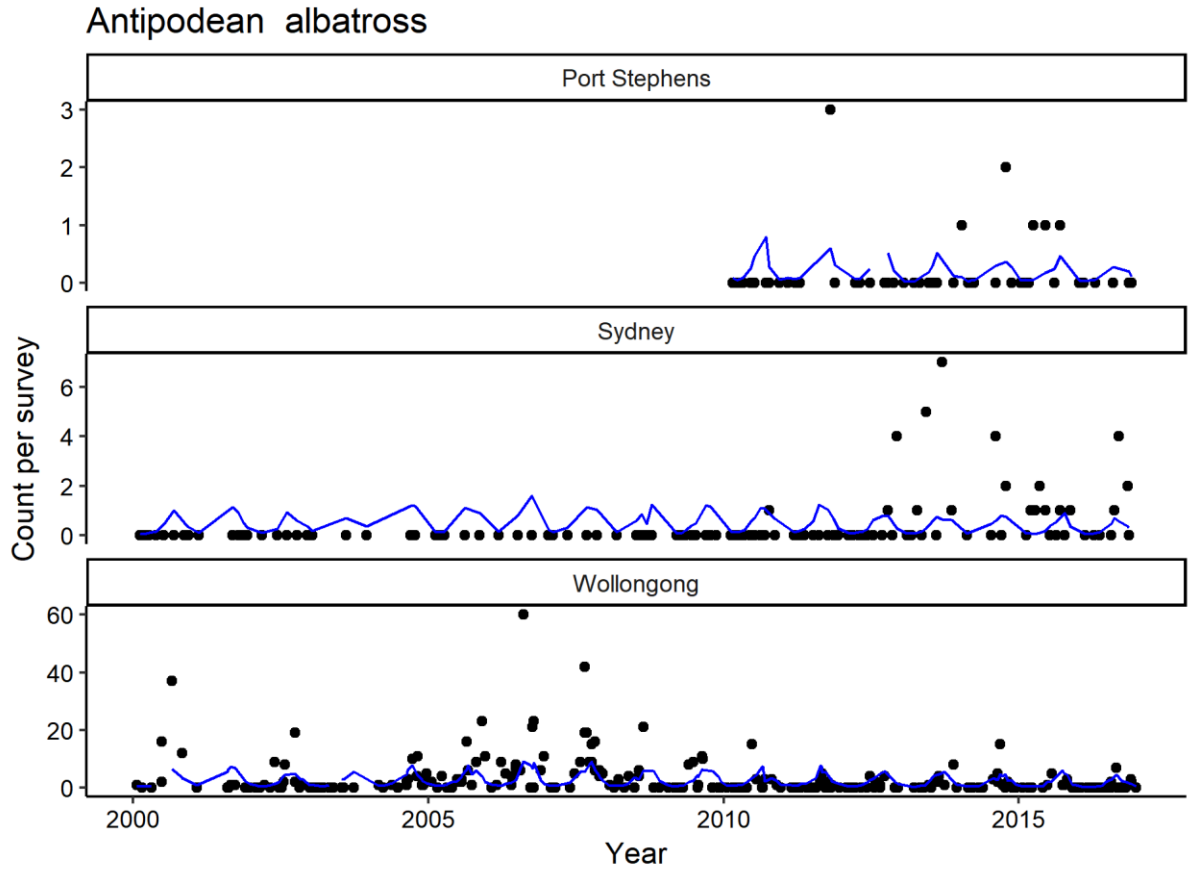
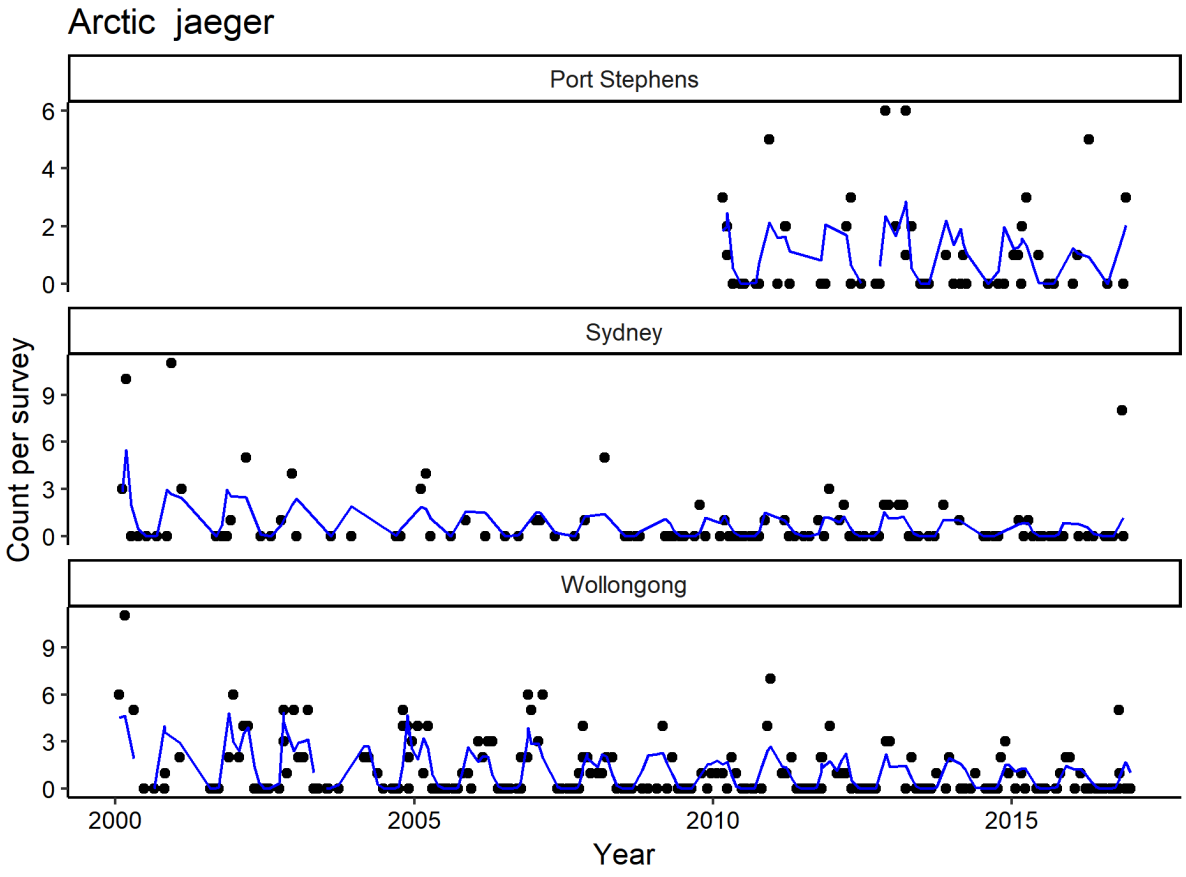
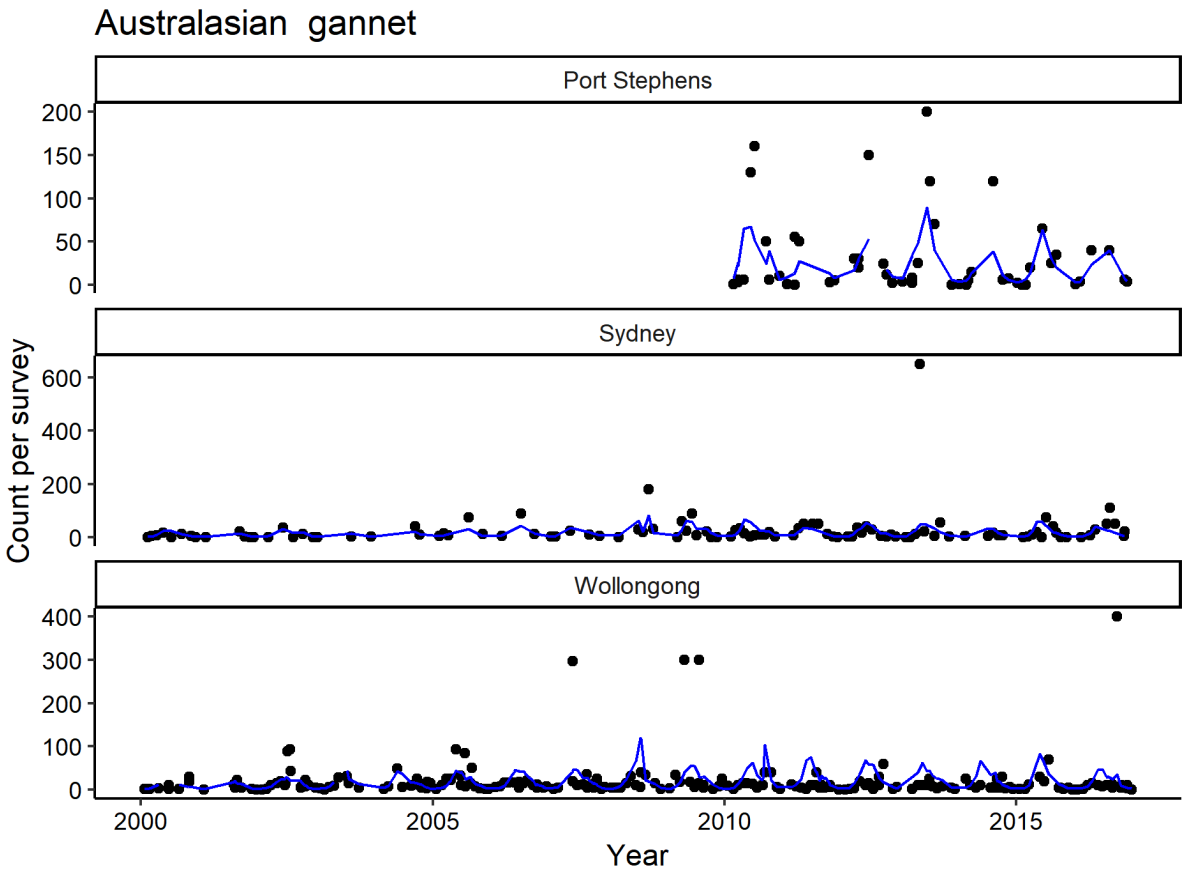
Generalised Additive Model (GAM) Figures

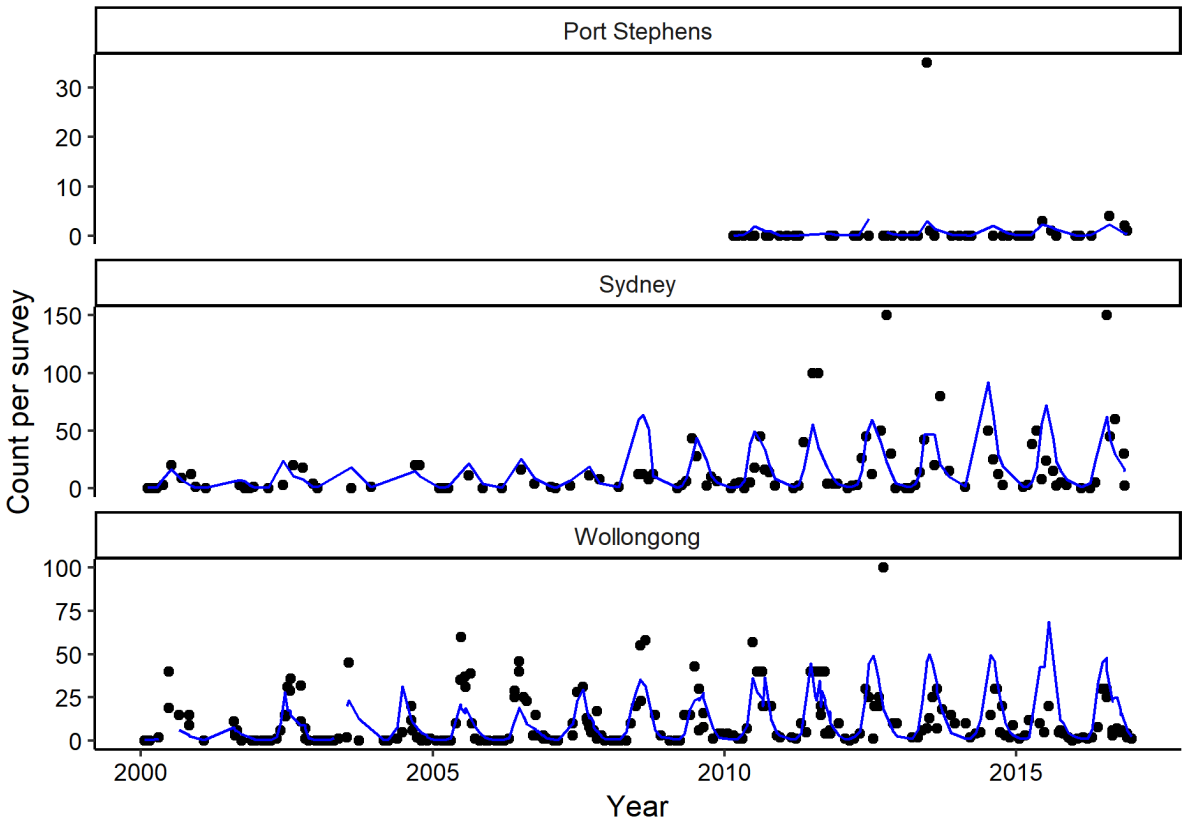
Counts of the top 30 species at three study sites (points), and the fitted counts from the negative binomial GAM (line). Where noted by superscript in title (e.g. Black petrel $^{(non\text{-}significant)}$), GAM results indicated a non-significant relationship between counts and time.



