SEQ Natural Assets Atlas 2015

Supplement to the SEQ NRM Plan:

Managing Natural Assets for a Prosperous SEQ

Version 5.1, August 2016

Acknowledgements

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Please reference as follows: SEQC (2015) *Natural Assets Atlas 2015,* South East Queensland Catchments Ltd., Brisbane.

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Atlas Update for the South East Queensland Natural Resource Management Plan 2009– 2031

The *South East Queensland Natural Resource Management Plan 2009 – 2031* (the NRM Plan) lists measurable targets for the extent and condition of our natural assets and is aligned to state and regional interests for the community and industry in the *South East Queensland Regional Plan 2009–2031*.

The NRM Plan has been prepared to coordinate the efforts of people working in environment and natural resource management and to guide sustainable development. To assist with this, all maps are aligned to catchment boundaries as well as Local Government planning areas. Unless otherwise stated, statistics are based on the SEQ Planning Boundary, including eleven Local Government Areas and the Toowoomba Urban Footprint (see Map 1: SEQ Planning Region). The NRM Plan provides regional targets to address key pressures on the region, including: rapid urban population growth, climate change, and increasing demand for infrastructure, housing, essential services and consumables. It also aims to promote and manage the natural assets that the region supports and ensure the long term liveability of SEQ.

Map of the South East Queensland Region

Implementation of the NRM Plan will ensure that we continue to work towards achieving good quality water, air and soil, as well as healthy farmland, waterways, wetlands, rainforests, woodlands and coastal environments.

Map 1: Planning Region and Catchment Boundary

The Atlas describes the data which supports the NRM Plan and is currently in two parts:

Part One – The Benchmark Atlas (2010)

The Benchmark Atlas contains regional benchmark maps which have been generated using the best available data to provide a spatial representation or picture of the region as it was at the time the data was collected. This allows the calculation of a benchmark or baseline (e.g. number of hectares of remnant vegetation) that the corresponding target will aim for by 2031 and can be used to measure progress towards the target.

Part Two – Natural Assets Atlas (2015)

The Natural Assets Atlas represents the first review of the status of natural resource assets since the completion of the Benchmark Atlas five years ago. Consequently this report includes maps which are specific to the current status of available region wide data for each Target. For some Targets where benchmark datasets were not available five years ago or agreement by the Expert Panels at the time on the validity of available datasets was not established, a benchmark and extent map may be presented for the first time in the Natural Assets Atlas 2015. For other Targets new data for the agreed benchmark date have been published and maps that more accurately represent the benchmark extent for an asset are presented.

A comparison with benchmark datasets is possible for Targets where more recent, region wide data has been collated using the same methodology as the benchmark. This allows an assessment of regional progress toward agreed Targets to be presented. These comparisons are best considered a snapshot of changed extent and current state of asset. Where there are multi-year datasets, progress towards achieving agreed Targets over the last five years may be considered.

Current available datasets may only address part of the Target e.g. extent versus condition. Also as a region wide assessment, progress towards achieving Targets, at individual Local Council Areas may be different to the region wide trend.

For an overview of all datasets, including original and revised benchmark datasets, see Appendix A.

NRM Plan Launch 2005, King George Square

Atlas Overview

Part One – The Benchmark Atlas

The Benchmark Atlas (2010, Version 3) details the data sets and methodology used to benchmark the Resource Condition Targets (RCTs), referred to as Targets hereafter, for the NRM Plan i.e. what is the current extent or condition of natural assets in SEQ?

To meet regional and state interests and the overall vision for the region by 2031, it is imperative that each target is described in a way that provides a measure of the required extent and condition of natural assets. This allows us the ability to measure progress towards the achievement of the target at regular intervals to ensure activity remains focused and integrated.

As current data to describe the extent and condition of the assets is not always available, the earliest year in which region wide reliable data was collected is nominated as the benchmark year. As a result, the benchmark year will be different for different targets. Where no region-wide baseline data set currently exists, one of the first key actions for that target will be to address the information gap to establish a suitable benchmark.

It is also important to note that the Benchmark Atlas is based primarily on State and Regional Government data sets to enable comparability and consistency across the broader Southeast Queensland region. In the first instance, the targets must establish a baseline for the whole of the Southeast Queensland Region.

Some local governments within the region have finer scale mapping of their natural assets. Over the last 5 years these have been identified and collected as part of the SEQ NRM Plan Atlas Program coordinated by SEQ Catchments in partnership with the Local Governments of SEQ. This local data is applied at the assessment and implementation phase of programs to ensure an overlap of interests e.g. local and regional priorities.

The Benchmark Atlas identified eight categories of region wide assets including Community and Traditional Owners. A total of 42 Resource Condition Targets (RCT) were considered. For these Targets, 21 had benchmarks established in part or full and 21 were identified as requiring region wide benchmarks.

Part Two– Natural Assets Atlas 2015

The maps contained in this report represent the current extent of each of the natural assets which had benchmarks established. Natural asset change maps have also been included where comparable data was available, displaying the mapped area where change in extent has occurred.

Since the NRM Plan was developed 5 years ago, a review of the benchmarks indicate that the state of the asset has declined for 12 targets, positive gain for 4 targets, both positive and negative progress for 3 targets, 9 additional targets with benchmark now mapped, and 8 targets still outstanding with no data/mapping. The response has been positive with 22 targets gaining considerable community support and activity to address pressures across the region.

The 2014 update of the SEQ NRM Plan (Managing Natural Assets for a Prosperous SEQ) provides a strategic regional plan to guide action and investment that supports State and Local Government, Industry and the Community to achieve Social, Economic and Environmental Visions for the Region. The benchmark and asset maps provide a spatial approach to where effort can be directed or used to inform policy and management responses.

Atlas Data Catalogue

Data utilized in this Atlas is described in the Atlas Data Catalogue in Appendix A.

Numinbah Valley Riverine Work Site

Land Plus! Property Planning Unit

A1 – Greenhouse Gases

By 2031, the region will make an equitable contribution to the national and regional targets for reduction in greenhouse gas emissions

Rationale

Australia has one of the world's highest per capita emissions rates (Commonwealth of Australia, 2008). The weight of scientific evidence tells us that Australians are facing risks of damaging climate change. These risks can be substantially reduced by strong, effective and early action by all major economies. In order for SEQ to make an equitable contribution to national targets, regional greenhouse gas emissions must be monitored.

Datasets

National Pollutant Inventory (NPI) Data for 2000-2012.

Methodology

Using Air Release (point and diffuse) NPI data for the time period available (2000-2012), reportable emissions were graphed to give an indication of change in emissions over time (Figure 1).

Results

Figure 1 identifies increasing carbon monoxide emissions to air over time.

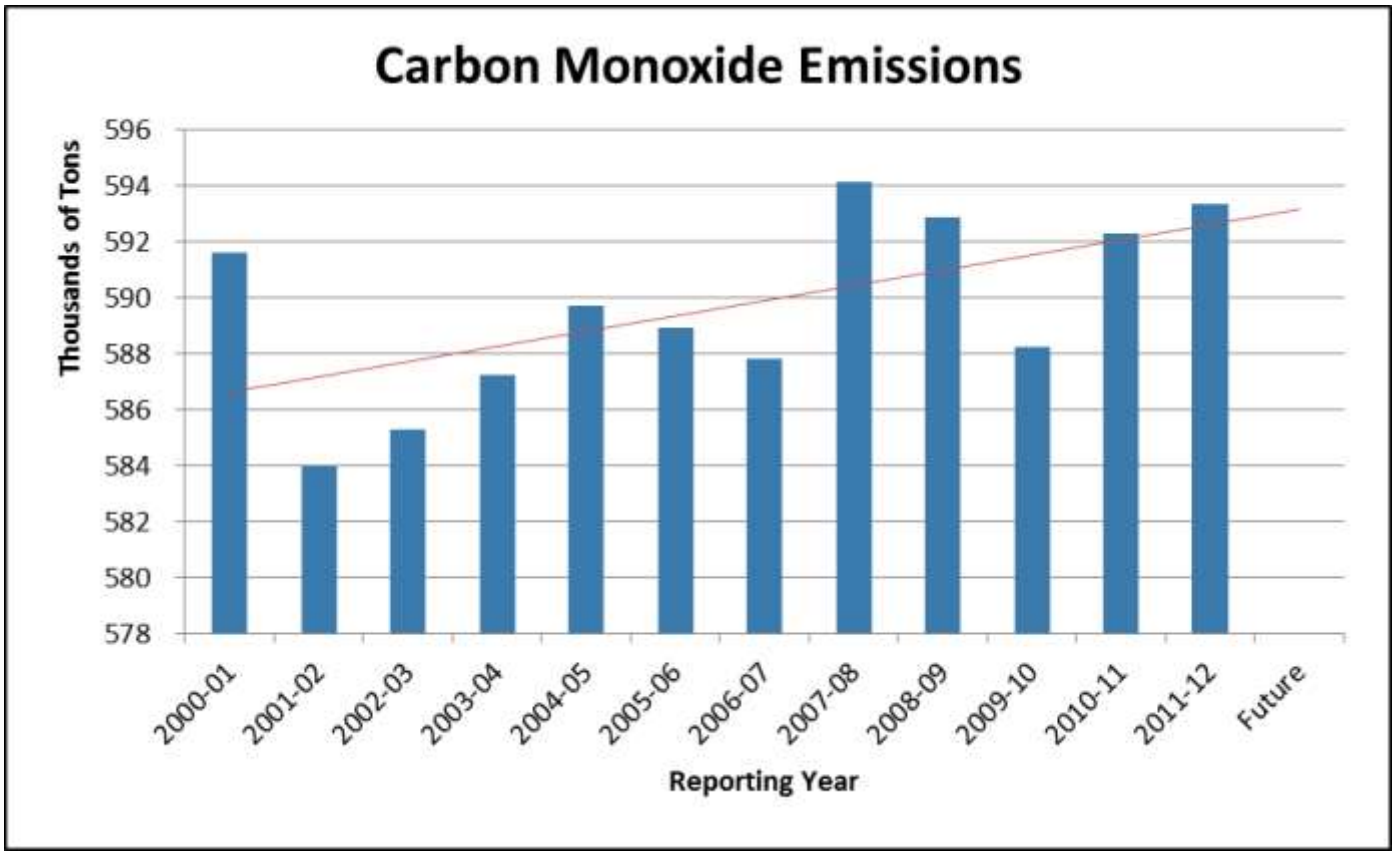


Figure 1: Change in Carbon Monoxide Levels 2000-2012

Data Limitation

Not all greenhouse gas emissions are recorded in the NPI, so target dataset is incomplete.

Credits

Interpretive Guide for the NPI: A guide to understanding South Australia's NPI data

(http://www.npi.gov.au/resource/interpretive-guide-npi-guide-understanding-south-australias-npi-data)

Brisbane City from Mt Gravatt Outlook Reserve

A2 – Air Quality

By 2031, the levels of air pollutants in the SEQ air shed will be at or below the quality objectives in the appropriate Schedule of the Environmental Protection (Air) Policy 2008

Rationale

The objective of the Environmental Protection (Air) Policy 2008 is to identify the environmental values of the atmosphere to be enhanced or protected and to achieve the objectives of the QLD Environmental Protection Act 1994, i.e. ecologically sustainable development. Particles with a diameter of 10 micrometres (PM-10) or less are inhalable and pose the greatest risk to human health and a risk to significant vegetation such as remnant vegetation and fauna.

Datasets

National Pollutant Inventory (NPI) Data for 2000-2012.

Remnant Vegetation extract of Regional Ecosystems v.8, 2011 extent (DERM 2012)

Methodology

Using Air Release (point and diffuse) NPI data for the time period available (2000-2012), reportable emissions identified as having significant environmental impacts were graphed to give an indication of change in emissions over time. The principal pollutants analysed include Carbon Monoxide (CO), Nitrogen Oxide (NOx), Sulfur Oxide (SOx) and particulate matter (PM-10, PM-2.5).

Map: a toxicity/health risk equivalence score was calculated for all reported air release compounds (based on "Interpretive Guide for the NPI"). A density map was generated based on the equivalence score, and intersected with remnant vegetation (Regional Ecosystems Version 8) to identify bushland potentially exposed to high air pollution risk levels.

Results

Based on NPI 2000-2012 data, there is an increasing trend in carbon monoxide (Figure 2) and air borne particulates (Figure 3); a decreasing trend in oxides of nitrogen, sulphur dioxide and fluoride (Figures 4, 5, 6) for SEQ.

Map 2: Air Quality identifies the location of significant point sources of pollution and their relative risks to natural assets (based on the health risk equivalence score).

PM10 fine particles affect the respiratory tracts of both humans and animals and as such high levels can have an adverse effect on priority taxa.

Nitrogen deposition for air pollution has been shown in Europe and USA to have an adverse effect on native forests, grasslands and waterways.

Deposition of fluorides from air pollution can accumulate in vegetation and soils and cause both fluorosis in herbivores and decline in soil invertebrates.

SOx air pollution can lead to acid rain impacts on both soils and waterways.

Data Limitation

The influence from topographic features and air currents on the movement of compounds was not included in this analysis. Previous studies outside of SEQ indicate that PM-10 exceedances vary by wind speed, wind direction and by levels of other variables (e.g. presence of SO2).

Data does not represent total emissions, only from companies required to report on emissions. The reportable emissions do not include emissions from natural and miscellaneous sources which are fugitive dust (unpaved and paved roads), agricultural and forestry activities, wind erosion, wild fires and managed burning.

Credits

Interpretive Guide for the NPI: A guide to understanding South Australia's NPI data
(http://www.npi.gov.au/resource/interpretive-guide-npi-guide-understanding-south-australias-npi-data)

