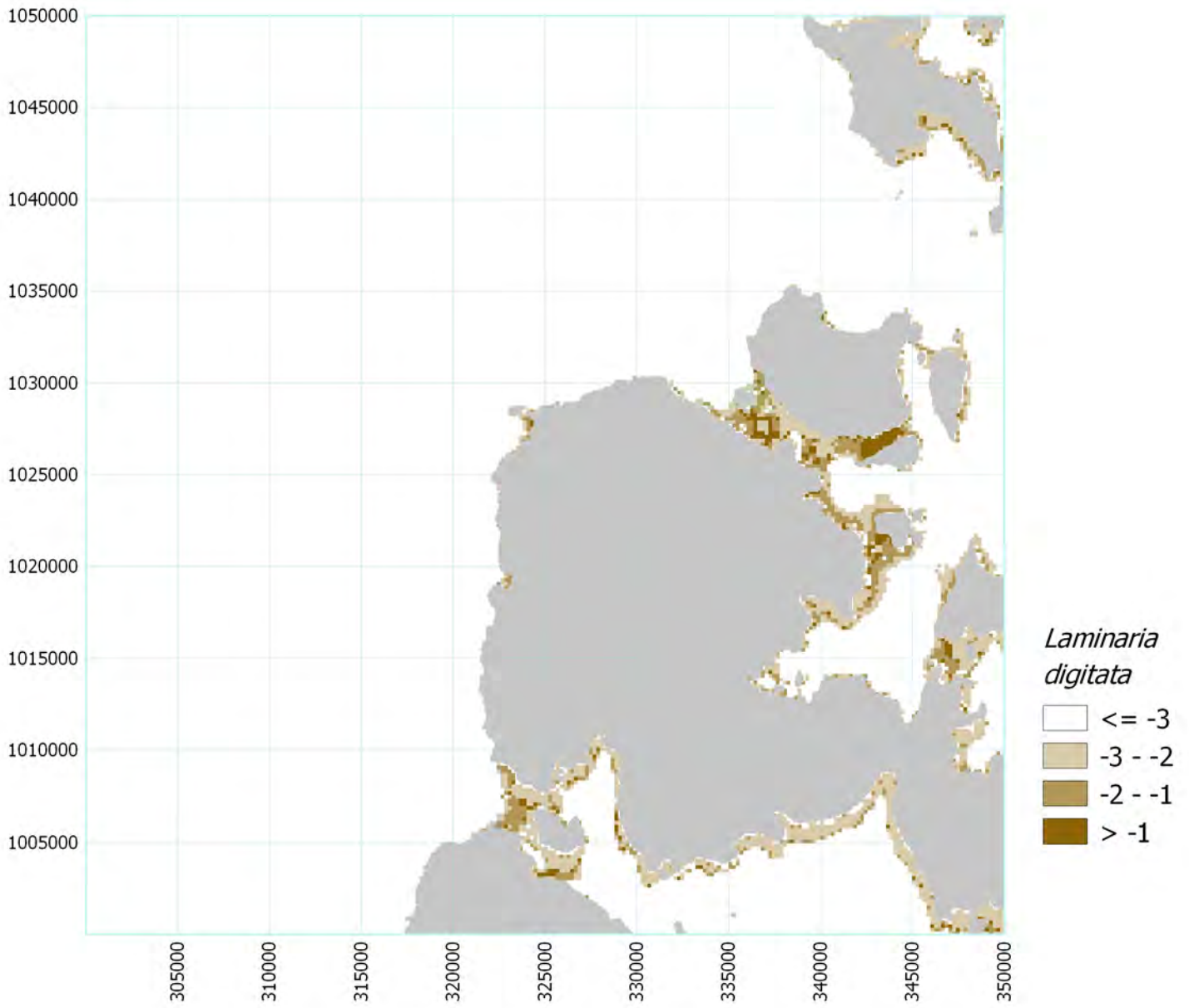
Map 4



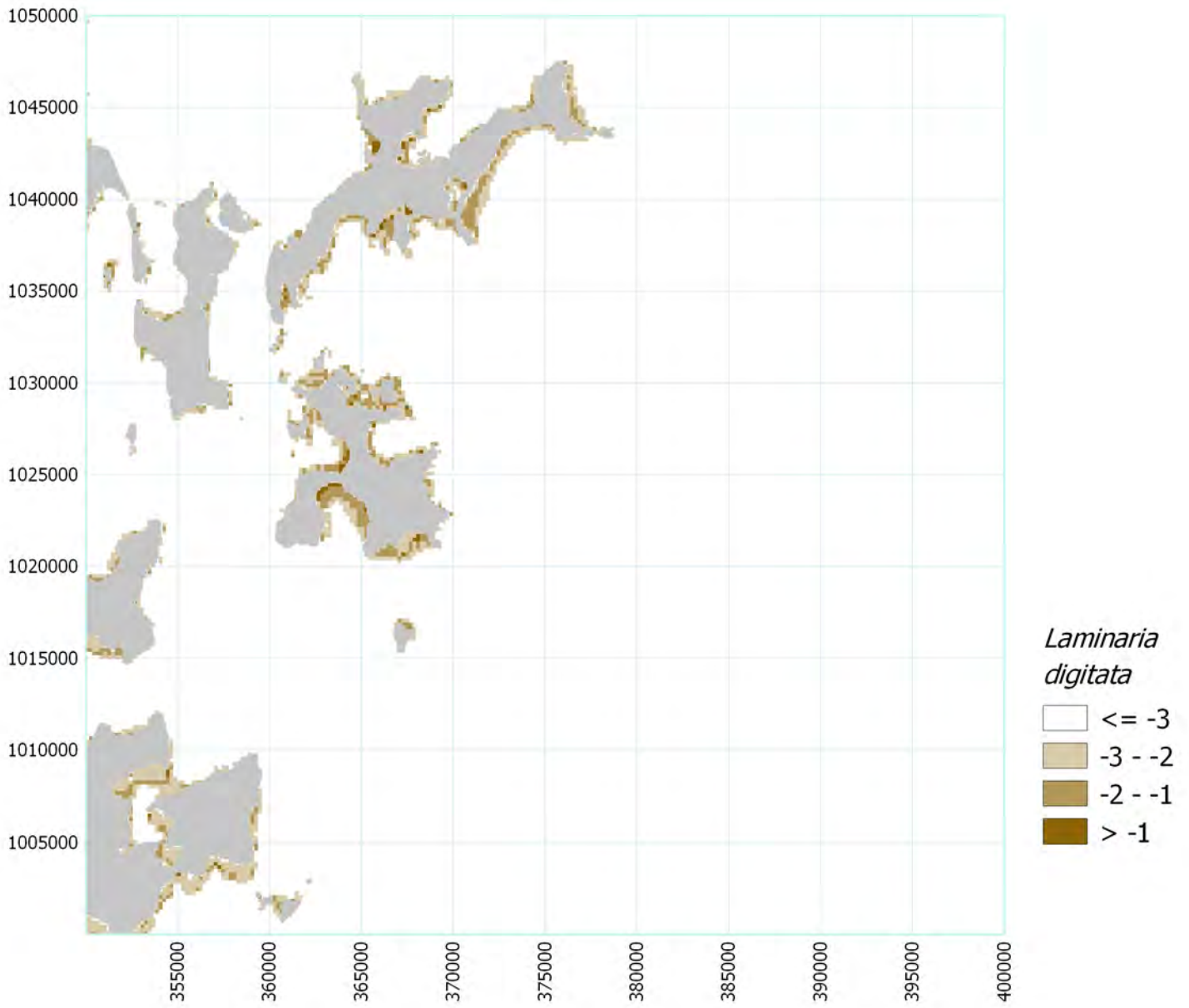
Map 5



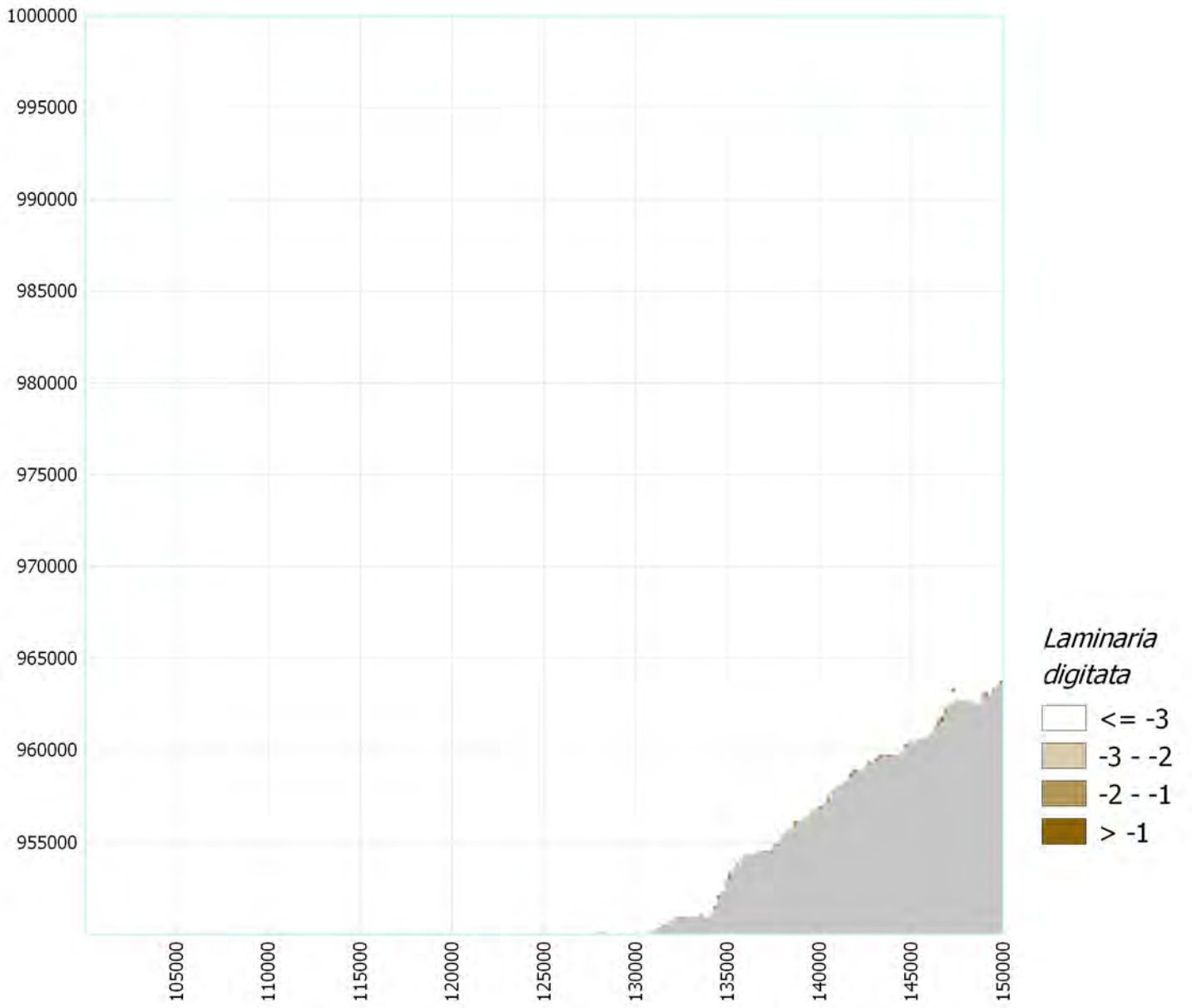
Map 6



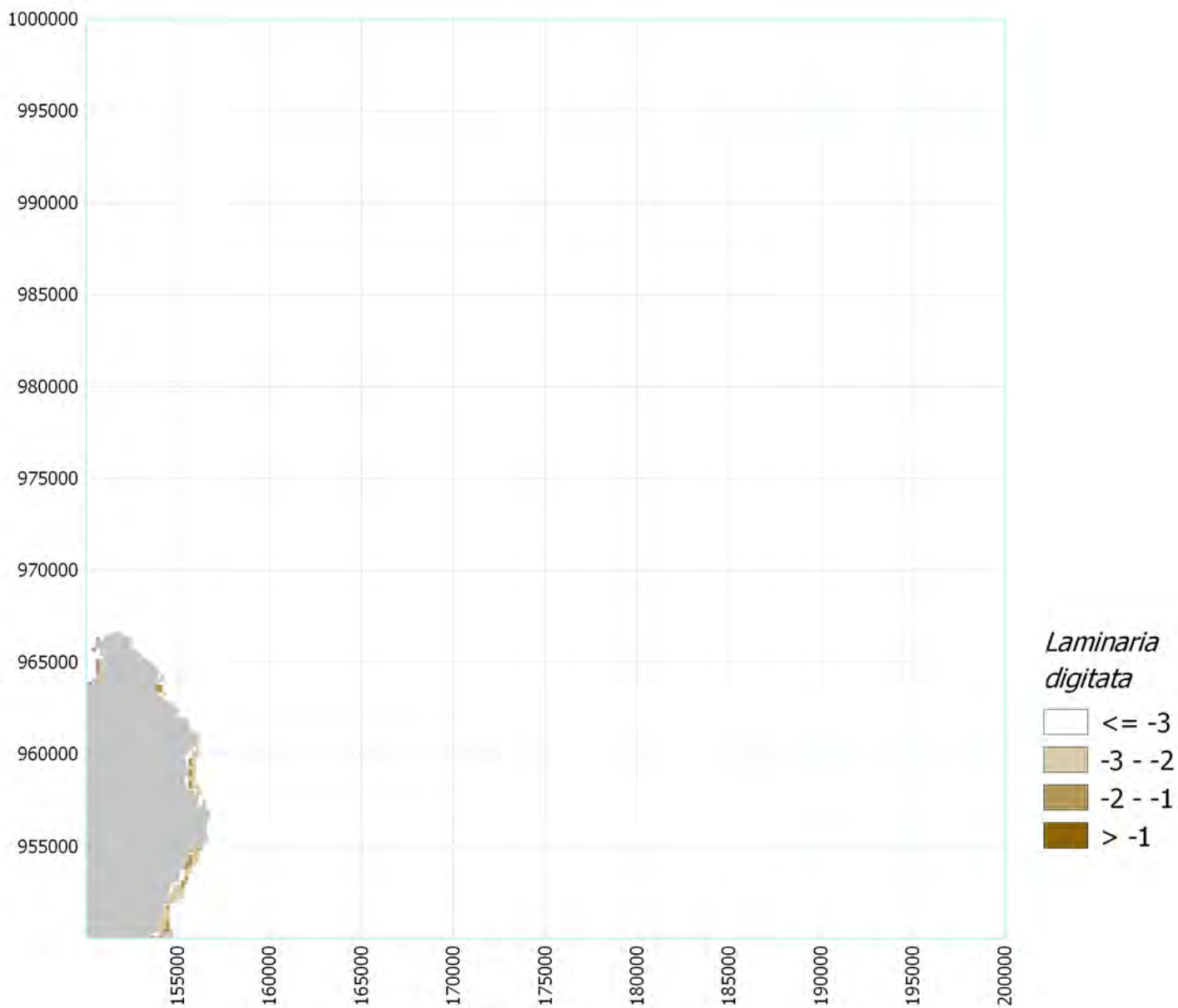
Map 7



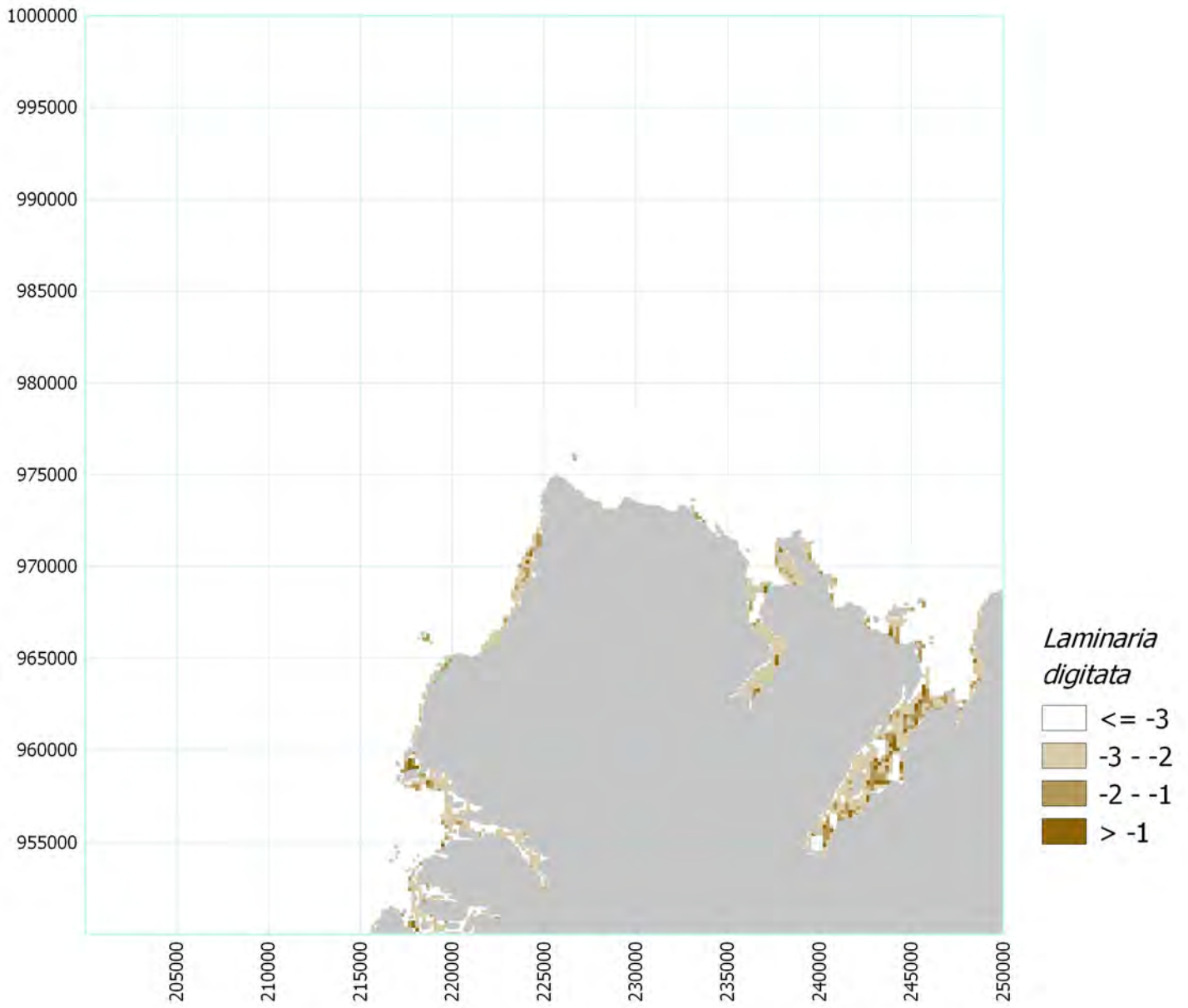
Map 8



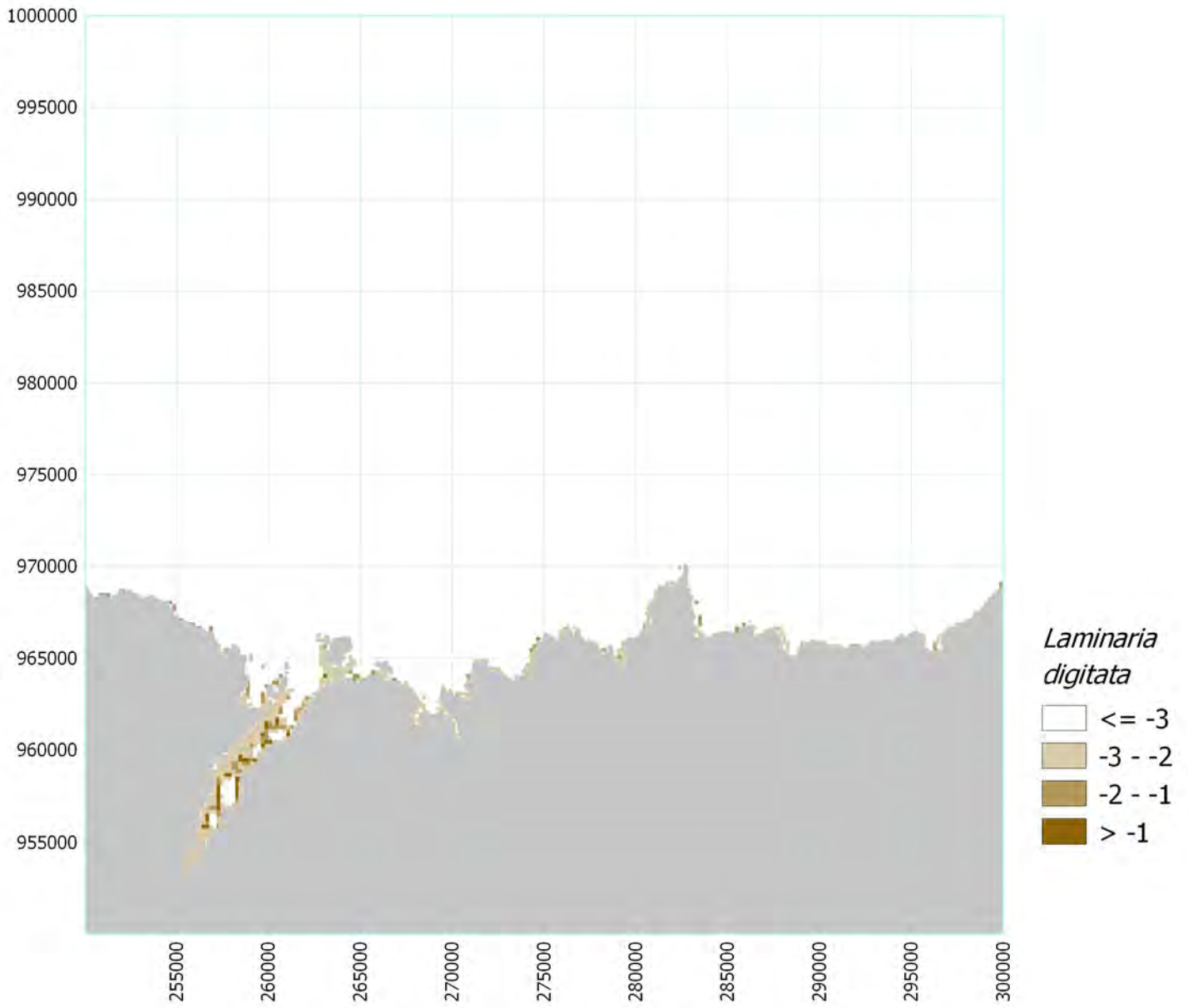
Map 9



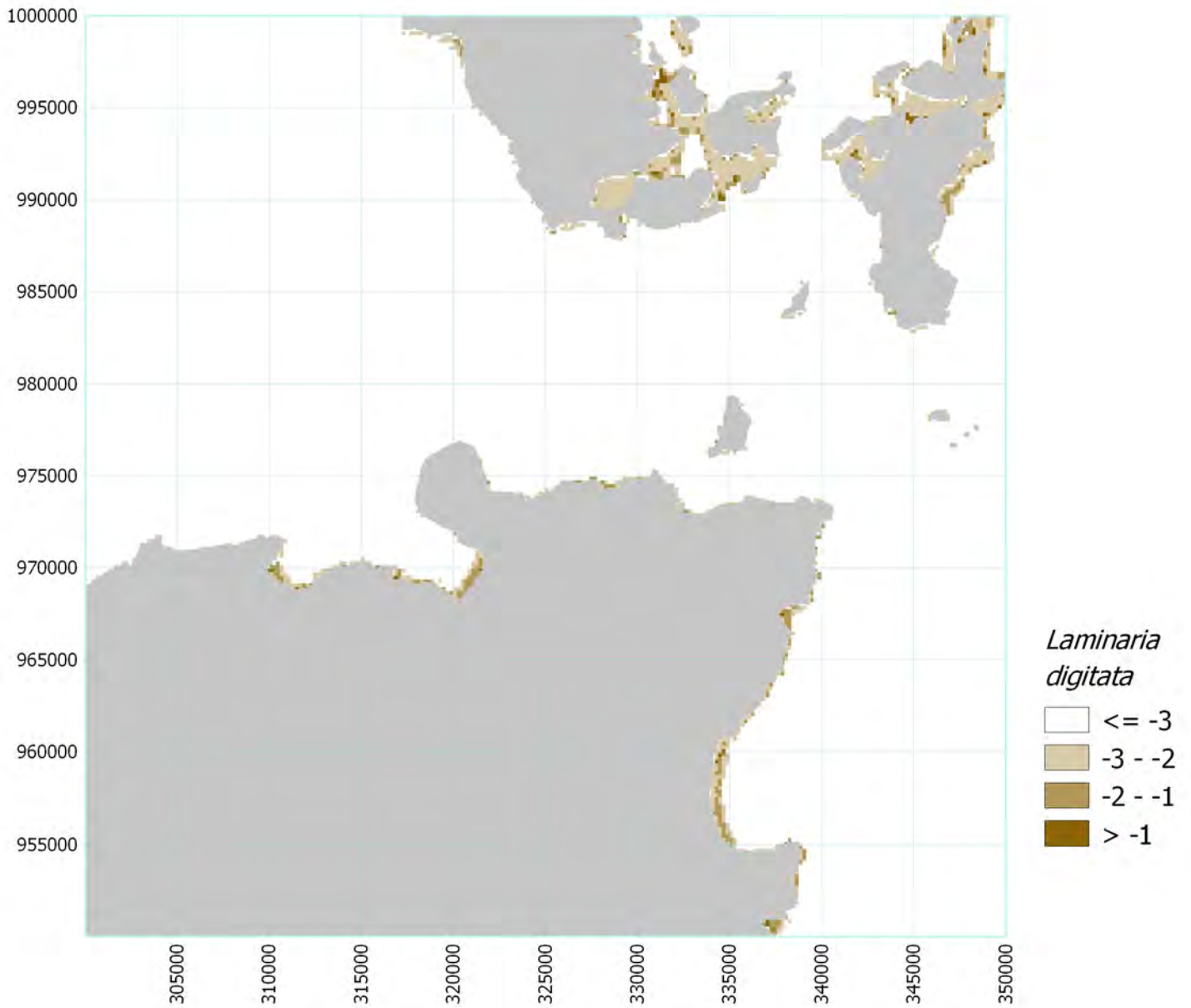
Map 10



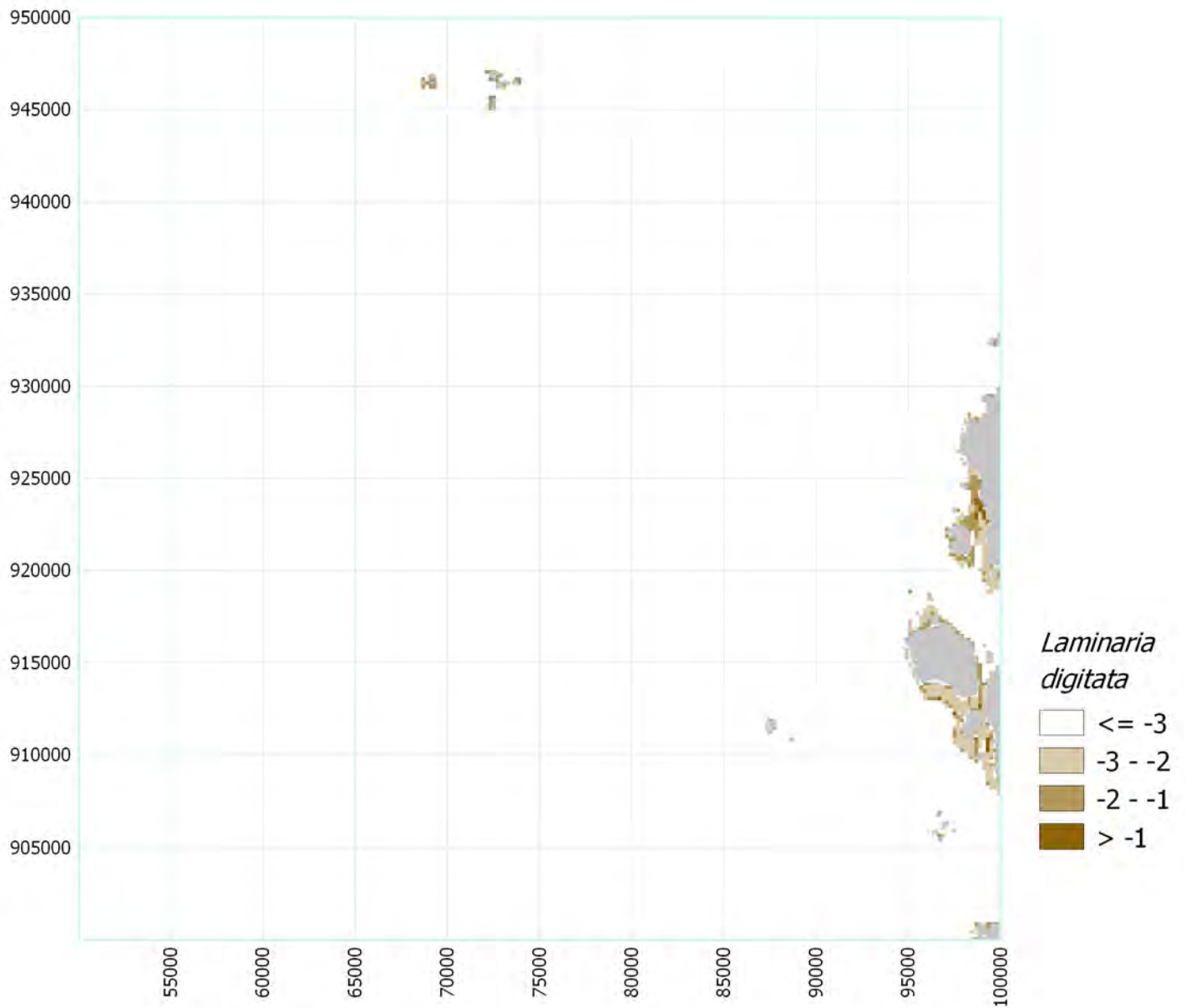
Map 11



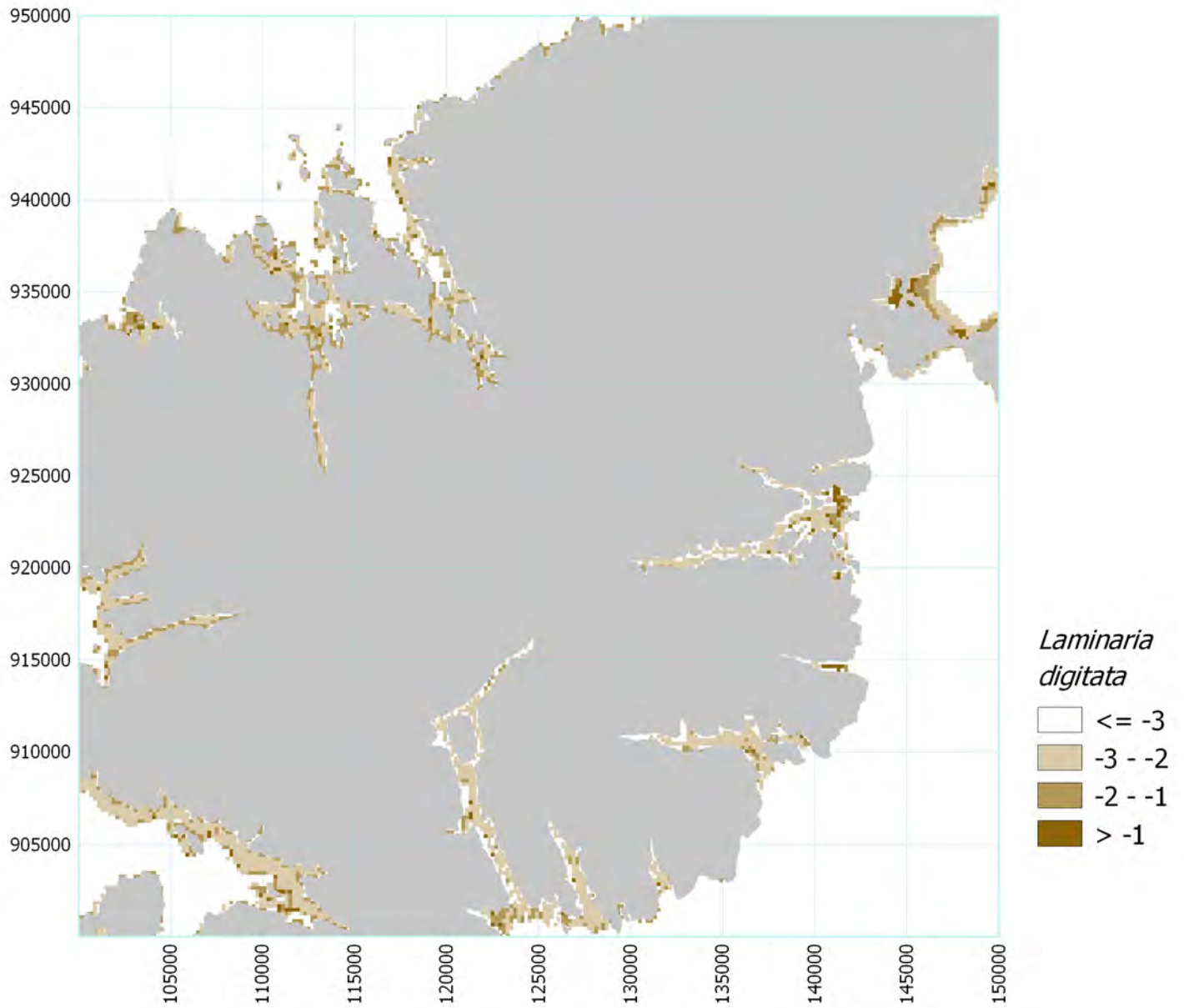
Map 12



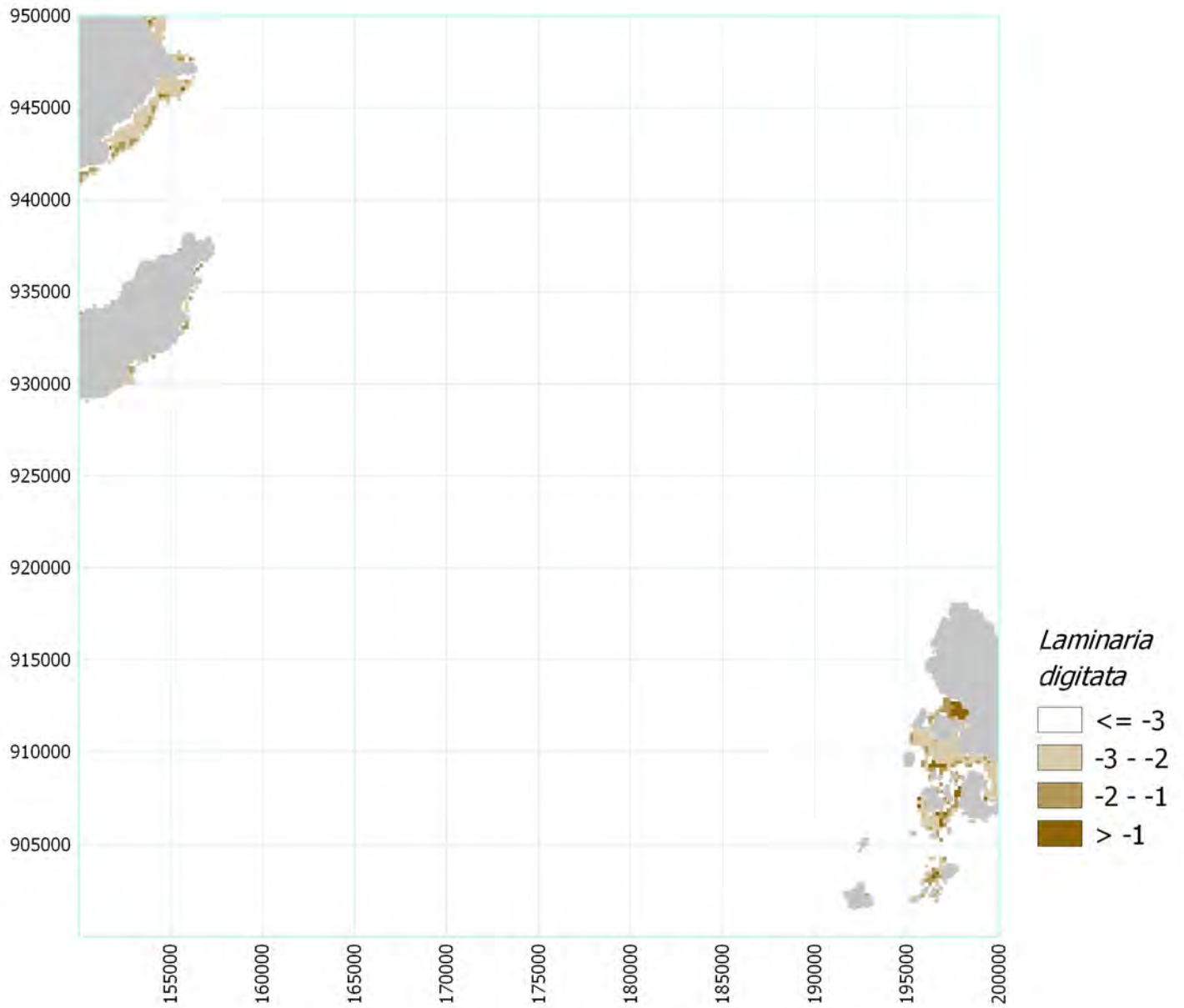
Map 13



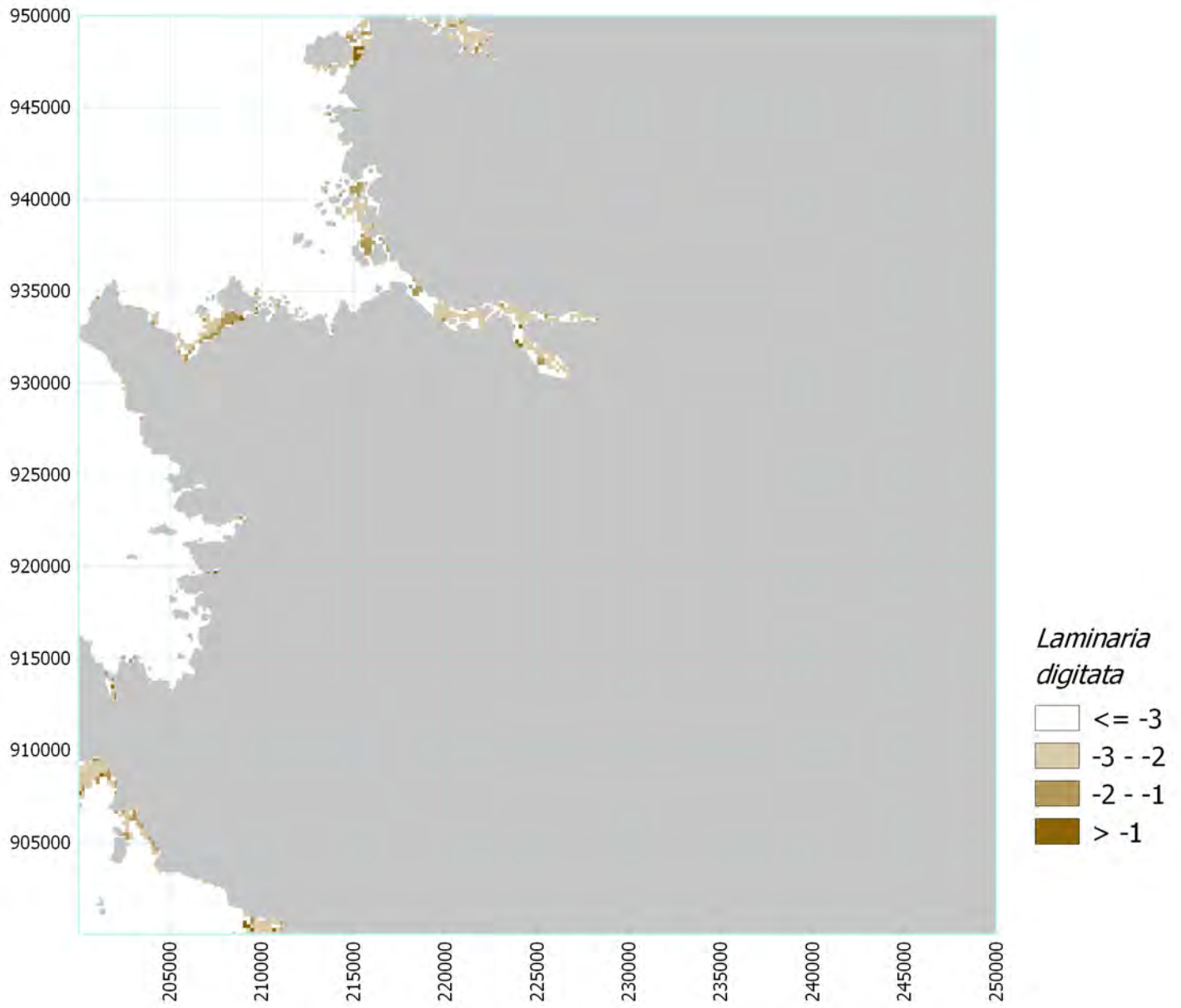
Map 14



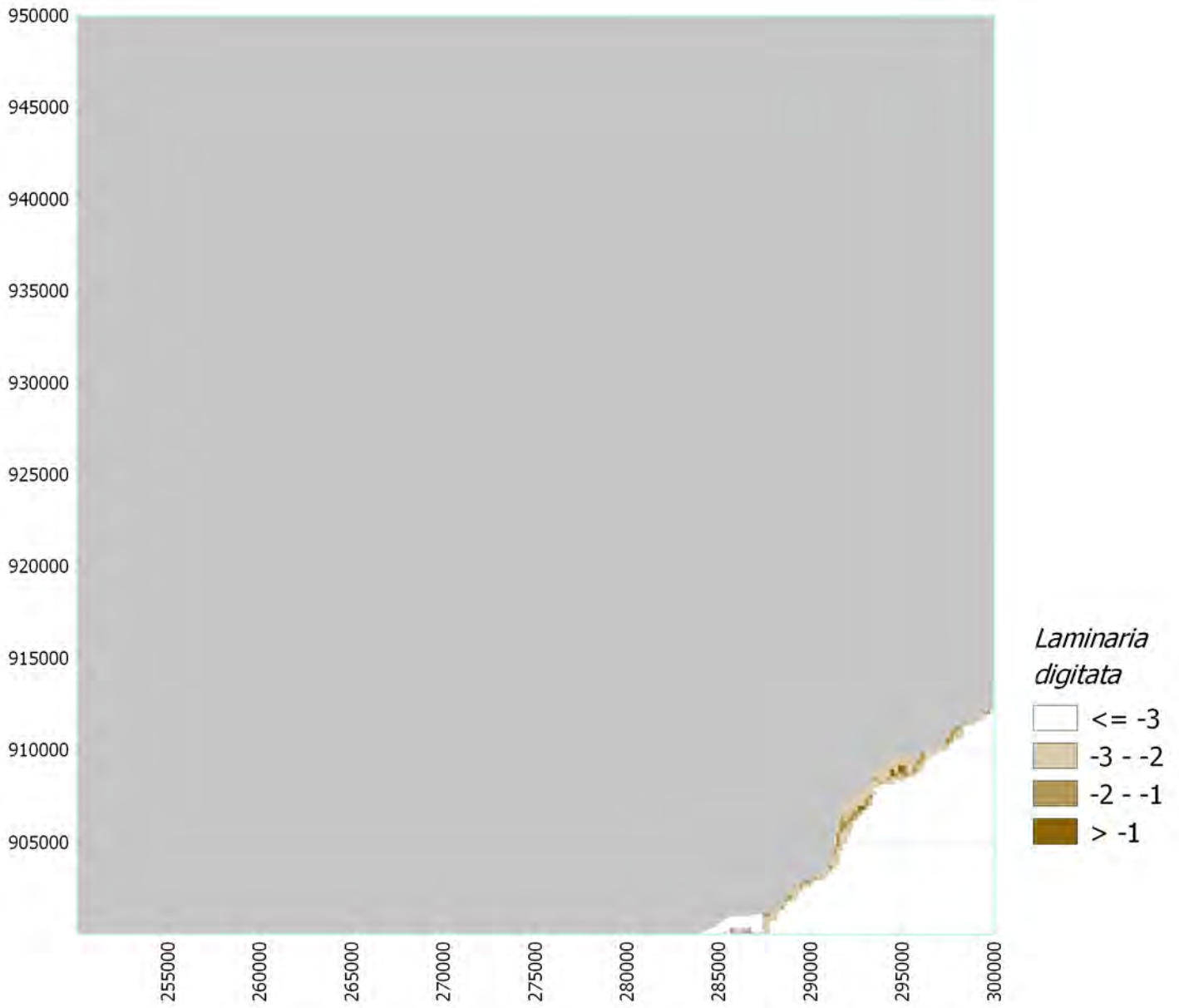
Map 15