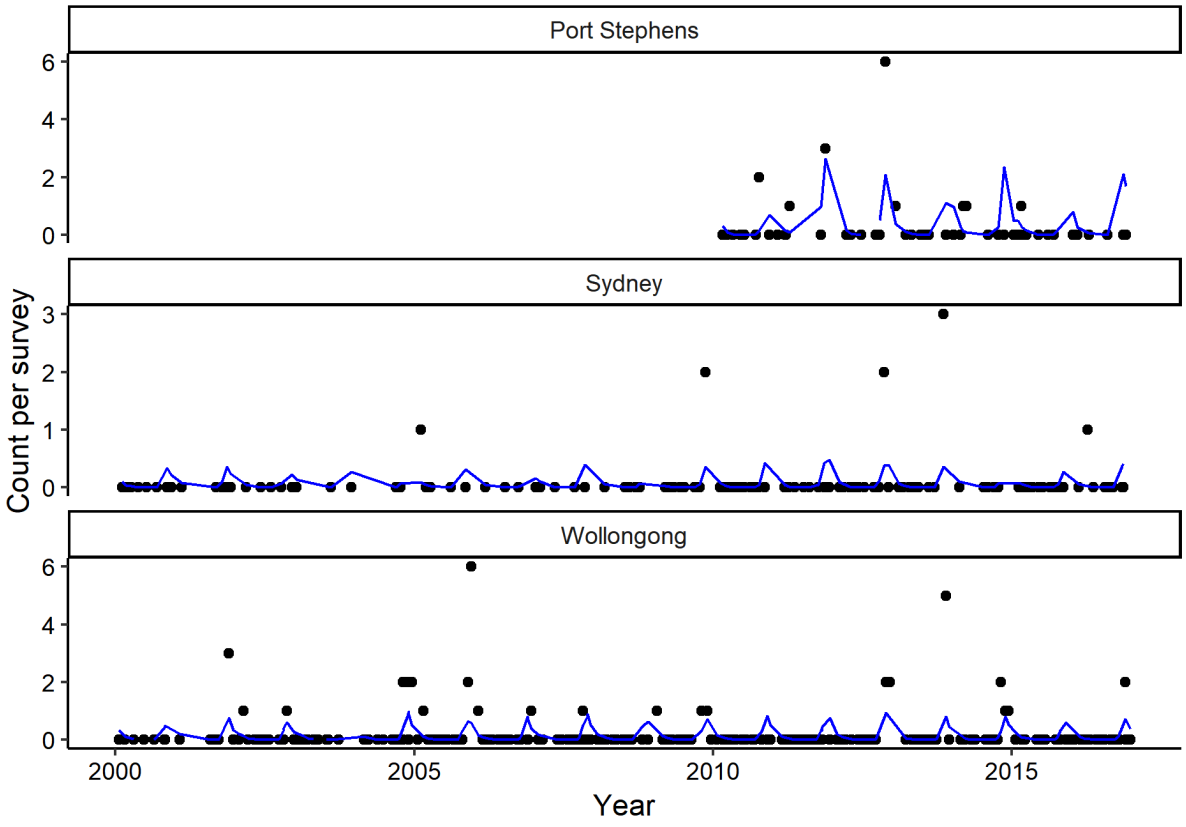

Arctic jaeger
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

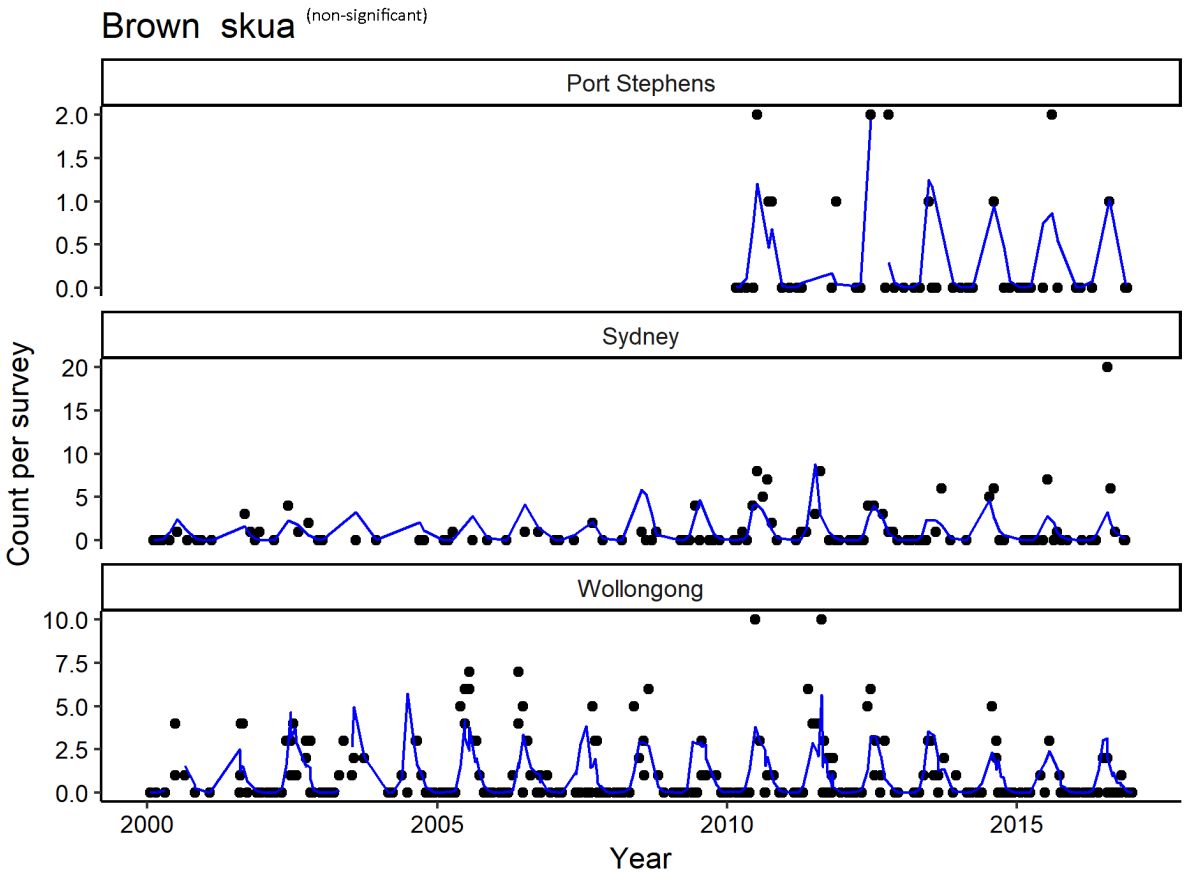

Australasian gannet
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

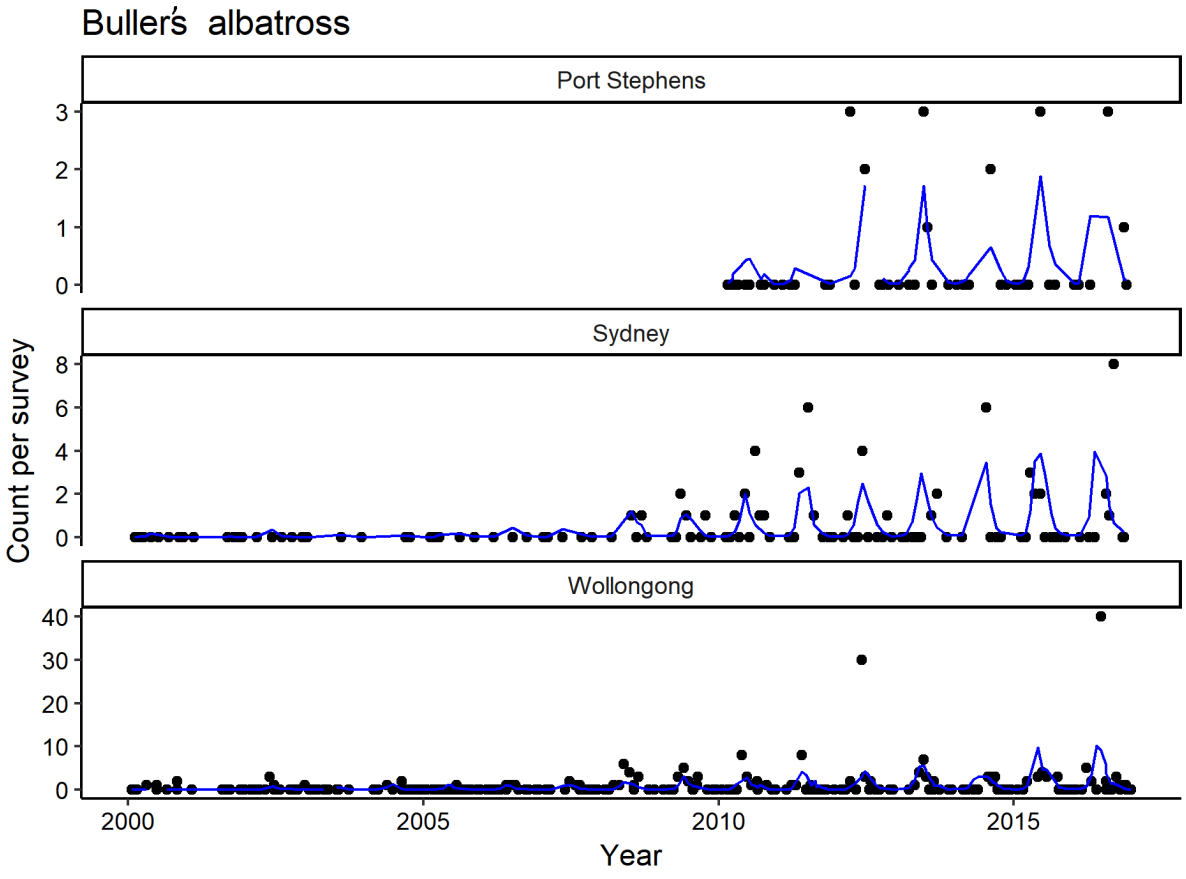
Black-browed albatross

