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Modelling anthropogenic loads

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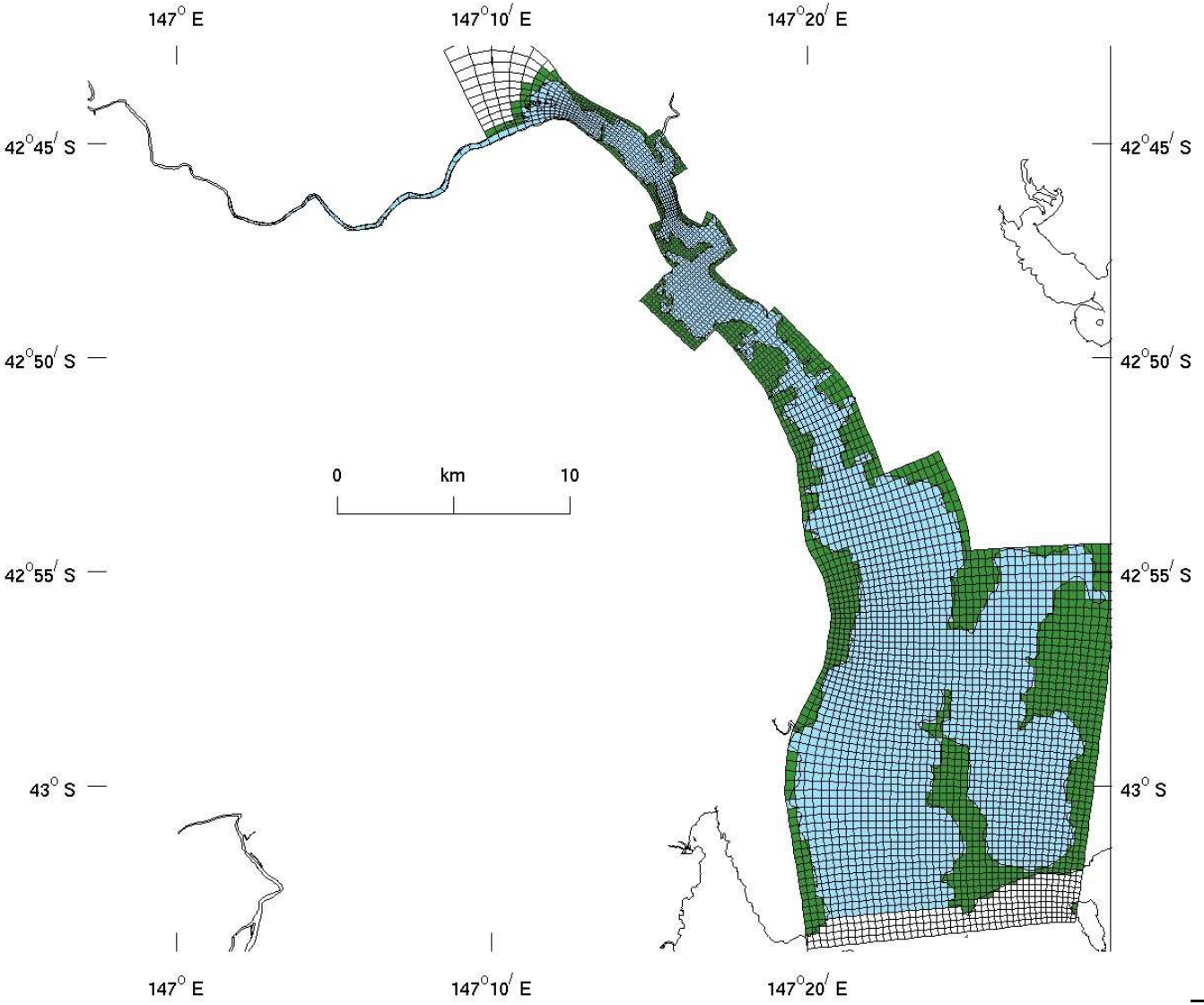
Environmental Modelling Group

