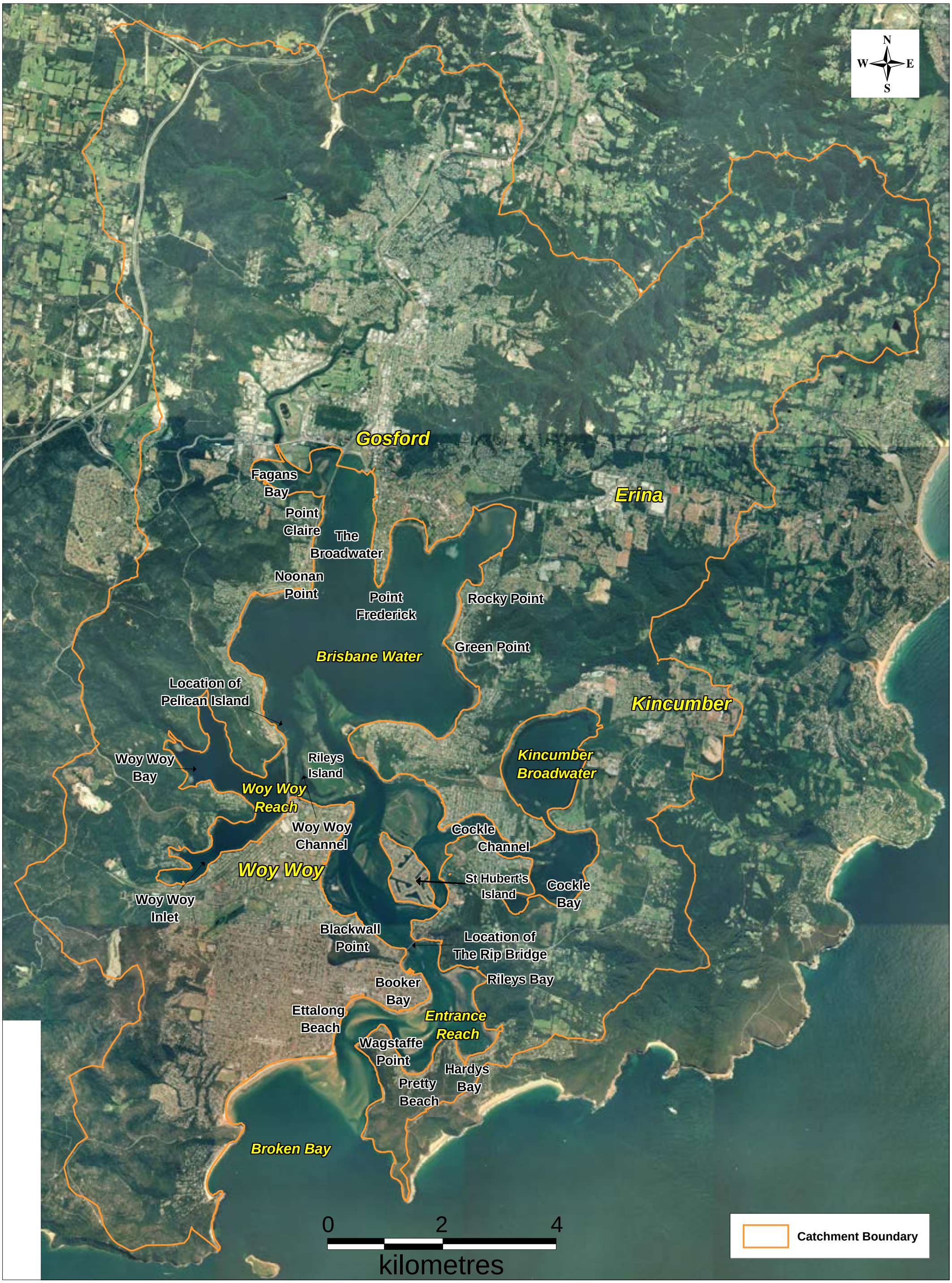

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FIGURE 1.1
STUDY AREA

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J:\CM\J2255bw\Figures\R2262\Fig 1.1 Study Area.Wor

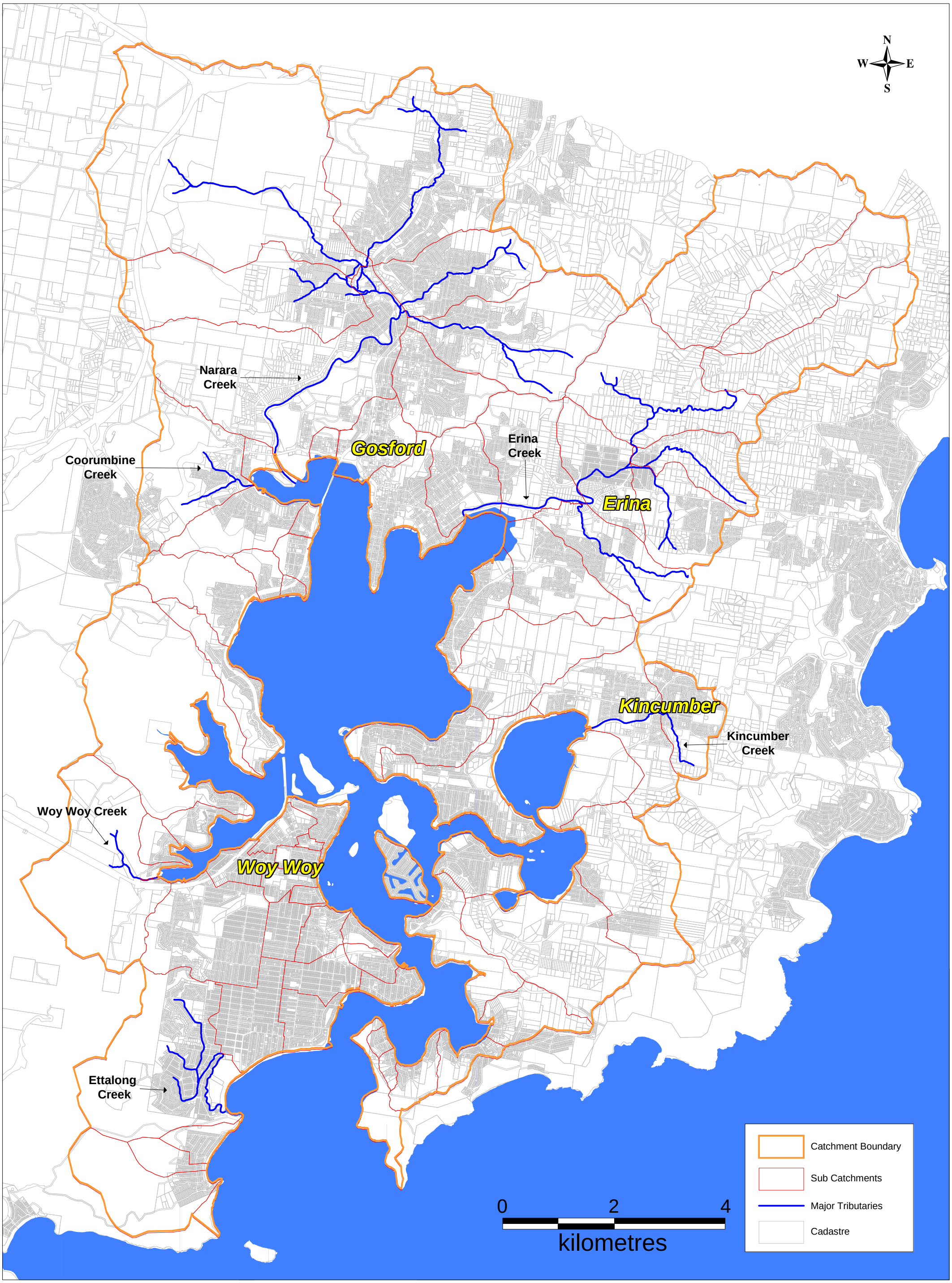

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FIGURE 1.2
MAJOR TRIBUTARIES
& SUB CATCHMENTS

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J:\CM\J2255bw\Figures\R2262\Figure 1.2 - Major Tributaries.WOR

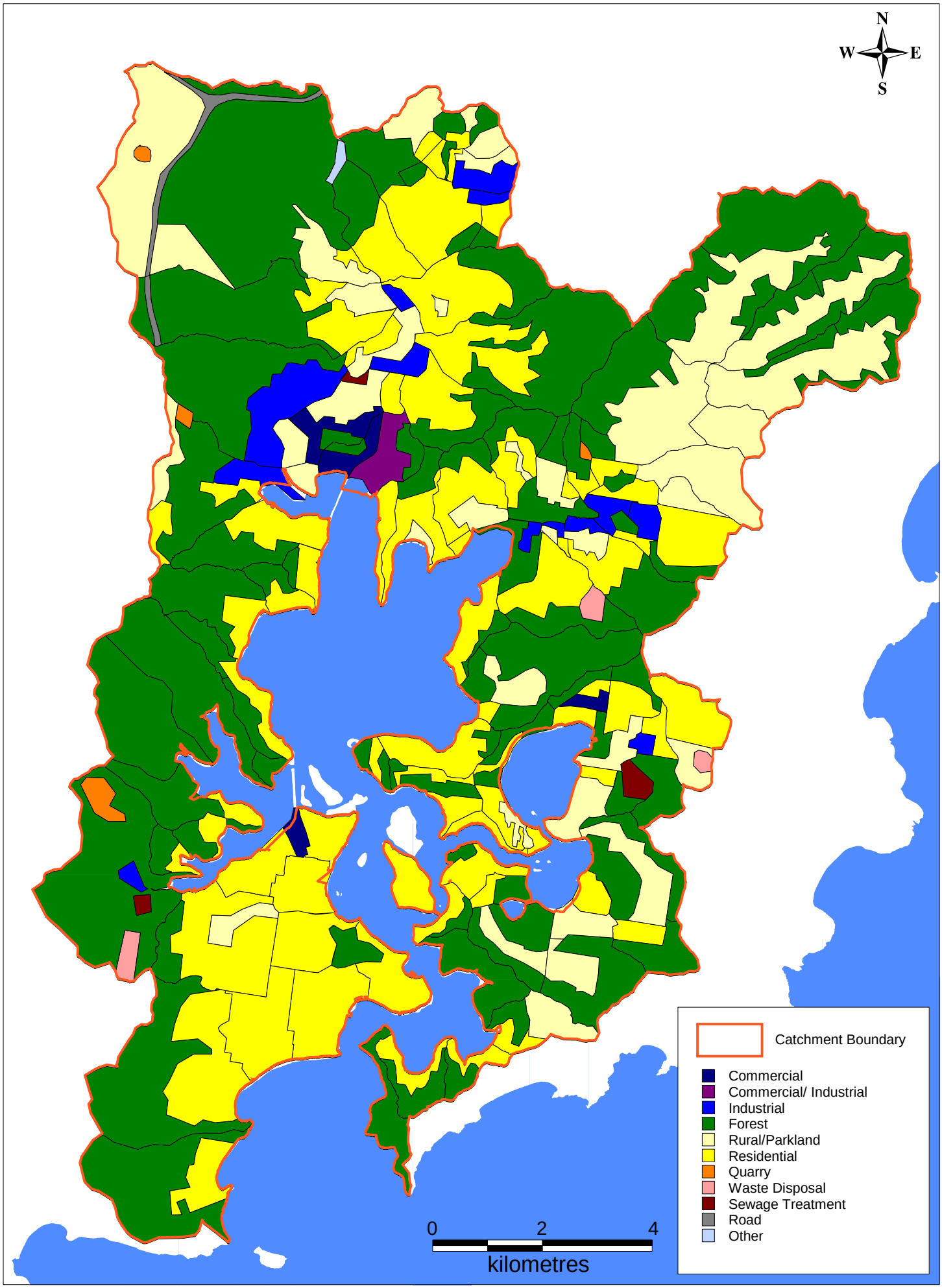

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FIGURE 3.1
LAND USE

LJ2255/R2262/V5
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J:\CM\J2255bw\Figures\R2622\Figure 3.1 - Land Use.WOR

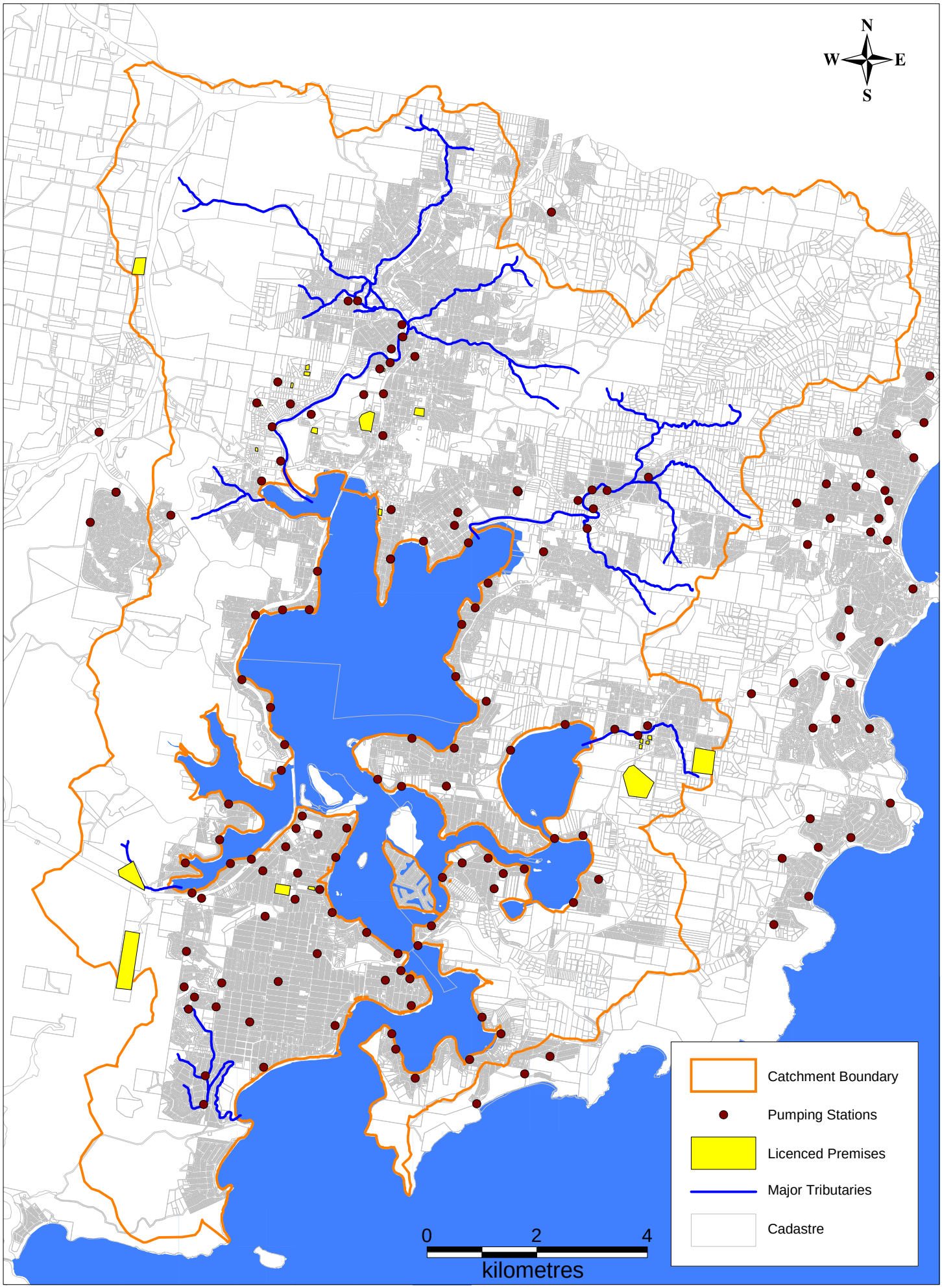

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FIGURE 3.2
EPA LICENSED PREMISES

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J:\CM\J2255bw\Figures\R2262\Figure 3.2 - EPA Premises.wor

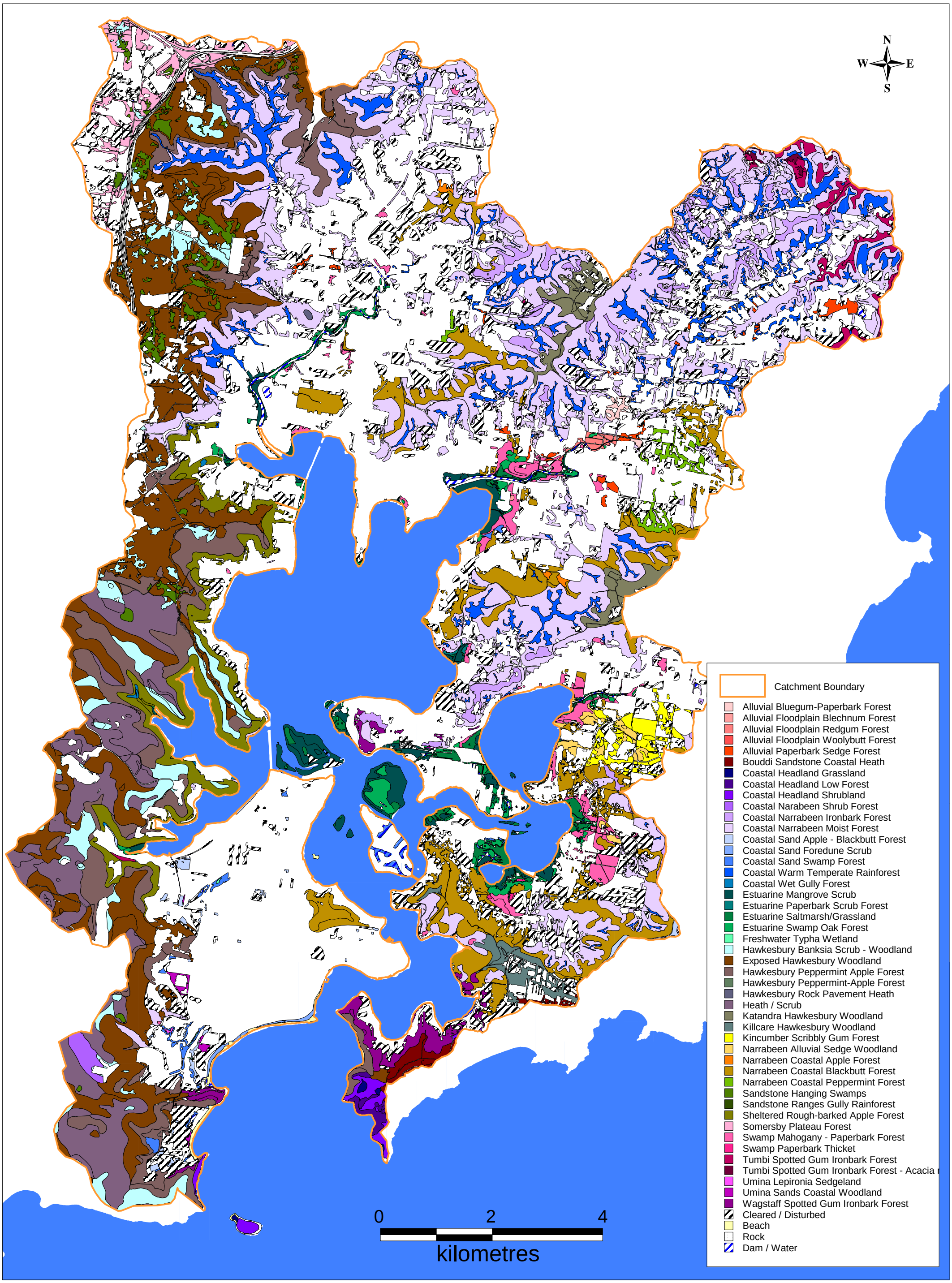

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FIGURE 3.3
TERRESTRIAL VEGETATION

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J:\CM\J2255bw\Figures\R2262\Figure 3.3 - Vegetation.WOR

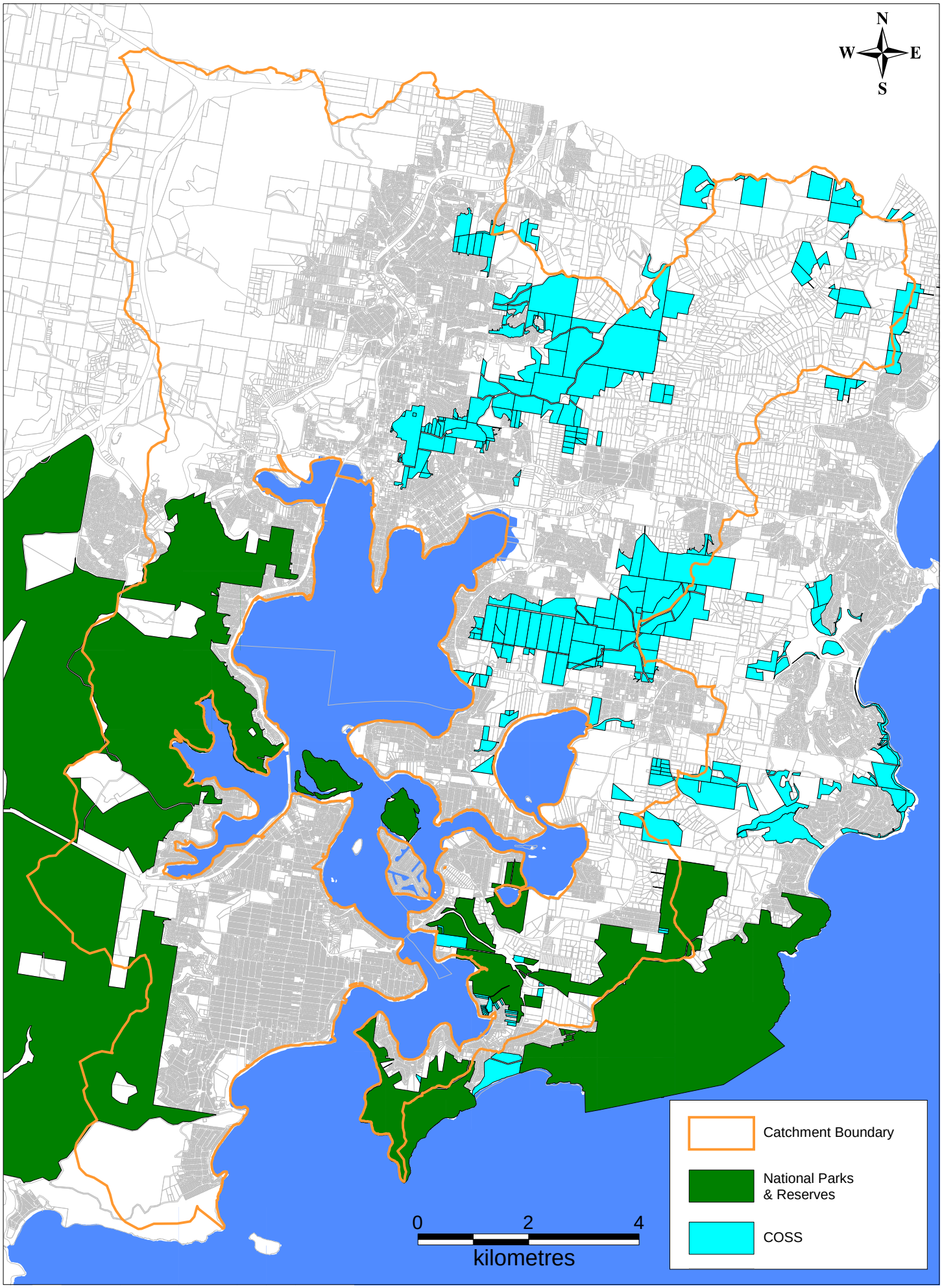

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FIGURE 3.4
RESERVE SYSTEM

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J:\CM\J2255bw\Figures\R2262\Figure 3.4 - Reserve System.WOR