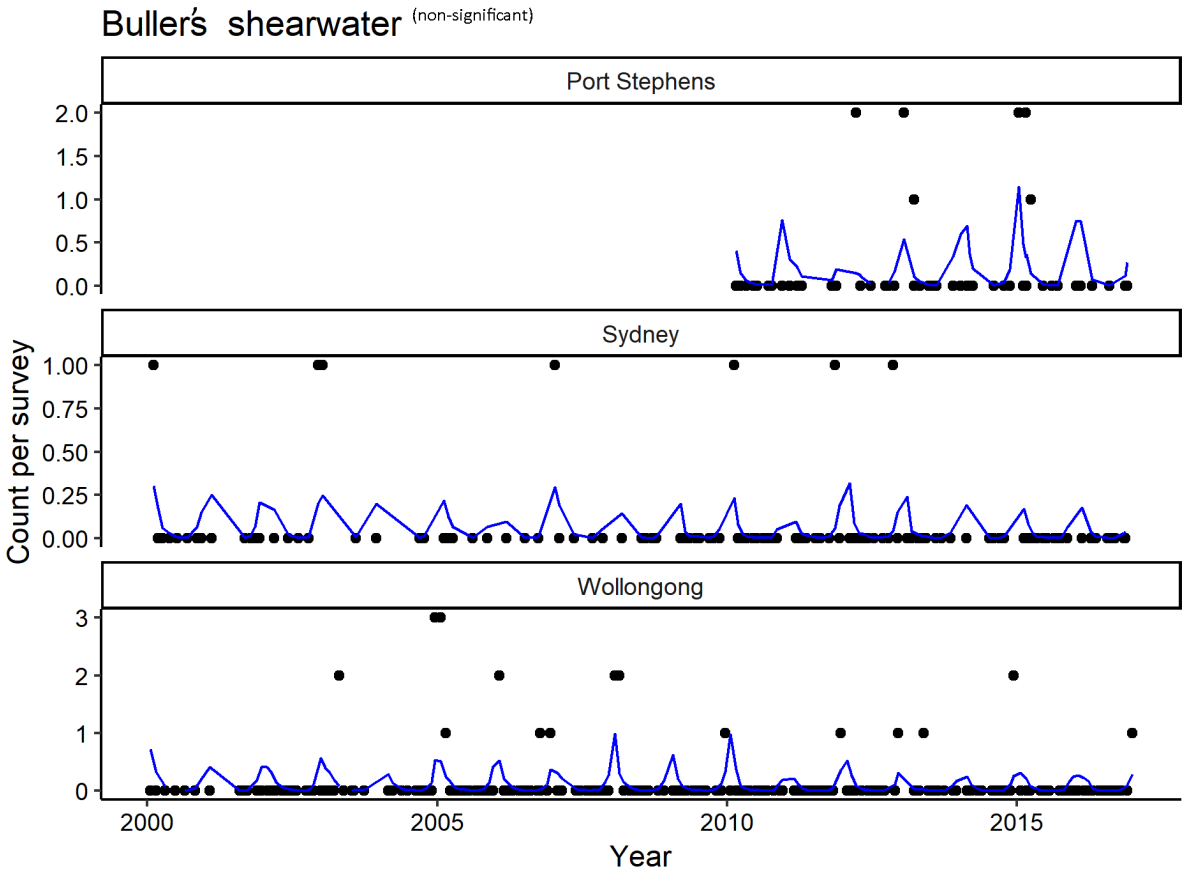


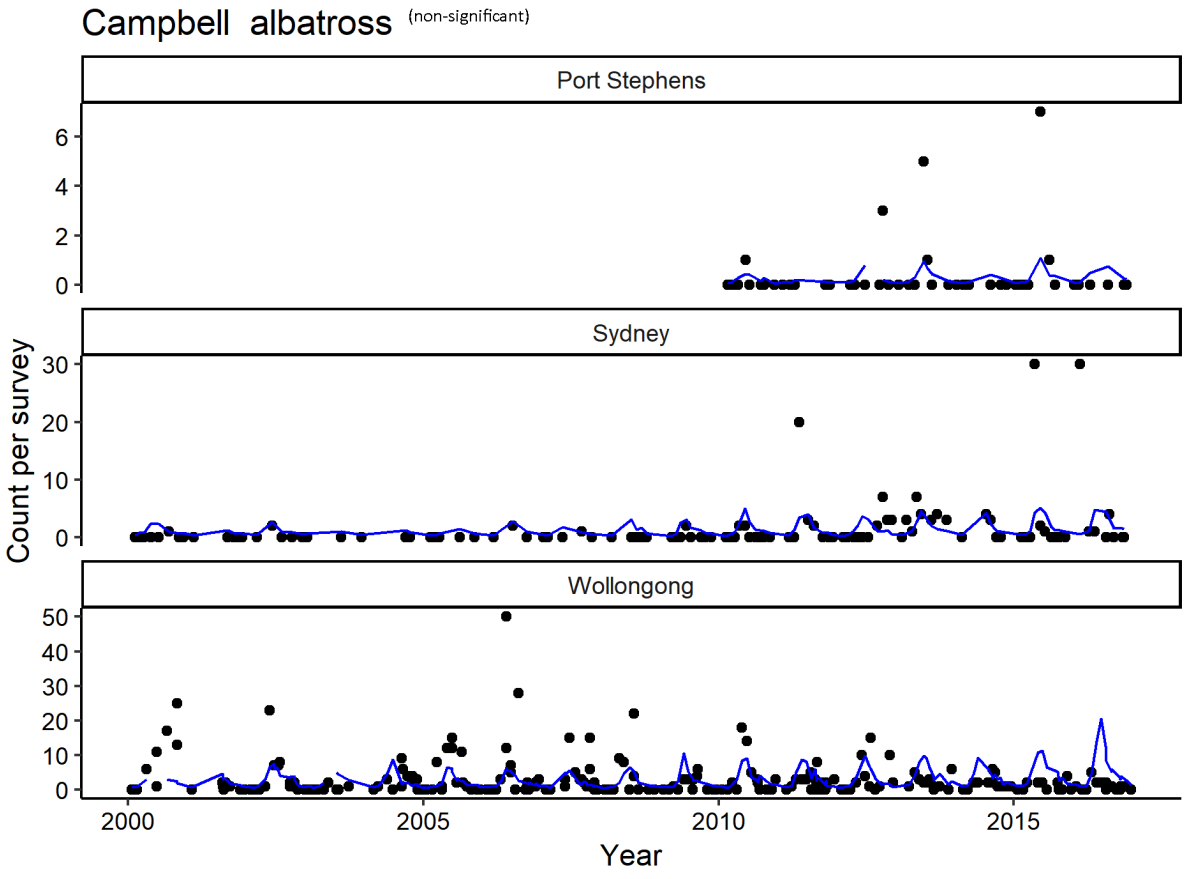
Black petrel (non-significant)

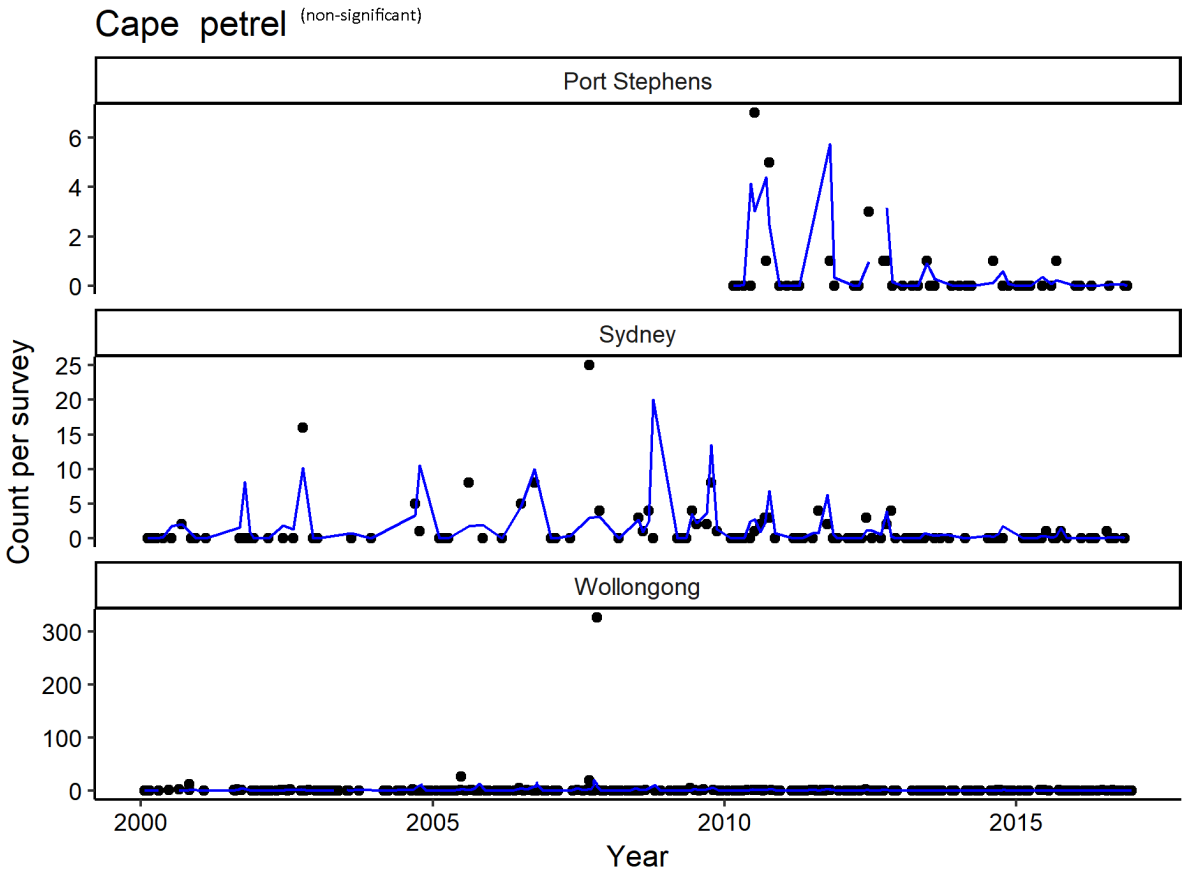


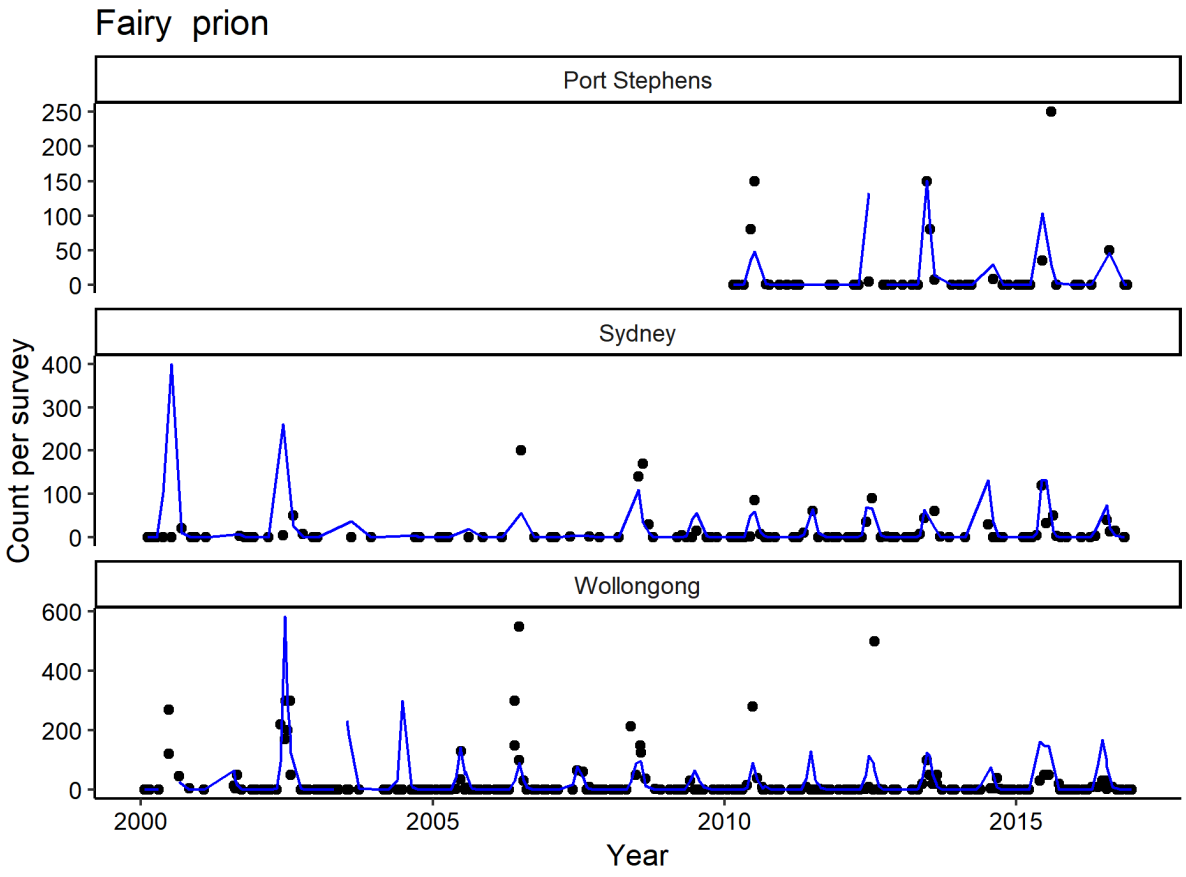

Brown skua (non-significant)
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