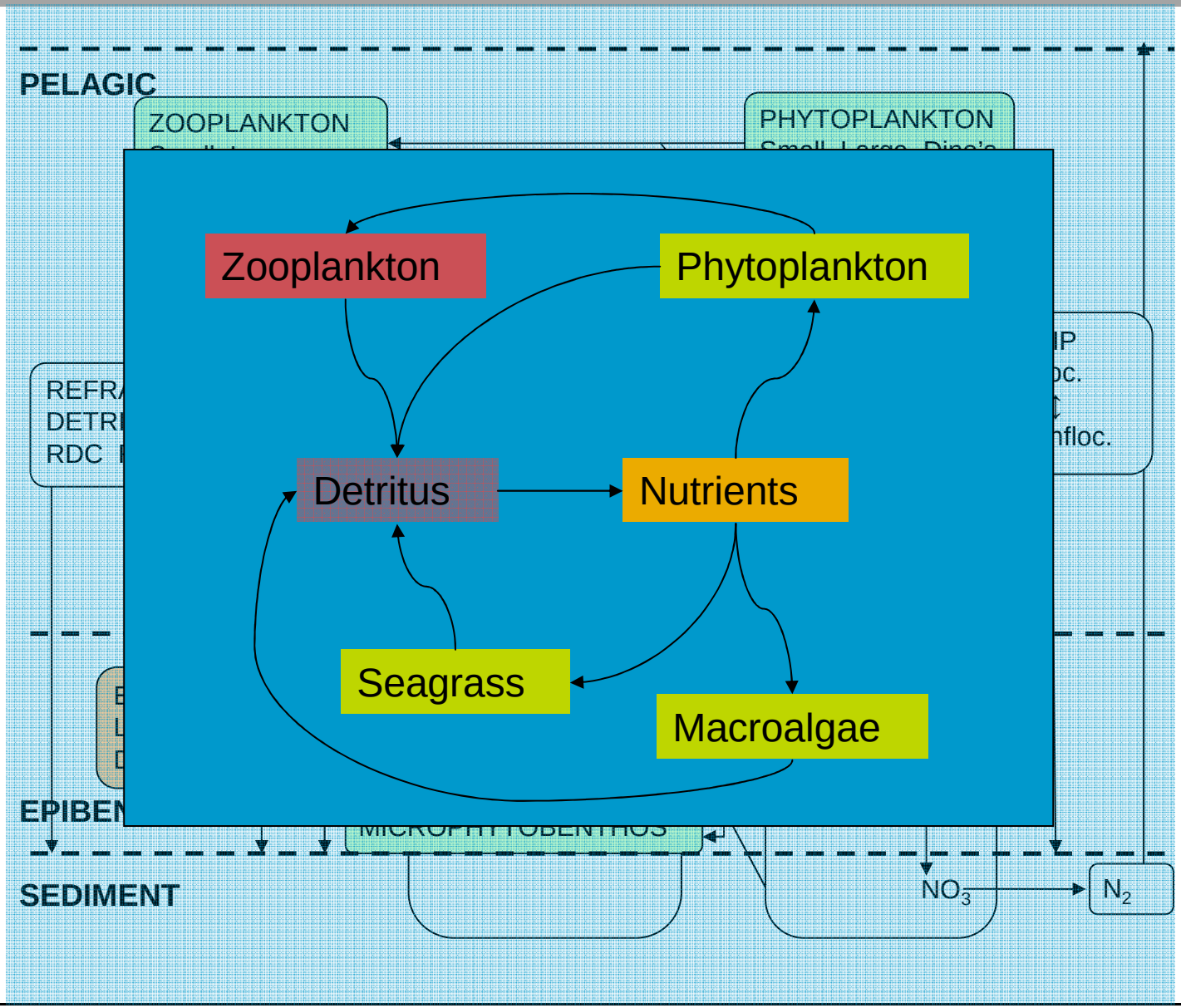
Derwent Estuary Program

CSIRO

Derwent River Estuary

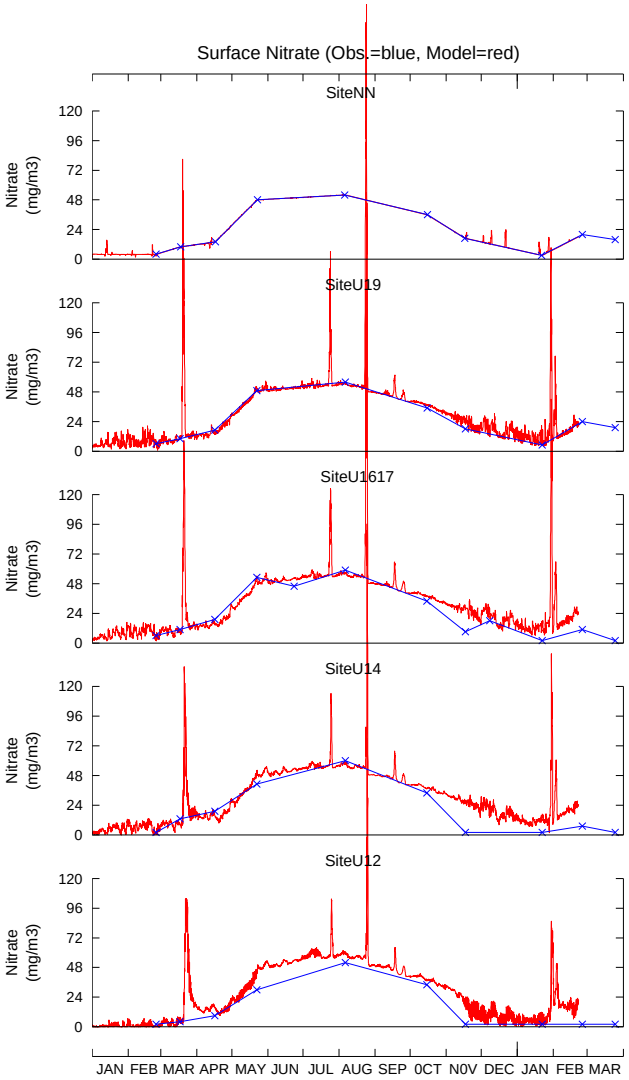


Biogeochemical Model

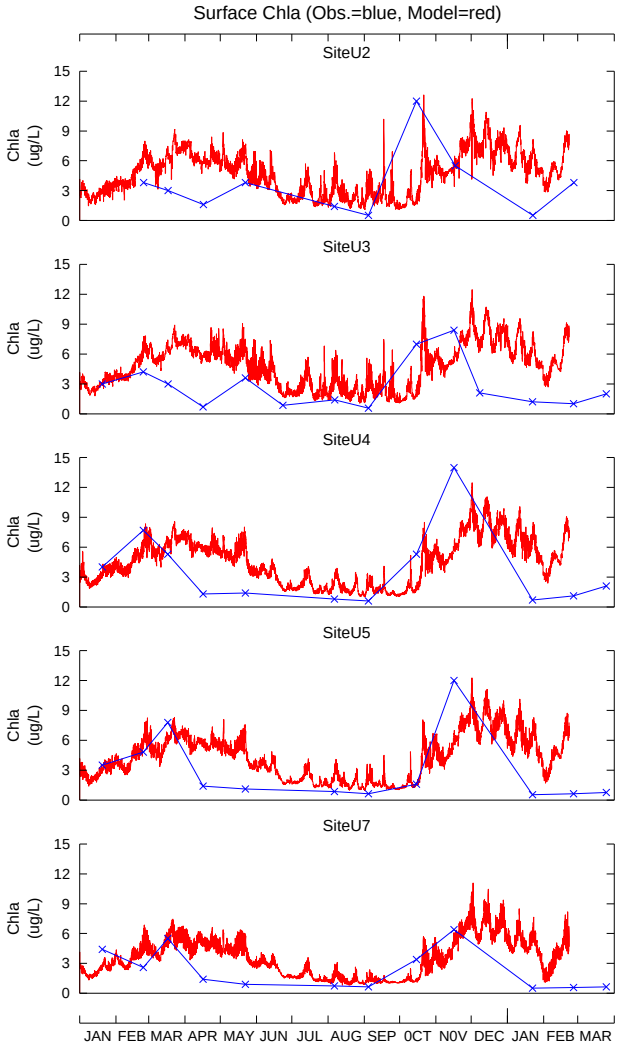