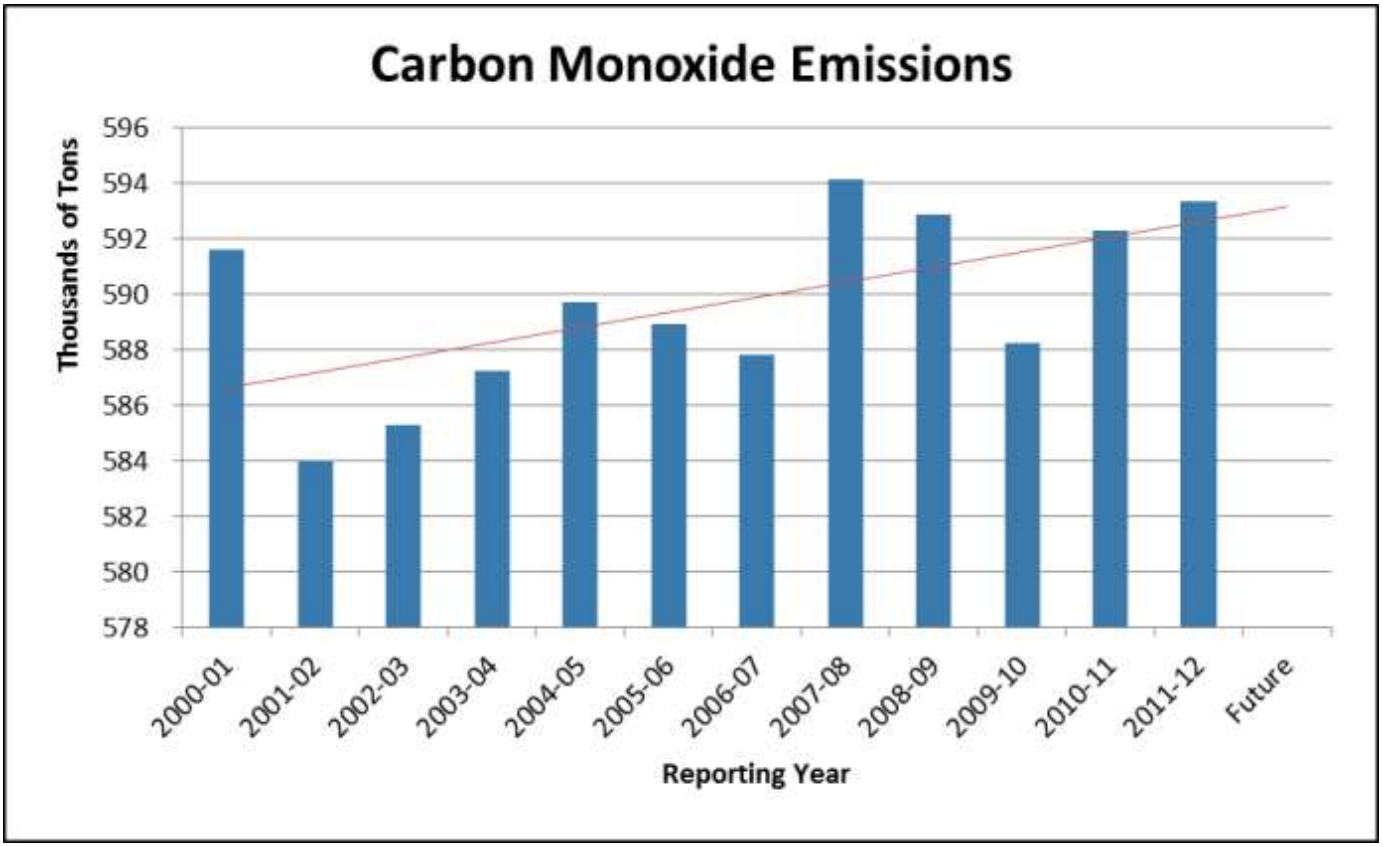


Figure 2: Change in Reported Carbon Monoxide Levels 2000-2012

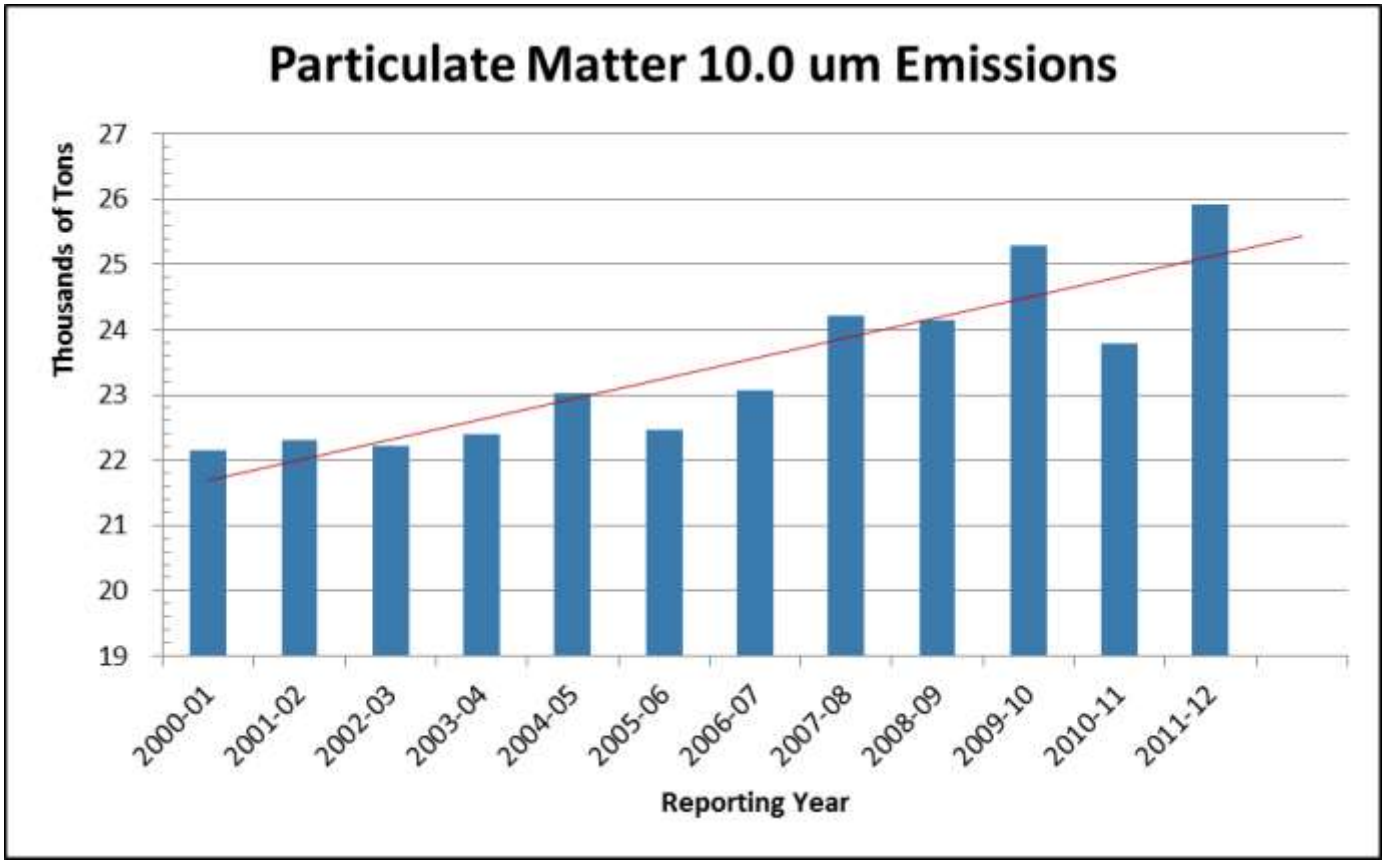


Figure 3: Change in Reported Air Borne Particulates 2000-2012

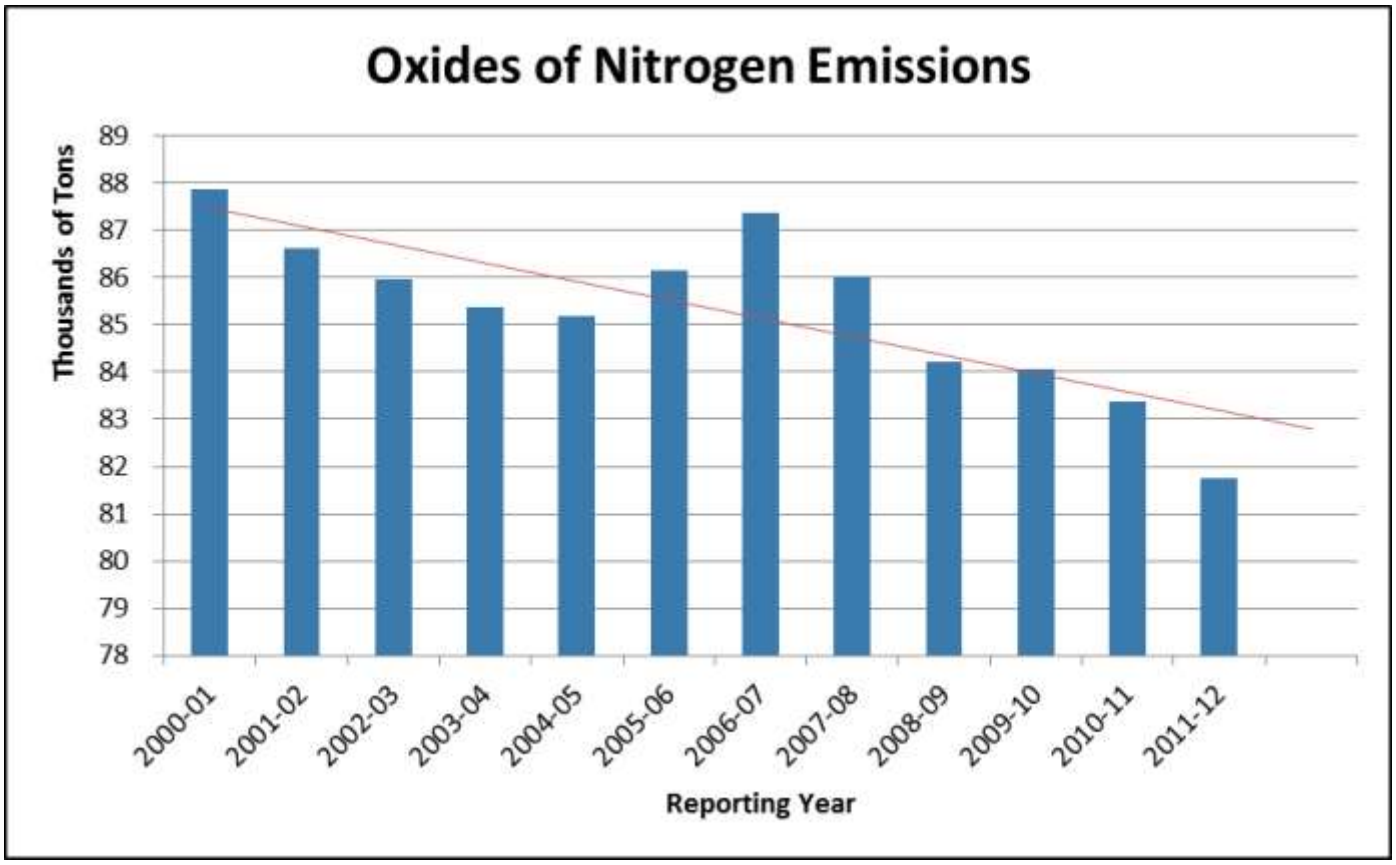


Figure 4: Change in Reported Oxides of Nitrogen 2000-2012

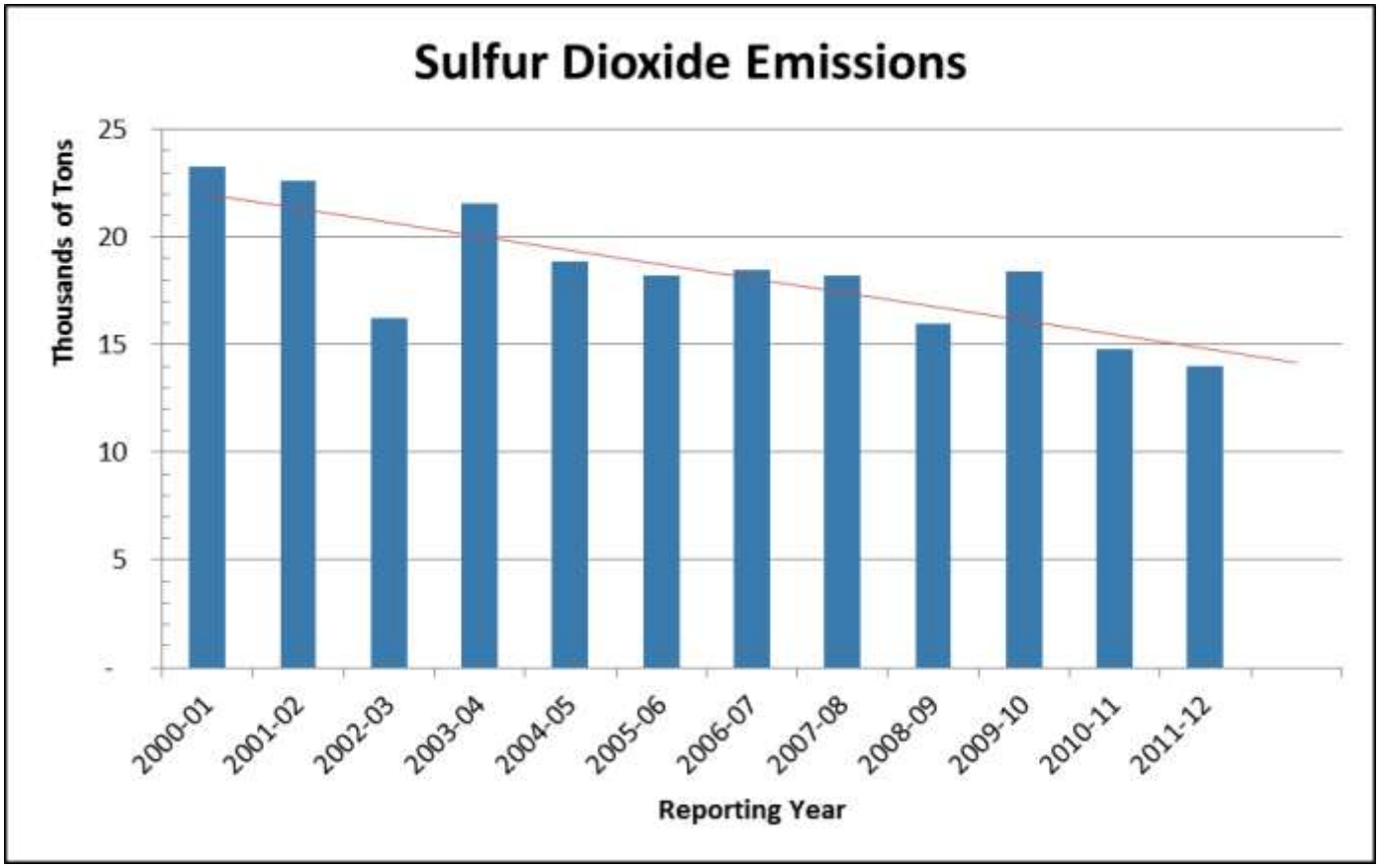


Figure 5: Change in Reported Sulfur Dioxide 2000-2012

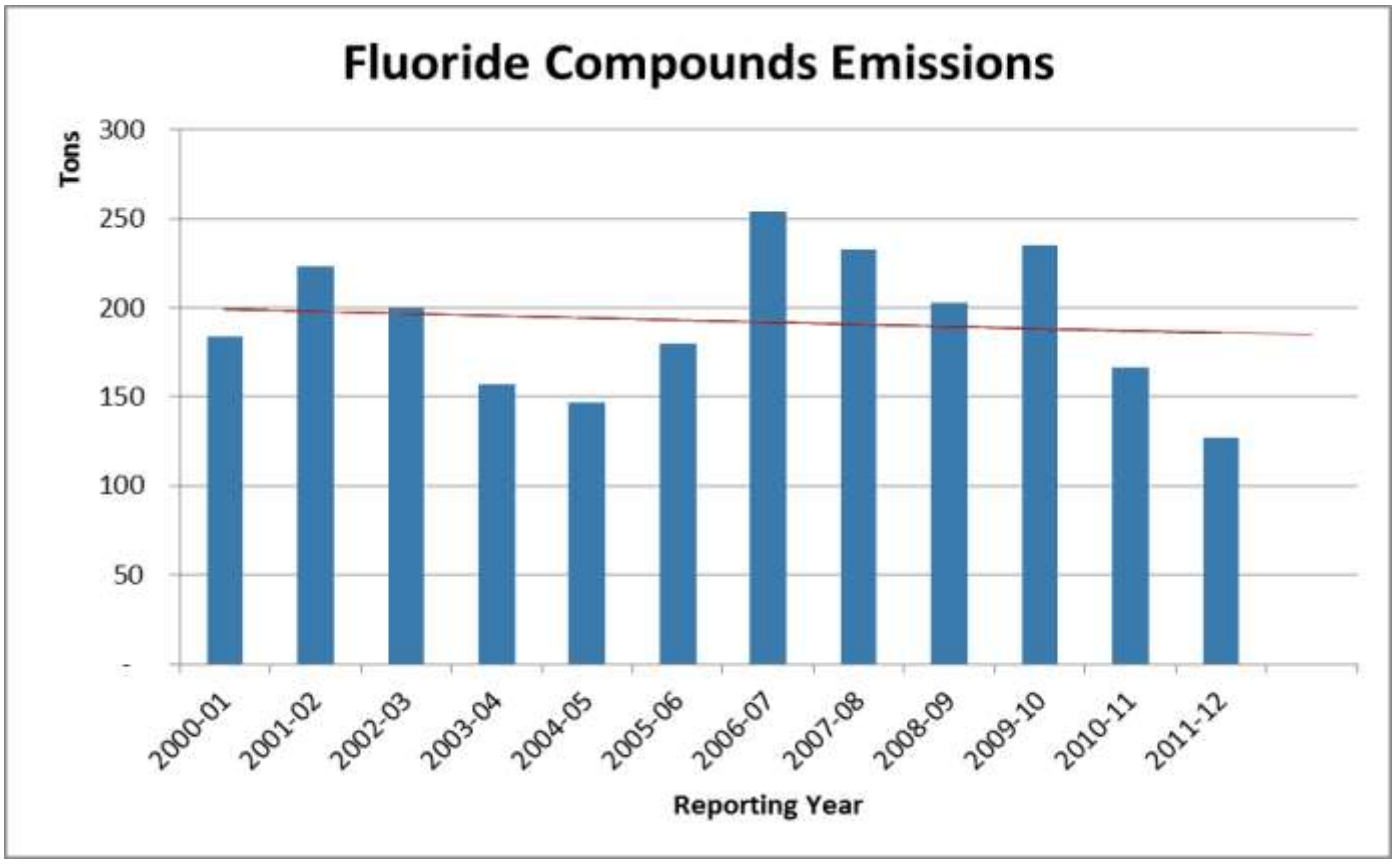
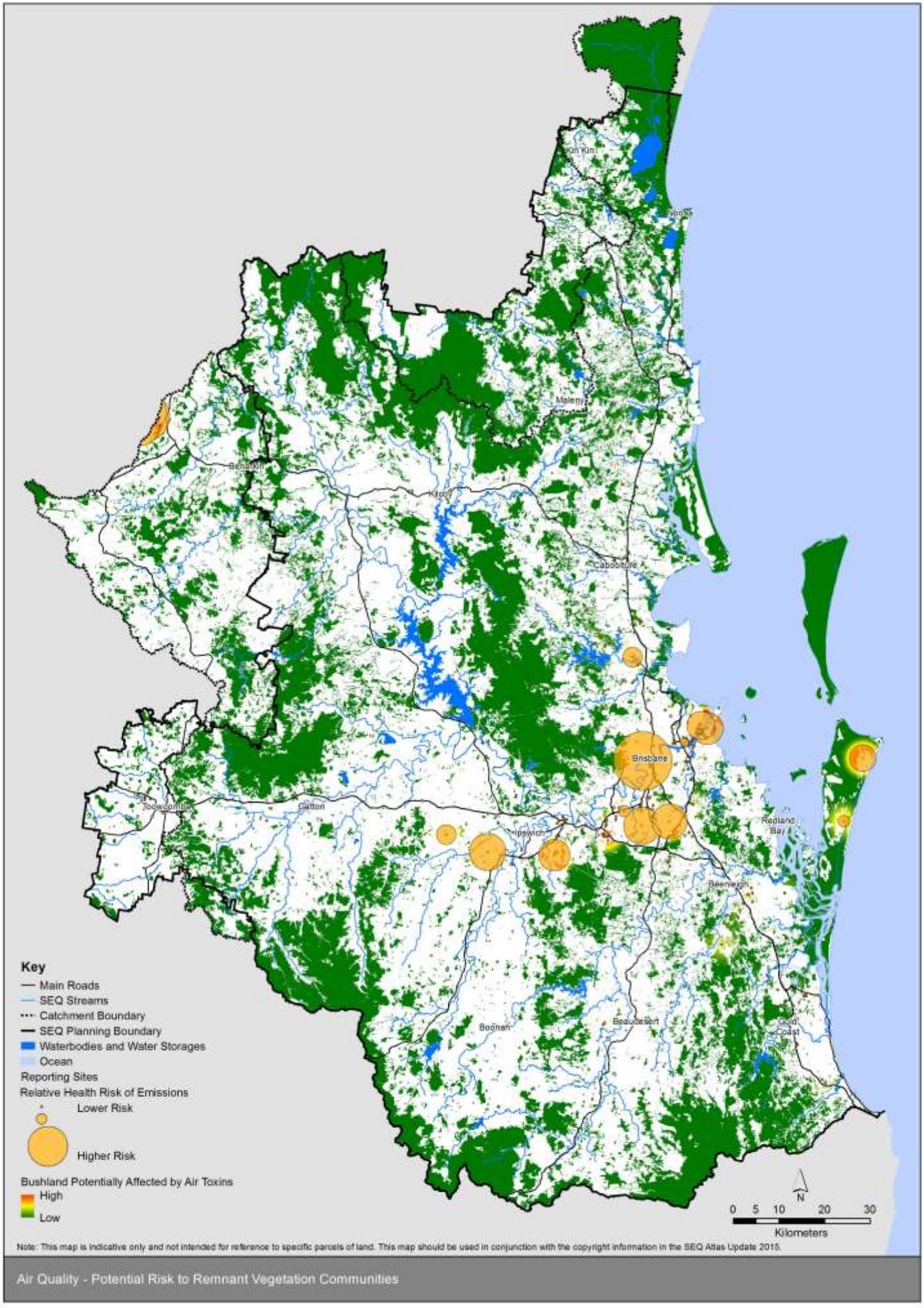


Figure 6: Change in Reported Airborne Flouride 2000-2012

Fires burning on horizon from Mt Barney outlook.



Map 2: Air Quality - Potential Risk to Remnant Vegetation Communities

A3 – Thermal Pollution

By 2031, SEQ thermal pollution will be at or below 2003 levels

Rationale

Thermal pollution affects a variety of natural resources, including Nature Conservation and Water targets. Temperature extremes can cause life cycle changes, stress and death in species through short and long term exposure.

Datasets

Satellite thermal data (Landsat Thematic Mapper Satellite Imagery). Landsat Band 6 thermal infrared data.

Methodology

To set benchmark.
Landsat Band 6 is used for thermal mapping and estimating soil moisture.
Based on the thermal pollution map, thermal hotspots to be identified that may be impacting on local ecosystems and aquatic environments.

Relative thermal load for each subcatchment in SEQ was calculated, then split over ten quantiles to identify the catchments most affected by thermal pollution.

Results

Map 3: Thermal Pollution identifies the relative thermal pollution load of each subcatchment in SEQ. The ranking system is shown in Table 1, with subcatchments split across ten quantiles.

Thermal characterisation of subcatchments completed for SEQ.
Heat Score developed which combines clearing, riparian health and builtup area, and correlated with thermal mapping.

Some verification completed based on expected heat score (risk factor) and thermal mapping product, with 40% correlation.

Further refinements to be made to thermal index, separating out natural hot areas and hotter risk areas.

Table 1: Thermal Pollution by Subcatchment

Thermal Rank	Number of Subcatchments	Area (ha)	% of Total Area
1 Lowest average temperature	79	142,335	5.4%
2	78	171,783	6.5%
3	79	115,965	4.4%
4	78	437,004	16.6%
5	78	378,535	14.4%
6	78	445,994	17%
7	78	301,019	11.5%
8	77	297,902	11.4%
9	79	234,940	9%
10 Highest average temperature	78	100,112	3.8%
Total	**782**	**2,625,590**	**100.00%**

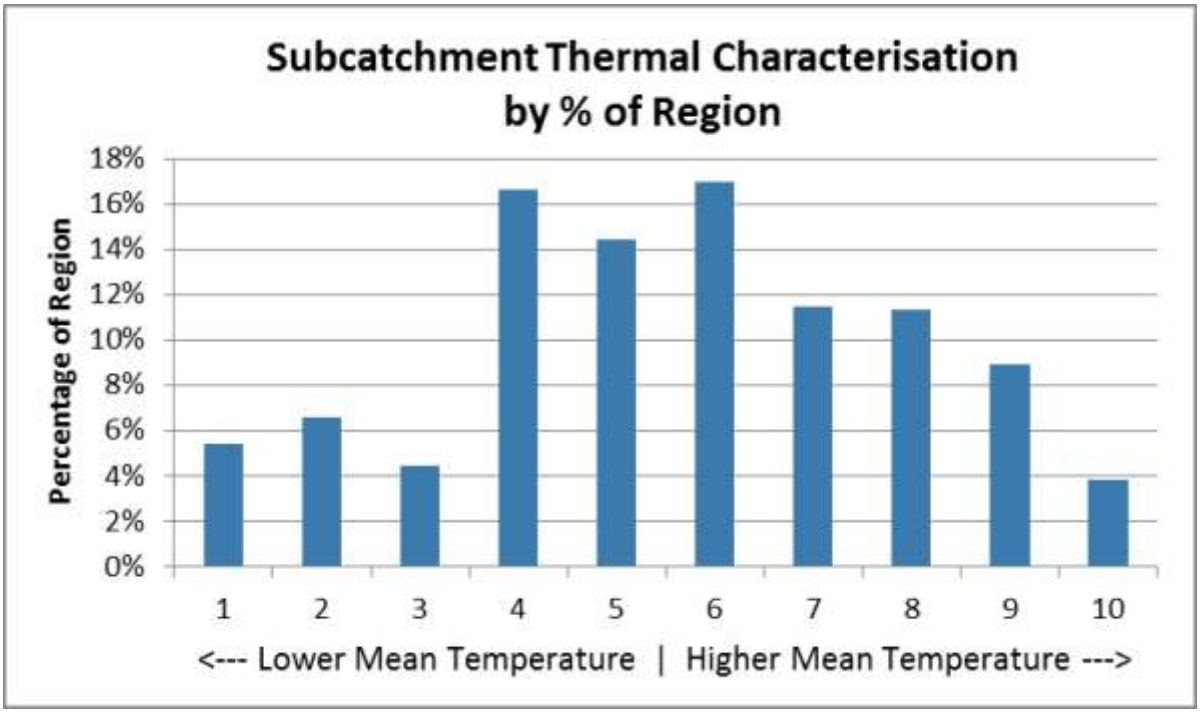


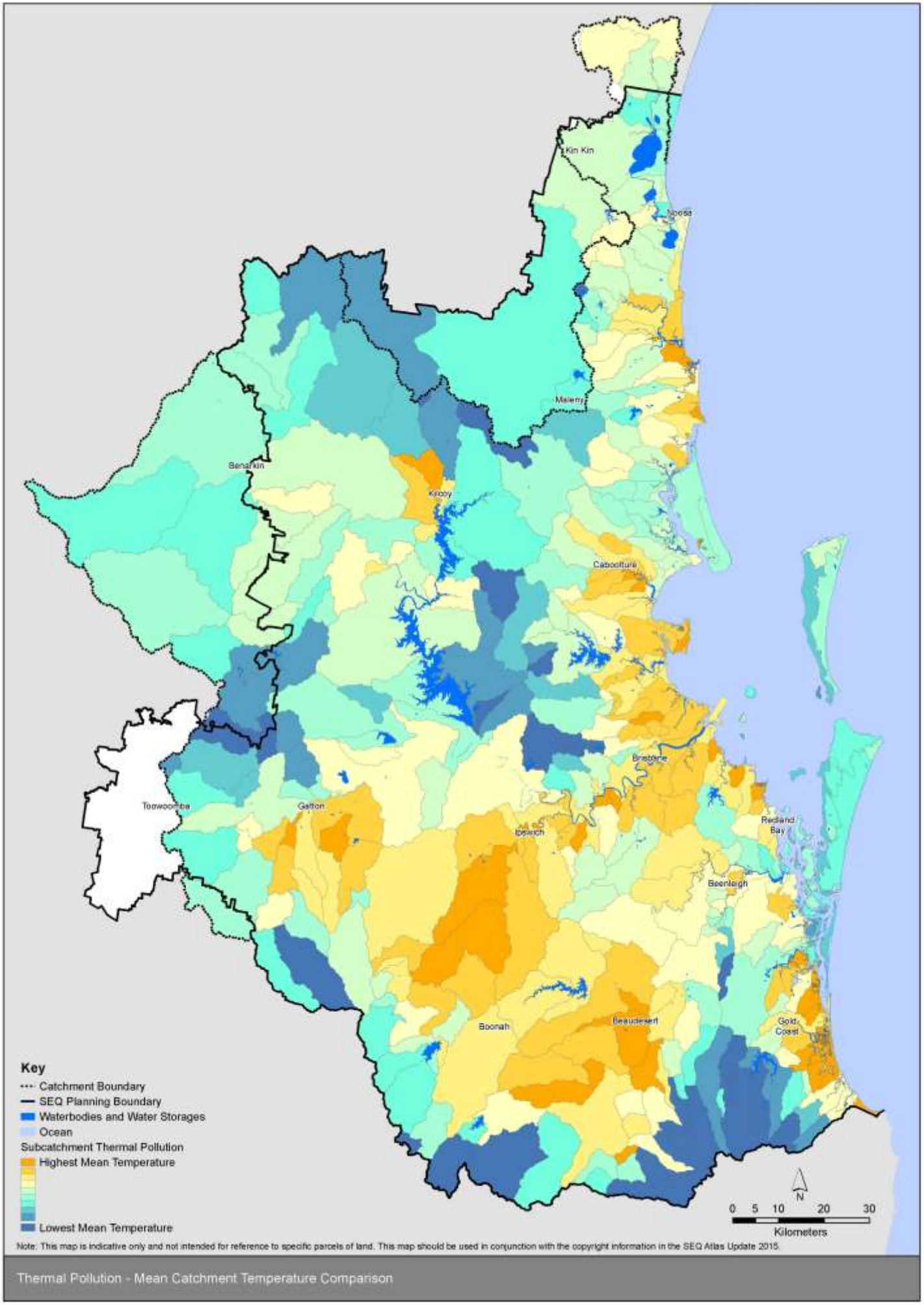
Figure 7: Subcatchment Thermal Characterisation by Percentage of Regional Area

Data Limitation

Data is acquired at 120 m resolution and resampled to 30 m pixels.

Credits

Band designations for the Landsat satellites: http://landsat.usgs.gov/band_designations_landsat_satellites.php



Map 3: Thermal Pollution by Subcatchment - Mean Temperature

A4 – Noise Pollution

By 2031, SEQ noise pollution will be at or below 1998 levels

Rationale

Noise pollution affects the behaviour of some species. It can cause previously suitable habitat to become unsuitable for particular species, and in some cases affect the ecology of an entire area (e.g. a pollinator species abandons an area due to noise pollution, causing reduced recruitment of plant species resulting in lowered resilience and ability to recover from extreme events).

Datasets

Not currently available.

Methodology

Assign decibel readings to roads layer and measure noise propagation over ecosystem mapping.

Results

Not currently available.

Data Limitation

Data not currently available.

Credits

Not currently available

A5 – Light Pollution

By 2031, SEQ light pollution will be at or below 1998 levels

Rationale

Light pollution affects the behaviour of some species. It can cause previously suitable habitat to become unsuitable for particular species.

Datasets

Benchmark: Web stable lights 2006 from DMSP-OLS Night-time Lights Time Series.
Update: Change in Web stable lights 1992-2012.

Methodology

Comparison of benchmark with change in lights time series. Display change in lights as 10 classes using quantile splits. The top quantile in the data range of 13.1-32 is where the highest change of lights has been observed.

Results

Map 4: Web Stable Lights 2006 identifies regionally where light pollution affects our natural assets. The change in lights dataset for a 20 year period can be used to identify regionally where light pollution has increased. Light pollution also correlates with census population data and can be used as an indicator for high population density and urban expansion.