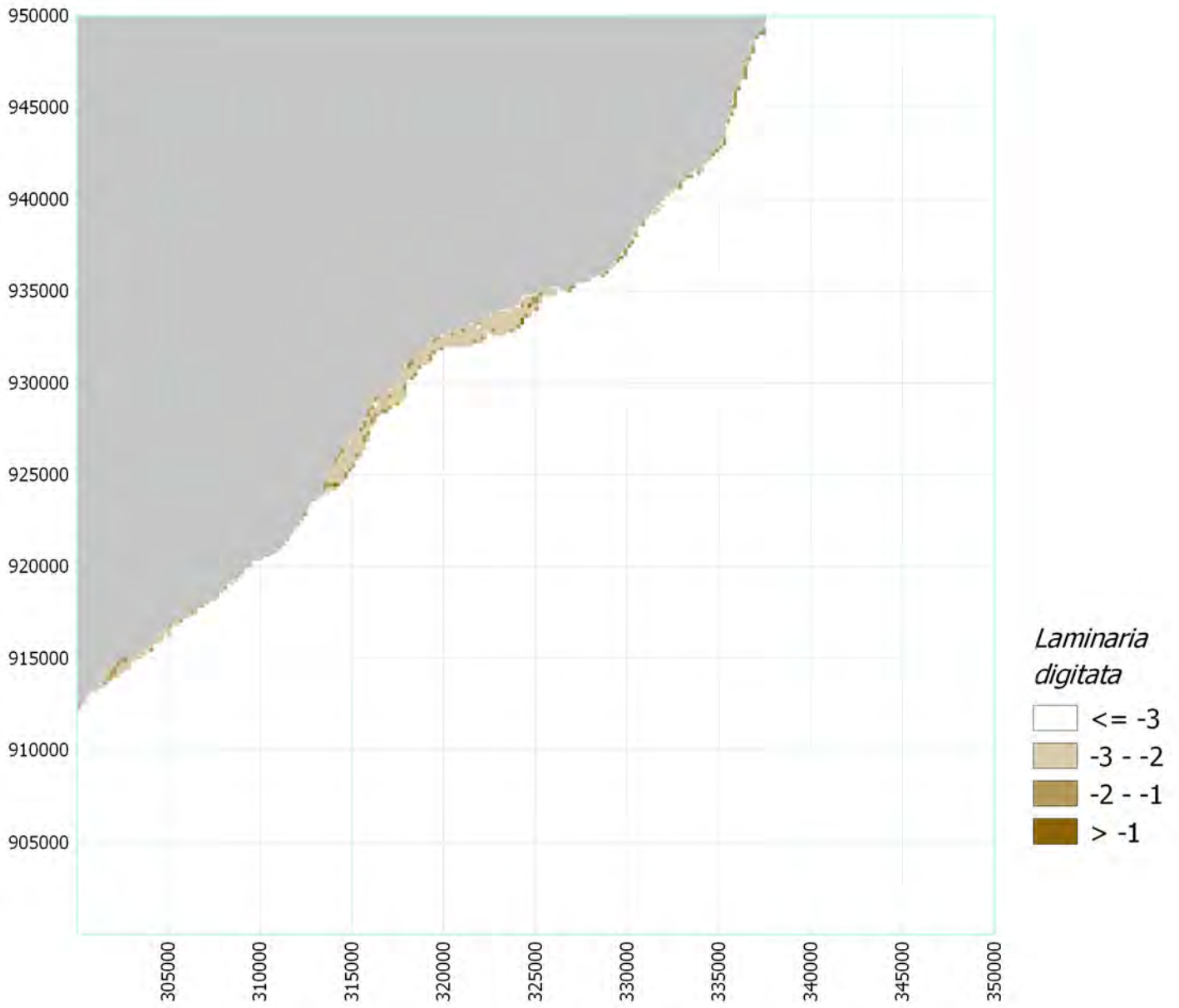
Map 16



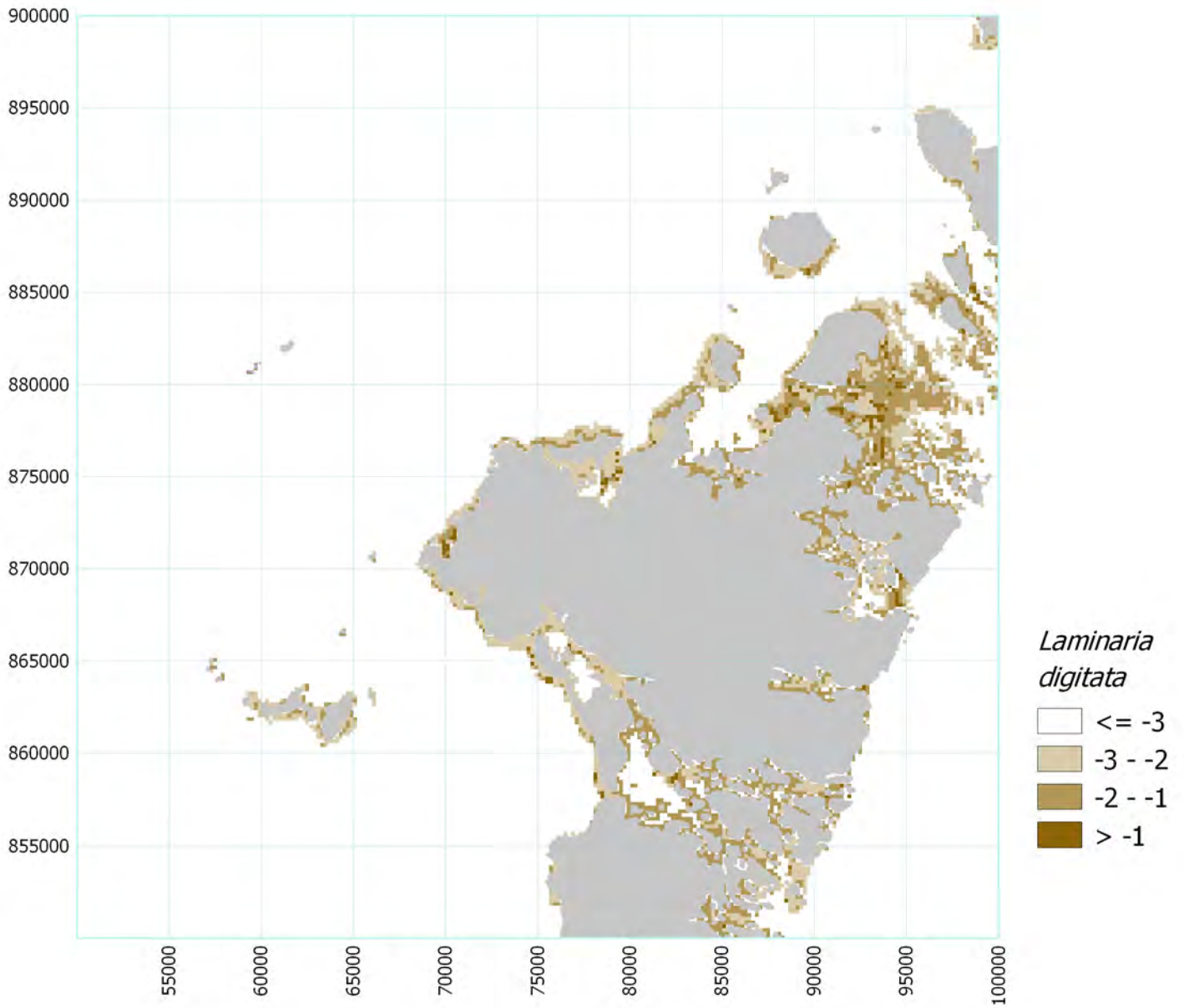
Map 17



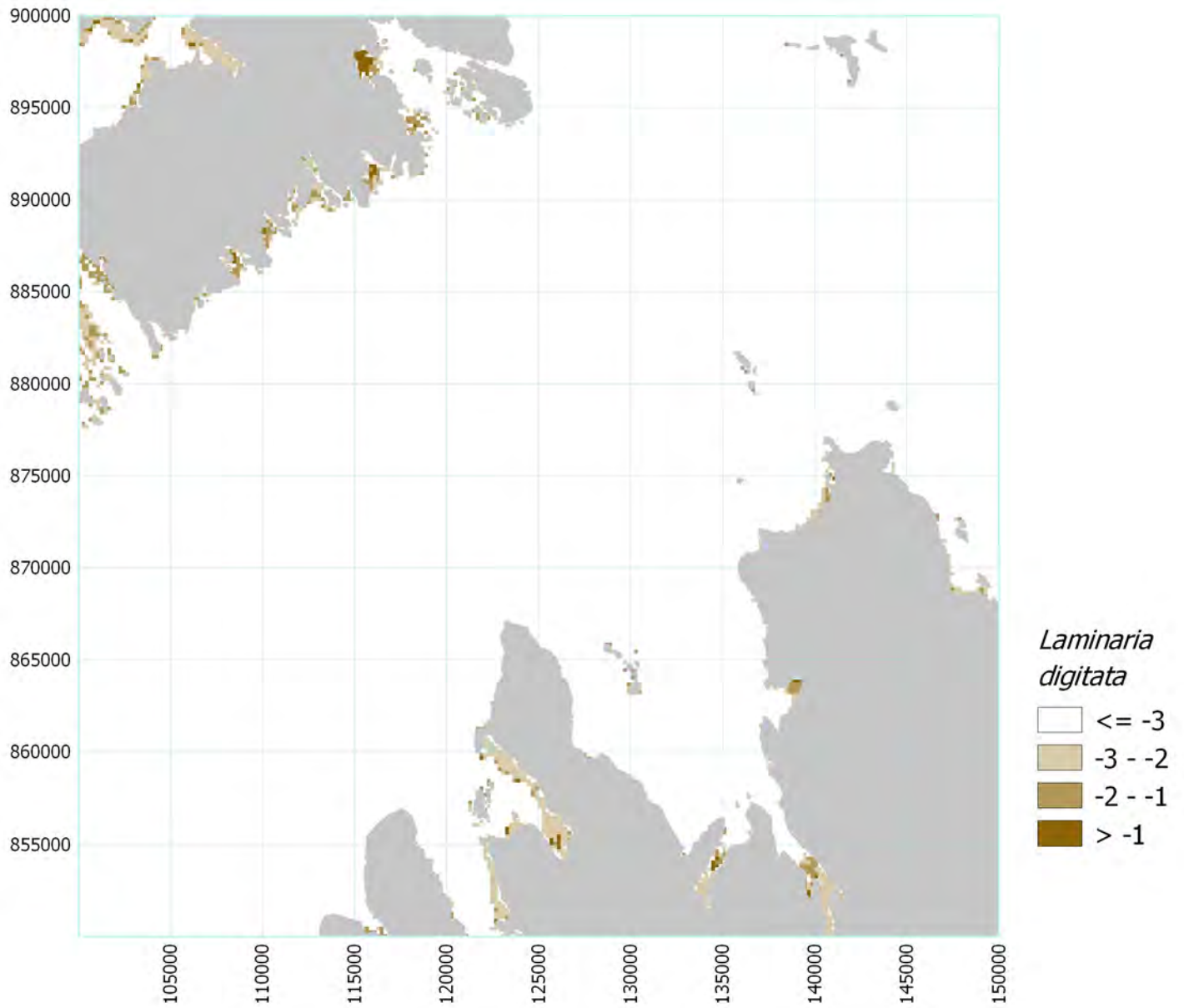
Map 18



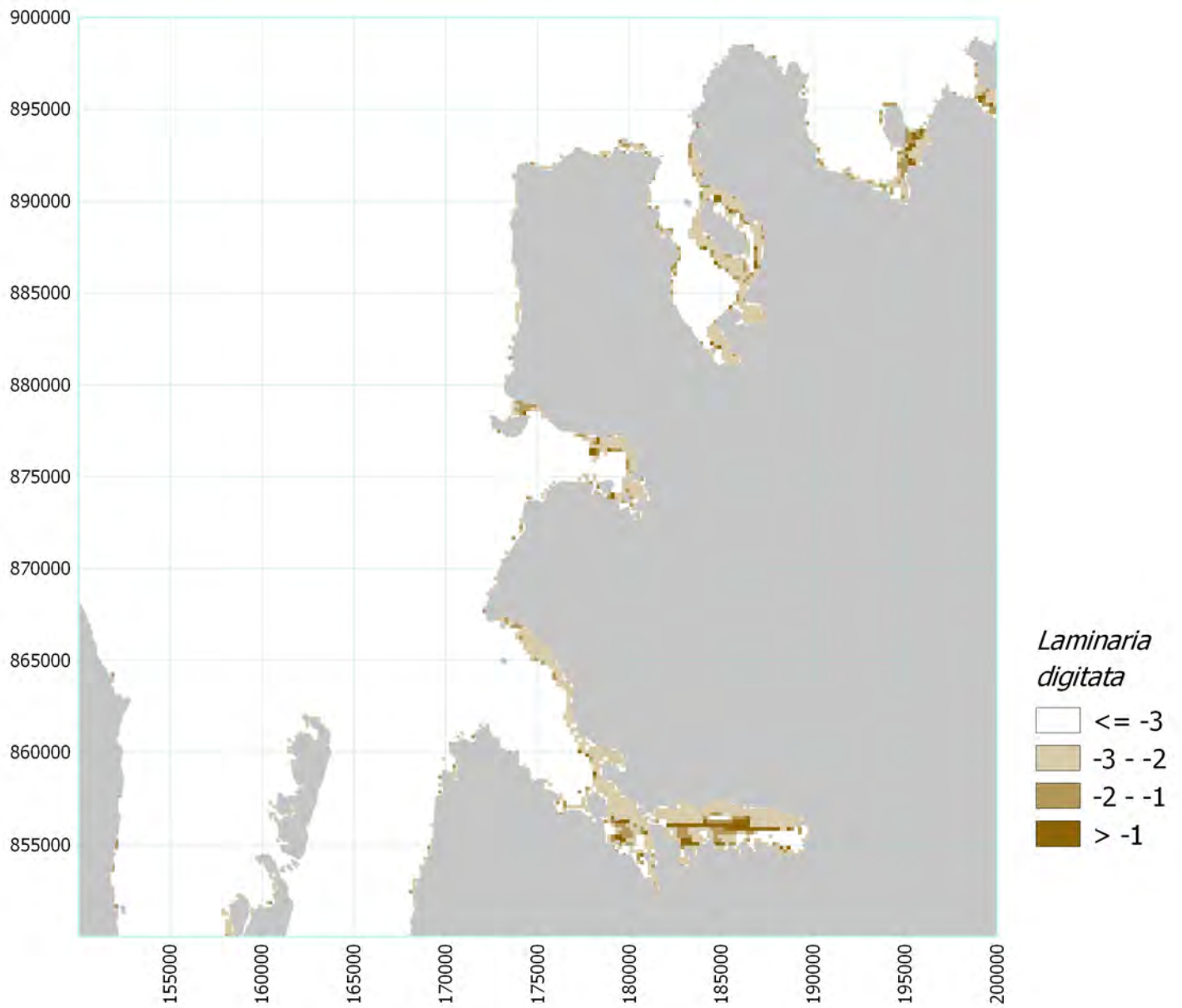
Map 19



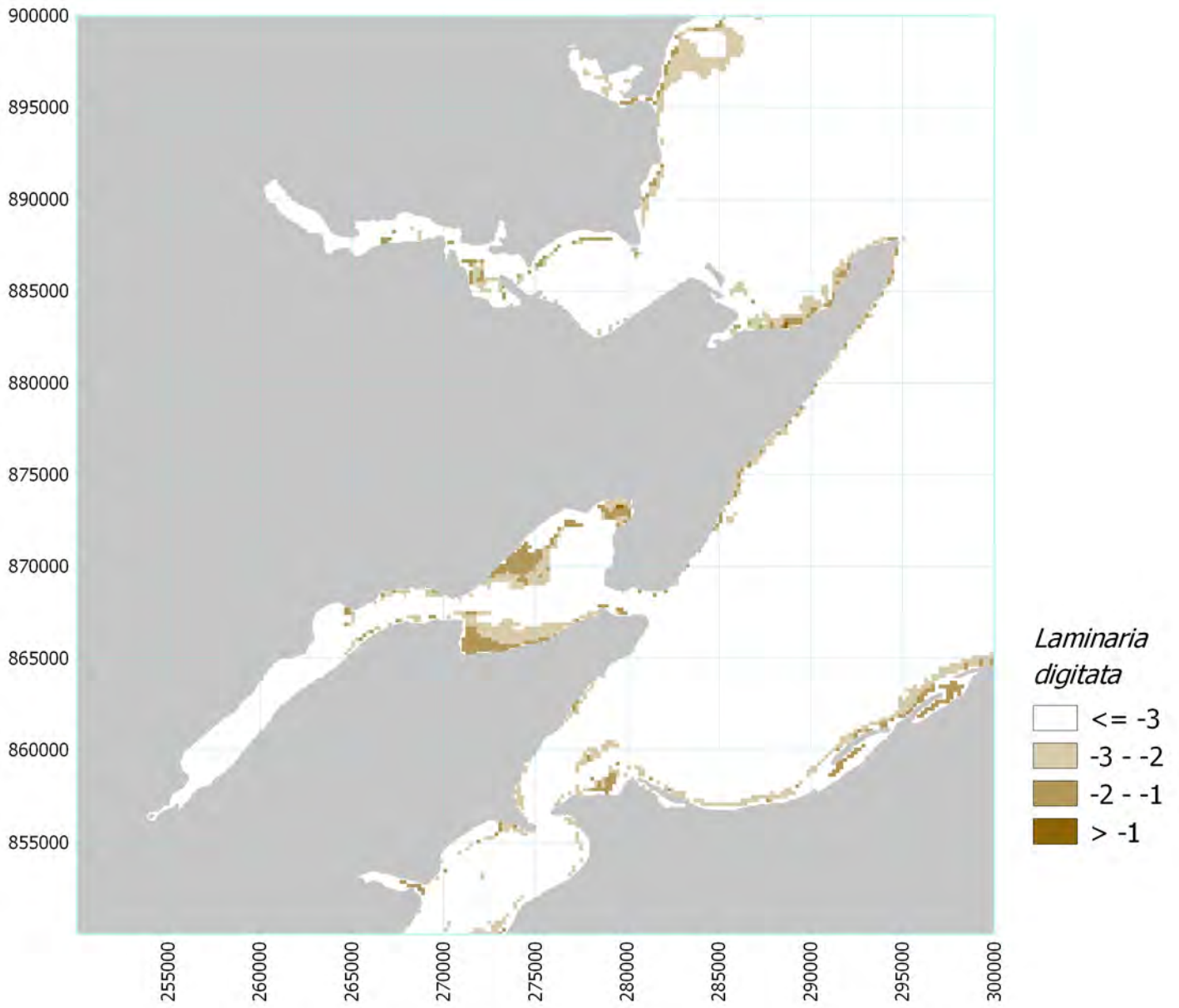
Map 20



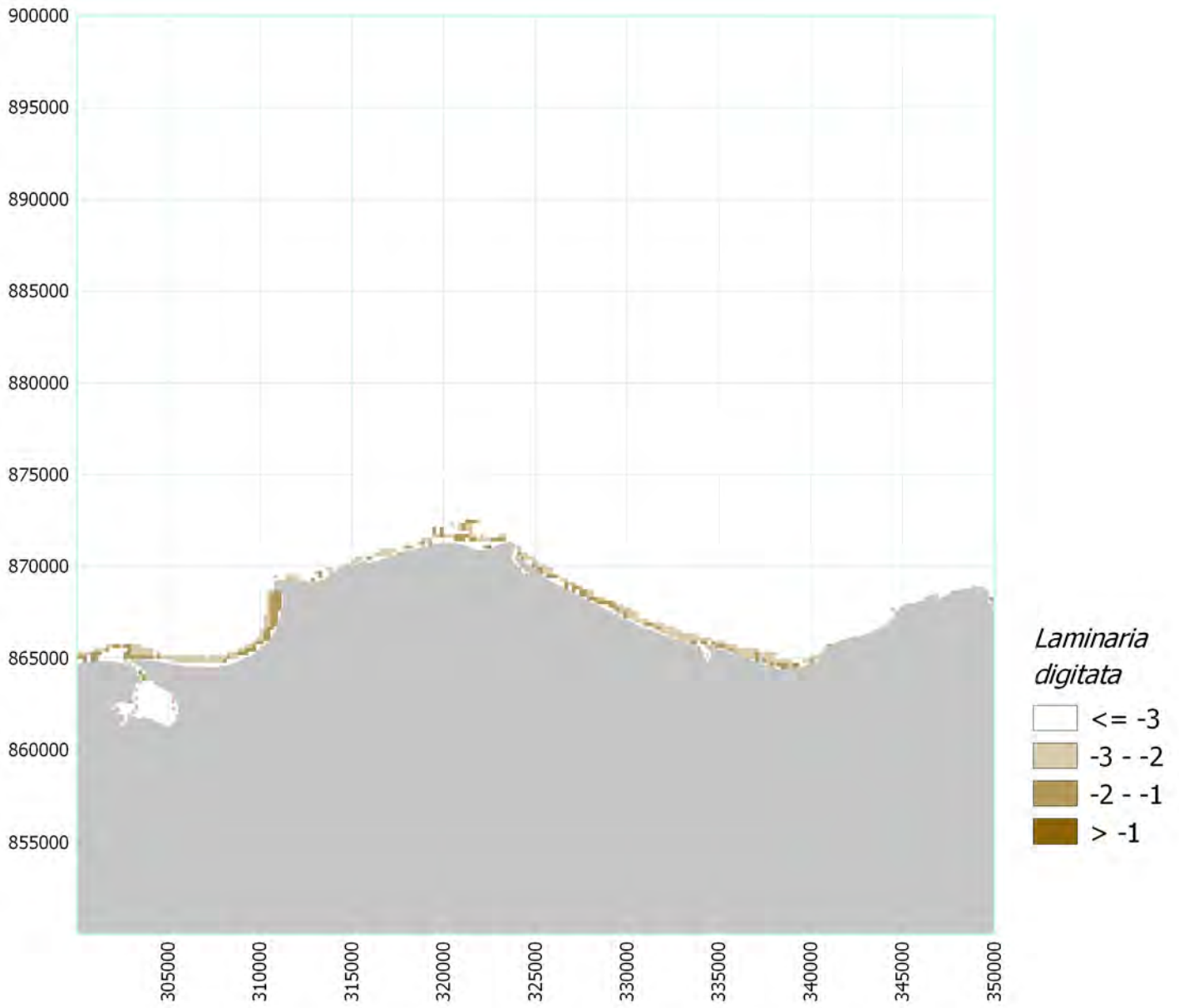
Map 21



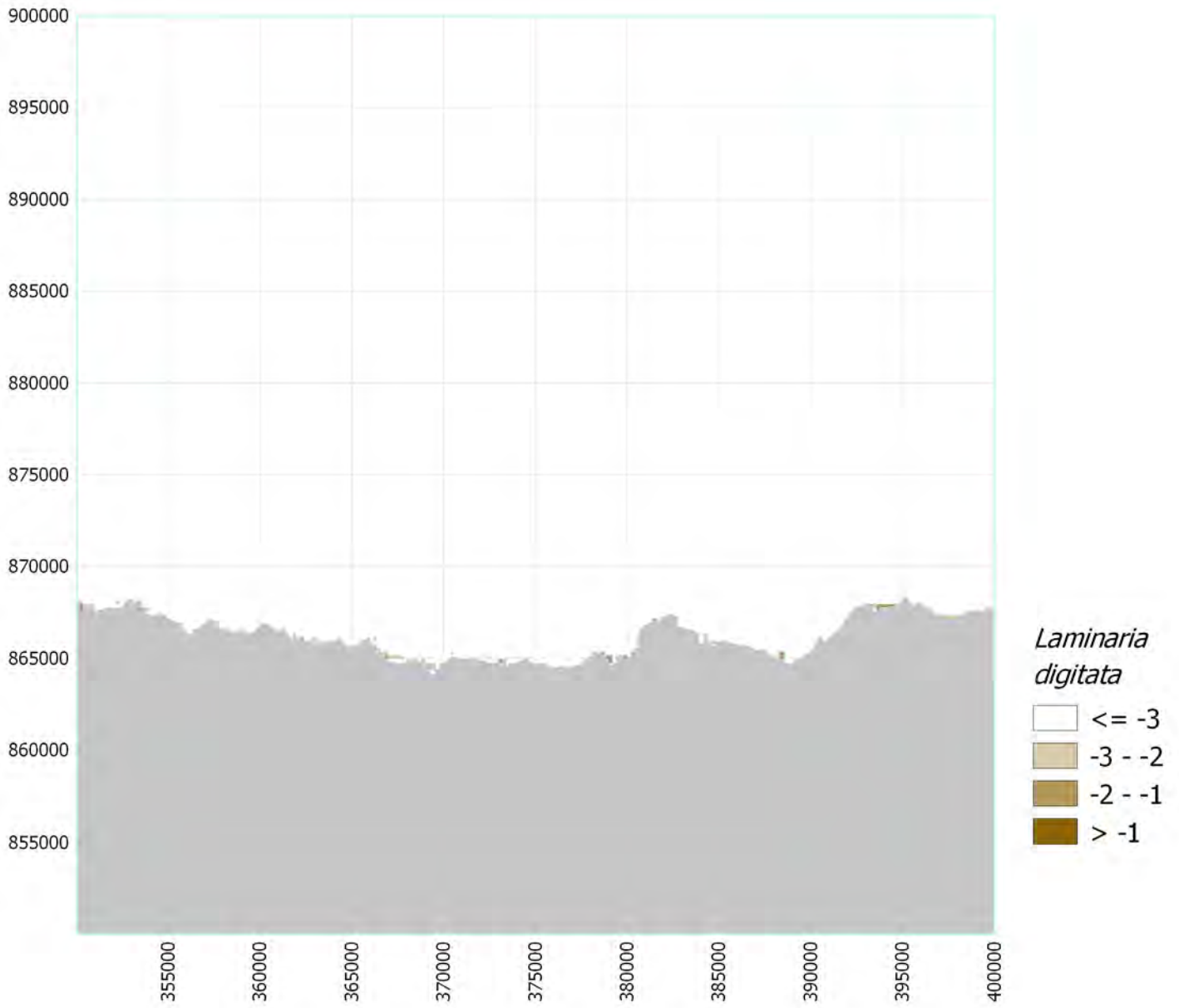
Map 22



Map 23



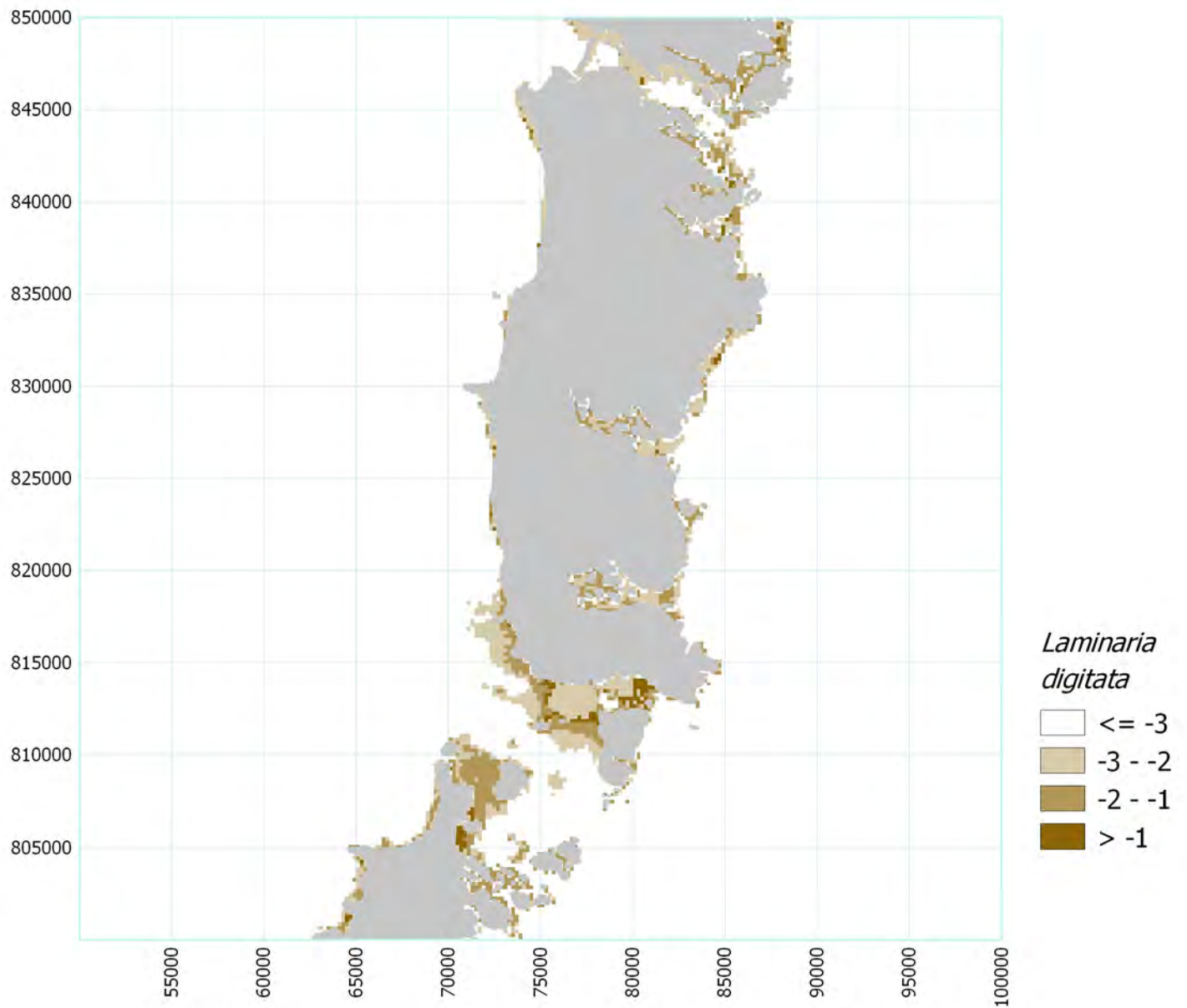
Map 24



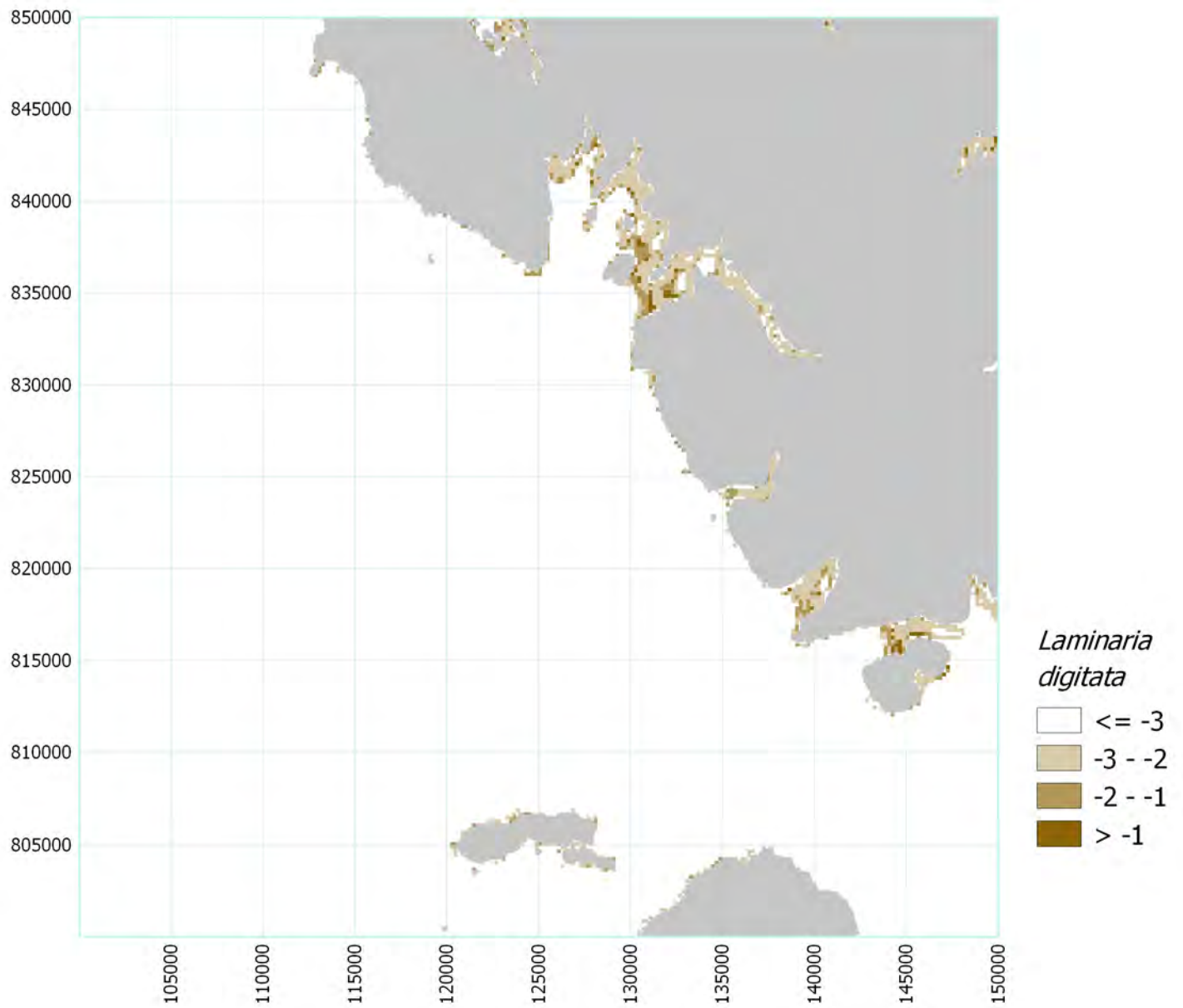
Map 25



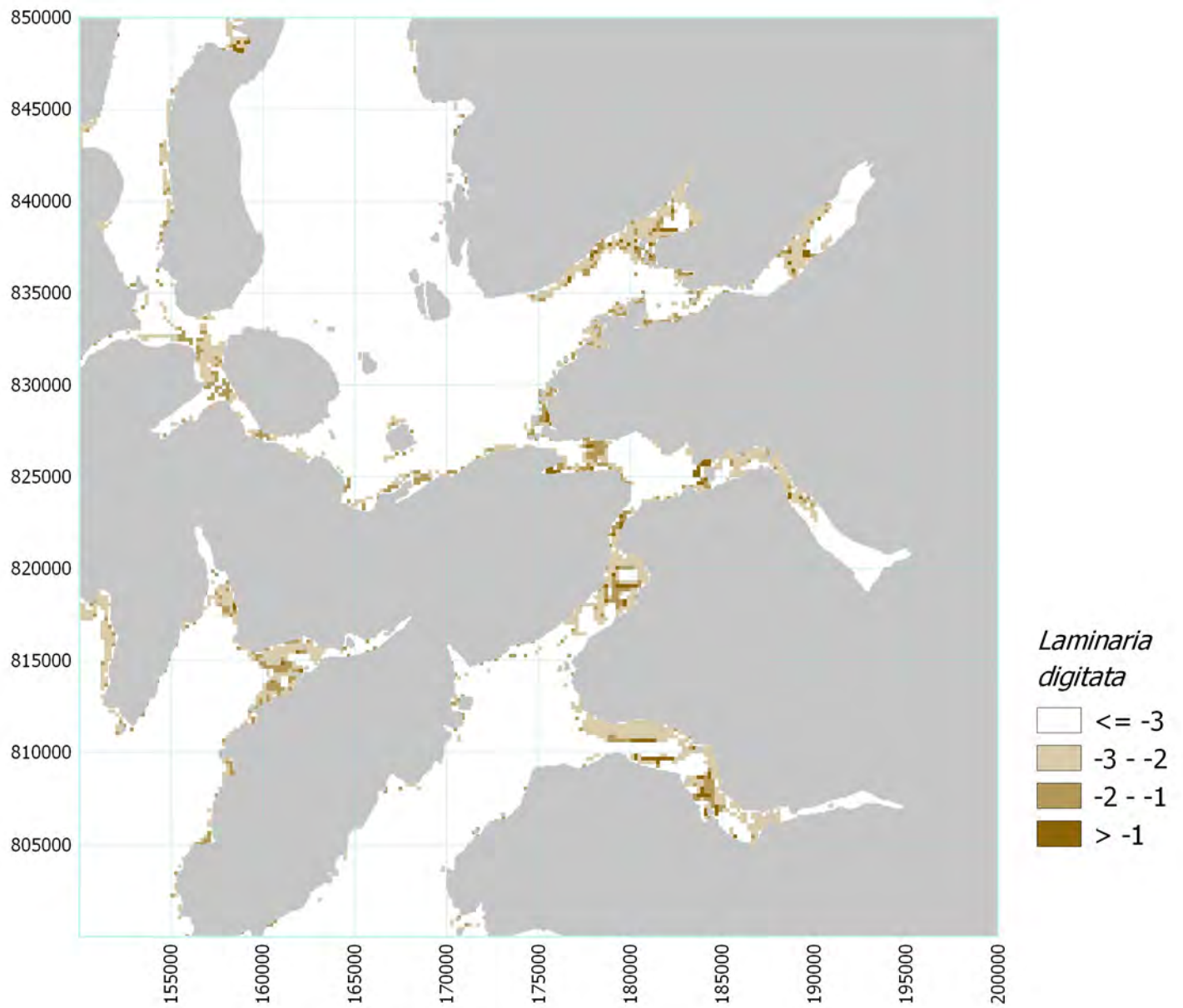
Map 26



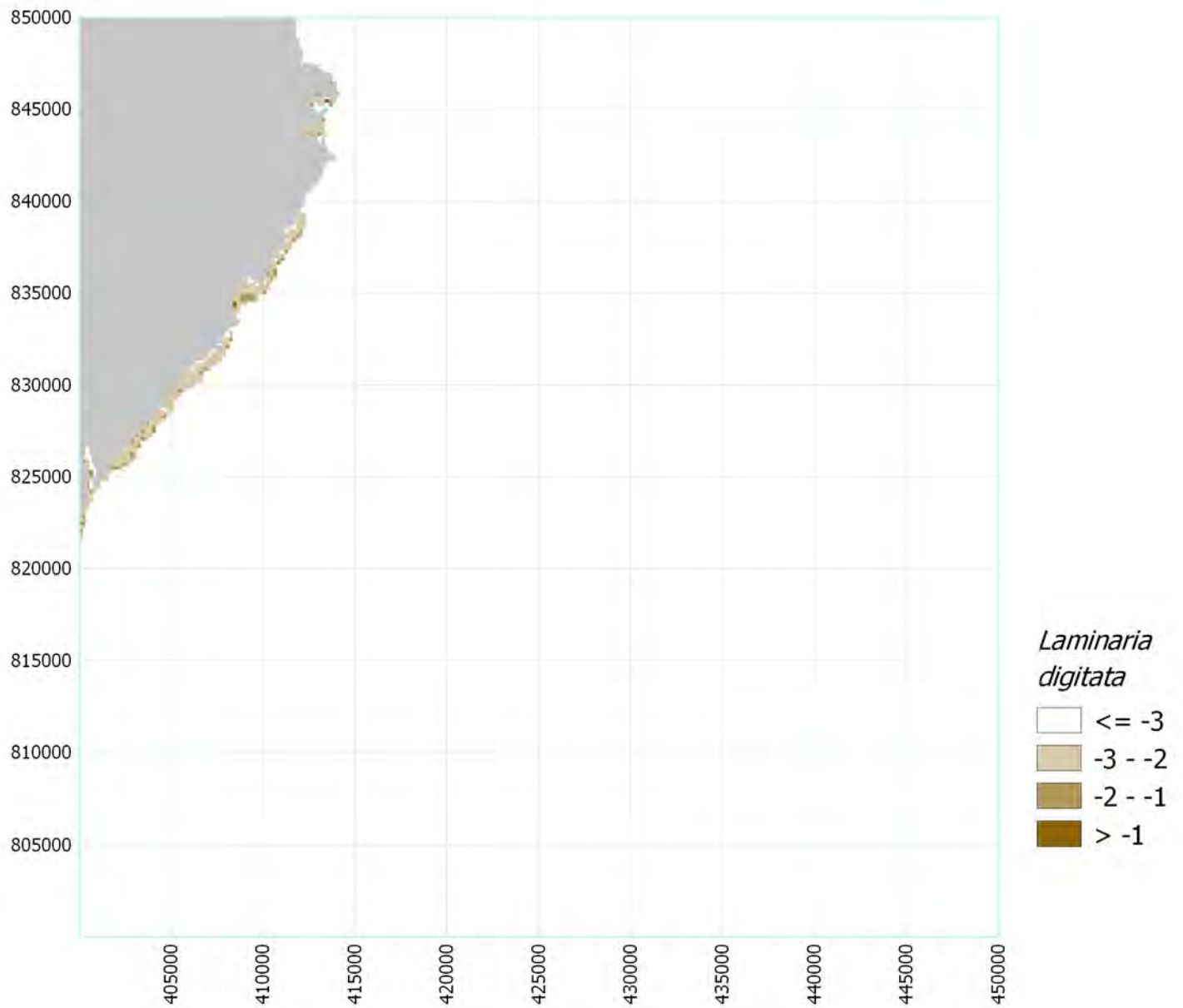
Map 27



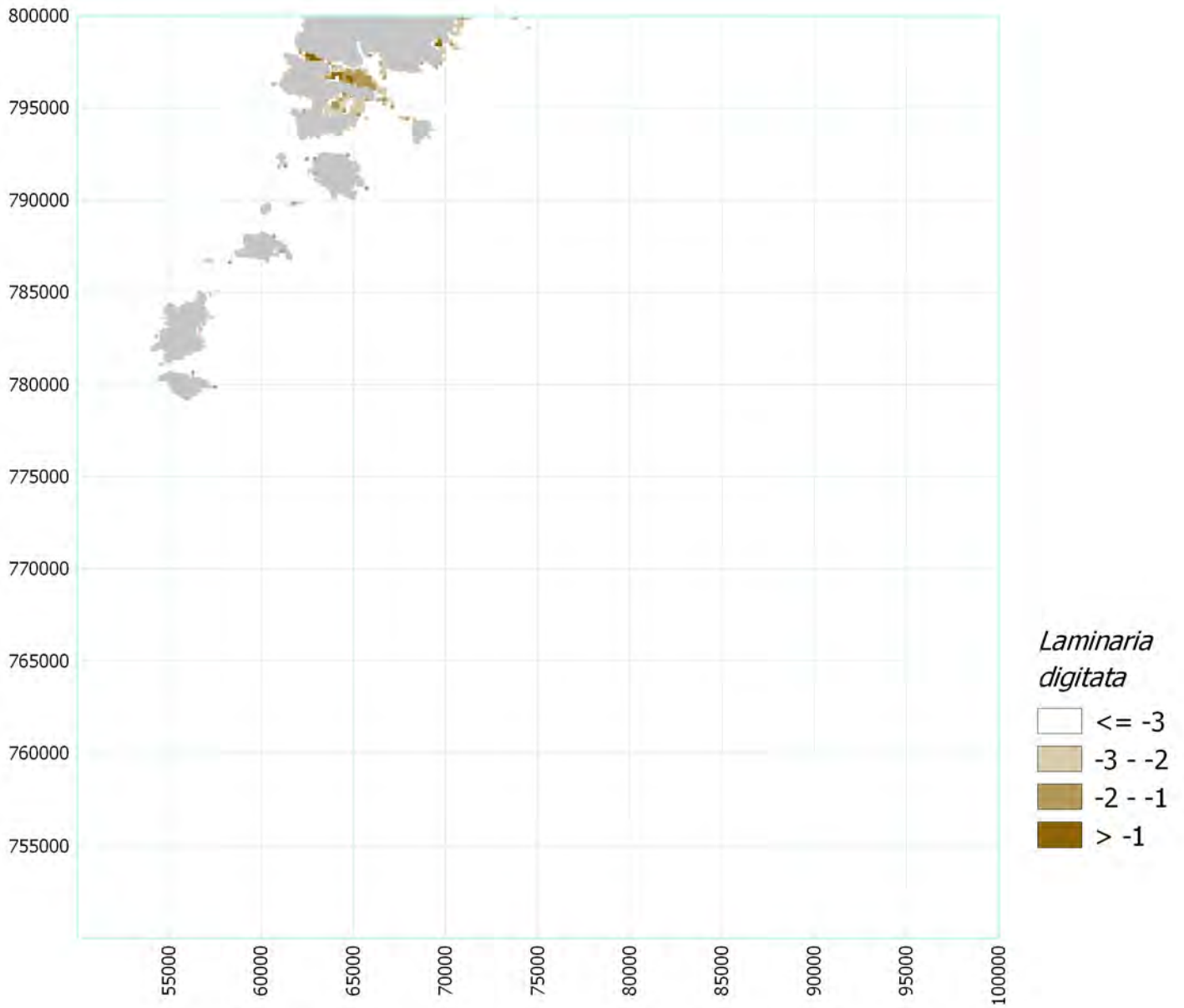