Model/observation

NOx

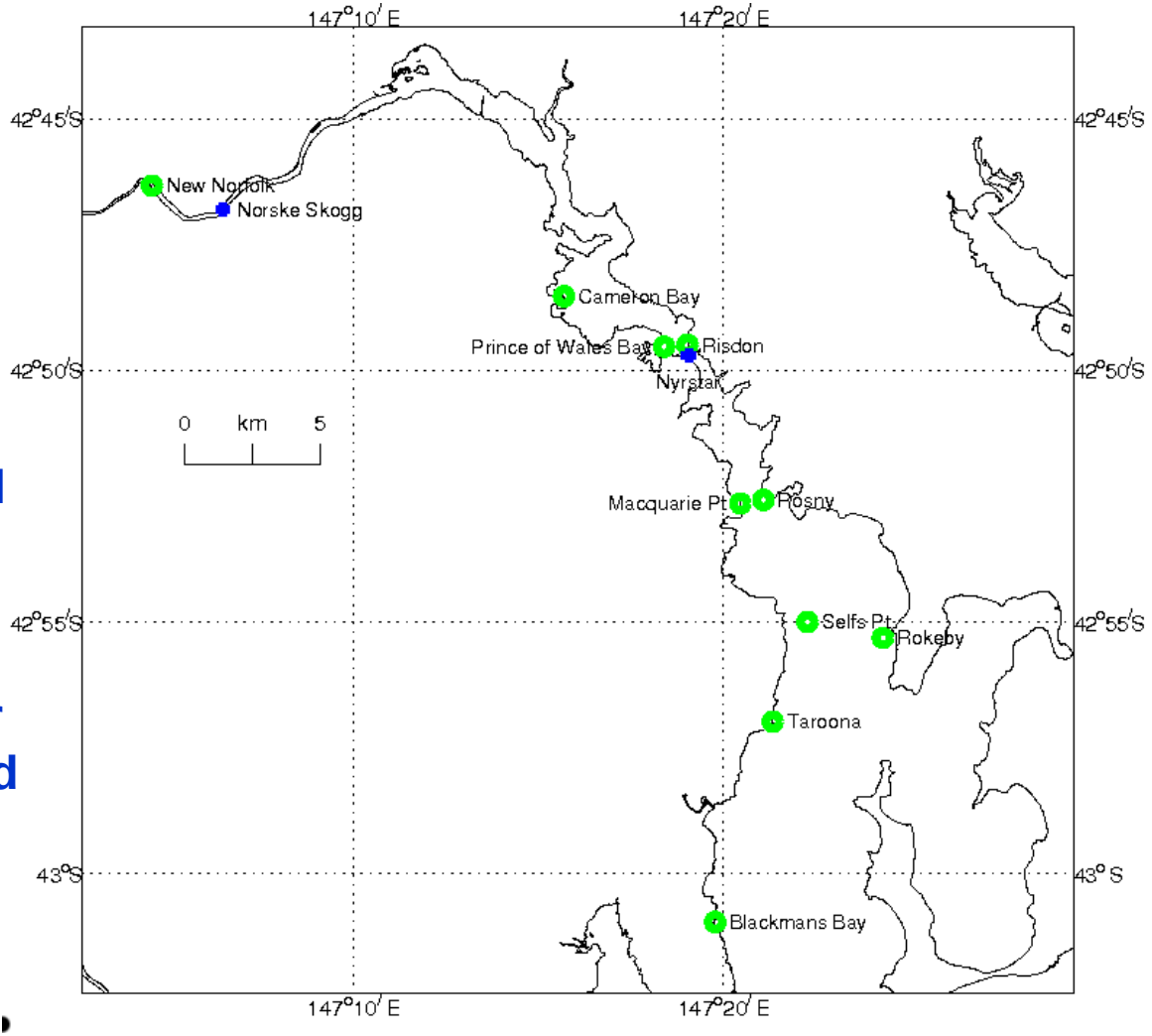


Chl

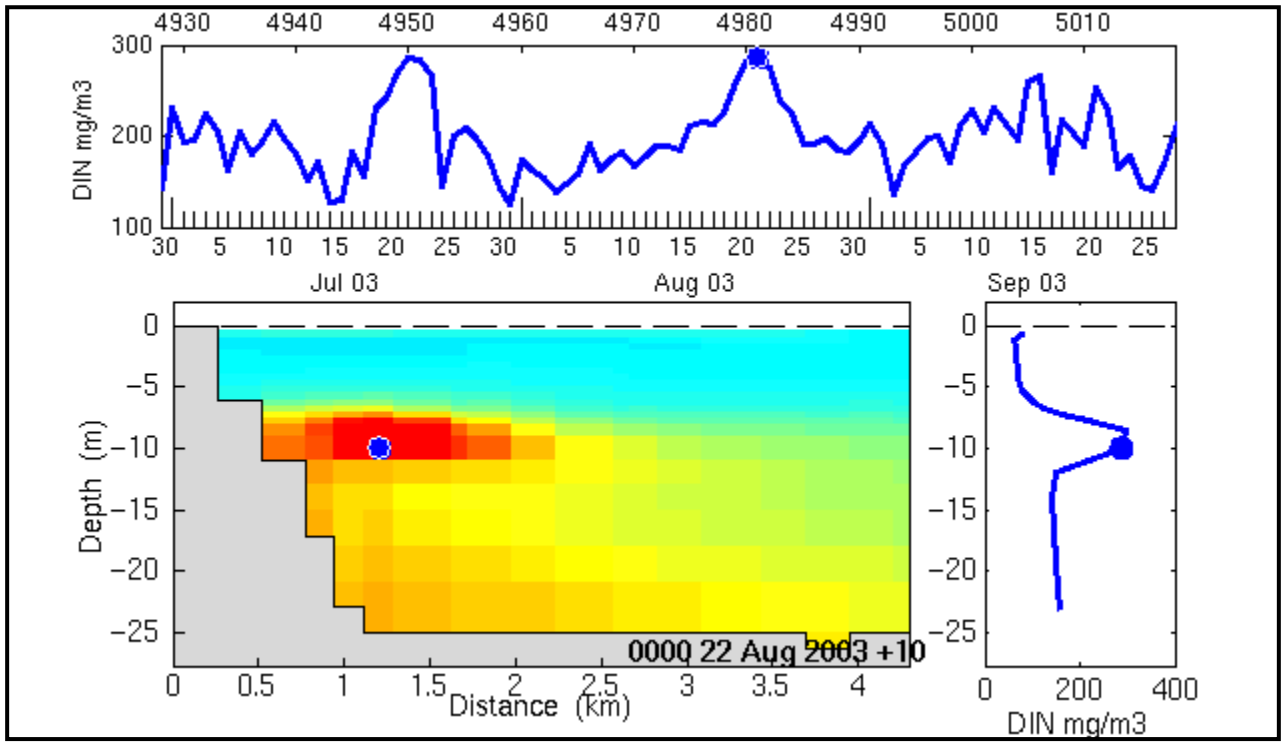


Sewerage Treatment Plant Data

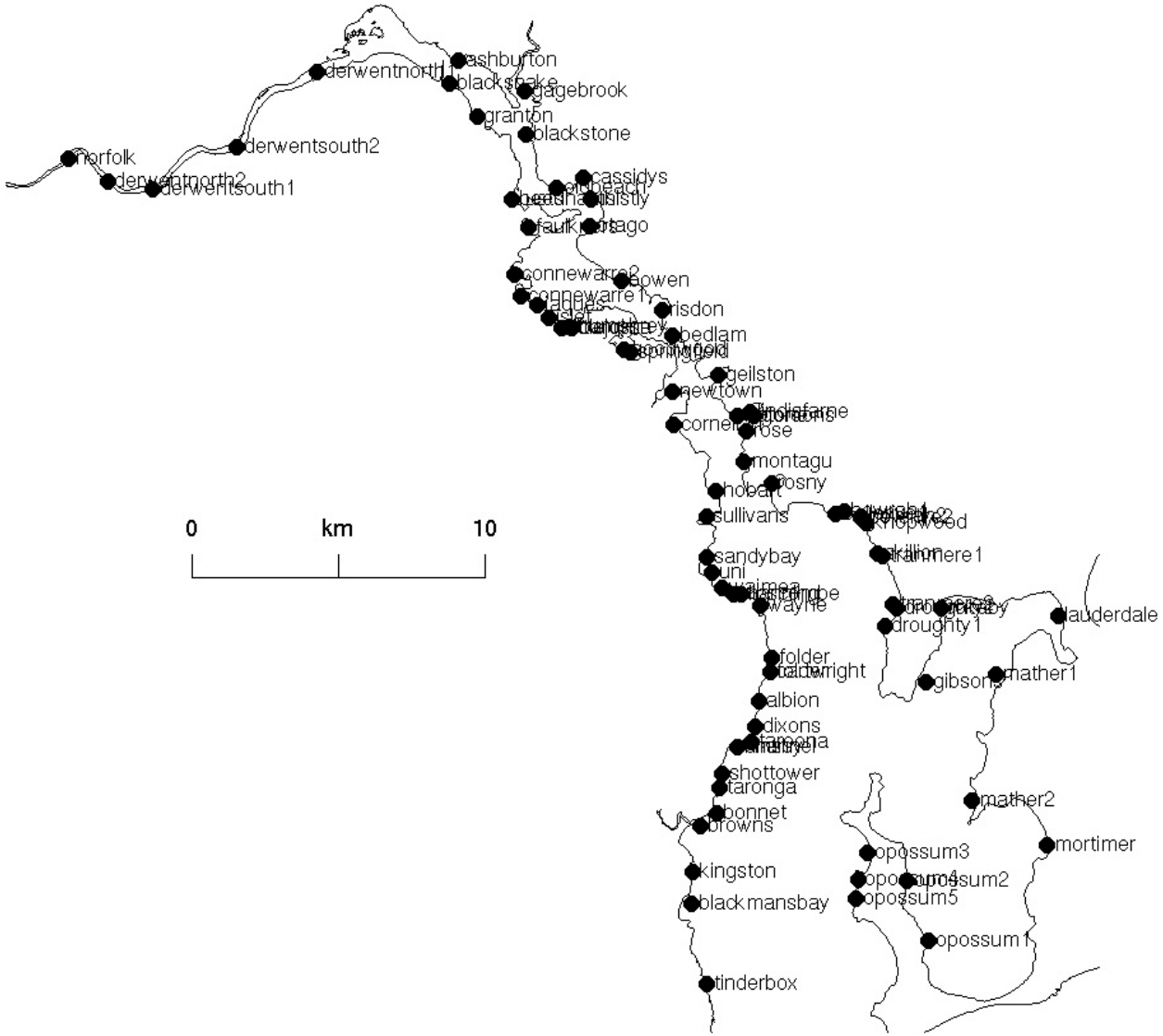
- **Dissolved & Particulate Loads**
- **NH4, NO3, DIP Detrital N+P**
- **Total dissolved N for all STP : 30-42 t per month for 2003**
- **Also shown are 2 major industrial sites (Pulp and Zinc mills)**