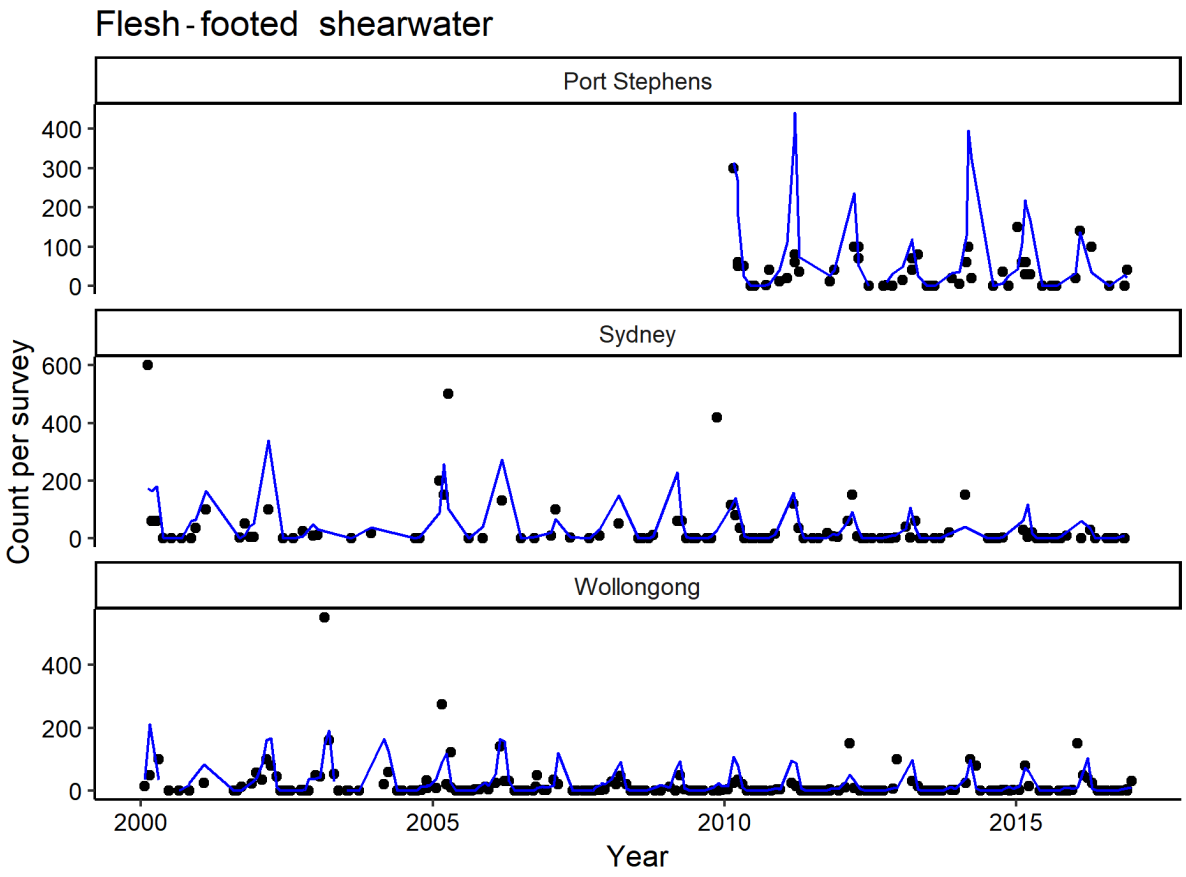

Buller's albatross
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

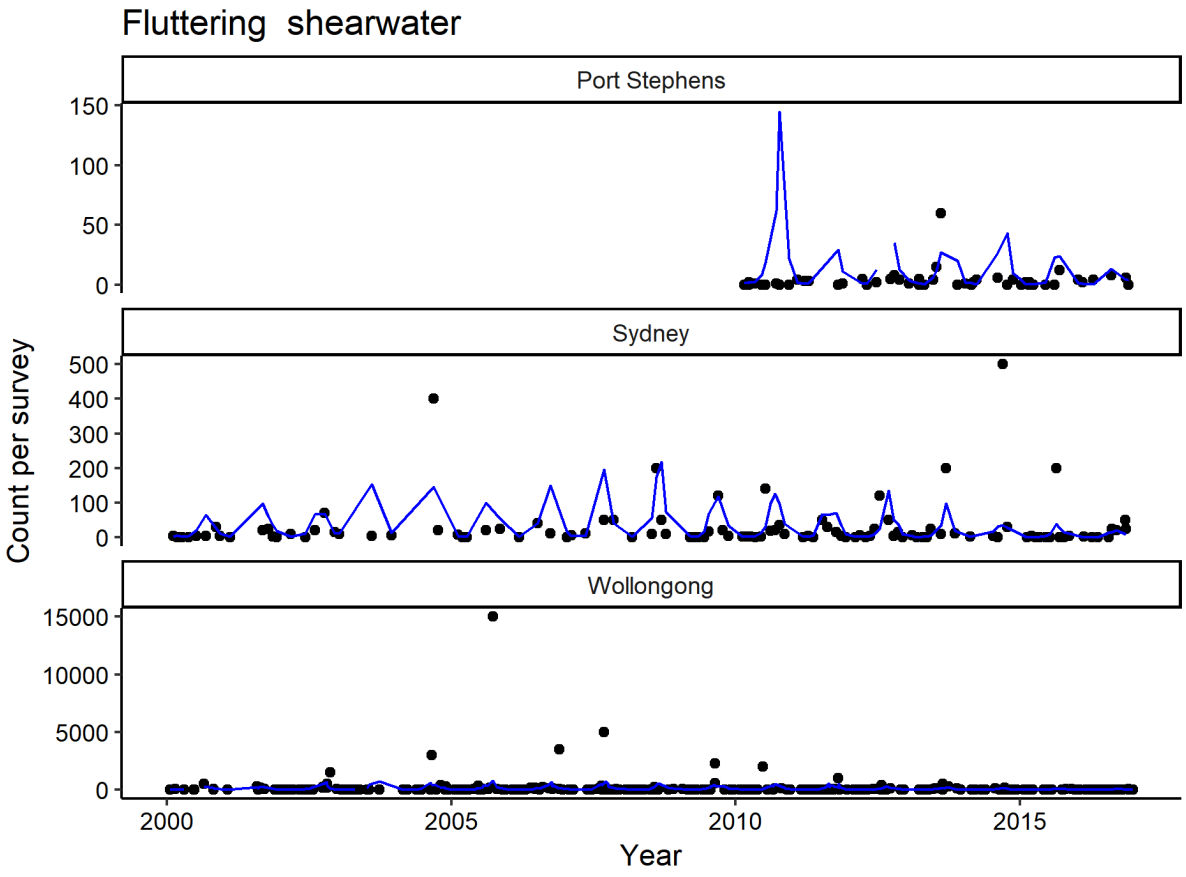

Buller's shearwater (non-significant)
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

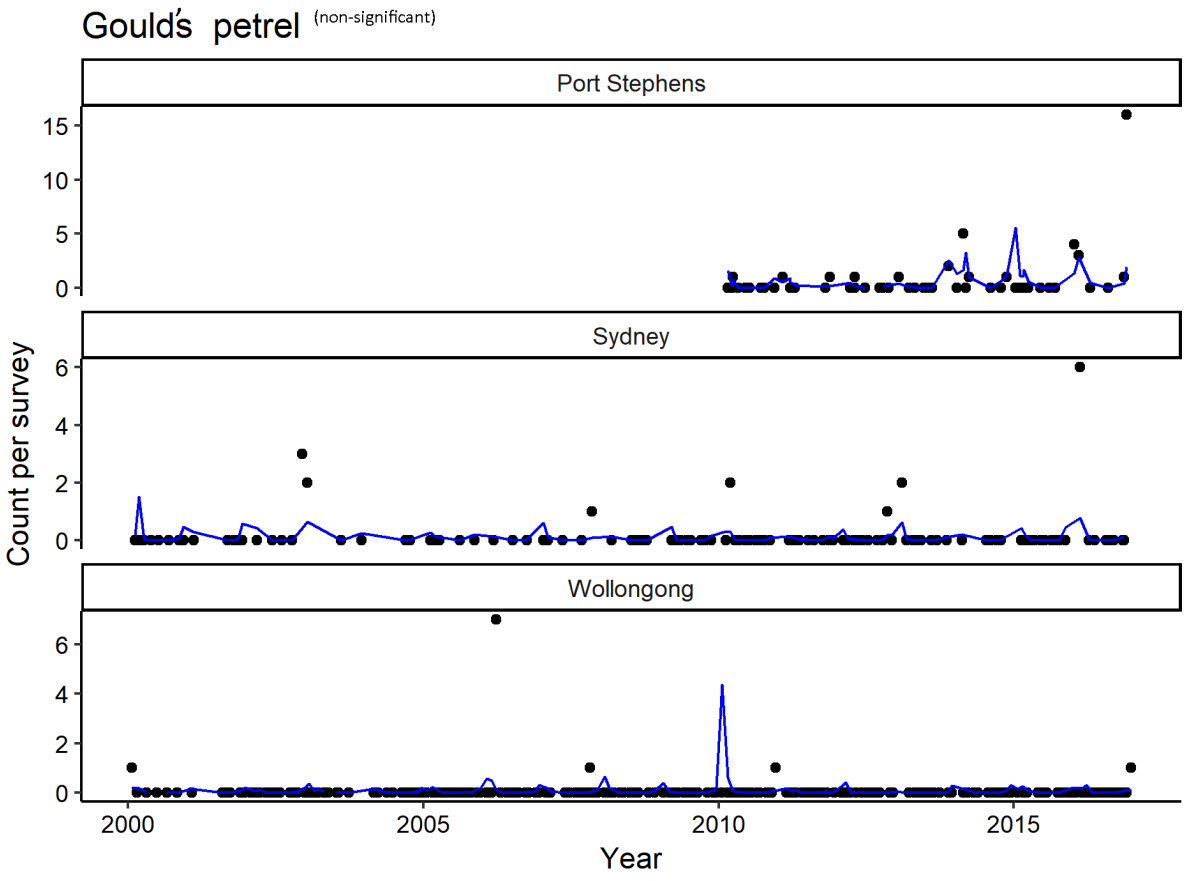

Campbell albatross (non-significant)
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

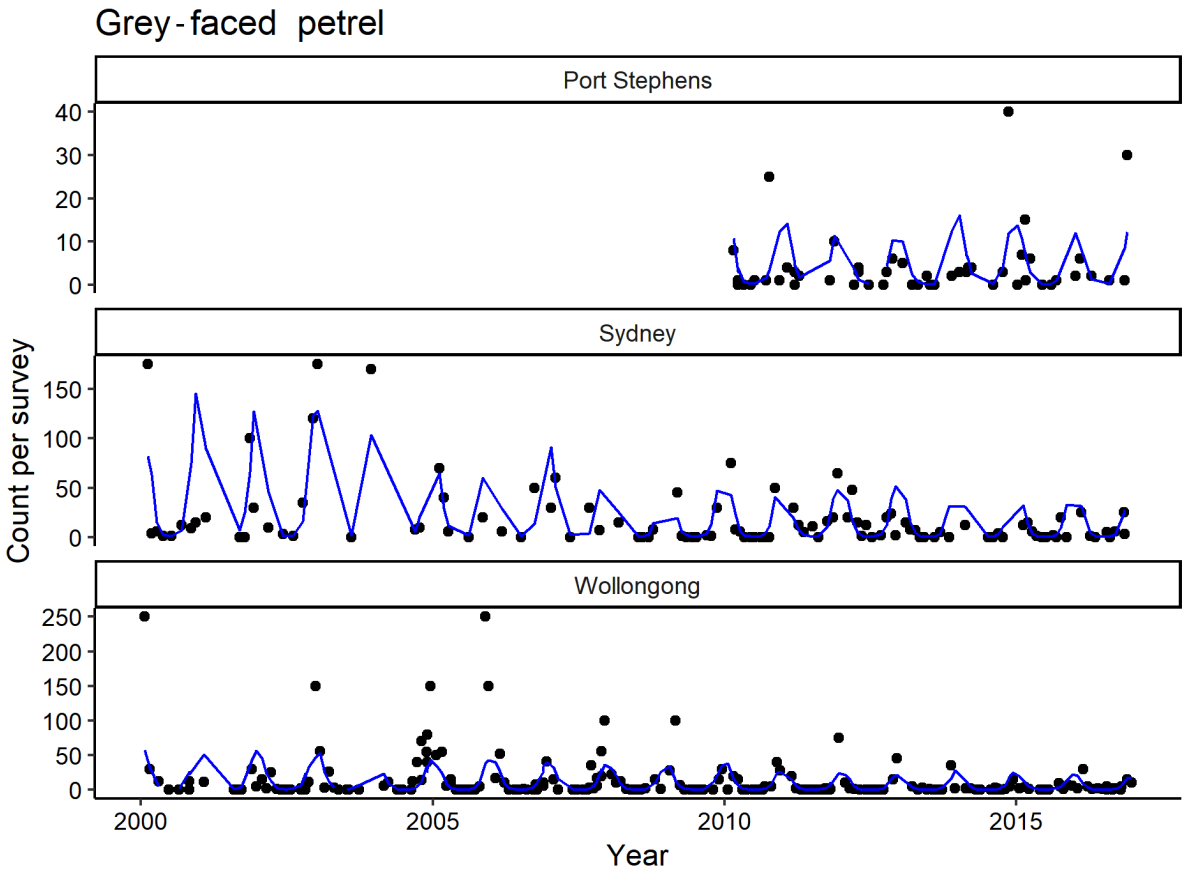

Cape petrel (non-significant)
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