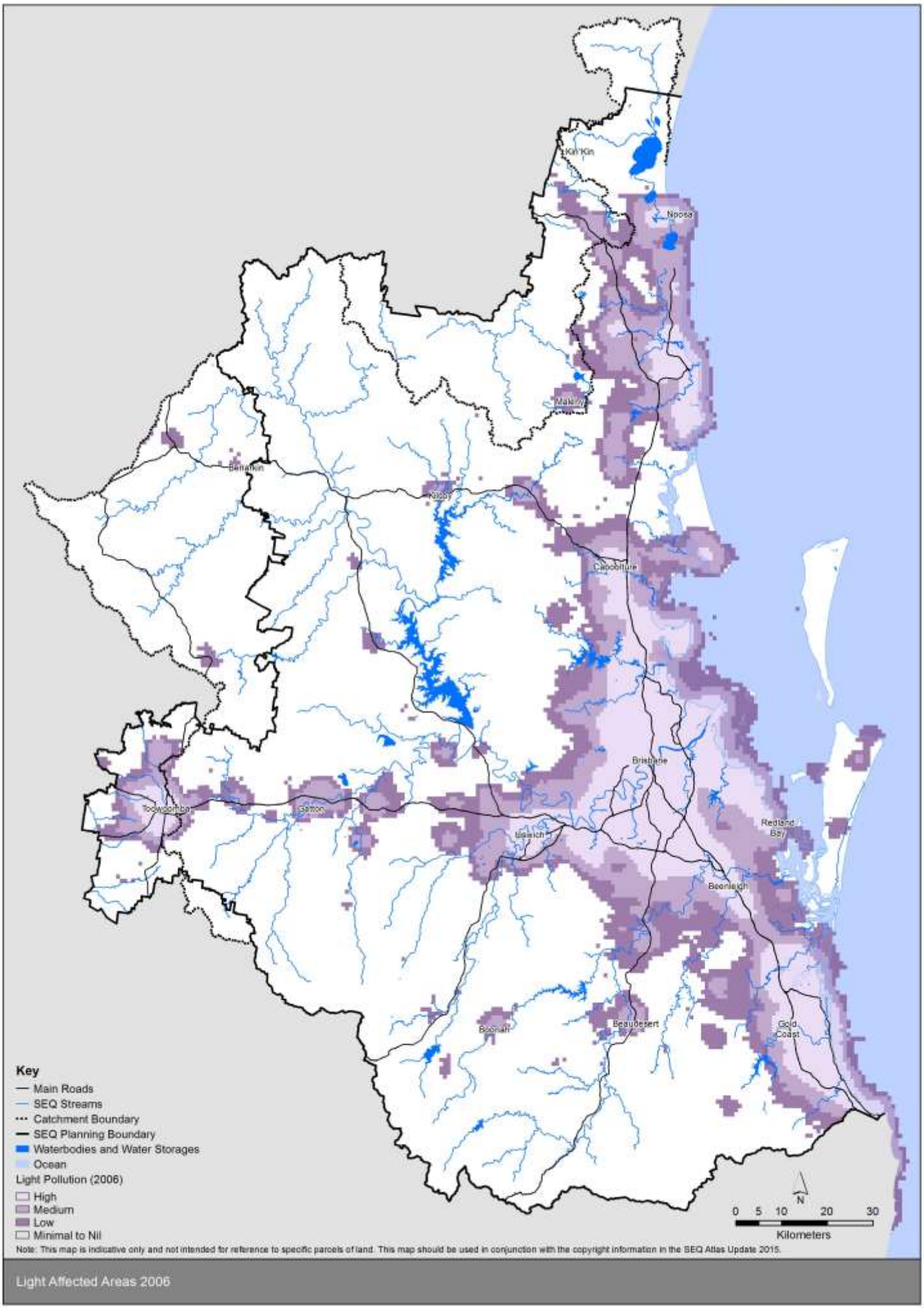
Map 5: Change in lights identifies areas which have had increased light pollution over a twenty year period from 1992—2012. Can be overlayed with areas of high Natural Assets, Nature Conservation and Coastal Assets, to identify areas at risk.

Data Limitation

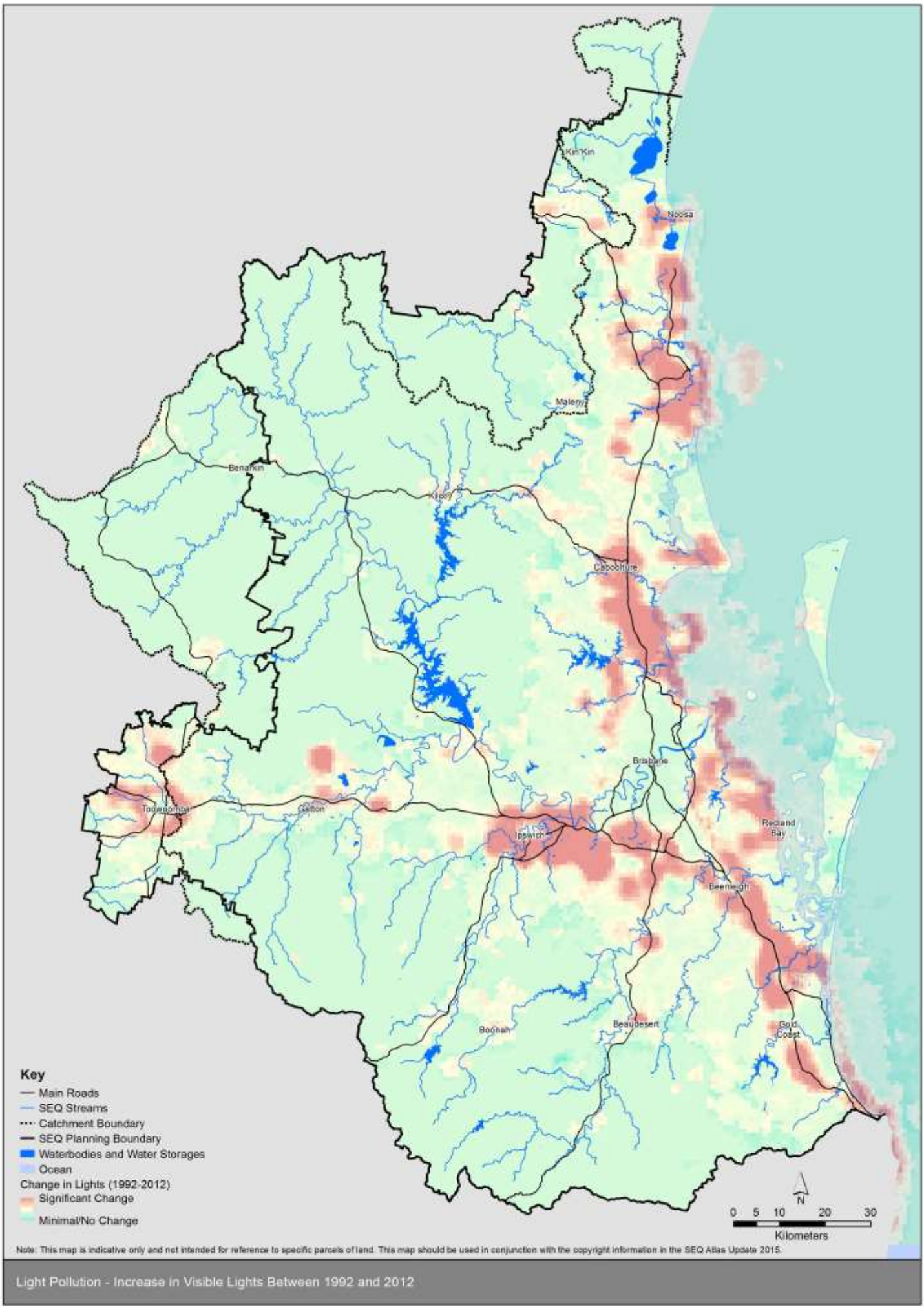
Stable lights mapping contains the lights from cities, towns, and other sites with persistent lighting, including gas flares. Ephemeral events, such as fires have been discarded.

Credits

Image and data processing by NOAA's National Geophysical Data Center.
DMSP data collected by US Air Force Weather Agency.



Map 4: Web Stable Lights 2006



Map 5: Change in Lights 1992-2012

CM1 – Seagrass and Mangroves

By 2031, the extent and condition of seagrass and mangrove ecosystems (including salt marsh) in bays and estuaries will be greater than or equal to that in 1988 and 2001 respectively

Rationale

Seagrass and coastal vegetation chosen as indicators for the health of sheltered estuarine ecosystems. These ecosystems provide important habitat and nursery areas for marine life and a range of fauna species (e.g. birds and invertebrates).

Datasets

Benchmark: Seagrass cover 1984-1988 (QDPI&F).
Moreton Bay Seagrass 2004 (Coastal CRC for EHMP)
Coastal Vegetation (Landzone 1) in 2001 based on Regional Ecosystems Version7(DERM, 2012).

Update: All Identified Potential Seagrass areas 1984 - 2012 (EHP and Partners)
Coastal Vegetation (Landzone 1) in 2009 based on Regional Ecosystems Version 7(DERM, 2012).

Methodology

Moreton Bay Seagrass extent mapping 2004 extent compared to most recent Moreton Bay Seagrass extent mapping 2011 for comparison statistics.
A region wide potential seagrass extent map was developed using all known seagrass mapping for SEQ collected between 1984 and 2012.
Data inputs included:

- Maroochy Seagrass 2005 (EPA for EHMP)
- Noosa River Seagrass 2002 (EPA for EHMP)
- Pumicestone Passage Seagrass 2002 (EPA for EHMP)
- Moreton Bay Seagrass 2004 and 2012 (EHMP, EHP and Partners)

Mangroves, samphire and saltmarsh vegetation types (Landzone 1) were selected from Regional Ecosystems Version 7 for 2001 and 2009 with extents compared.

Results

The total area of identified seagrass meadows in 1988 (benchmark year) was 27,085 ha for the SEQ Region.

The total recorded extent of seagrass meadows in the SEQ region between 1988 and 2012 is 44,830 ha. In any given year, seagrass extent will be less than the total identified area, as seagrass cover fluctuates based on conditions and boundaries of meadows change. This can be caused by seasonal changes, water turbidity, nutrient load, sediment load and other factors.

Seagrass density also changes over time, ranging from patchy or sparse (<10% cover) in some areas to moderate or dense (>75% cover) in others. The variety of seagrass species and densities provides habitat and food for a range of different animal species.

The seagrass change analysis focussed on Moreton Bay where comparable extents existed.

Comparable seagrass extents:
Moreton Bay extent 2004: 18,392 ha
Moreton Bay extent 2011: 20,659 ha

The change in Moreton Bay seagrass between 2004 and 2011 (approximately 10%) may be due to seasonal fluctuations.

The total area of mangrove, samphire and saltmarsh ecosystems in 2001 was 22,724 ha and in 2009 was 22,683 ha, with an estimated loss of 42 ha. See Table 2 for comparison.
Maps 6 and 7 show location of seagrass, mangrove and samphire/saltmarsh ecosystems, including areas of coastal vegetation which have been lost between 2001 and 2009.

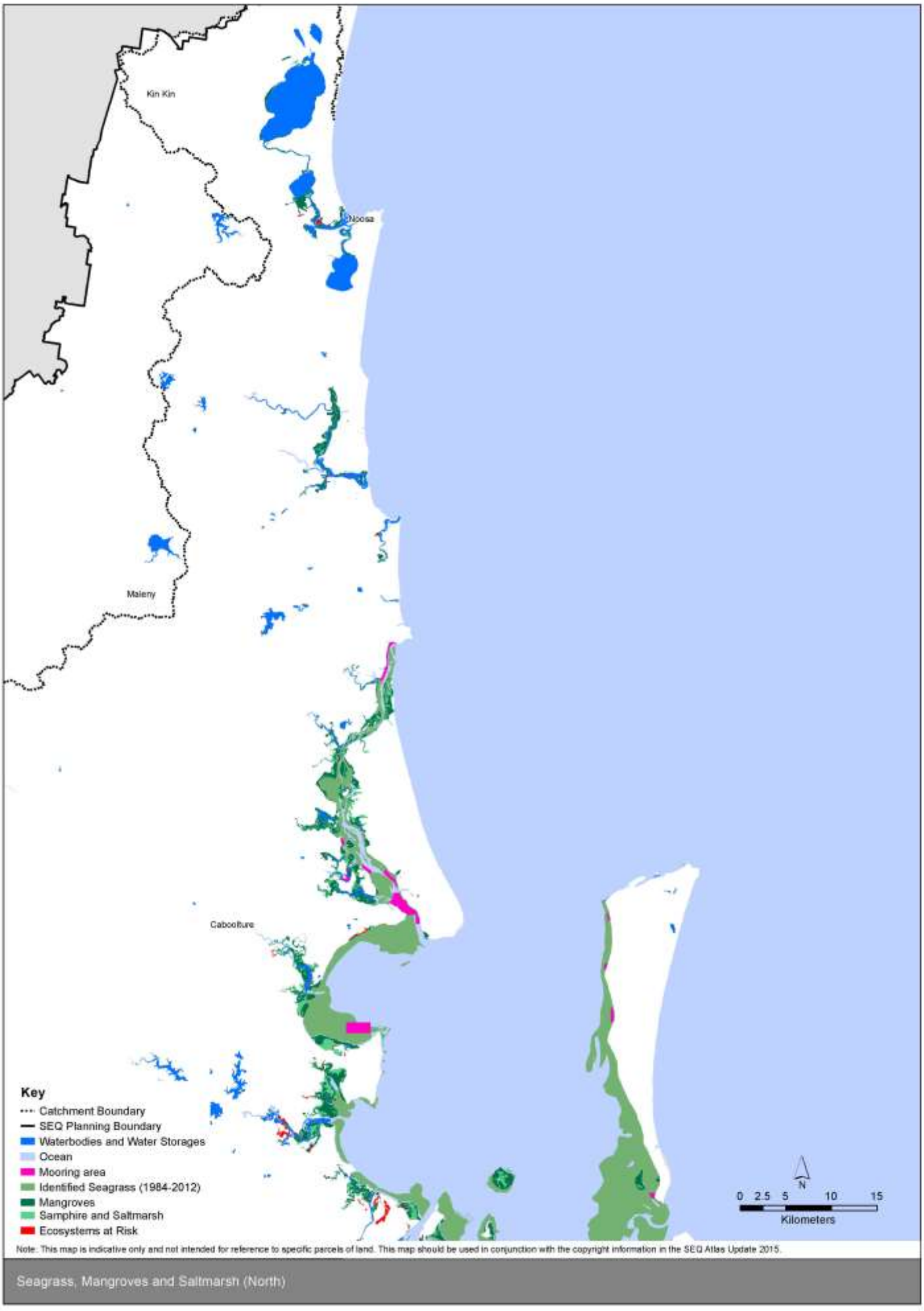
Table 2: Comparison of Mangrove, Saltmarsh and Samphire Extent for 2001 and 2009

Year	Saltmarsh and Samphire (ha)	Mangrove (ha)	Total (ha)
2001	5,221	17,503	22,724
2009	5,209	17,474	22,683
Total Loss	-13	-29	-42

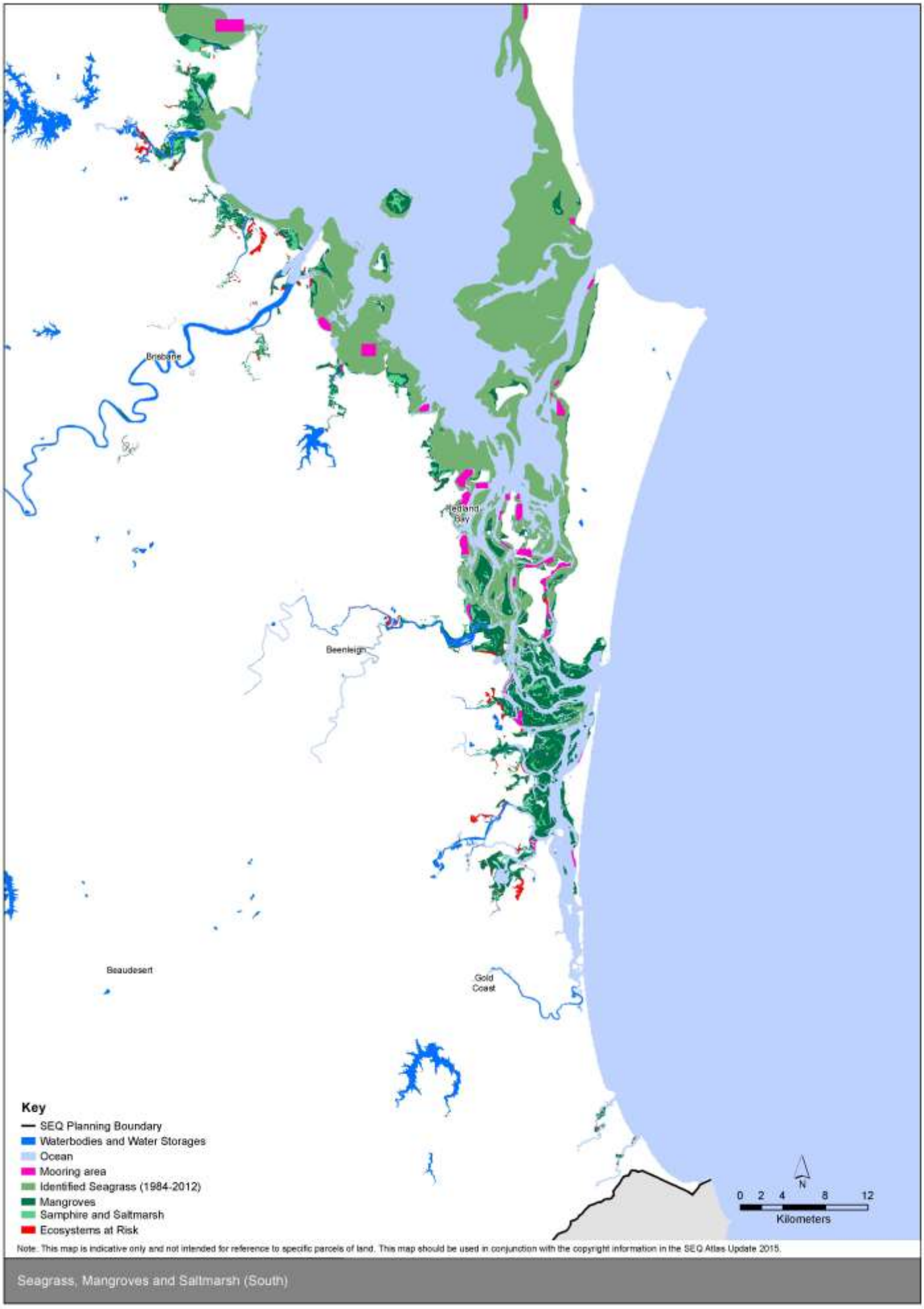
Data Limitation

Current seagrass mapping approaches underestimate extent of seagrass meadows and provide a sound snapshot only. The condition of seagrass meadows and coastal vegetation fluctuates yearly and is influenced by threatening processes and environmental factors. Some work is being done to better understand long term condition trends through programs such as Seagrass Watch and Mangrove Watch.

Regenerating mangroves at the Bulimba Creek Ox-bow Project Site



Map 6: Seagrass and Mangrove Extent and Change over Comparison Period (North)



Map 7: Seagrass and Mangrove Extent and Change over Comparison Period (South)

CM2 – Coral

By 2031, the condition and spatial distribution of soft and hard corals will be maintained at least at 2005 levels

Rationale

Over time in SEQ, submerged rocky outcrops have been colonised by hard and soft corals and other invertebrates, making new reefs and habitat for a wide variety of marine life.

Datasets

Benchmark: Coral and Reef extent 2014 (DERM, Reef Check)
Update: Coral condition and impacts survey 2007-2013 (Reef Check)

Methodology

Coral and reef extent calculated based on collated data for Moreton Bay, Sunshine Coast and Gold Coast reefs (known extent).
Condition of reefs examined through Reef Check Australia over a period of monitoring 2007-2013.

Results

Combined coral and reef extent is 4,364 ha, excluding any island areas above sea level.
Coral cover trends and impacts were mapped where data existed.

Map 8 provides a breakdown of the major identified impacts on reefs during surveys. The data represents all identified impacts over the survey period. Major observed impacts to our reefs included Coral Bleaching, Coral Damage, Fishing Gear and Unknown Scars.

Map 9 provides a summary of coral cover extent (as a percentage of the total area) and type (relative soft and hard coral cover) at each survey site. Data represents the most recent survey for each reef.

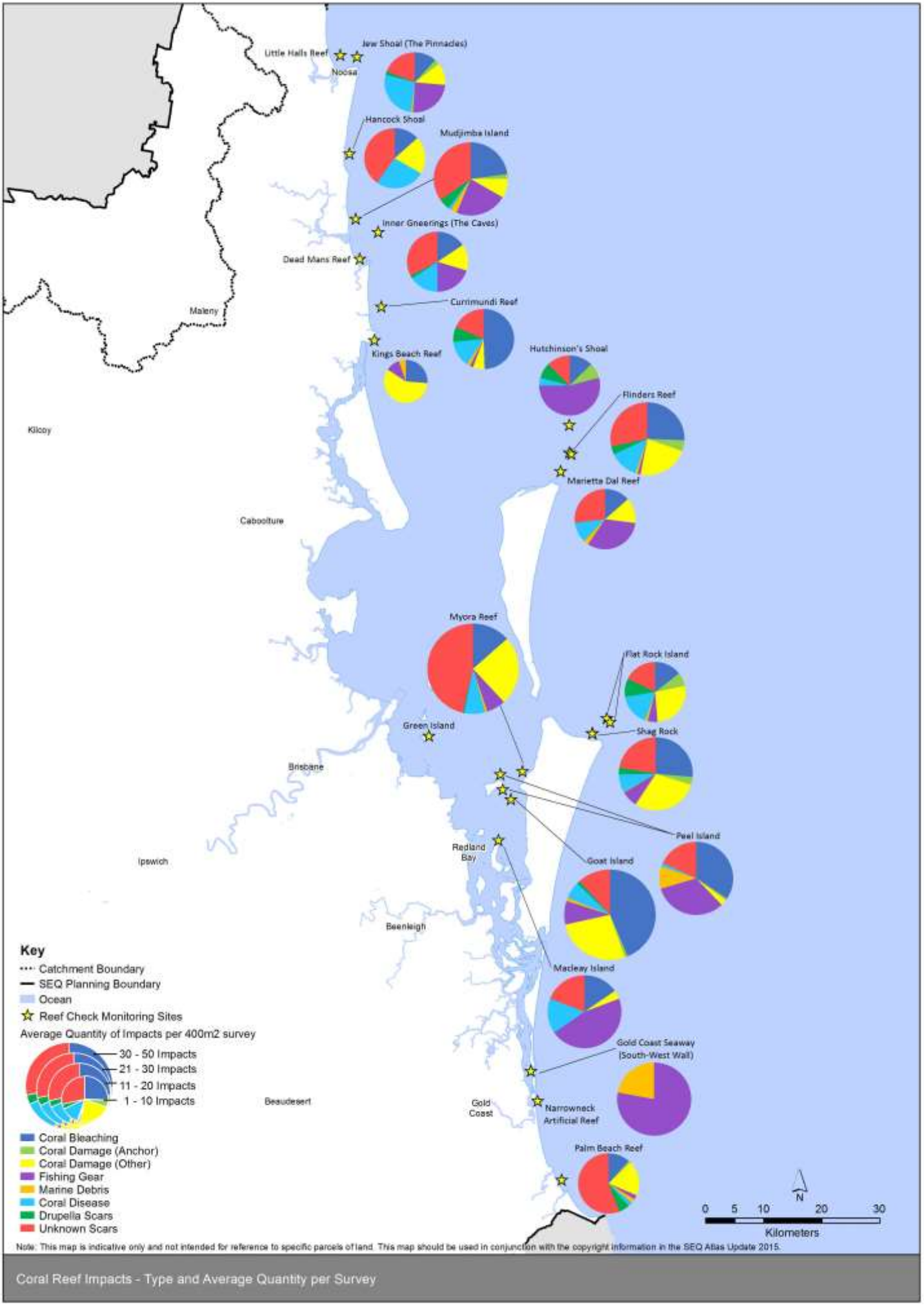
Maps 10 and 11 show coral cover trends over time. All survey dates for each reef are displayed as bar graphs representing soft and hard coral cover percent at the survey site on the date of the survey.