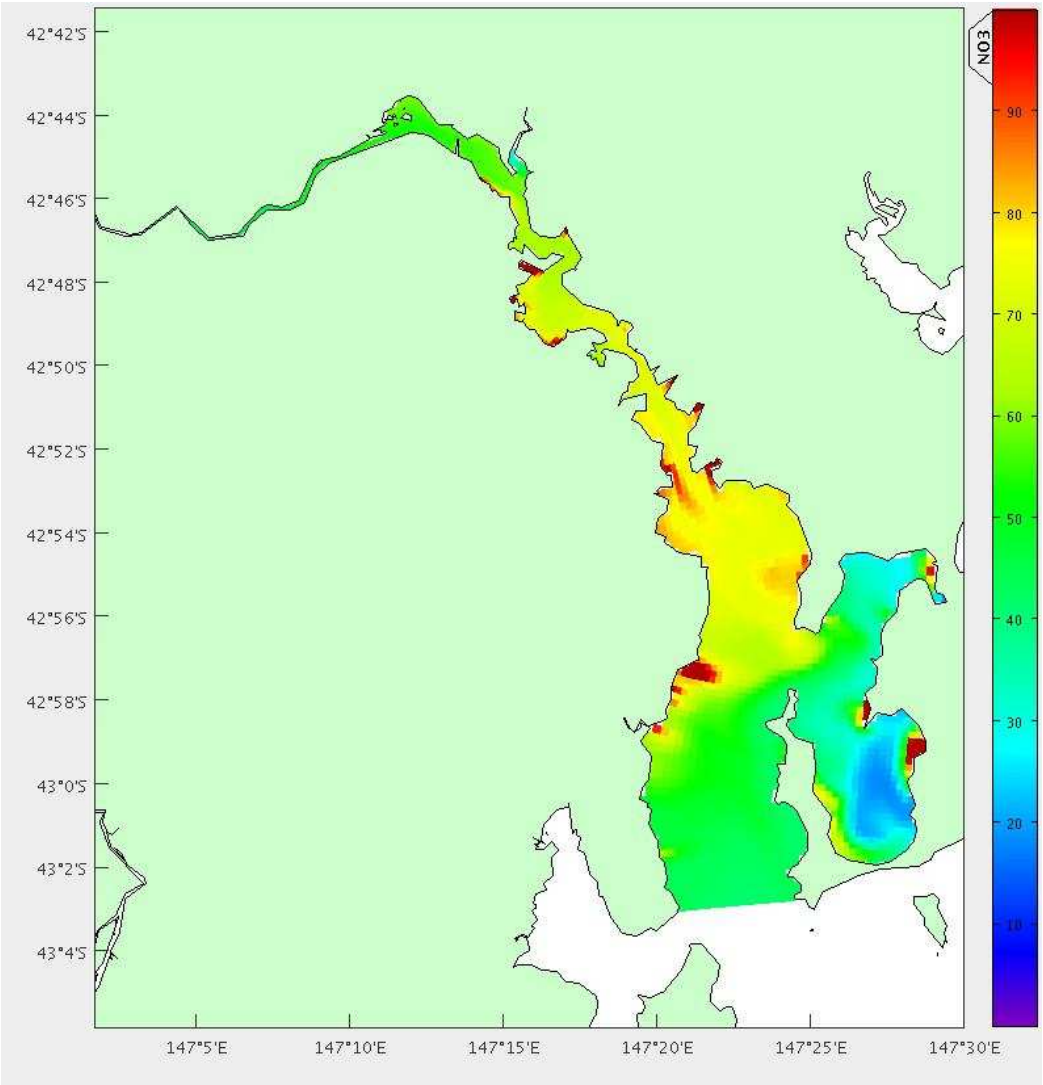
STP


4930
4940
4950
4960
4970
4980
4990
5000
5010
300
200
100
DIN mg/m3
30
5
10
15
20
25
30
5
10
15
20
25
30
5
10
15
20
25
Jul 03
Aug 03
Sep 03
0
−5
−10
−15
−20
−25
Depth (m)
0000 22 Aug 2003 +10
0
0.5
1
1.5
2
2.5
3
3.5
4
Distance (km)
0
200
400
DIN mg/m3

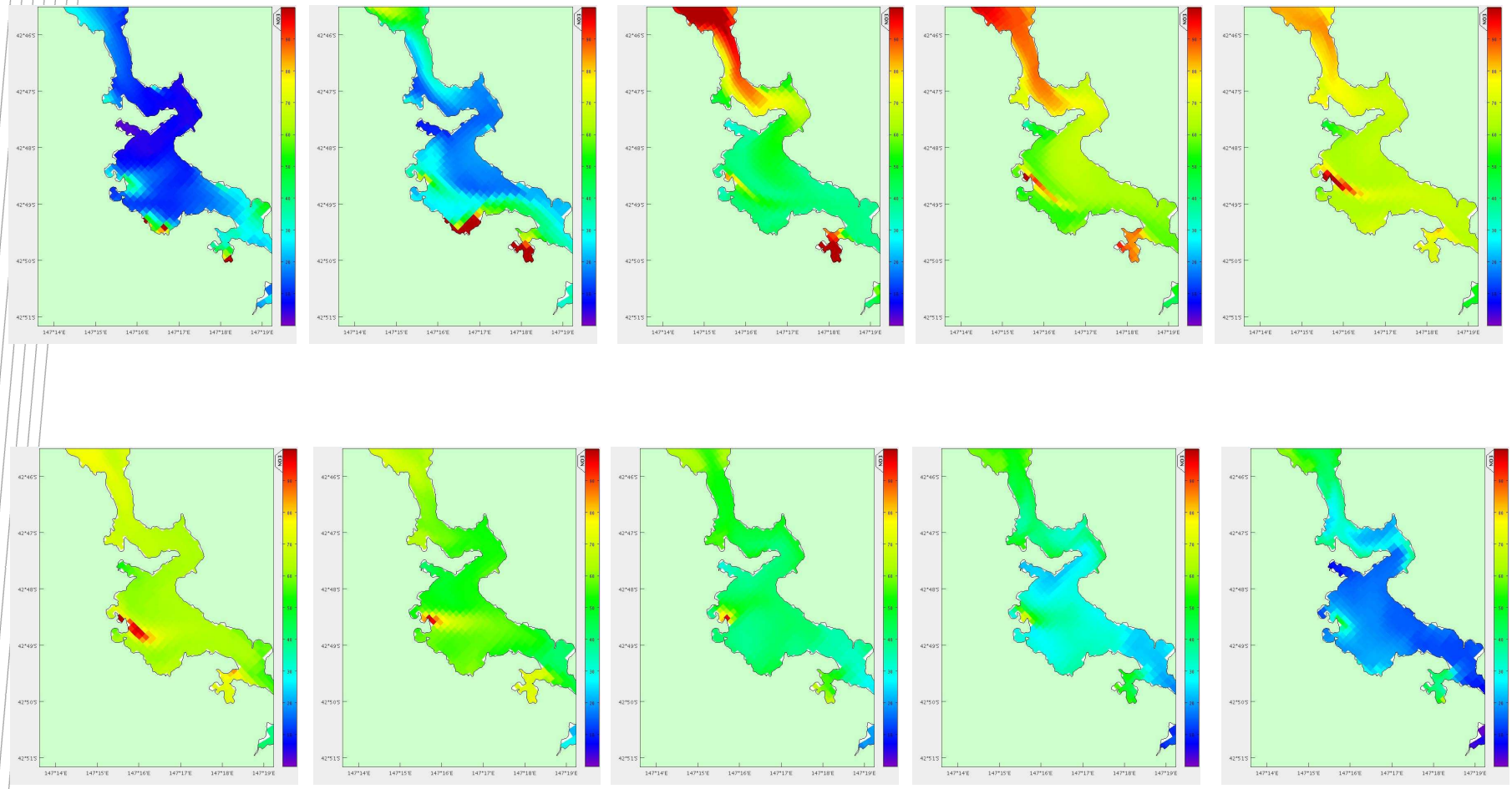
Stormwater


ashburton
derwentnorth1
blackshake
gagebrook
granton
blackstone
derwentsouth2
norfolk
derwentnorth2
derwentsouth1
cassidys
connewarre2
connewarre1
owen
risdon
bedlam
geilston
newtown
montagu
posny
sullivans
sandybay
wayne
folder
albion
dixons
shottower
taronga
bonnet
browns
kingston
blackmansbay
tinderbox
drought1
lauderdale
gibson
mather1
mather2
mortimer
opossum3
opossum2
opossum5
opossum1
0
km
10