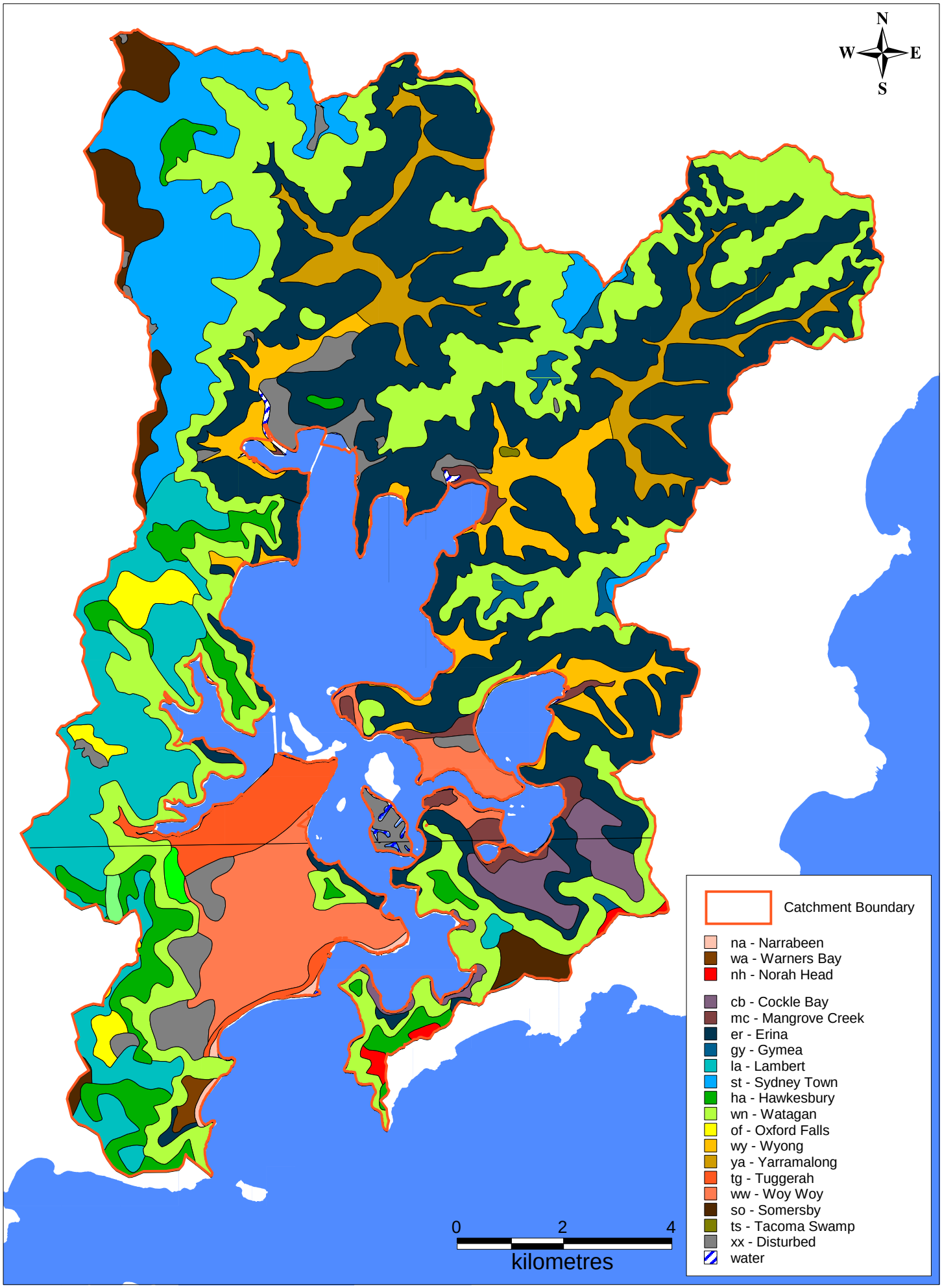

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FIGURE 3.5
SOILS

LJ2255/R2262/V5
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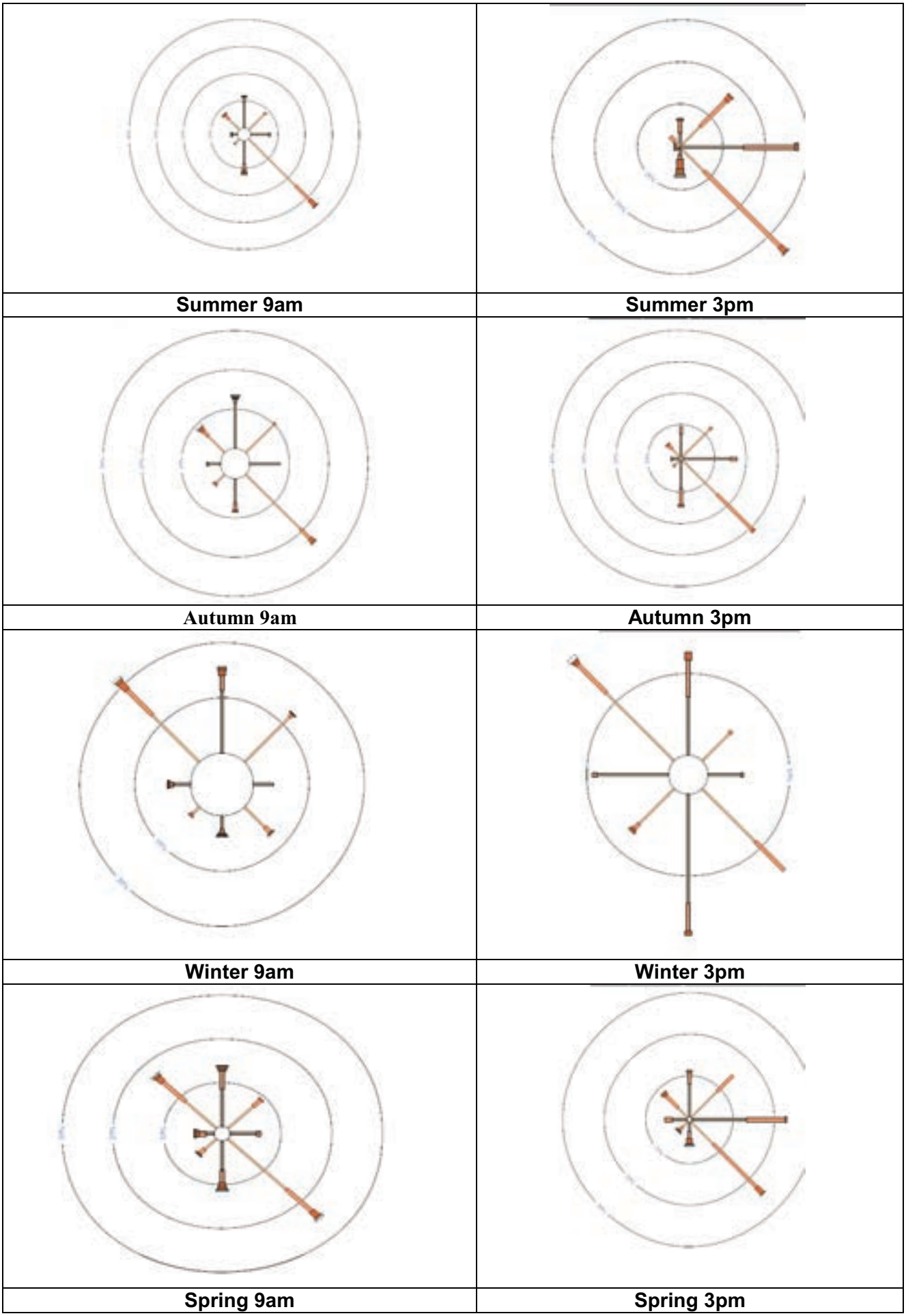
J:\CM\J2255bw\Figures\Figure 3.5 - Soils.WOR



Source: BoM 2007

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FIGURE 3.6
WIND ROSES
(NARARA AWS)

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FIGURE 4.1
MHL DATA LOCATIONS

LJ2255/R2262/V5
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J:\CM\J2255bw\Figures\Figure 4.1 - MHL Data Locs.WOR

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FIGURE 4.2
MAXIMUM SHEAR INDEX
- 9 MARCH 2004

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March 2008

LJ2255\Figures\R2262\Figure 4.2-Maximum Shear Index Plot.Wor

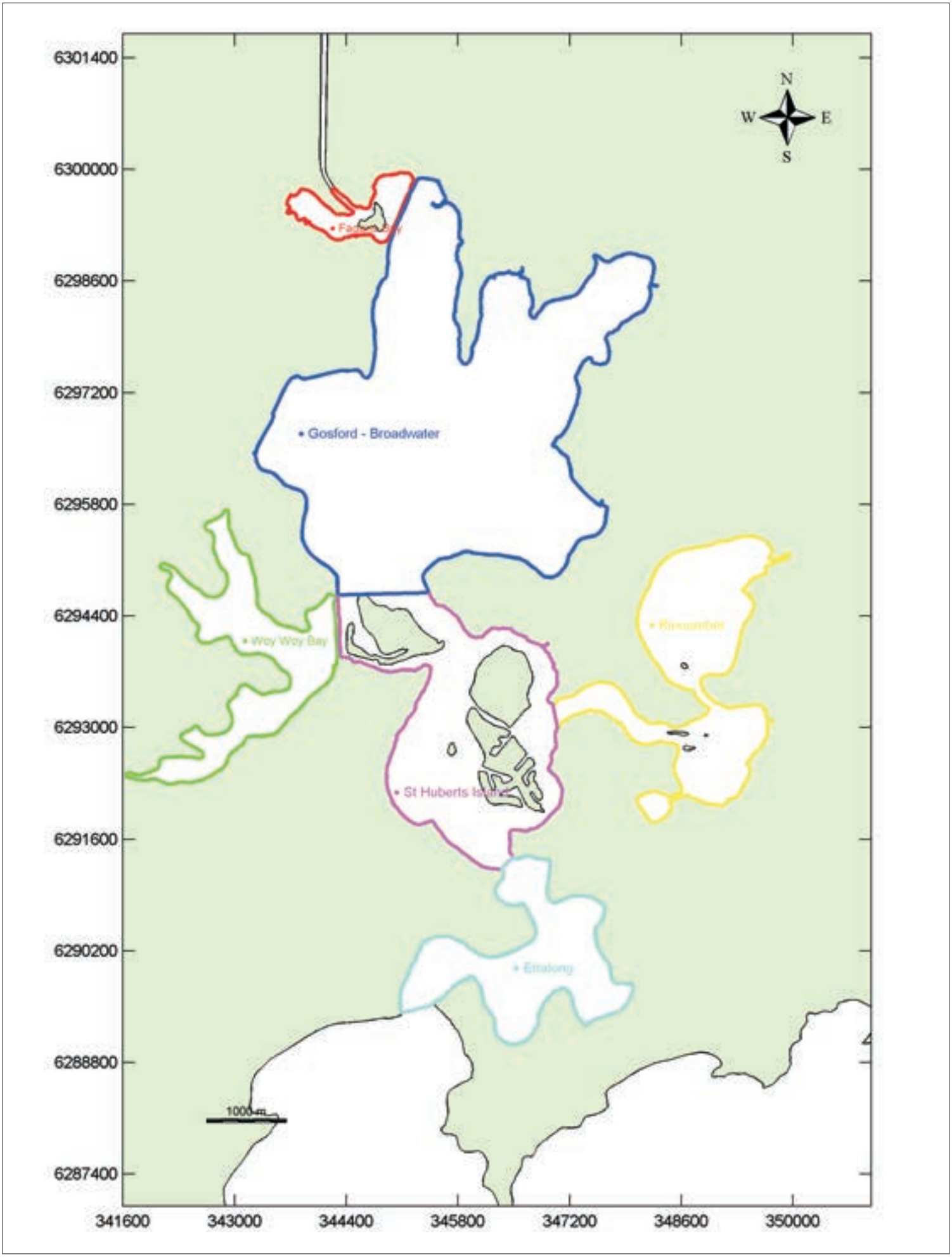

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FIGURE 4.3
BIO-REGIONS

LJ2255/R2262/V5
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J2255/Figures/R2262/SFigure 4.3 - Bioregions.cdr

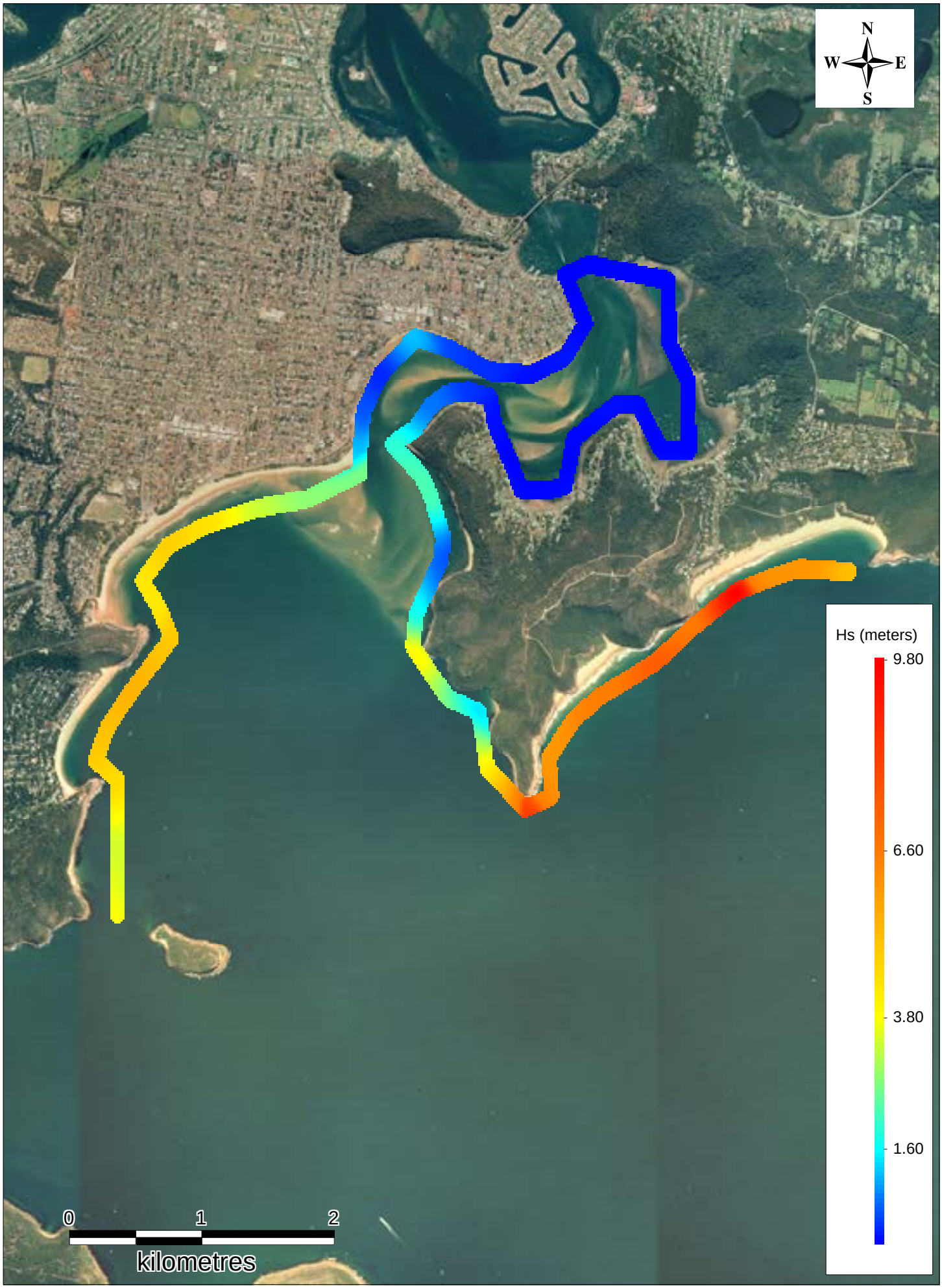

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FIGURE 4.4
SWELL EXPOSED AREAS
- 5YR ARI WAVE CONDITIONS

J2255/R2262/V5
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J2255\Figures\R2262\Figure 4.4 - Wave ExposedWor

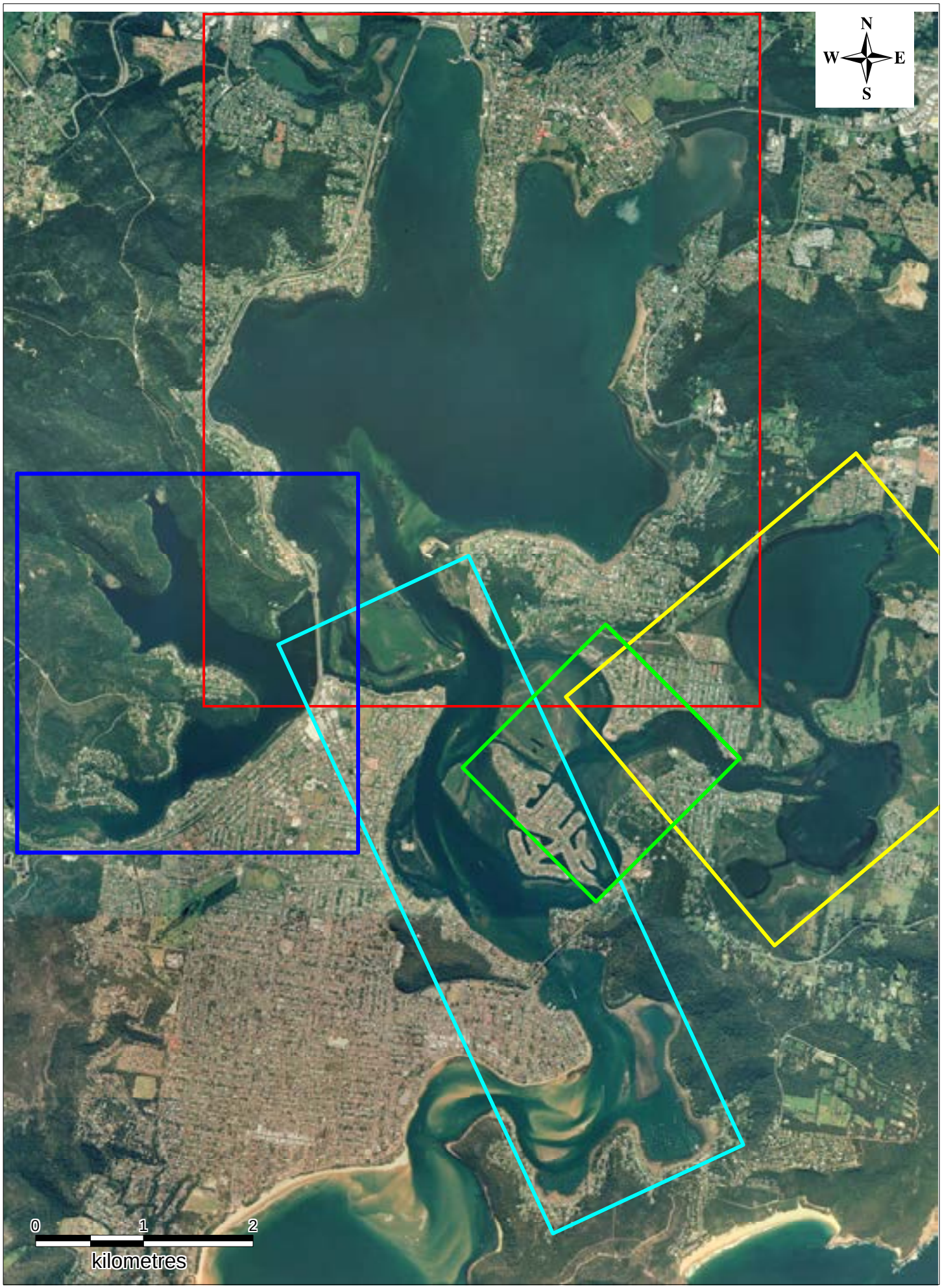

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FIGURE 4.5
SUB-REGION SWAN MODELS

LJ2255/R2262/V5
March 2008

J:\CM\J2255bw\Figures\R2262\Figure 4.5 - SWAN Grids.WOR

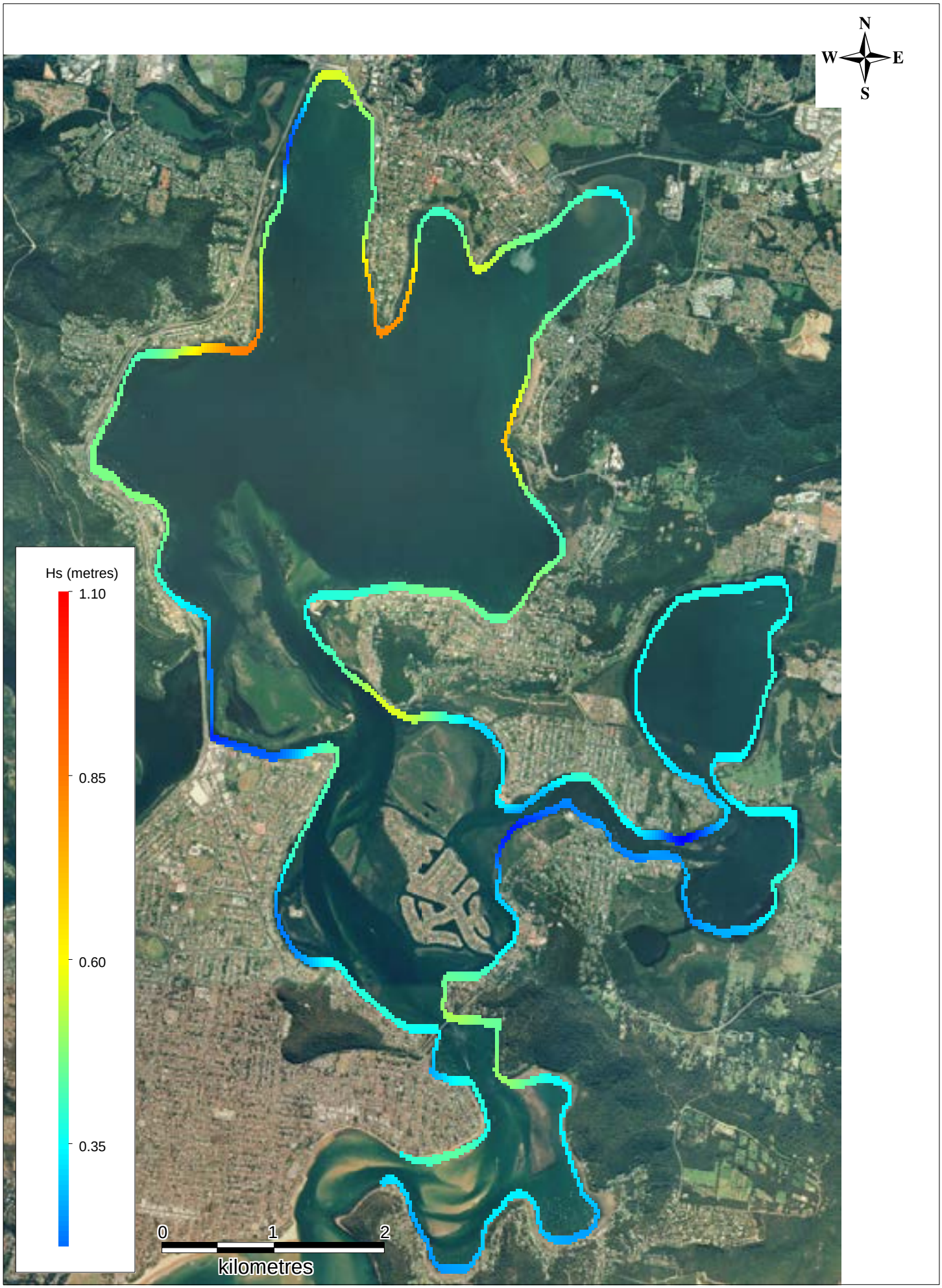

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FIGURE 4.6
5YR ARI WAVE CONDITIONS
LOCAL SEA DOMINATED AREAS

J2255/R2262/V5
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J2255\Figures\R2262\Figure 4.6 - 5YR ARI Wave Conditions.Wor

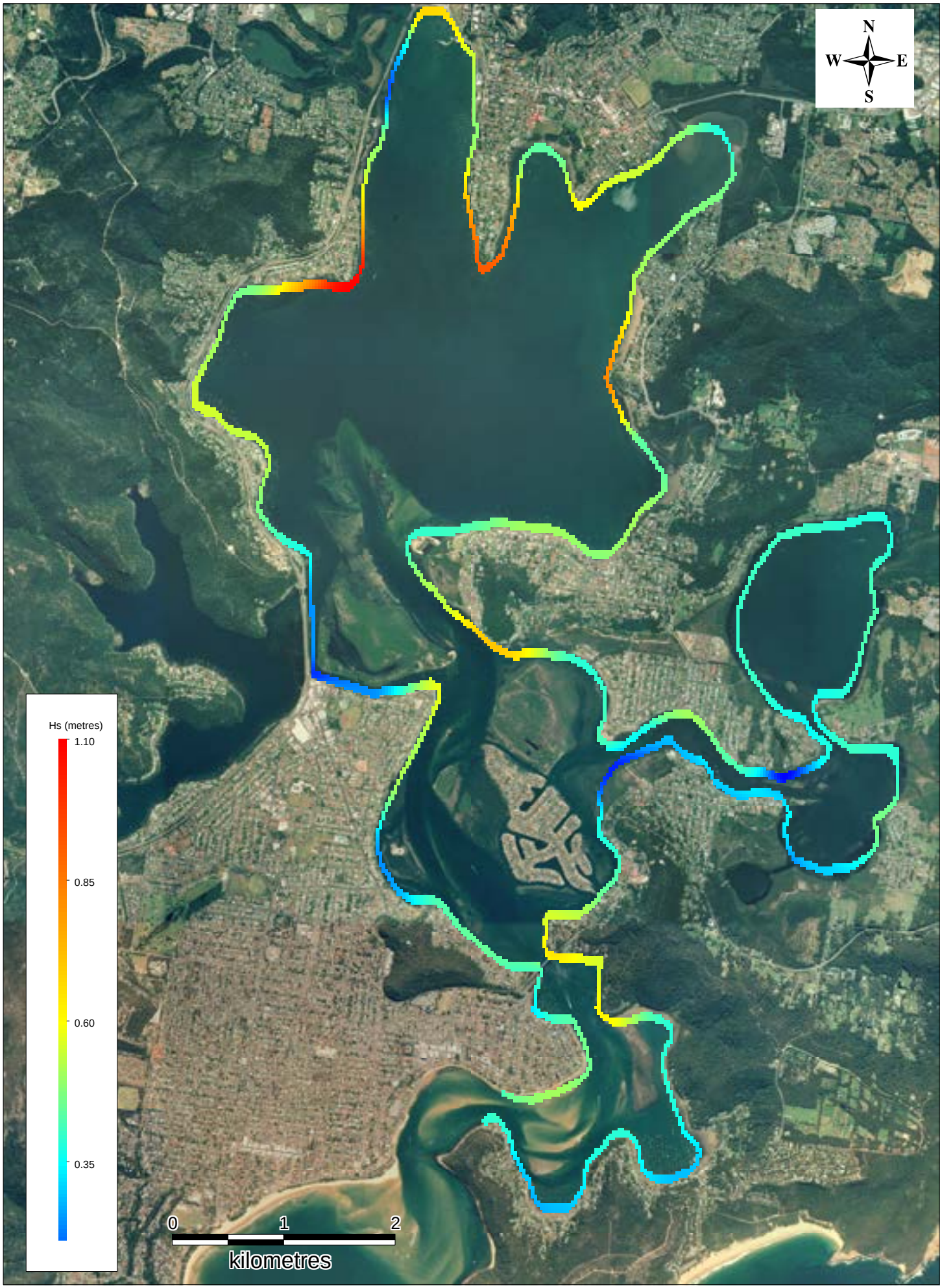

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FIGURE 4.7
100YR ARI WAVE CONDITIONS
LOCAL SEA DOMINATED AREAS

J2255/R2262/V5
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J2255\Figures\R2262\Figure 4.7 - 100yr ARI Wave Conditions.Wor