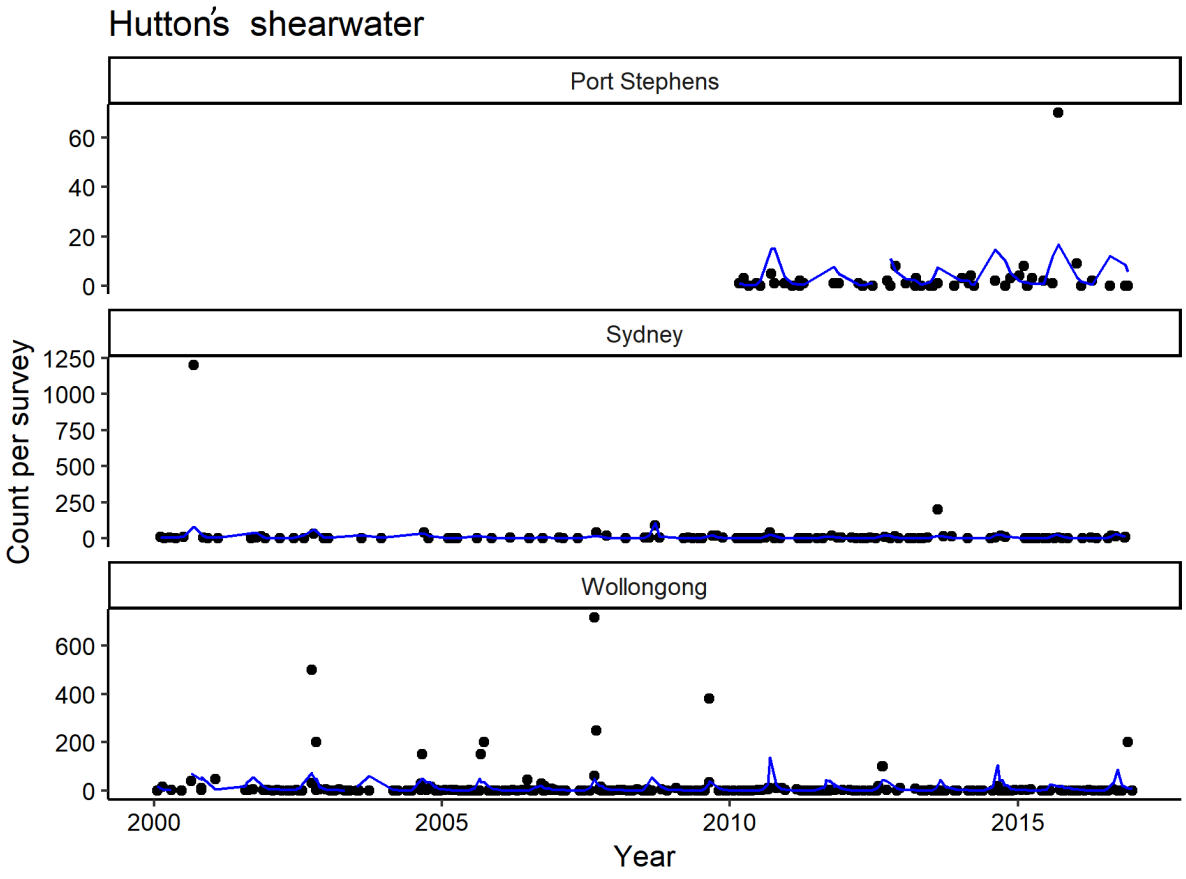

Fairy prion
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

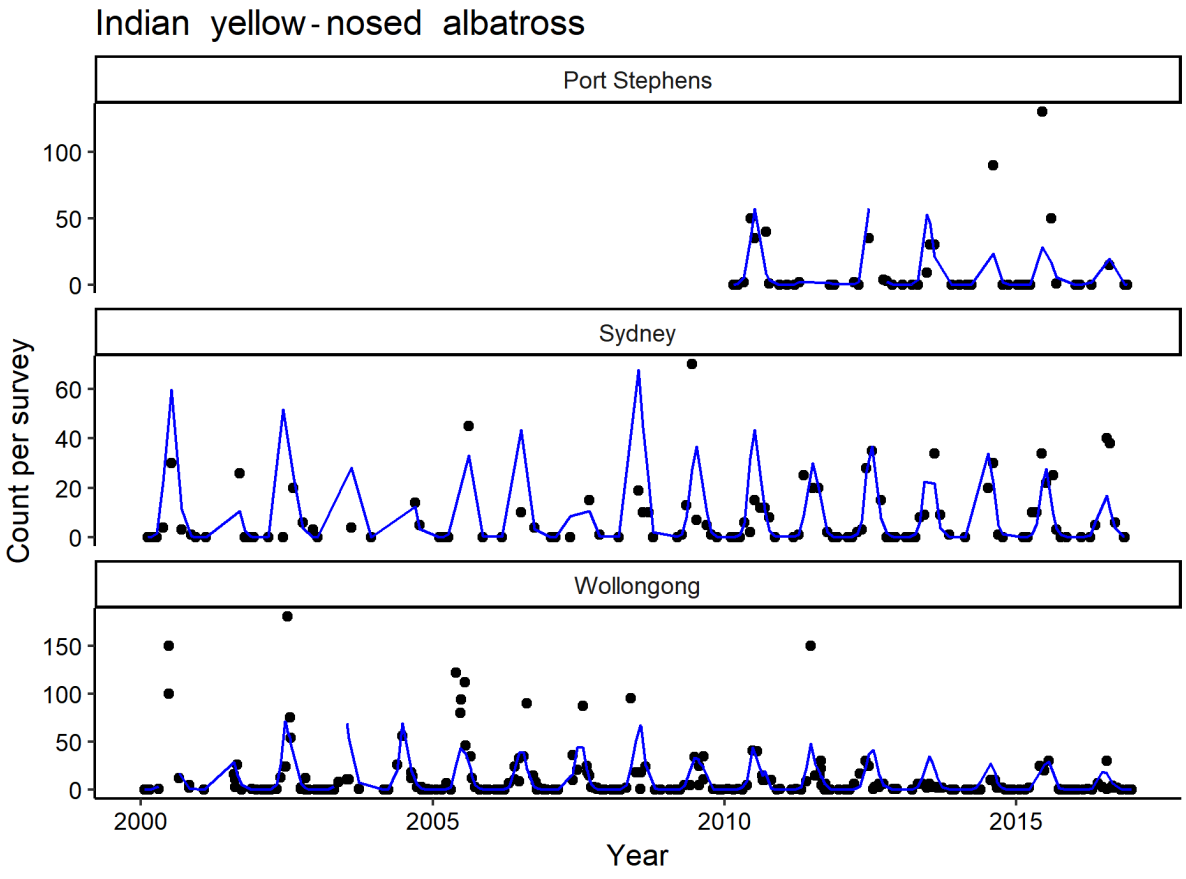

Flesh-footed shearwater
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
100
200
300
400
600
2000
2005
2010
2015

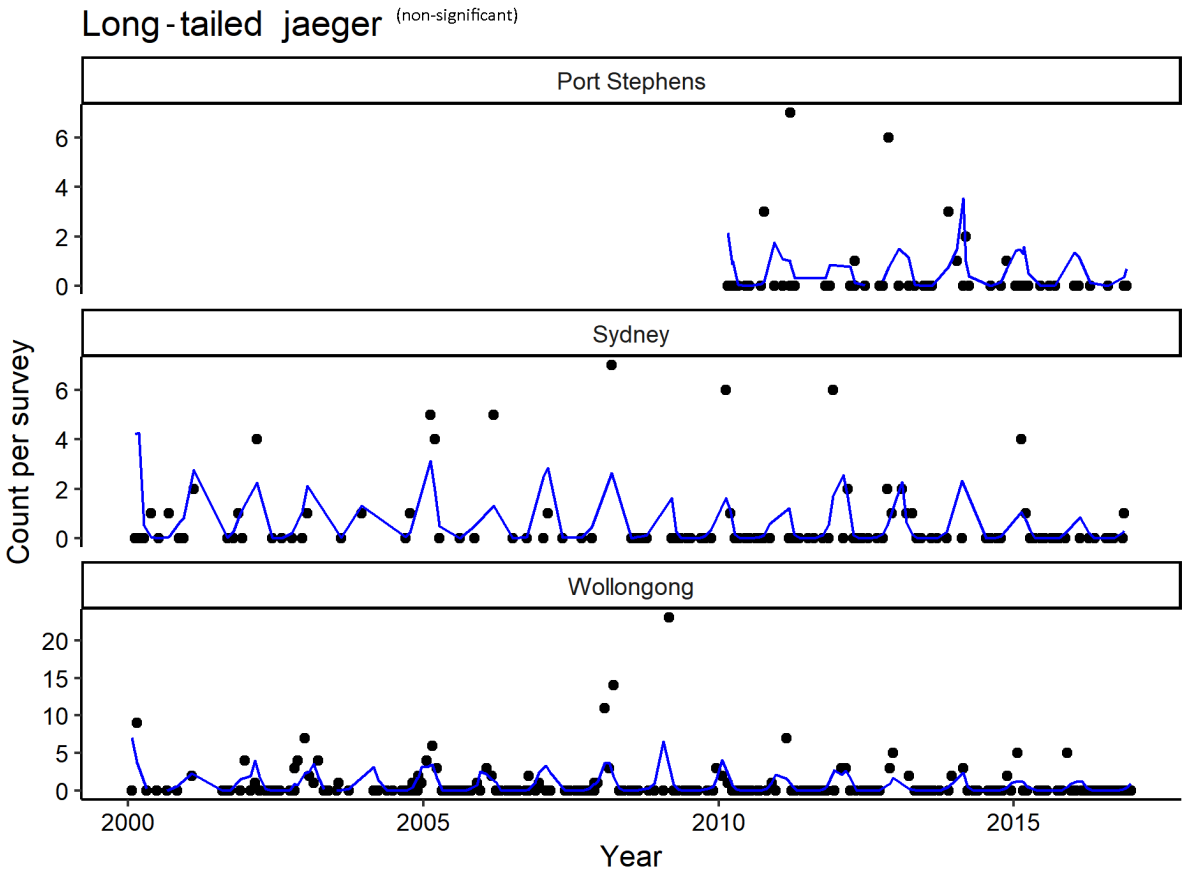

Fluttering shearwater
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
50
100
150
200
300
400
500
5000
10000
15000
2000
2005
2010
2015

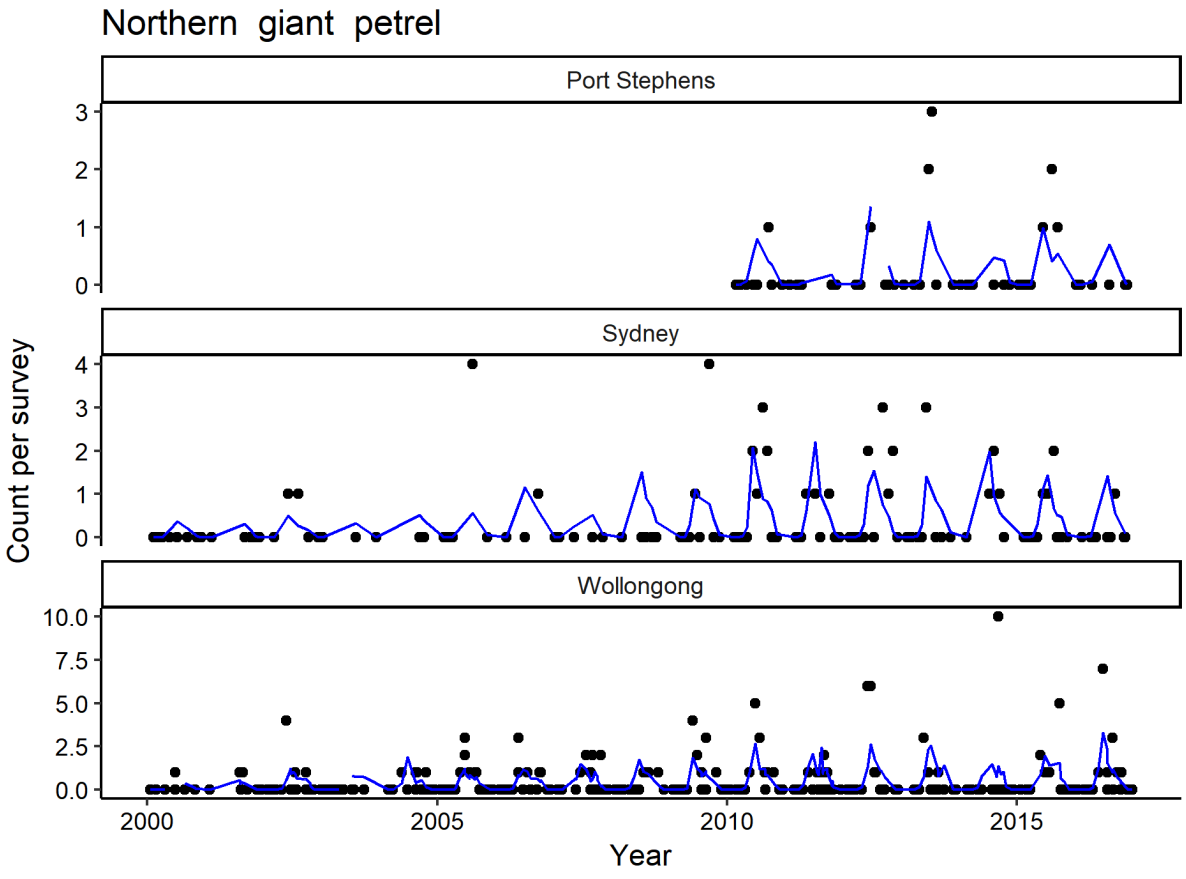

Gould's petrel (non-significant)
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
5
10
15
2
4
6
2000
2005
2010
2015

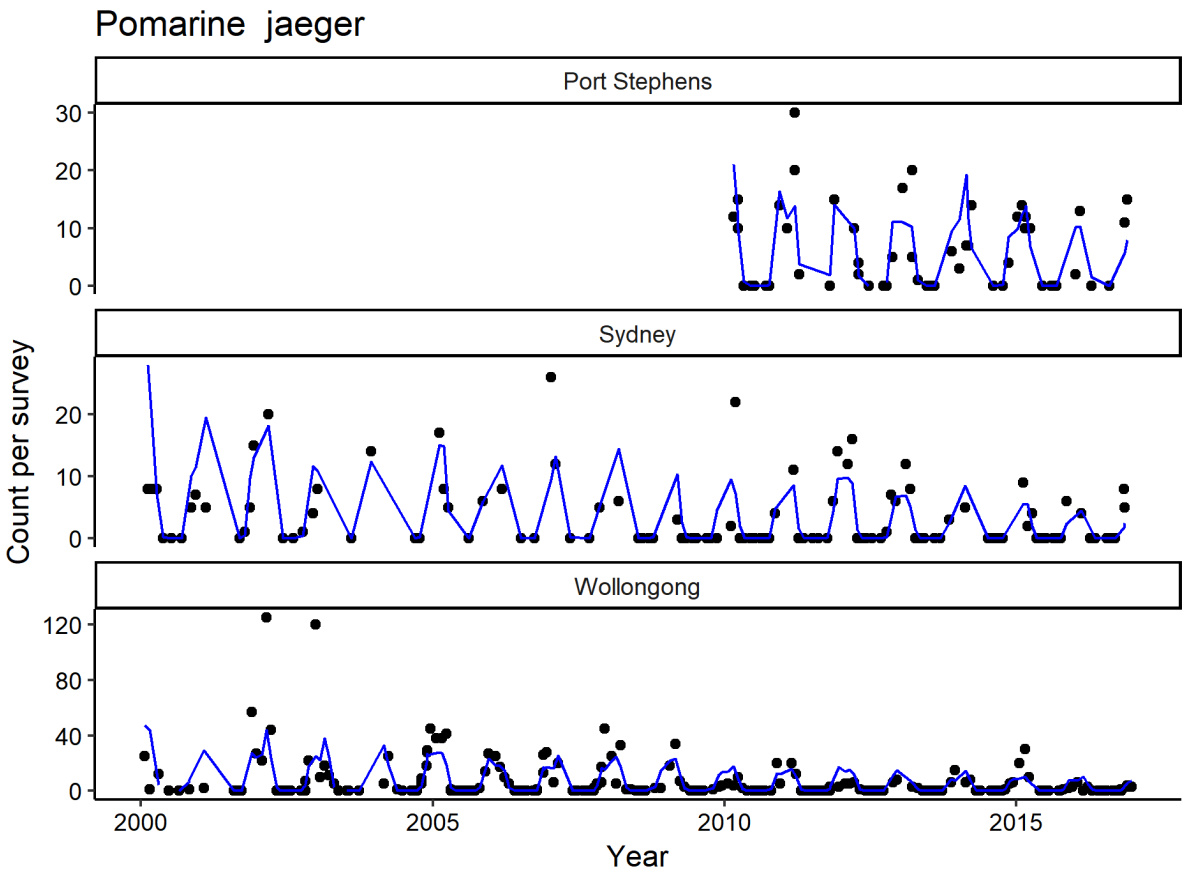

Grey-faced petrel
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
10
20
30
40
50
100
150
200
250
2000
2005
2010
2015