Stormwater

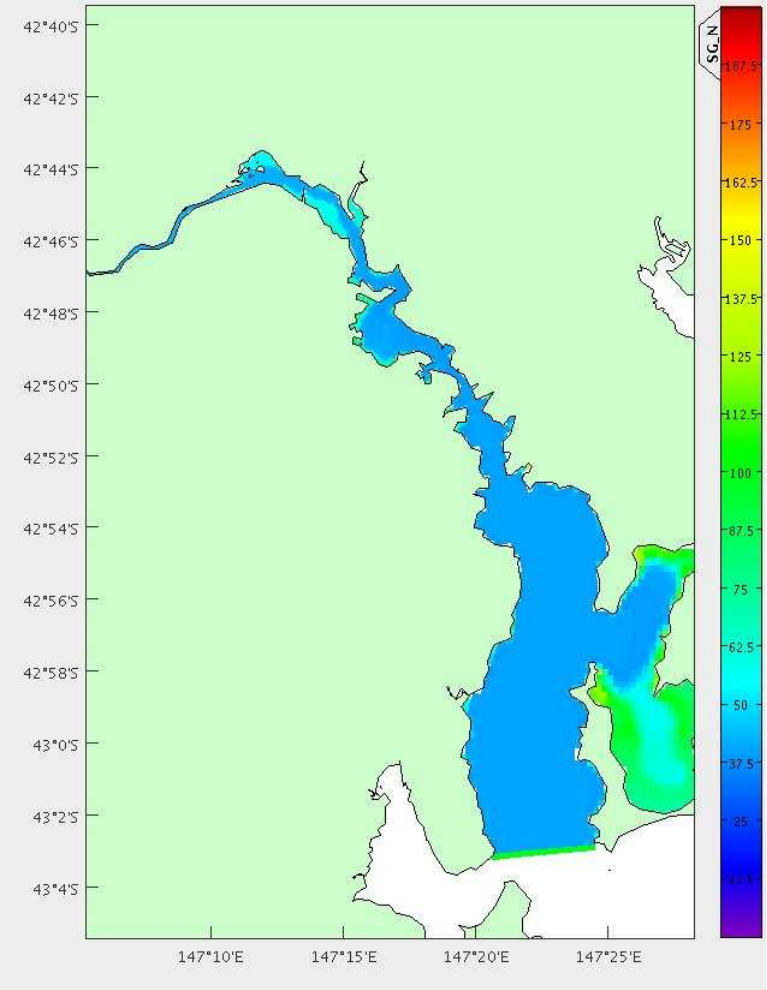

42°42'S
42°44'S
42°46'S
42°48'S
42°50'S
42°52'S
42°54'S
42°56'S
42°58'S
43°0'S
43°2'S
43°4'S
147°5'E
147°10'E
147°15'E
147°20'E
147°25'E
147°30'E
NO3
90
80
70
60
50
40
30
20
10