Summary information also available on the ReefCheck website: http://www.reefcheckaustralia.org/data.html

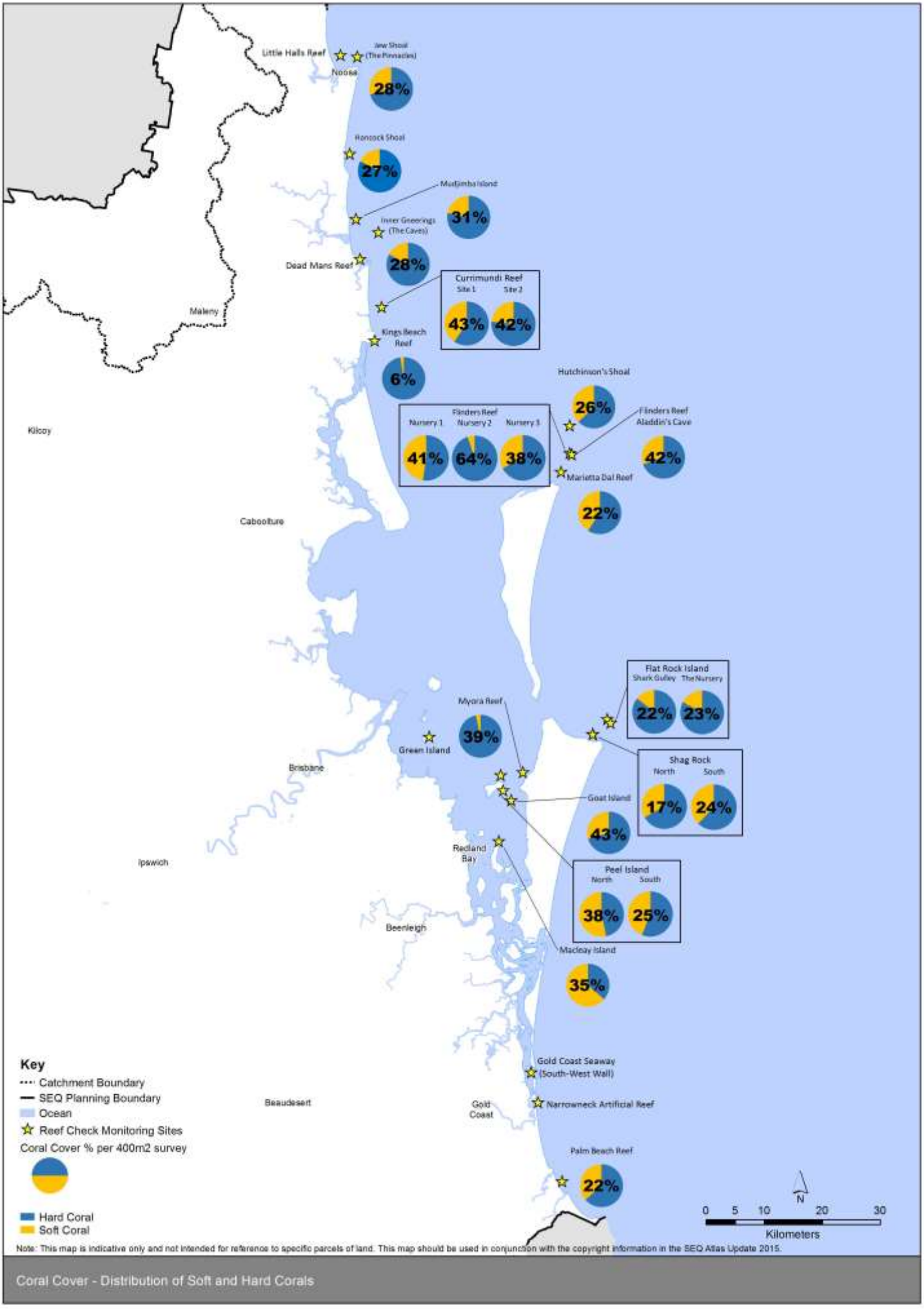
Data Limitation

Further work to be undertaken on refining reef extents and identifying and surveying additional reefs across SEQ. Recent work being undertaken by Queensland Government EHP towards marine morphology will further inform target.

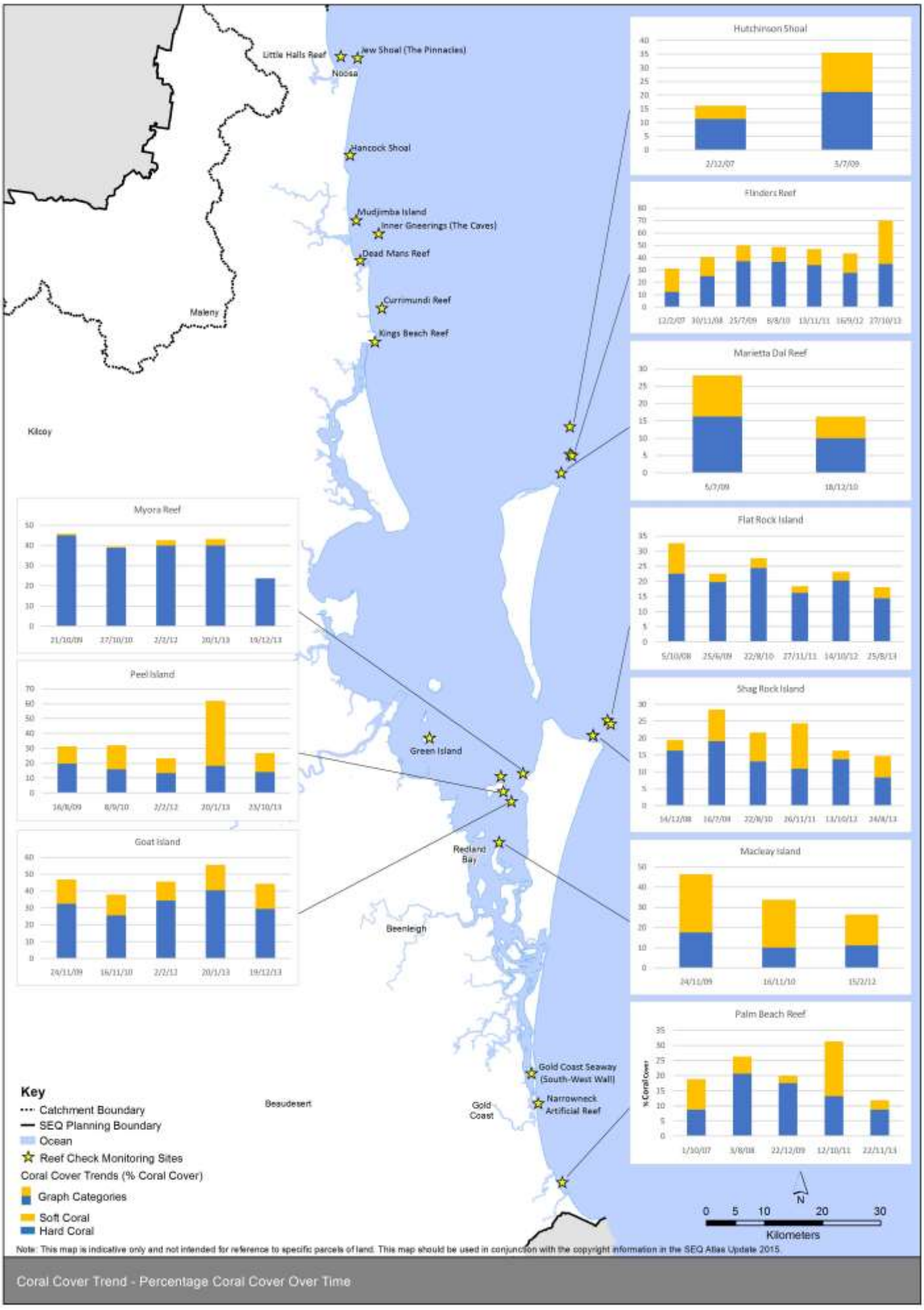
Coral, Moreton Bay Wrecks



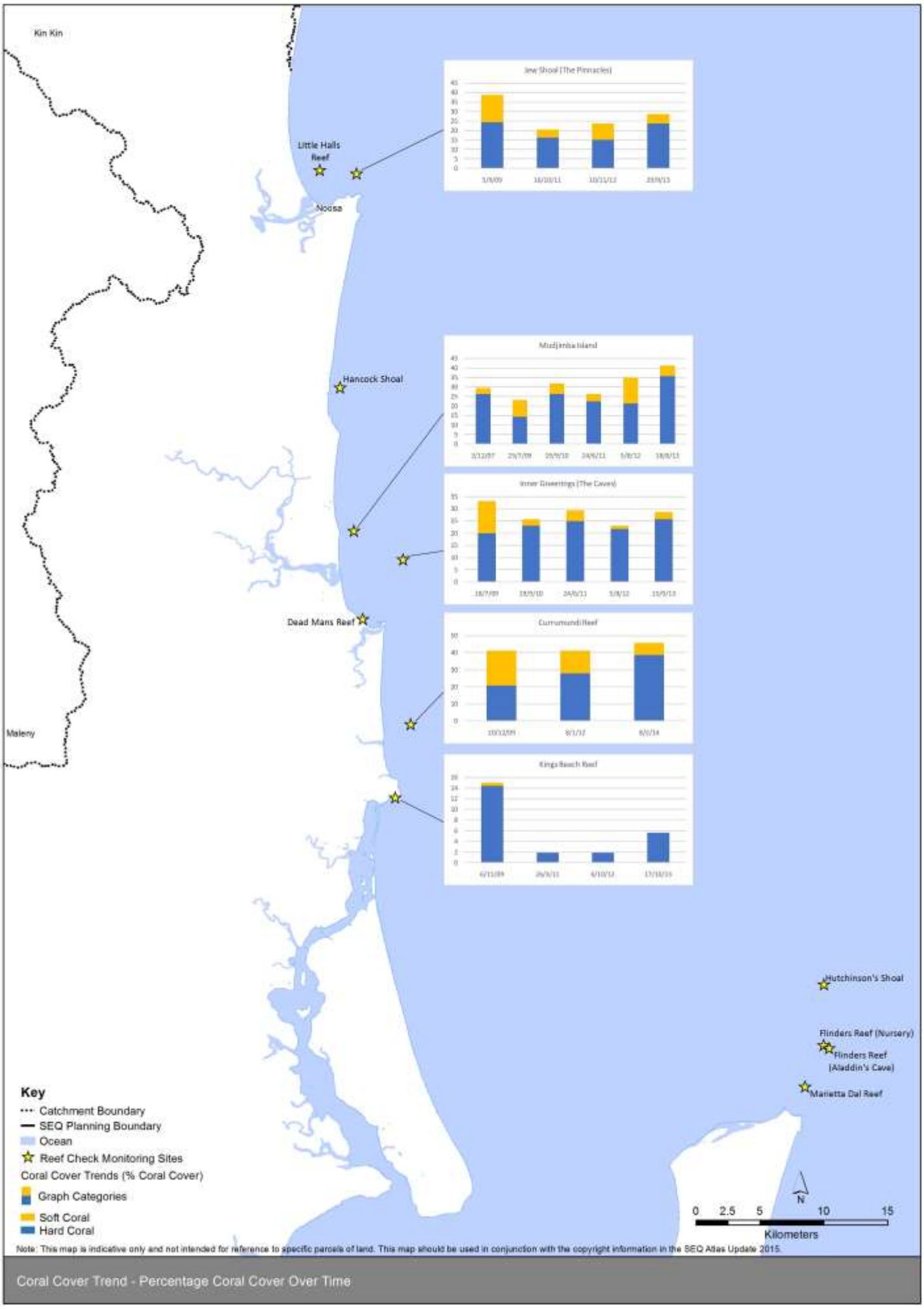
Map 8: Coral Impacts



Map 9: Coral Cover (Soft and Hard Coral Percent)



Map 10: Change in Coral Cover over Survey Period (Southern Reefs)



Map 11: Change in Coral Cover over Survey Period (Northern Reefs)

CM3 – Beaches

By 2031, the condition of open coastlines (headlands, beaches and dunes) will be at or better than in 2006

Rationale

Headlands, beaches and dunes provide a barrier effect to buffer against extreme weather events such as cyclones and storm surges. These coastal landforms and supporting habitats provide protection to coastal properties and infrastructure.

The spatial extent of our open coastlines and the associated land cover classes provide an indication of the condition of these areas. Natural land cover classes including Native Forest and Non-forest Native Vegetation (mangroves and low shrub) provide stability within the coastal zone and reduce beach and dune erosion from wave and storm events.

Datasets

Benchmark: Beach extent and beach buffer and relative condition based on 2006 Land Cover (SEQC, 2007).
No benchmark established for headlands and dunes to date.

Update: Beach extent and beach buffer and relative condition based on 2012 Land Cover (SEQC, 2014).

Methodology

A 100 m buffer was assigned to high energy beaches excluding the ocean side. This buffer was then used to select and analyse the 2012 Land Cover classes. Incompatible Land Cover classes include Non-vegetated, Impervious Road Surface, Irrigated Crop and Pasture, and Tree Crop. These areas have a higher risk and level of vulnerability and reduce the overall condition of the beach. Table 3 identifies the type and extent of landcover found within the beach buffer.

The expert panel suggested a 100 m buffer was suitable for the analysis, as opposed to the 50 m buffer width used previously.

Analysis of the Digital Cadastral Database (DCDB) within the beach buffer was carried out. Comparison of the 2006 and 2009 DCDB tenure type and count were compared as a secondary indicator and to further investigate change within the beach buffer zone (See Table 4).

Results

Table 4 shows an increase in number of disturbed area parcels or fragmentation/higher density (easement +40, freehold +1,205). Protected areas have also increased (National Park +11, Reserve: +14, Covenant +8).

Overall, there was a decrease in the number of State land and lease land parcels.

Table 3: Land Cover 2012 for Beach and 100m Buffer (landward side only)

Land Cover 2012	Area (ha)	Percent (%)
Non-vegetated/Urban	258	3.9
Impervious Road Surface	152	2.3
Irrigated Crop and Pasture	2	0.01
Tree Crop	2	0.01
Grass	111	1.7
Waterbody	65	1.0
Sand | Mud Bank	3,494	53.4
Native Forest	1,878	28.7
Non-forest Native Vegetation	579	8.8
Natural Rock | Cliff	3	0.1
Total	6,546	100.0

Table 4: Change in Tenure Type and Parcel Count in High Energy Beach Buffer for 2006-2014

Tenure Type	2006 Count	2014 Count
Easement	266	306
Freehold	3,813	5,018
State Land	90	73
Lands Lease	89	72
National Park	59	70
Reserve	246	258
Covenant	3	11
Total	**4,566**	**5,808**

Most of the major land use changes to our open coastline and beach zone were made 50 years ago during the development boom of 1960's and 1970's within SEQ.
Where high risk and vulnerable areas have been identified, local analysis of beach profile using LiDAR information can be assessed for a management response for beach stabilisation.

Data Limitation

Land Cover datasets for 2006, 2009 and 2012 provide a snapshot for that year and season based on supervised remote sensing techniques. Some improvements to the methodology have also been made since the 2006 assessment and care needs to be taken with the interpretation of the results. At present, SEQ Catchments has generated 3 Land Cover time series with option for data trends to start showing e.g. Non-vegetated/Urban Class slowly trending up. Where there has been a 20 % or greater change within a Class this needs to be further investigated.

Benchmark extents for headlands and coastal dunes need to be set.

Moreton Island dunal lagoon

CM4 – Fish Stocks

By 2031, wild fishery stock condition will be sustained at sufficiently high levels to support commercial, recreational and Indigenous cultural fisheries, based on the 1995–2005 benchmark

Rationale

Measuring the quantity of fish, crab, prawns and other species provides an indication of the productivity and health of our coastal and marine waters.

Datasets

Benchmark: No accepted benchmark
Benchmark to be based on Commercial Fish Catch data 2008 - 2014
Update: Fish Habitat Areas
Reef Check fish surveys
Queensland Commercial Fishery Reporting (DAFF, 2013)

Methodology

Preliminary work completed on the analysis of Commercial Fish Catch data for five different fishing methods i.e. Trawl, Trawl Beam, Pot, Net, and Line. Results mapped as total mean catch in kg over a 3 year period.

The Moreton Bay Marine Park Zoning Plan identifies four zones of limited activity for the protection and management of 16 broad-scale habitat types in the marine park.

Fish Habitat Areas (declared under Schedule 3 Fisheries Regulations 2014) and Ramsar wetlands are also present in Moreton Bay and surrounds.

These datasets were used in the absence of specific fish breeding area and habitat data.

Results

Map 12 identifies mechanisms for protecting and managing fish breeding habitat, which is an essential component of fishery sustainability.

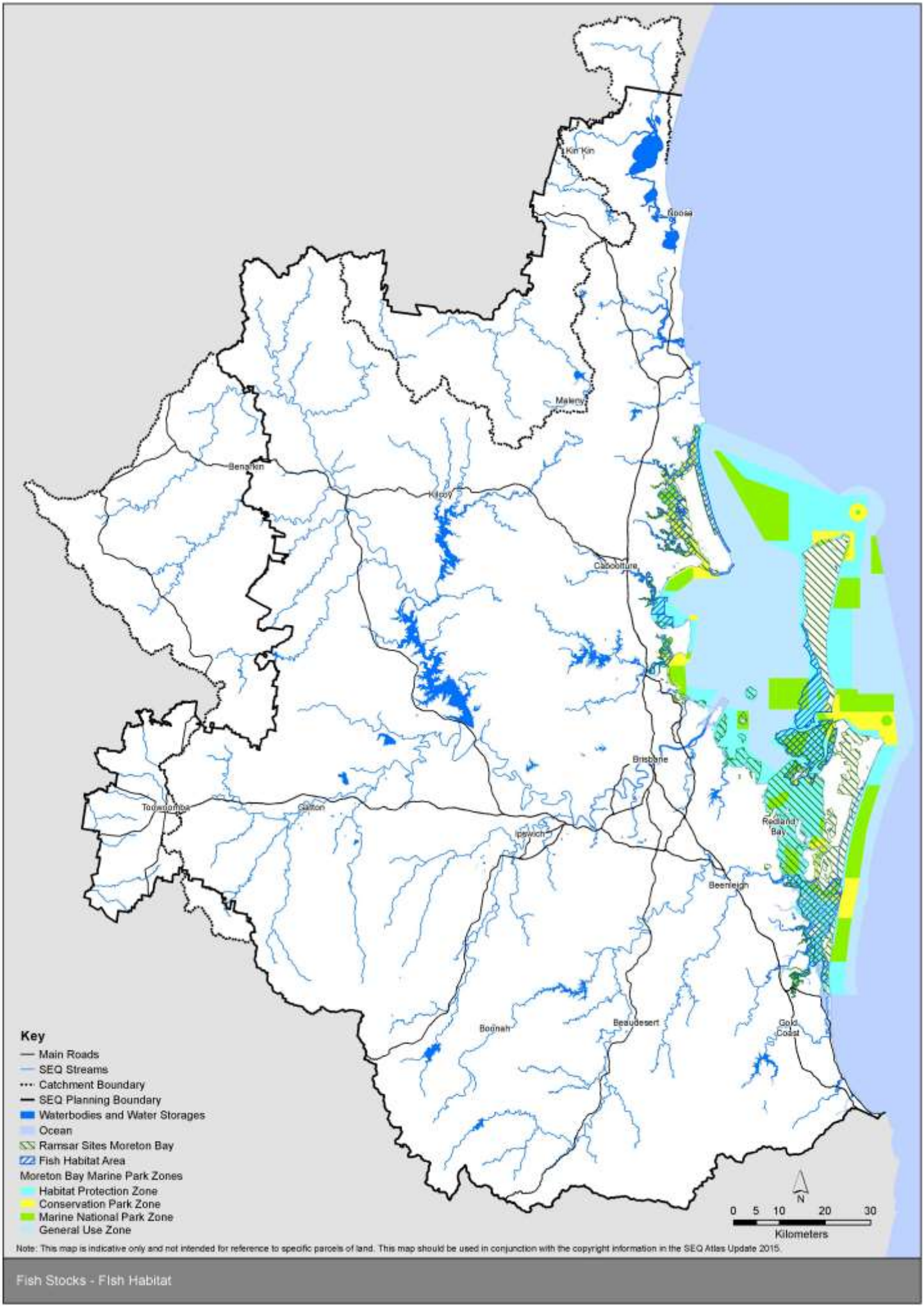
Table 5: Fish Habitat and current Marine Park Zonings (areas may overlap)

Type	Area (ha)
Fish Habitat Area	48,435
MBMP Marine National Park Zone	54,291
MBMP Conservation Park Zone	26,030
MBMP Habitat Protection Zone	104,040
MBMP General Use	158,117
Ramsar	91,234

Data Limitation

Experts recommended other valuation methods including catch data (some available) and fish health.

Fish, Moreton Bay



Map 12: Fish Habitat Protection Zones

CM5 – Key Marine Species

By 2031, the extent and condition of the habitat of bottlenose and Indo-Pacific humpback dolphins, dugongs, sharks, turtles and wader birds will be equal to or greater than that in 2001 for each species

Rationale

The presence of iconic species is an indicator of the health of our coastal and marine environments and is a key contributor to the tourism industry. Key marine species were chosen that represented different components of the marine food web and their ecological niche. Coastal and marine habitats that the species covered included open water, deeps and drops, shallows, sand and mudflats.

Datasets

Benchmark:	High precision records for Dolphin, Dugong and Turtle sourced from Wildnet for years 1981-2001.
	Wader habitat (DERM, 1998)
	Known Turtle rookeries (DERM)
Update:	High precision records for Dolphin, Dugong and Turtle sourced from Wildnet for years 1994-2014.

Methodology

Selected records of dolphins, turtles, dugongs, and sharks from Wildnet database. Filtered data by precision (<=500m) and year (20 year currency) to generate high precision point records for each of the target species.

Applied a kernel density function with a 1.5 km density radius for high precision records to a 25 m grid output. The resulting species density layers were then clipped to marine and estuarine water bodies to remove any false positives. Kernel density mapping provides potential species distribution based on known records.

No known updates to the SEQ Wader Data (1998). Site information includes: habitat type, wader usage, conservation significance, threats and disturbance.

No known updates to the Turtle Rookery database.

Results

The kernel density map (Map 13) presents key marine species distribution for SEQ. Higher observation data was available for Moreton Bay and surrounding islands. This correlates with high species utilisation and overlap of species in and around Moreton Banks (between Moreton and North Stradbroke Islands), Peel Island, Dunwich, Canalpin, Krummel Passage (between Macleay and Russell Islands), and the Jumpinpin.

Over the species monitoring period, there was a significant increase in Dugong and Hawksbill turtle sightings, and a decrease in Indo-Pacific Bottlenose dolphin sightings. This could be caused by various factors, including:

- An increase/decline in species abundance in Moreton Bay,
- A change in species use of bay area over time, or
- A result of changes in survey effort.

Currently 9 Turtle Rookery sites are known across SEQ.