Map 28



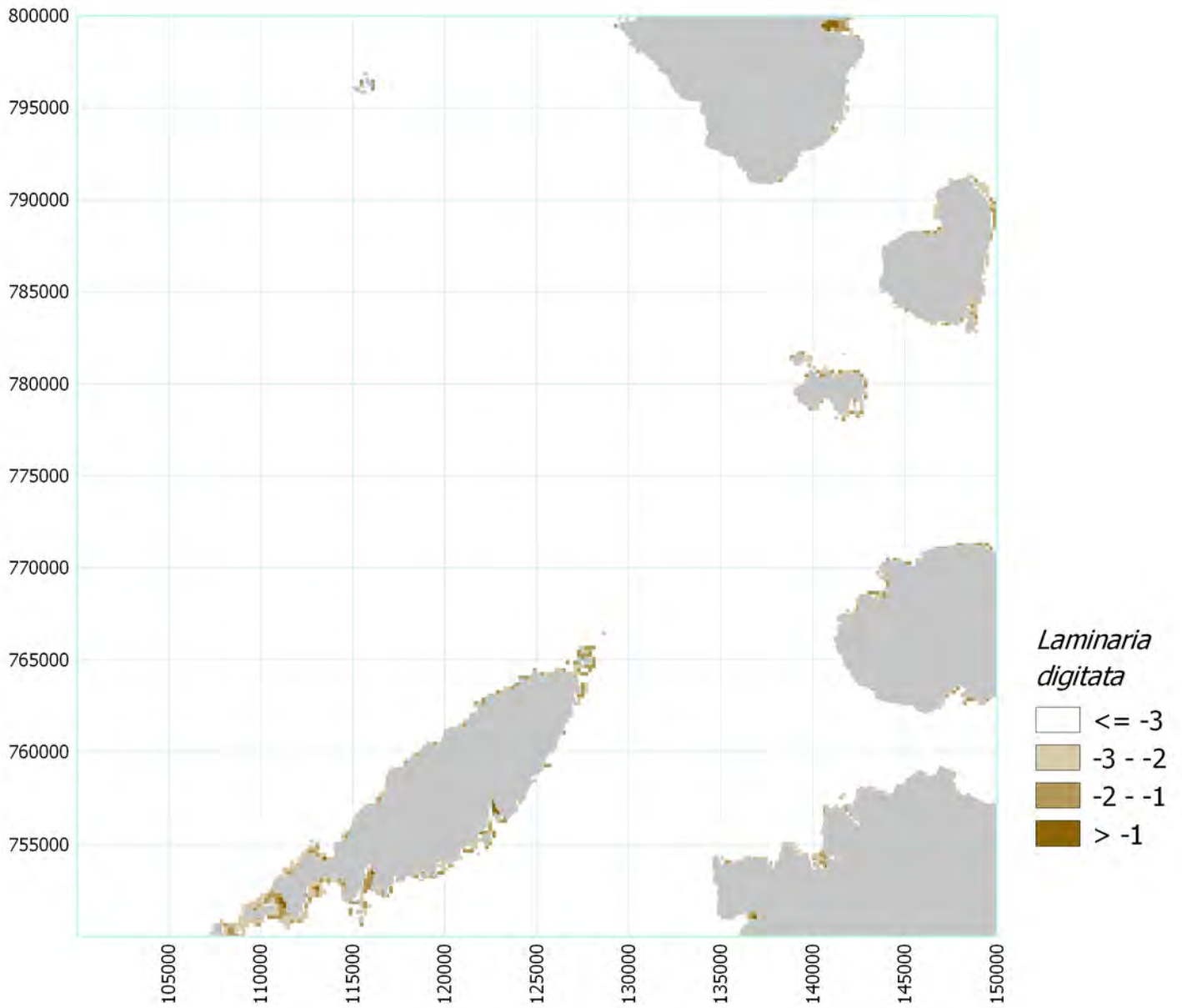
Map 29



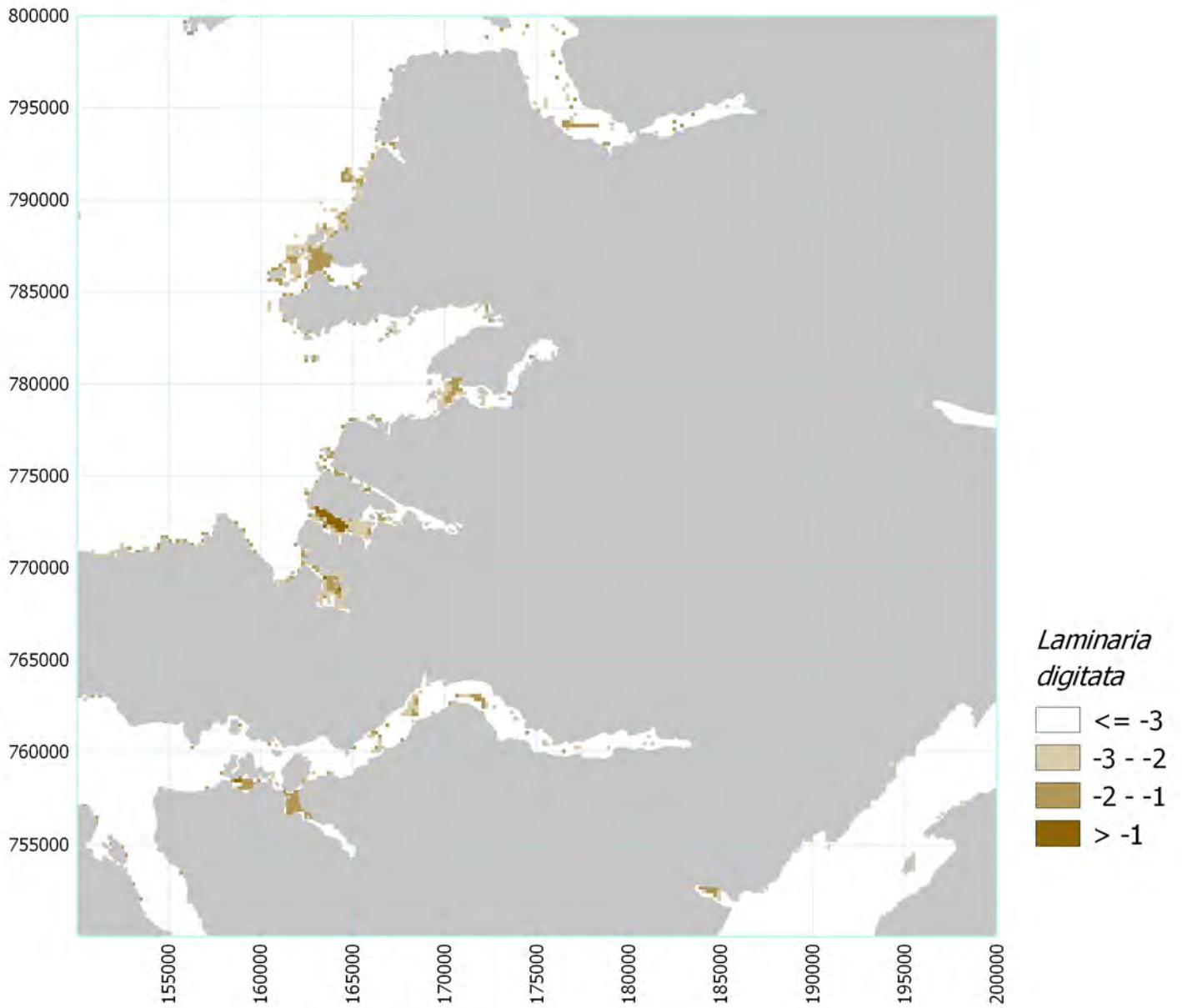
Map 30



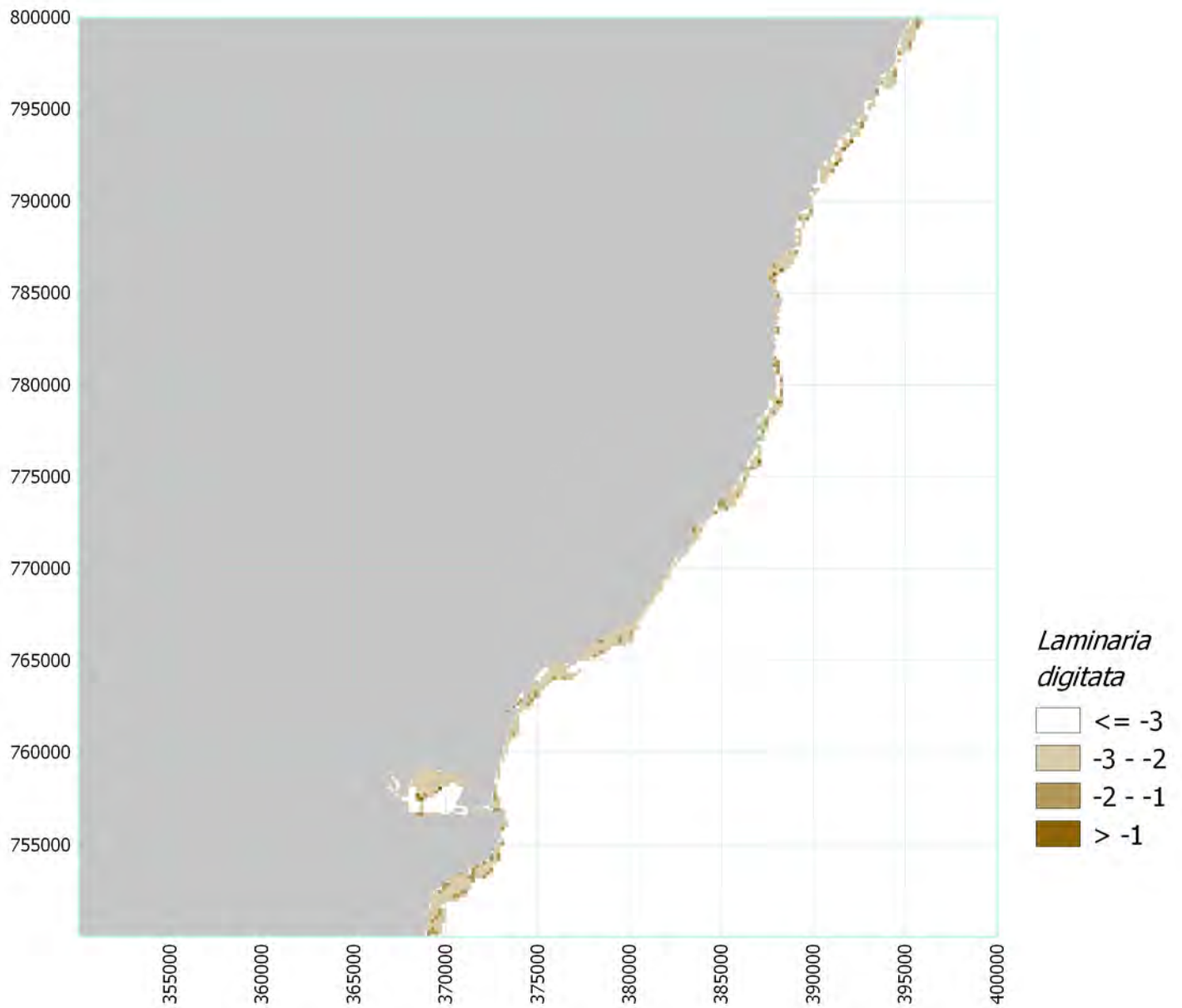
Map 31



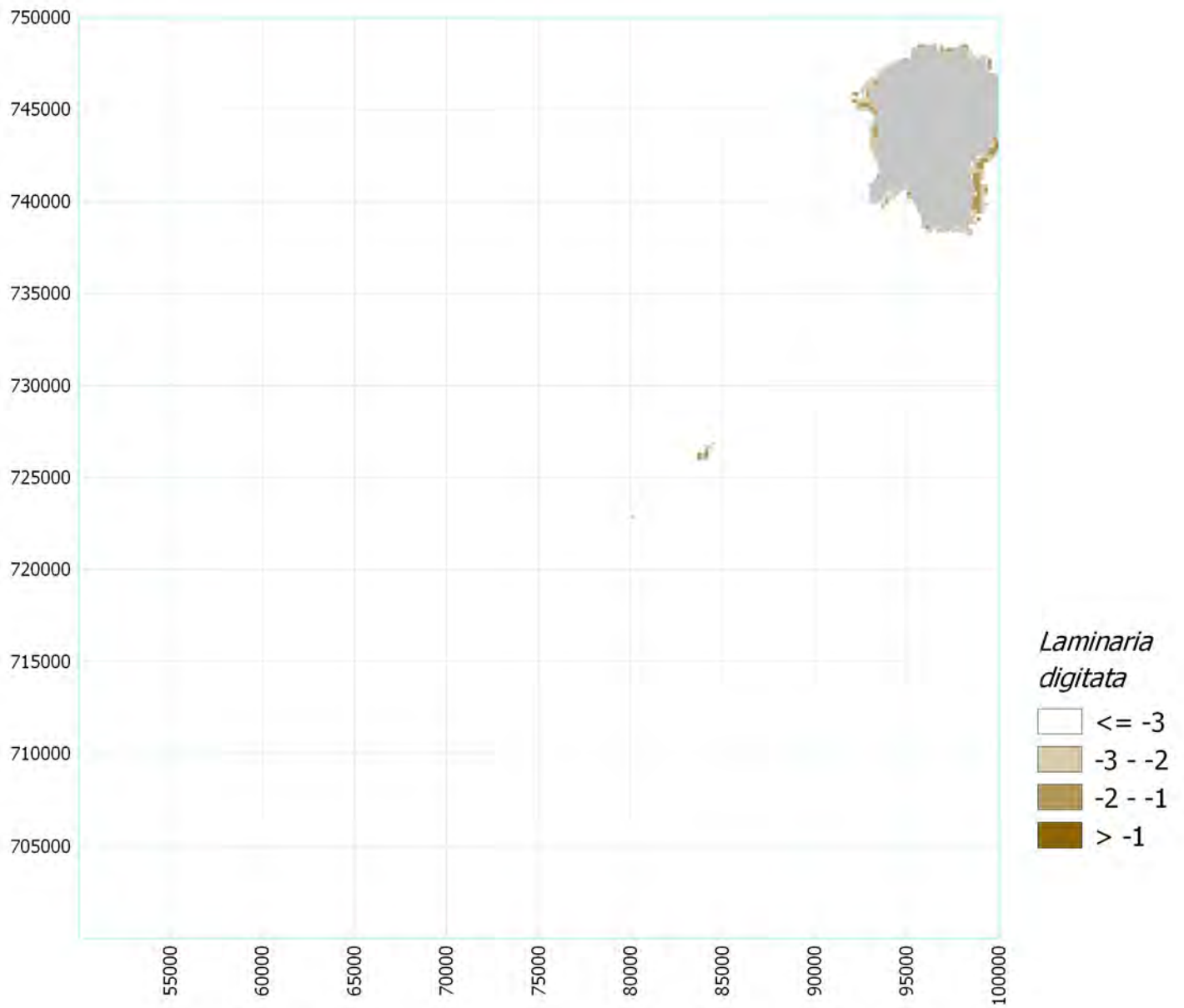
Map 32



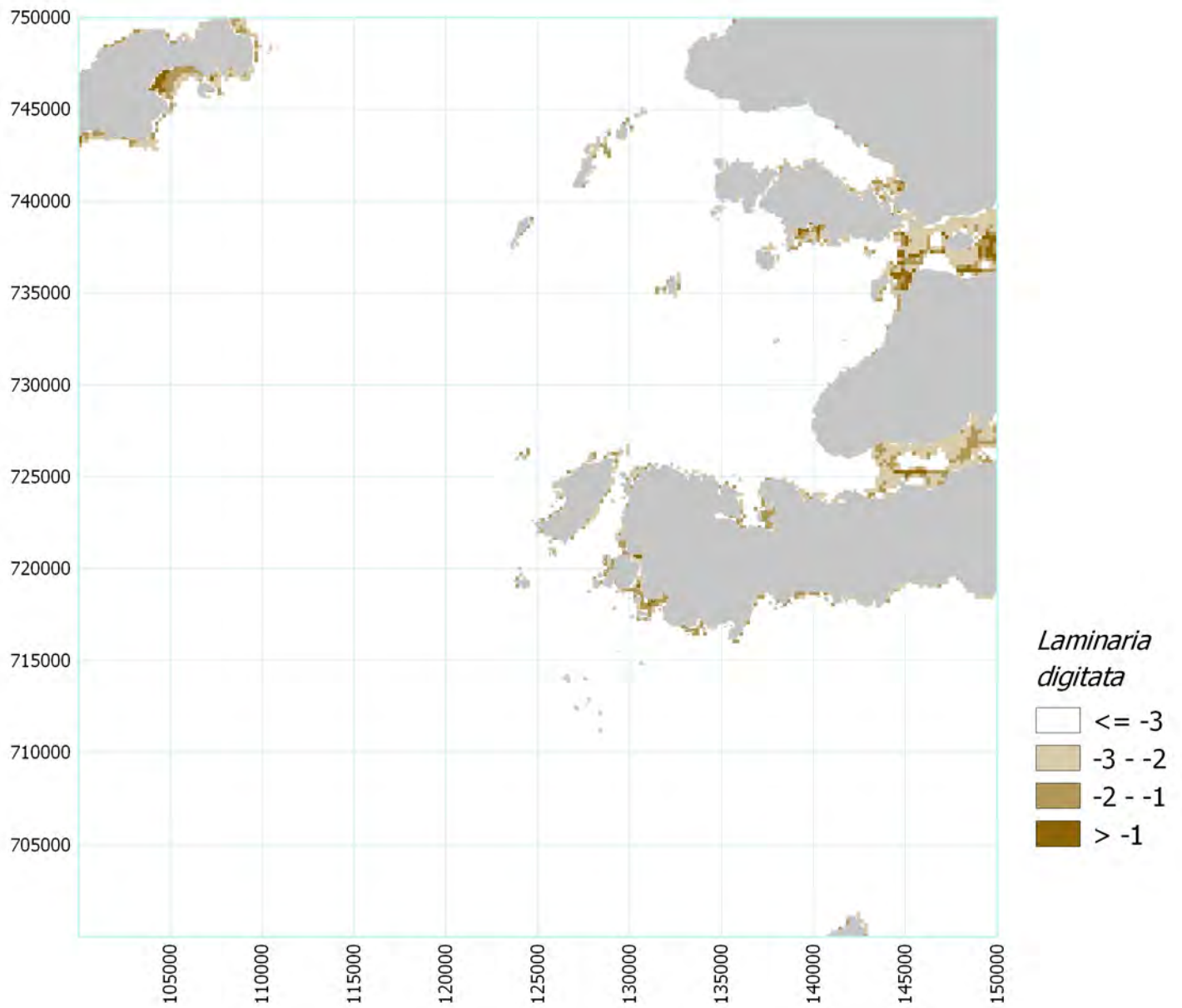
Map 33



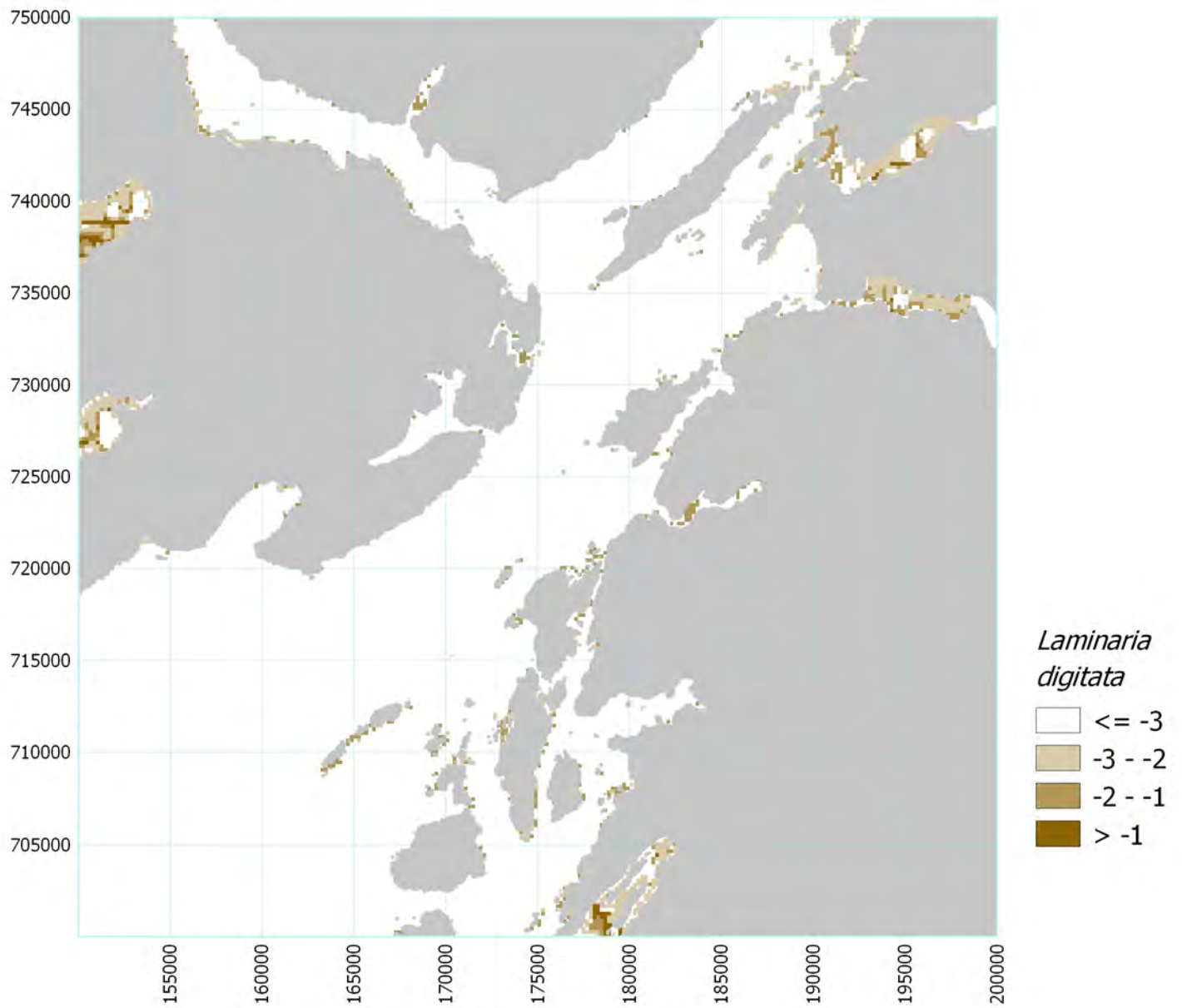
Map 34



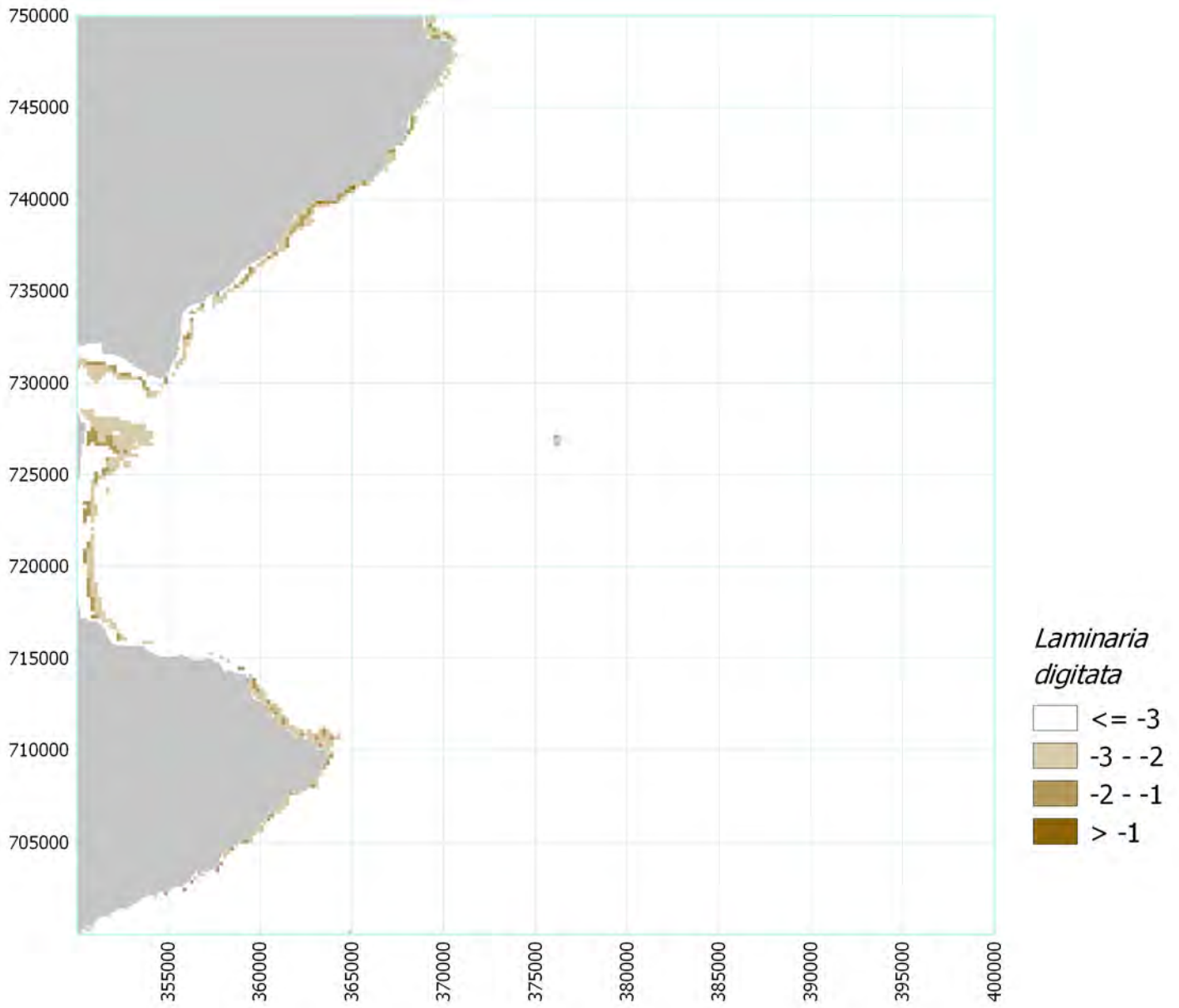
Map 35



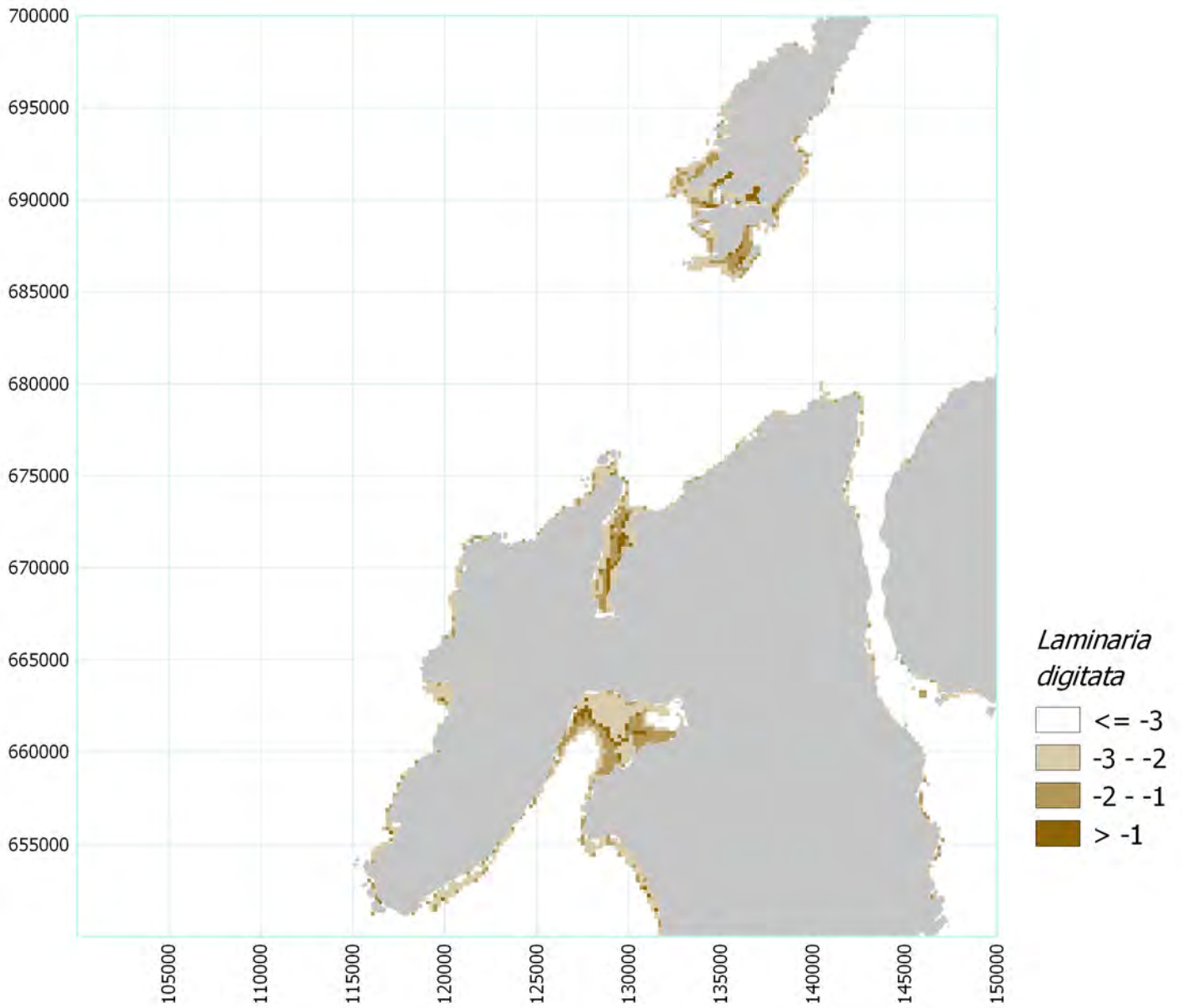
Map 36



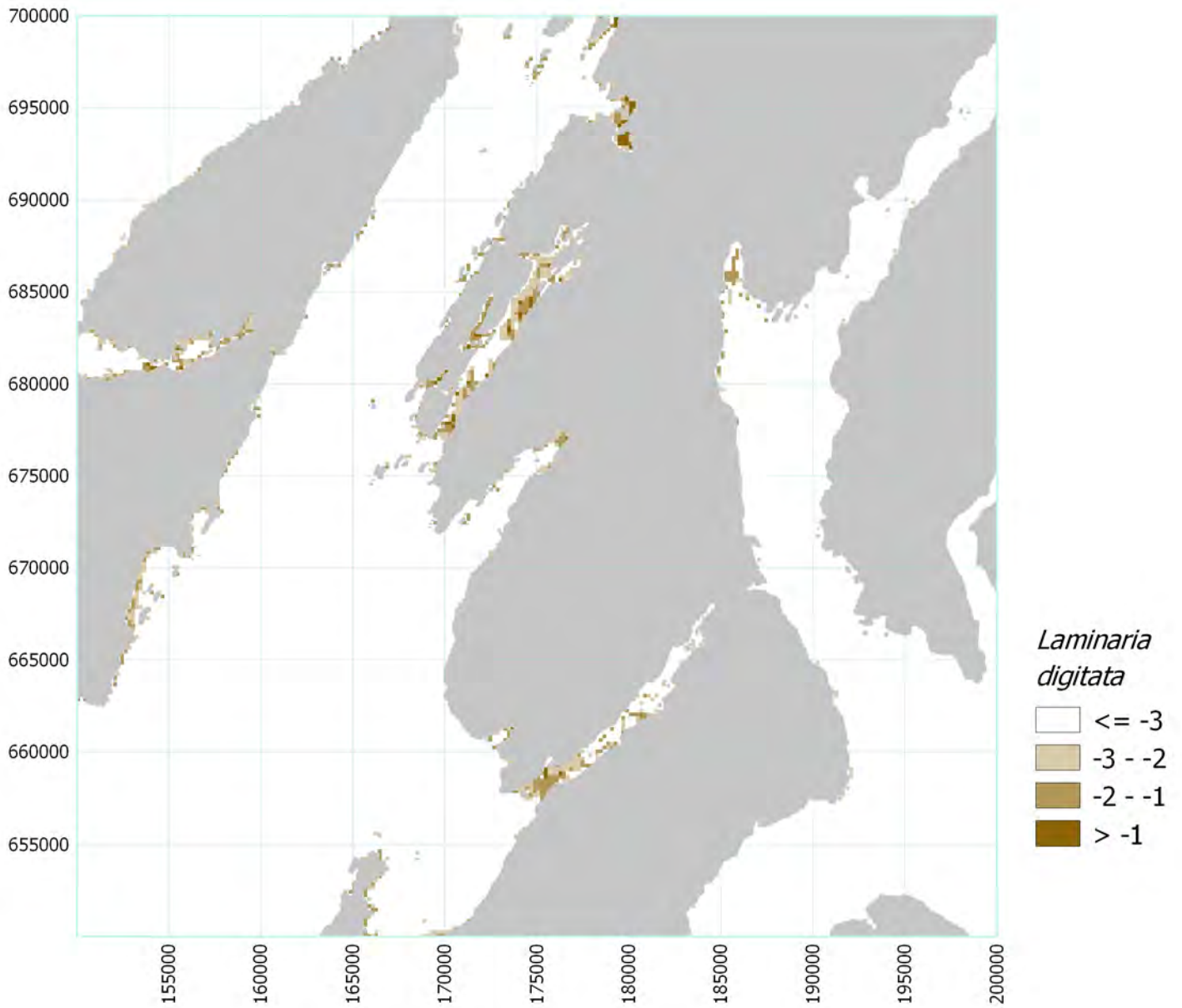
Map 37



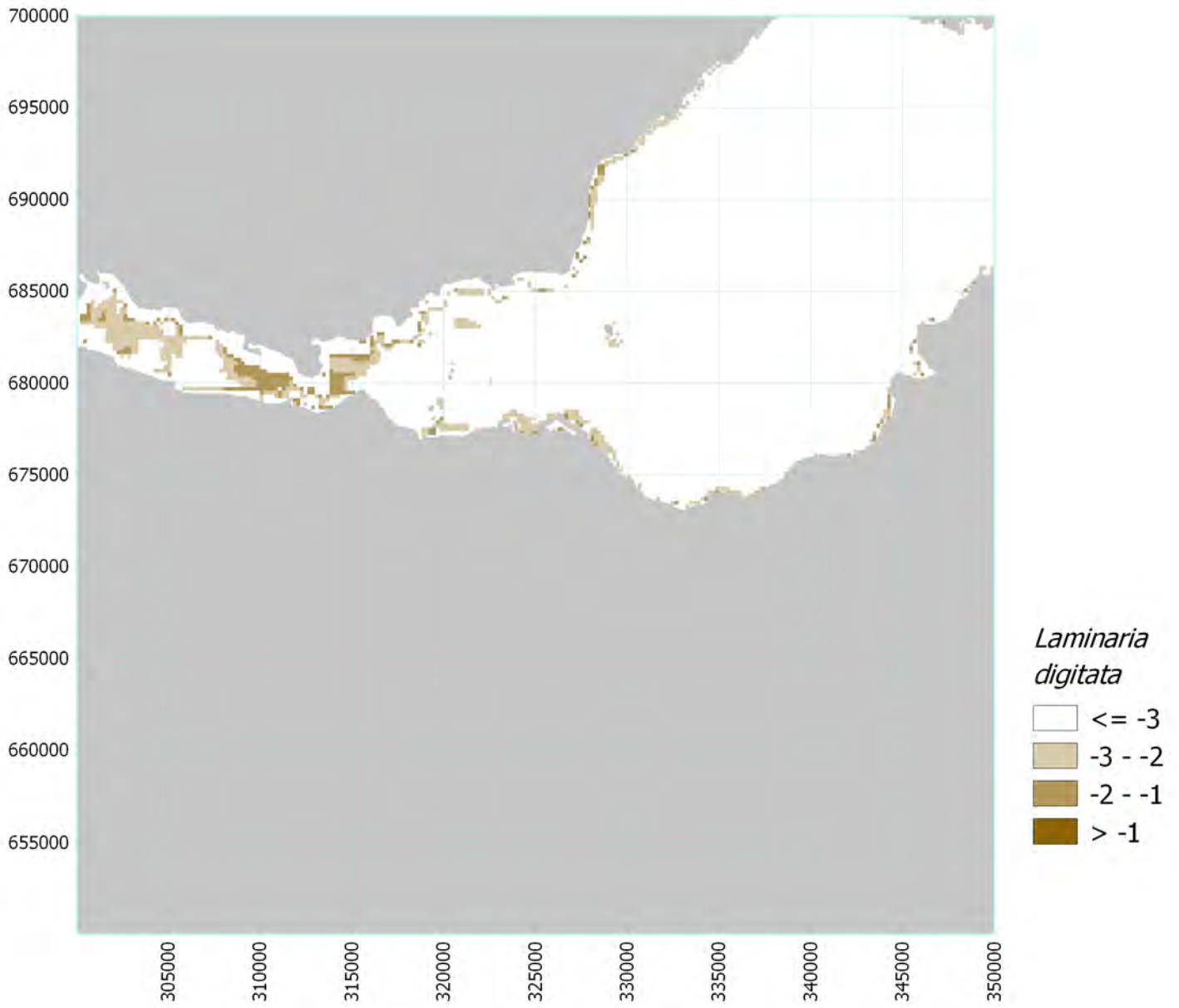
Map 38



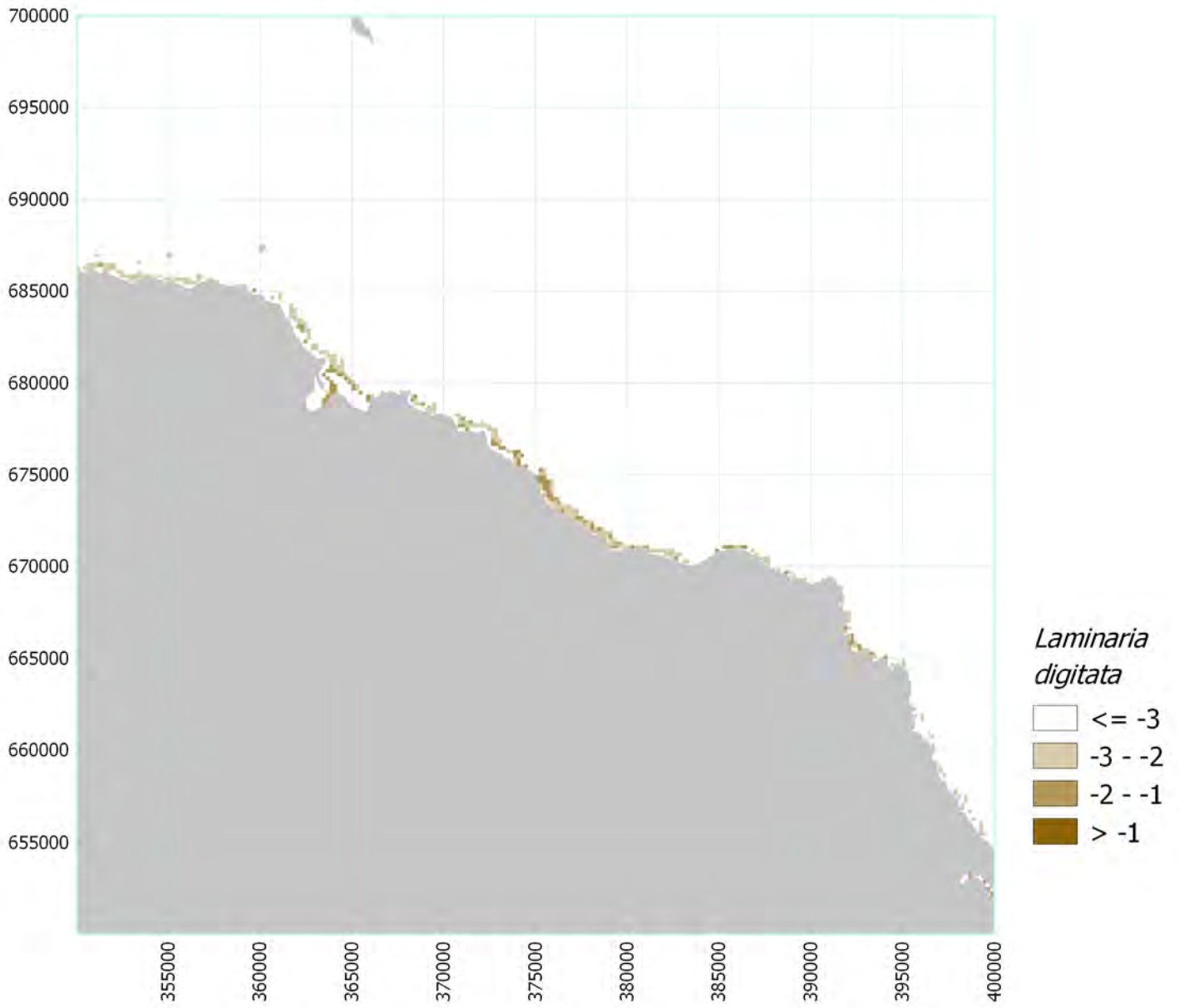
Map 39