Stormwater sewage rain events

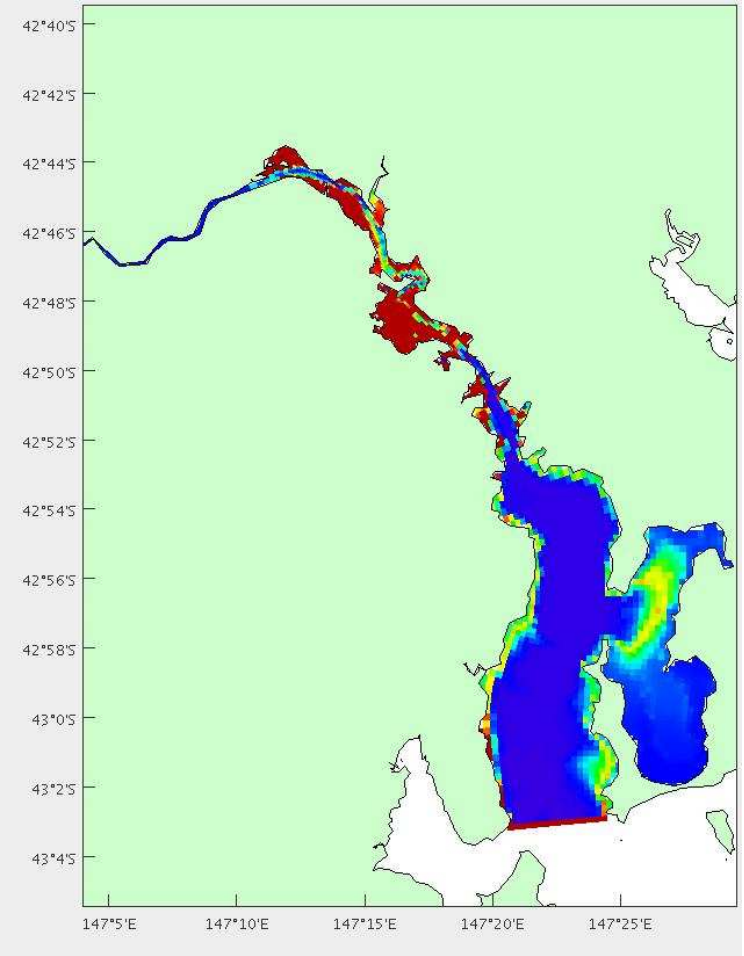


Nitrogen

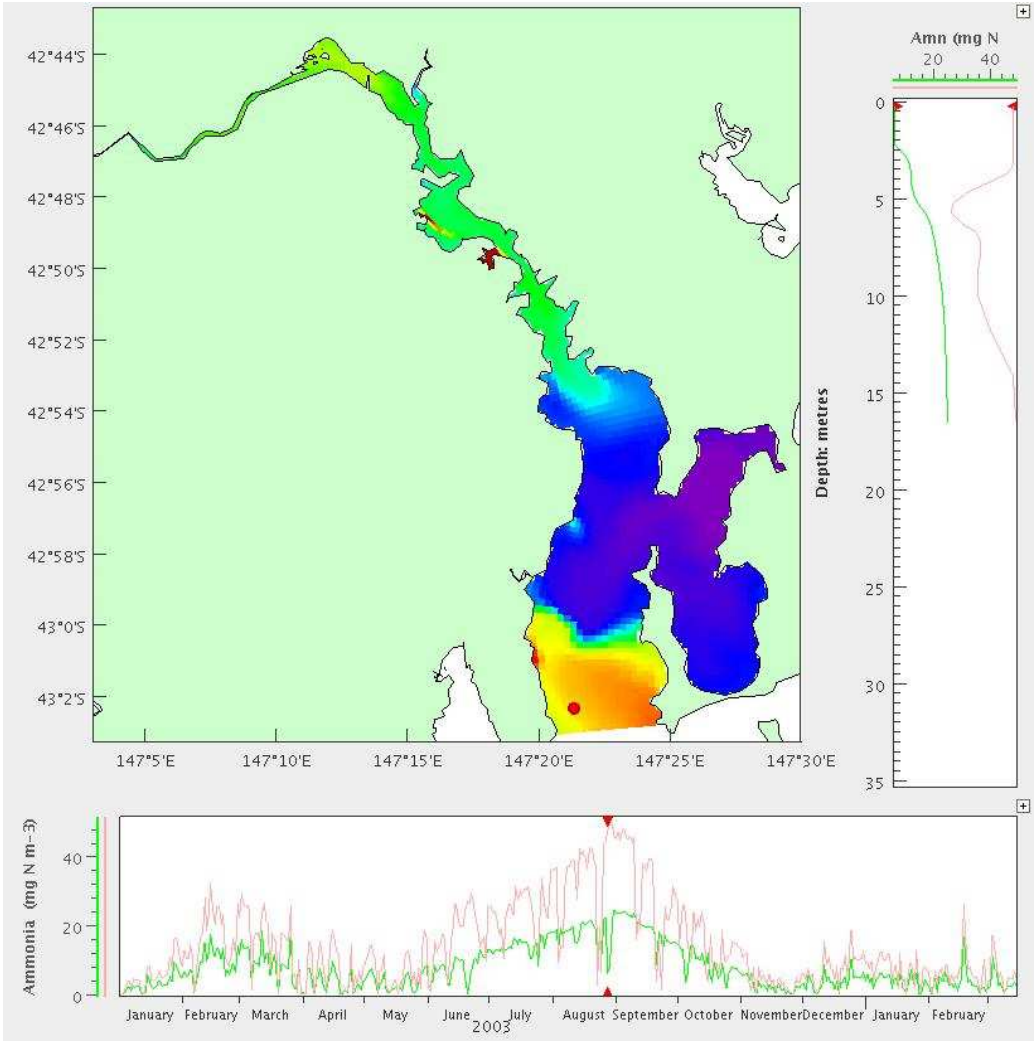
Seagrass



Macroalgae



Management scenarios



Estuarine Zinc Dynamics
(Margvelashvili et al 2005)

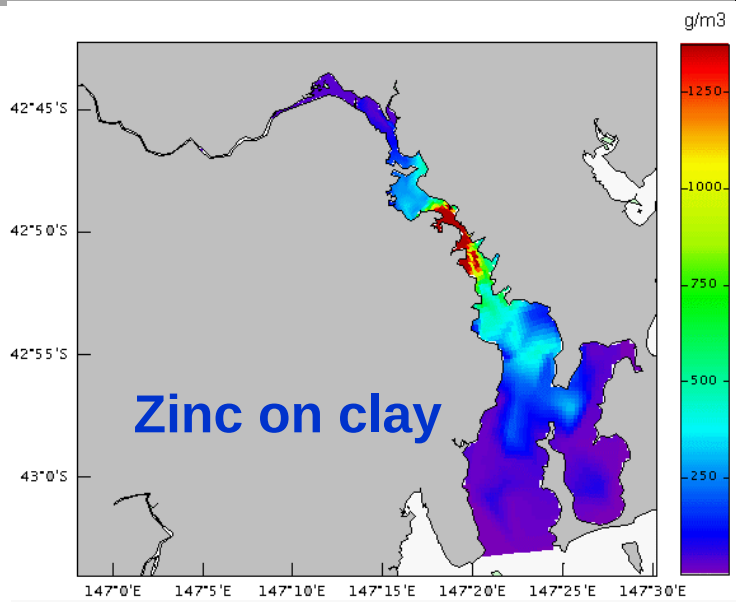
Dissolved Zinc

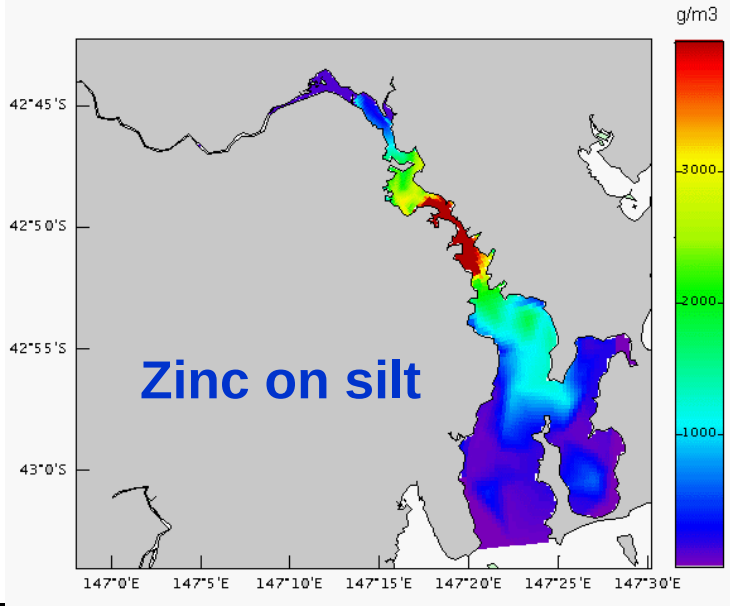
3D Transport, deposition & resuspension of clay & silt in water column & 2 bed layers