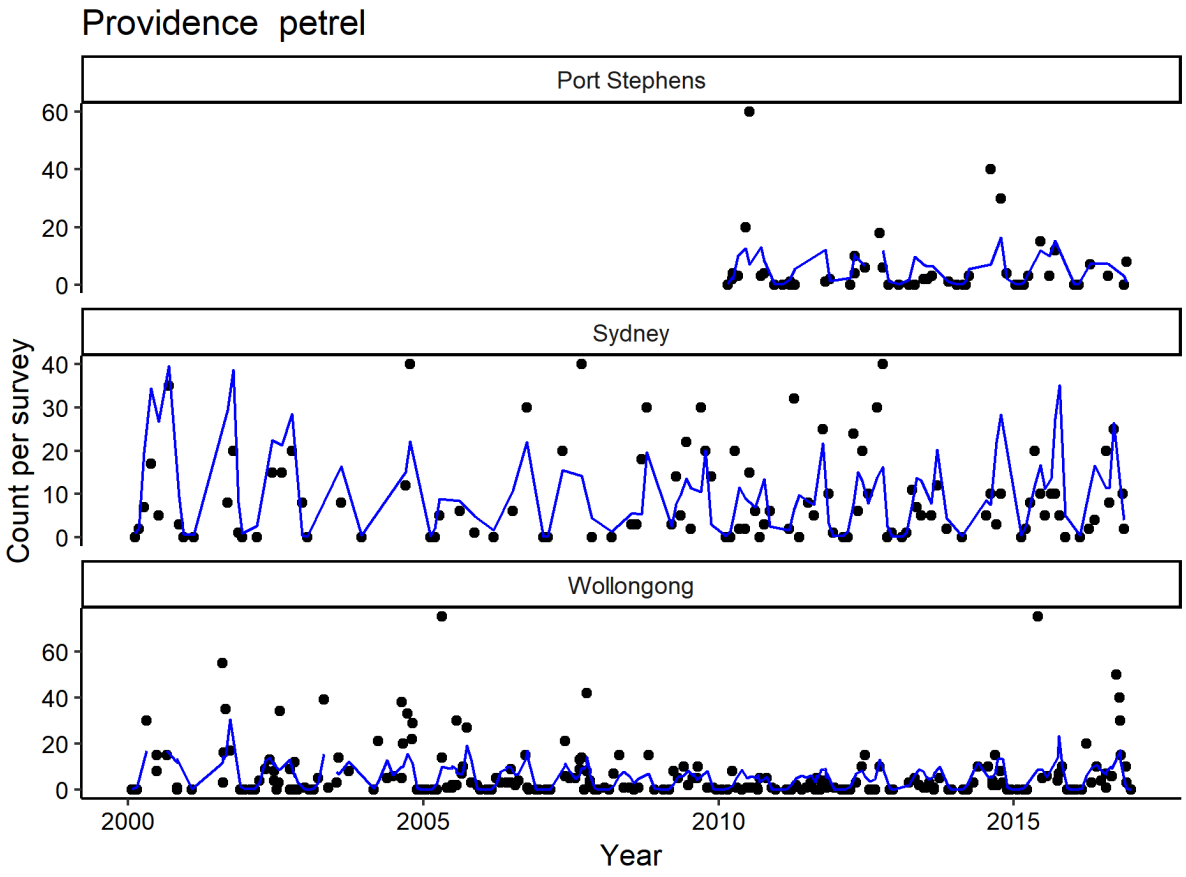

Hutton's shearwater
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
20
40
60
250
500
750
1000
1250
200
400
600
2000
2005
2010
2015

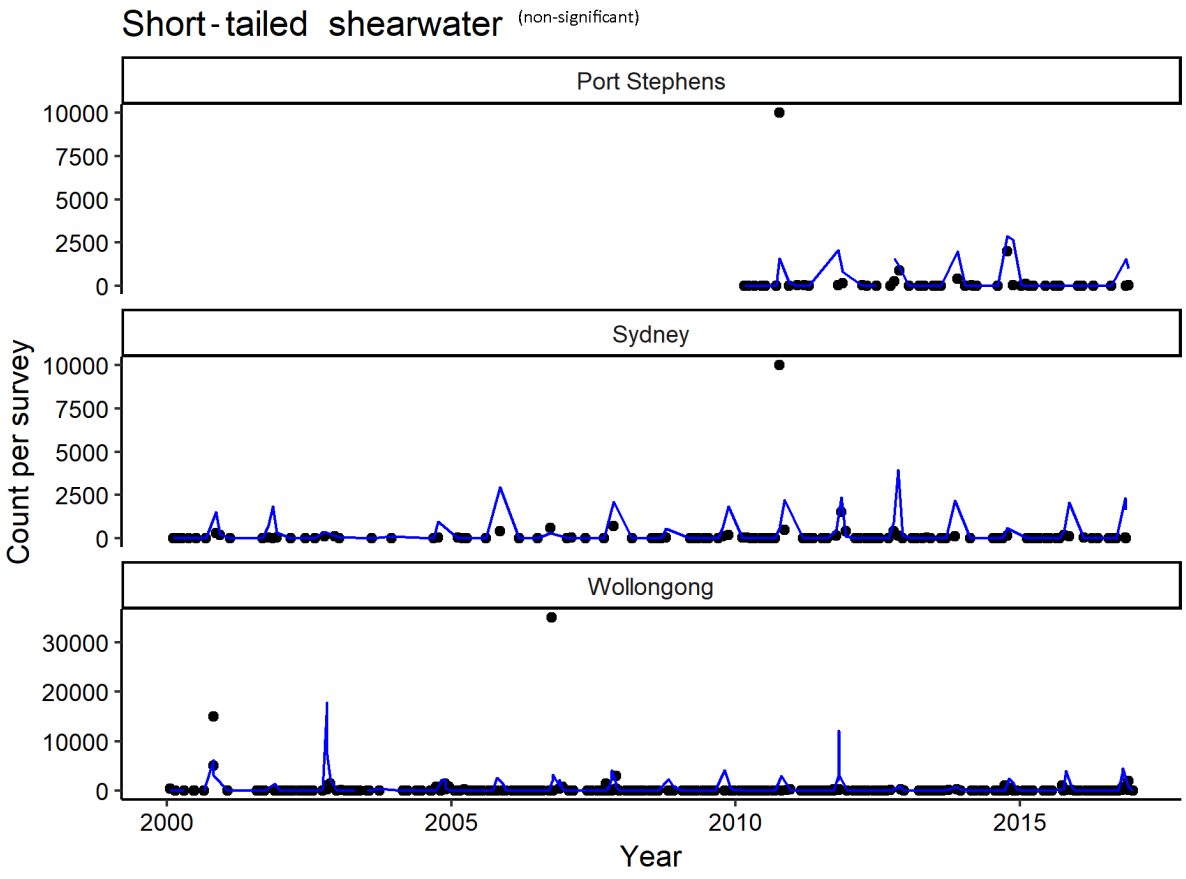

Indian yellow-nosed albatross
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
50
100
20
40
60
150
2000
2005
2010
2015

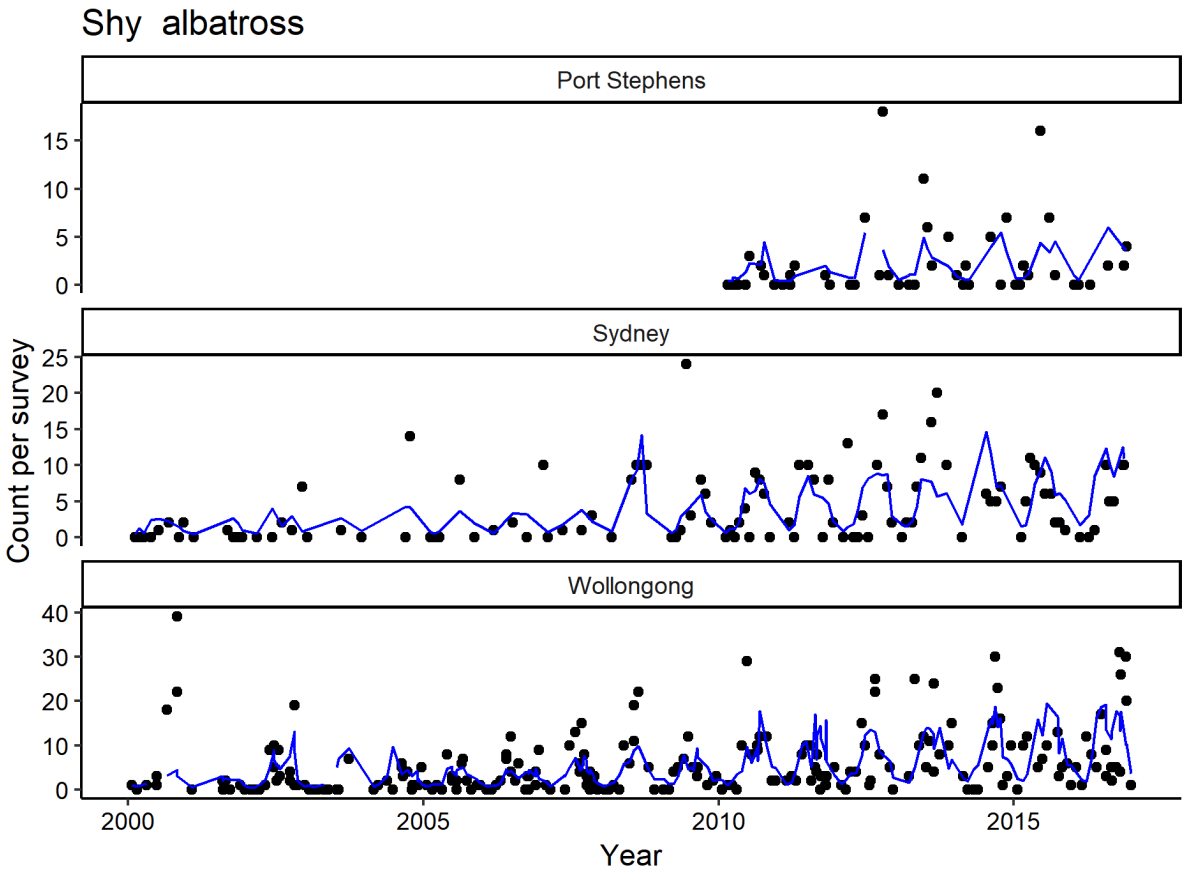

Long-tailed jaeger (non-significant)
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