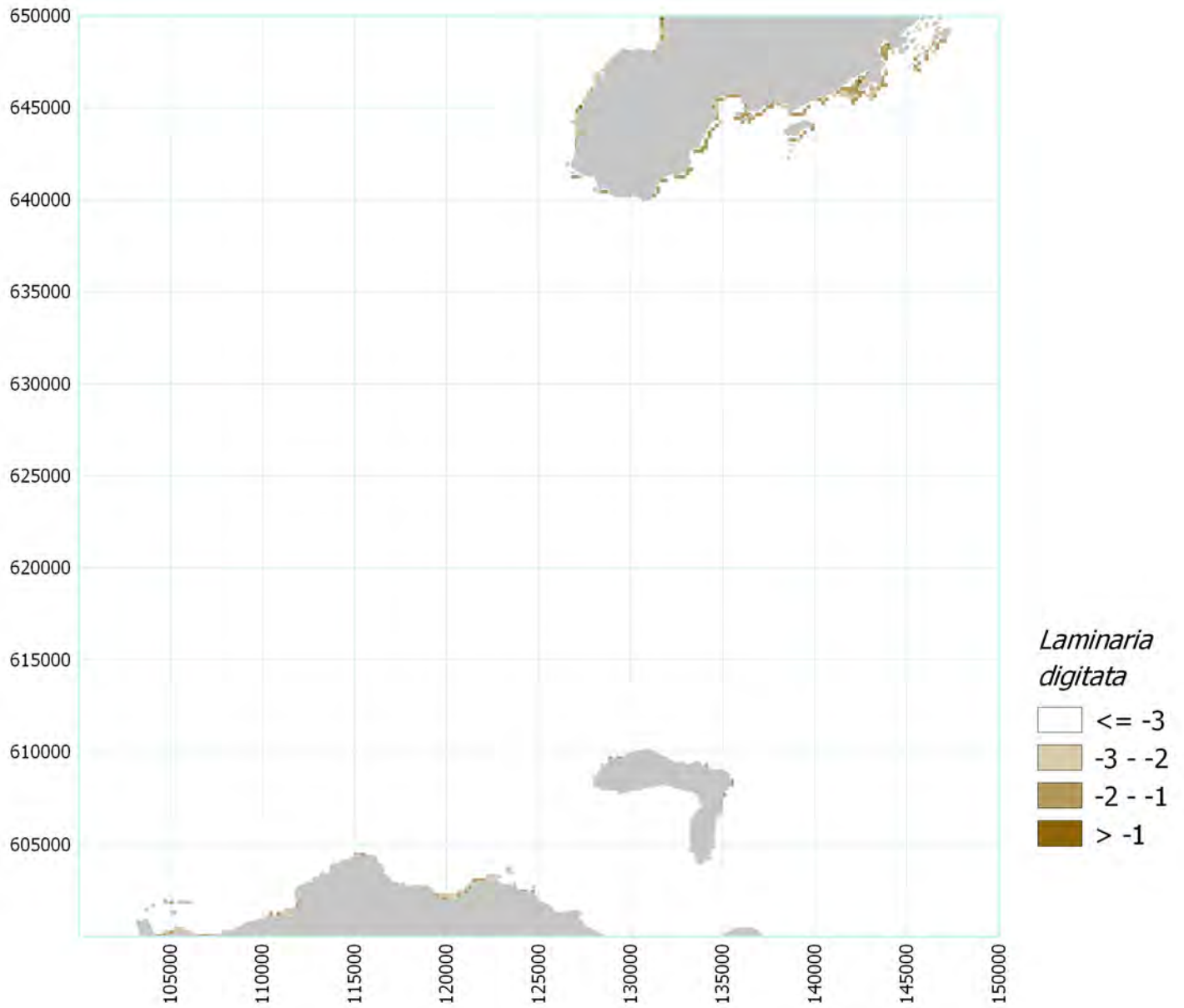
Map 40



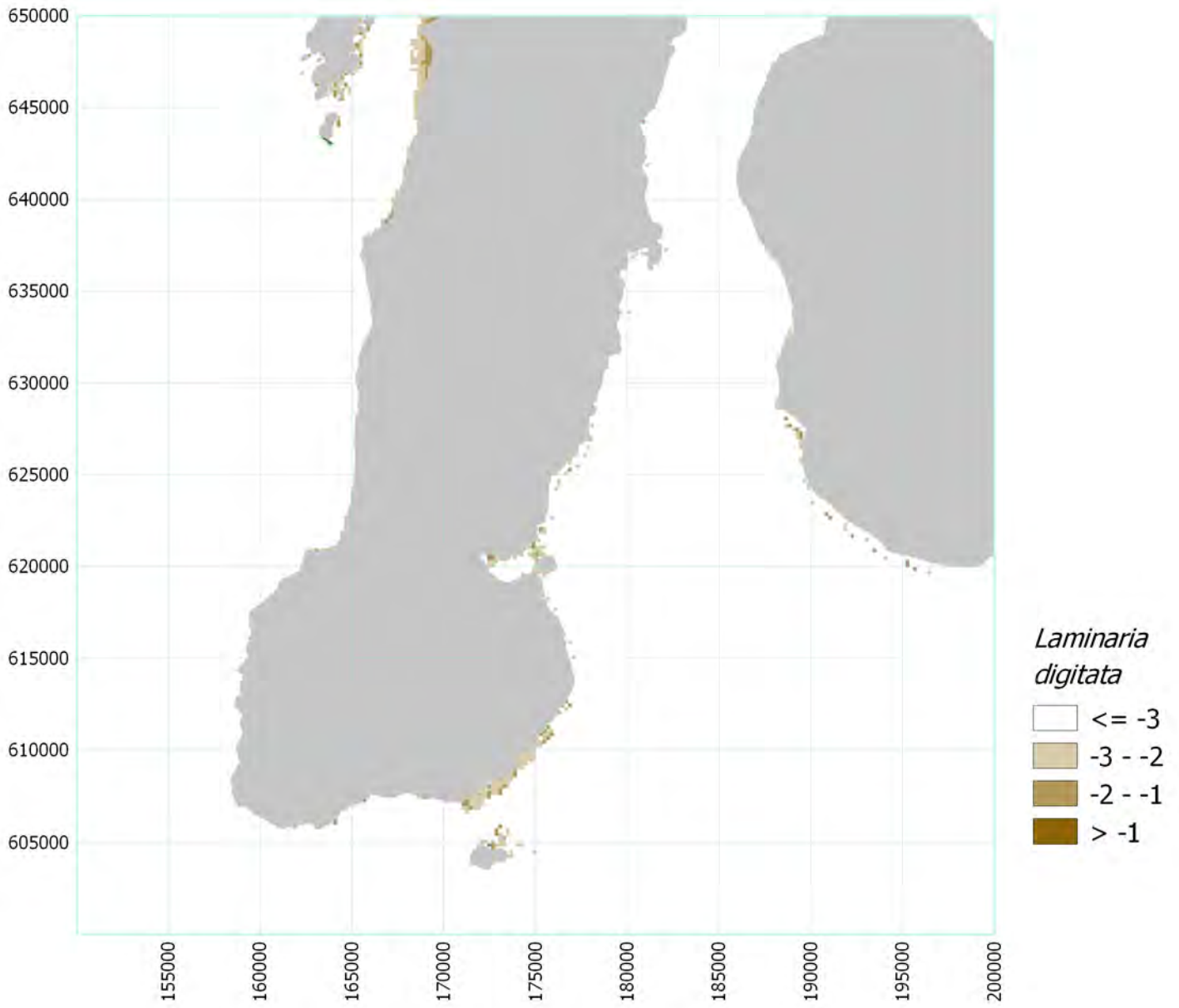
Map 41



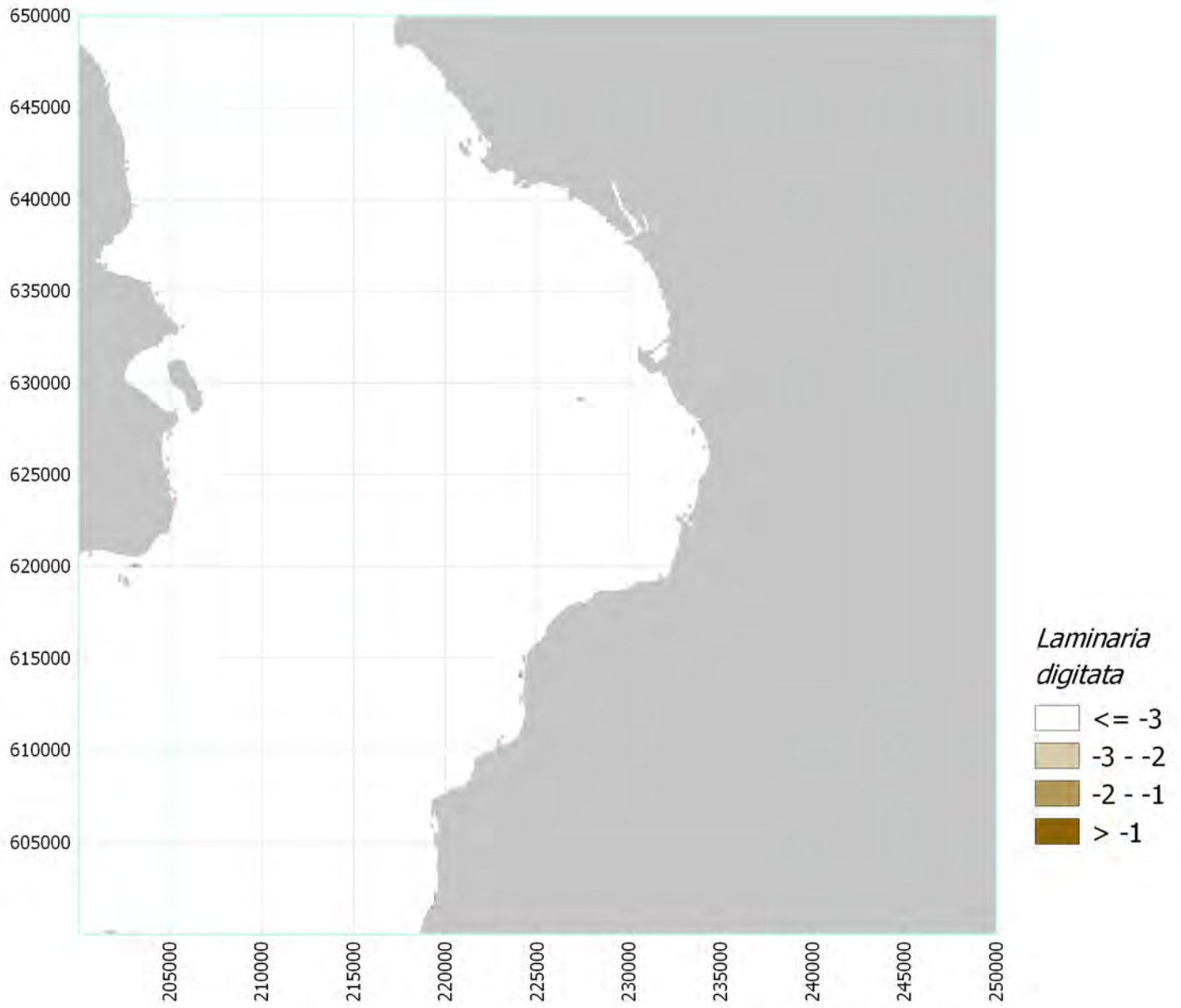
Map 42



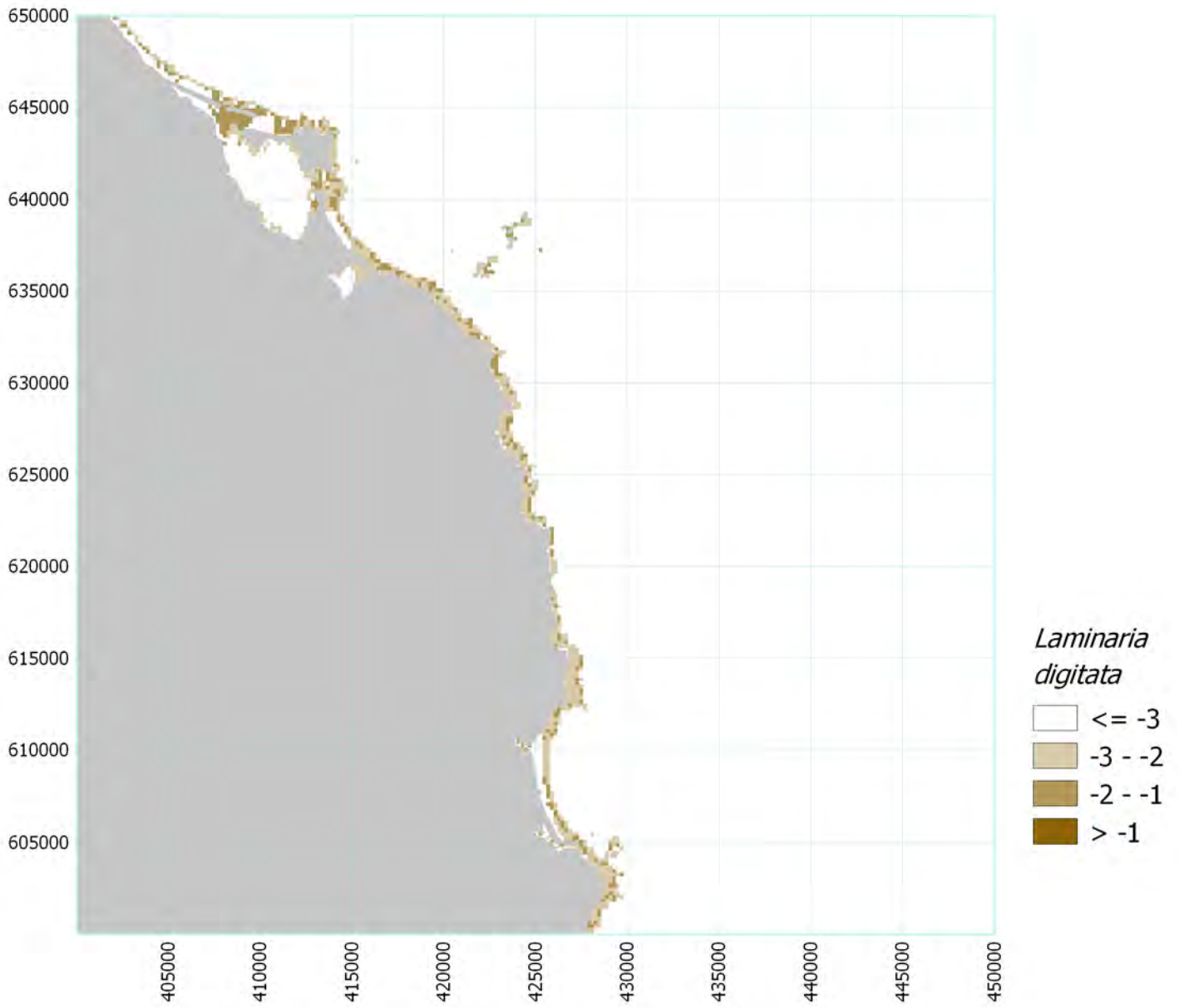
Map 43



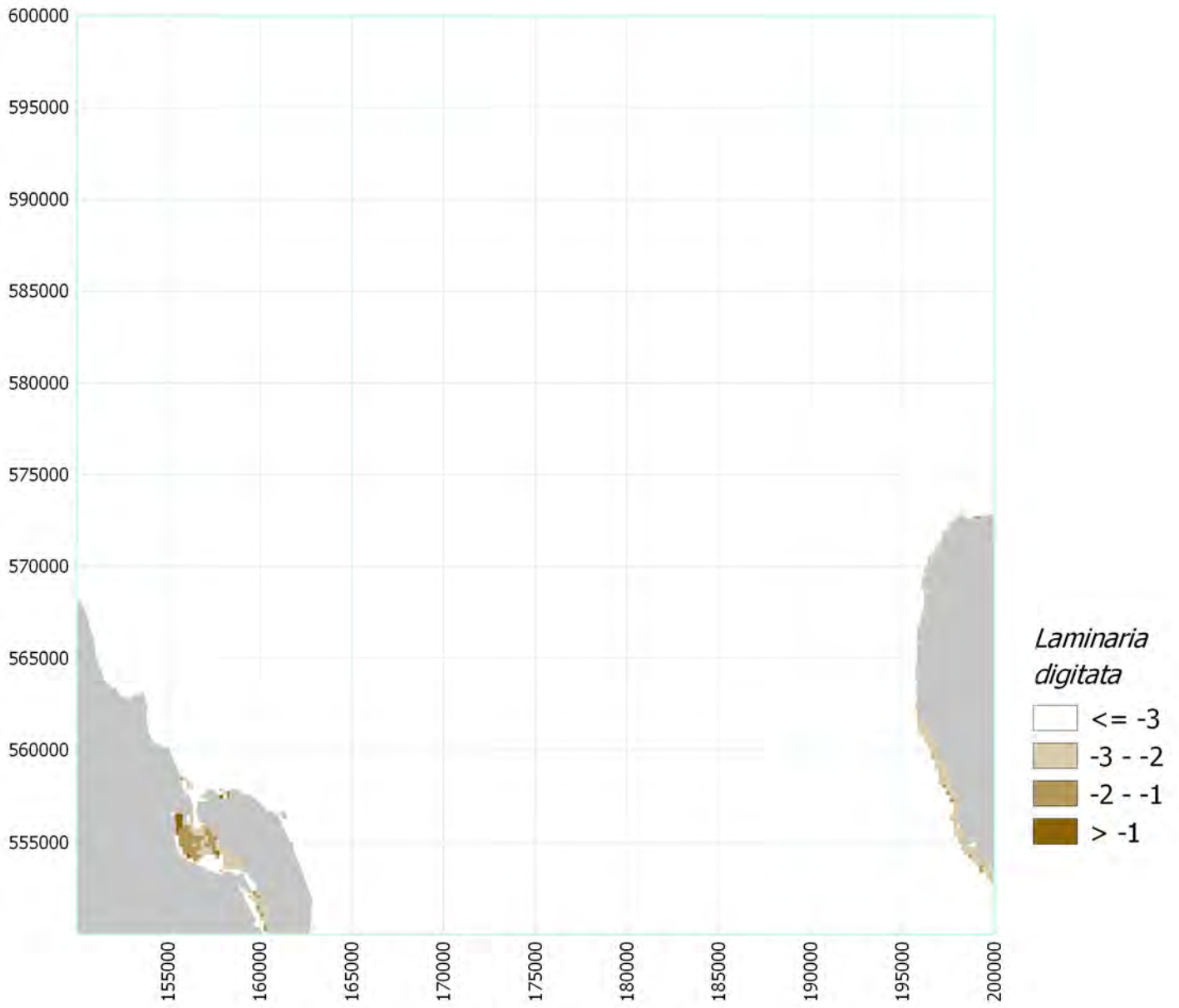
Map 44



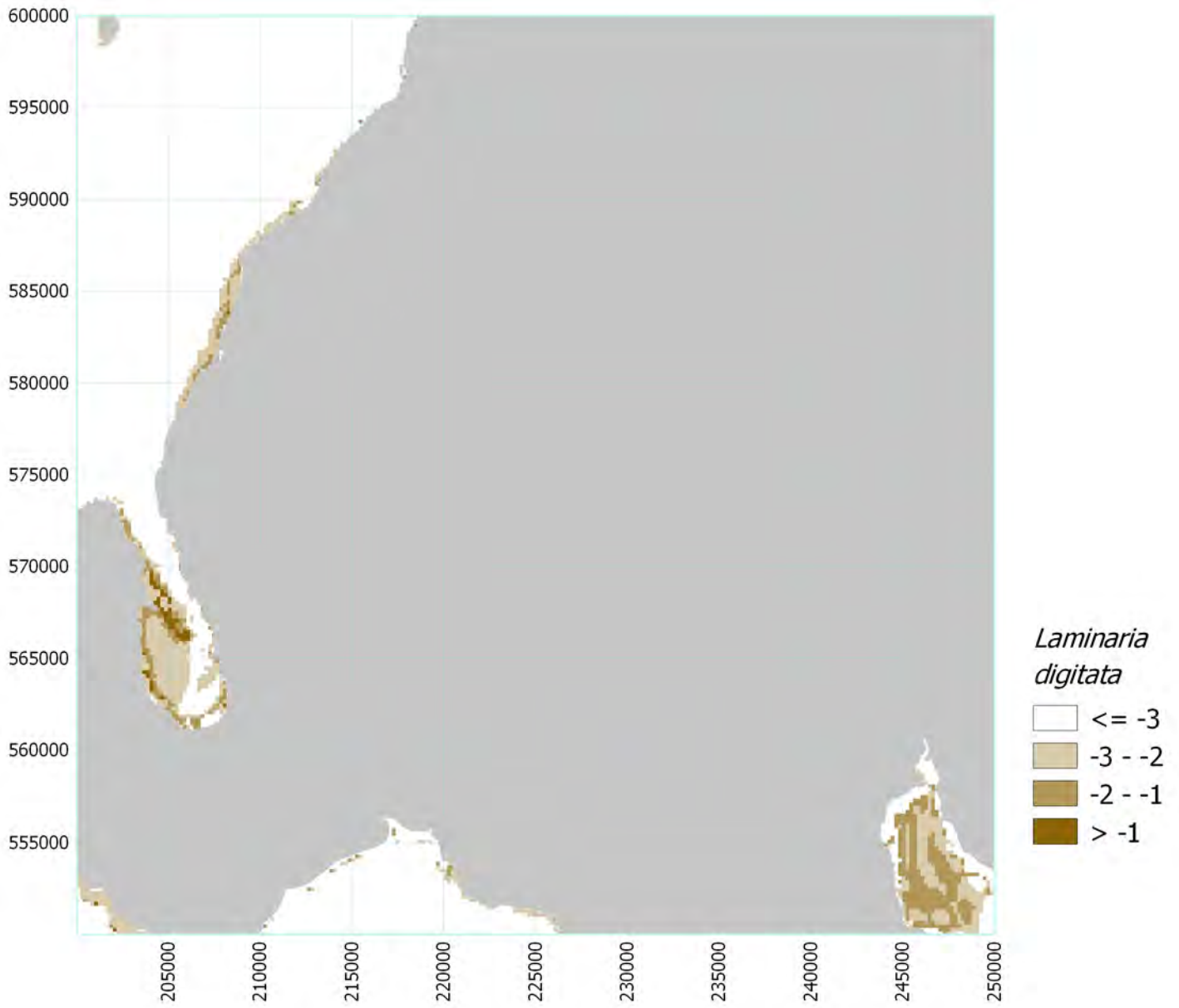
Map 45



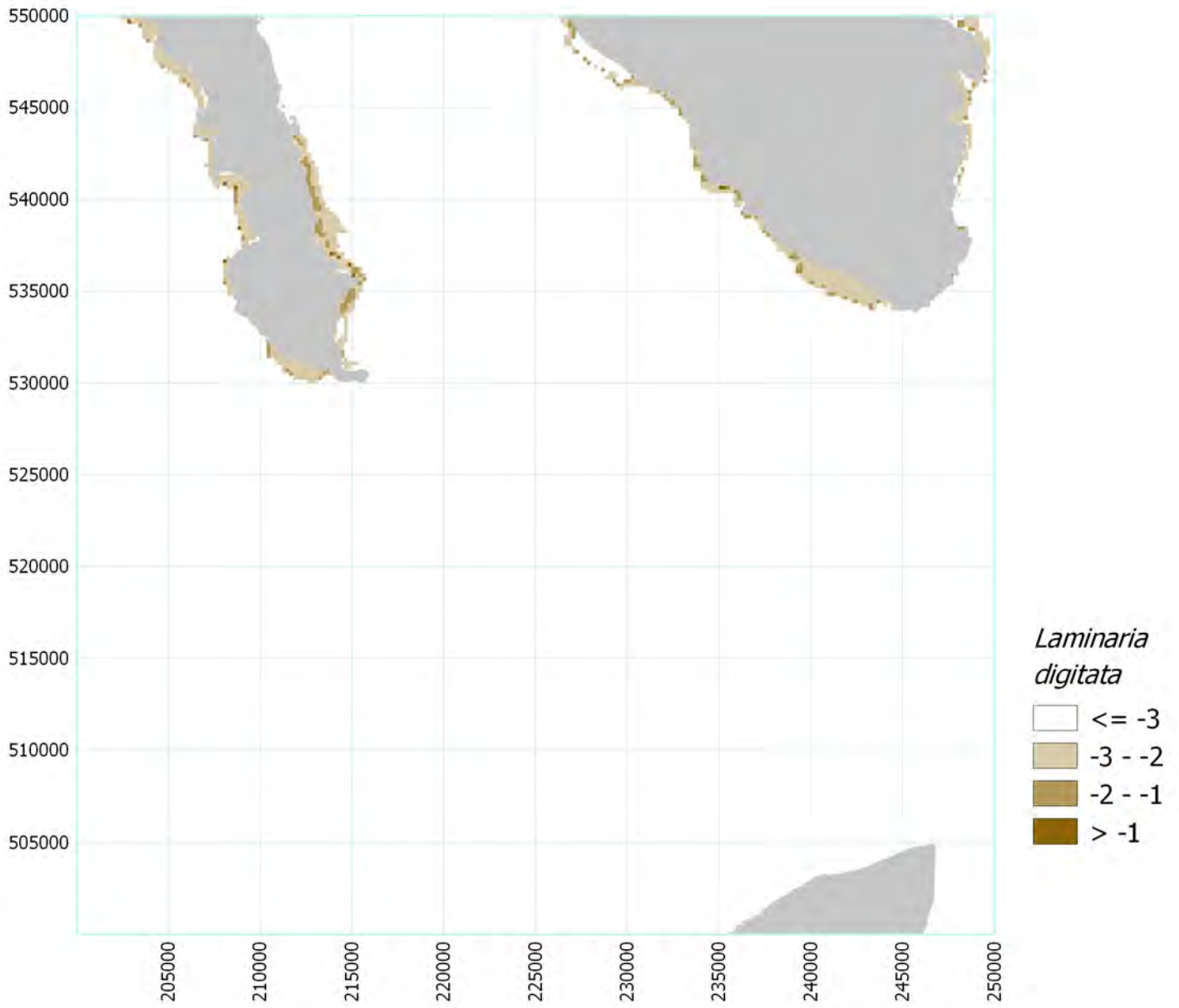
Map 46



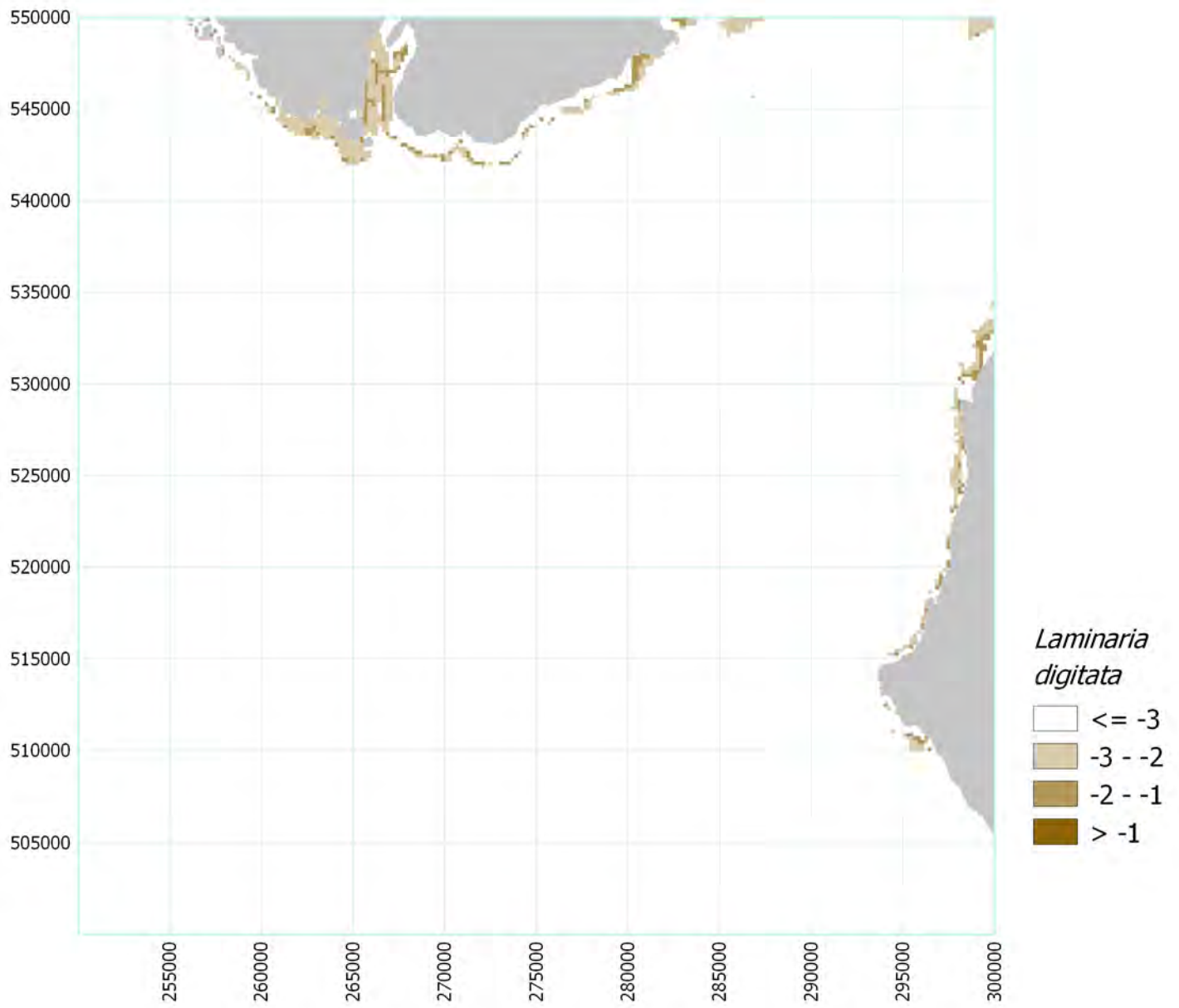
Map 47



Map 48



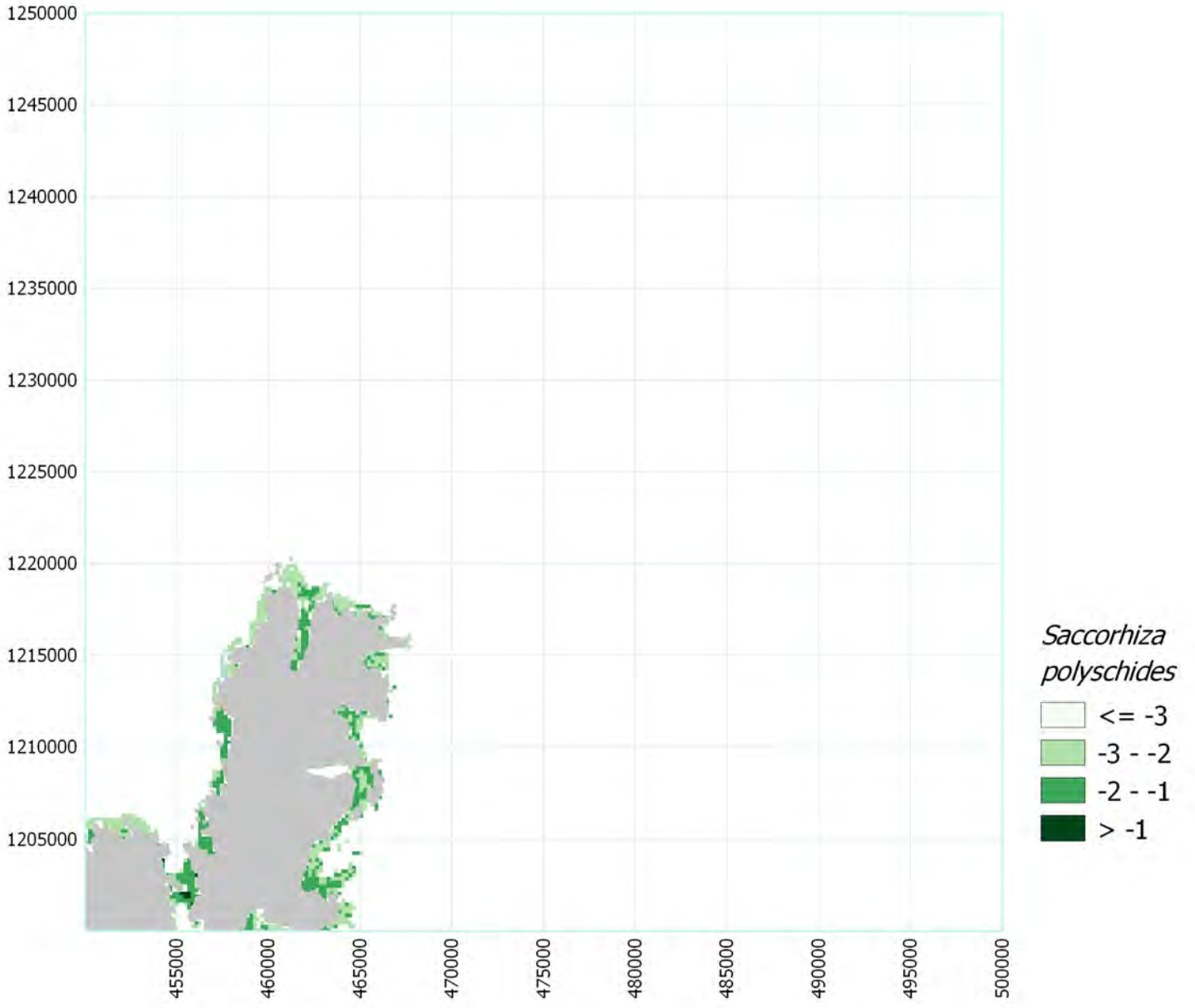
Map 49



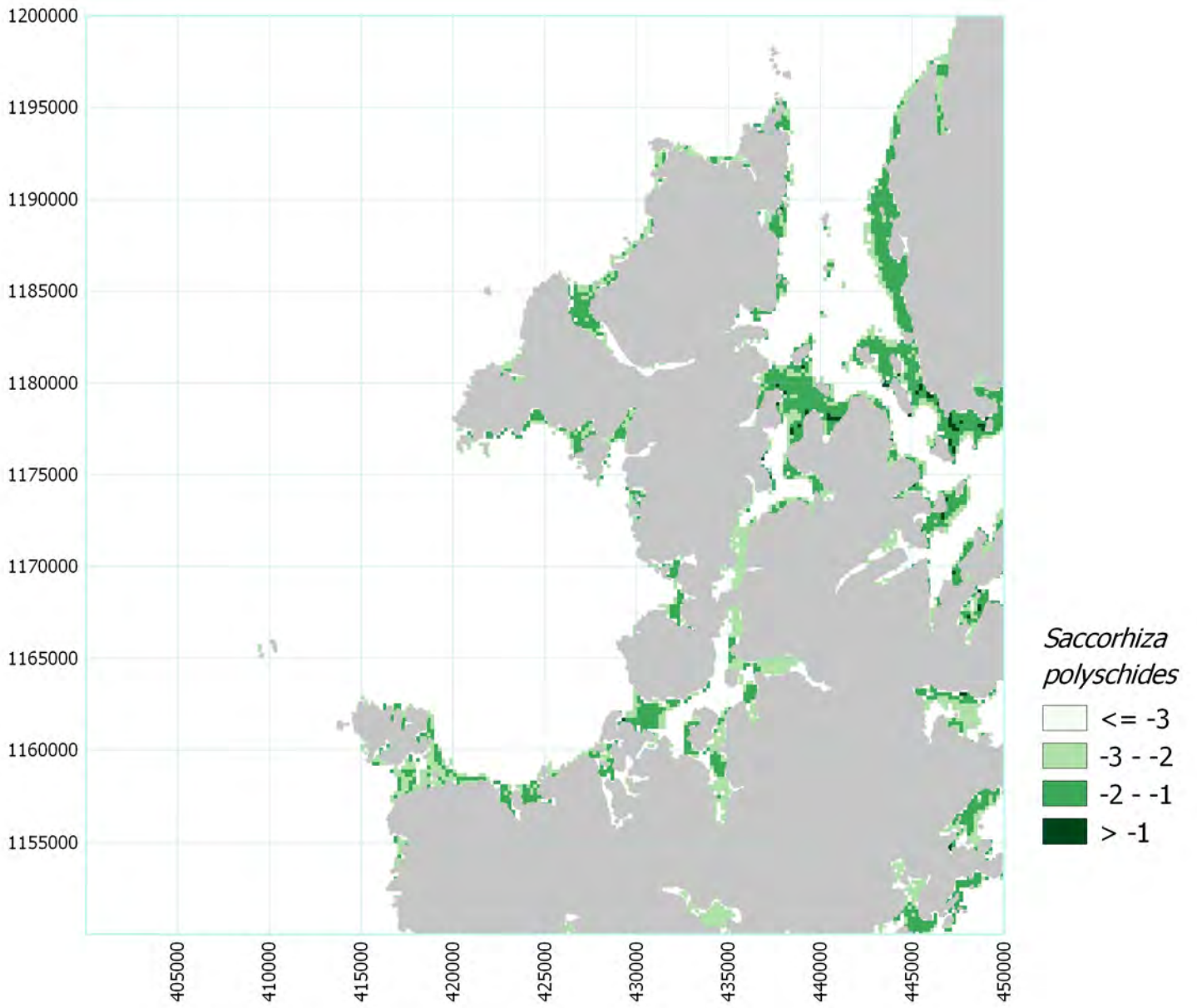
2.4 *Saccorhiza polyschides*

The following pages show the habitat suitability for *Saccorhiza polyschides*.