Cycling of Zn by adsorption-desorption onto fine particles

Forced with Derwent River sediment loads Calibrated against in-situ observations

Model reproduces observed zinc levels in the estuary

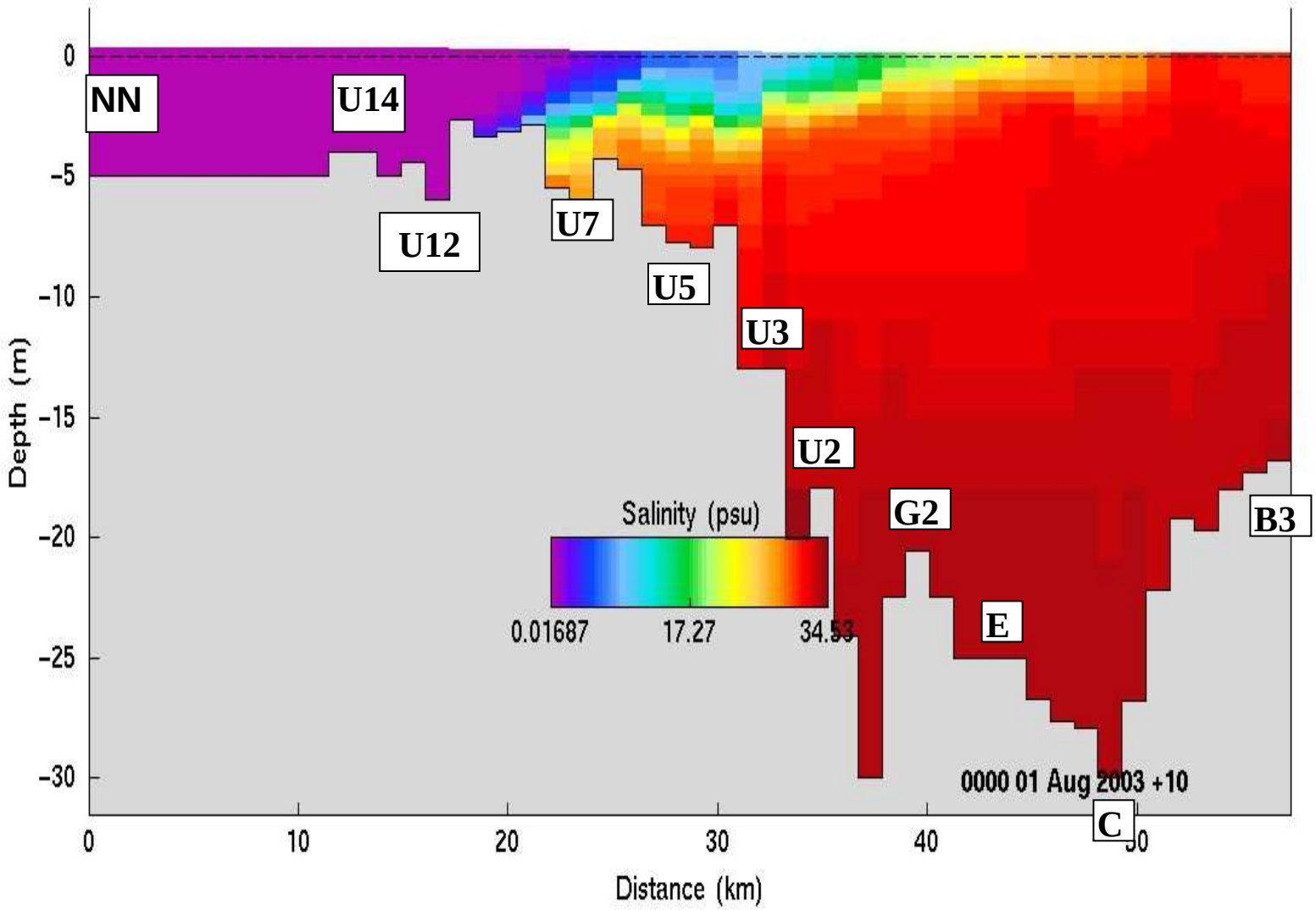




Acknowledgements

DEP Norske skogg and Nystar for industrial data TAFI benthic spatial survey

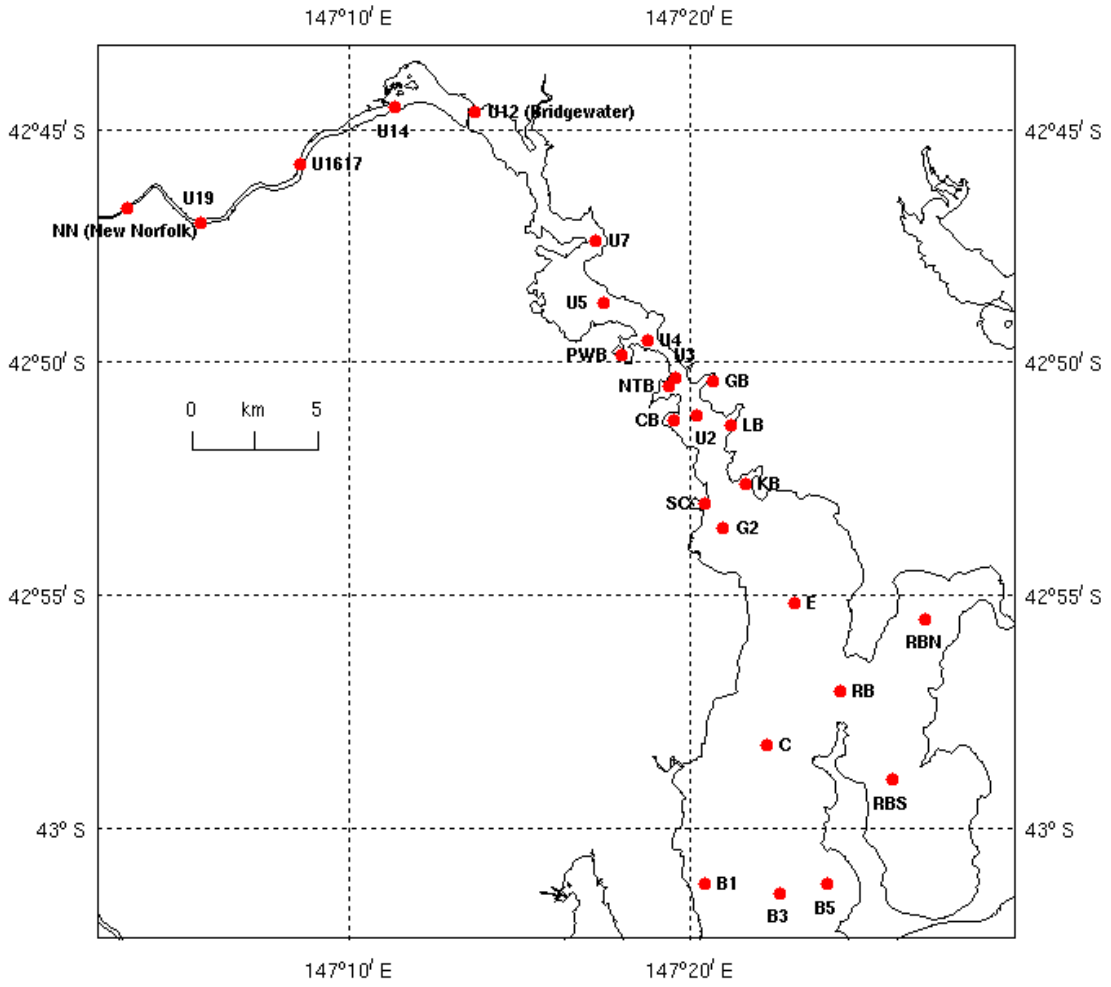
Transect Profile of Derwent Estuary



Initial Conditions

- From data-base of in-situ observations of nutrients, chlorophyll, DOC, TSS & DO at multiple depths

- Model validated against observations made in 2003



DIN-Derwent Estuary transect- **Summer**