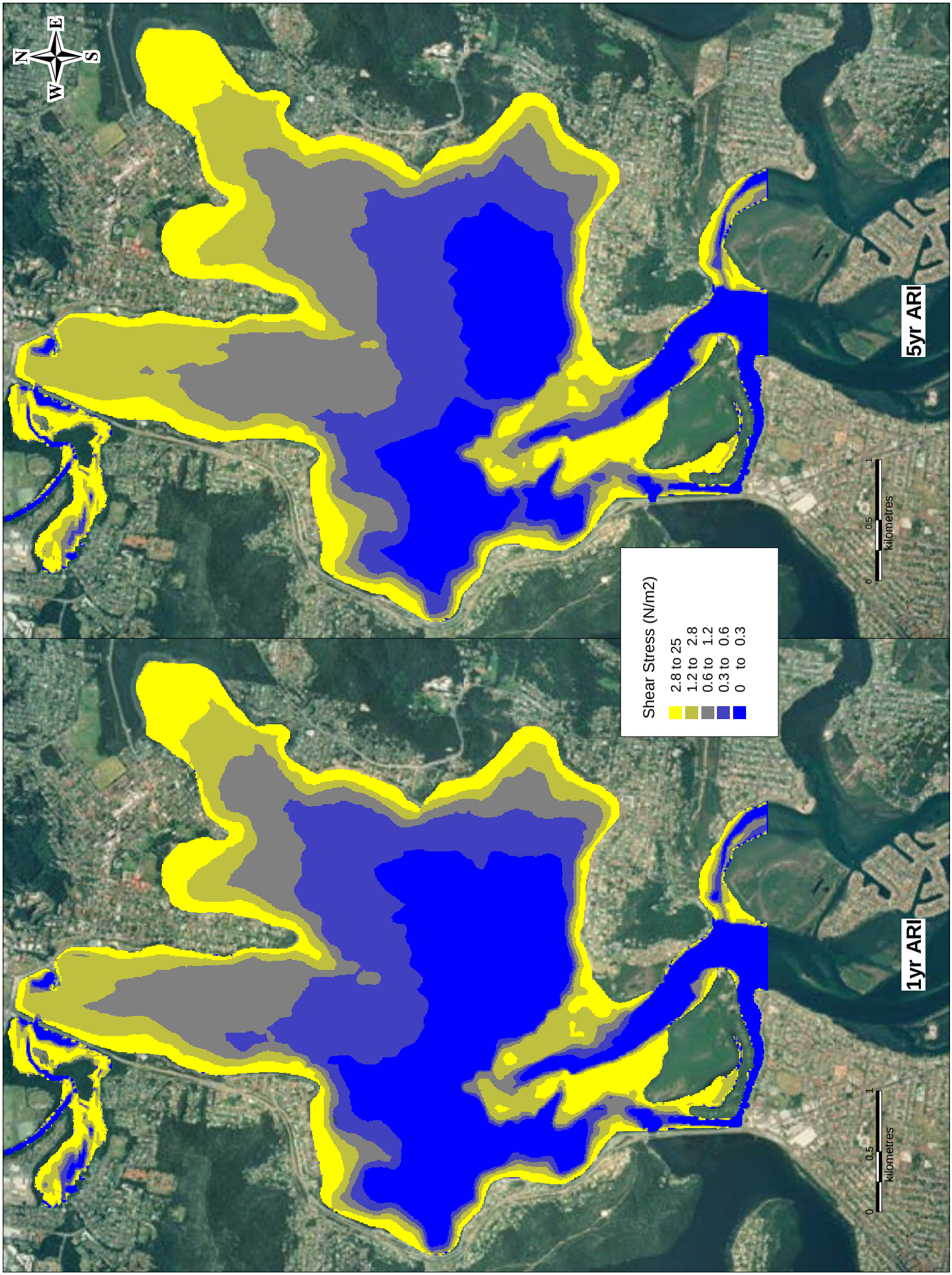

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FIGURE 4.8
BED SHEAR COMPARISONS

LJ2255/R2262/V5
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J:\CM\J2255bw\Figures\R2262\Figure 4.8 - Bed Shear.wor

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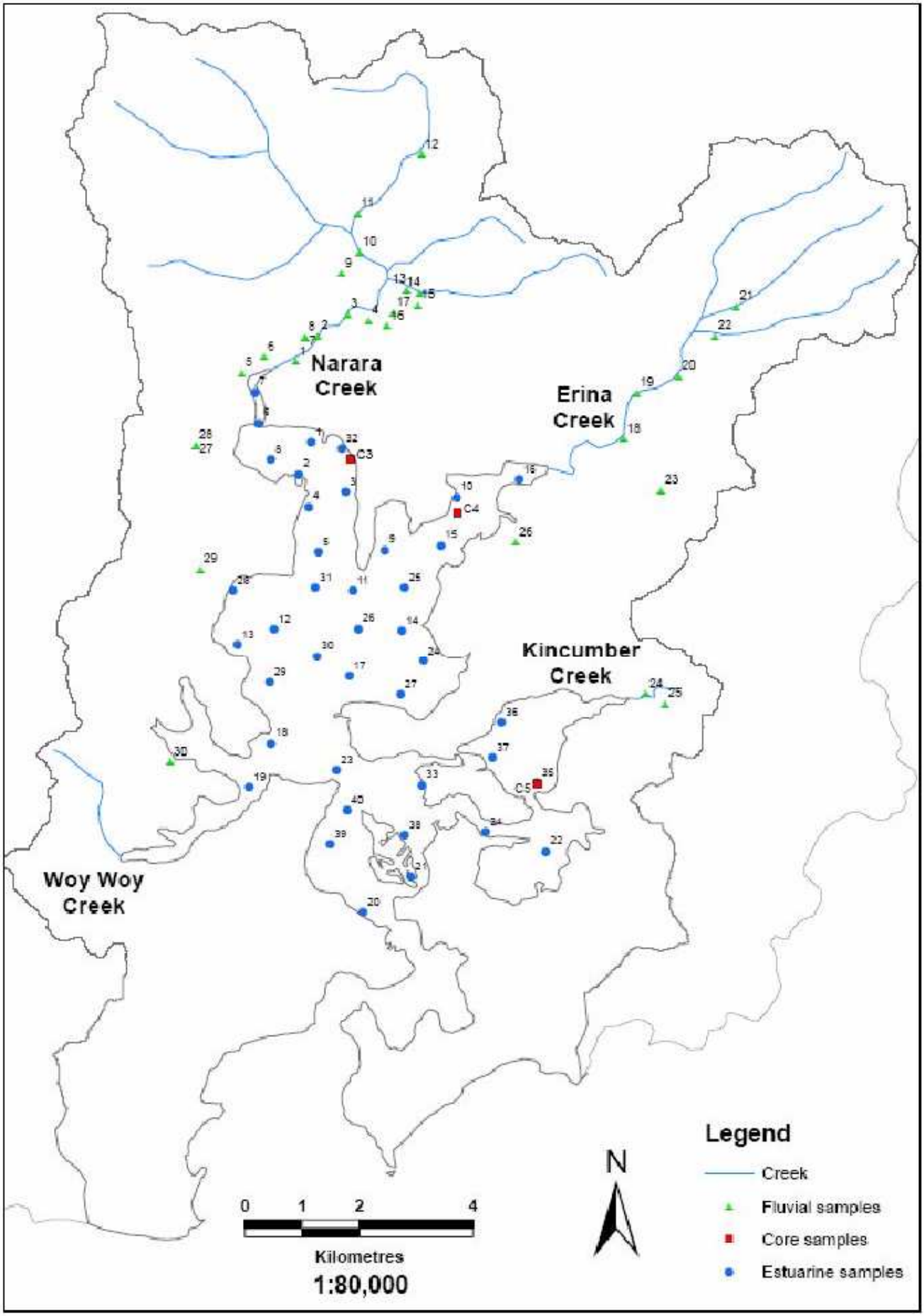
FIGURE 4.9
SHORE NORMAL STORM
EROSION SECTIONS

LJ2255/R2262/V5
March 2008

J:\CM\J2255bw\Figures\R2262\Figure 4.9 - Litprof Sections.WOR



Source: USEGG, 2007

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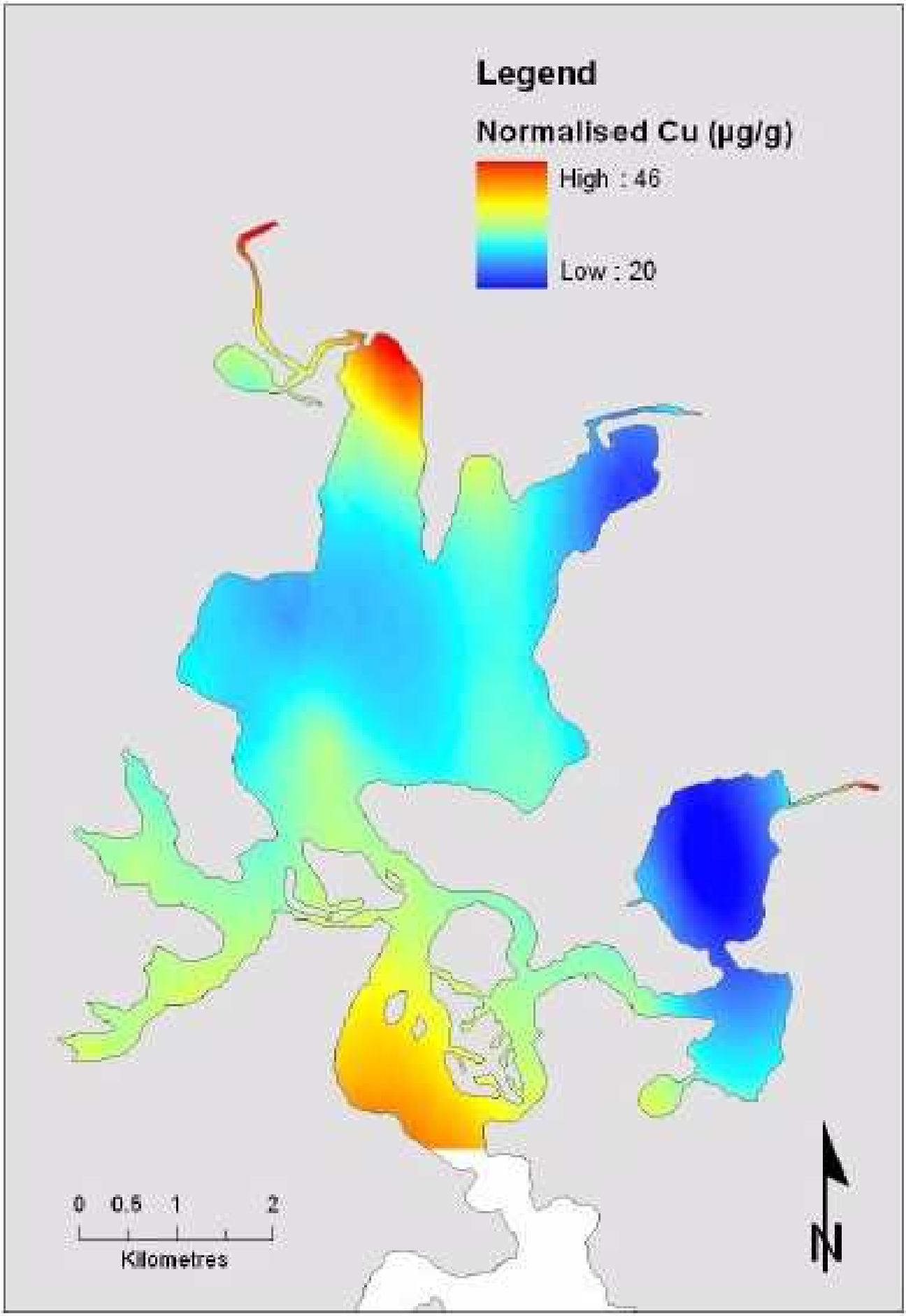
FIGURE 5.1
SEDIMENT
SAMPLING LOCATIONS

LJ2255/R2262/V5
March 2008

J:\CM\J2255bw\Figures\R2262\Figure 5.1 - Soil Samples.WOR



Source: USEGG, 2007

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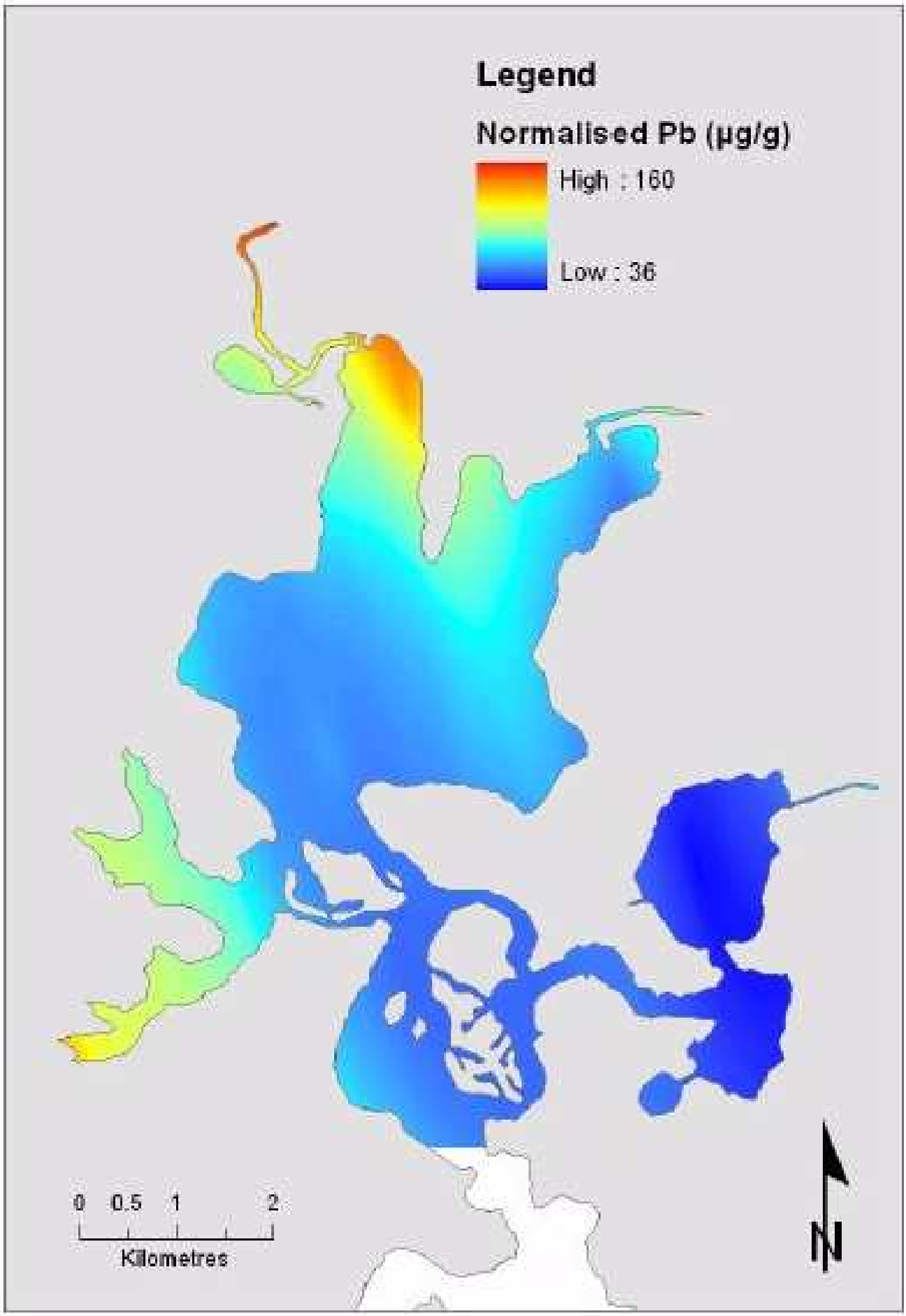
FIGURE 5.2
NORMALISED Cu
CONCENTRATIONS



Source: USEGG, 2007

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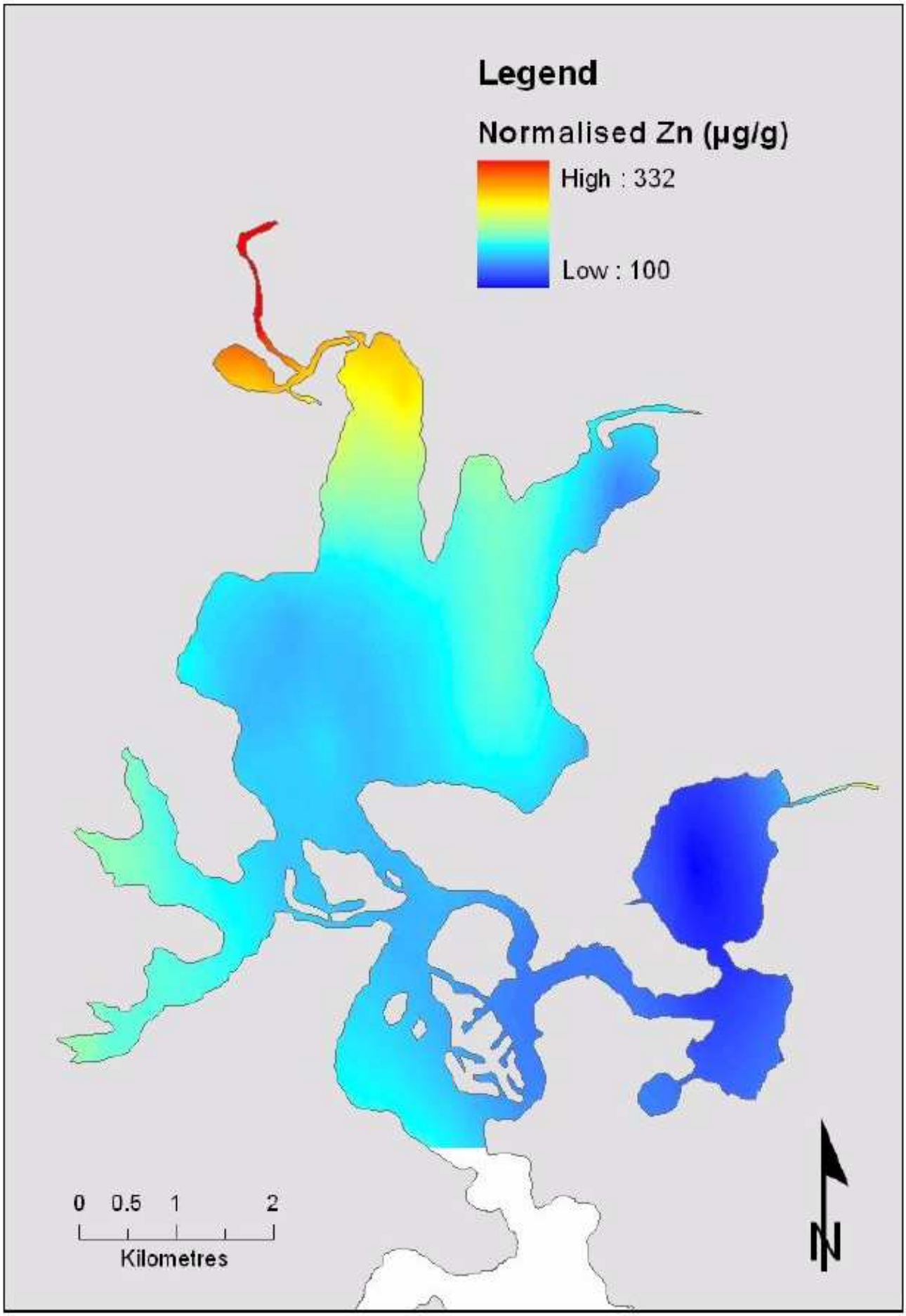
FIGURE 5.3
NORMALISED Pb
CONCENTRATIONS



Source: USEGG, 2007

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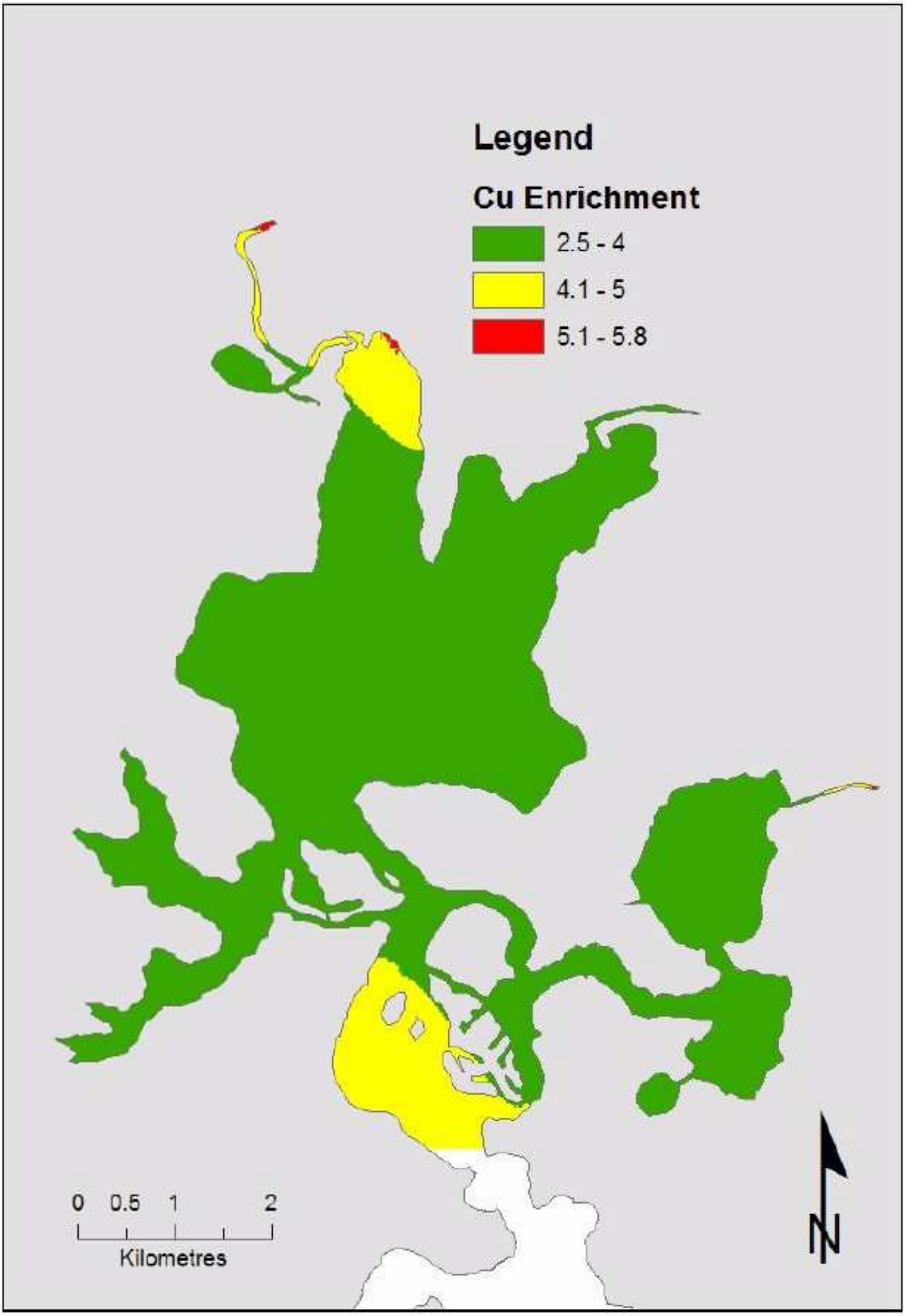
FIGURE 5.4
NORMALISED Zn
CONCENTRATIONS