Table 6: Number of Sightings in a 20 Year Period for Target Species

Species	Records 1981-2001	Records 1994-2014
Australian snubfin dolphin	2	2
bottlenose dolphin	-	6
Indo-Pacific bottlenose dolphin	126	16
Indo-Pacific humpback dolphin	38	52
Offshore bottlenose dolphin	10	11
Short-beaked common dolphin	-	1
Spinner dolphin	1	1
Dugong	7	113
Green turtle	17	46
Hawksbill turtle	3	8
Leatherback turtle	-	2
Loggerhead turtle	25	29
Total	**229**	**287**

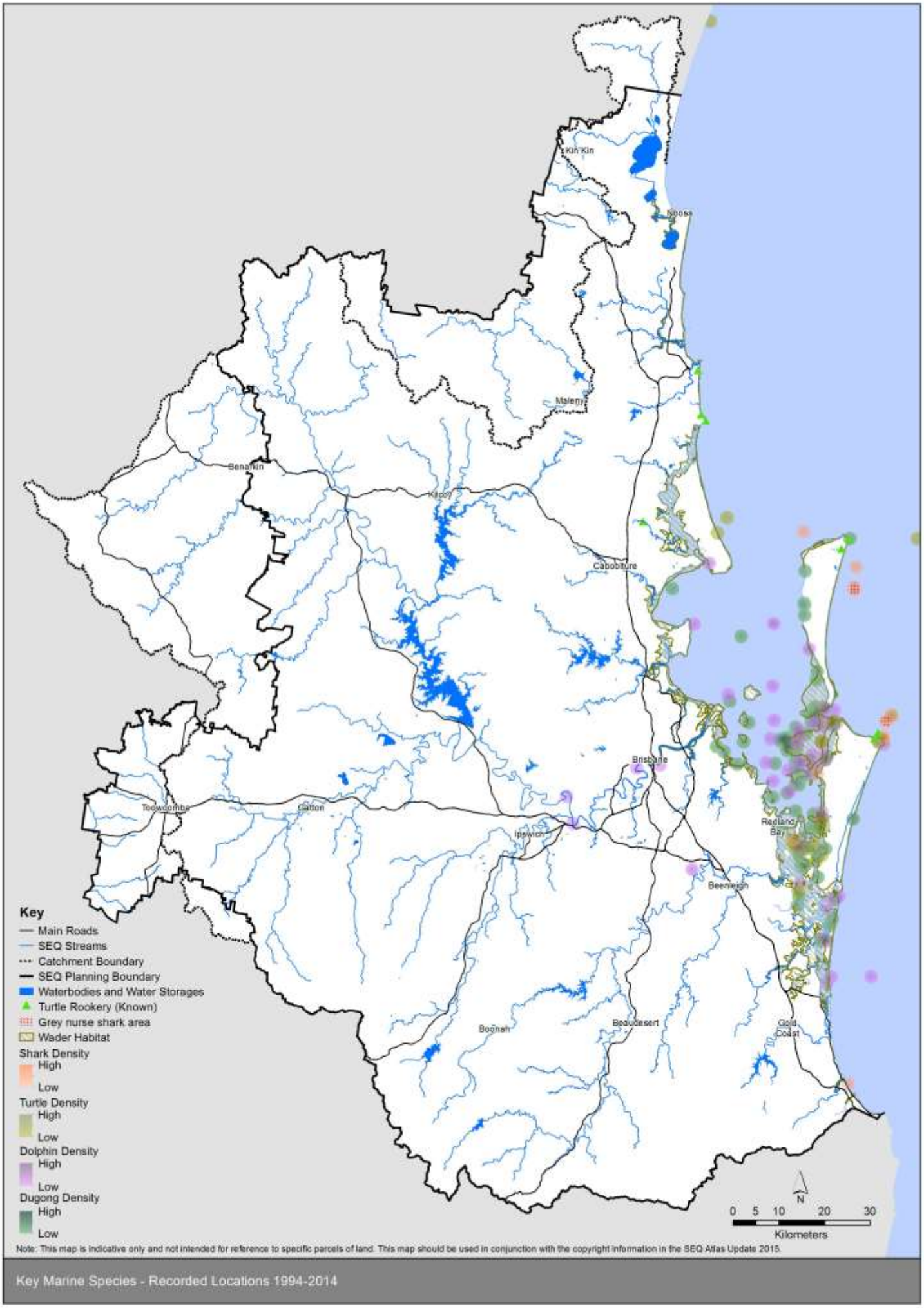
(NOTE: number of sightings may reflect survey effort rather than change in population size)

Table 7: Wader Habitat Types

Habitat Type	Area (ha)
Critical Habitat	217
General Habitat	61,272
Roosting Area	228
High Stage Roosting Area	11
General Feeding Area	1,861
Grand Total	**63,588**

Data Limitation

The "kernel density" feature in GIS allows the creation of maps that show broader density distribution and species usage patterns. More survey effort in gap areas would assist in the verification of species utilisation. Further work required in mapping of species habitat.



Map 13: Distribution of Recorded Species 1994 - 2014

CM6 – Coastal Algal Blooms

By 2031, the extent and frequency of coastal algal blooms (CAB) will be reduced from the 2002–05 benchmark (five-year rolling average)

Rationale

Algal blooms in estuarine and marine waters of SEQ have been increasing in frequency and extent since the mid-1990s. Algal blooms impact on water quality, biodiversity, human health, and the recreational and commercial values of coastal waterways.

Datasets

Benchmark: Lyngbya extent based on monitoring data (DEHP, 2003-2012)
Update: Change in yearly extent and frequency.

Methodology

Lyngbya survey data was collected for 2003-2012, providing a 10 year timeframe of recorded algal blooms. A kernel density function was applied in GIS using a 1 km density radius to generate the extent and distribution of lyngbya blooms for the time period. This map represents the actual algal bloom risk. An additional kernel density using a 5 km density radius was also generated showing actual and surrounding at risk areas. The density took into consideration the lyngbya intensity score and was then clipped to marine and estuarine water bodies to remove false positives.

Results

See Figure 8 for yearly observation and intensity data.

Over the reporting period, high observed presence of lyngbya blooms for the areas of:

Sandstone Point, southern entrance to Pumicestone Passage
Mouth of Ningi Creek and adjacent area of Banksia Beach (Bribie Island)
Mouth of Elimbah Creek
Mouth of Bells Creek
Tangalooma Point to Kounungai (Eastern Banks, Moreton Island)
Moreton Banks and Amity Banks
Horseshoe Bay (Peel Island)
Dunwich

See Map 14 for other affected areas.

Based on yearly observations and intensity, there was very high lyngbya occurrence for the months of May, November, January and December. Other months with high observation and intensity included June, February, August, April and October.

Lyngbya links and further information can be found at:

http://www.ehmp.org/ScienceandInnovation/Lyngbyalinks.aspx

Data Limitation

Mapping only available for lyngbya blooms for years 2002-2012. Does not include other algae types and is not collected for all areas in all years.

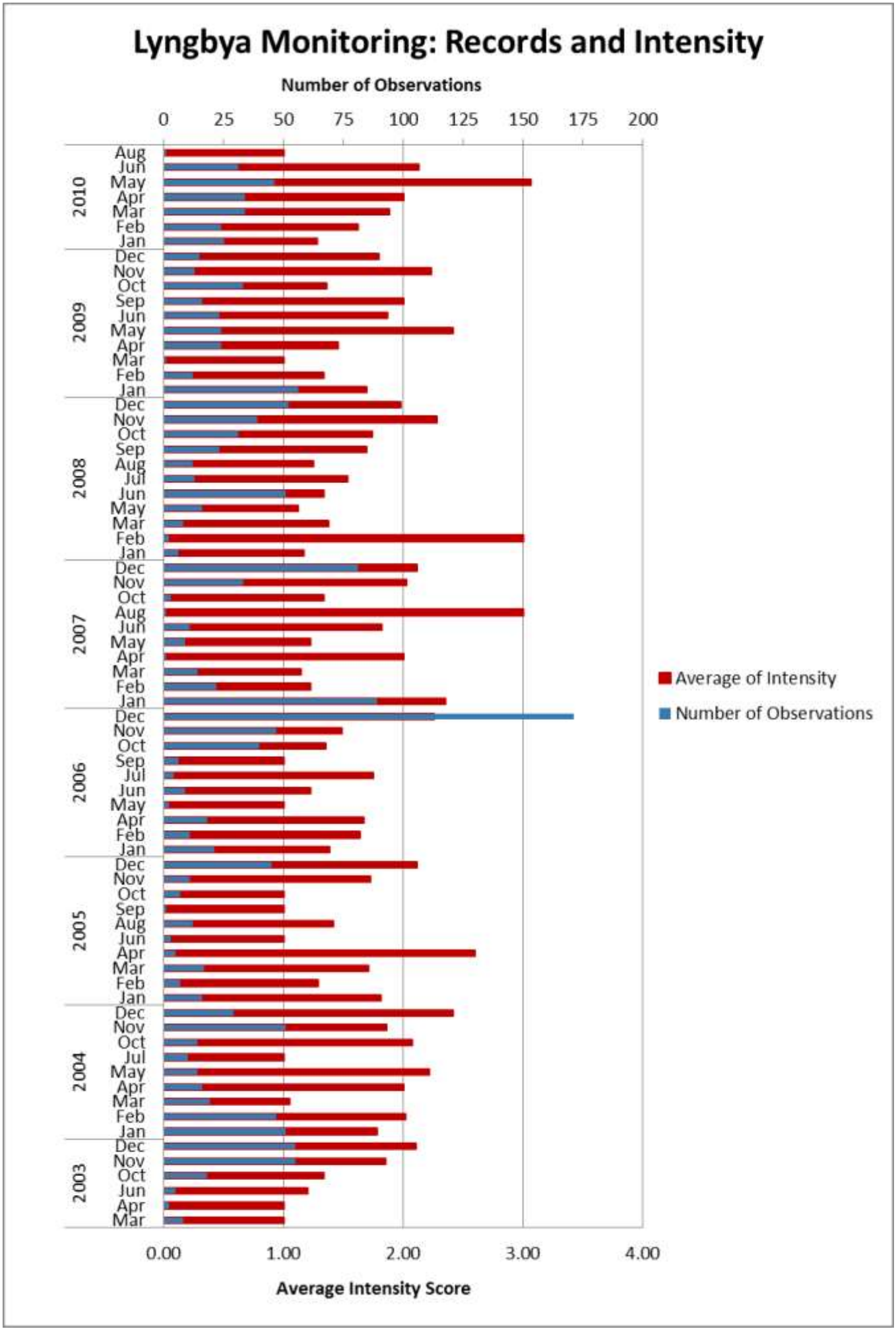
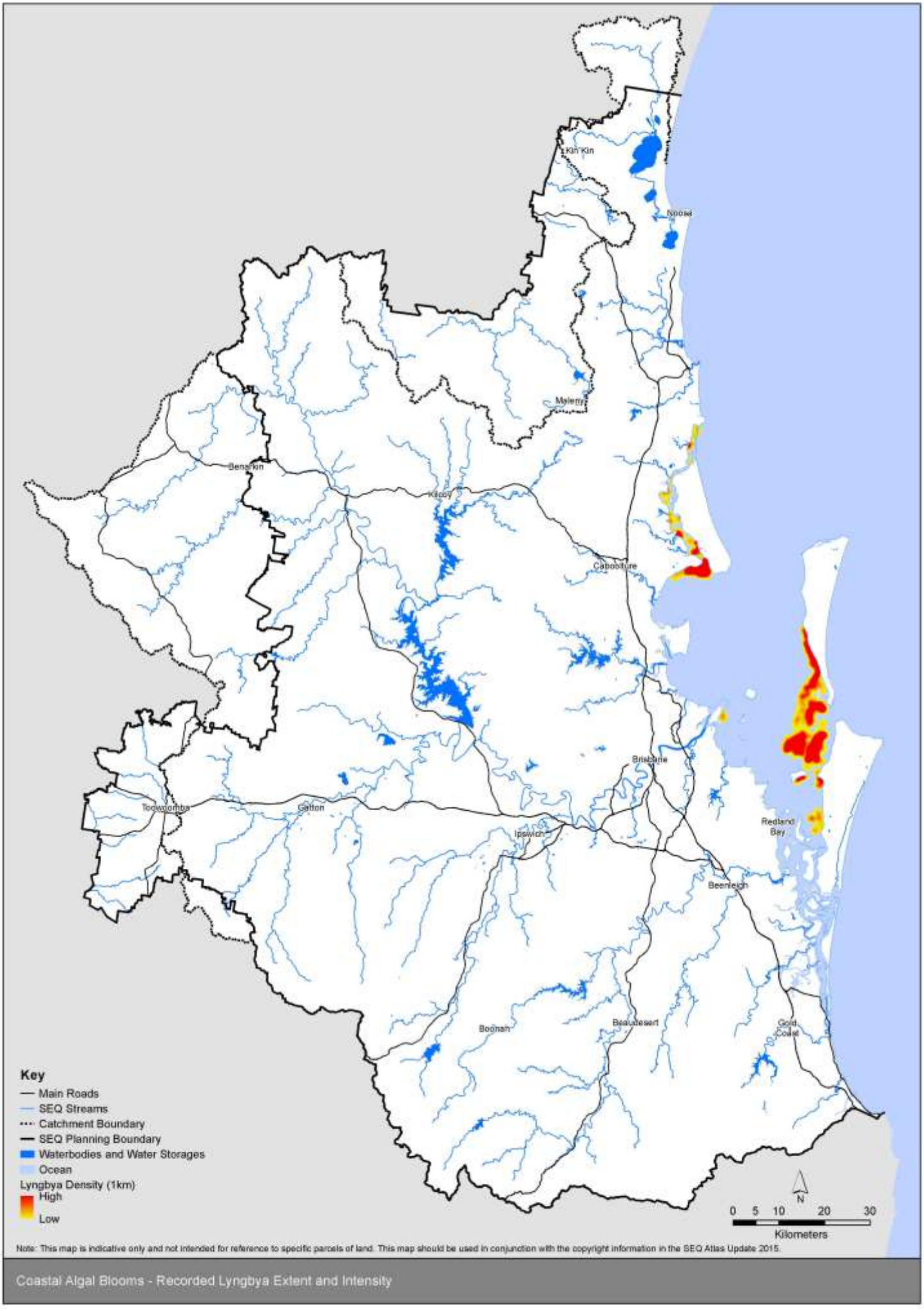


Figure 8: Lyngbya Observations and Intensity 2003-2012



Map 14: Recorded Lyngbya Outbreak Locations and Intensity

CM7 – Coastal Wetlands

By 2031, the condition and extent of SEQ coastal wetlands, particularly those connecting fresh and estuarine/marine habitat (including fish passage), will be equal to or greater than that in 2007

Rationale

Coastal wetlands play a key role in supporting the diversity and abundance of plants and animals; providing important habitats and refuges for many migratory, rare and threatened species. They are an essential part of natural hydrological cycles, providing water passage and storage, and may contribute to flood mitigation and the recharge of aquifers. The connectivity of coastal wetlands to other water bodies such as rivers, creeks, estuaries and oceans is a critical component for ecosystem function.

Datasets

Benchmark: Wetland System 2001, Version 3 (DEHP, 2012)
Update: Wetland System 2009, Version 3 (DEHP, 2012)

Methodology

Selected from Queensland Wetlands Program data, all wetlands natural, unmodified that are within elevation range of 5m (HAT* + 5 m) or less. This provided an extent of coastal wetlands that are associated with Moreton Bay, Pumicestone Passage, Cooloola Coast and tidal regimes, estuaries, rivers, creeks and islands.

For wetland connectivity, palustrine wetlands adjacent and immediately upstream of estuarine wetlands could be monitored over time. This wetland type interface zone (between fresh and salt water) could experience change due to sea level rise and changing hydrological regimes.

*Highest Astronomical Tide

Results

For the mapped change period of 2001-2009, a loss of 620ha of natural wetlands (no modification observed) was noted. Of the total loss, 556 ha were Palustrine wetlands.

Map 15 identifies all wetlands within 5 vertical meters of HAT. These wetlands are (or have potential to be) affected by coastal processes.

Conservation significance of coastal wetlands was assessed in Coastal Wetlands of South East Queensland (Chenoweth & EPA, 2001).

Table 8: Changes in Coastal Wetland Extent by Type (2001-2009)

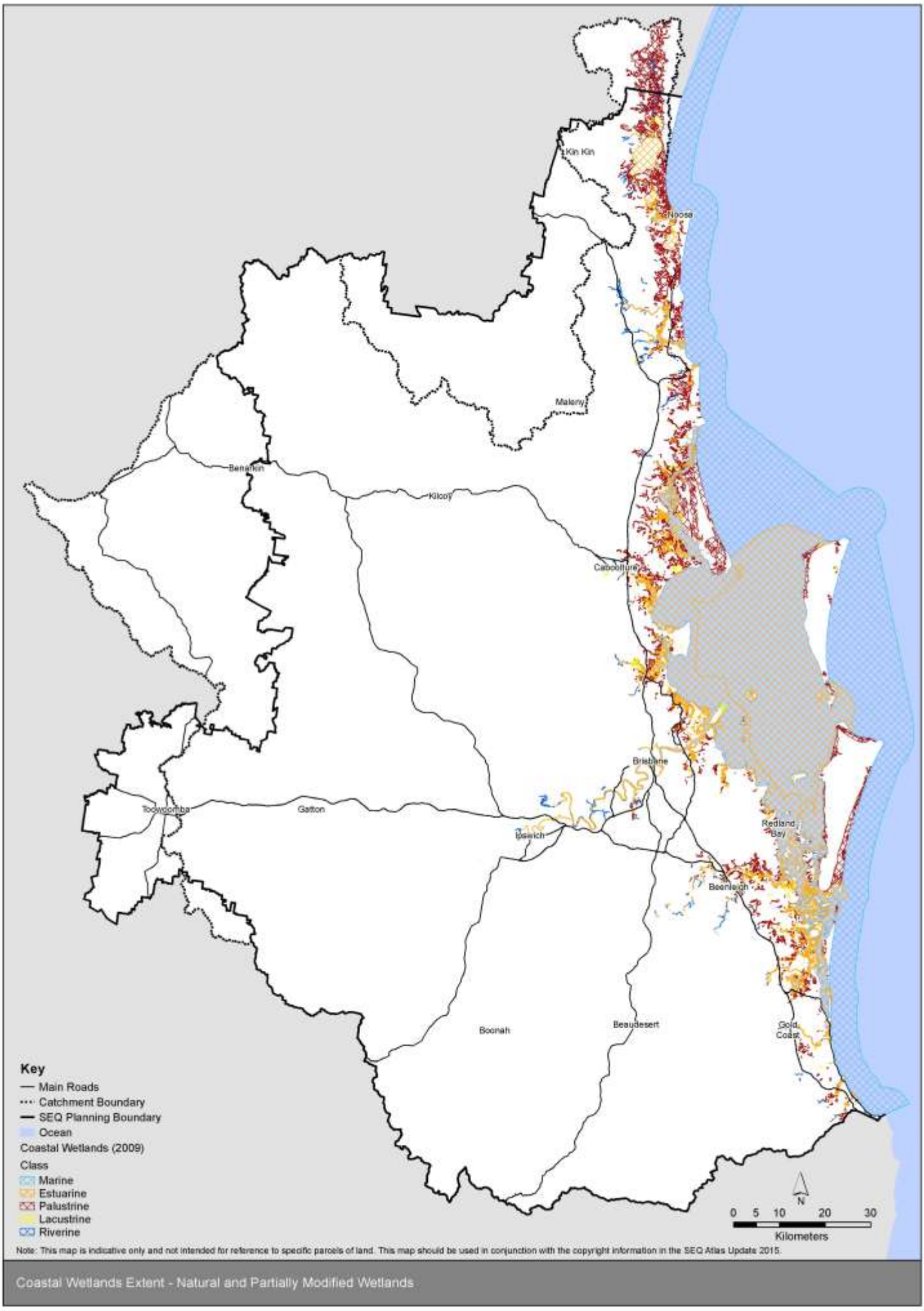
Wetland Type	Area 2001 (ha)	Area 2009 (ha)	Loss (ha)	Loss (%)
Estuarine	23,615	23,572	-43	-0.2%
Palustrine	34,055	33,498	-556	-1.7%
Riverine	1,433	1,412	-21	-1.5%
Lacustrine	1	1	0	0.0%
Regional Total	**59,104**	**58,484**	**-620**	**-1.1%**

Data Limitation

None indicated.

Top photo: Palustrine Wetland and Magpie Geese, Lower Pine River

Bottom photo: Toorbul Roost Site and Estuarine Environment



Map 15: Coastal Wetland Extent and Type (2009)

C1 – Community Engagement and Partner Projects

By 2031, natural resource managers, government and non-government organisations will be resourced and working together to implement the SEQ NRM Plan

Rationale

The region has a history of voluntary community action supported by industry and government investment and human capital. Approximately 77% of the region is managed by private landholders. Enhancing and maintaining the capacity and ability of the community to engage in planning, implementation and monitoring of local actions to support achievement of regional targets is therefore a priority.

Datasets

SEQC Funded and Co-funded Projects 2014 (SEQC).
Monitoring projects (ReefCheck, SeagrassWatch and MangroveWatch).
Land for Wildlife and Property Management Planning databases based on the Qld DCDB.

Methodology

Project density was mapped using SEQC and Partner project information. A kernel density function with a search radius of 1,500 m was applied to regionally present the information and protect privacy of input data. The project area and density of projects was included in the analysis, identifying areas of large project extent and large number of projects. The mapped values are described in Table 2.

Table 2: Project Density Description

Score	Description
0	limited engagement
1	low engagement/ small extent
2	medium engagement
3	high engagement
4	very high engagement / significant project extent

Results

Highest score value represents a larger number of projects in close proximity to one another or projects covering large areas, providing a snapshot of where community effort is strong. Areas of limited engagement could be targeted for future engagement, where potential projects could be developed.
Map 6: SEQC Partner Projects and Community Effort uses low to high indices that combine the number and extent of community projects occurring within a 1,500 m search radius.

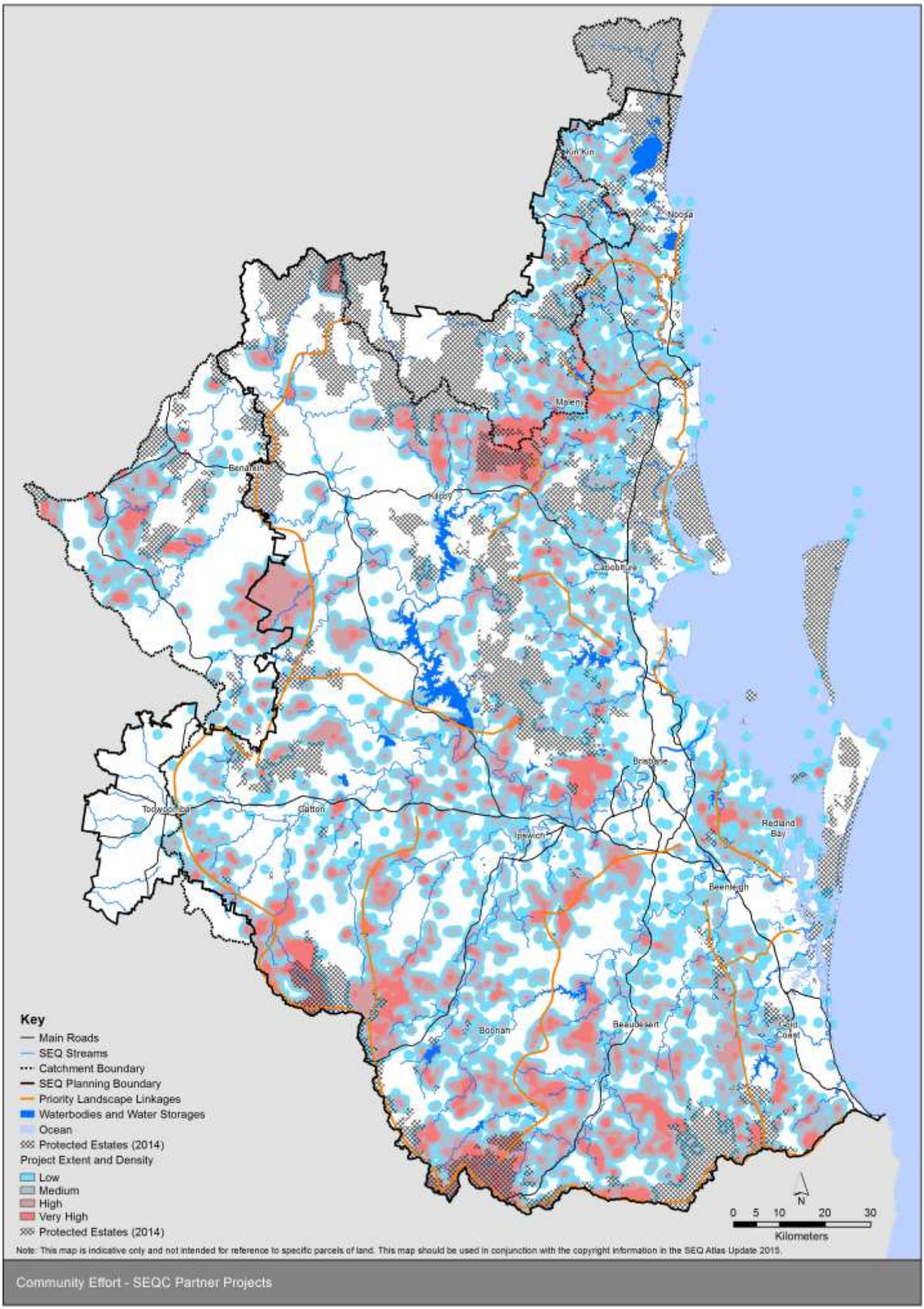
Data Limitation

Only SEQC partner projects and available monitoring projects were considered in this analysis.

Top Photo: Friends of Lagoon Creek Bushcare Site

Bottom Left: Brisbane Valley Rail Trail Project

Bottom Right: Greening Lockyer Site; Hinterland Bush Links Site, Maleny; Numinbah Valley Community Nursery



Map 16: SEQC Partner Projects and Community Effort

L1 – Salinity

By 2031, the area of secondary salinization in SEQ will be10% less than in 2008

Rationale

The ability of our land assets to efficiently meet the needs of existing and future communities require that they are not impacted by salinity or soil health decline in general.