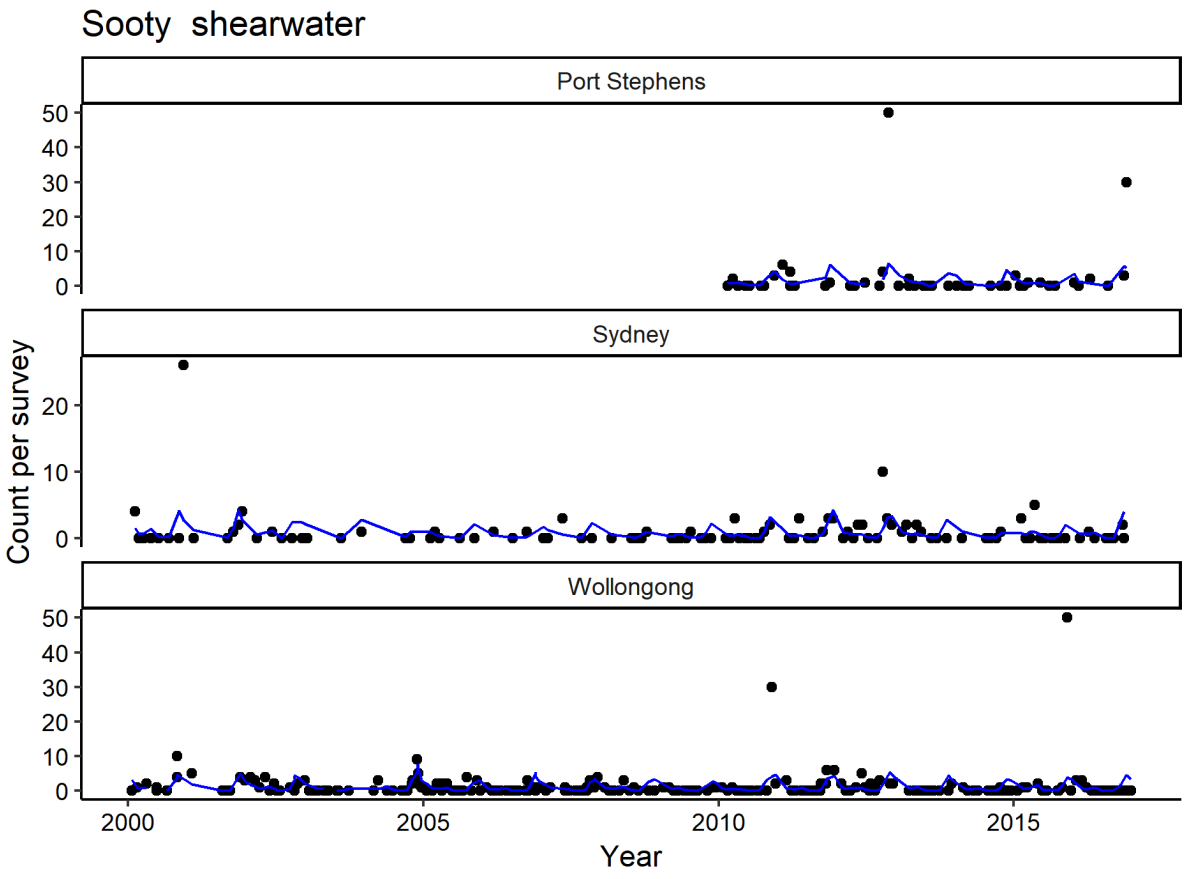

Northern giant petrel
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

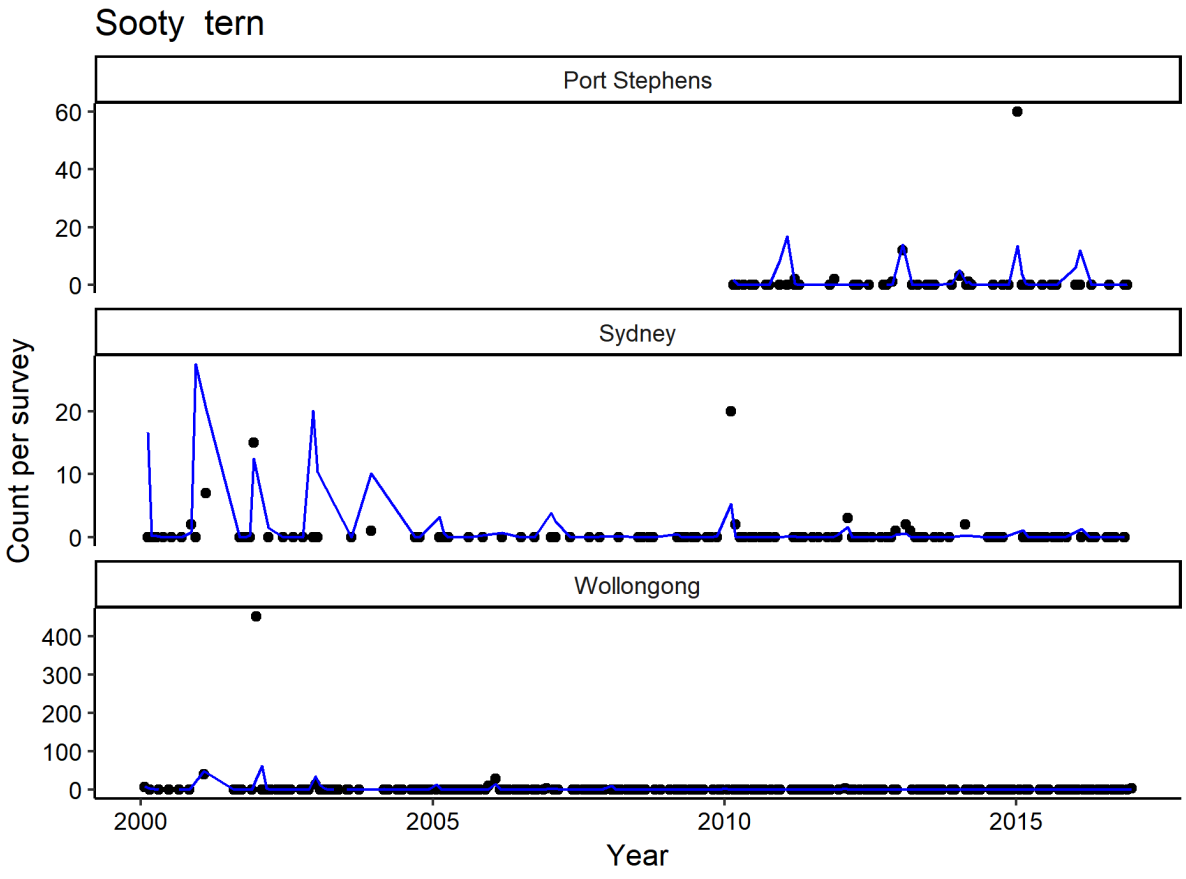

Pomarine jaeger
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
10
20
30
40
80
120
2000
2005
2010
2015

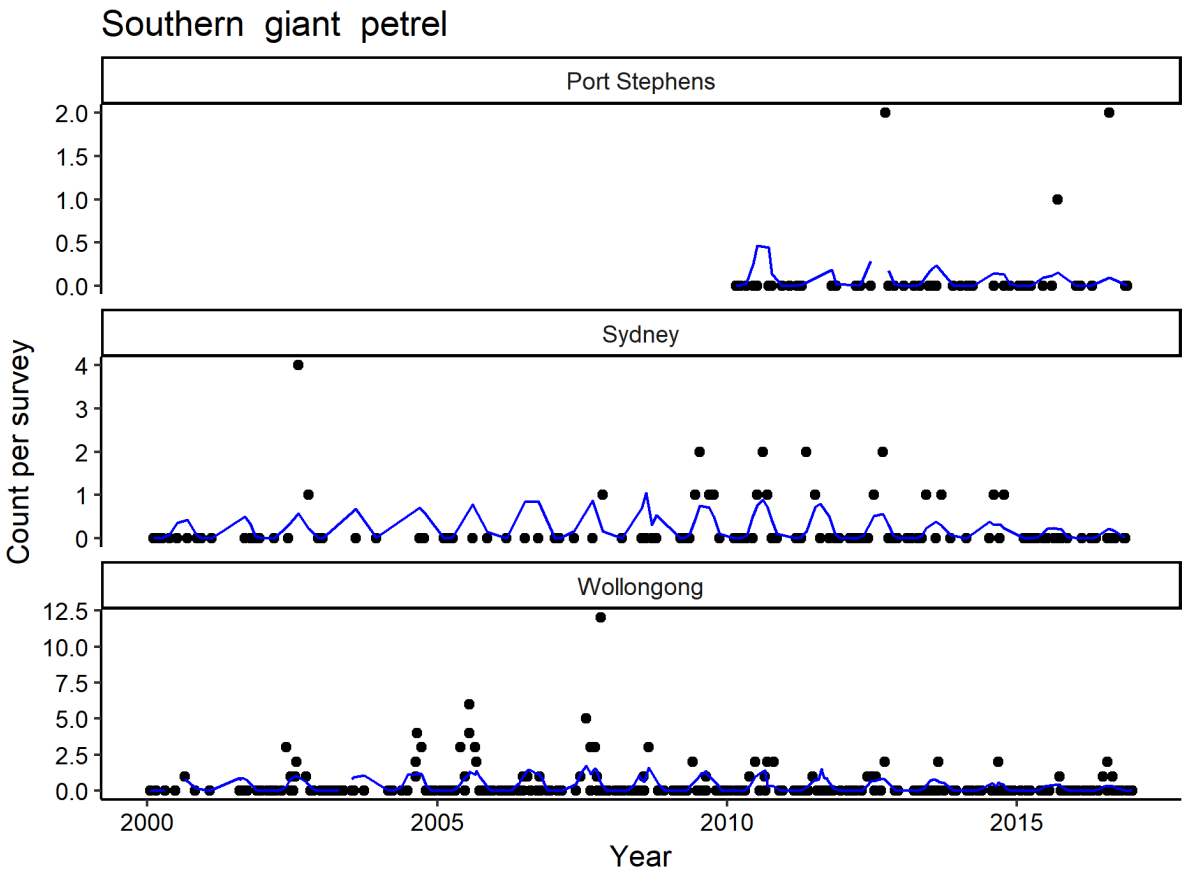

Providence petrel
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
10
20
30
40
60
2000
2005
2010
2015

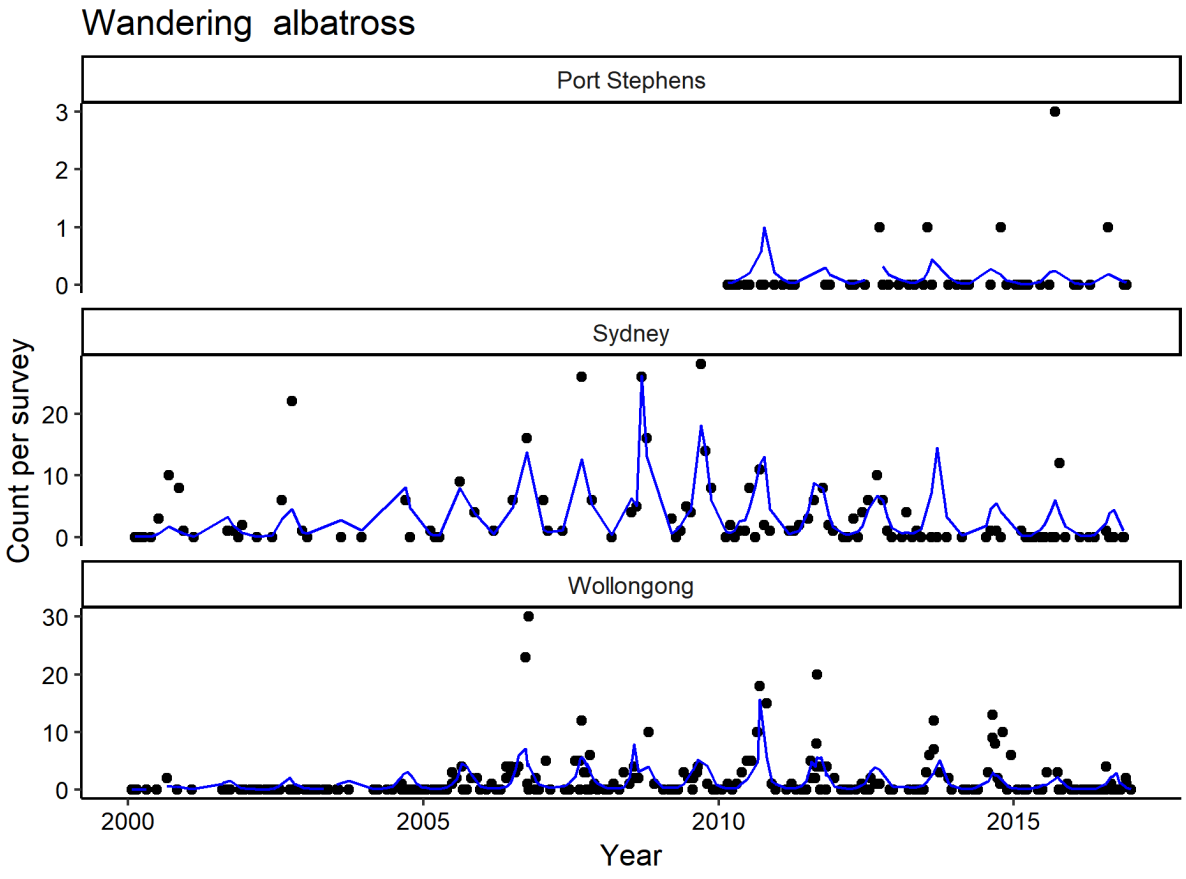

Short-tailed shearwater (non-significant)
Port Stephens
Sydney
Wollongong
Count per survey
10000
7500
5000
2500
0
30000
20000
2000
2005
2010
2015
Year

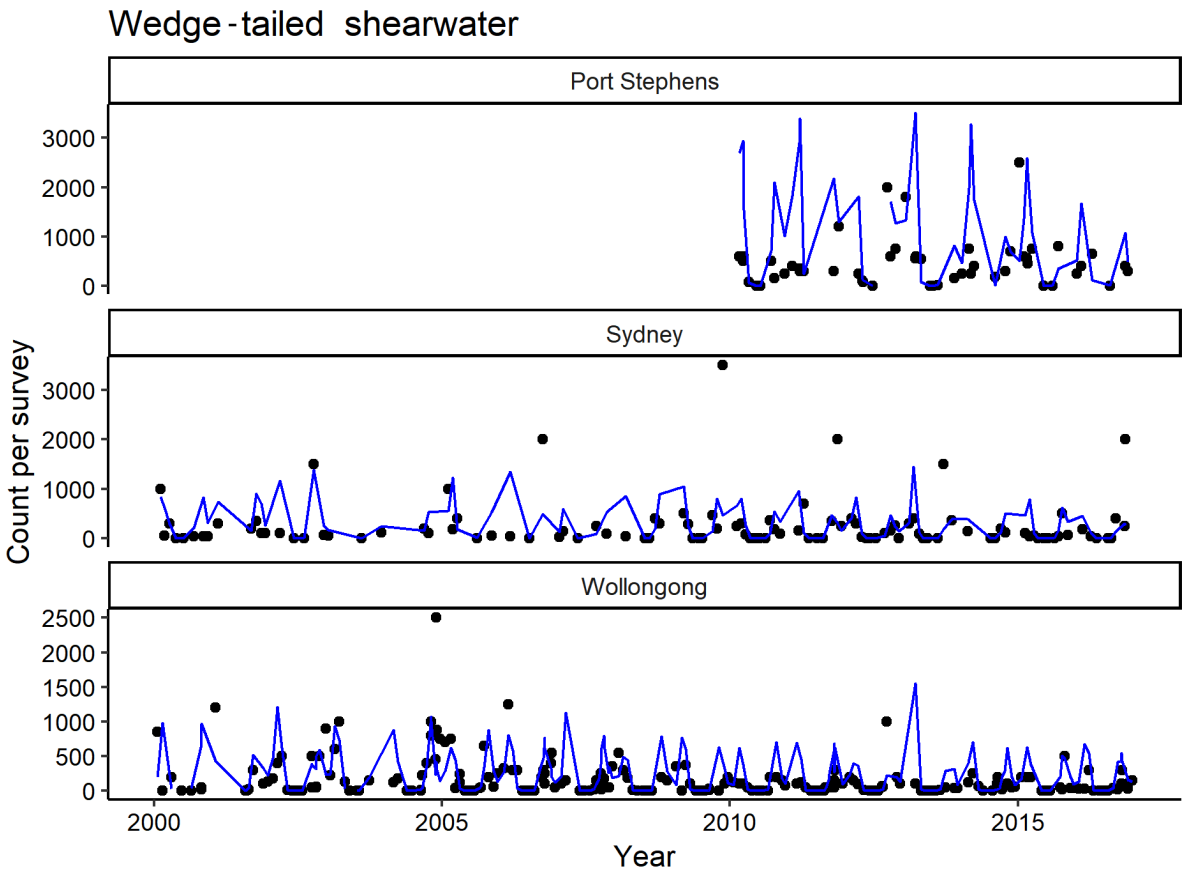

Shy albatross
Port Stephens
Sydney
Wollongong
Count per survey
15
10
5
0
25
20
40
30
2000
2005
2010
2015
Year