Source: USEGG, 2007

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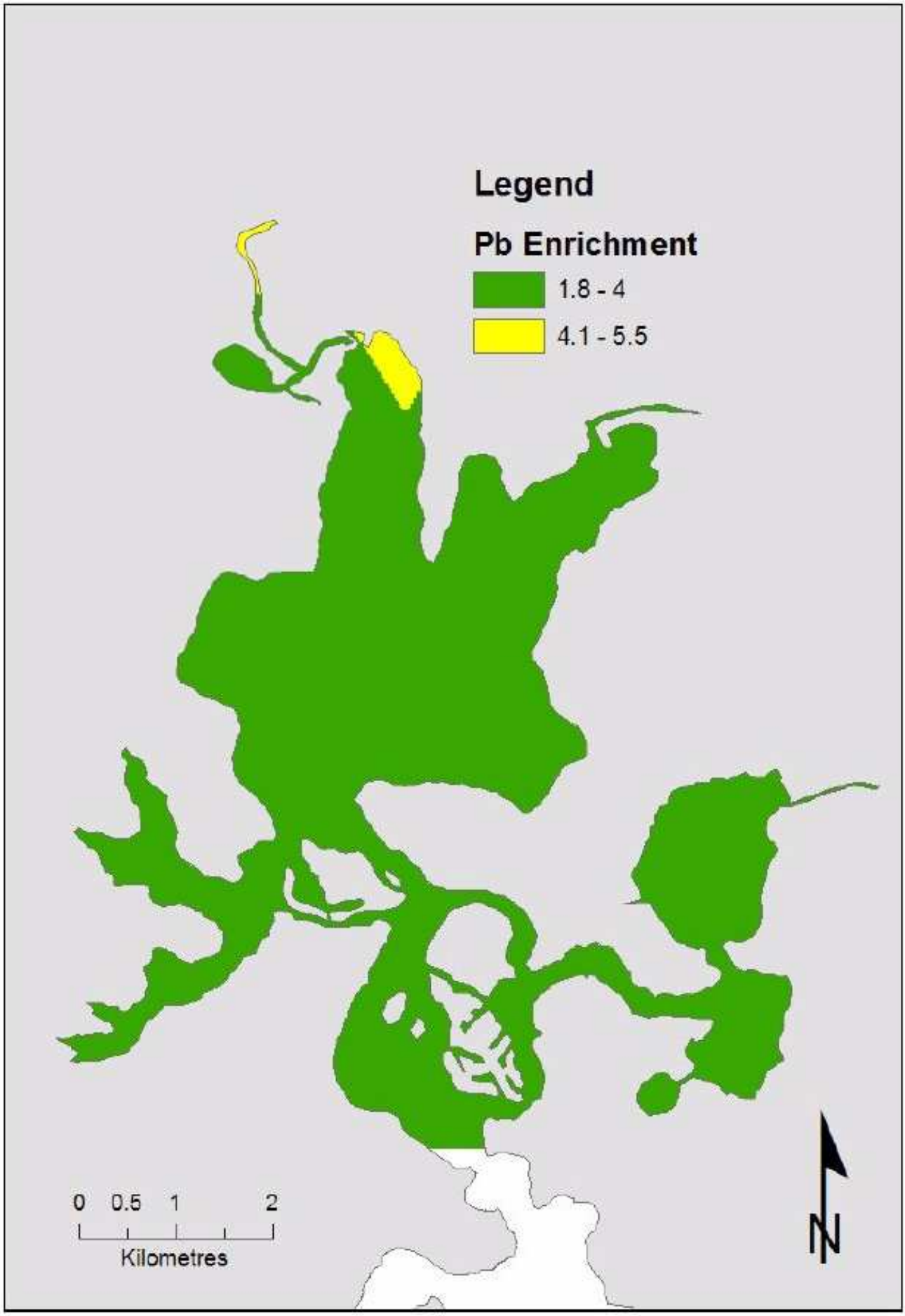
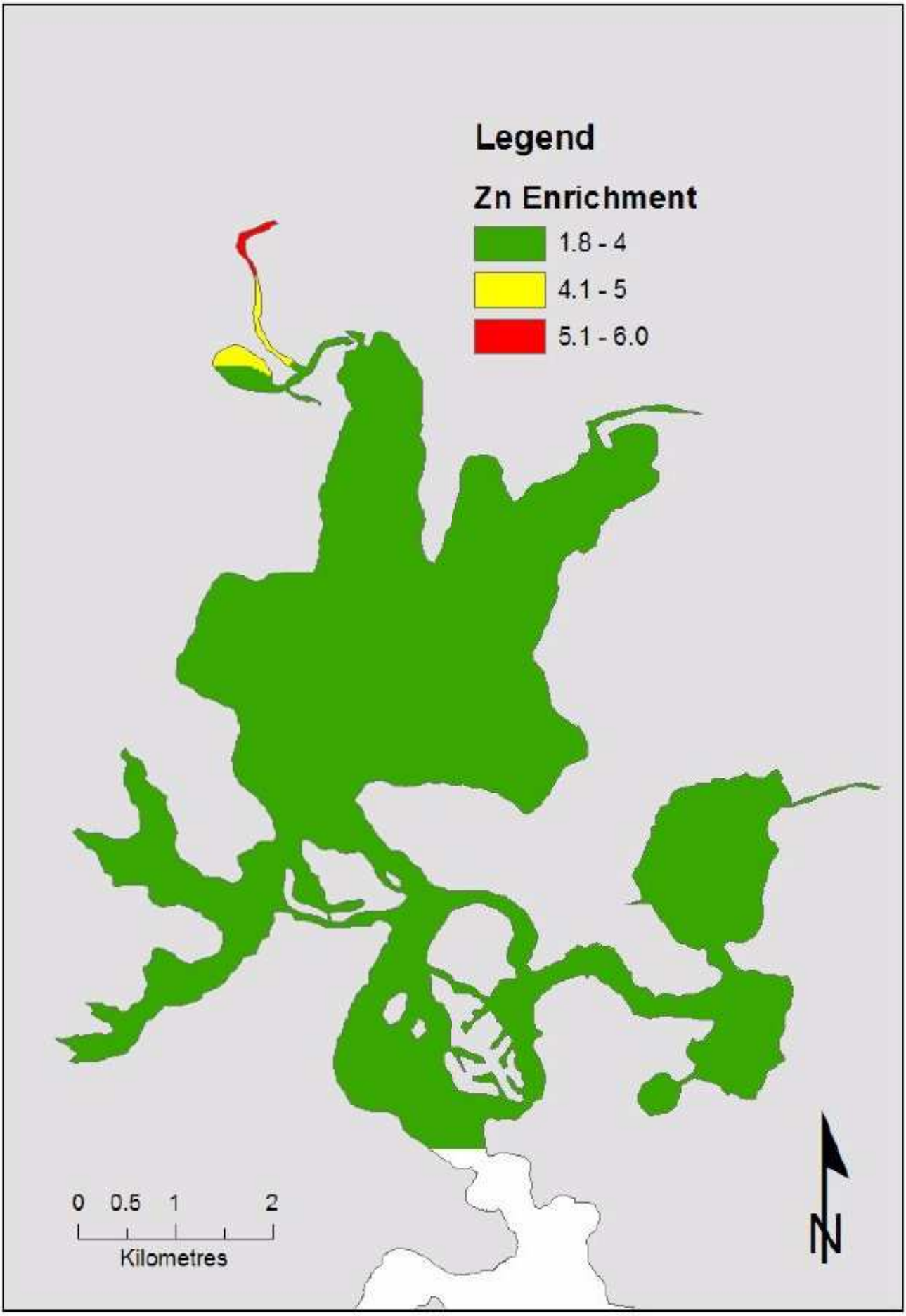
FIGURE 5.5
Cu ENRICHMENT LEVELS



Source: USEGG, 2007



Source: USEGG, 2007

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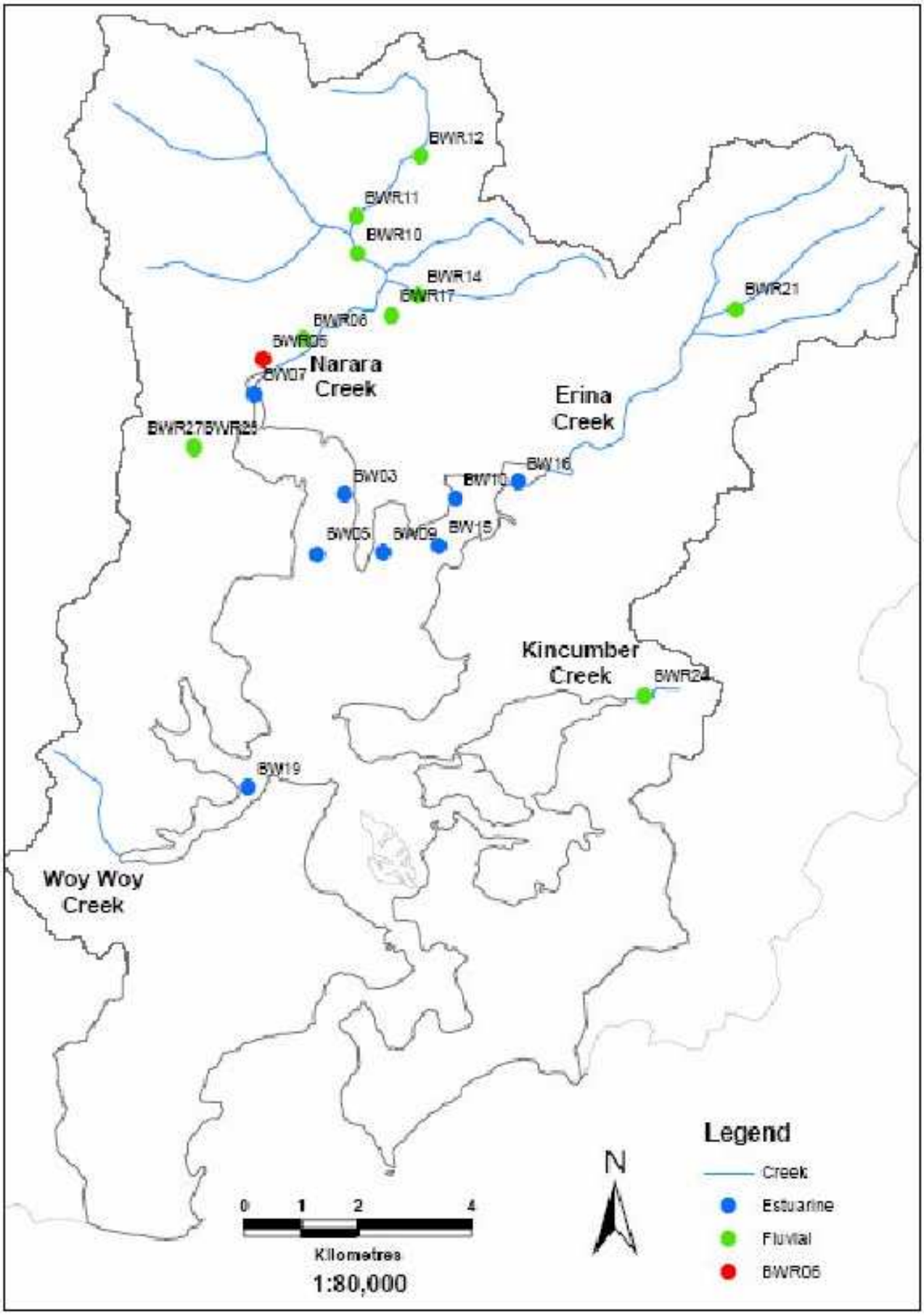
FIGURE 5.7
Zn ENRICHMENT LEVELS



Source: USEGG, 2007

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FIGURE 5.8
SAMPLES EXCEEDING
ISQG LOW VALUES

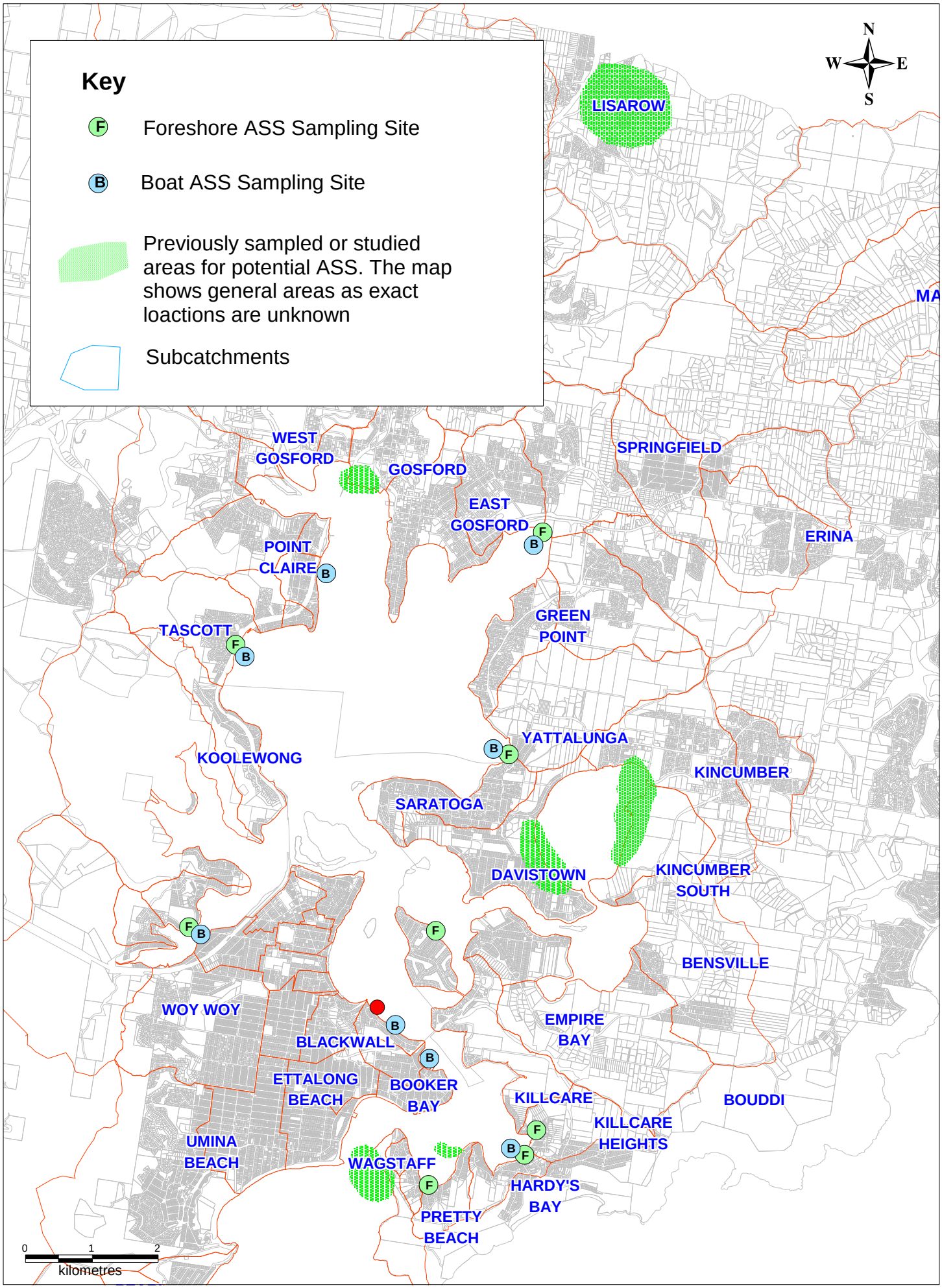

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FIGURE 5.9
SOIL SAMPLING LOCATIONS

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J:\CM\J2255bw\Figures\R2262\Figure 5.9 - Sediment Sampling.WOR

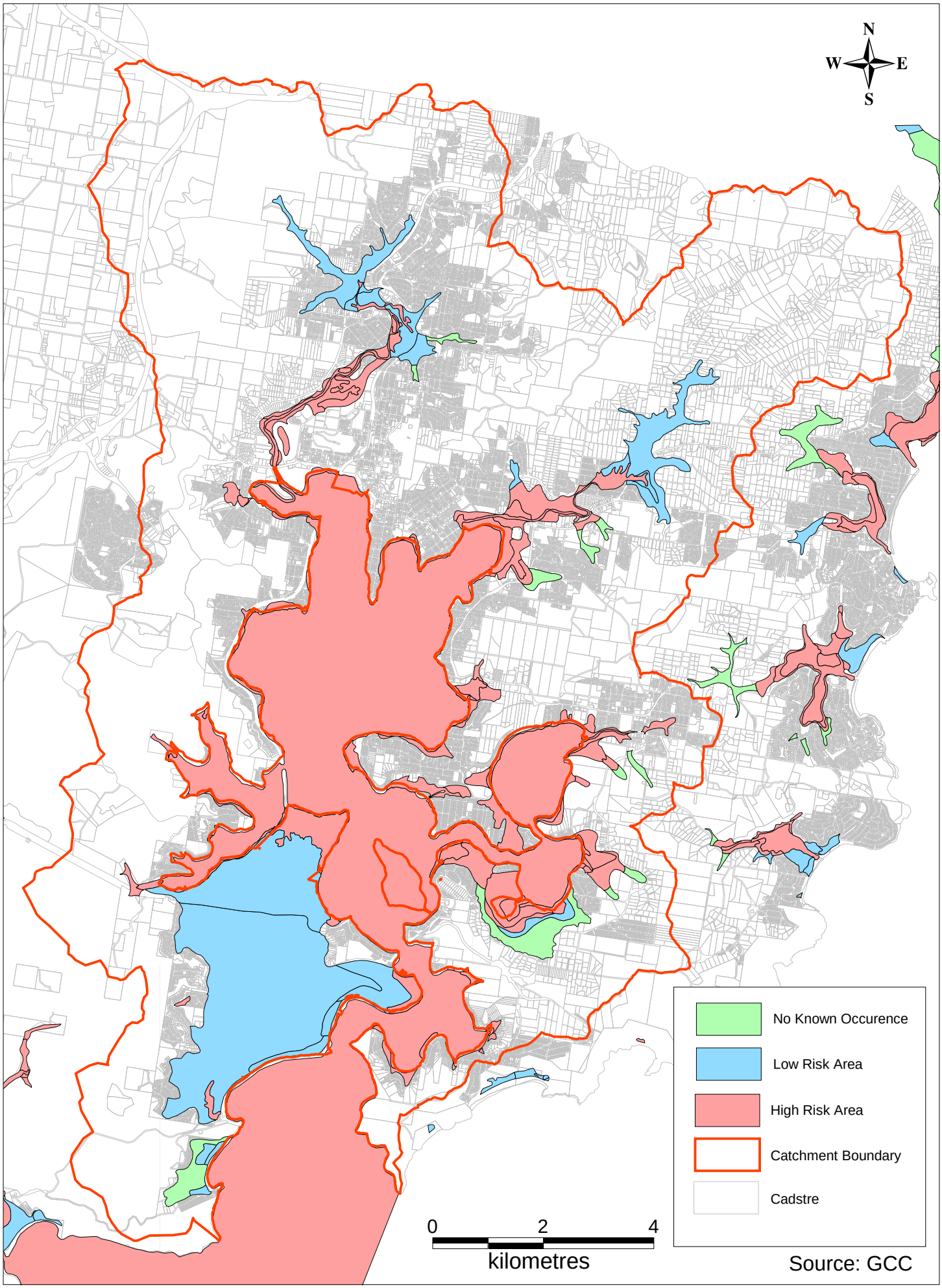

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FIGURE 5.10
PASS AREAS

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FIGURE 5.11
GARDEN AREAS BEHIND
FORESHORE STRUCTURES

J:\CM\J2255bw\Figures\R2262\Figure 5.11 - Foreshore_Gardens.WOR

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FIGURE 5.12
ST HUBERTS ISLAND
SHORELINE PROCESS LOCATIONS

LJ2255/R2262/V5
March 2008

J:\CM\J2255bw\Figures\R2262\Figure 5.12 - StHuberts.wor

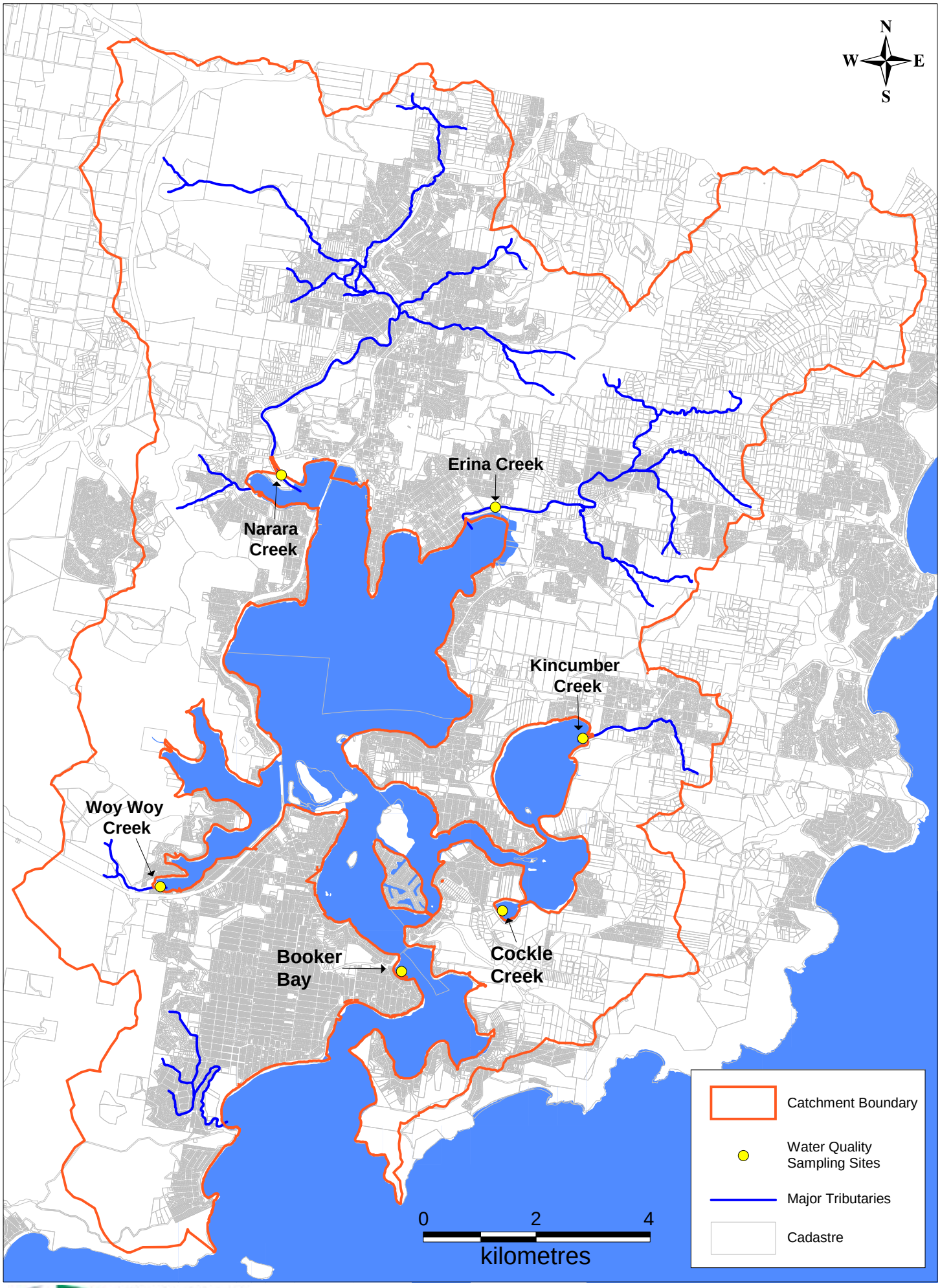

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FIGURE 6.1
WATER QUALITY MONITORING SITES

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J:\CM\J2255bw\Figures\R2262\Figure 6.1 - WQ Sampling Sites.Wor

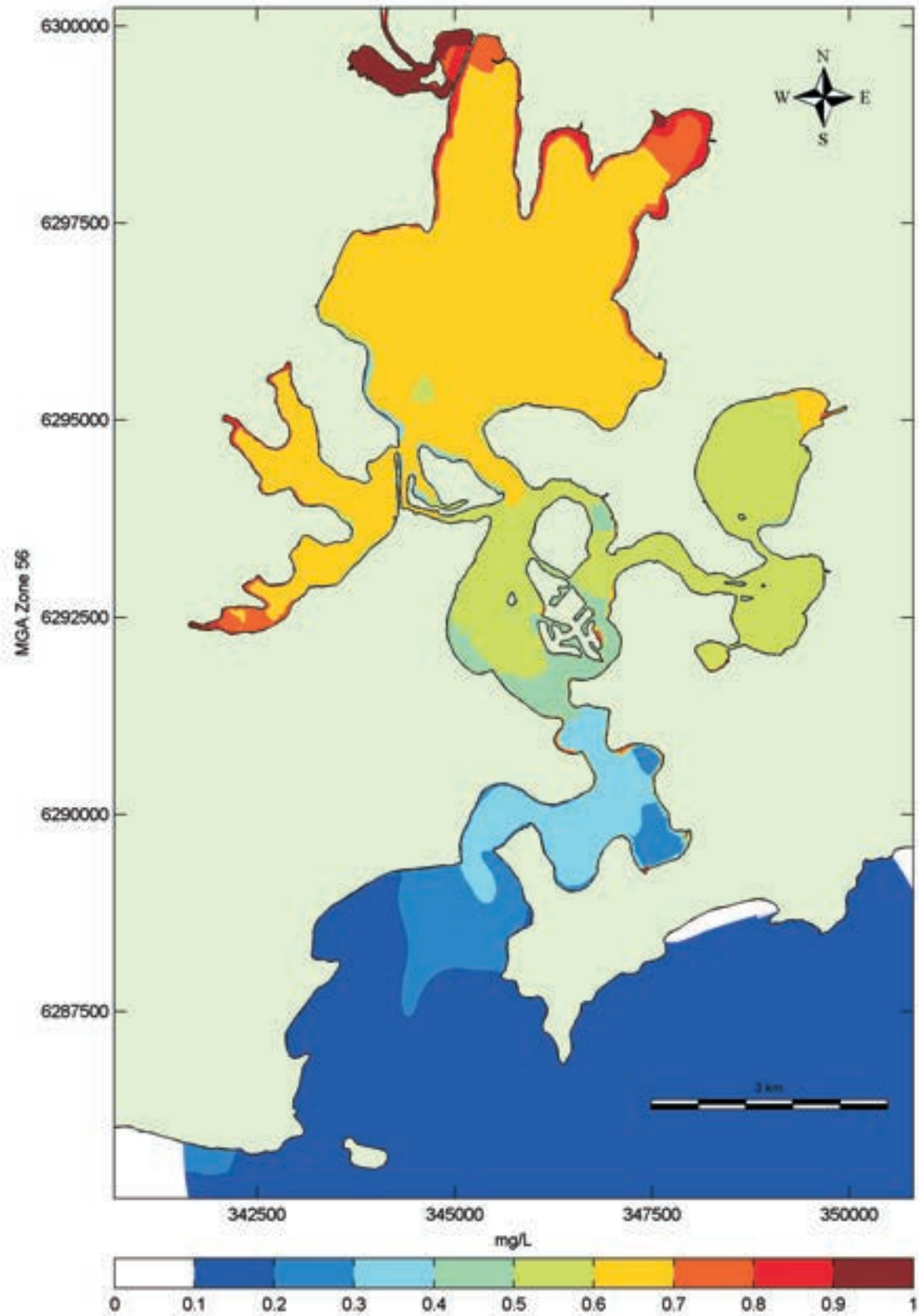

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FIGURE 6.2
SUMMER 2000 (DRY YEAR)
NUTRIENT RUNS - TN - 30th APRIL