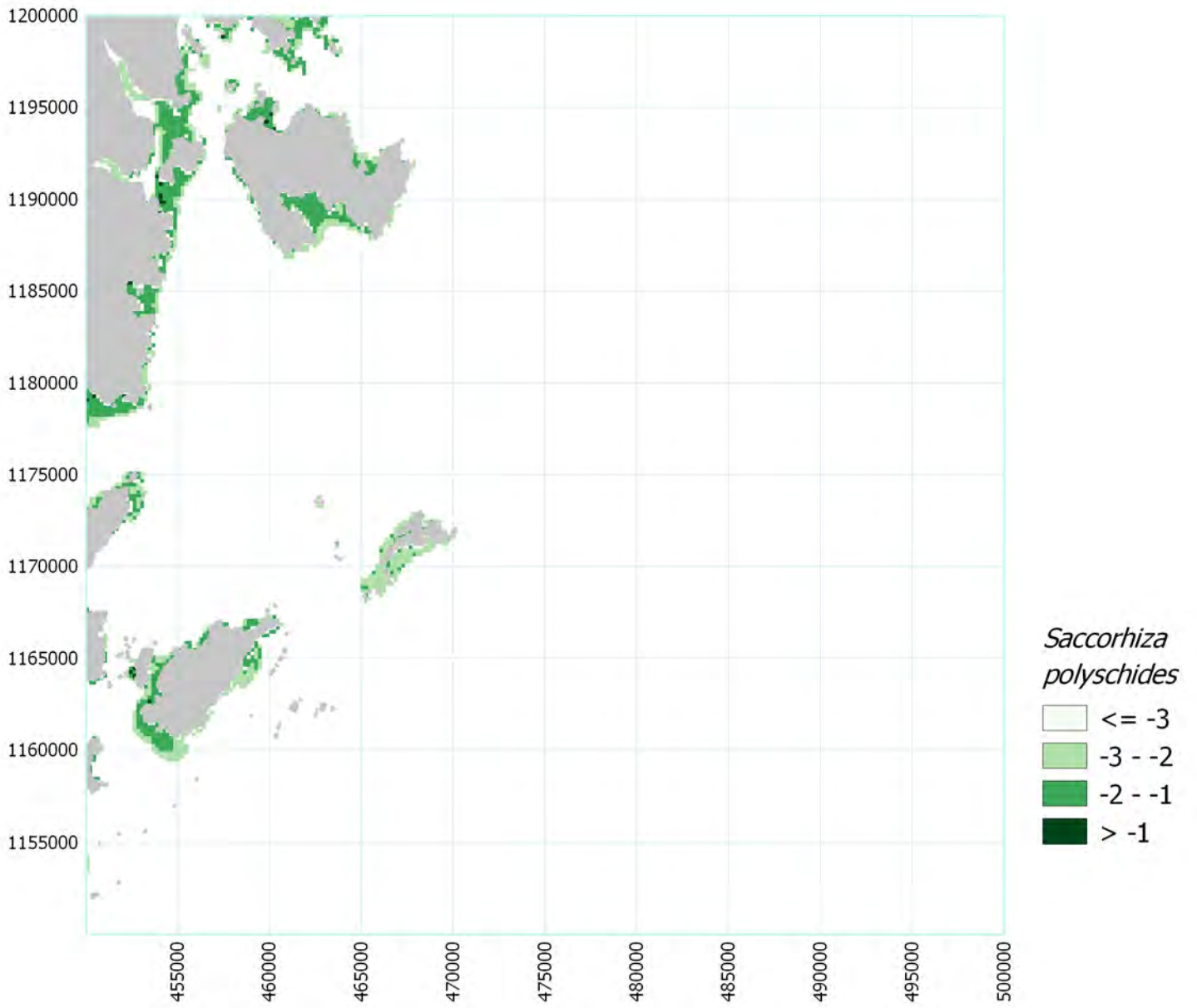
Map 1



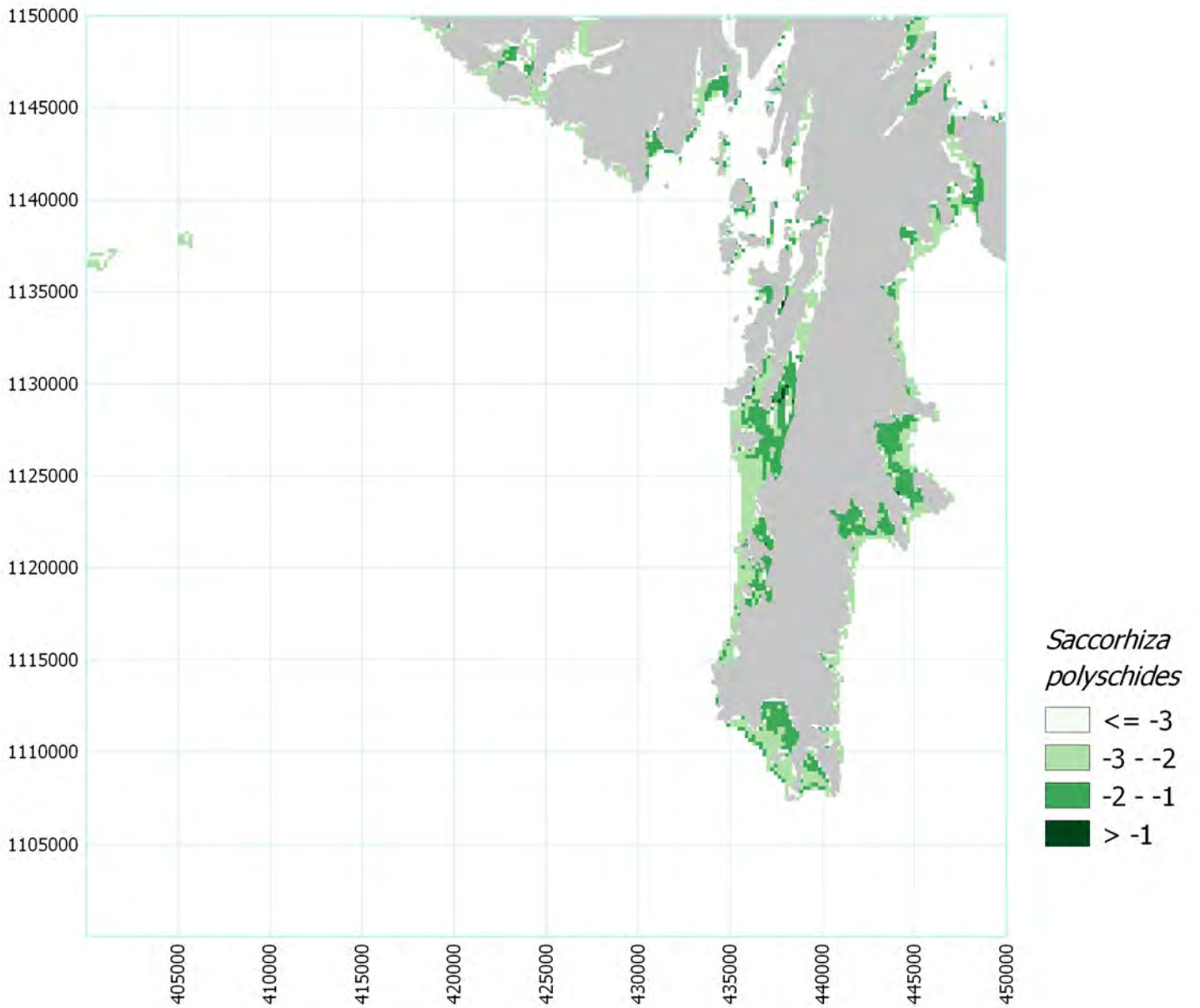
Map 2



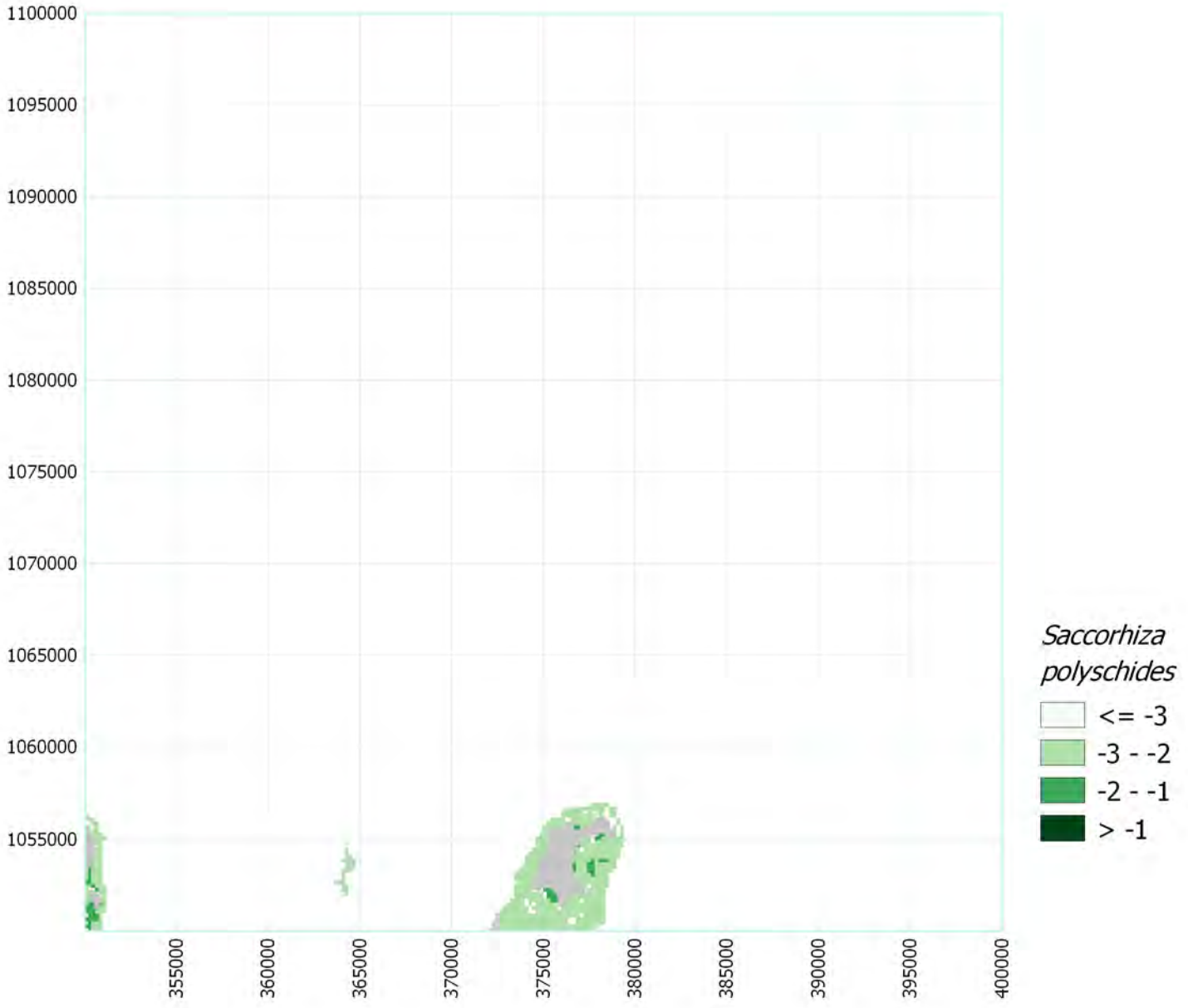
Map 3



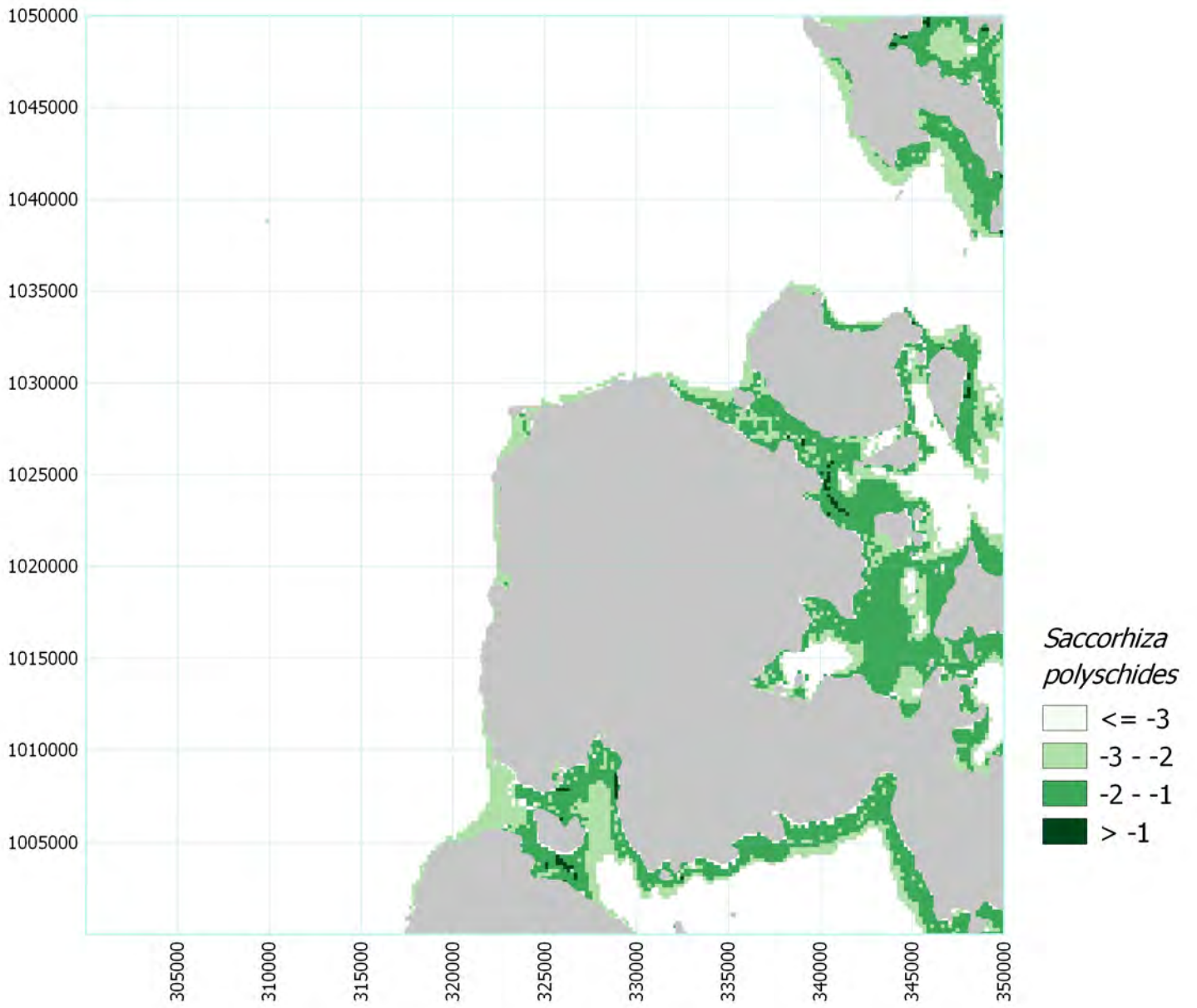
Map 4



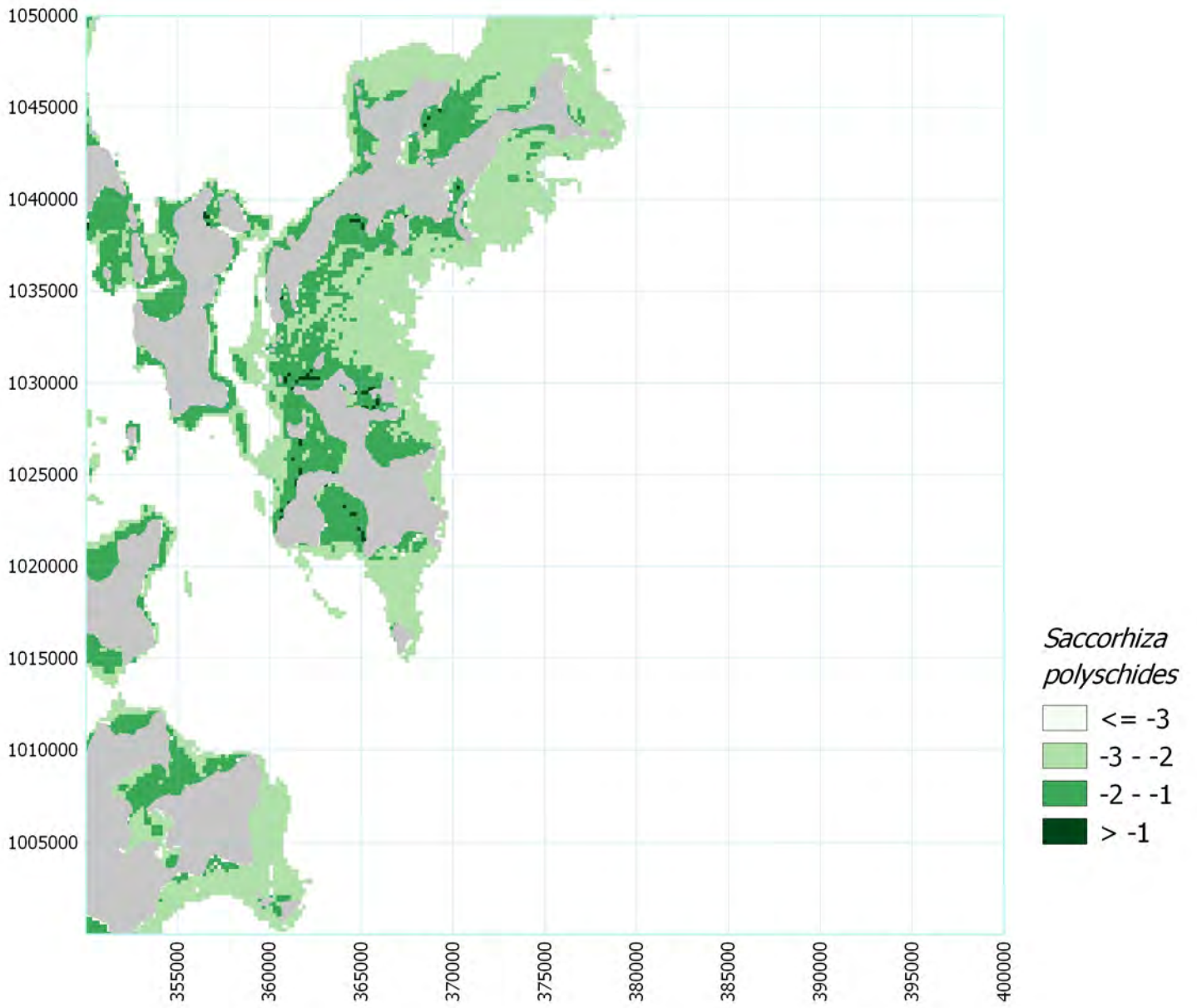
Map 5



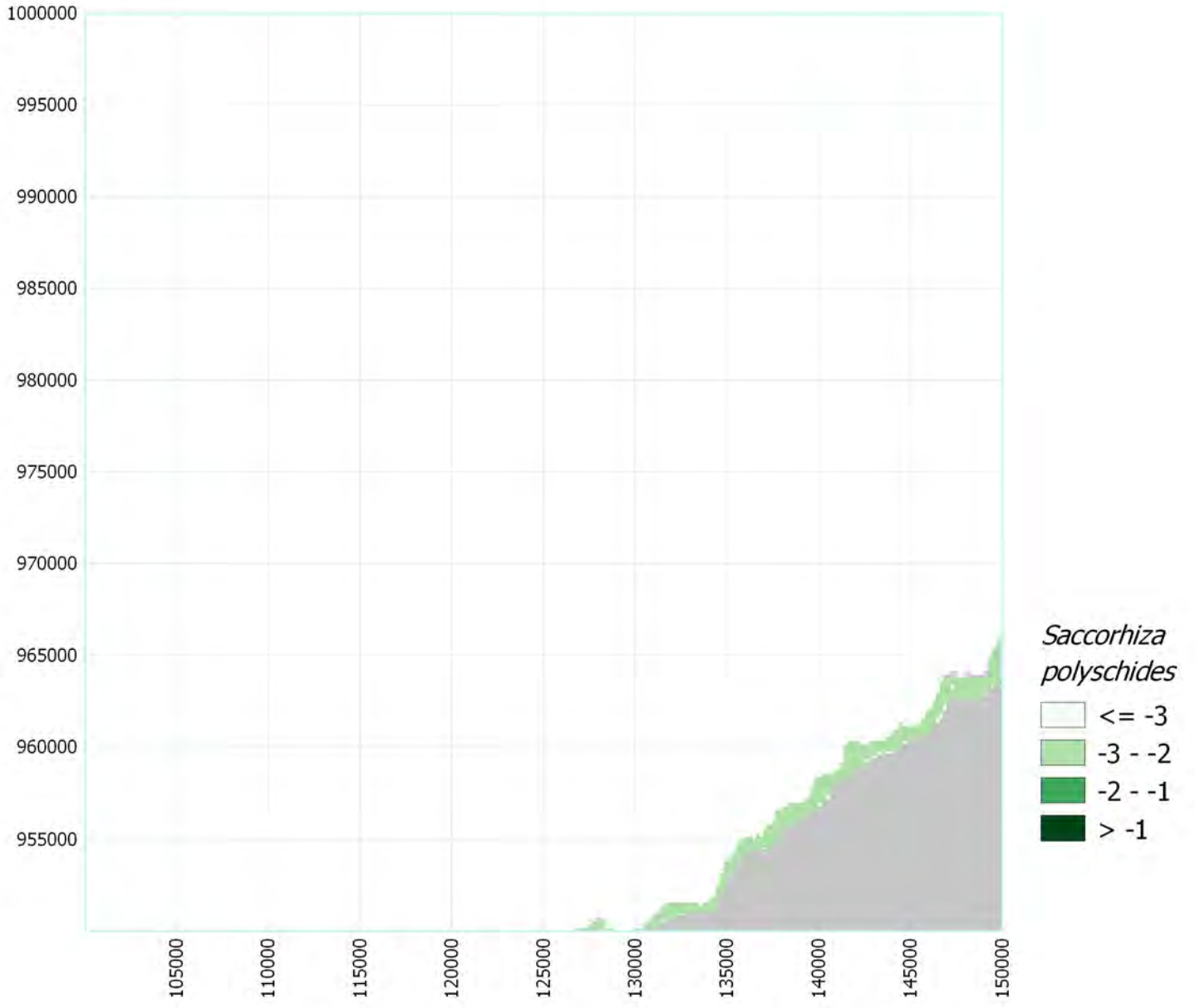
Map 6



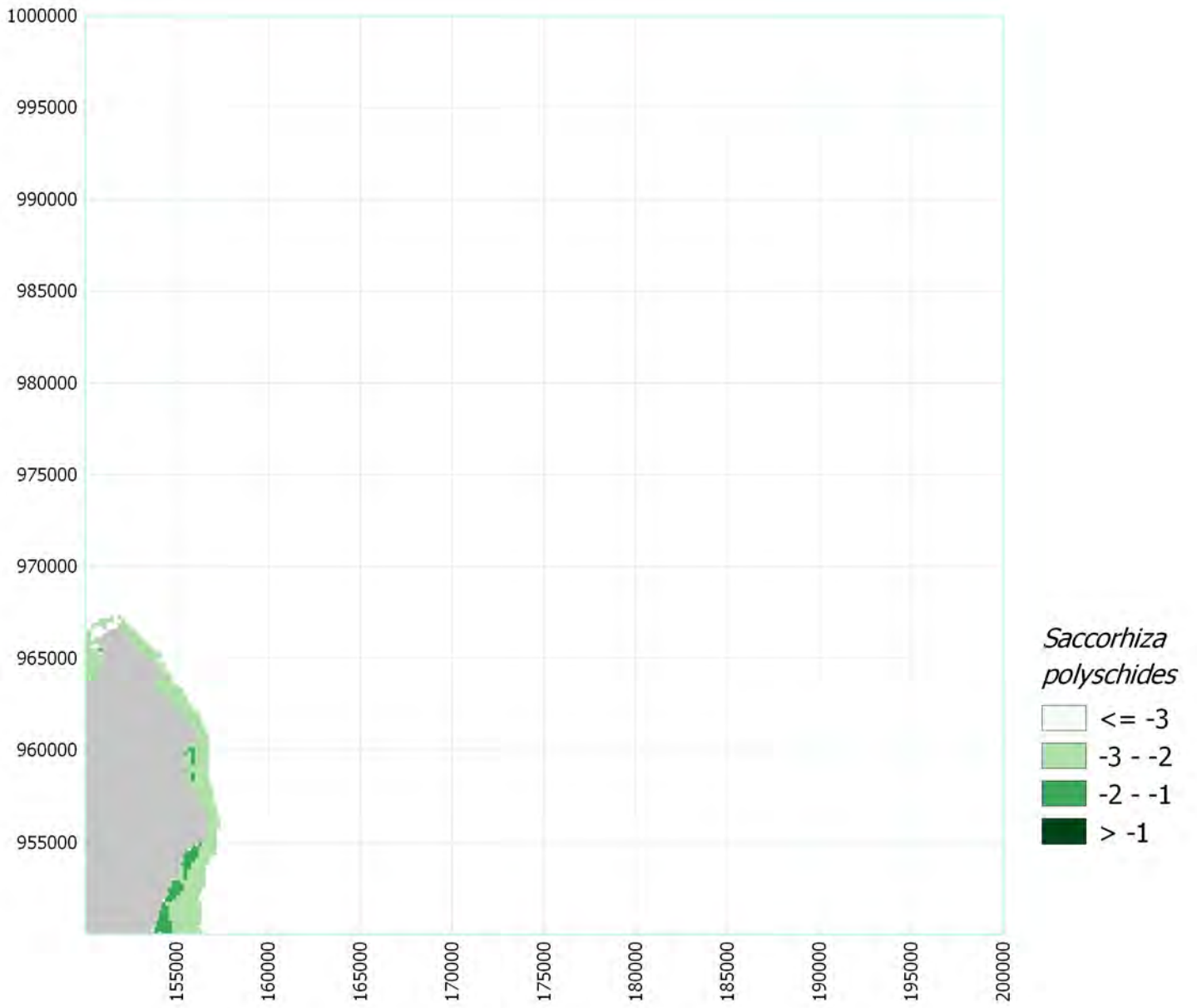
Map 7



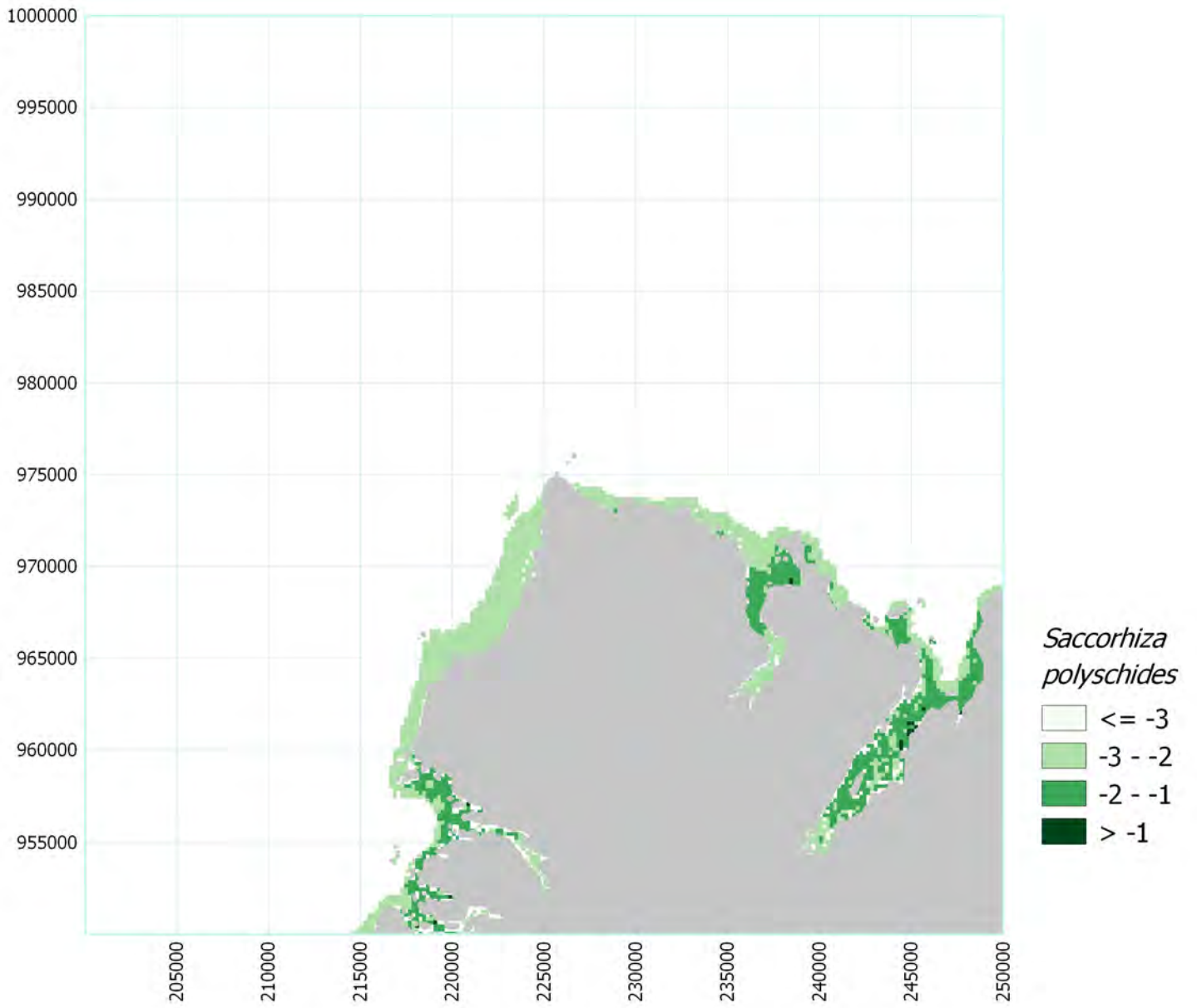
Map 8



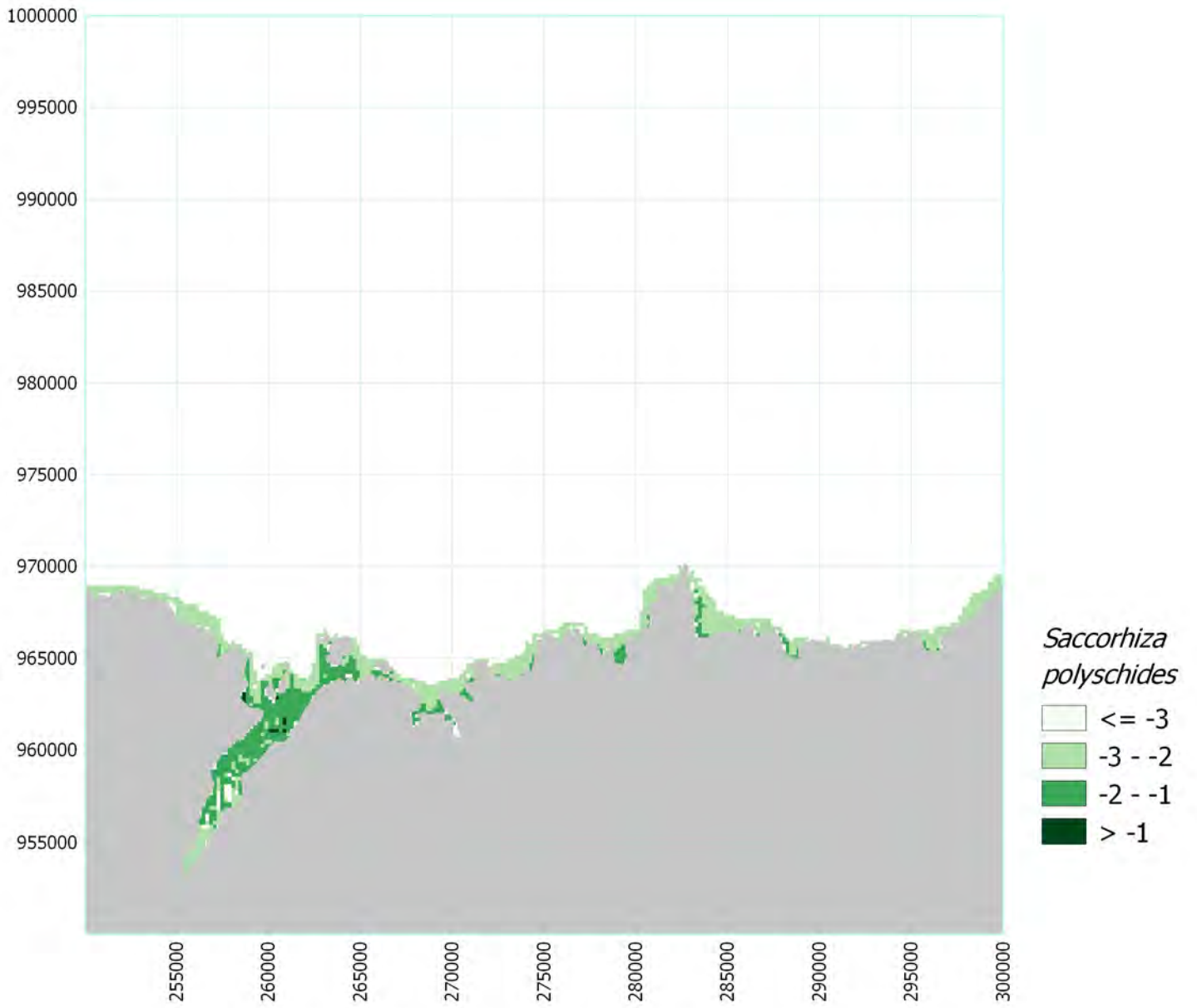
Map 9



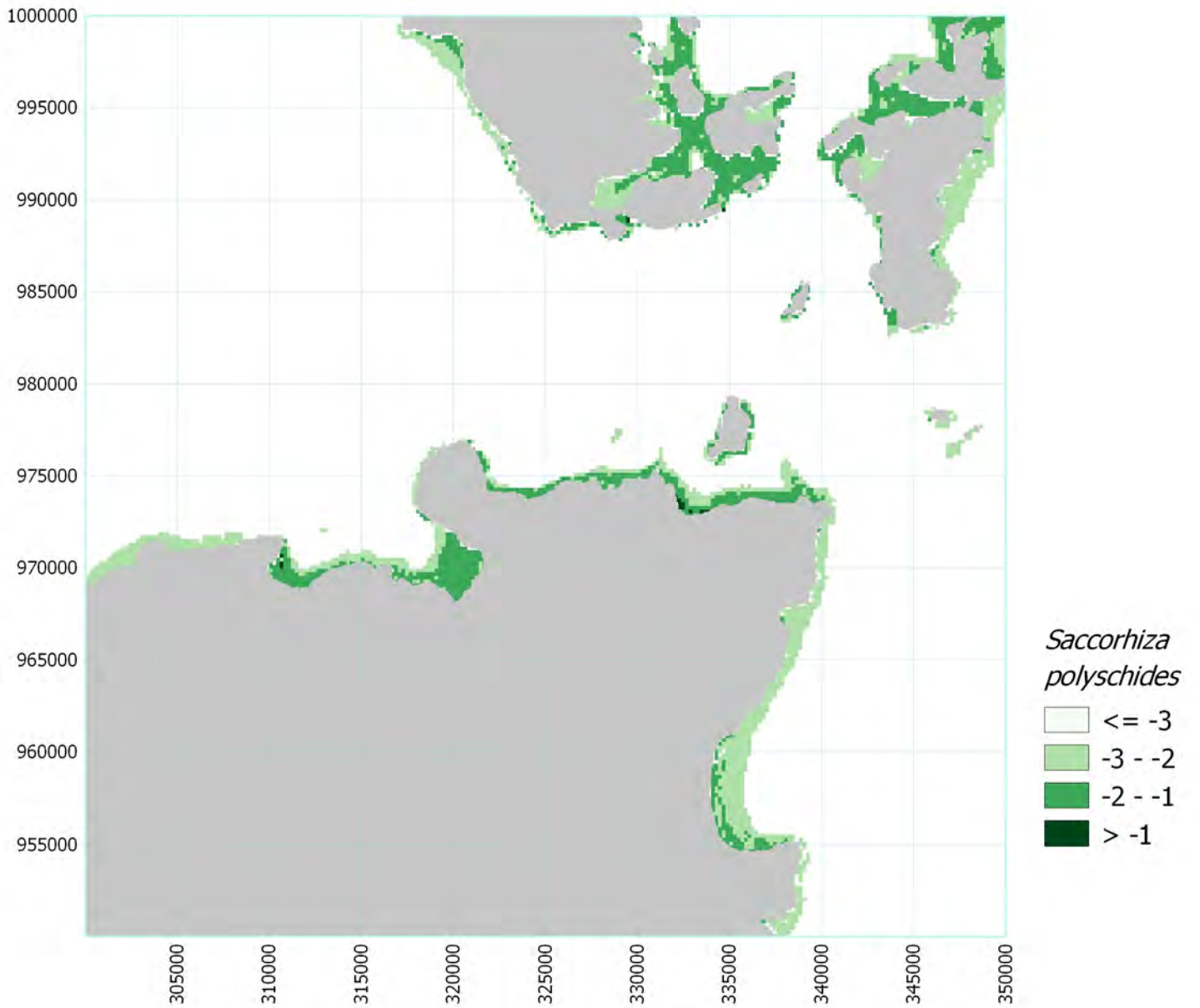
Map 10



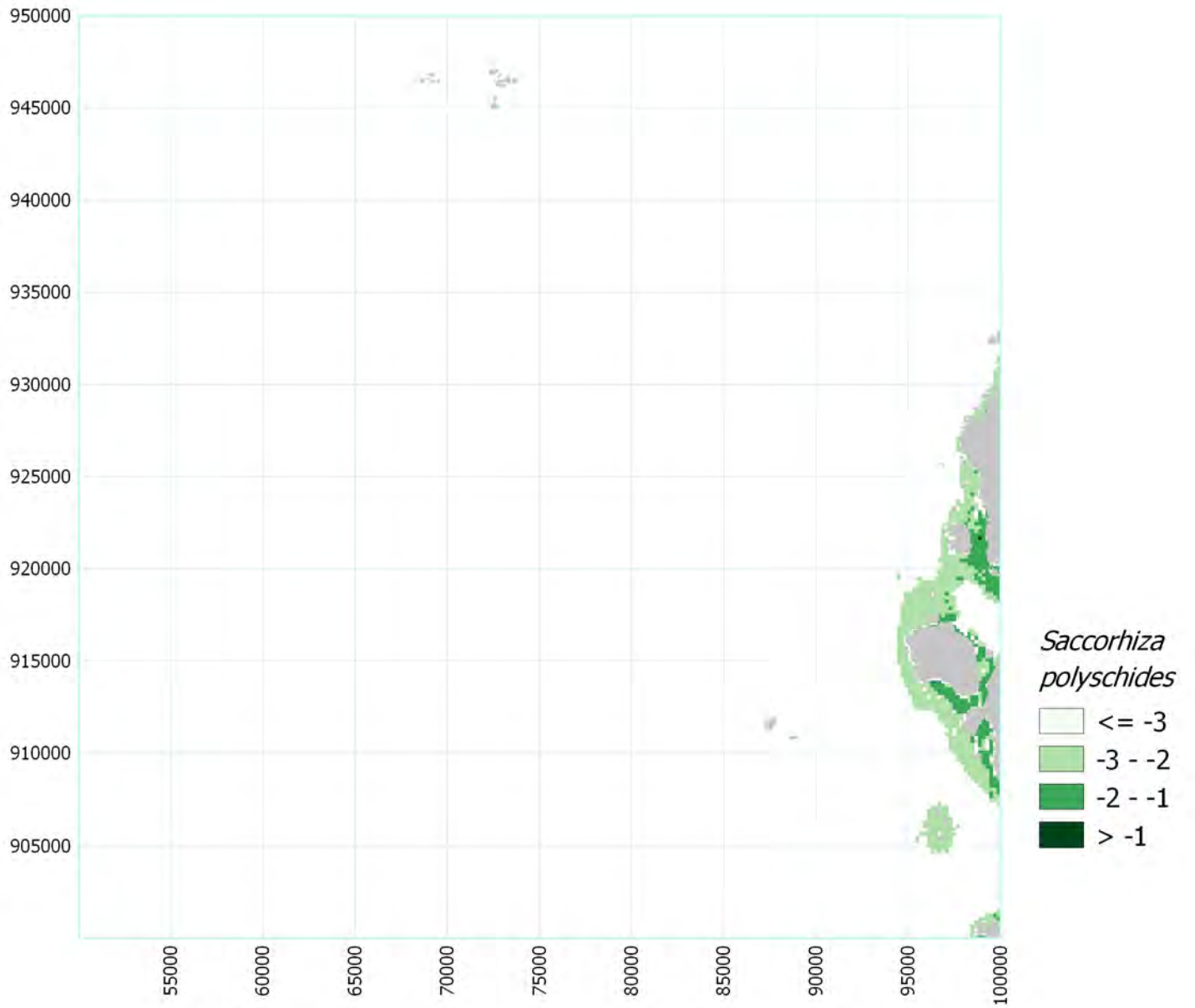
Map 11



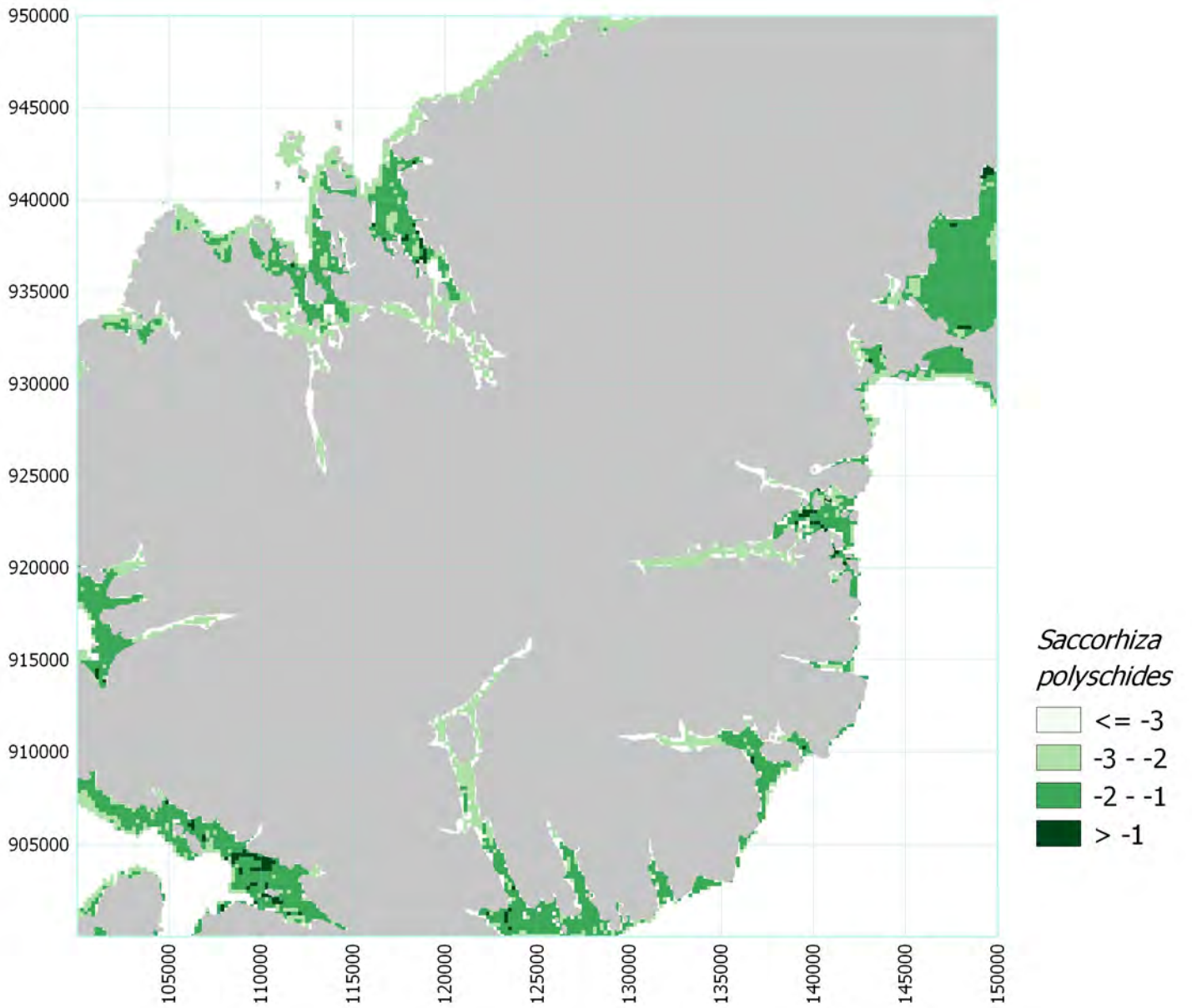
Map 12



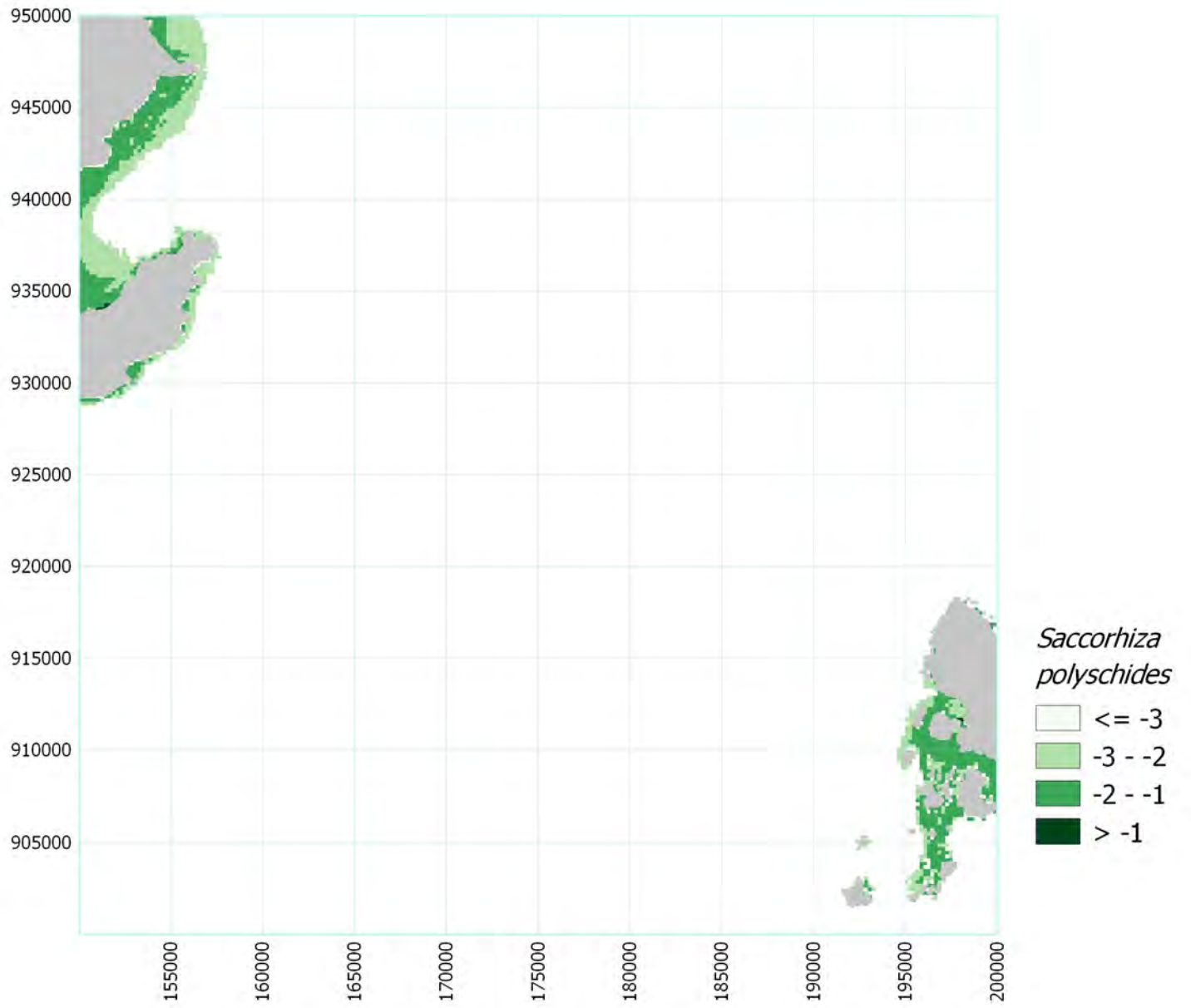
Map 13



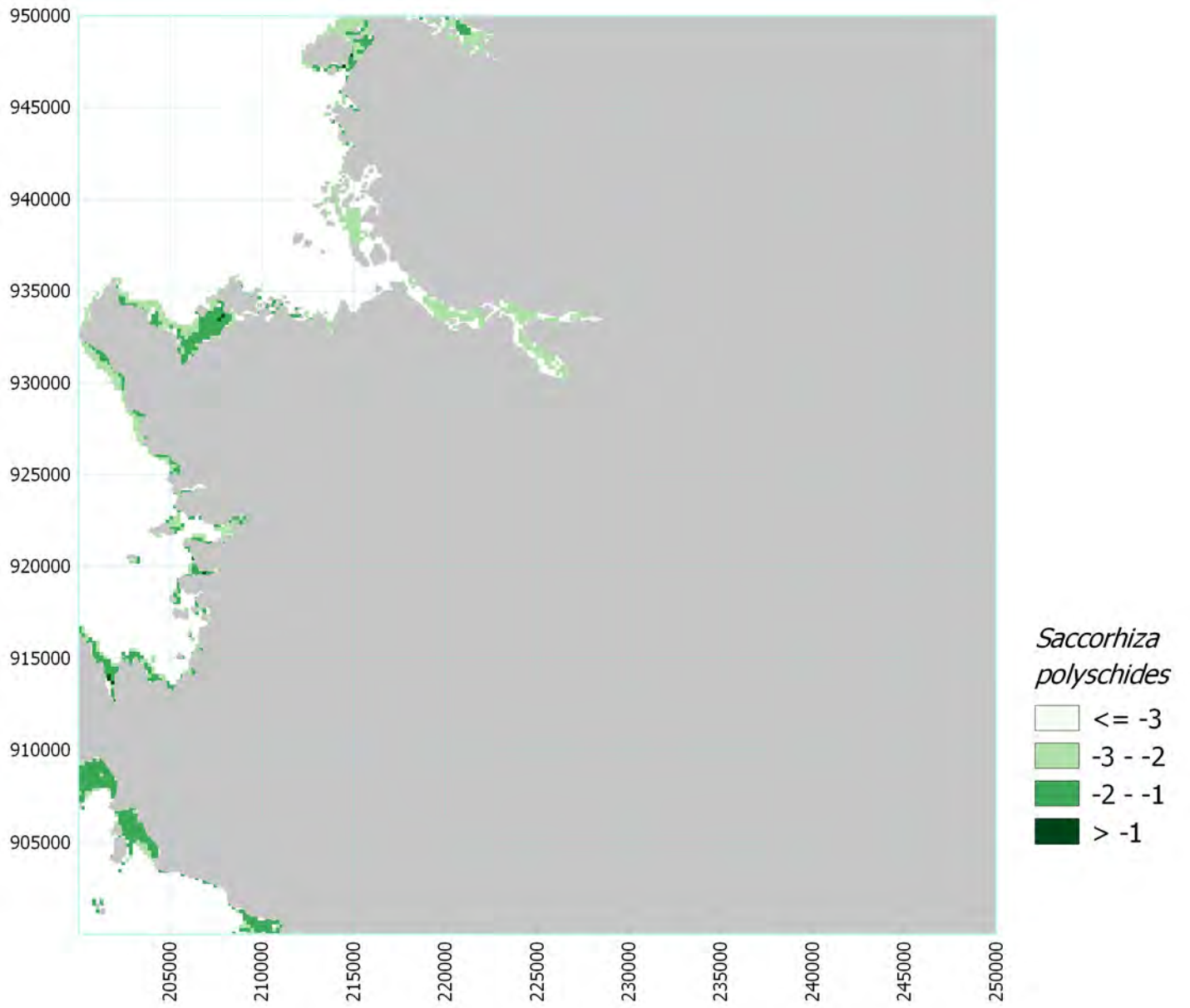
Map 14



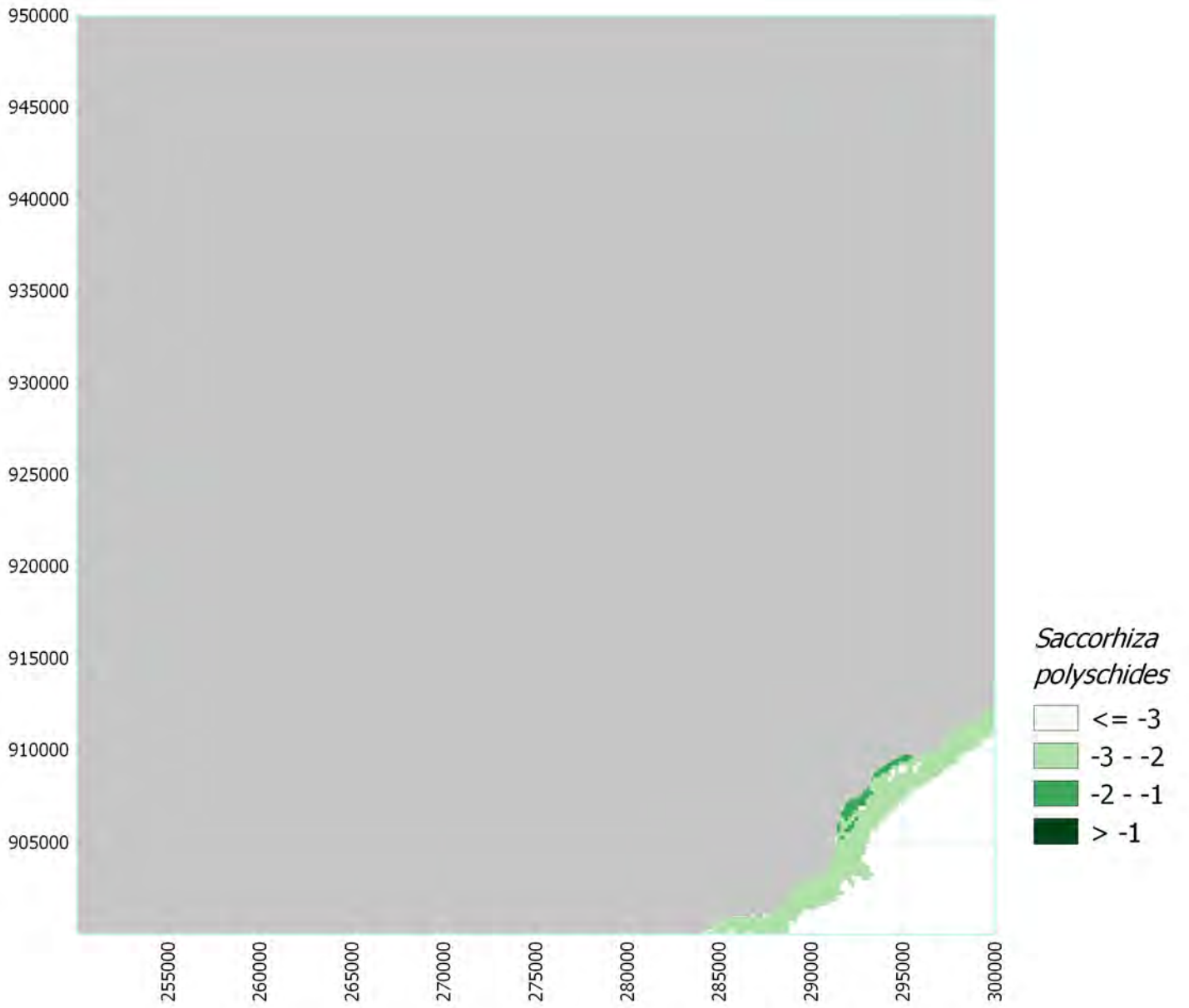
Map 15



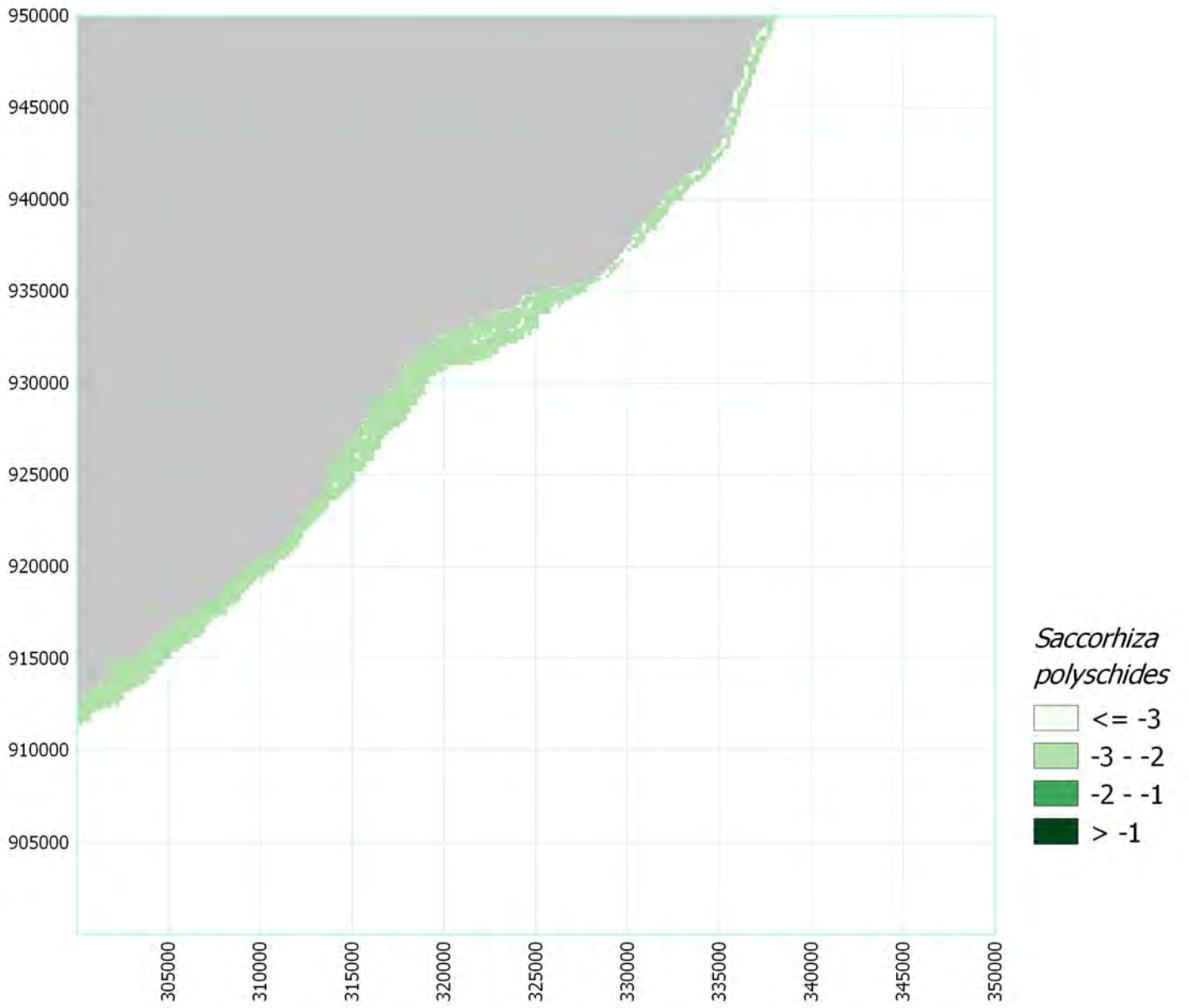
Map 16



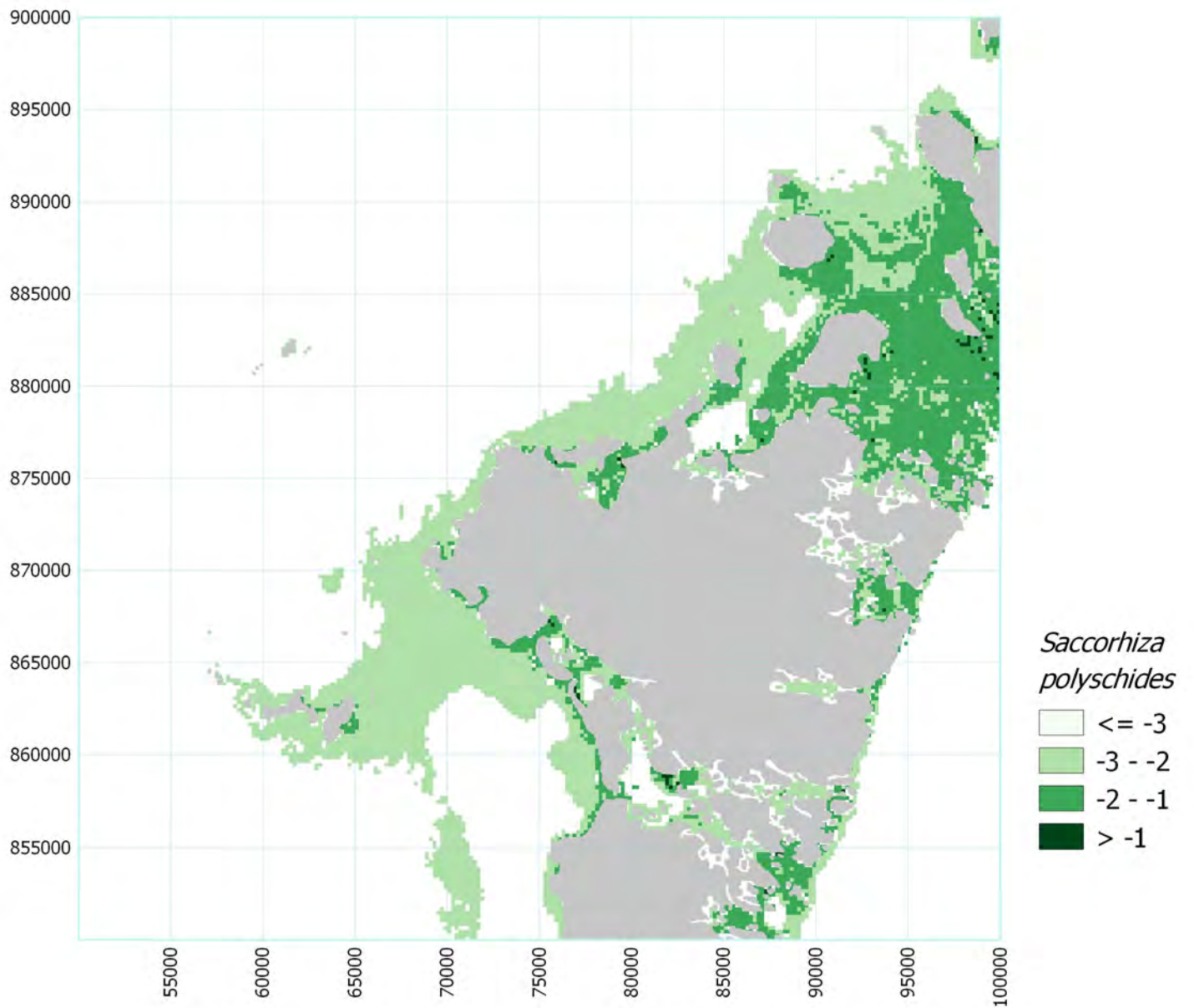
Map 17



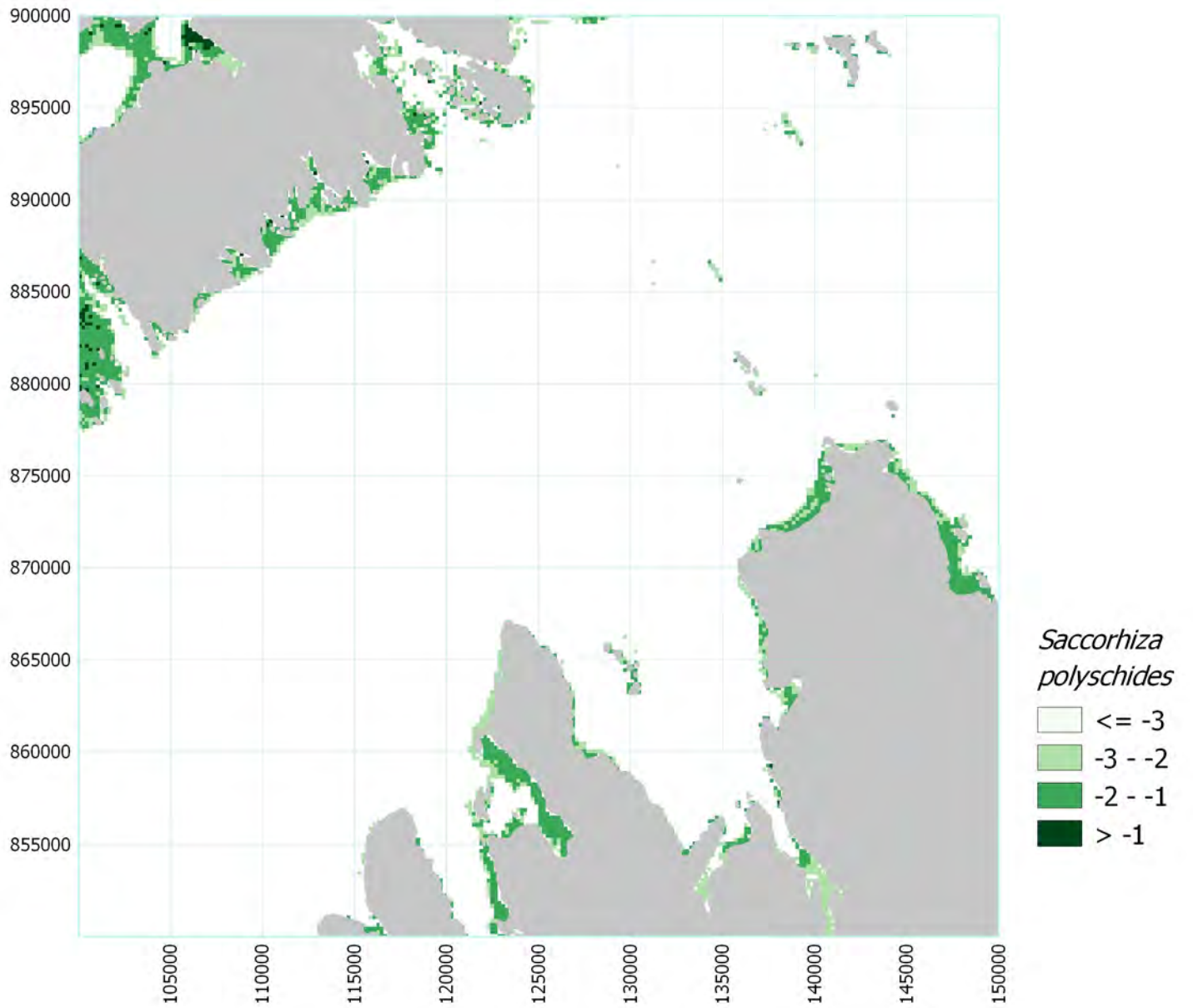
Map 18



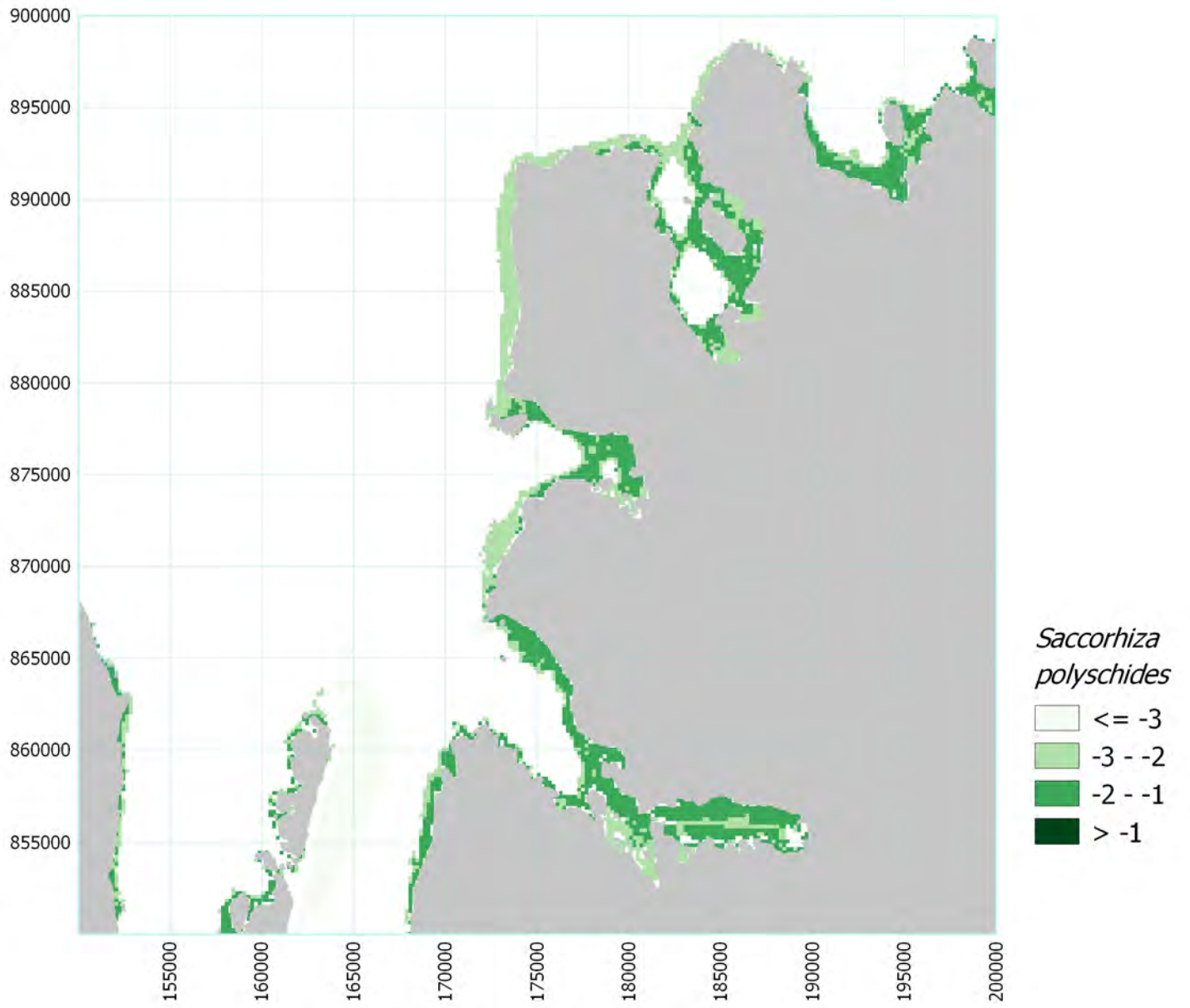