Datasets

Benchmark: Salinity Extent Mapping for SEQ, (DERM, 2009)
Update: South East Queensland Salinity Project (DNRM, 2013)
Land Cover (SEQC, 2014) as condition indicator on salinity affected land
Sub Catchment Health (SEQC, 2014)

Methodology

The SEQ salinity project was undertaken to identify the extent and severity of salinity in the region. A 2009 baseline was established and additional updates will be provided through area wide salinity projects. The 2013 extent included update mapping from the Roadvale Salinity Project for the upper Purga Creek Catchment.
Separated salinity extent into two classes based on expert advice – Coastal Salinity and Dryland/Irrigation Salinity. Coastal salinity was identified within lands less than 5 m elevation. The remaining extent was assigned Dryland/ Irrigation salinity. Identified landcover types affected by salinity. Identified subcatchments with salinity and calculated statistics including extent per subcatchment and percentage of subcatchment affected.

Results

Table 10 summarises the land cover by salinity extent. Up to 17,742 ha of land is known to be affected by salinity across SEQ. Over 60% of the salinity extent was associated with Grass (38%) and Dryland Cropping (30%). These areas would have declining productivity levels due to salinity impacts affecting agricultural land use (see map 18). In addition, Non-Vegetated/Urban and Impervious Road Surfaces are also being impacted by salinity incurring a cost for infrastructure replacement. Tables 11, 12 and Map 17 identify subcatchments with high salinity extent or which have a high percentage of their total area affected by salinity. Figure 9 is a representation of salinity percent in various catchments.

Table 10: Land Cover Affected by Salinity

Land Cover	Area (ha)	Percent (%)
Grass	6,820	38%
Dryland Crop	5,281	30%
Non-vegetated	1,235	7%
Impervious Road Surface	885	5%
Irrigated Crop and Pasture	125	1%
Mine | Quarry | Industrial	10	0.1%
Canal	7	0.0%
Native Forest	2,343	13%
Non-forest Native Vegetation	488	3%
Waterbody	172	1%
Sand | Mud Bank	88	0.5%
Tree Crop	214	1%
Plantation	73	0.4%
Total	**17,742**	**100.0**

Credits (further reading)

Shaw, Roger and Eyre, Lauren (2013). Roadvale salinity project. Salinity processes, management options and planning considerations for upper Purga Creek catchment, South East Queensland. Final Report, SEQ Catchments, Brisbane.

Table 11: Highest Subcatchment Salinity Extents and Percentages in Non-coastal Catchments

Priority Subcatchments	Catchment Area (ha)	Salinity Extent (ha)	% of Catchment
Middle Brisbane River	30,912	345	1.12
Woolshed and Spring Creeks	37,210	295	0.79
Purga Creek	22,266	220	0.99
Middle Warrill Creek	10,102	205	2.03
Warrill and Waroolaba Creeks	20,448	162	0.79
Upper Teviot Brook	35,598	142	0.40
Lower Laidley Creek	13,365	141	1.05
Plain Creek	8,100	131	1.61
Middle Cooyar Creek	52,292	104	0.20
Worongary Creek	1,656	44	2.67

Table 12: Highest Subcatchment Salinity Extents and Percentages in Coastal Catchments

Coastal Subcatchments	Catchment Area (ha)	Salinity Extent (ha)	% of Catchment
Upper Pimpama River	9,345	2,634	28.19
Brisbane Airport	5,735	2,051	35.77
Behm Creek	2,587	1,476	57.04
Lower Pimpama River	3,472	1,034	29.79
Lower Logan River	14,515	822	5.66
Mudgeeraba Creek	2,322	775	33.40
Lower Nerang River	4,271	740	17.32
Bulimba Creek	6,929	436	6.29
Tallebudgera Creek	4,044	395	9.76
Pimpama Island	1,497	341	22.75
Beachmere Floodplain	527	140	26.63

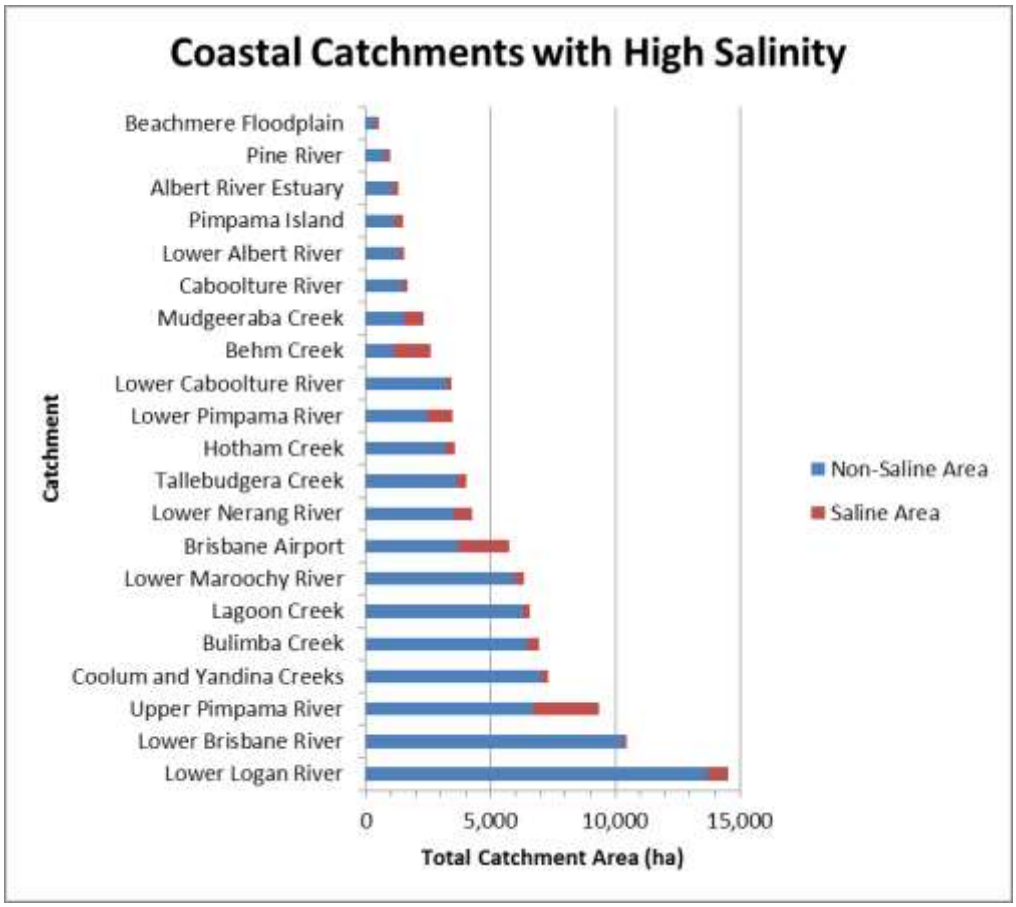
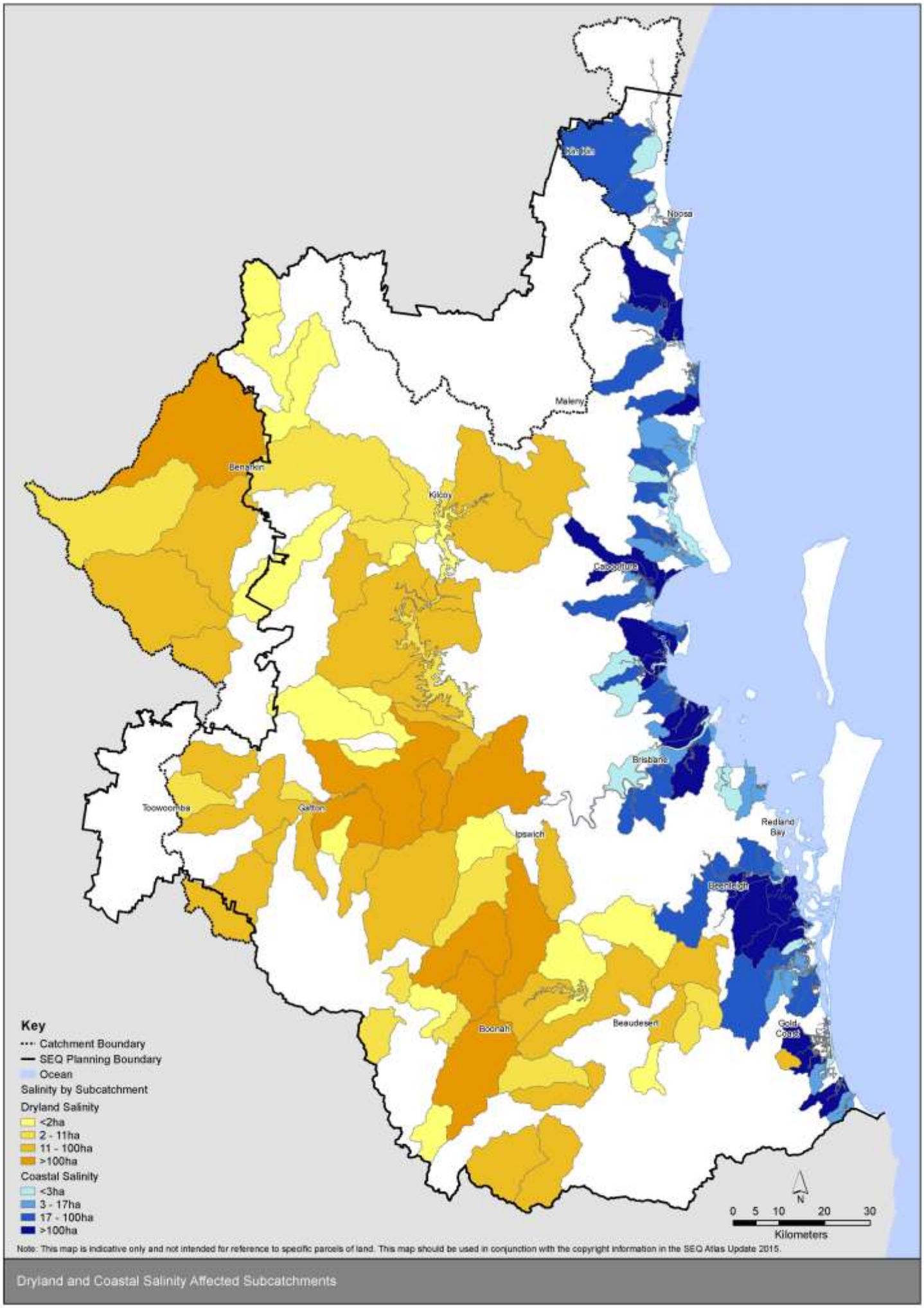
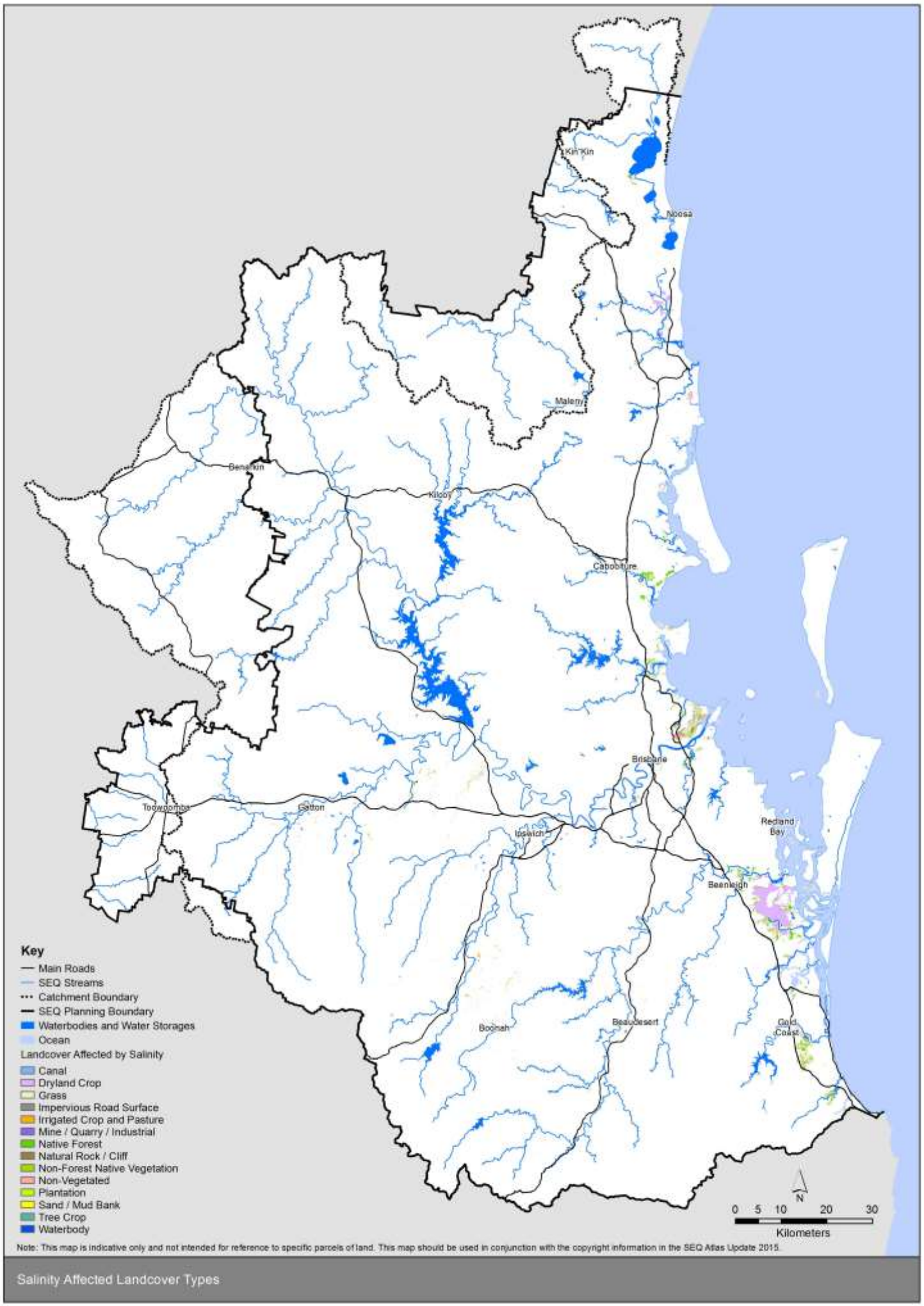


Figure 9: Comparison of salinity extent in Coastal Catchments



Map 17: Subcatchments with Dryland/Irrigation Salinity



Map 18: Salinity Affected Landcover Types

L2 – Agricultural Land

By 2031, >90% (>266 667 ha) of SEQ agricultural land at 2004 will be available for sustainable agriculture

Rationale

A target of 90% ensures a substantial area of good agricultural land must remain in SEQ to enable significant production of food and fibre for local food markets and future populations.

Datasets

Benchmark: Agricultural Land Classes (ALC) (DERM, 2004)

Update: Land Use and Land Use Change, Queensland Land Use Mapping Program (QLUMP)(DSITIA, 1999–2013)
DCDB 2006-2012 (DERM\DNRM)

Methodology

Mapped and reviewed recent Agricultural Land Class extent (2013), and blended with benchmark ALC (2004).

Agricultural land classes on lots less than 1ha in size were identified and compared for years 2006 and 2012 to identify fragmentation of good agricultural land.

Land use for agricultural purposes was selected in 1999 (benchmark) and 2011-13 (update) to identify trend in agricultural land use change.

Results

Agricultural Land Use Classes were developed in 2004 to describe the quality/capability of the land to produce certain products.

- A Class lands are of high quality, suitable for producing a wide variety of crops.
- B Class lands are good quality, suitable for producing a limited range of crops or grazing.
- C Class lands are suitable for grazing.

Map 19 shows Agricultural Land Use classes identified by multiple mapping projects in SEQ since 2004.

Land Use classifications (Table 13) are used to describe land use patterns and changes in SEQ. Categories identify both principle use of the land and resulting land management practices. (e.g. grazing in native vegetation). Identifying changes in Agricultural Land Uses can help determine how much productive land is being lost to other uses. Map 20 shows the 2012 extent of Land Uses associated with agricultural activities.

Lot Size Change can be used as a measure of land fragmentation.

Table 15 shows an increase in smaller lots and a decrease in larger lots, indicating an increase in fragmentation on agricultural lands.

Table 13: Identified Agricultural Land Classes >=1ha

Agricultural and Grazing Land	Area (ha)
A (Cropping)	251,306
B (Grazing, limited cropping)	104,904
C1&2 (Limited grazing)	728,903
C3 (Marginal grazing)	107,733
Total	1,192,846

Table 14: Agricultural Land Use Change

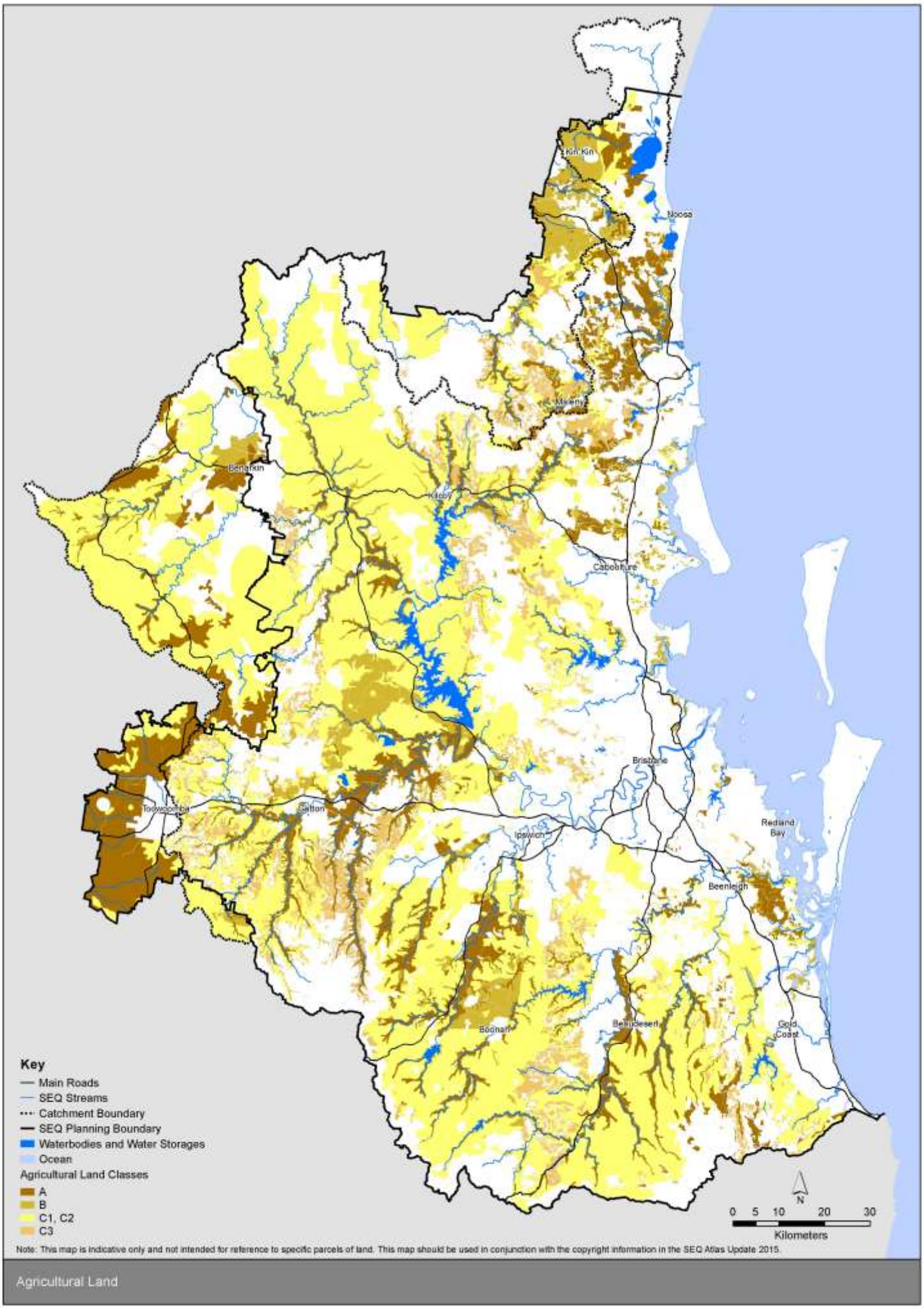
Land Use Change	**1999 Extent**	**2013 Extent**	**Change**
Use: Grazing			
Grazing modified pastures	7,571	8,555	984
Grazing native vegetation	1,158,981	1,124,670	-34,768
Irrigated modified pastures	13,511	12,408	-1,103
Livestock grazing	58,254	56,566	-1,192
SUBTOTAL	1,238,318	1,202,199	**-36,079**
Use: Agricultural			
Cropping	11,104	8,137	-2,657
Cropping - Sugar	17,638	10,277	-7,361
Intensive horticulture	1,120	1,412	293
Irrigated cropping	27,003	22,267	-4,696
Irrigated cropping - Sugar	19	23	5
Irrigated perennial horticulture	5,706	6,449	749
Irrigated seasonal horticulture	34,673	34,407	-266
Perennial horticulture	10,629	8,624	-2,001
Seasonal horticulture	104	72	-32
SUBTOTAL	107,994	91,669	**-15,967**
Use: Forestry			
Plantation forestry	65,230	63,492	-1,680
Production forestry	171,562	88,628	-82,616
Irrigated plantation forestry	144	241	96
SUBTOTAL	236,936	152,360	**-84,200**
TOTAL	1,583,248	1,446,228	**-136,245**

Table 15: ALC Lot Size Change (fragmentation)

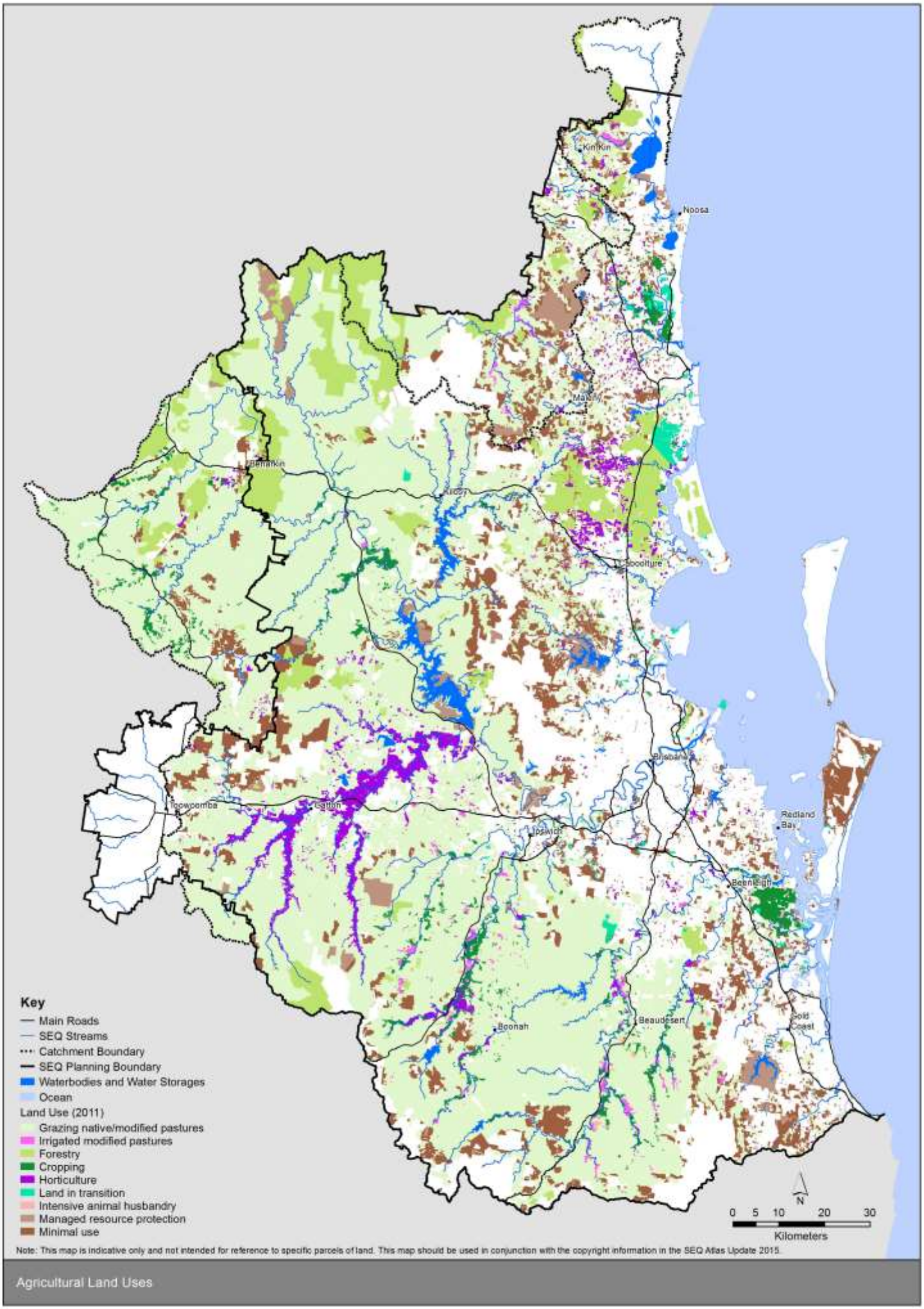
Lot Size	**A Class**	**B Class**	**C1 Class**	**C2 Class**	**Total Change**
< 1 ha	1,258	1,181	1,030	2,059	5,528
1 - 5 ha	-58	537	500	1,044	2,024
5 - 8 ha	20	-75	3	308	257
8 - 16 ha	-259	-135	144	506	257
16 - 40 ha	-491	-250	113	-827	-1,455
40 - 100 ha	-360	-960	-1,124	-901	-3,346
>100 ha	-618	-875	-876	-2,861	-5,230

Data Limitation

Agricultural land use is not confined to land identified within ALC mapping. Multiple lines of evidence have been adopted to gain a more informed understanding of changes to agricultural land use across SEQ. Due to the use of multiple datasets, the Change values in Table 14 may not equal the 2009 Extent minus the 2013 Extent.