J2255/Figures/R2262/Figure 6.2 - TN Summer 2000.cdr

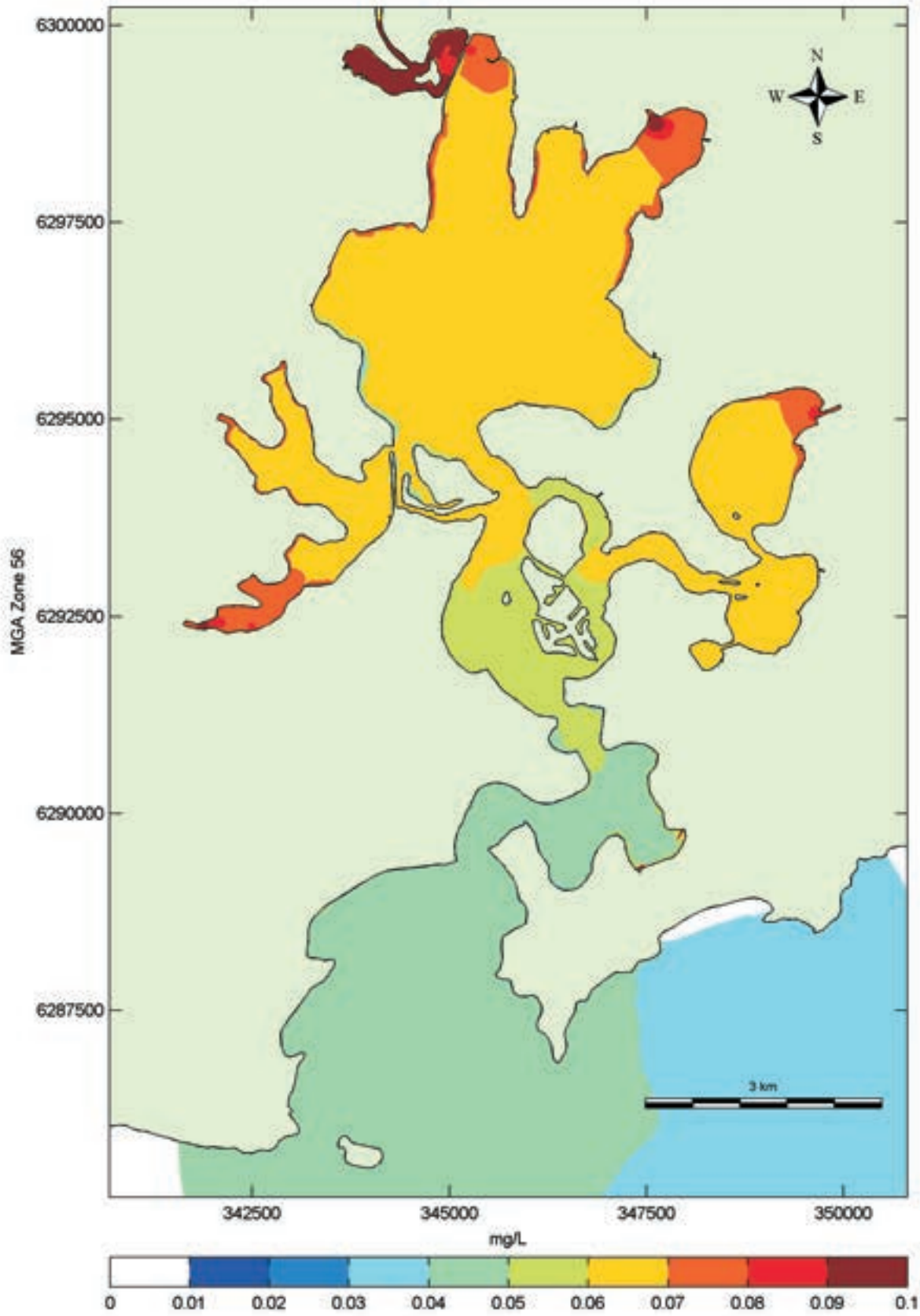

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FIGURE 6.3
SUMMER 2000 (DRY YEAR)
NUTRIENT RUNS - TP - 30th APRIL

LJ2255/R2262/V5
March 2008

J2255/Figures/R2262/Figure 6.3 - TP Summer 2000.cdr

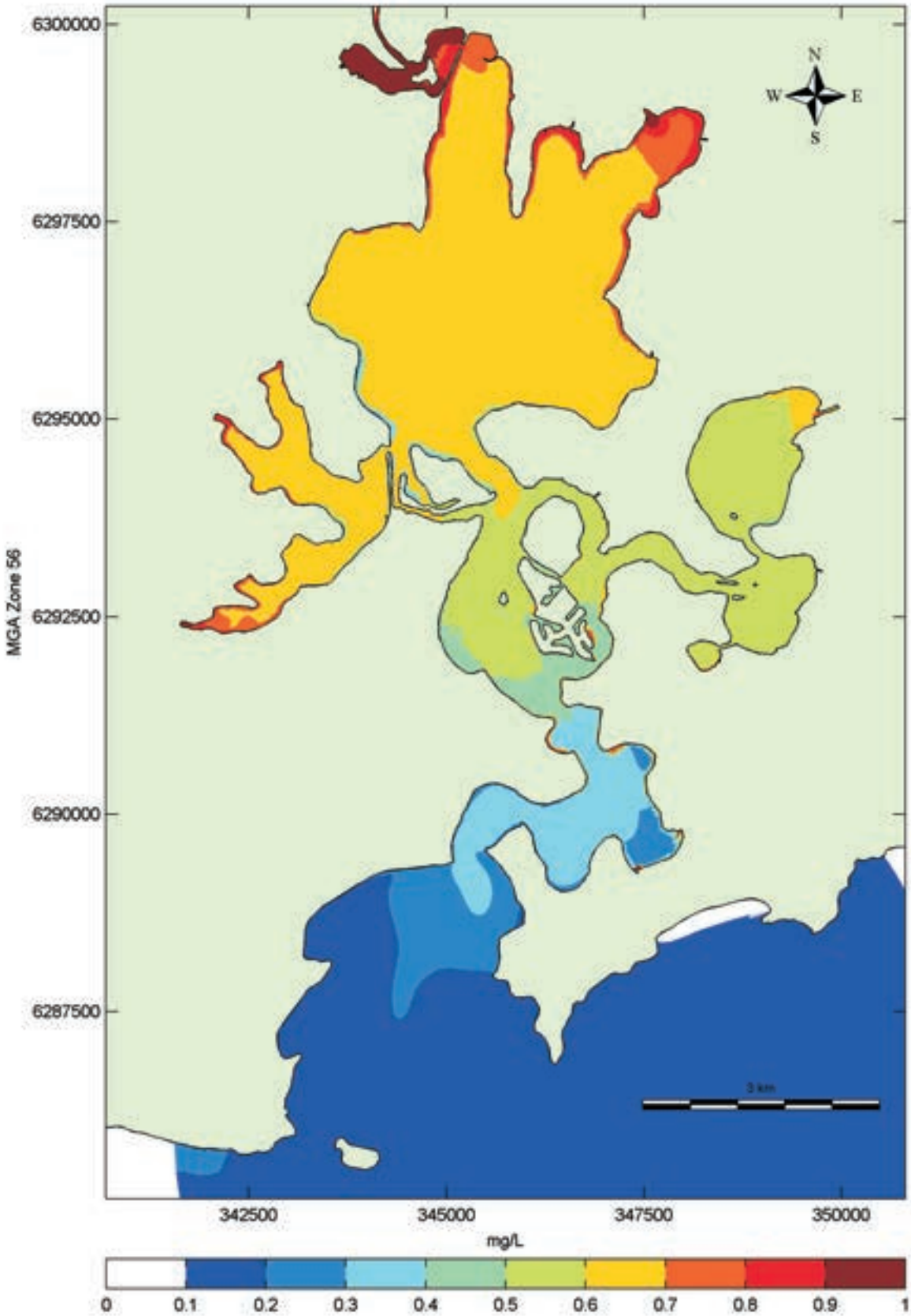

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FIGURE 6.4
SUMMER 1995 (AVERAGE YEAR)
NUTRIENT RUNS - TN - 30th APRIL

J2255/Figures/R2262/Figure 6.4 - TN Summer 1995.cdr

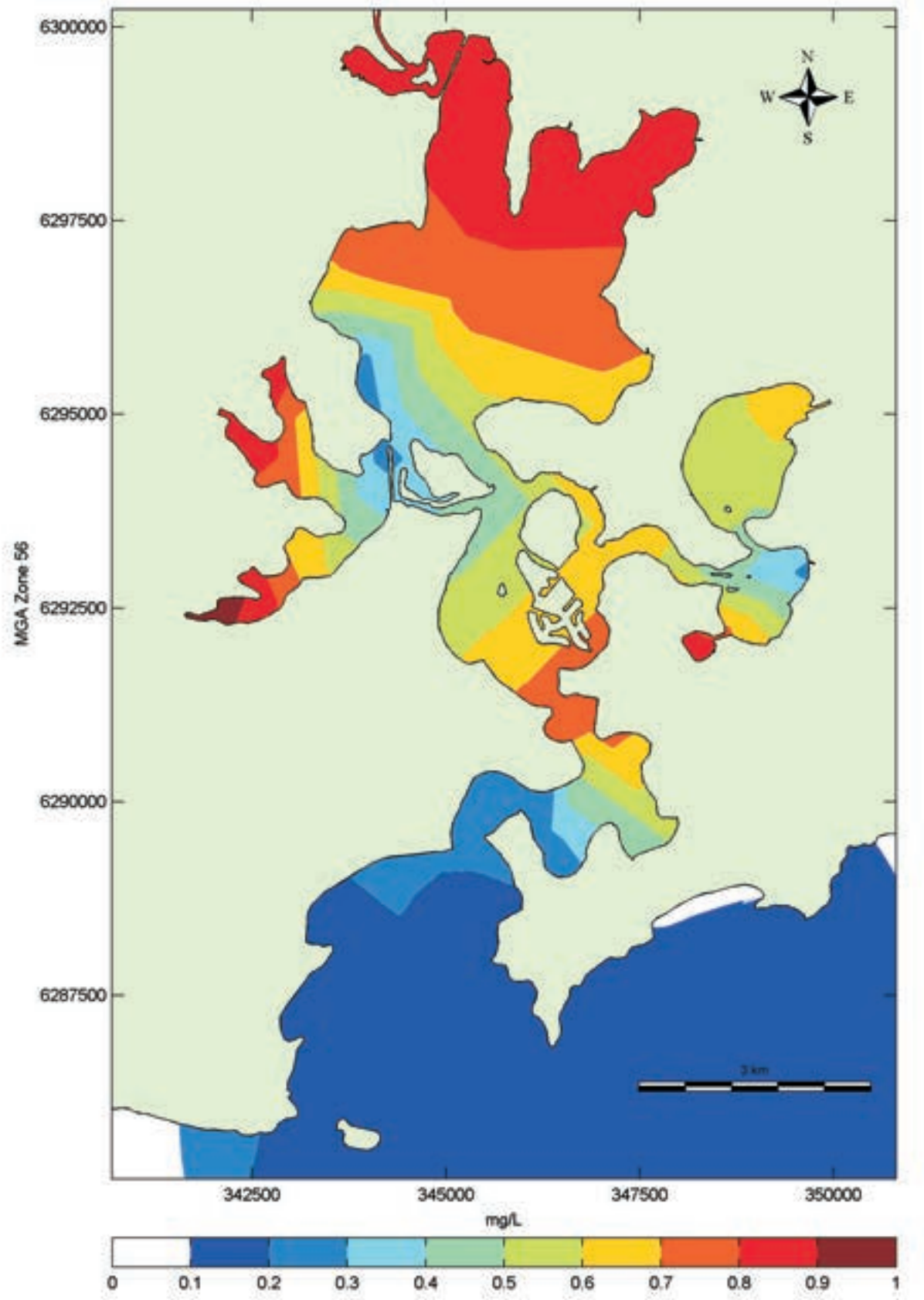

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FIGURE 6.5
SUMMER 1998 (WET YEAR)
NUTRIENT RUNS - TN - 30th APRIL

J2255/Figures/R2262/Figure 6.5 - TN Summer 1998.cdr

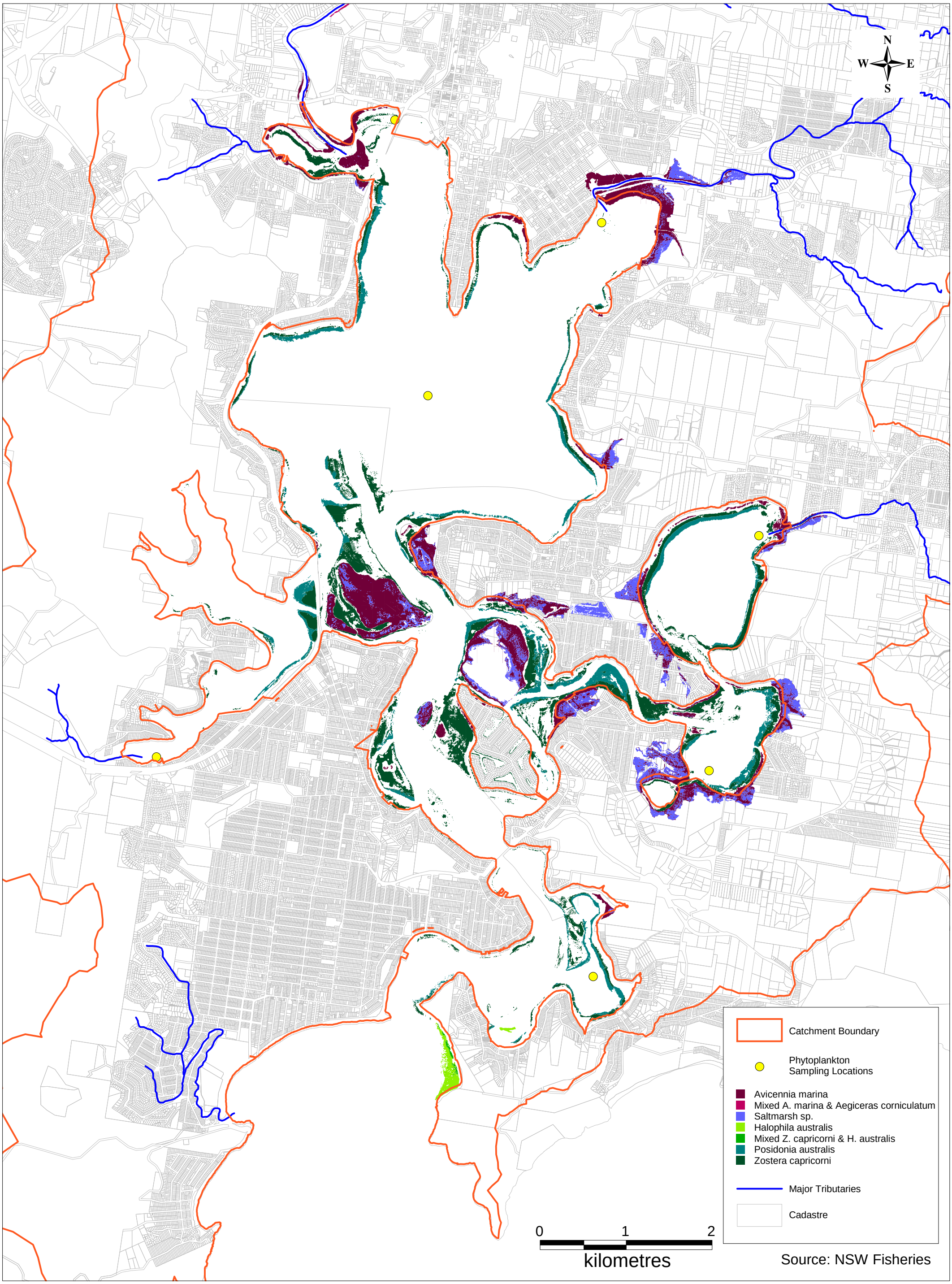

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FIGURE 7.1
AQUATIC VEGETATION MAPPING
& PLANKTON SAMPLING SITES

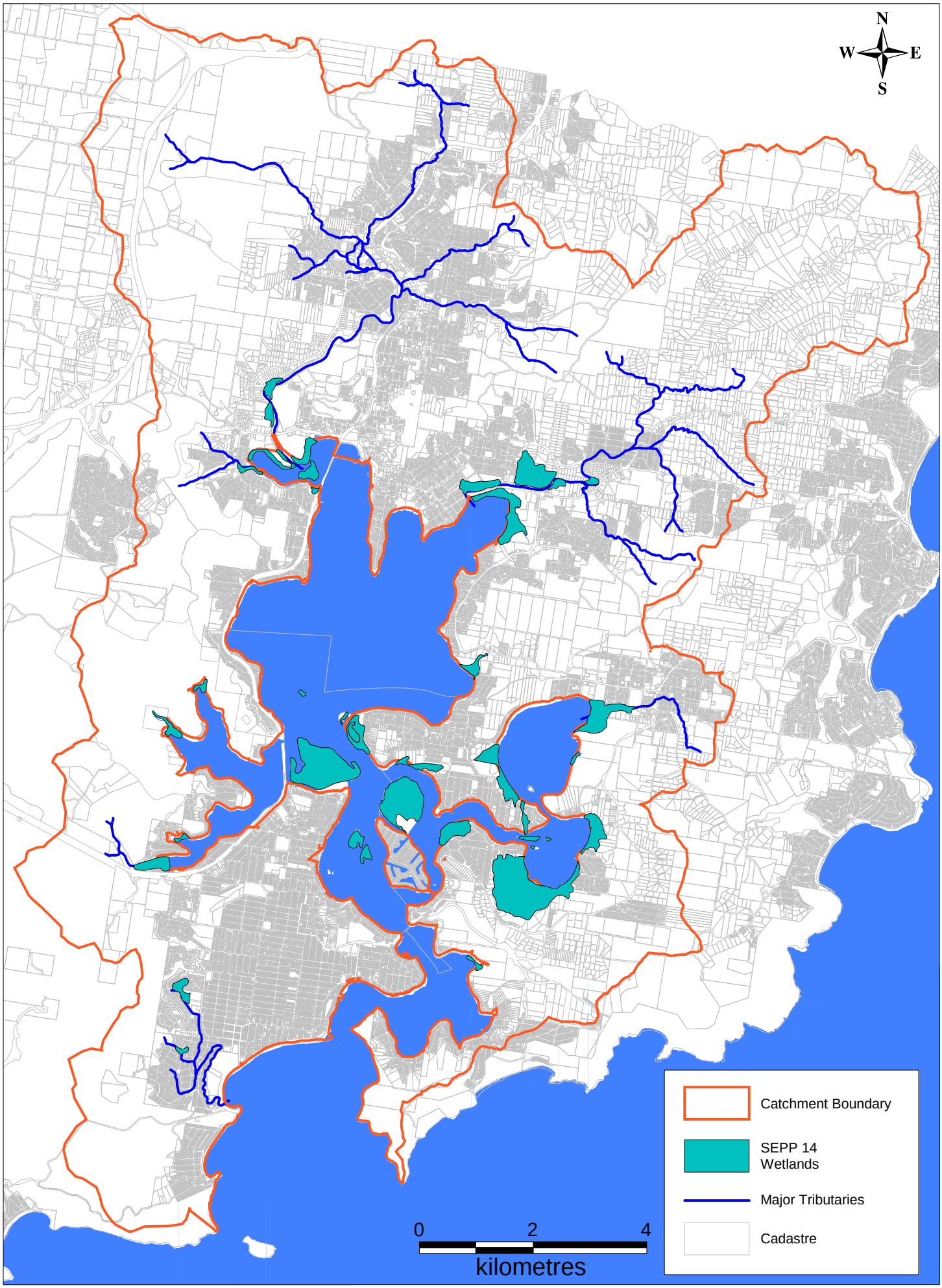

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FIGURE 7.2
SEPP 14 WETLANDS

Undisturbed low marsh.

Undisturbed high marsh.

Disturbed saltmarsh..

Source: Roberts and Sainty, 2005

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FIGURE 7.3
SALTMARSH
HABITATS

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J2255/Figures/R2262/Figure 7.3 - Saltmarsh Habitats.cdr

Mangrove forest dominated by the Grey Mangrove,
Avicennia marina.

The River Mangrove, *Aegiceras corniculatum*.