Map 19



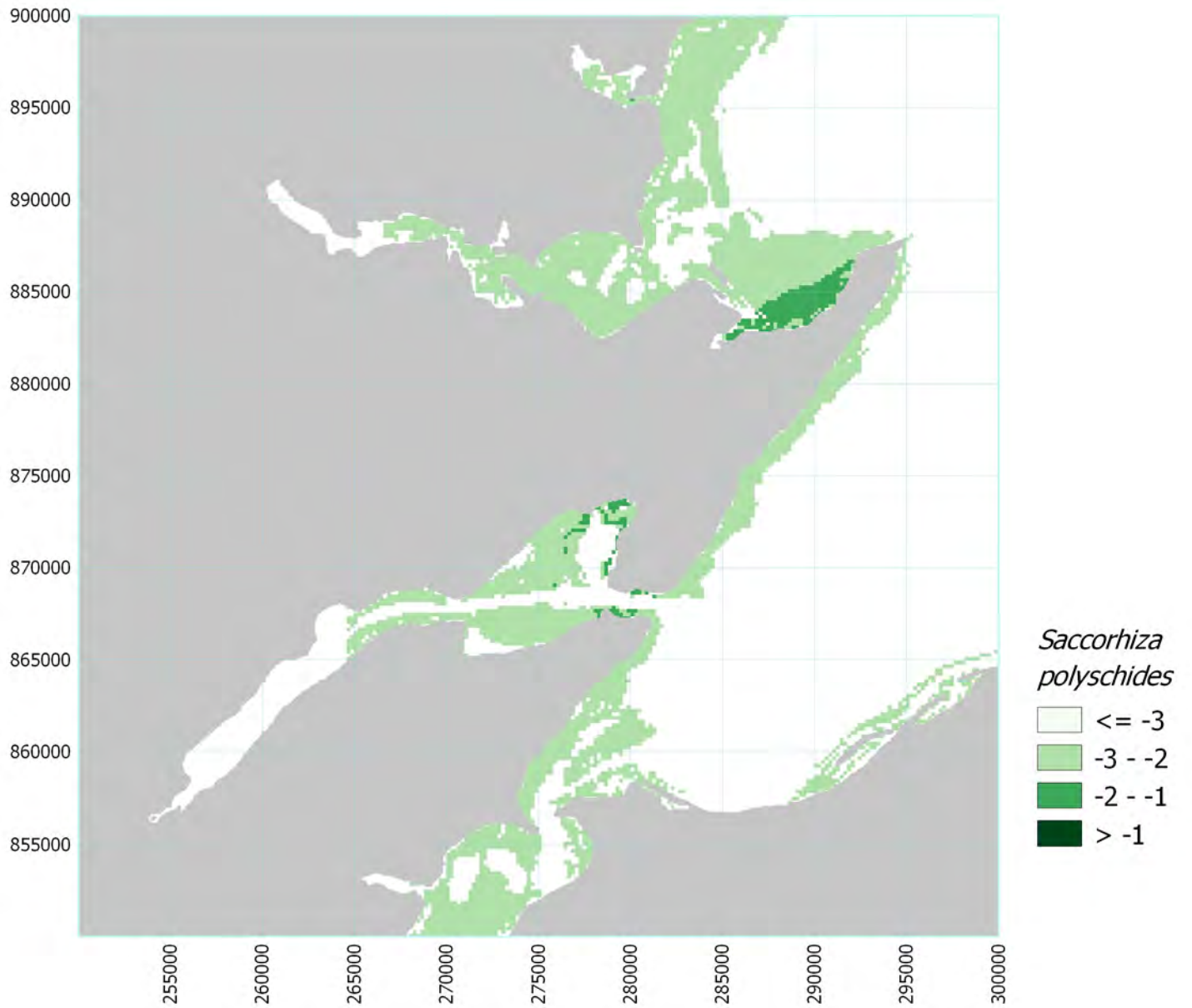
Map 20



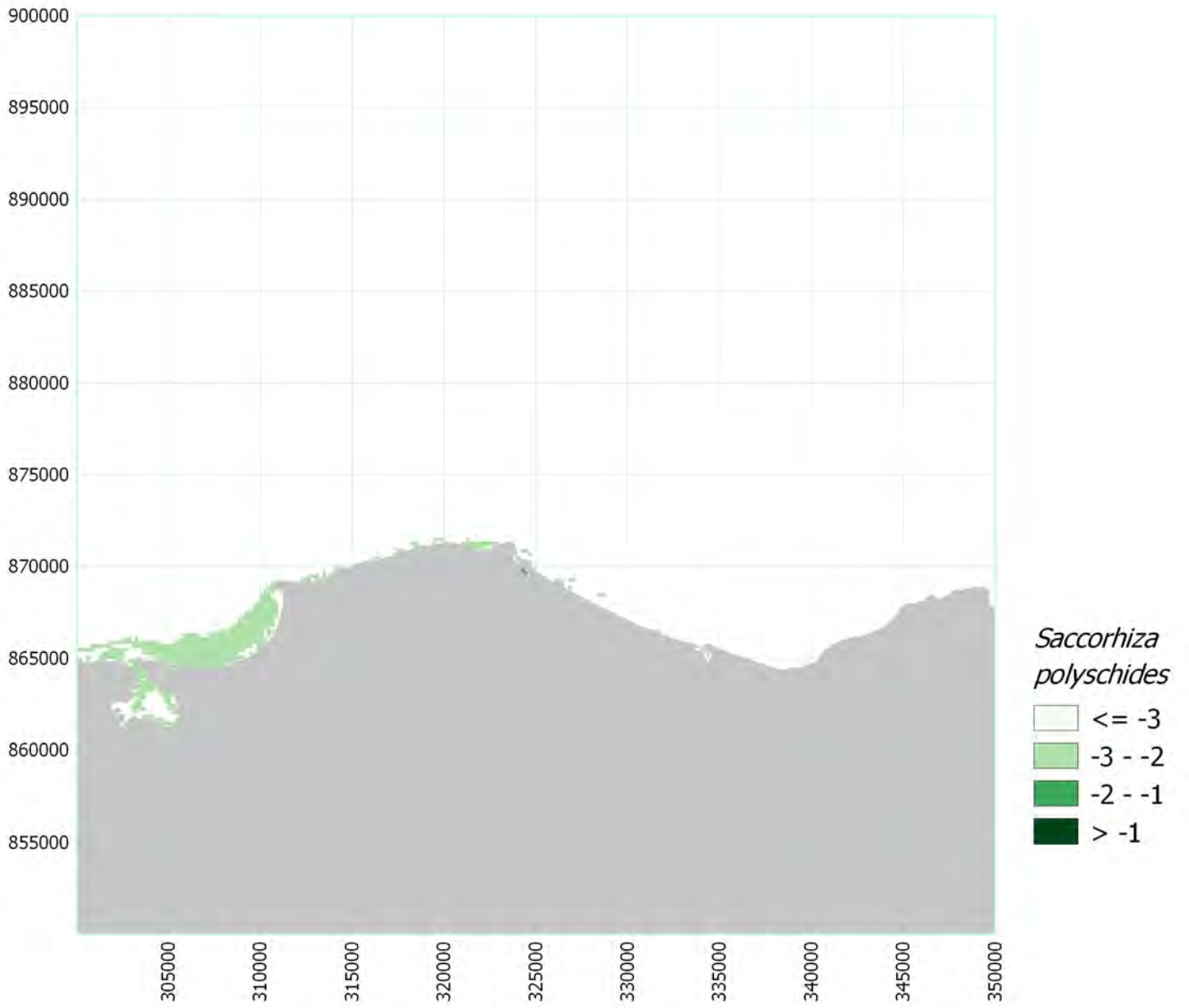
Map 21



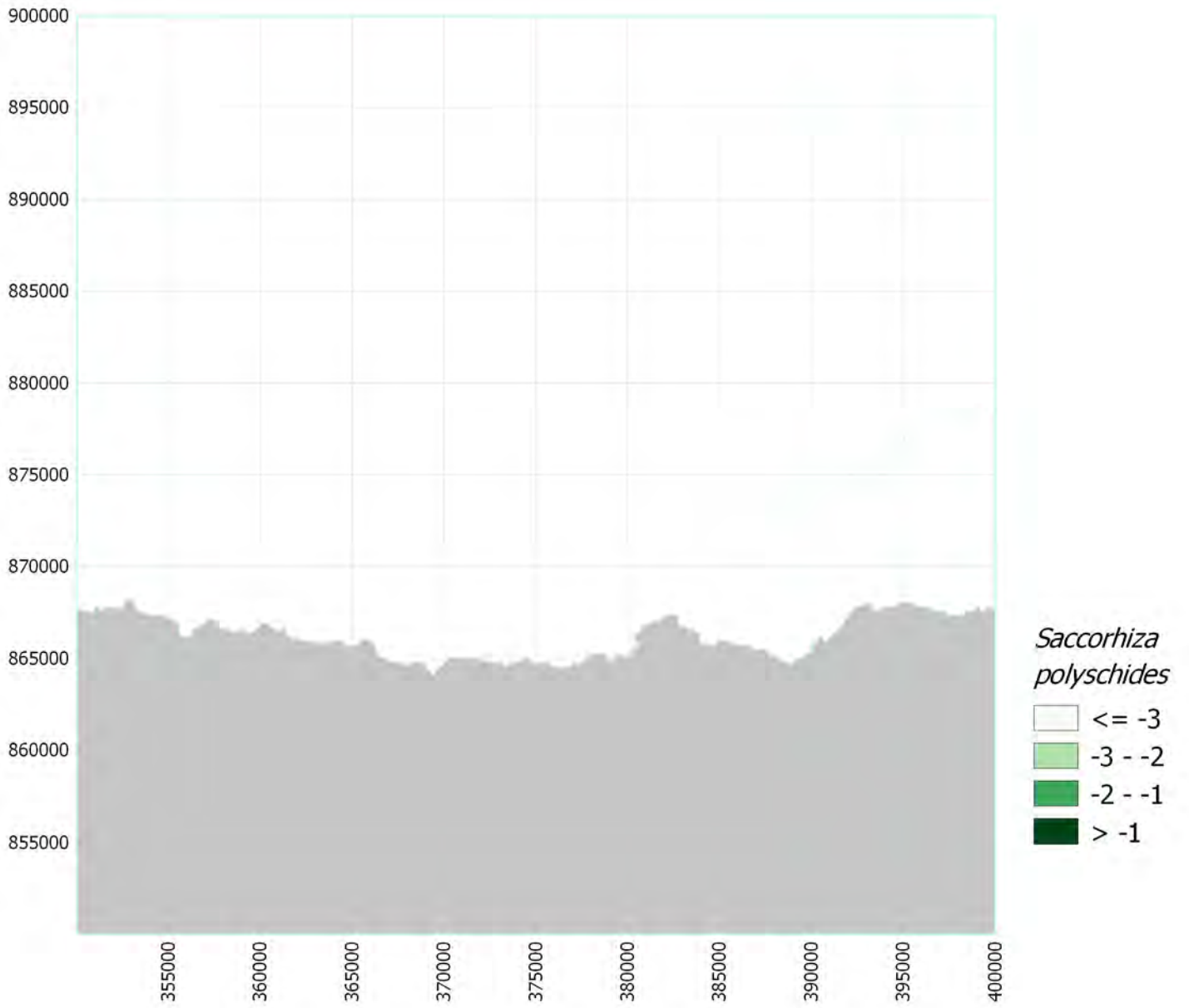
Map 22



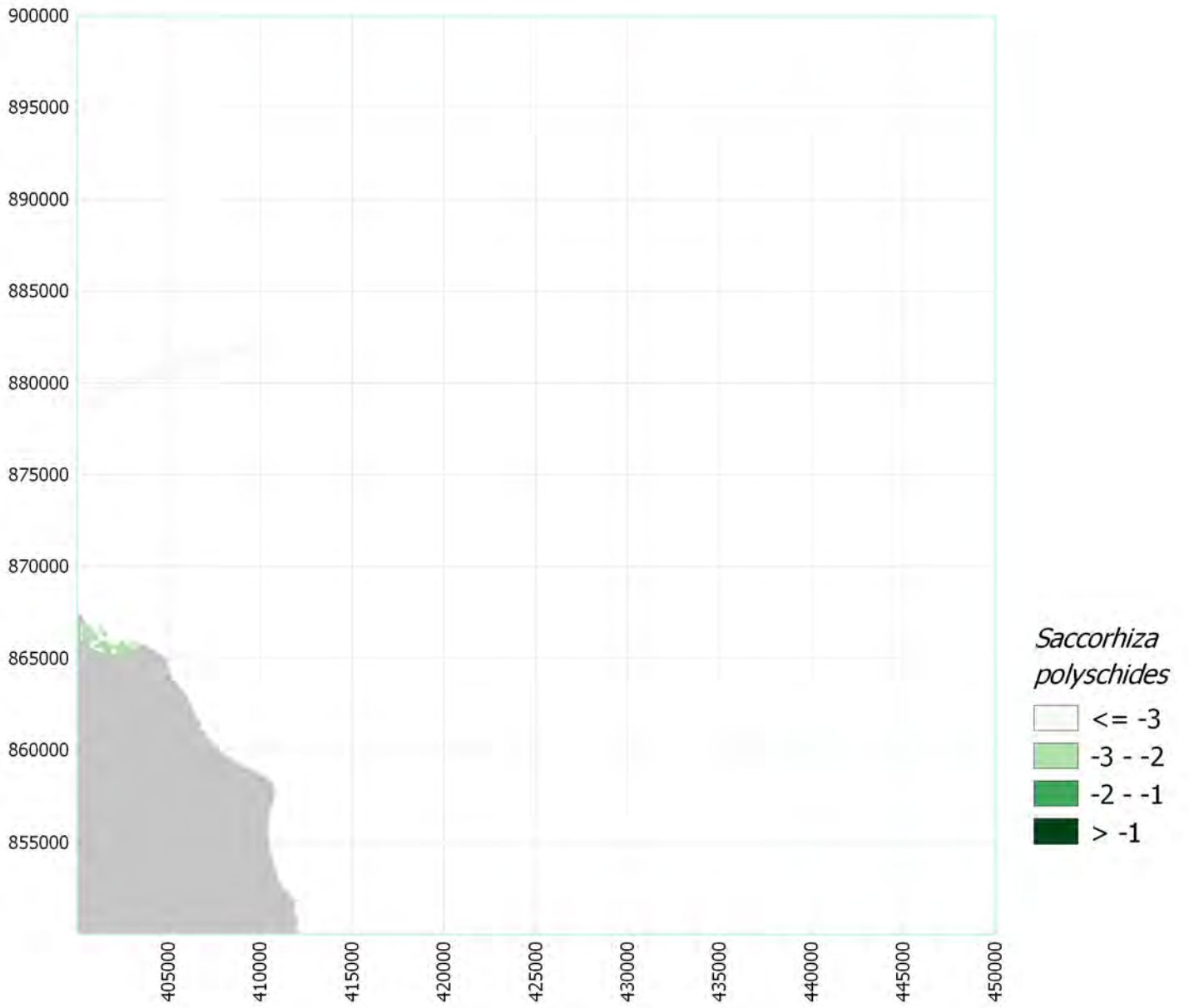
Map 23



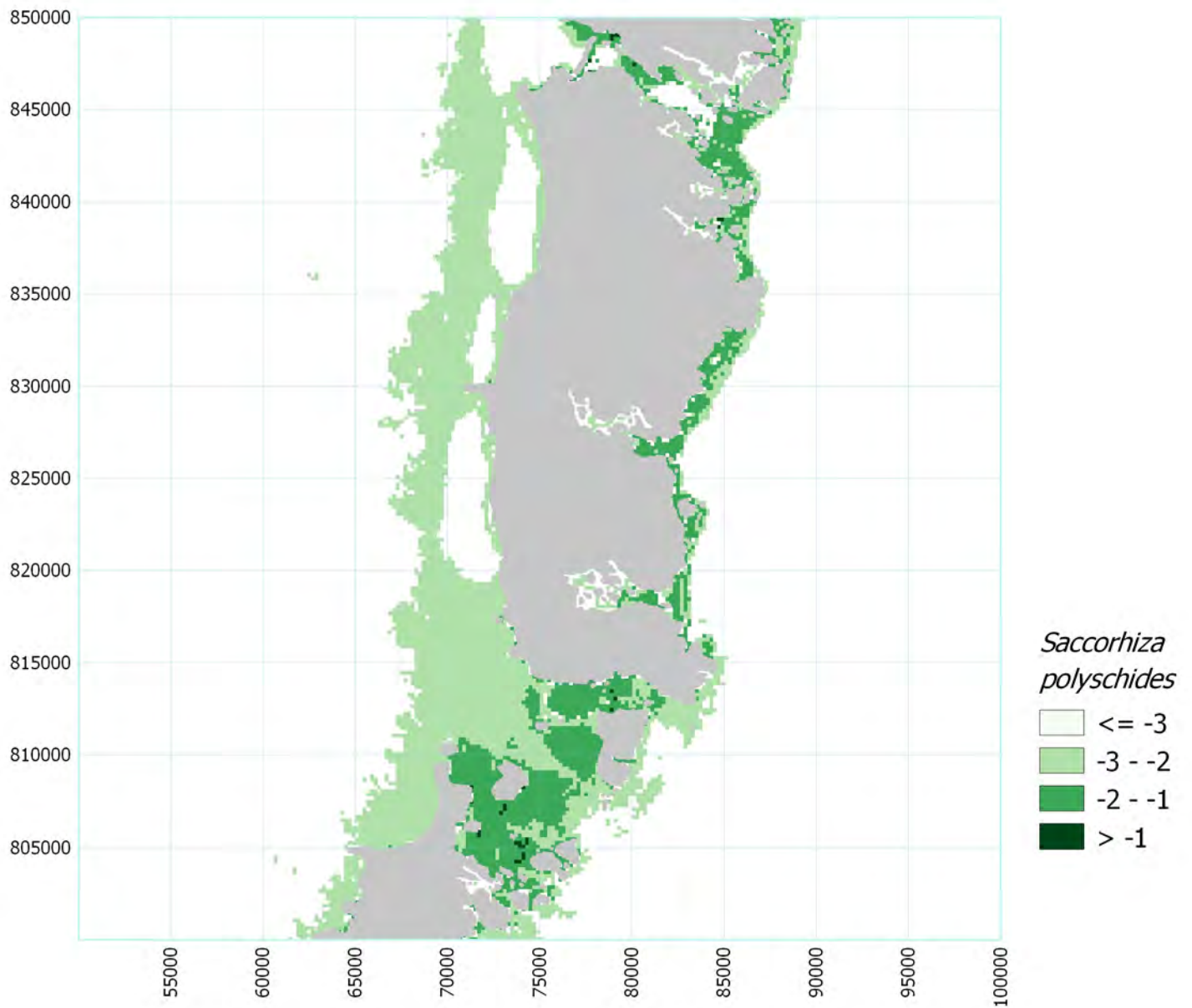
Map 24



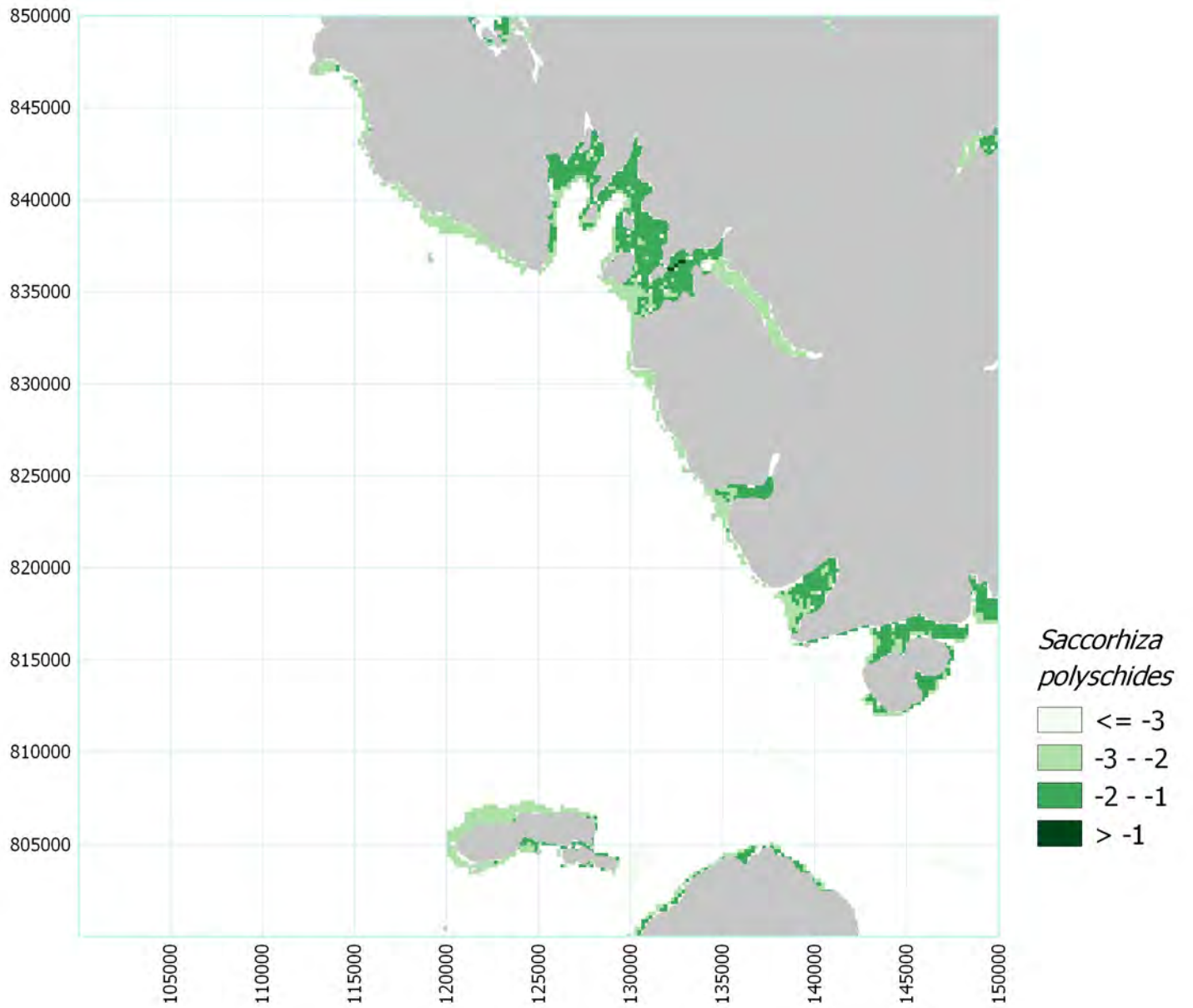
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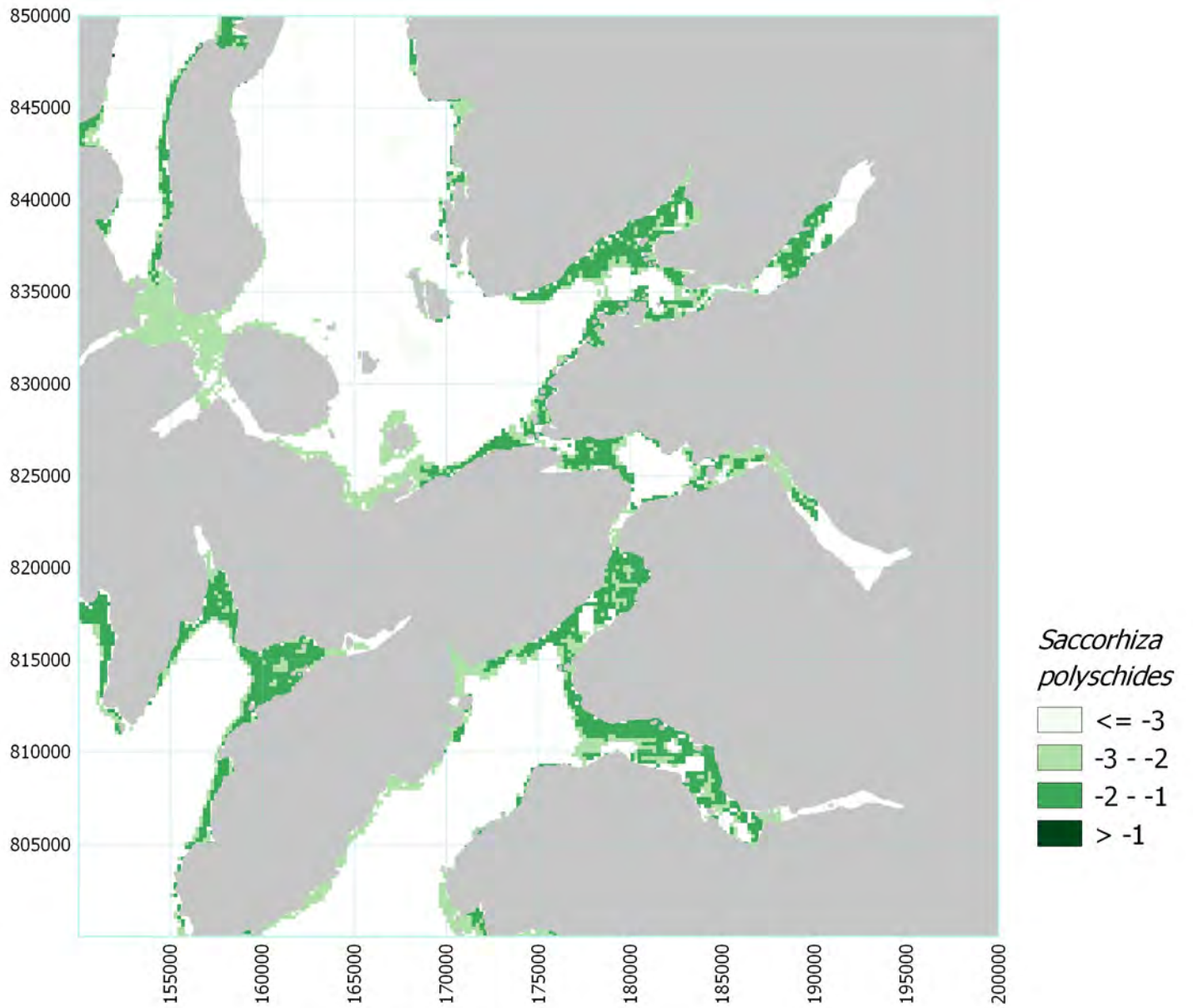
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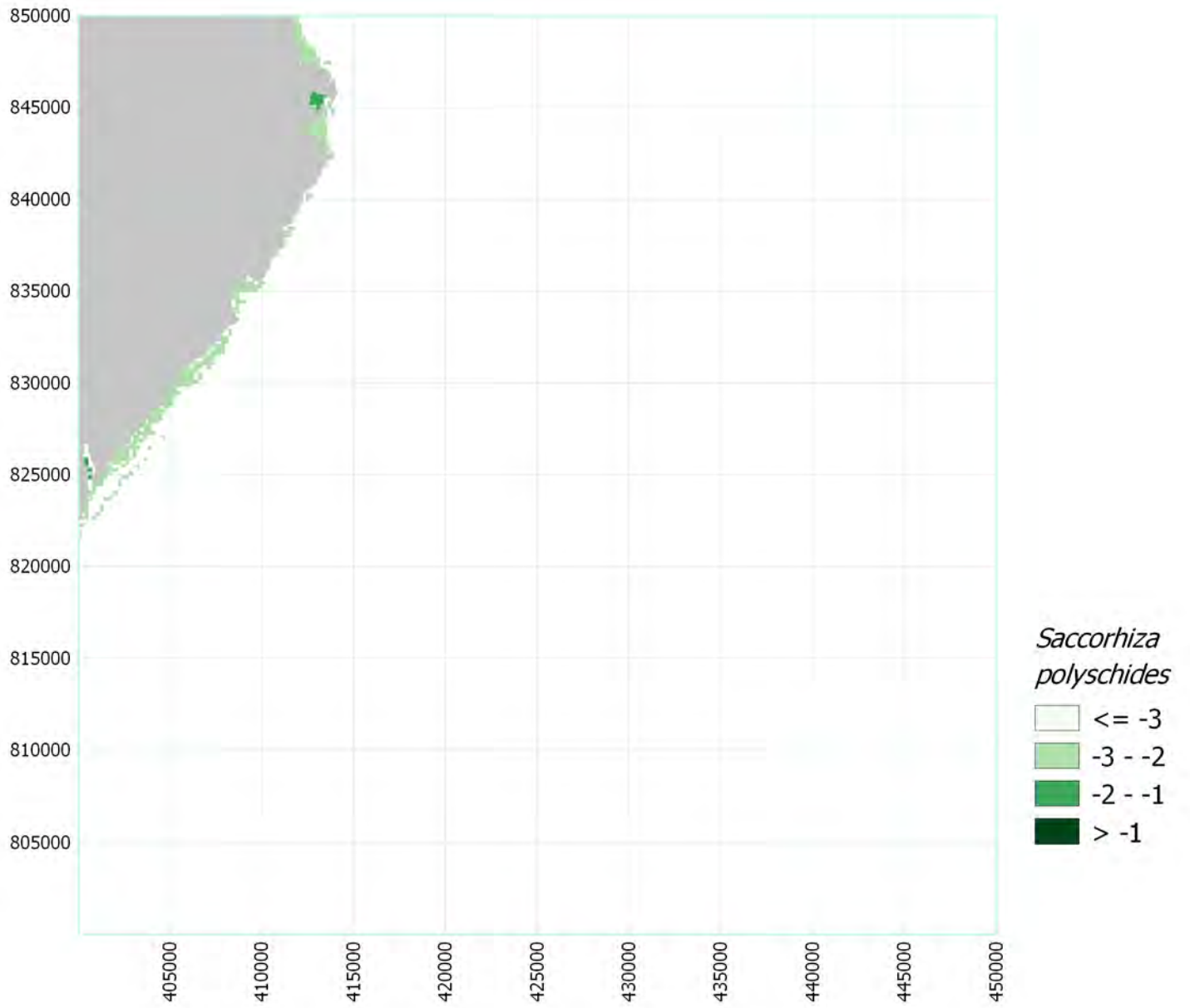
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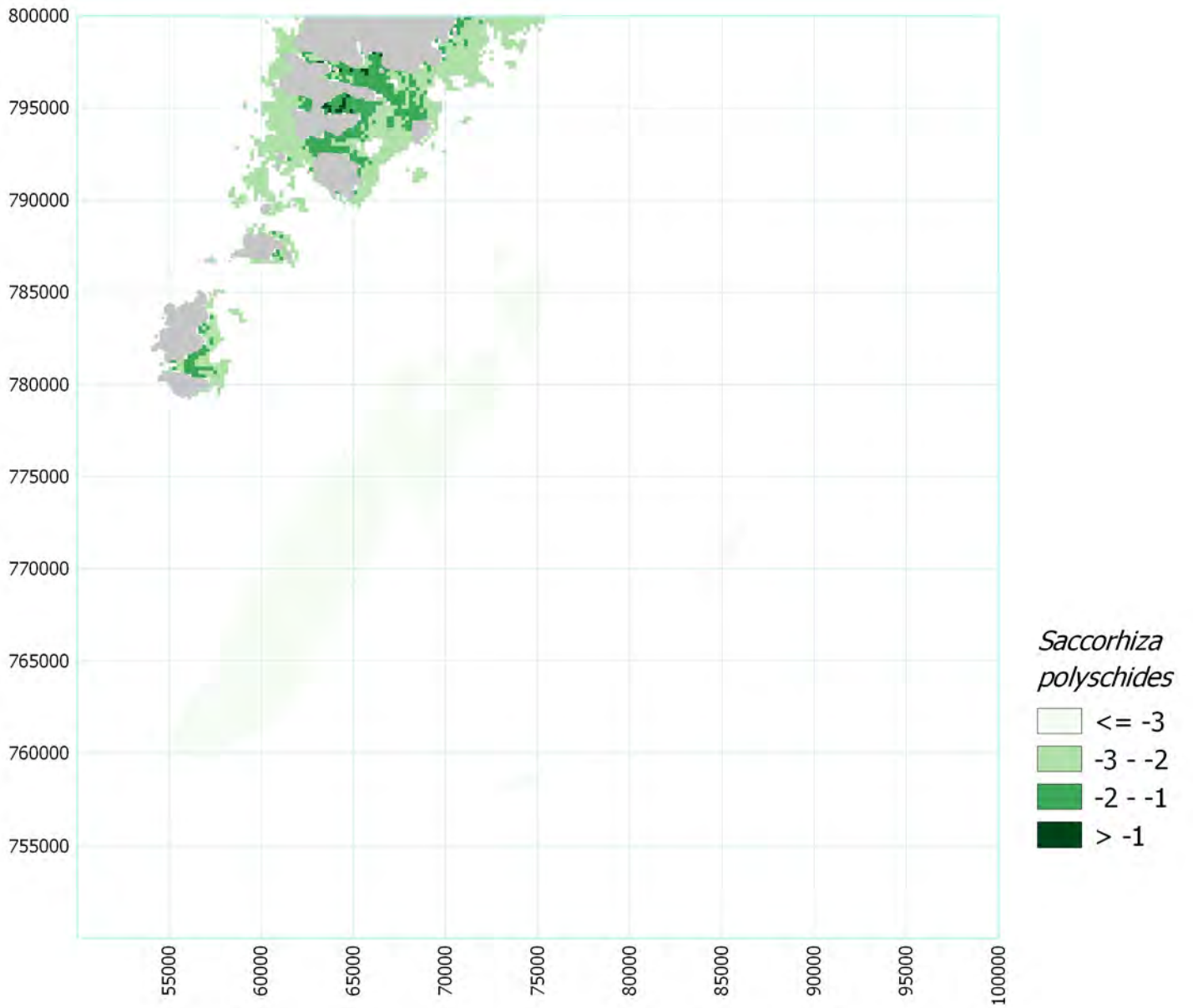
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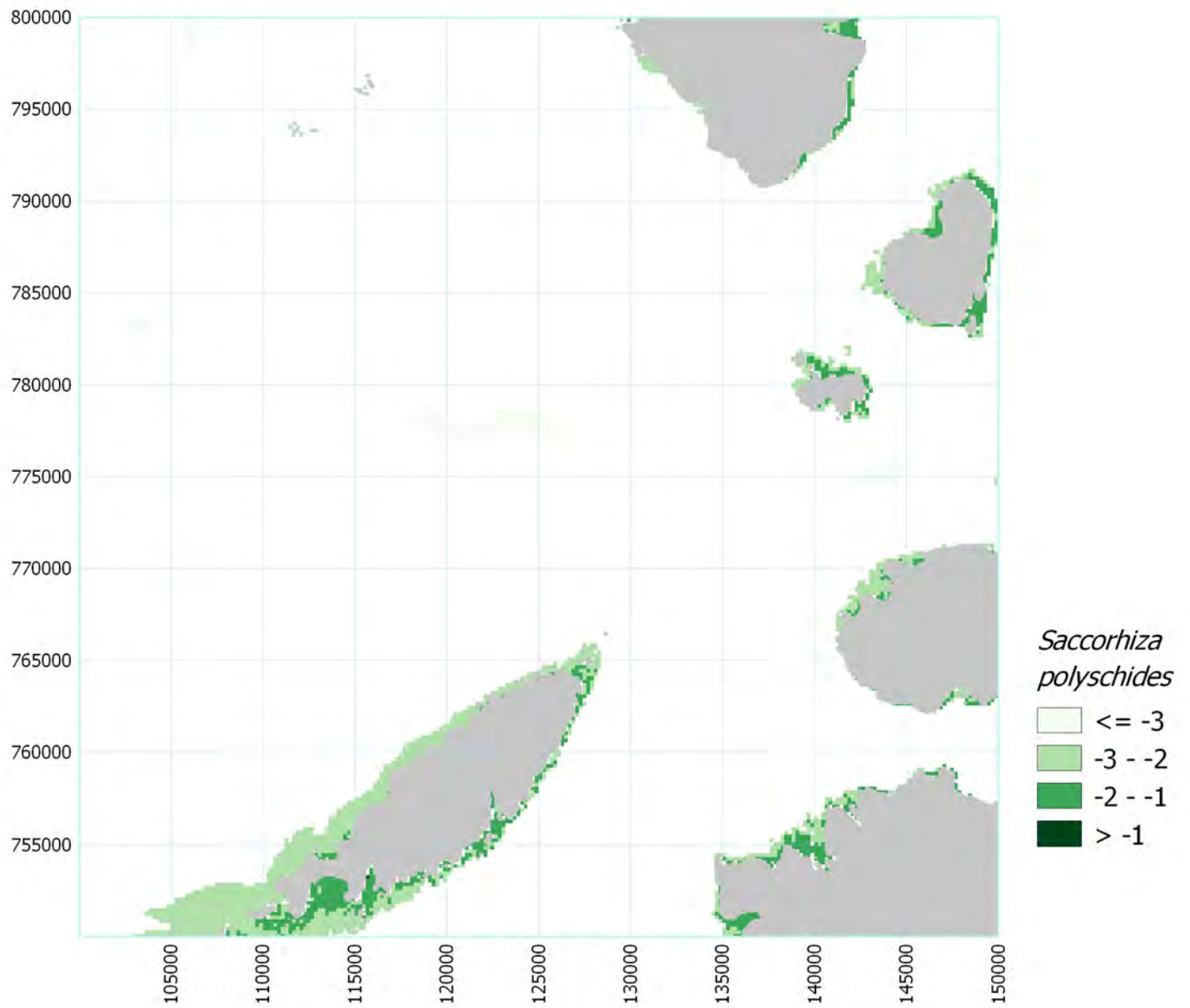
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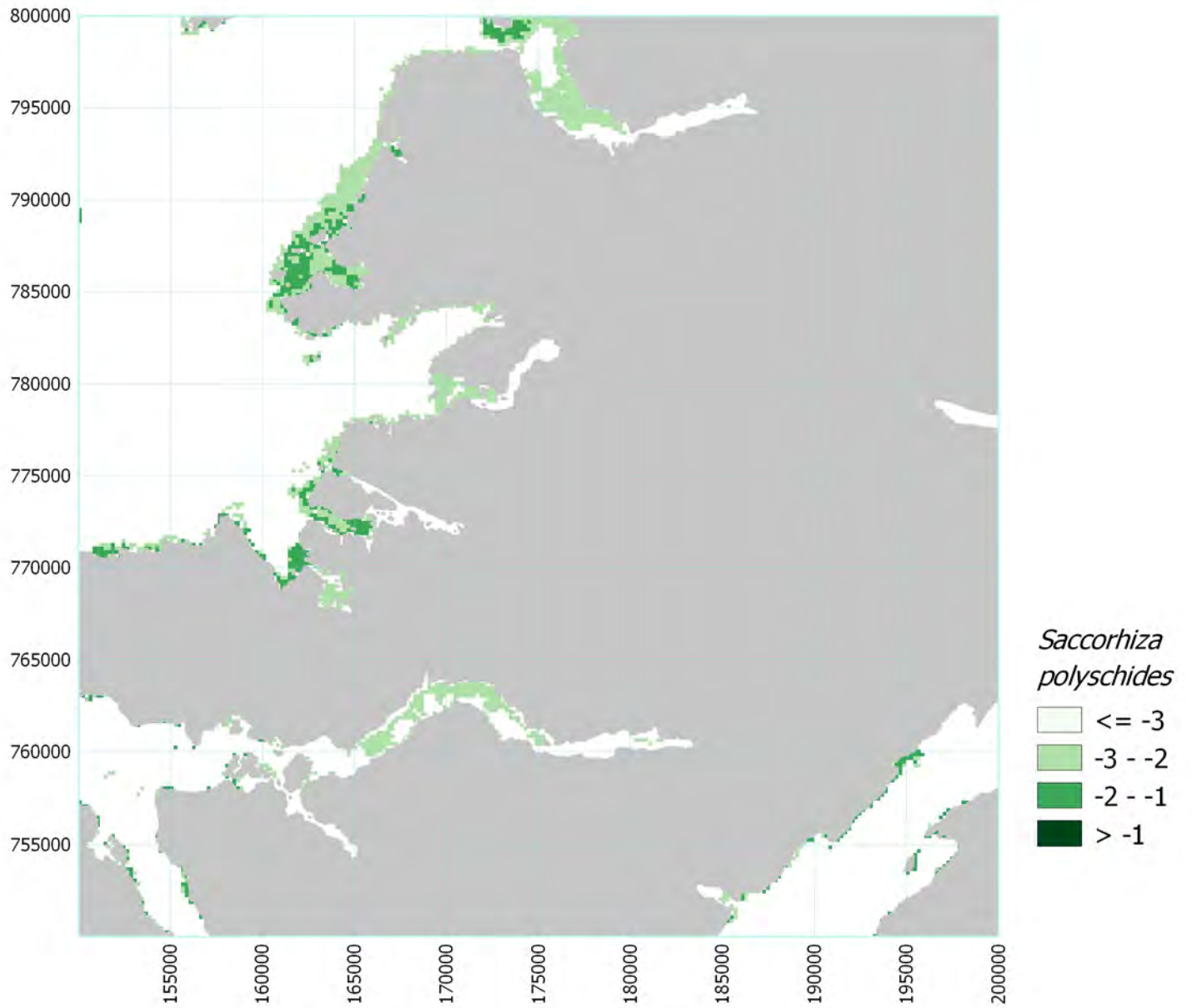
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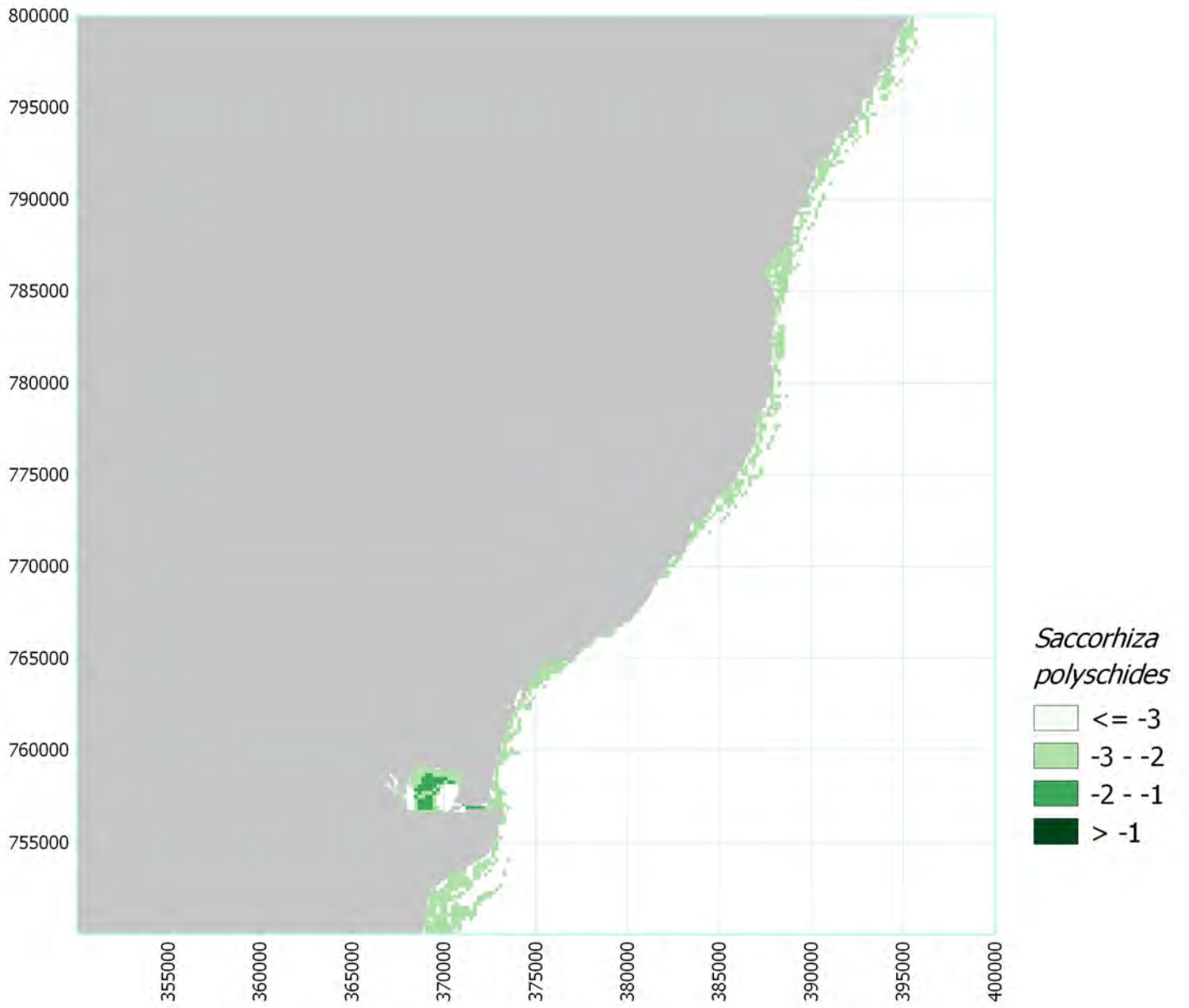
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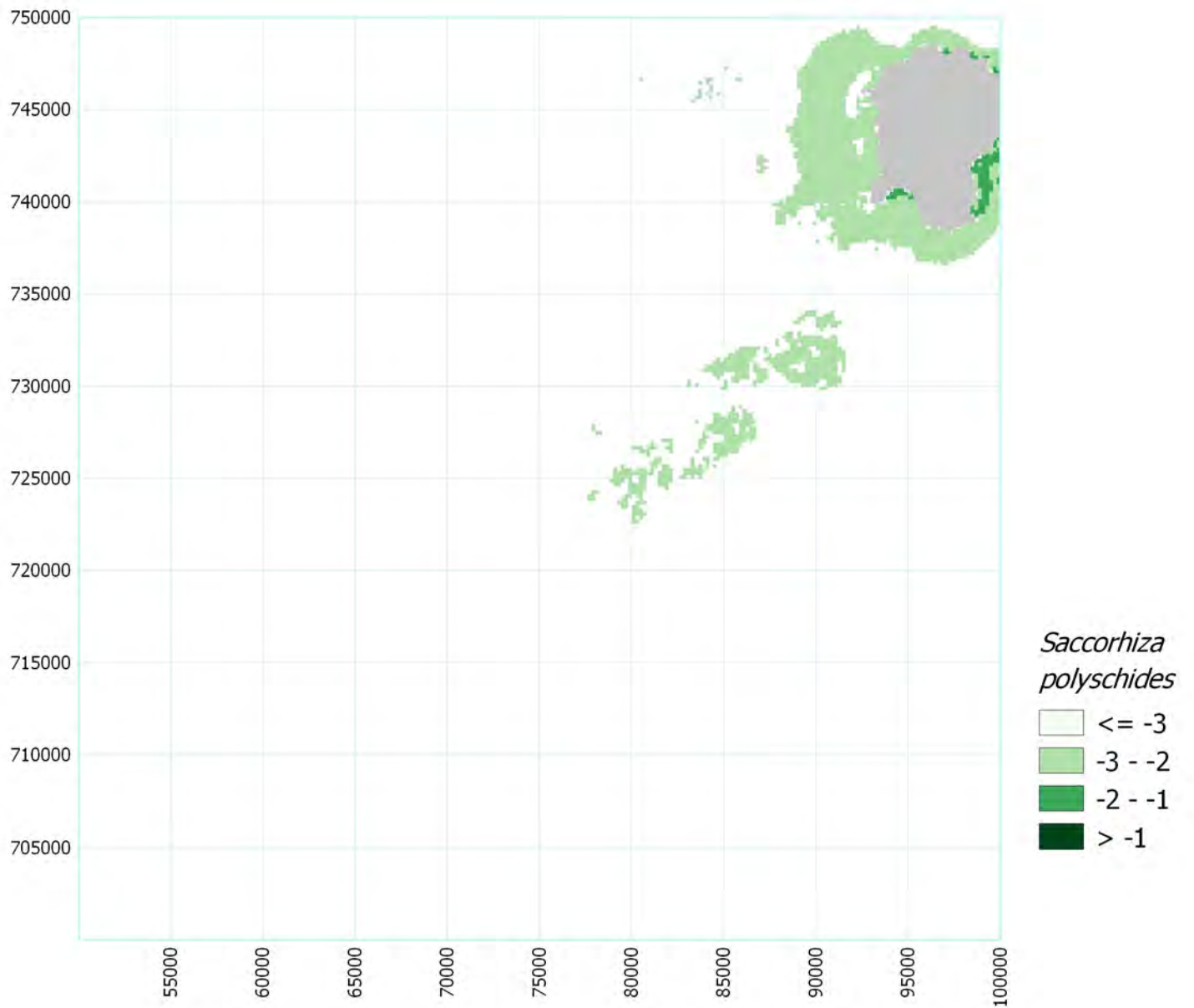