Map 19: Agricultural Land Types



Map 20: Agricultural Land Uses

L3 – Soil Acidity

By 2031, the area of acidified agricultural soils within SEQ will be reduced by 50% from the 2008 baseline

Rationale

The ability of our land assets to efficiently meet the needs of existing and future communities requires that they are not impacted by soil health decline.

Datasets

Benchmark: Soil Acidity extent based on Soil Acidity Risk mapping (2008)
Update: Not currently available

Methodology

This mapping was generated by combining land use mapping (intensity) with soil order mapping. It indicates the capacity of the soil to buffer against acidifying inputs such as inorganic fertilisers and therefore the ability to maintain soil structure and health over time. Results are grouped into high, medium and low risk categories.

Results

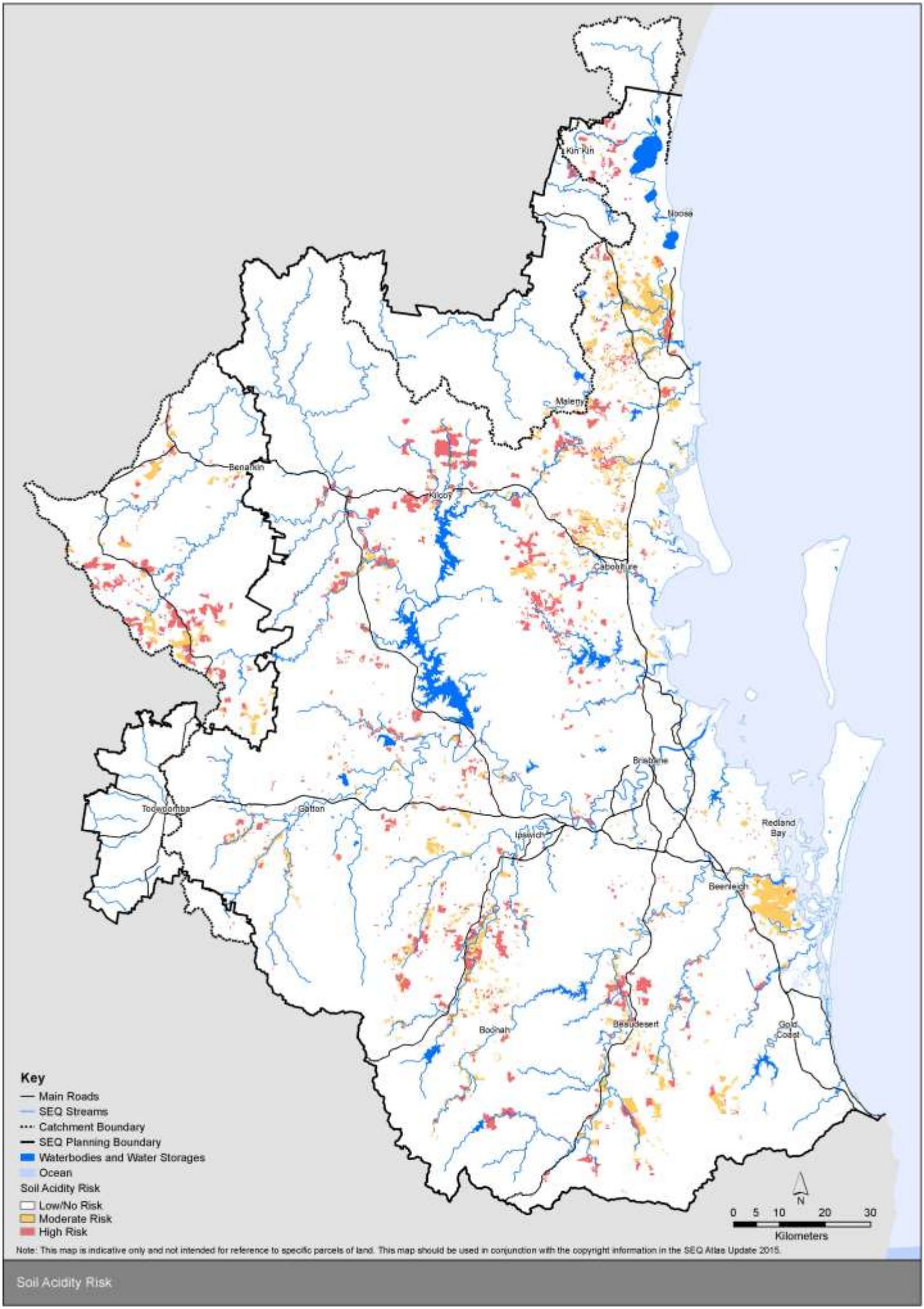
Total acidity risk area in 2008 was 57,110ha. 50% of this area or 28,555 ha was at risk of high soil acidity.

Map 21 shows the extent of identified soil acidity risk.

Data Limitation

The availability of data limits the options for assessment of risks to soil health. Soil acidity (buffering capacity) was identified as a surrogate layer. No new data was available for change analysis. Any soil health targets or sampling need to relate to the National Soil Health Monitoring Framework to be released in the near future. Suggested project with DEHP to establish representative soil sampling sites across the region for sampling at 5 year intervals.

Trialling cover crop of Pinto Peas with Pineapples, Pumicestone



Map 21: Soil Acidity Risk Areas

L4 – Soil Organic Matter

By 2031, the level of soil organic matter (carbon in t/ha) in agricultural soils will be higher than in 2008 or baseline year

Rationale

Soil organic matter decline is a major threat to sustainable agricultural production. Trends indicate an ongoing decline which must be reduced to allow a net increase in organic matter to occur across the region in the near future.

Datasets

Benchmark: Organic soil carbon stocks (CSIRO, 2014) – available but not accessible
Update: Not currently available

Methodology

The data collates soil information from all states and territories of Australia, including soil types present in the Australian Soil Classification database and land-use mapping. It represents the most current dataset on the soil organic carbon stocks of Australia.

Results

Not currently available.

Data Limitation

Dataset not available.

Any soil health targets or sampling need to relate to the National Soil Health monitoring Framework to be released soon. Suggested project with DERM to establish representative soil sampling sites across the region for sampling at 5 year intervals.

L5 – Acid Sulfate Soils

By 2031, the area of 'severe' acidification caused by the disturbance of ASS will be lower than in 2008

Rationale

Acid Sulfate Soils (ASS) are formed through natural processes and are generally covered by other soils. However, when ASS are exposed to air by drainage or digging and then wet again, highly acid drainage water is produced. Acid runoff causes a range of detrimental impacts to the environment, coastal development, fishing and agricultural industries.

Datasets

Benchmark: Acid Sulfate Soils Risk Mapping (DERM, 2006)
Land less than 5m above HAT 2008, Acid Sulfate Soils by Land Cover 2006 (SEQ Catchments)
Update: Updated Acid Sulfate Soils extent (Qld Govt 2012)
Land less than 5m above HAT 2008, Acid sulfate Soils by Land Cover 2012 (SEQ Catchments)

Methodology

Area at risk calculated from unmodified dataset and mapping. Potentially disturbed areas calculated by applying high risk land cover classes to indicate areas which are not vegetated or associated with land uses that may disturb acid sulfate soils namely roads, mine/quarry, irrigated crop and pasture and non vegetated. Land less than five meters above Highest Astronomical Tide included as risk areas due to historical deposition of potential acid sulfate bearing sediments in these areas.

Results

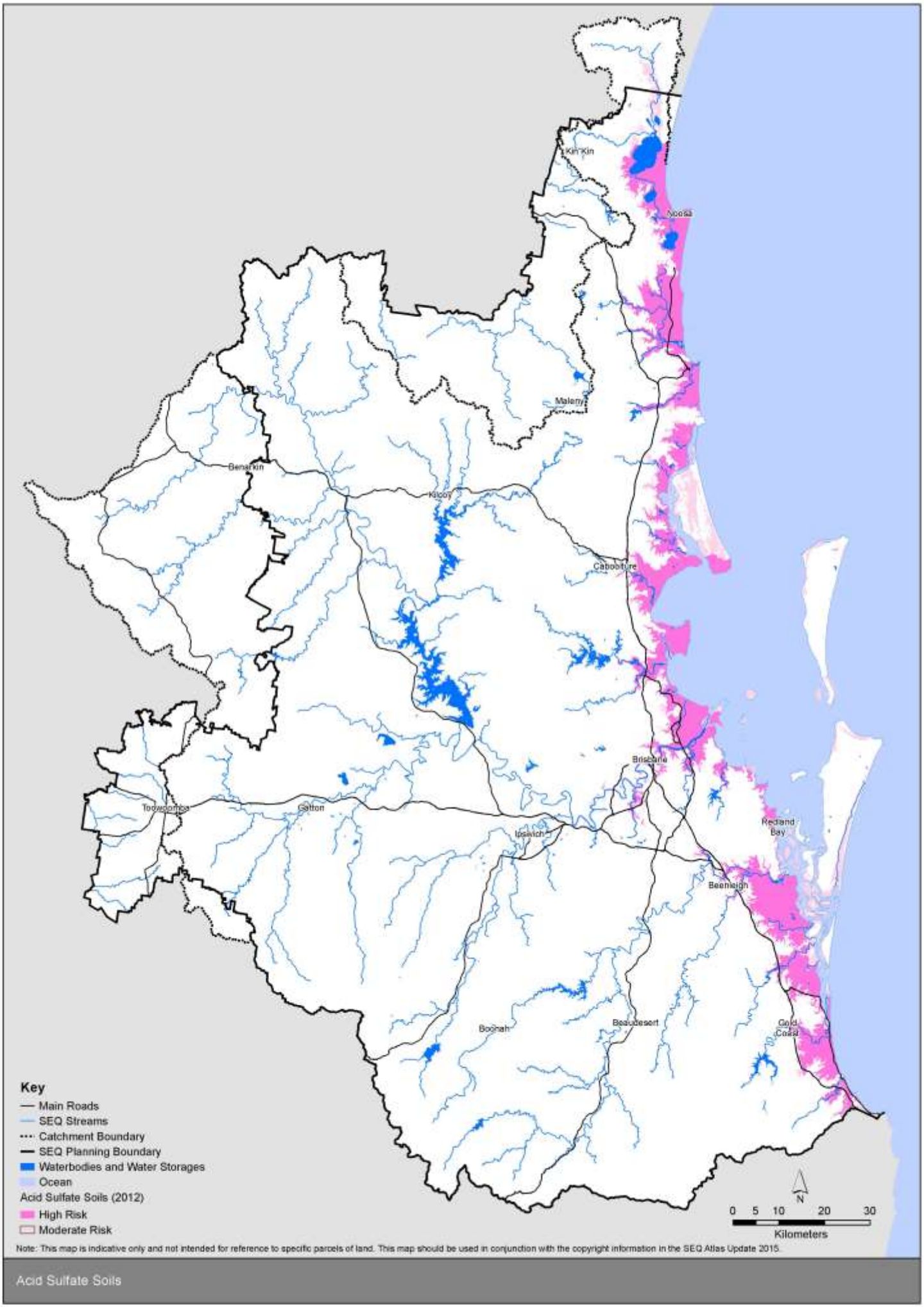
For the Benchmark year, area of potentially disturbed ASS was 12,744ha from a total affected area of 72,233ha. (17% disturbed) The total extent of ASS has been revised since the benchmark year as further studies were completed and analysed against the 2012 Land Cover (Table 16). Map 22 shows the updated ASS extent and Map 23 identifies areas of potentially disturbed ASS through Landcover Types.

Table 16: Landcover on Acid Sulfate Soils

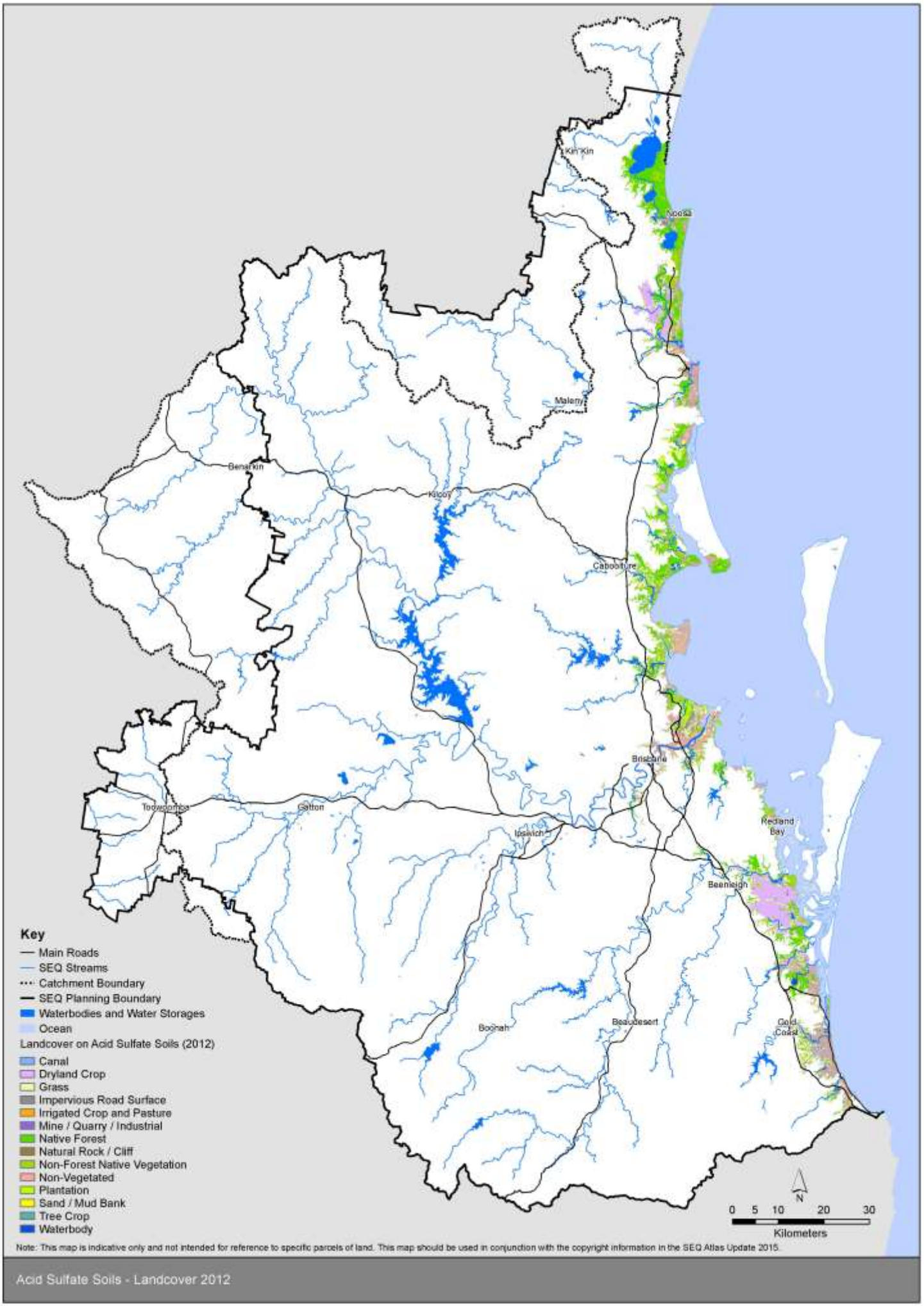
Landcover 2012	Area (ha)	Percent of Total
Non-vegetated	17,514	16.1%
Impervious Road Surface	6,857	6.3%
Plantation	1,749	1.6%
Tree Crop	721	0.7%
Mine / Quarry / Industrial	563	0.5%
Irrigated Crop and Pasture	516	0.5%
Subtotal: Potentially Disturbed Landcover	**27,919**	**25.0%**
Native Forest	32,866	30.2%
Grass	17,909	16.4%
Non-forest Native Vegetation	13,052	12.0%
Dryland Crop	11,479	10.5%
Waterbody	2,312	2.1%
Canal	1,473	1.4%
Sand / Mud Bank	1,161	1.1%
Total: All Landcover	108,926	100%

Data Limitation

The 2006 landcover is not comparable to 2012 Landcover due to changes in methodology. Although the area of potentially disturbed acid sulfate soils has doubled. The increased area of mapped ASS may be attributed to further studies rather than an increase in overall extent.



Map 22: Acid Sulfate Soils Risk



Map 23: Landcover on Acid Sulfate Soils

L6 – Soil Erosion

By 2031, the extent of erosion from hill slopes and gullies will be reduced by 50% from the 2008 baseline

Rationale

Land degradation from soil erosion, both on site (e.g. gullies loss of soil and nutrients) and offsite (damage to infra-structure, siltation of dams, increased cost for treatment of water supplies) is difficult to quantify but includes considerable private and public community costs.

Datasets

Benchmark: 2008 Revised Universal Soil Loss Equation (RUSLE) (DERM, 2008)
Hillslope and landslip hazard (SEQC)
Low grass cover from the bare ground index (DSITIA)
Stream bank erosion hazard (SEQC)
Update: 2008 RUSLE (not updated)
Hillslope and landslip Hazard (updated)
Stream bank erosion hazard (updated)

Methodology

The erosion risk mapping consists of 3 components including:

- Un-vegetated slopes above 7 degrees using forest classes from Land Cover
- Unvegetated streams using stream order mapping and forest classes from Land Cover
- Outputs from the Revised Soil Loss Equation which is the compilation of rainfall runoff erosivity factor (R), soil erodibility factor (K), slope length factor (L), slope steepness factor (S) and cover management factor (C).

The inputs are standardised to a 10 m grid and grouped into a 4 class system, combined to give a highest total score of 12. Values are reclassified (using quantile Splits) back to a 4 class system with final groupings of low risk (1), moderate risk (2), high risk (3) and very high risk (4).

Results

Updated Erosion Risk Map 2014 completed.

Some works have been completed to reduce and address erosion through the Healthy Country Program and Flood recovery works (2011 and 2013).

Map 24 identifies both the benchmark Erosion Risk extent 2008 and the revised Erosion Risk extent 2014.

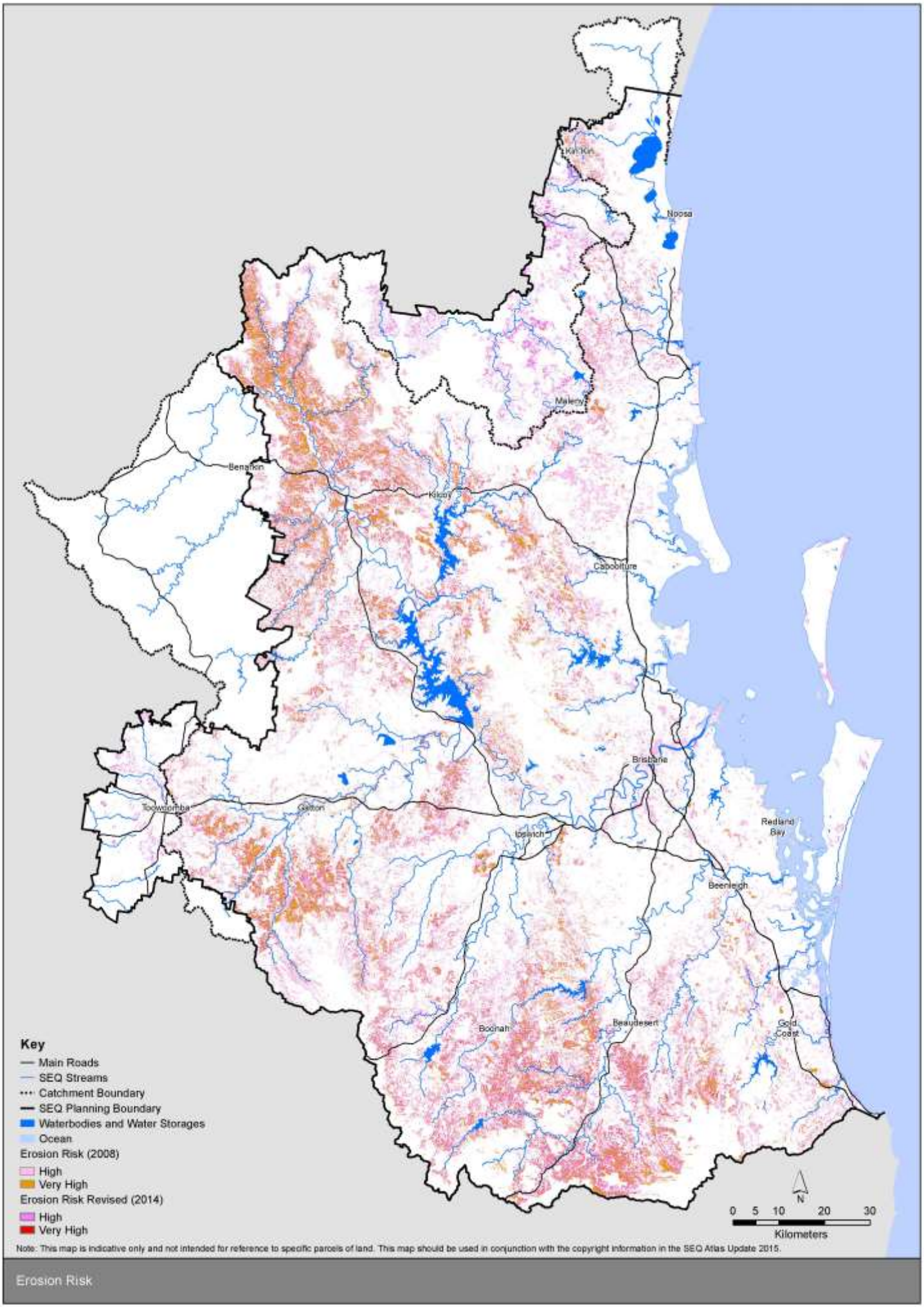
Table 17: Erosion Risk Area (hectares)

Descriptor	Benchmark (2008, ha)	Update (2014, ha)	Change (ha)
Areas classified as high to very high risk for erosion	255,026	269,737	14,711 (5% increase)

Top photo: Hell Hole Landslips, Mooloolah Valley

Bottom Left: Riparian fencing site, Pine Rivers; Waterway erosion site, Logan River

Bottom Right: Gully site, Logan River



Map 24: Erosion Risk

L7 – Grazing Land Condition

By 2031, 75% of grazing land in SEQ will be in a 'good' condition

Rationale

A decrease in the extent of available grazing land in SEQ is likely to reduce the region's grazing capacity and may place increased pressure on remaining lands.