Source: Roberts and Sainty (2006)

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FIGURE 7.4
MANGROVE
SPECIES

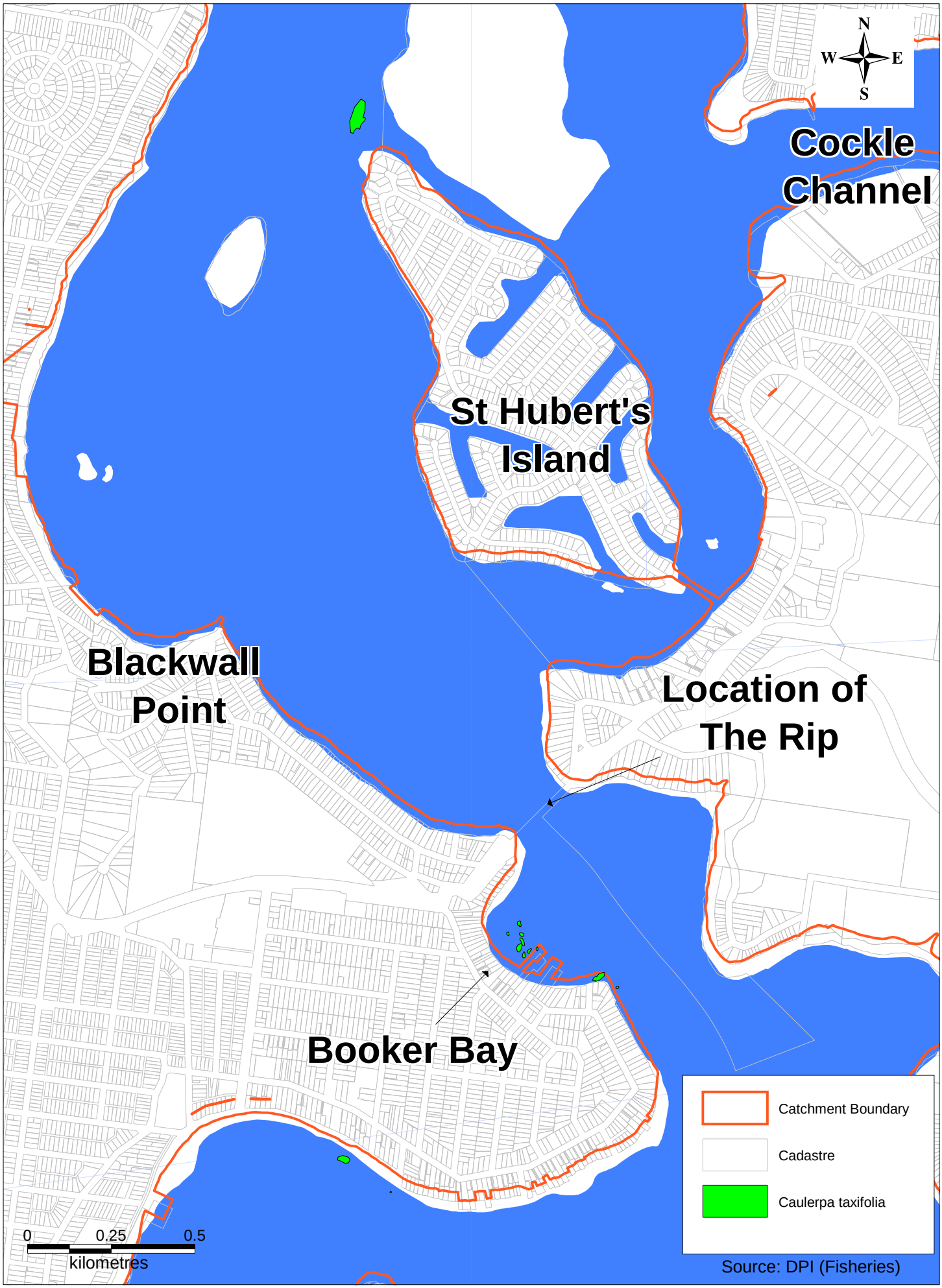

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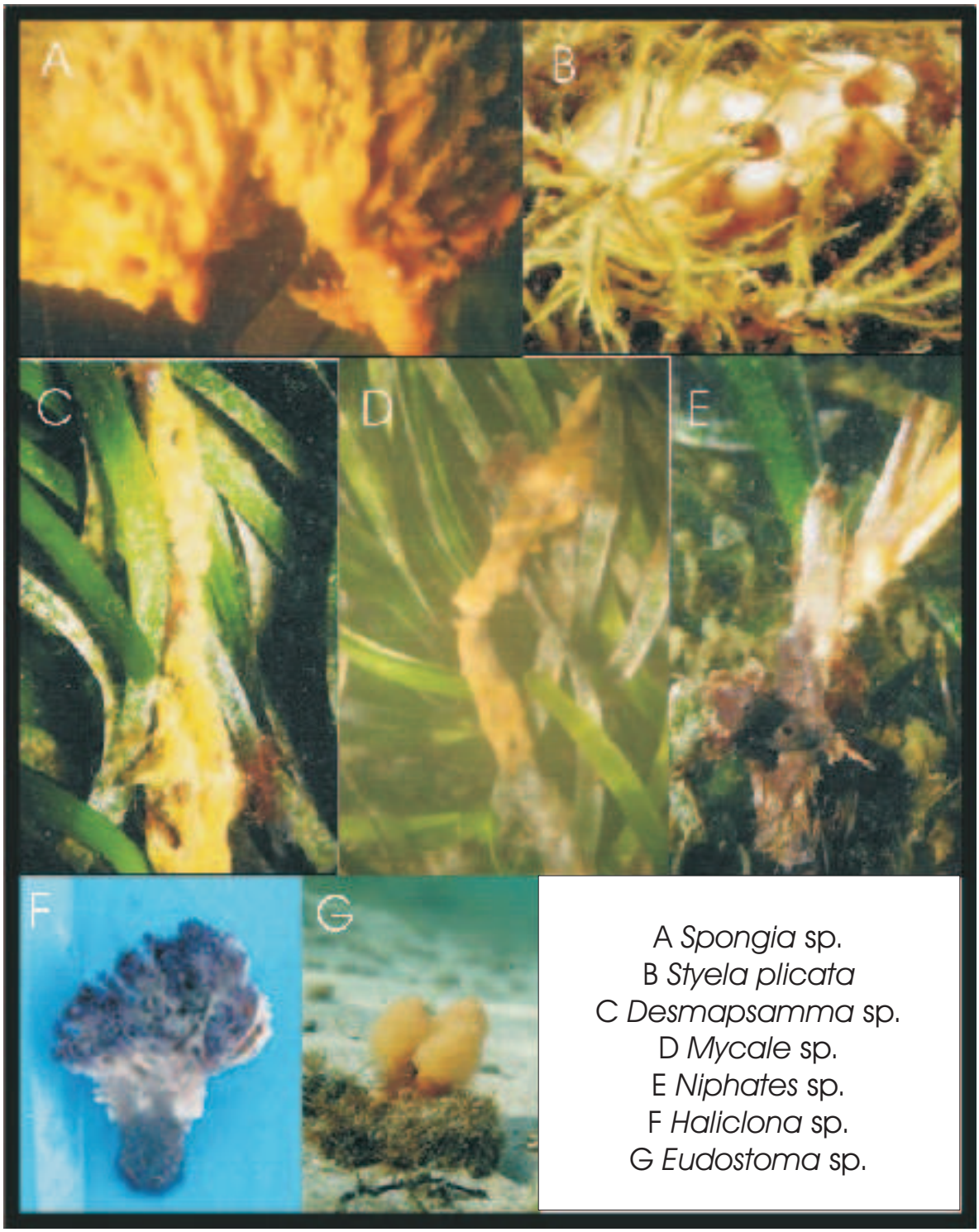
FIGURE 7.5
CAULERPA TAXIFOLIA RECORDS

LJ2255/R2262/V5
March 2008

J:\CM\J2255bw\Figures\R2262\Figure 7.5 - BW C. taxifolia.WOR



Source: Barnes 2006

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FIGURE 7.6
SPONGES & ASCIDIANS
OF BRISBANE WATER

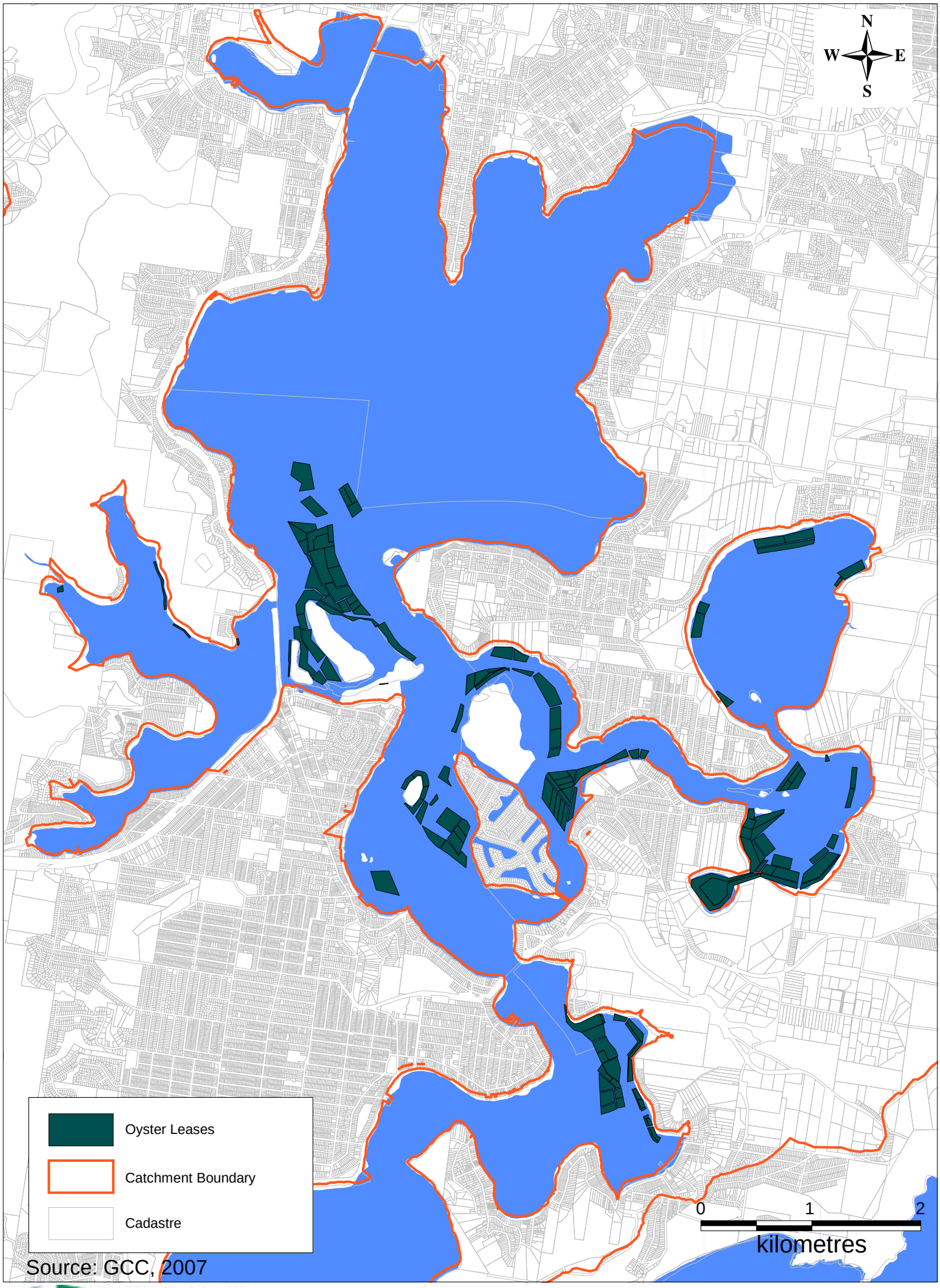

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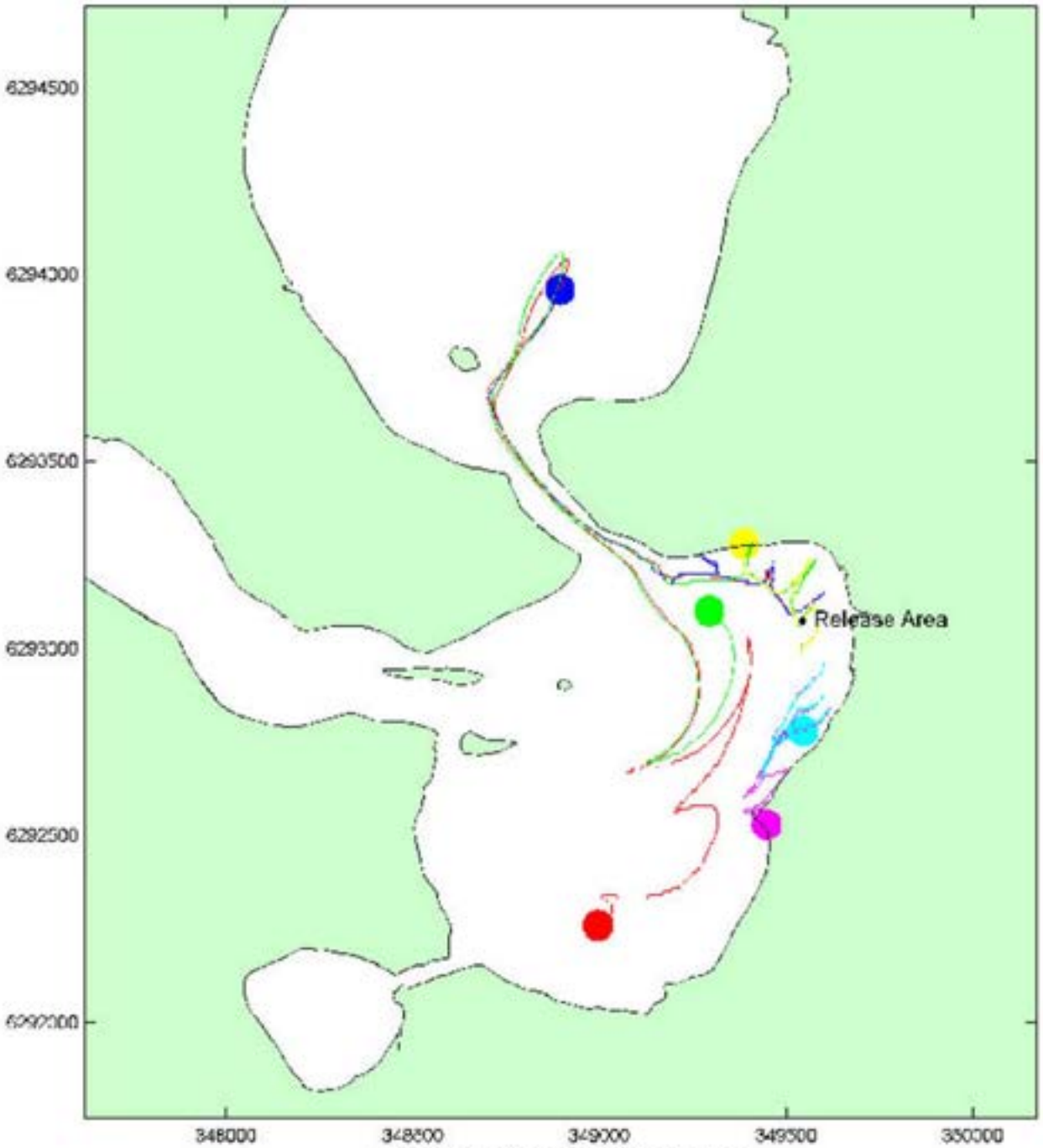
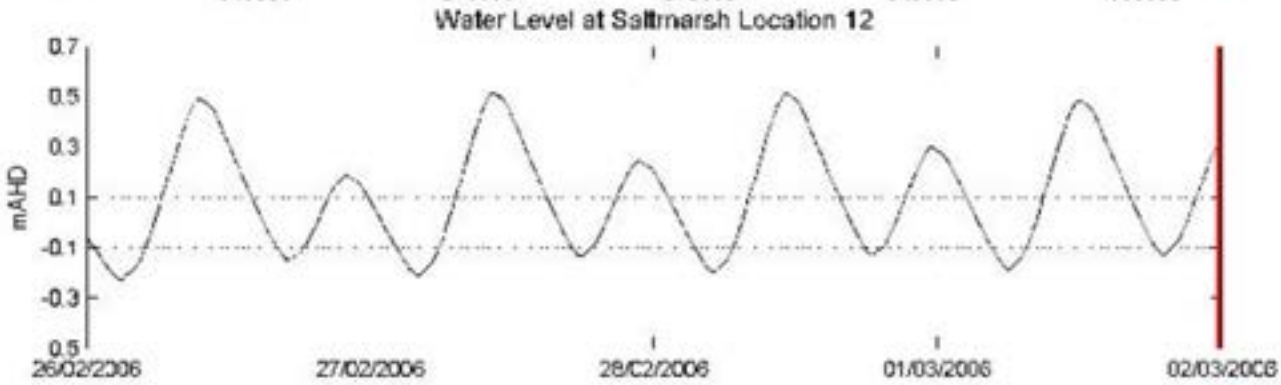
FIGURE 7.7
OYSTER LEASES

J2255\R2262\V5
March 2008

J:\CM\J2255bw\Figures\R2262\Figure 7.7 - Oyster Leases.Wor





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J2255/R2262/V5
J:\CM\J2255bw\Figures\R2262\Figure 7.8.cdr

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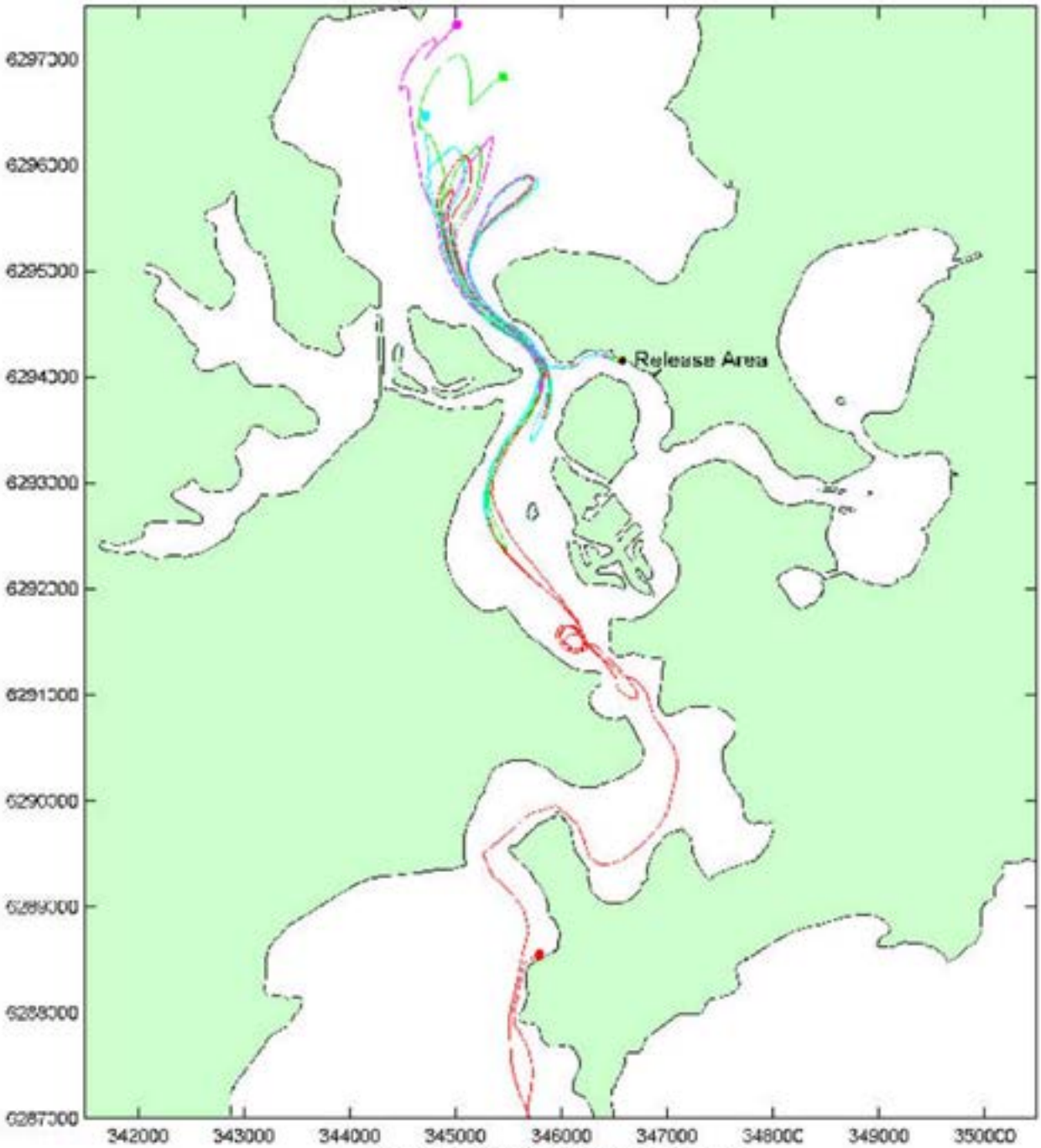
FIGURE 7.8
DROGUE TRACKING
COCKLE BAY



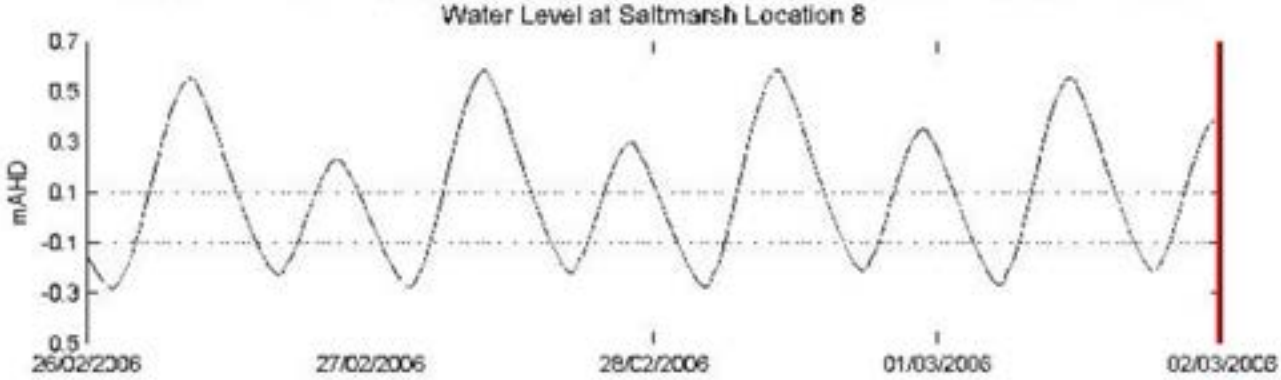


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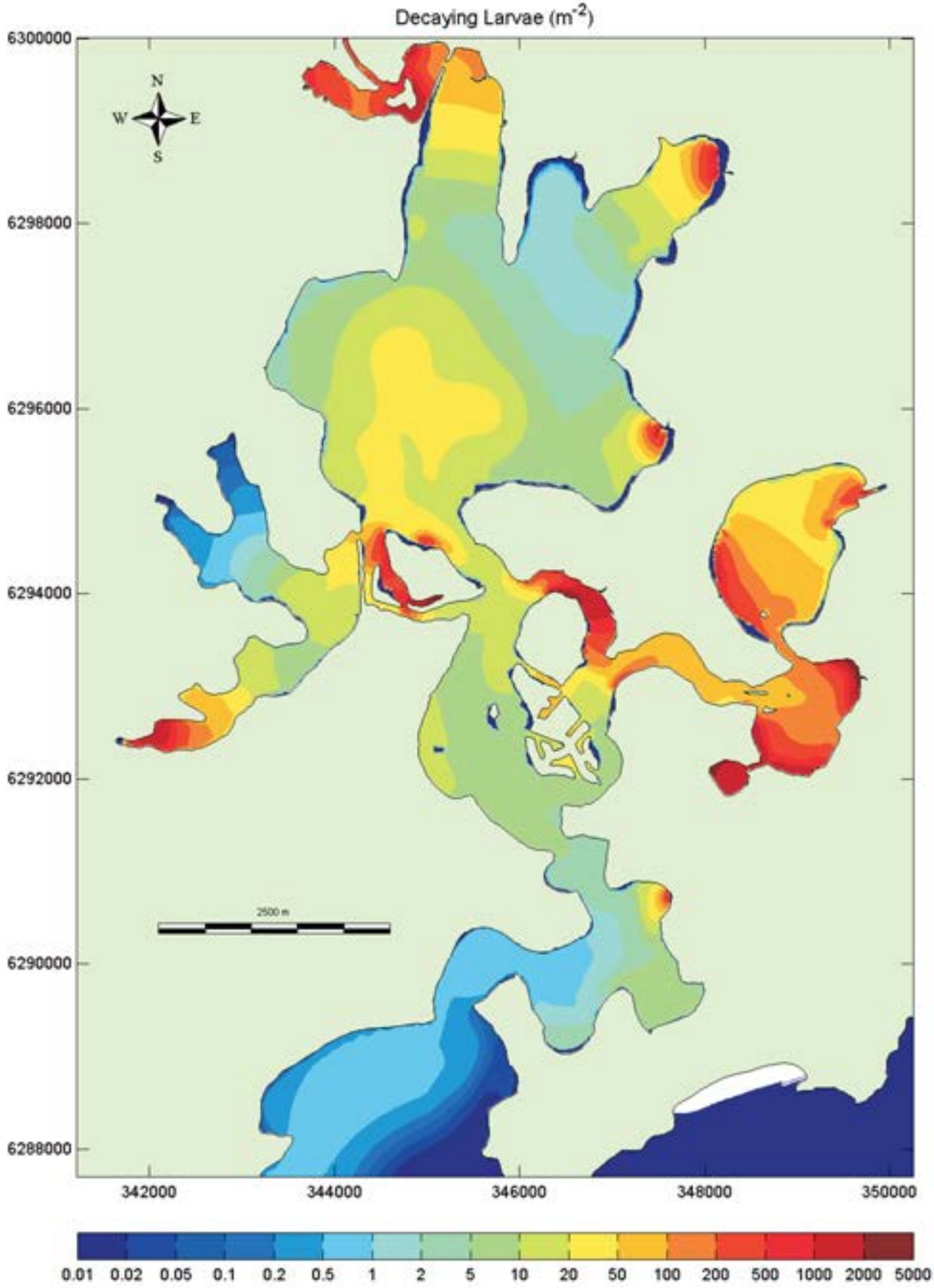
FIGURE 7.9
DROGUE TRACKING
COCKLE CHANNEL/ST HUBERT'S ISLAND



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J:\CMJ2255bw\Figures\R2262\Figure 7.10 - Larval Modelling 1.cpt