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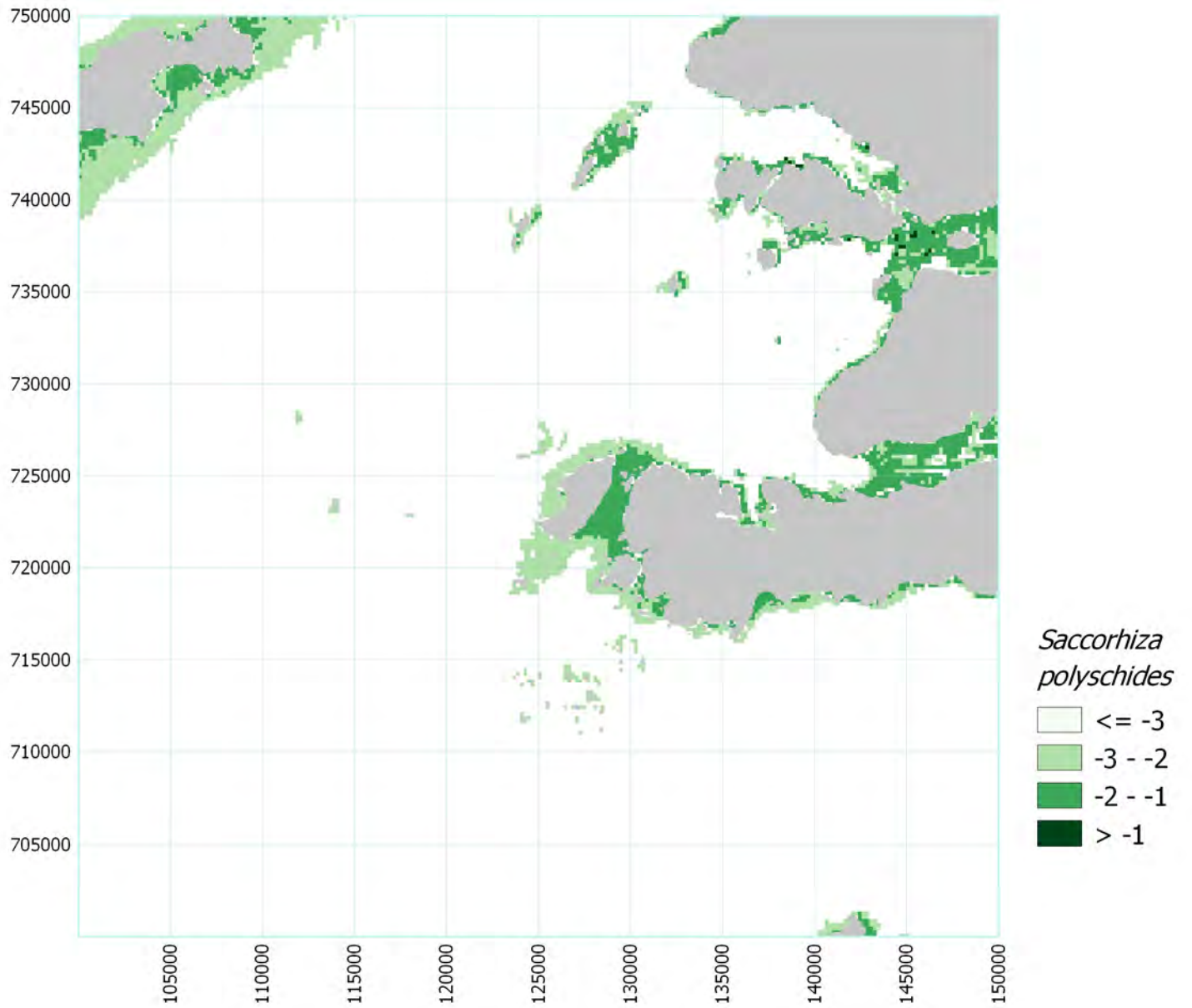
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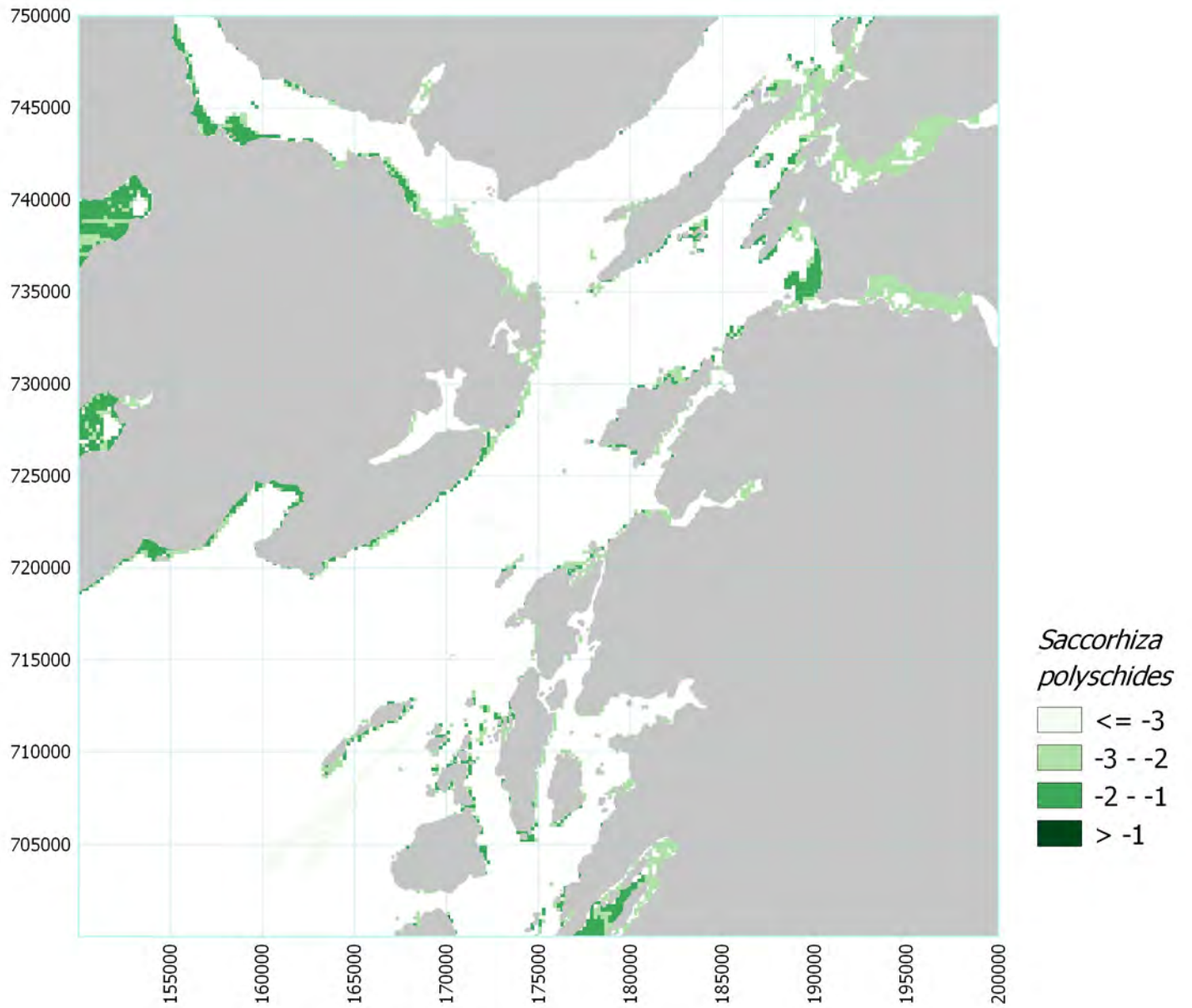
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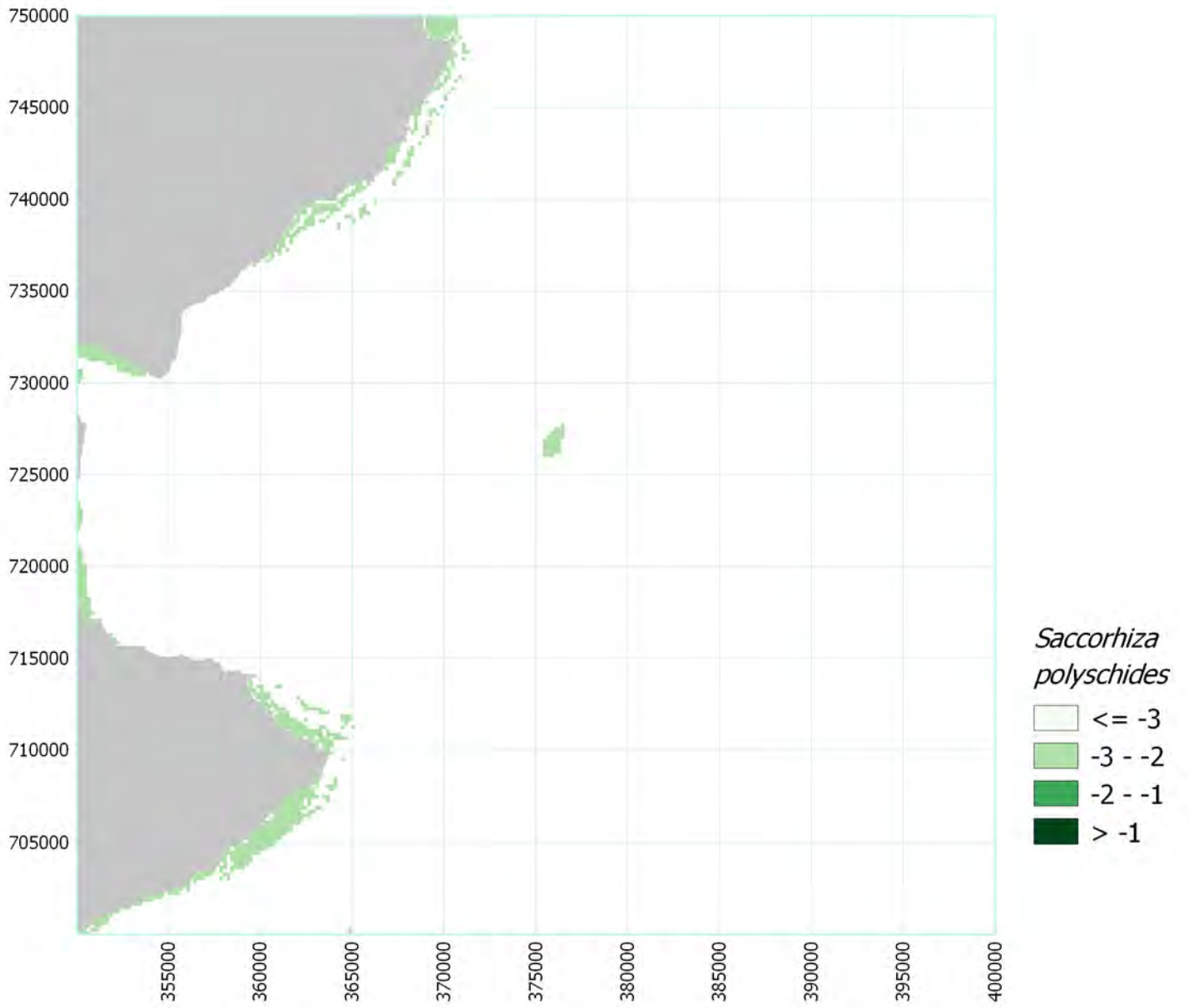
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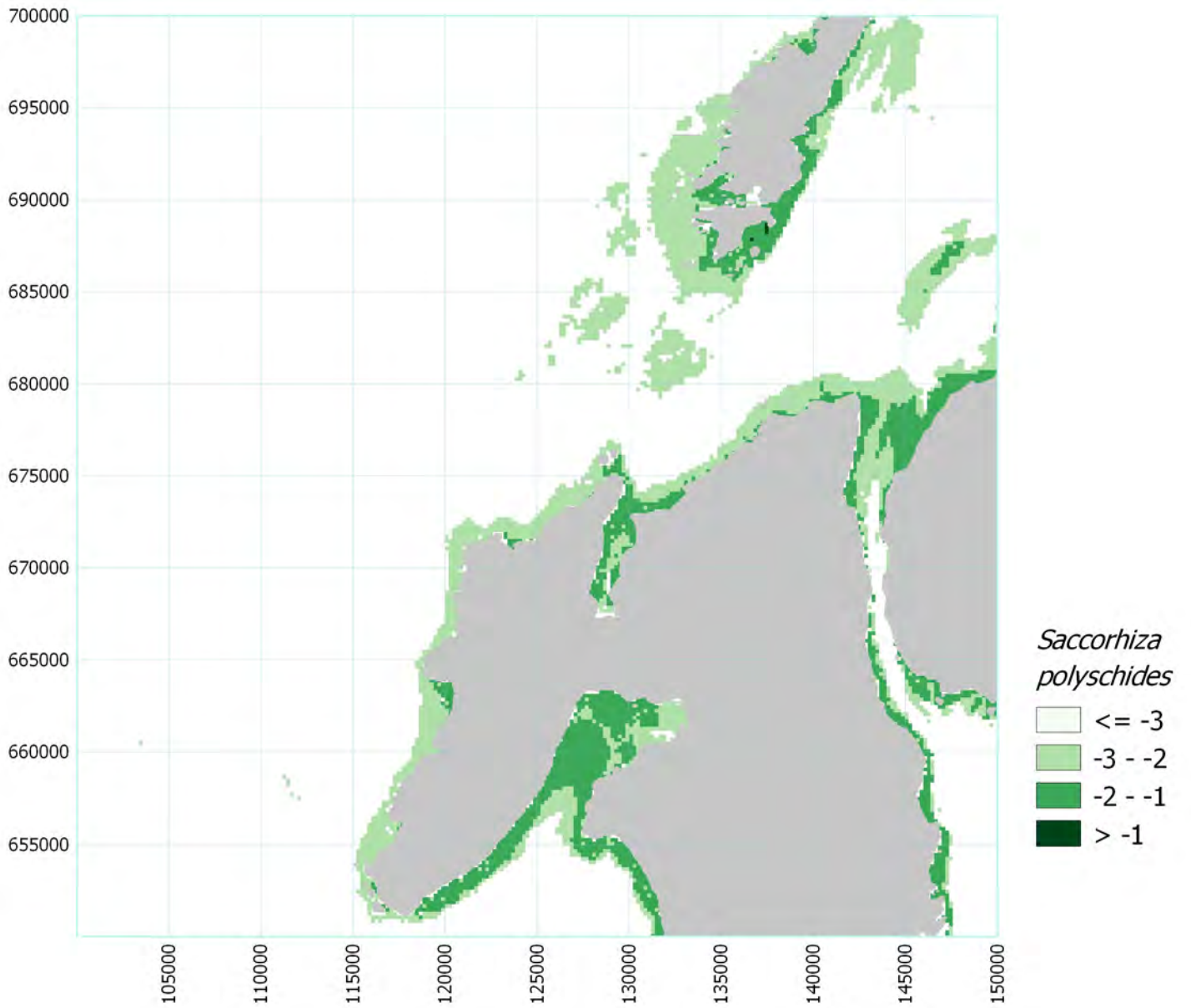
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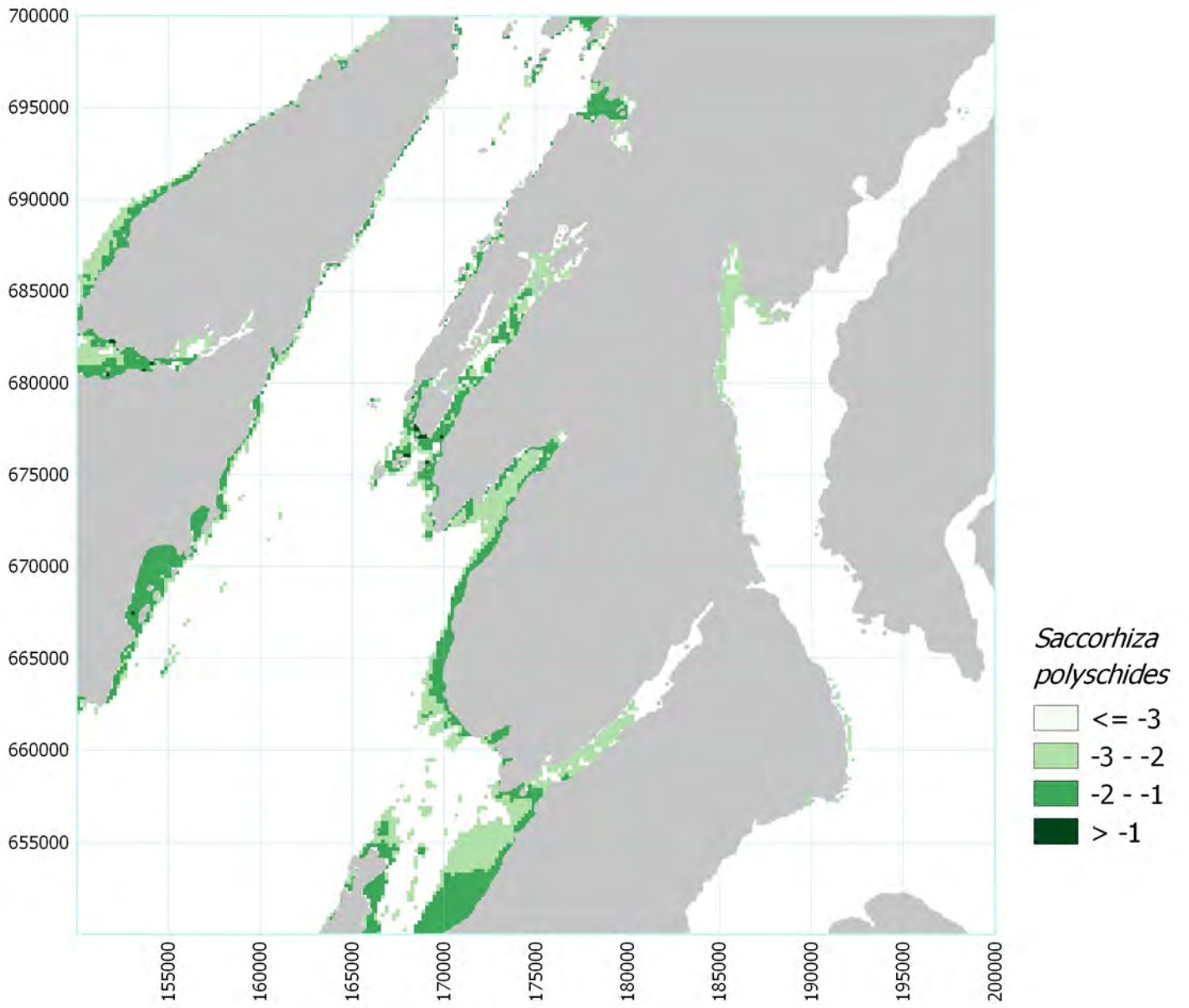
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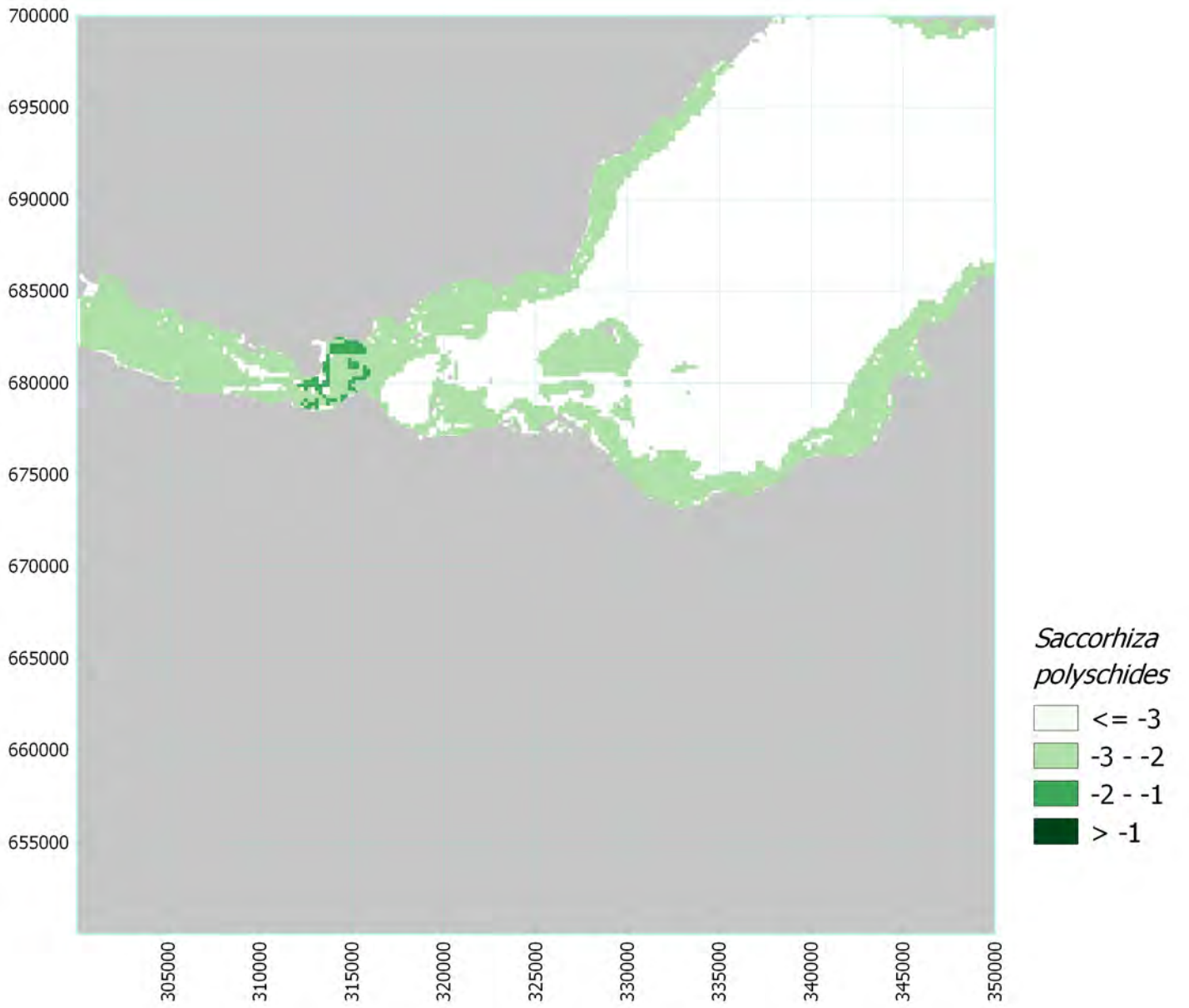
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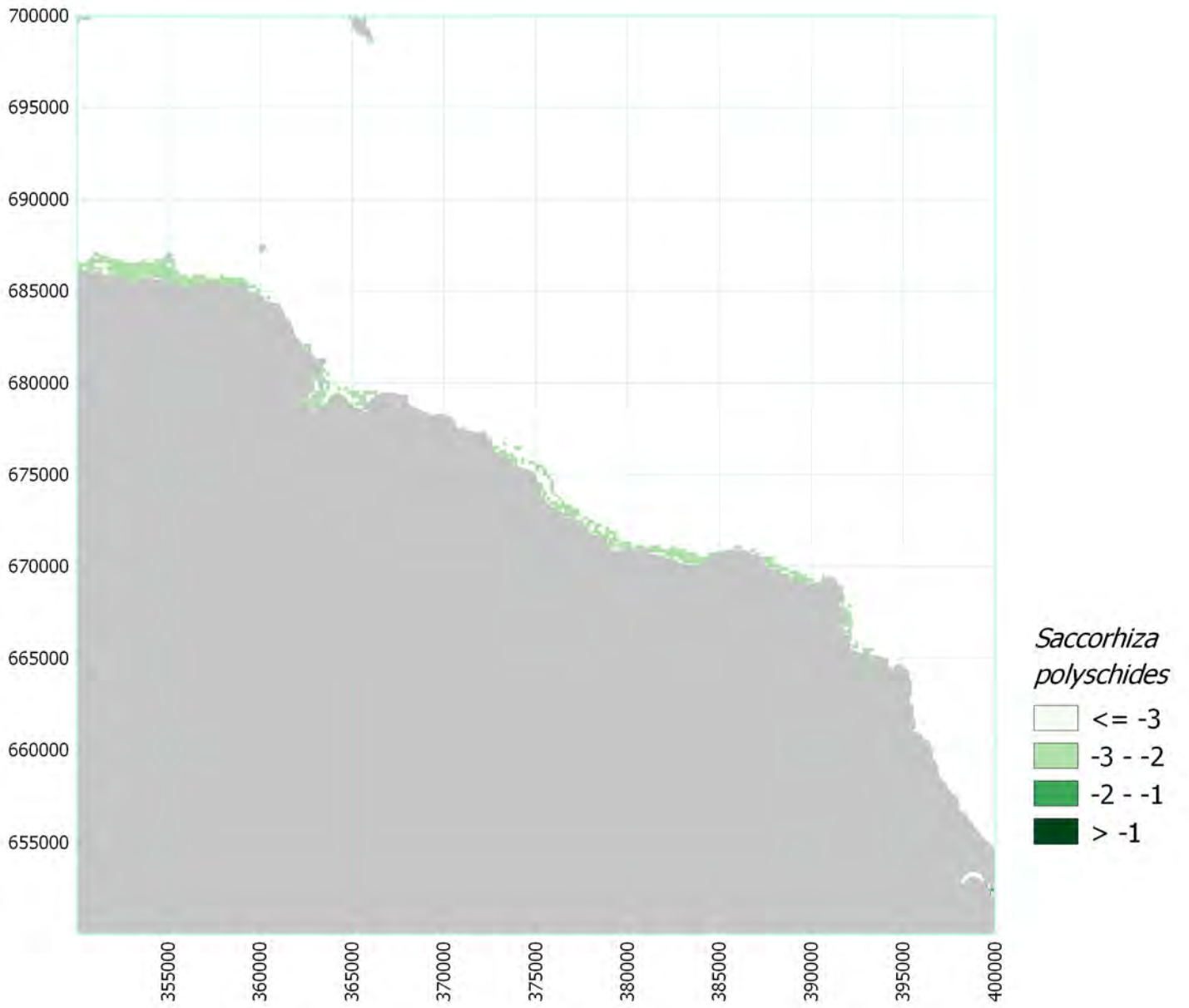
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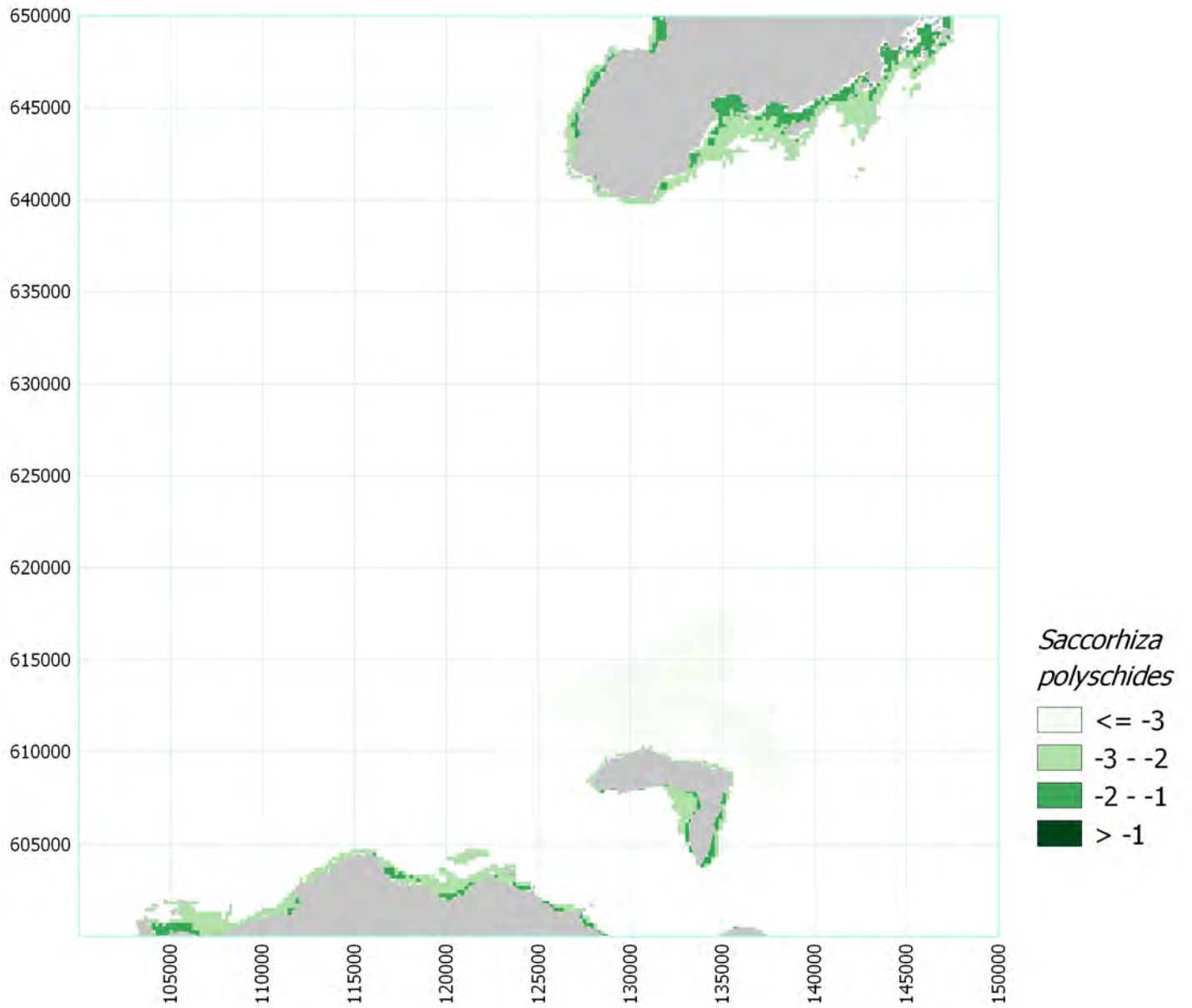
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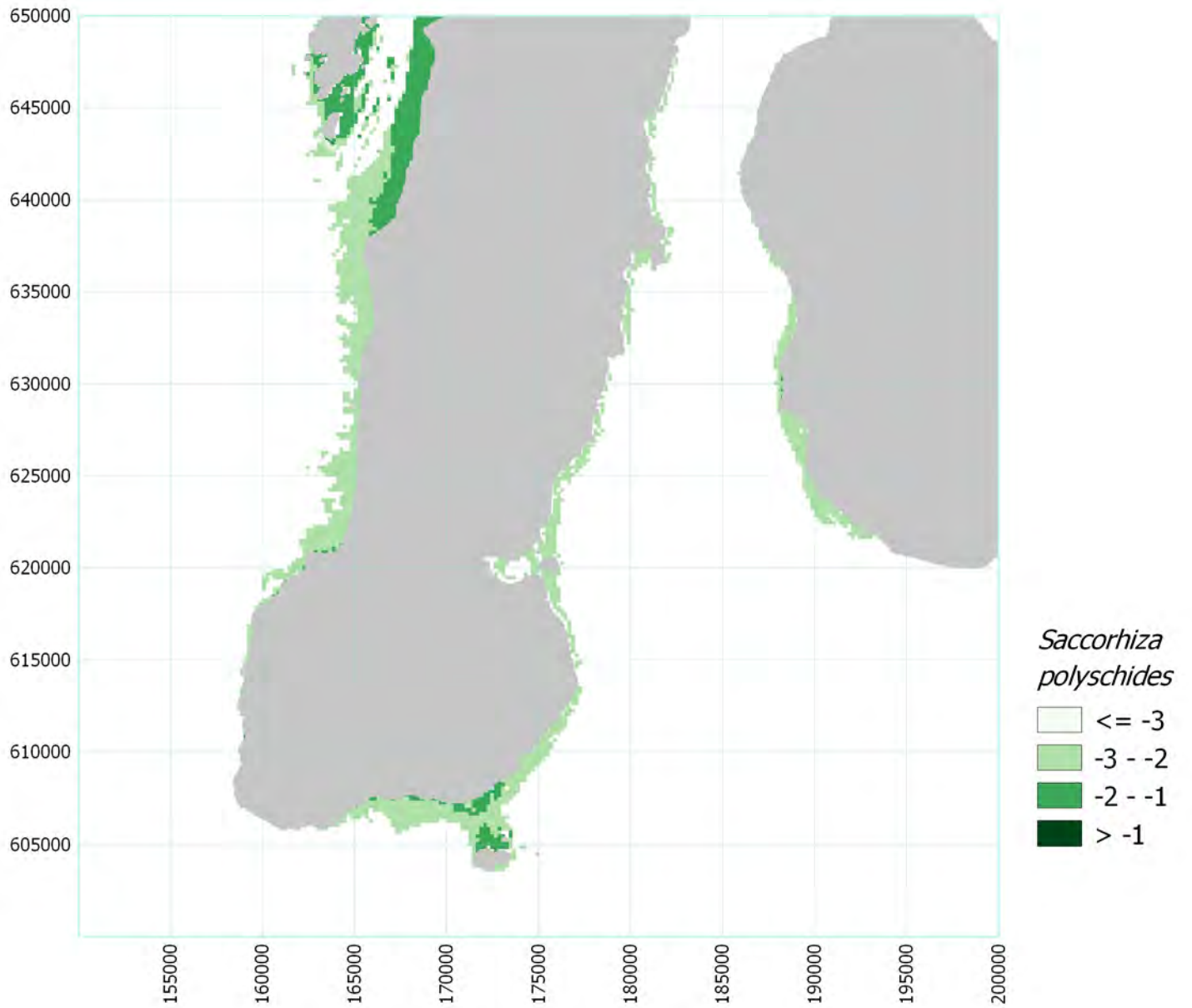
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Map 42