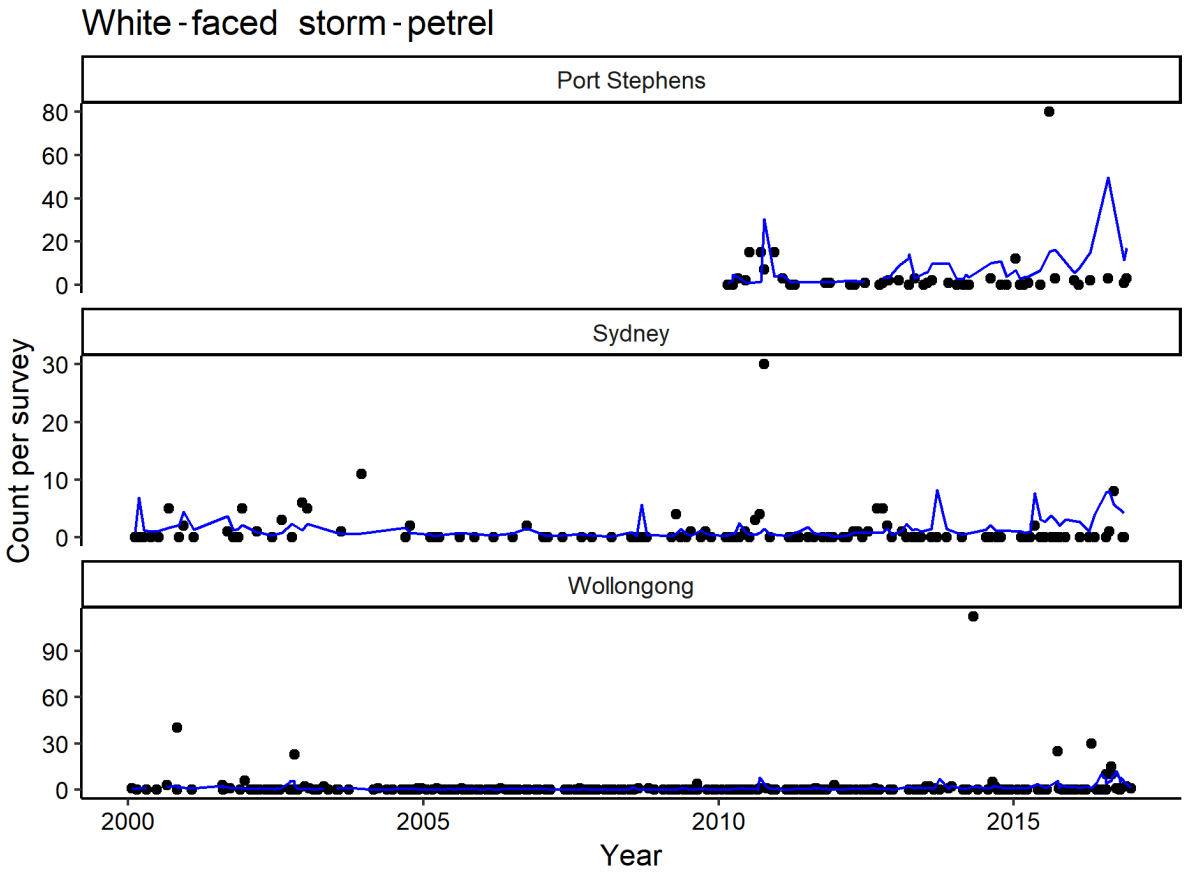

Sooty shearwater
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

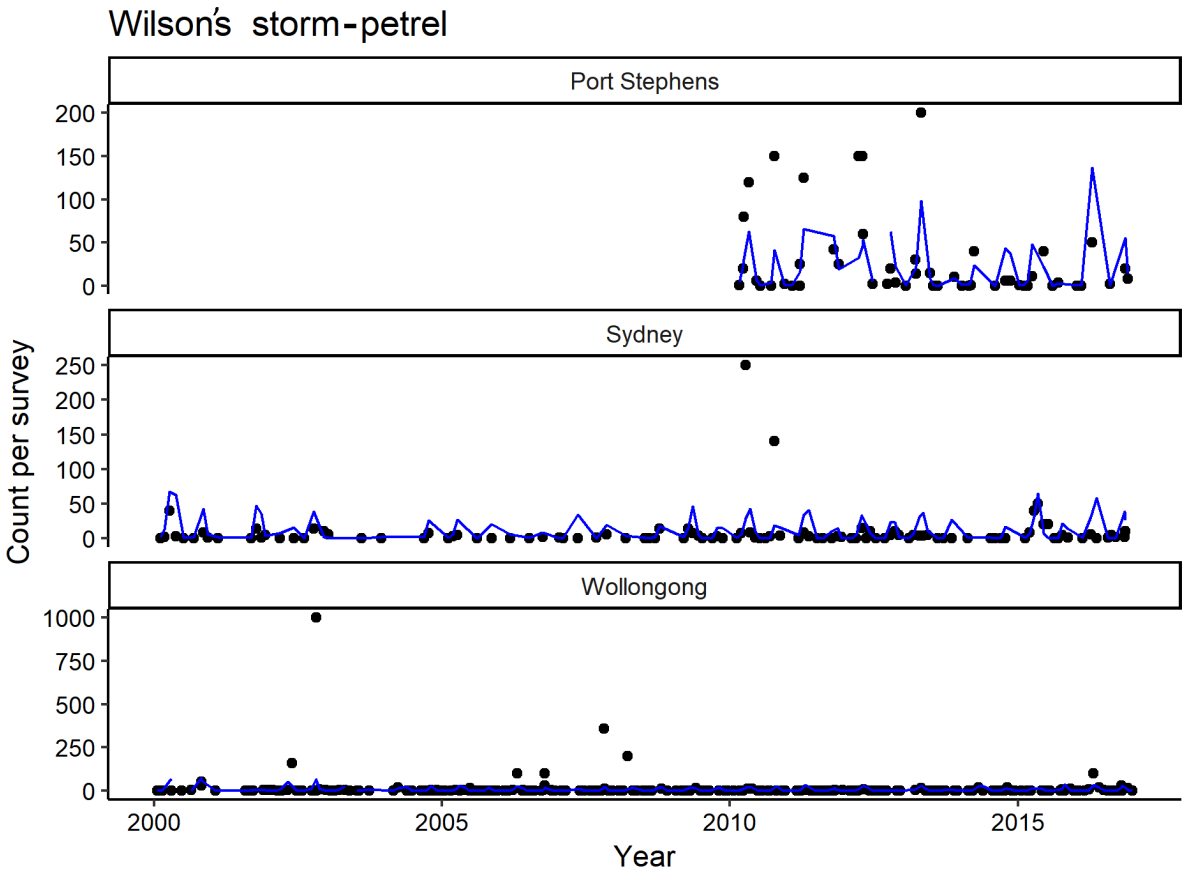

Sooty tern
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015


Southern giant petrel
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

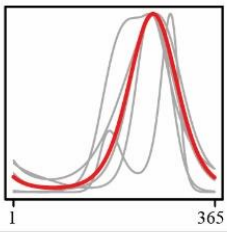
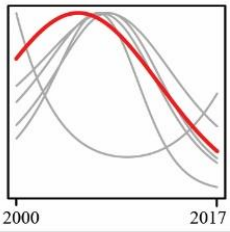
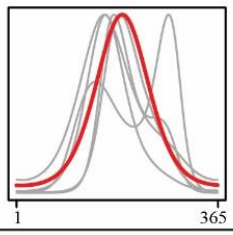
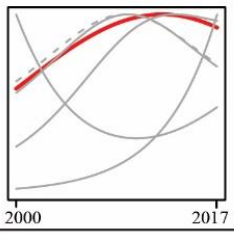
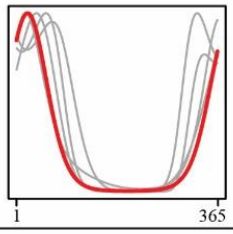
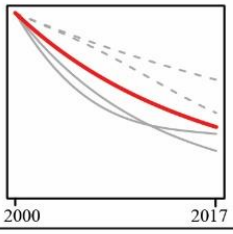
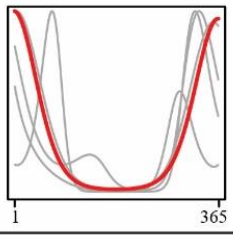
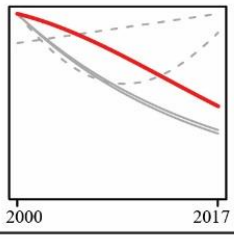
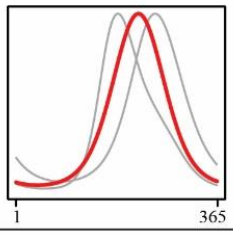
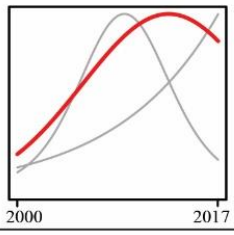
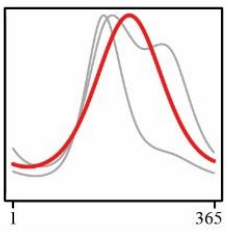
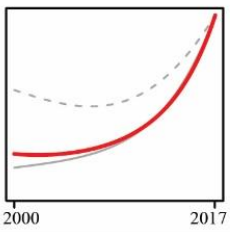

Wandering albatross
Port Stephens
Sydney
Wollongong
Count per survey
Year
2000
2005
2010
2015

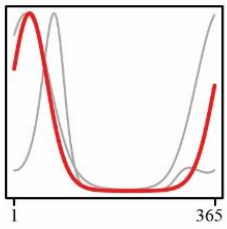
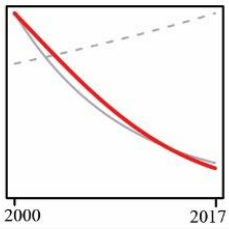
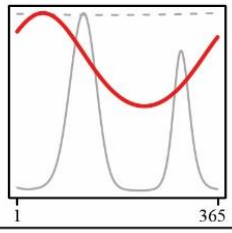
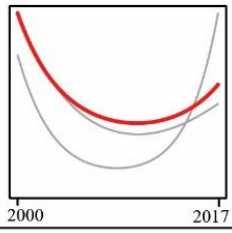
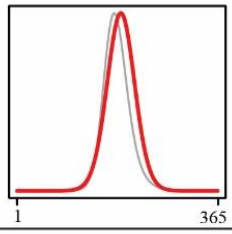
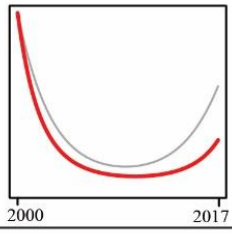
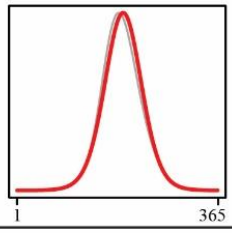
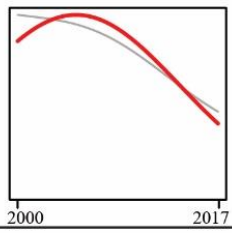
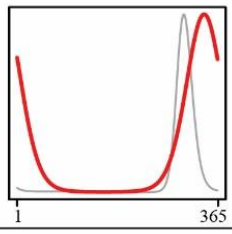
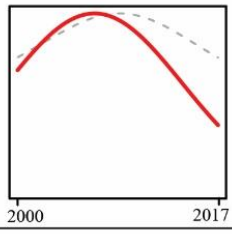
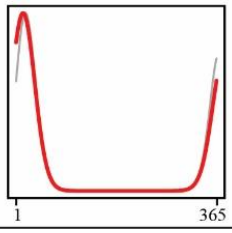
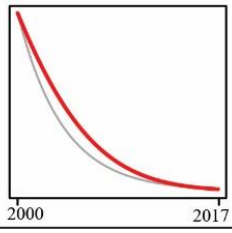

Wedge-tailed shearwater
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
1000
2000
3000
500
1500
2500
2000
2005
2010
2015


White-faced storm-petrel
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
20
40
60
80
10
30
90
2000
2005
2010
2015


Wilson's storm-petrel
Port Stephens
Sydney
Wollongong
Count per survey
Year
0
50
100
150
200
250
500
750
1000
2000
2005
2010
2015

Species Archetype Modelling

a) Archetype	Day-of-year	Time	SST anom.	Chl.	EKE	Wind speed
Archetype 1: Antipodean Albatross Cape Petrel Fluttering Shearwater Hutton's Shearwater Southern Giant Petrel			−0.052	−0.077	0.039	0.025
Archetype 2: Australasian Gannet Brown Skua Buller's Albatross Northern Giant Petrel Providence Petrel			0.045	0.139	−0.041	0.076
Archetype 3: Arctic Jaeger Buller's Shearwater Long-tailed Jaeger Pomarine Jaeger			−0.22	−0.027	−0.015	0.043
Archetype 4: Black Petrel Grey-faced Petrel Sooty Shearwater Wedge-tailed Shearwater			0.029	0.057	−0.023	−0.025
Archetype 5: Black-browed Albatross Wandering Albatross			−0.082	0.129	−0.009	0.103
Archetype 6: Campbell Albatross Shy Albatross			−0.122	0.098	−0.096	0.27

b) Archetype	Day-of-year	Time	SST anom.	Chl.	EKE	Wind speed
Archetype 7: Flesh-footed Shearwater Gould's Petrel			0.40	−0.158	0.022	0.028
Archetype 8: White-faced Storm-petrel Wilson's Storm-petrel			0.31	0.5	−0.30	0.189
Archetype 9: Fairy Prion			−0.25	0.27	0.029	0.133
Archetype 10: Indian Yellow-nosed Albatross			−0.119	0.149	−0.087	0.031
Archetype 11: Short-tailed Shearwater			0.31	0.160	0.204	0.7
Archetype 12: Sooty Tern			0.9	−0.32	0.098	−0.4

Interpretation:

- "Archetype" represents seabird groups (note single-species groups cannot be compared with multi-species groups)
- "Day-of-year" represents intra-annual trend (grey = species response, red = group response)
- "Time" represents the intra-annual trend (grey = species response, red = group response)
- "SST anom" represents group correlation with sea-surface temperature anomaly (or departure from average SST). Positive values reflect warmer-than-average water, negative reflect cooler-than-average water.
- "Chl." represents group correlation with chlorophyll a concentrations; higher values represent higher concentrations.
- "EKE" represents group responses to eddy kinetic energy, a measure of ocean current strength. Higher values represent stronger currents.
- "Wind speed": higher values represent stronger wind speeds.

Dashed grey lines indicate non-significant responses to time, and font size is proportional to magnitude of values (e.g. Chl. is most important for archetype 8).