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FIGURE 7.10
MODEL OF LARVAL TRANSPORT
-3RD EBB TIDE, HOUR 0

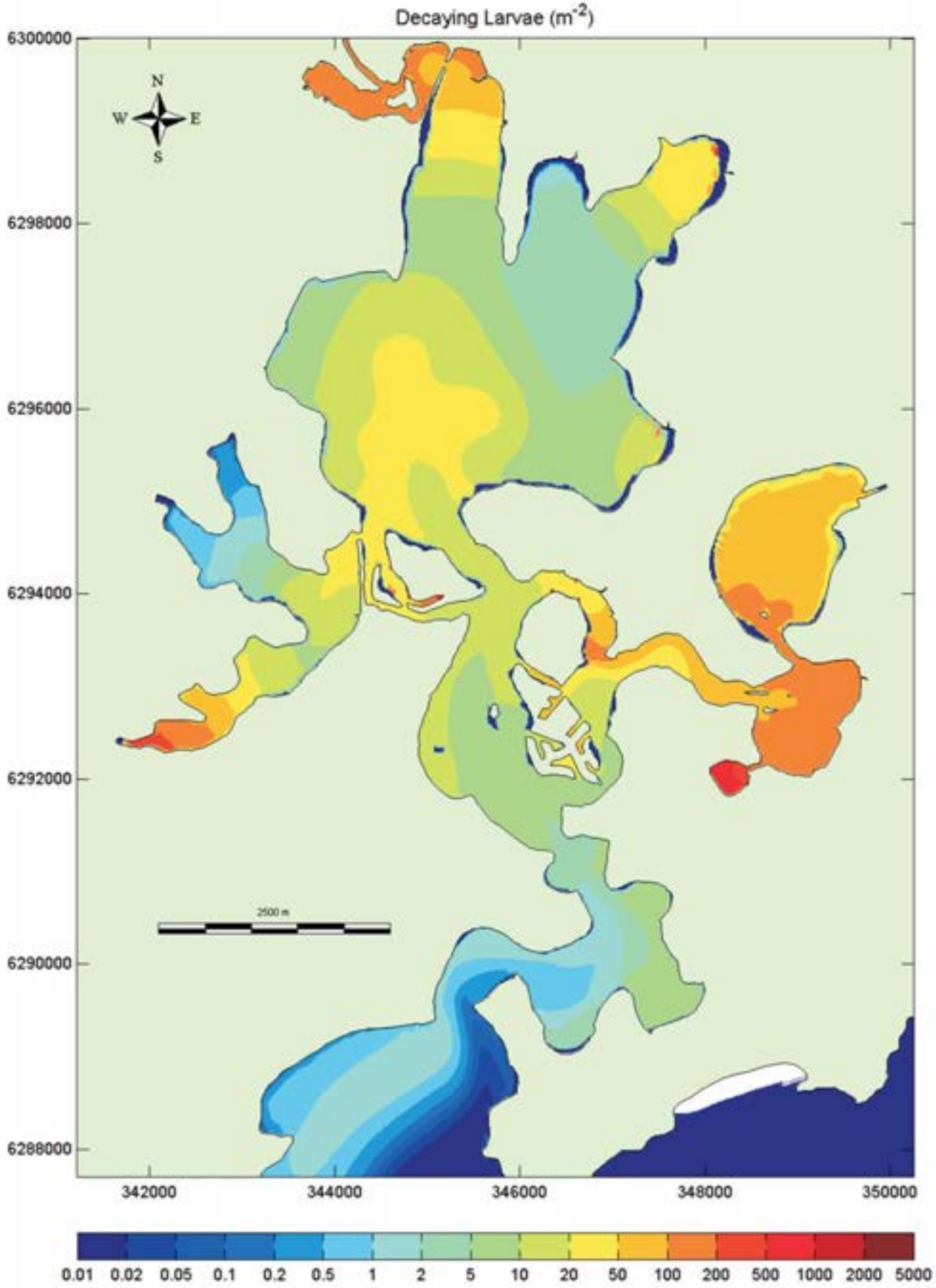

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FIGURE 7.11
MODEL OF LARVAL TRANSPORT - HOUR 24

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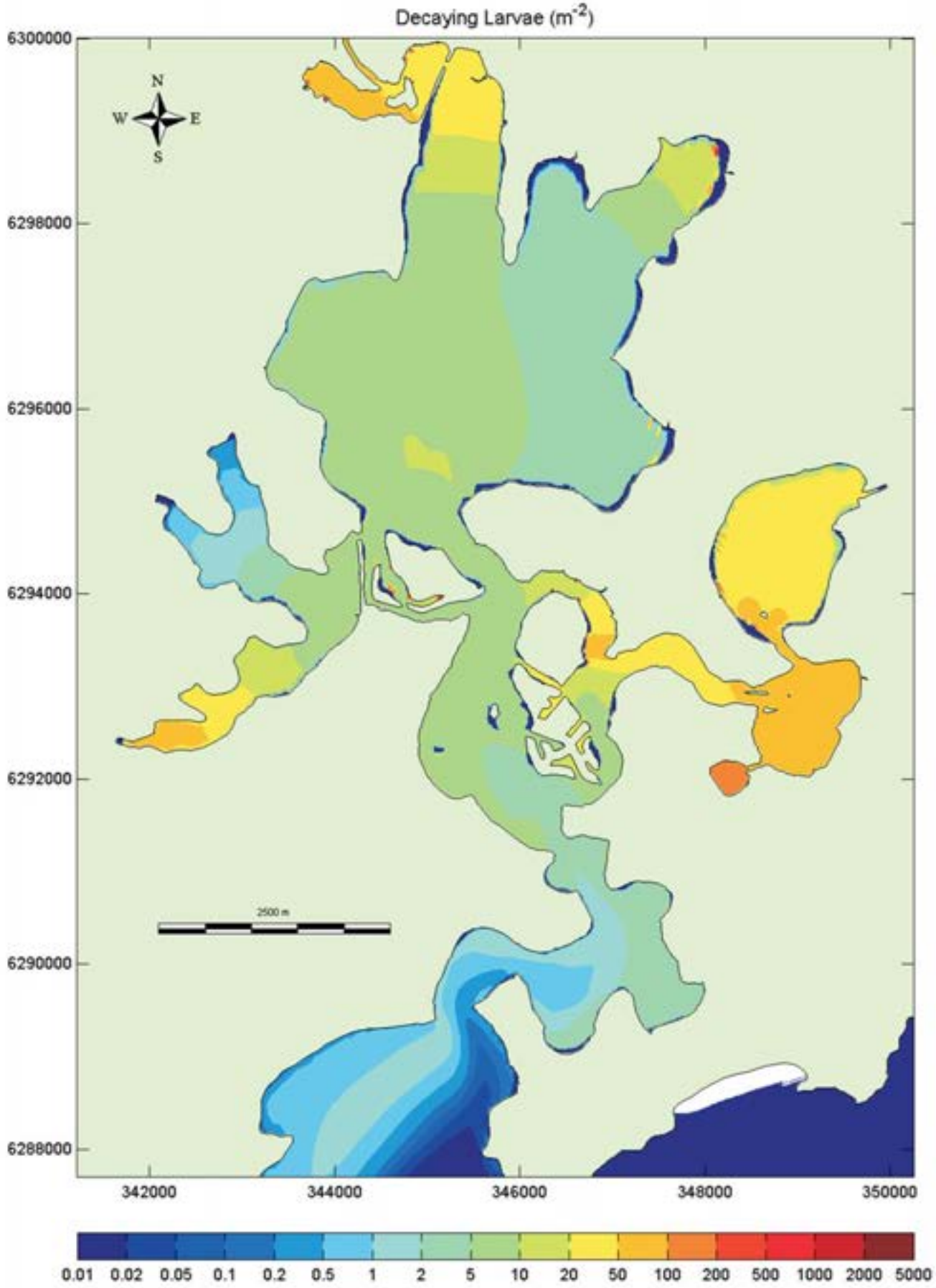
J:\CMJ2255bw\Figures\R2262\Figure 7.11 - Larval Modelling 2.cpt



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J:\CM\J2255bw\Figures\R2262\Figure 7.13 - Larval Modelling 3.cpt

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FIGURE 7.12
MODEL OF LARVAL TRANSPORT - HOUR 48

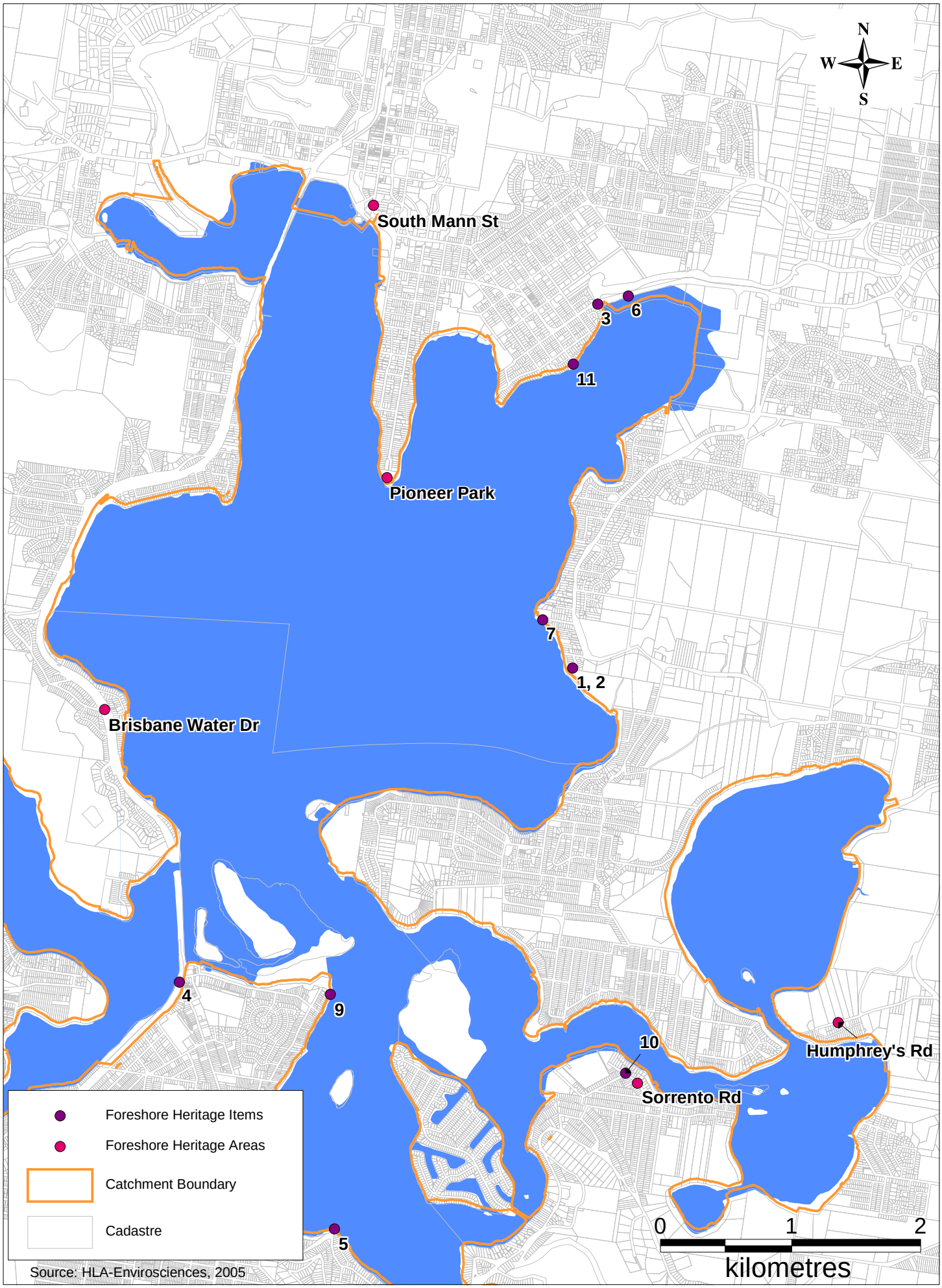

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FIGURE 8.1
HERITAGE ITEMS LOCATED ON FORESHORE LAND

LJ2255/R2262/V5
March 2008

J:\CM\J2255bw\Figures\R2262\Figure 8.1 - Foreshore Heritage.WOR

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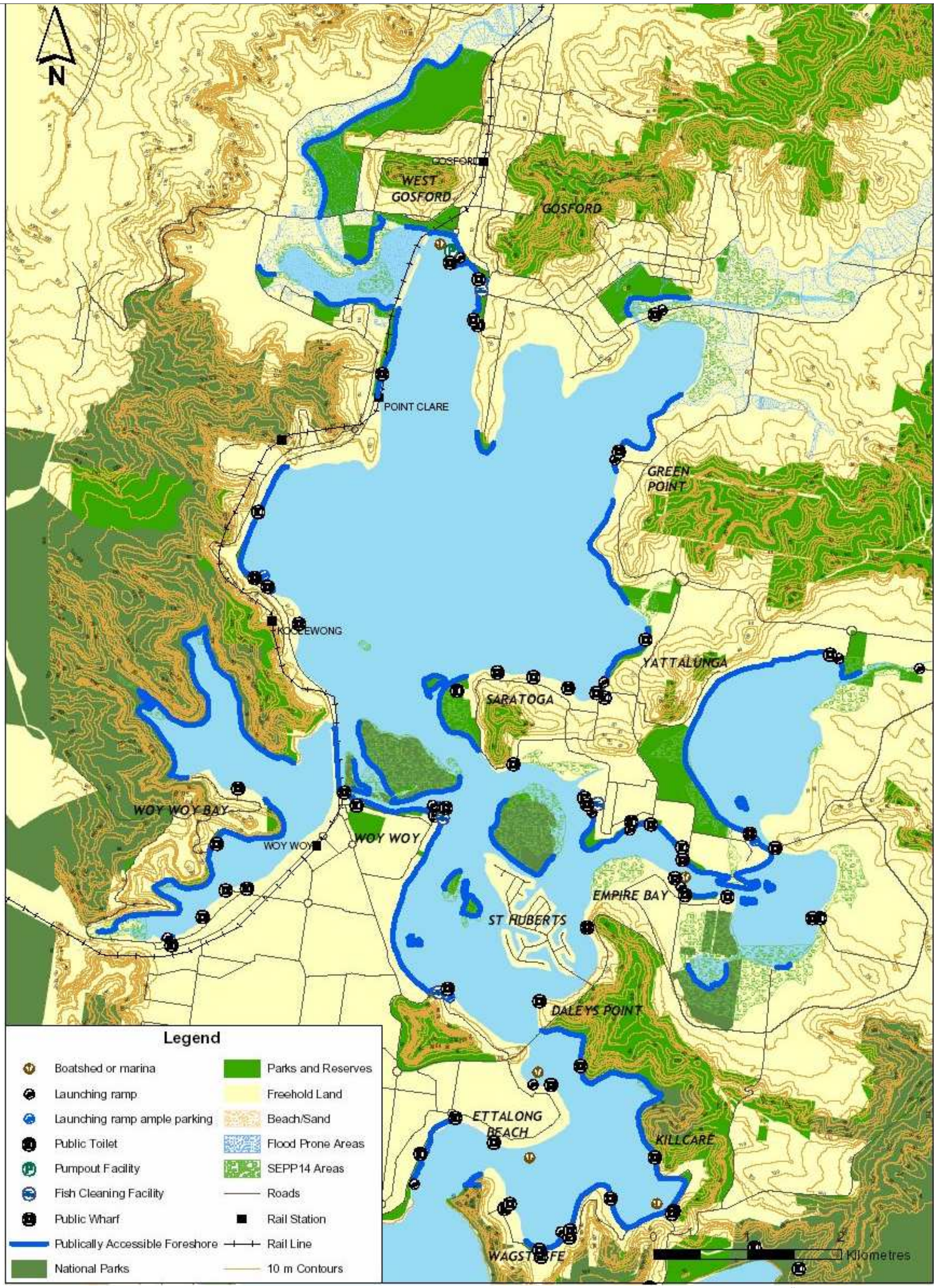
FIGURE 8.2
REGISTER OF THE NATIONAL ESTATE

LJ2255/R2262/V5
March 2008

J:\CM\J2255bw\Figures\R2262\Figure 8.2 - Register Natnl Estate.WOR



Source: Kellogg Brown & Root, 2005

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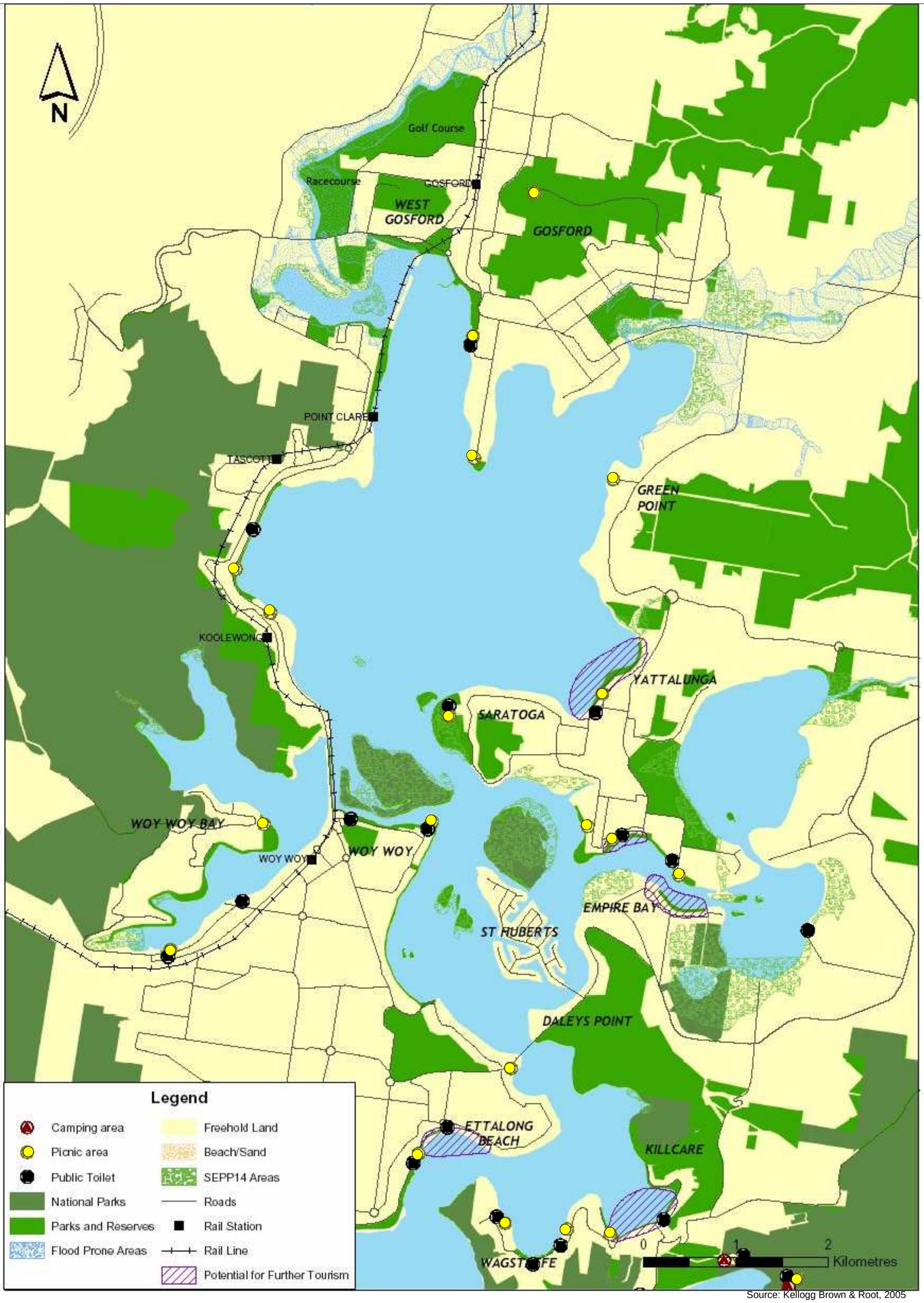
FIGURE 9.1
PUBLICALLY ACCESSIBLE FORESHORES



Source: Kellogg Brown & Root, 2005

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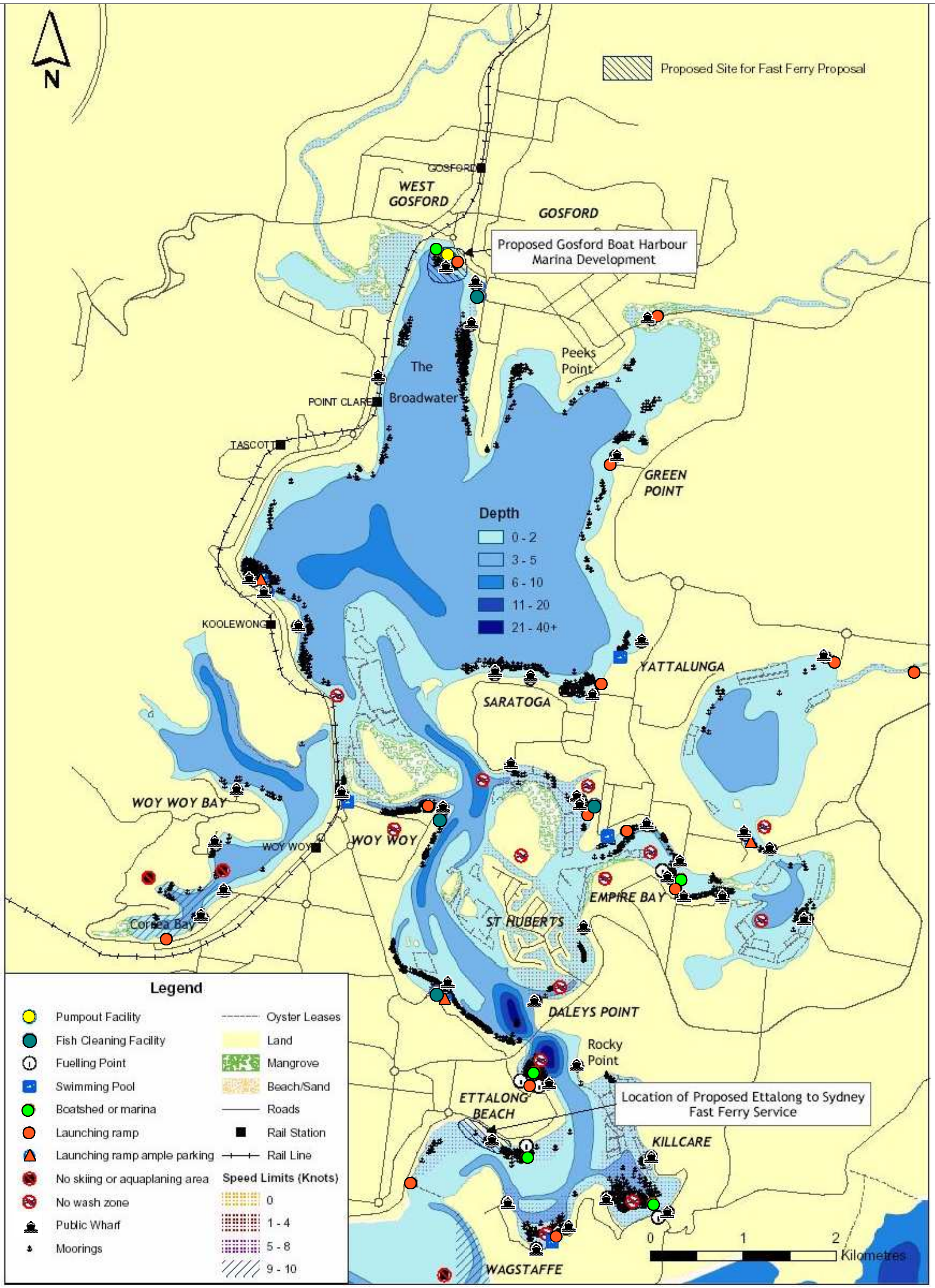
FIGURE 9.2
RECREATIONAL FACILITIES &
POTENTIAL FOR TOURISM DEVELOPMENT

J2255/R2262/V5
March 2008

J2255\Figures\R2262\Figure 9.2 Recreational Facilities.Wor



Source: Kellog Brown & Root, 2005

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FIGURE 9.3
WATERWAY USE
& FACILITIES

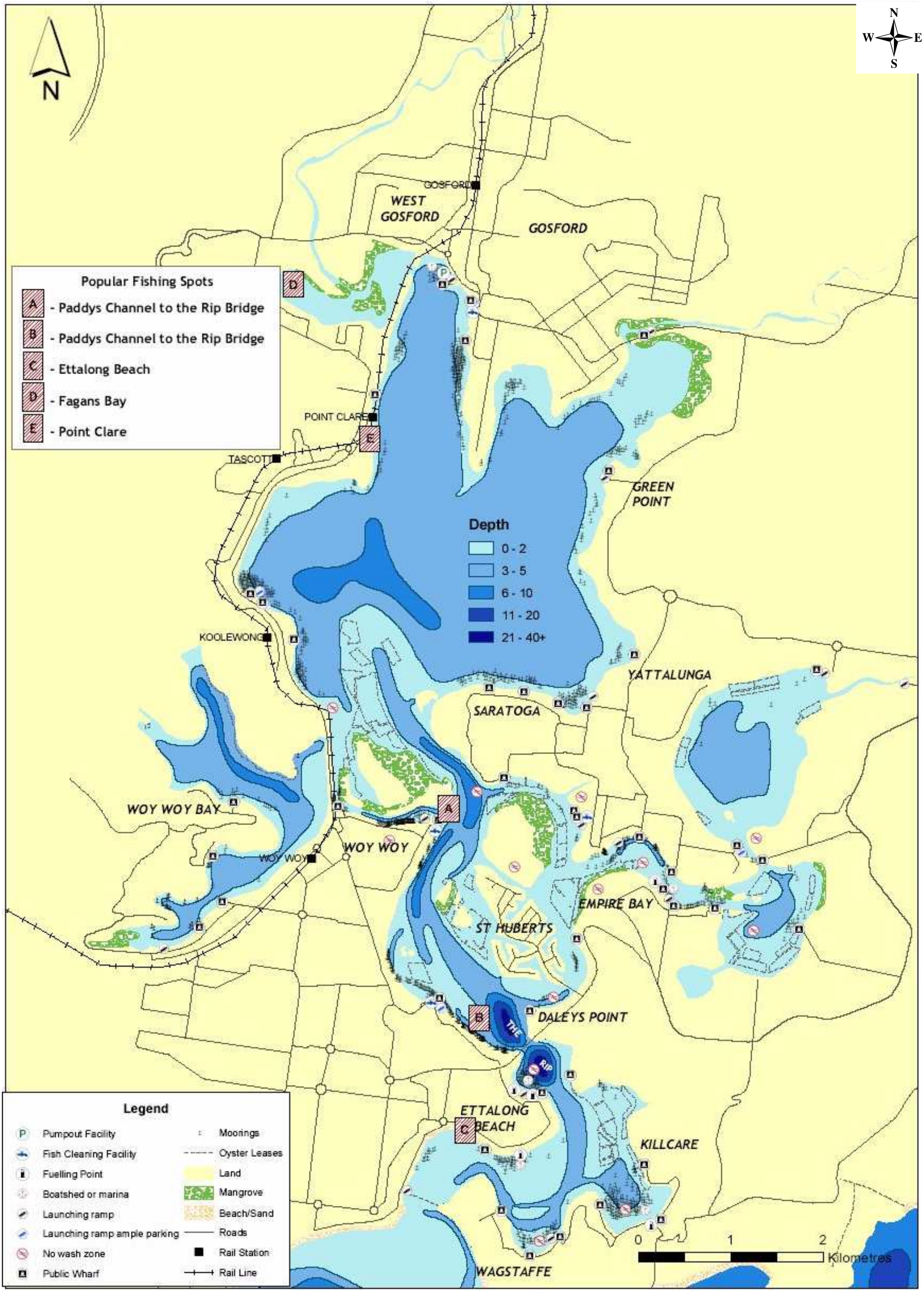

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FIGURE 9.4
POPULAR FISHING AREAS