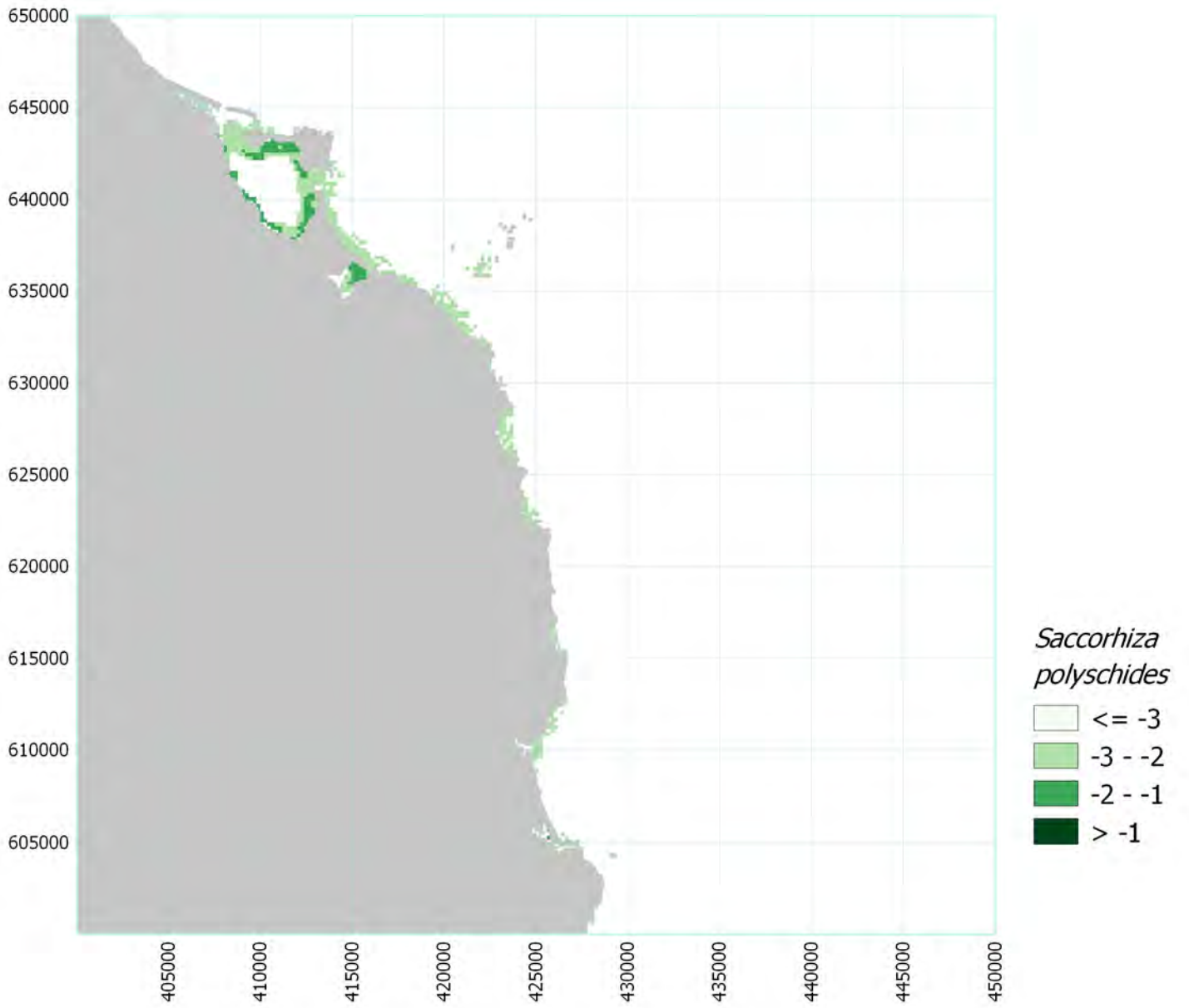
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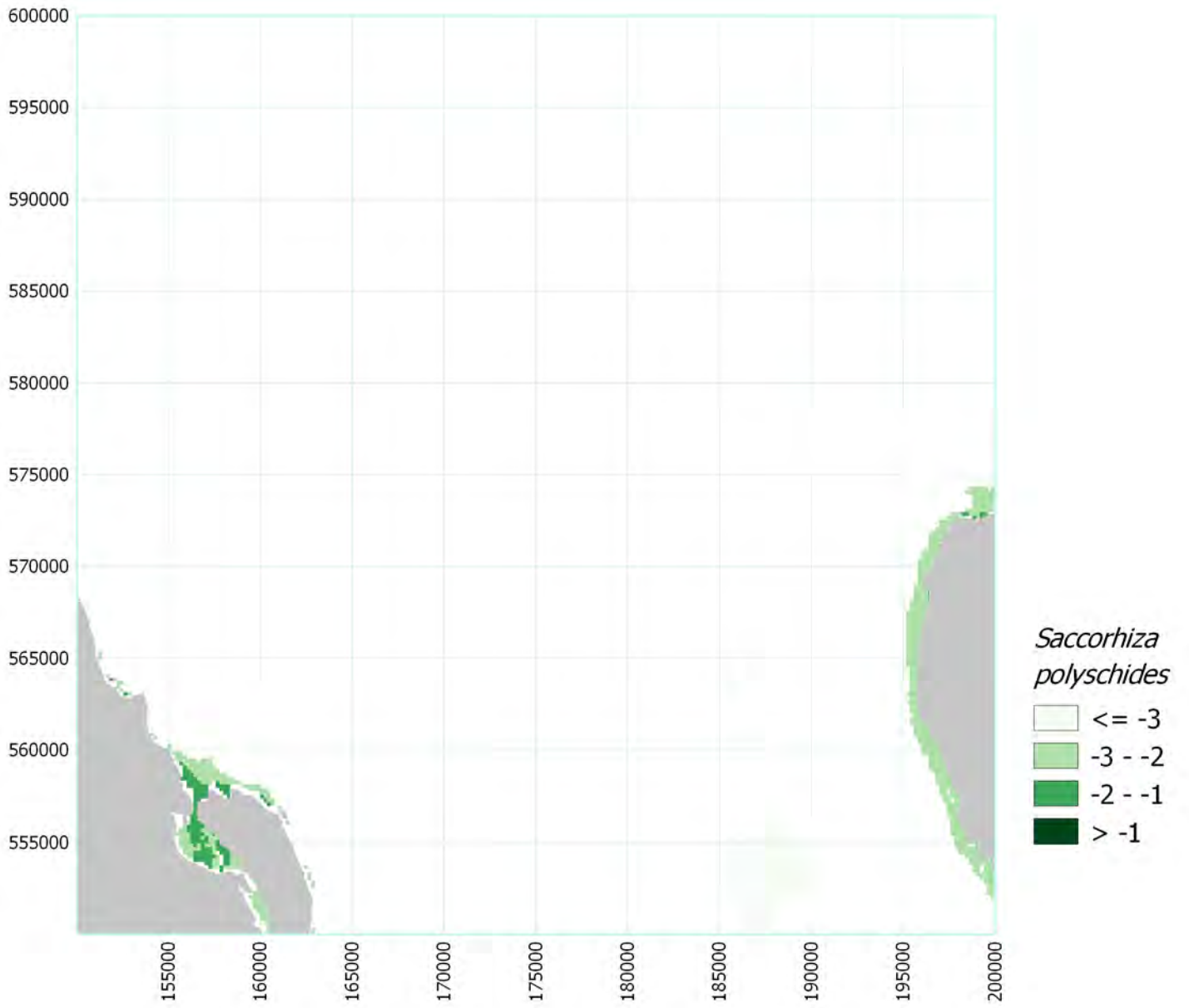
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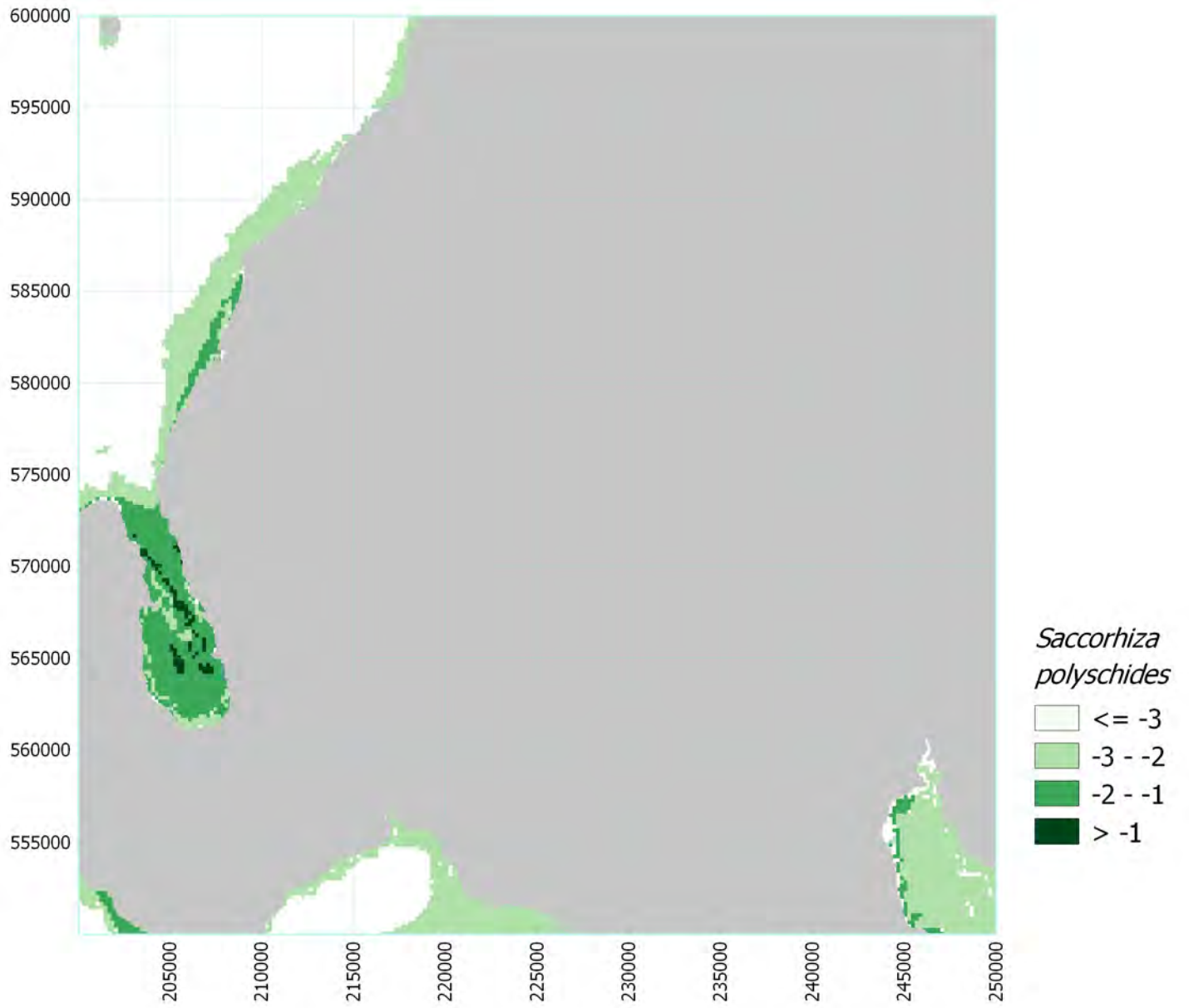
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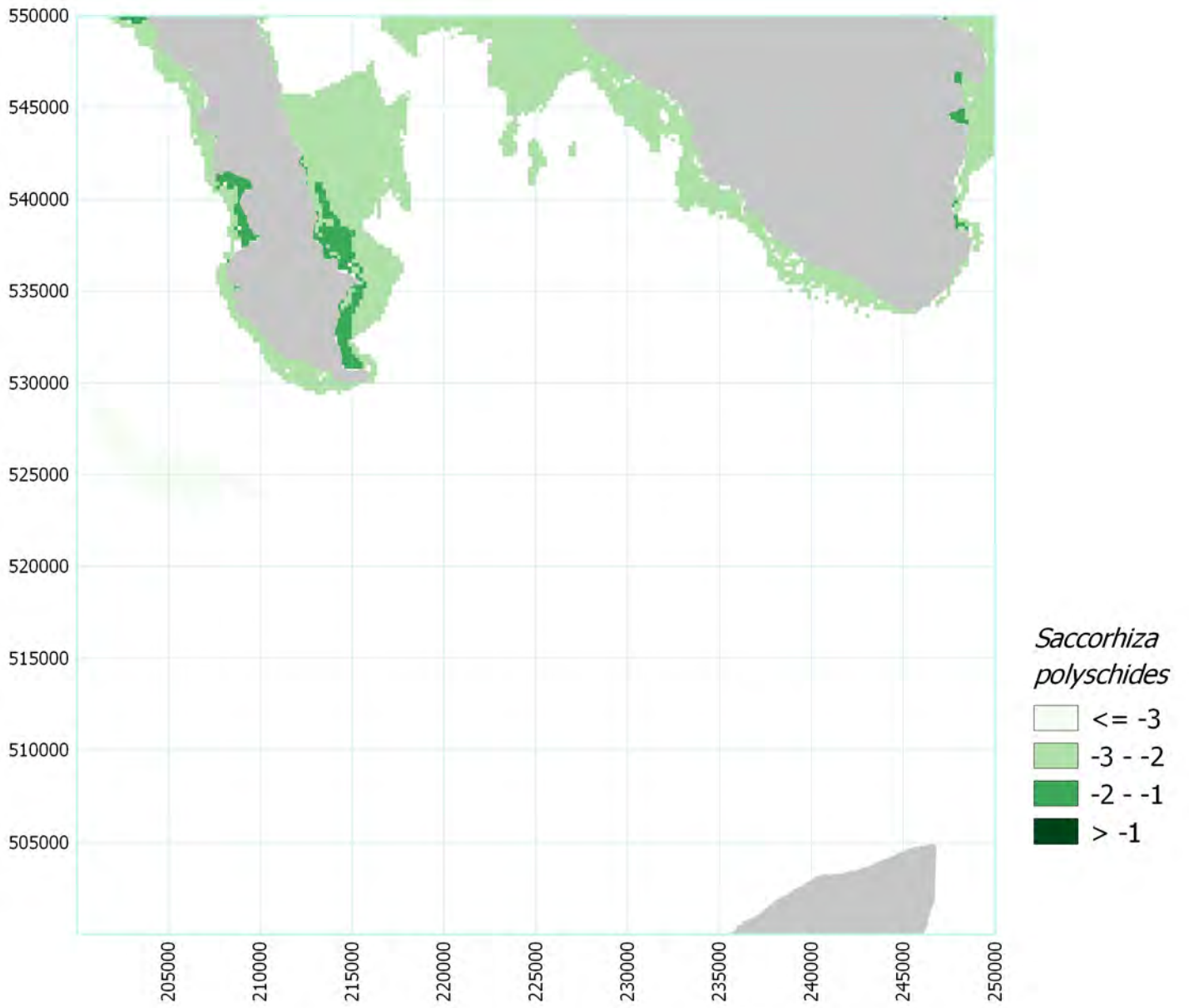
Map 46



Map 47



Map 48



Map 49



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