Source: Kellogg Brown and Root, 2005

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FIGURE 9.5
RECREATIONAL
FISHING CLOSURES

LJ2255/R2262/V5
March 2008

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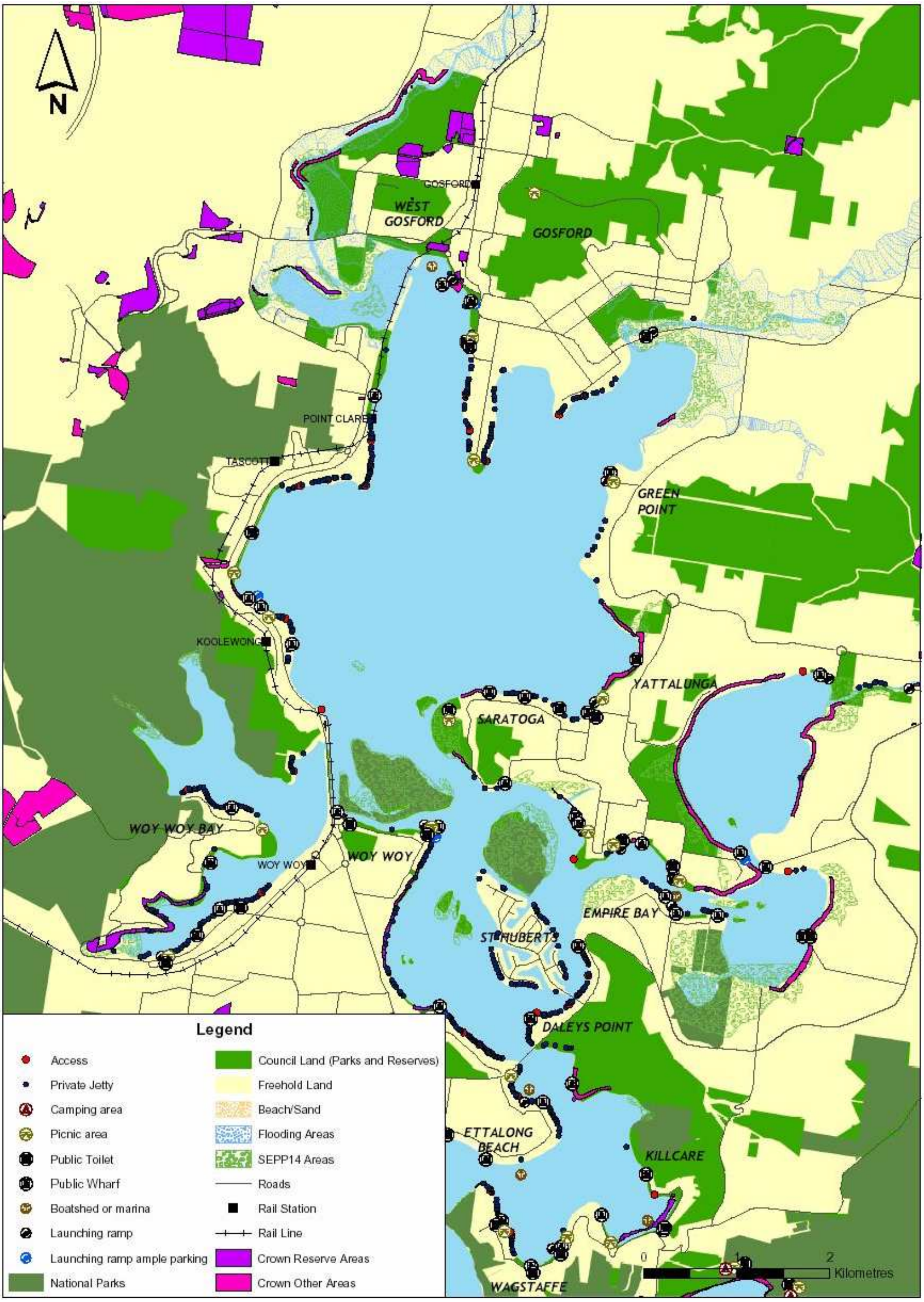

Source: Kellogg Brown & Root, 2005

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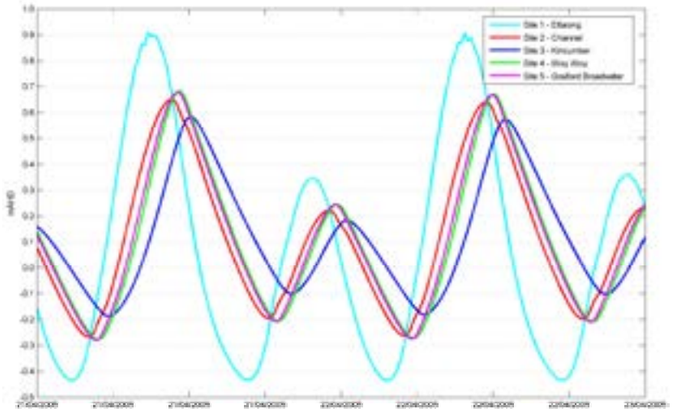
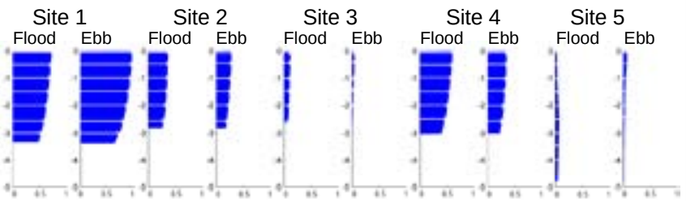
FIGURE 9.6
FORESHORE LAND
OWNERSHIP & CROWN LAND

Tidal Levels and Peak Current Speeds





Vertical Current Profiles (m/s) at the peak of flood and ebb tides

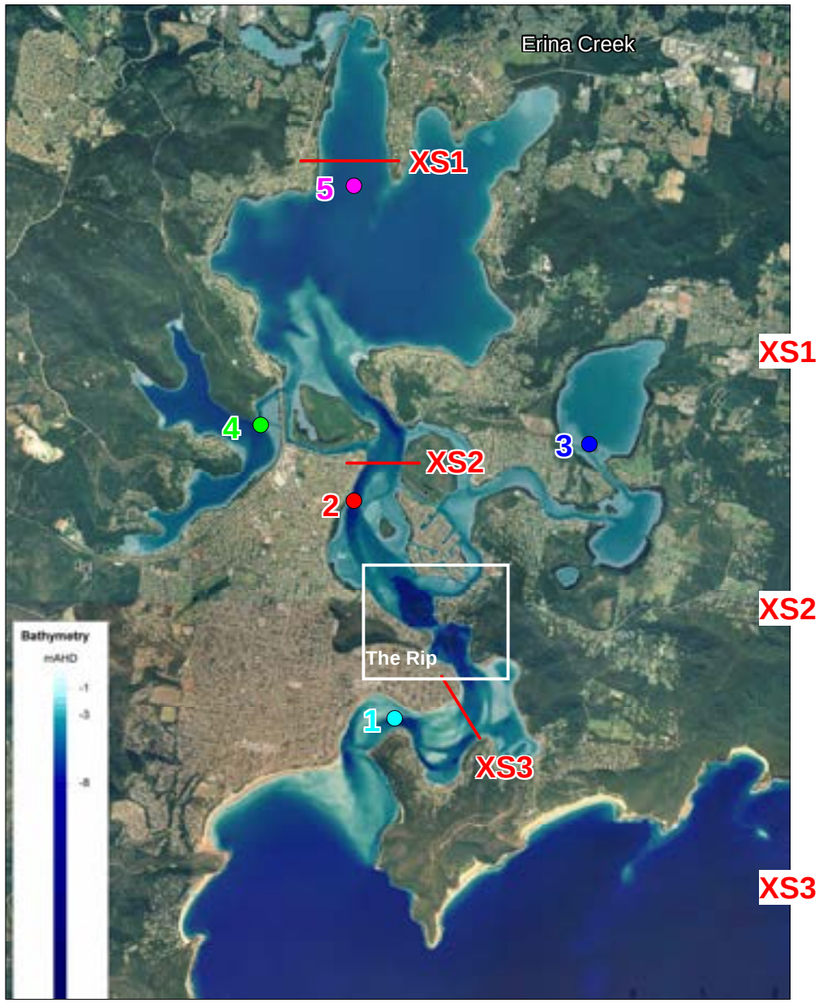
Astronomical Tides are the most significant hydrodynamic driver in the estuary.

Significant tidal attenuation up through the estuary (see water level curves above), with a major hydraulic control at The Rip (see insert bottom right).

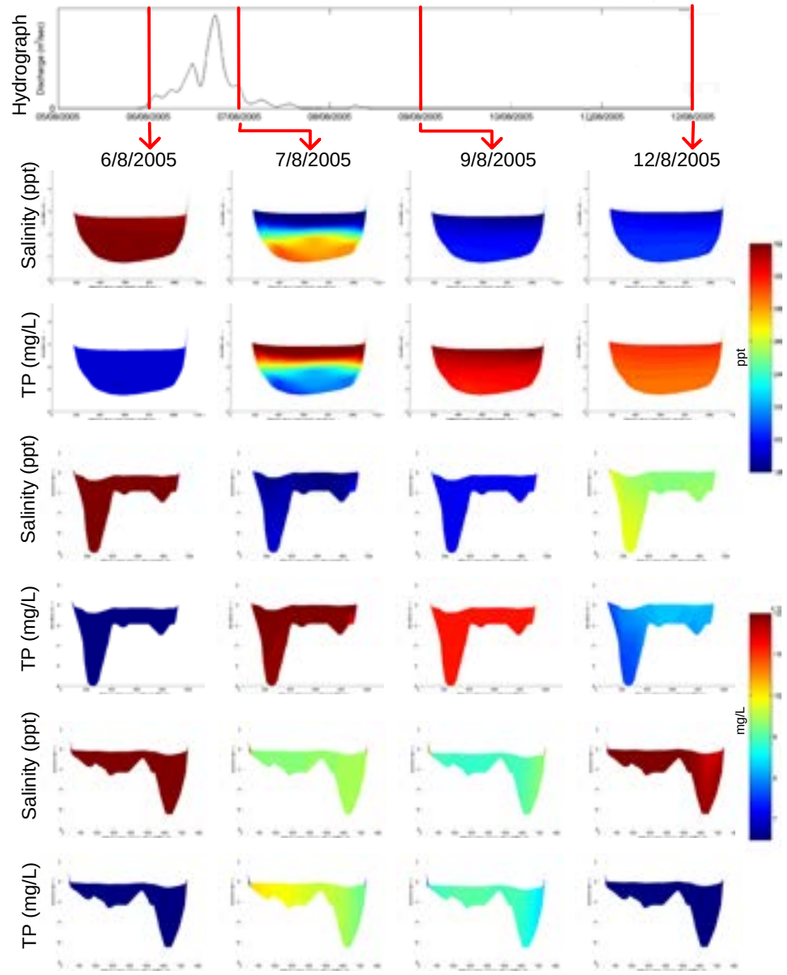
Tidal flows are the primary control on mixing and flushing with lower rates of flushing in the lower estuary.

Tidal characteristics affect important environmental attributes which determine the diversity of species and distribution of habitats.

The water quality and ecological characteristics of the estuary vary in line with the gradient of tidal influence.



20yrARI Catchment Storm Event



Wet weather events cause water quality issues in upper reaches of the estuary, especially near tributaries, including elevated turbidity, low dissolved oxygen concentrations and high nutrient concentrations.

The lower reaches of the estuary are less affected due to the higher degree of tidal / marine influence.

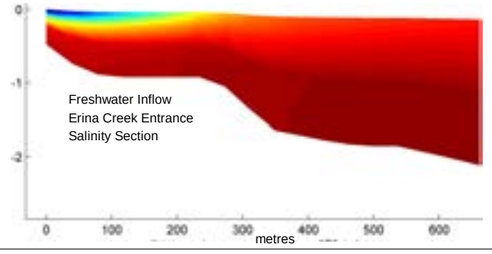
Modelled catchment storm events result in long water quality recovery times in the upper reaches of the estuary while the lower reaches recover more quickly after a rainfall event.

Creek Flows

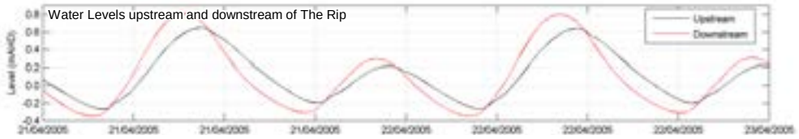
Constant freshwater creek flows provide a nutrient source that stimulates primary productivity, thereby allowing for the establishment of a variety of habitats.

Freshwater impacts are relatively localised and variable down through the water column, where stratification is evident as the freshwater meets the saltier estuary water (see figure below).

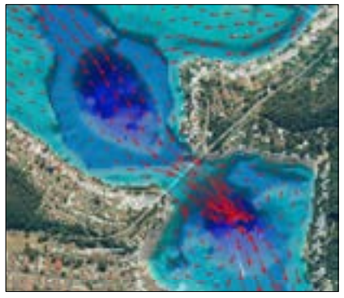
Creek flows deliver sediment from the catchment areas, depositing their loads near the creek entrances.



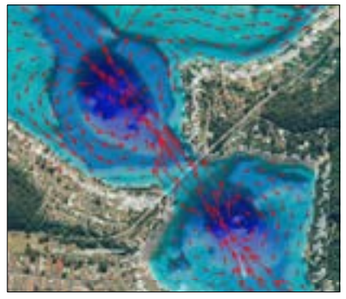
The Rip



Ebb Tide



Flood Tide



Depth Averaged Current Vectors (m/s) at the peak of flood and ebb tides

The Rip is a unique hydraulic feature, formed by two 30m+ gorges, that attenuates the tidal signal (thereby damping the tidal levels) at upstream locations.

The narrow channel at The Rip constricts tidal flows, increasing velocity and leading to the formation of eddy structures (see figures left).

The fast tidal flows at The Rip cause scouring down to the bedrock.

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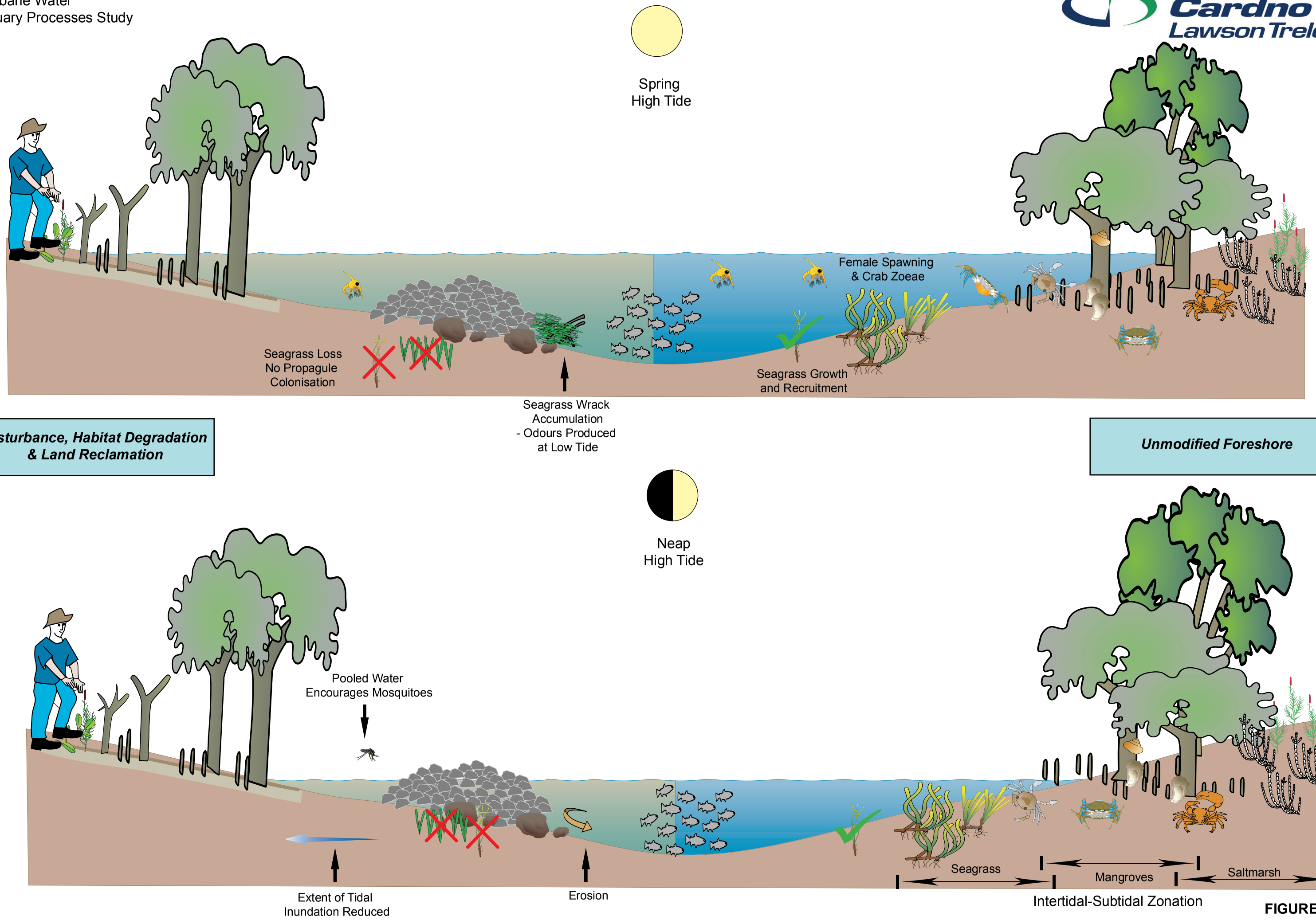

FIGURE 10.2
CONCEPT MODEL:
HYDRO-ECOLOGY

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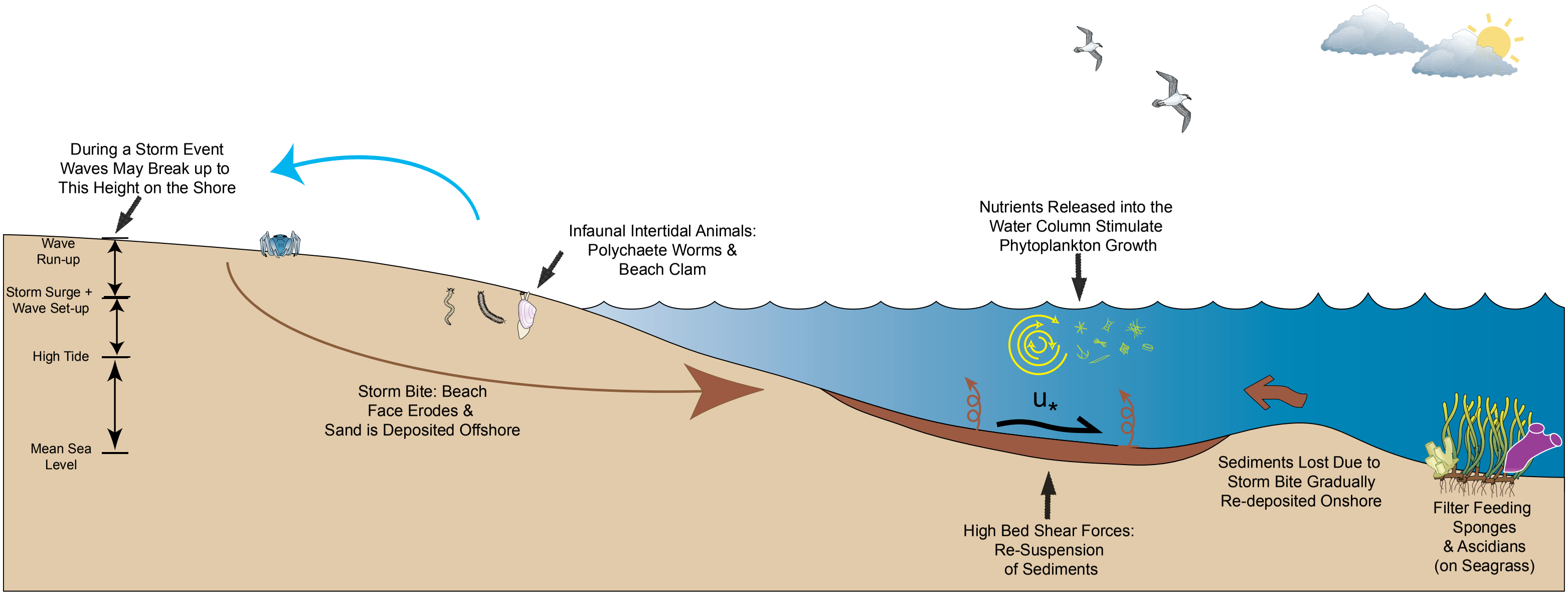

FIGURE 10.3
CONCEPTUAL MODEL:
MORPHOLOGY-ECOLOGY

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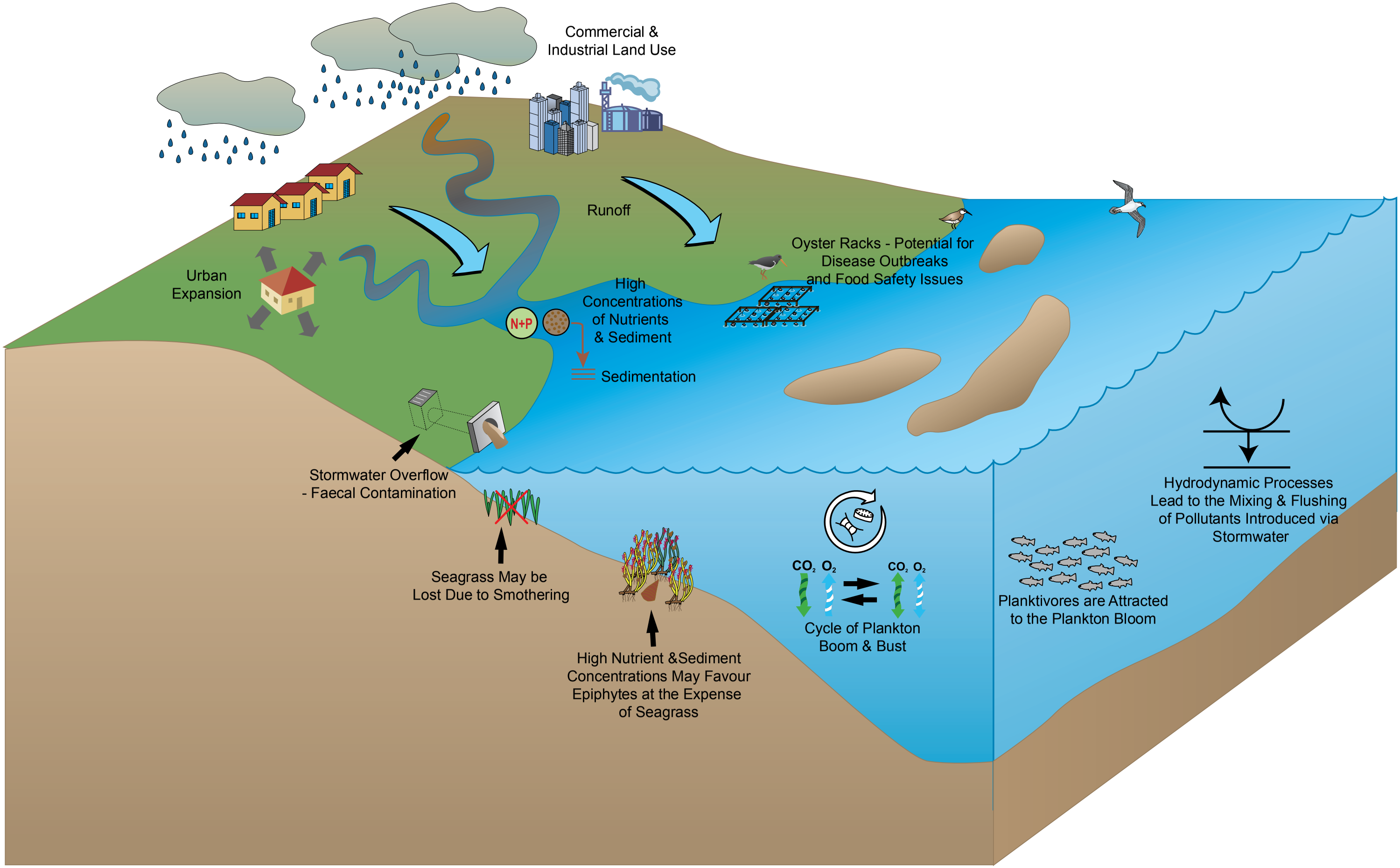

FIGURE 10.4
CONCEPTUAL MODEL:
WATER QUALITY-ECOLOGY