Datasets

Benchmark: Bare Ground Index (DSITIA)
Organic soil carbon stocks (CSIRO, 2014) – available but not accessible

Update: Land Use and Land Use Change, Queensland Land Use Mapping Program (QLUMP/ABARES*) (DSITIA, 1999 – 2013)
*Australian Bureau of Agricultural and Resource Economics and Sciences

Methodology

Land use for agricultural purposes was identified in 1999 (benchmark) and 2011-13 (update) to identify trend in agricultural land use change.

Results

Land Use classifications (Table 18) are used to describe land use patterns and changes in SEQ. Identifying changes in Grazing Land Use can help determine how much productive land is being lost to other uses. Based on the land use change mapping, a slight decrease observed in overall area of Grazing Native Vegetation. This change maybe due to improved mapping methodologies.

Table 18: Decrease in land identified as being used for grazing purposes.

Land Use Change	1999 Extent	2013 Extent	Change
Grazing modified pastures	7,571	8,555	984
Grazing native vegetation	1,158,981	1,124,670	-34,768
Irrigated modified pastures	13,511	12,408	-1,103
Livestock grazing	58,254	56,566	-1,192
Total	1,238,318	1,202,199	**-36,079**

Data Limitation

No condition included in the available datasets to address Target.

Off-stream watering site, Echidna Creek

L8 – Land Contamination

By 2031, existing contamination sites and off-site impacts will be reduced; and no new sites will be created over the 2008 baseline data

Rationale

Soil contamination can potentially cause sickness or death in people, plants and animals. Long term soil contaminants such as persistent organochlorine pesticides (dieldrin and heptachlor), cadmium, lead and high energy radiation are more insidious because they can accumulate to unacceptable levels in food plants and farm animals without causing visible harm to their host.

Datasets

Benchmark: Not currently available
Update: Not currently available

Methodology

No agreed methodology.

Results

Not currently available.

Data Limitation

Dataset not available

L9 – Extractive Resources

By 2031, extractive resources within "Key Resource Areas" in SEQ will be available for their highest use with no net loss of other environmental and landscape values

Rationale

Mining and extractive resources are protected by a State Planning Policy which allows these resources to be accessed. This creates potential conflicts for the achievement of other Targets such as Nature Conservation and the protection of Water Assets. Having a Target for extractive industry in the NRM Plan enables the offsetting requirements of the industry and to minimise overall impact to natural resources.

Datasets

Benchmark: Key Resource Areas (KRAs) (DNRM, 2007)
Update: Regional Ecosystems (V7, 2009 extent)
BPA (V3.5, 2006)
Updated Key Resource Areas

Methodology

An analysis of existing KRAs and the potential impact on vegetation and nature conservation was summarised.

Results

Map 25 identifies the locations of Key Resource Areas, Separation Areas and Transport Routes.

Figure 10 identifies habitat, corridors and priority species values for each KRA. While ecosystems in the Separation Areas may not be affected by the extraction process to the same extent as within the KRAs, impacts such as increased noise and air pollution will affect some species ability to use the areas. Also, removal of vegetation for resource extraction in KRAs will create 'edge effects' or undesirable impacts such as breaks in the established canopy, allowing weed colonisation and management issues.

Key Resource Areas that have the potential to impact on regionally significant nature conservation areas include:

Bli Bli, Blue Rock, Bracalba, Carbrook/Eagleby, Kholo Creek, Mount Coot-tha, Mount Cross, Moy Pocket, Mundoolun Connection Sands, Narangba, Nerang, Ningi, Northern Darlington Range, Wellcamp Downs, West Mount Cotton.

(areas selected based on BPA values present on >50% of area or BPA values greater than 250 ha on site)

Data Limitation

Not identified

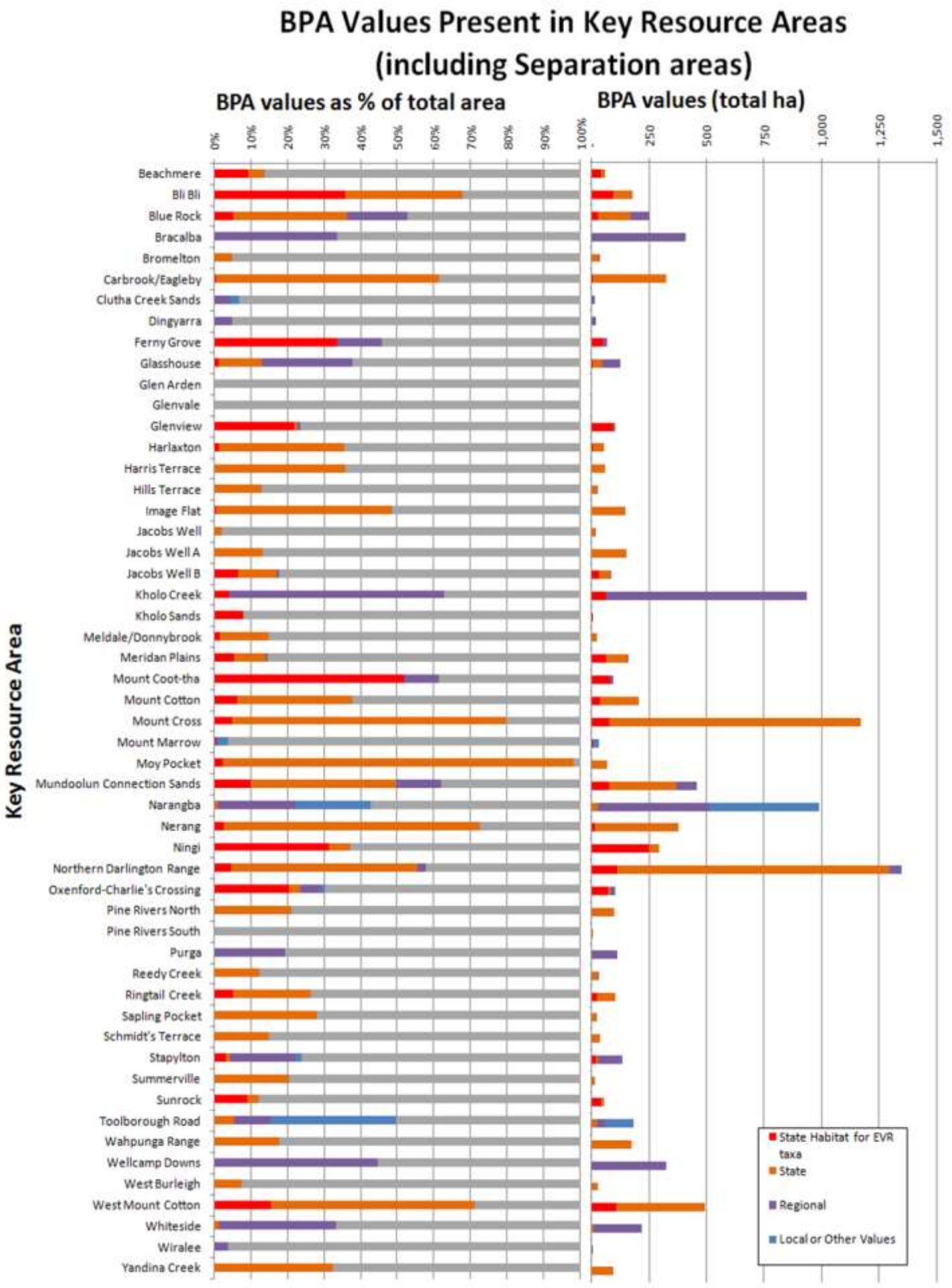
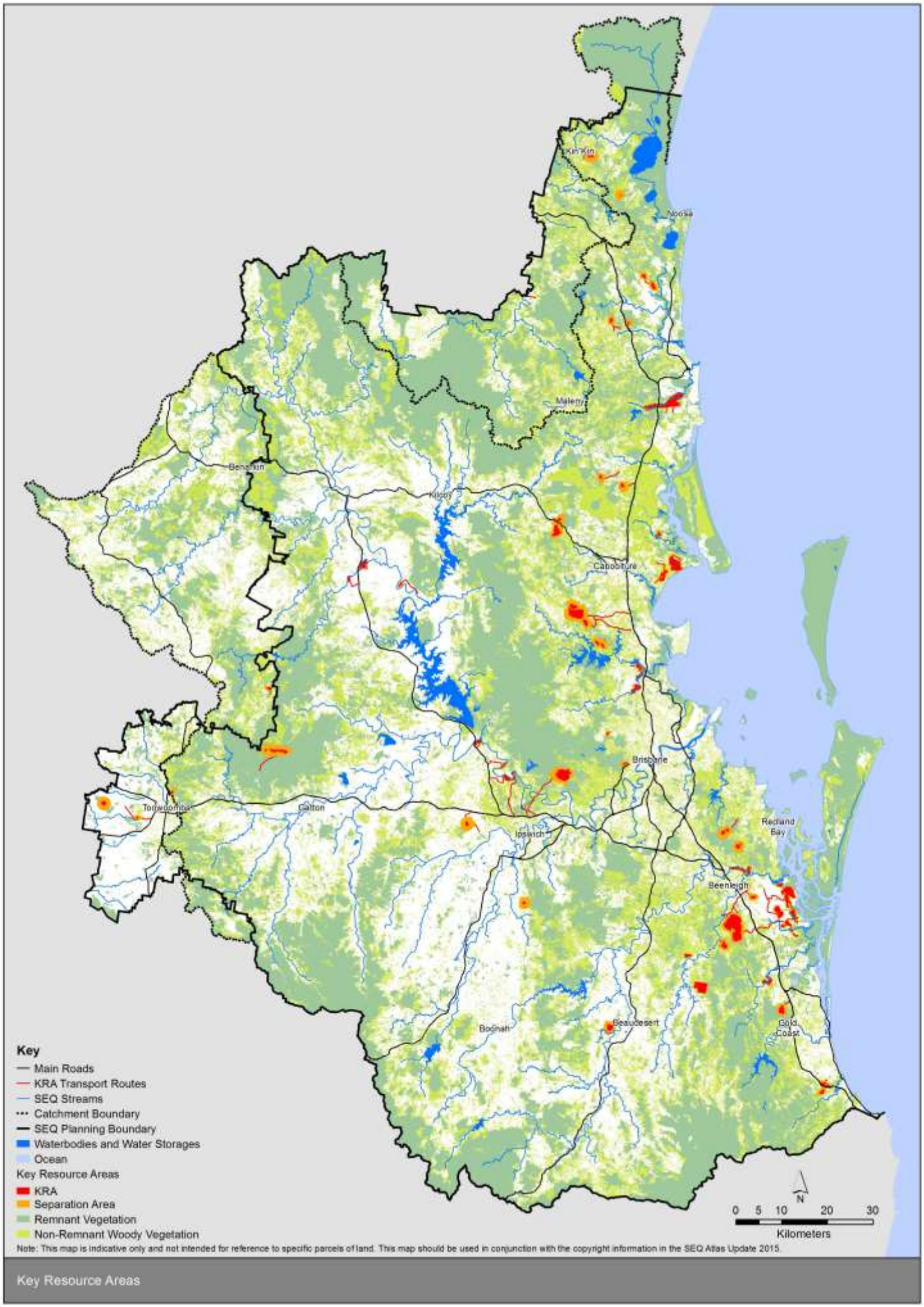


Figure 10: Biodiversity Values on Key Resource Areas



Map 25: Key Resource Areas and Separation Areas, Showing Vegetation Overlap

NC1 – Remnant and Woody Vegetation

By 2031, the 2001 extent of regional vegetation cover— including both remnant vegetation (35%) and additional non-remnant woody vegetation (22%)—will be maintained or increased

Rationale

There is a broad recognition that at least 30% remnant vegetation cover is required to maintain a minimum level of species and ecosystem function throughout a region. Studies have also indicated a progressive decline of species and greater rate of extinctions with incremental habitat loss. The SEQ Region as a whole has up to 35% remnant vegetation cover (2001 baseline) mostly located in upland areas. In lowland areas, remnants comprise small patches of highly valued fragmented vegetation.

Areas of woody regrowth and non-woody ground cover that provide habitat structure necessary for survival of many species are also important assets that can make a positive contribution to vegetation cover both now and into the future.

Remnant vegetation cover varies across SEQ and while 35% remains the regional target, targets to support this goal will need to be considered in each catchment/local government area.

Datasets

Benchmark: Remnant Vegetation extract of Regional Ecosystems v.7, 2001 extent (DERM, 2012)
Non-remnant Woody Vegetation extract from Statewide Land and Tree Study (SLATS) 2001 (DERM, 2003)
Update: Remnant Vegetation extract of Regional Ecosystems v.7, 2009 extent (DERM, 2012)
Non-remnant Woody Vegetation extract from Statewide Land and Tree Study 2011 (DERM, 2012)

Methodology

Ran selection queries on Regional Ecosystem datasets for 2001 and 2009, obtaining remnant vegetation extent.

Extracted woody vegetation values from SLATS based on foliage projective cover (FPC) cut-offs .

Area of remnant vegetation was then removed from the woody vegetation extent to identify areas of non-remnant woody vegetation only.

Final extents of both remnant and non-remnant woody vegetation were then calculated.

Results

Map 25: Vegetation Change identifies areas of existing remnant and non-remnant woody vegetation in 2011, as well as vegetation loss or modification over the previous decade (2001-2009). A further 9,355 ha (0.4% of SEQ remnant vegetation) may have been lost between 2009 and 2011.

Table 19 summarises changes in remnant and non-remnant woody vegetation extent since the benchmark year.

A decrease in remnant vegetation across SEQ has been observed. An estimated total of 10,477 ha has been cleared between 2001-2009. Larger areas of remnant cleared were noted in the locality boundaries of Cooroibah, Peregian Springs, Wamuran, Narangba, Cashmere, Upper Kedron, Seventeen Mile Rocks, Forest Lake, Parkinson, Drewvale, Springfield Lakes, Brookwater, Collingwood Park, Mount Cotton, North Stradbroke Island, Coomera and Upper Coomera, Varsity Lakes, Palen Creek, Mundoolun, Waterford, New Beith, Deebing Heights and South Ripley, Helidon, Gatton, Buaraba South, Churchable, Mount Hallen, and Monsildale. The majority of clearing was done in many small fragments of 5—10 ha in size.

Non-remnant woody vegetation has increased in some areas due to changed land management or land use. Community lead projects have also assisted in some gains through natural regeneration and revegetation activities.

Table 19: Summary of Remnant Vegetation and Non-Remnant Woody Vegetation changes in extent

Vegetation Type	2001 Extent (ha)	2009 Extent (ha)	Change (ha)
Total area of remnant vegetation	823,873 ha (35.85%)	813,396ha (35.4%)	-10,477ha (-0.5%)
Total area of non-remnant woody vegetation	646,128 ha (28%)	411,002ha	43,888 ha was cleared (SLATS clearing summary)

Data Limitation

The SLATS figures represent the best estimate of possible vegetation cover. The non-remnant woody vegetation could consist of both exotic and native species.

Some work is underway to better understand and calculate increases in vegetation cover.

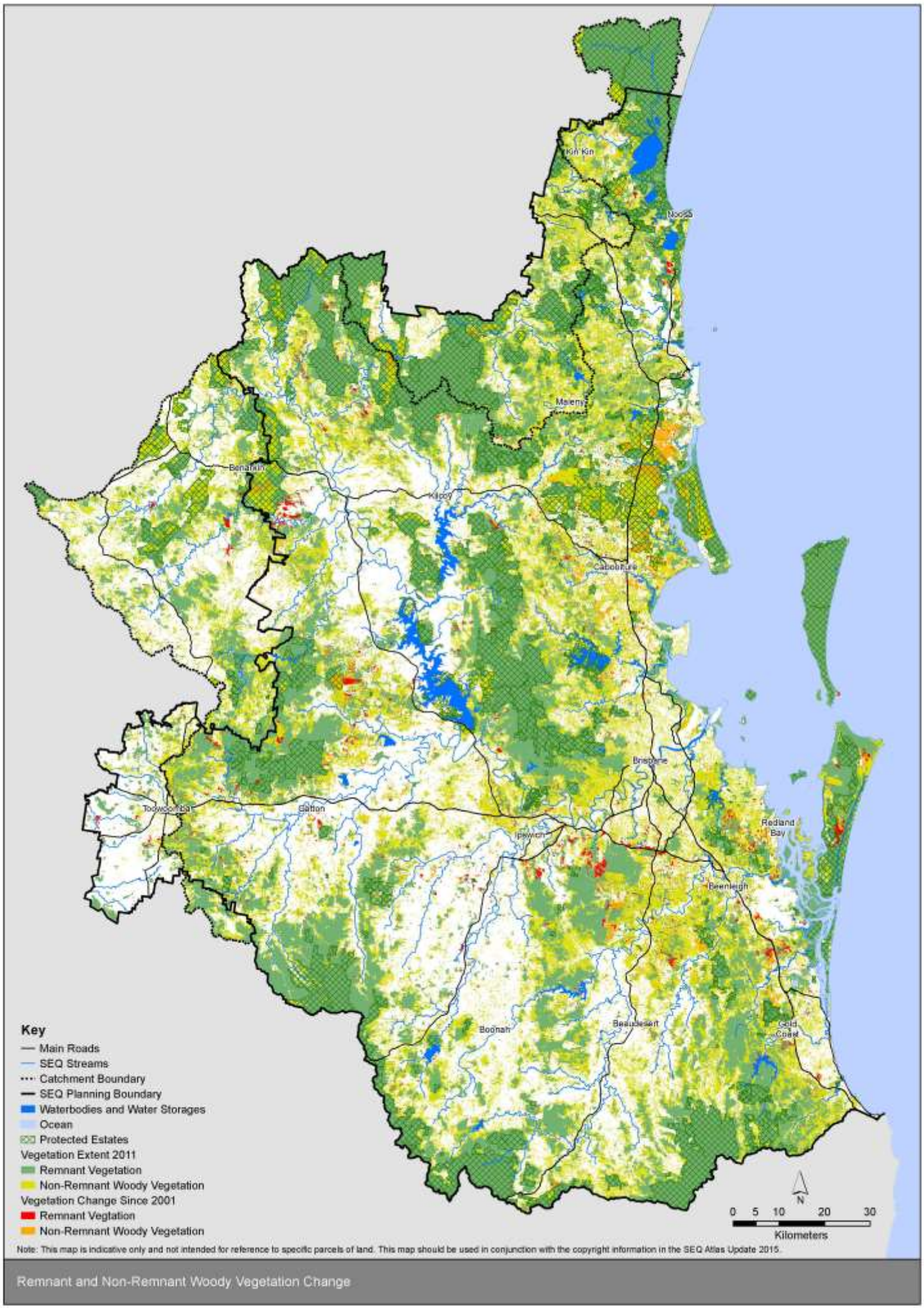
Change figures are calculated based on remnant and non-remnant woody vegetation and the overlap with clearing polygons.

Gains and losses to vegetation cover are difficult to quantify due 2 yearly monitoring cycles and lag time affect with clearing. The remote sensing techniques used to monitor vegetation and landcover are dependent on quality of imagery and environmental factors at time of capture.

Non-remnant woody vegetation layers are not comparable due to data variability. Note that benchmark and update extents for non-remnant woody vegetation cannot be compared due to the nature of the data, and provide snapshots only of current extents.

Tracking regrowth and other vegetation increases could be used as a future assessment criteria of progress on this target.

Christmas Bells and wallum vegetation community, Pumicestone



Map 26: Vegetation Change

NC2 – Vegetation Fragmentation

By 2031, there will be no net fragmentation of larger tracts (greater than 5,000 ha), and 20% of priority smaller tracts (less than 5,000 ha) will be better connected than the 2003 baseline.

Rationale

A tract is a continuous patch of vegetation. Tract analysis is an assessment of the degree of vegetation fragmentation across the landscape. Larger, intact tracts of vegetation are generally more resilient than smaller tracts due to their ability to regulate local microclimates (humidity and temperature), producing favourable conditions for the plant community. Larger tracts are also less likely to be affected by edge effects (such as weed invasion, noise, thermal and light pollution) and generally support a wide range of viable plant and animal communities (species diversity and richness).

Maintaining and connecting 20% of tracts greater than 100 ha was originally suggested as a realistic and achievable target in SEQ. This could include re-connecting large tracts, through a series of smaller size tracts if they were in strategic locations.

Datasets

Benchmark: Remnant Vegetation extract of Regional Ecosystems v.7, 2001 extent (DERM, 2012)
Non-remnant Woody Vegetation extract from Statewide Land and Tree Study (SLATS) 2001 (DERM, 2003)
SEQ Roads based of State Digital Road Network (DERM, 2007

Update: Remnant Vegetation extract of Regional Ecosystems v.7, 2009 extent (DERM, 2012)
Remnant Vegetation extract of Regional Ecosystems v.8, 2011 extent (DERM, 2012)
SEQ Roads based of State Digital Road Network (DERM, 2007)

Methodology

For the benchmark, SLATS foliage projective cover (FPC) of >33 % was selected. Major roads were buffered and erased to remove road shadow anomalies from the dataset and to verify fragmentation. Remaining vegetation tracts were split by quantile, to set size class (ha).

Due to the yearly variability in FPC, comparison over time to detect change is not recommended. Instead, the FPC tracts were used as an indication of potential total extent of tracts. This provides a snapshot of non-remnant woody vegetation tracts for the set years.

Remnant tracts were chosen due to greater data confidence towards comparing between benchmark and update years. Regional Ecosystem data for 2001 and 2009 were selected and manipulated to generate remnant tracts through a dissolve function (which groups neighbouring vegetation communities). Major roads were also buffered and erased to verify fragmentation. Remaining remnants were then summarised by area.

A fragmentation index (analysis of change in tract size, number of fragments, fragment size ratio, area lost, percent of total area lost, and surface area to volume ratio) was developed to compare tract characteristics over time. This approach has allowed further understanding of how this target is tracking.

Results

Map 27 shows tract size classes across the region.

Core Tracts in dark green (>5,000ha) are further reviewed in Table 20.

Table 20 identifies changes that have occurred in the larger tract class since the benchmark year.

During the reporting period, there has a been a steady decrease in overall size within the Core Tracts. There were 4 Core Tracts that lost more than 500 ha of vegetation from total area, and three significantly impacted. With the loss of vegetation to the North Stradbroke and Greenbank Tracts, this resulted in a downgrade of tract class. A nil change in tract size was observed across 4 tracts including Mt Barney (-1.0 ha change), Main Range (South), Yabba, and Deer Reserve State Forest.

The Fragmentation Index (Map 28) identifies tracts of remnant vegetation which have experienced significant change in extent or significant fragmentation since the benchmark year.

Table 20: Summary of remnant tract size class changes 2001-2009 (Planning region extent)

Name (locality)	**Area (ha) 2001**	**Area (ha) 2009**	**Fragmentation* (ha) 2001-2009**
Conondale/ Bellthorpe/ Kenilworth/ Imbil	58,956	58,814	-141
Main Range (North)	47,835	47,796	-40
Elgin/ Yabba/ Squirrel Creek/ Jimna/ Conondale	43,196	43,089	-107
Mt Mee/ D'Aguilar (North)	41,568	41,504	-64
Lockyer National Park	34,473	34,013	-460
D'Aguilar (South)/ Mt Glorious/ Enoggera	31,008	30,961	-47
Lamington	28,874	28,861	-13
Great Sandy National Park	21,067	21,040	-27
North Stradbroke	20,318	19,535	-783
Mount Barney	20,145	20,144	-1
Moreton Island	17,295	17,252	-44
Mapleton	15,096	15,037	-59
Spring Mountain/ Mt Perry (FKC)	14,501	13,950	-551
Deongwar State Forest	12,320	11,183	-1,138
Springbrook	9,339	9,320	-19
Main Range (South)	9,072	9,072	0
Bribie Island	8,752	8,730	-22
Yabba	8,659	8,659	0
Bromelton/ Kooralbyn (FKC)	7,216	7,178	-37
Deer Reserve State Forest	7,036	7,036	0
Greenbank (FKC)	6,003	4,885	-1,119
TOTAL	462,728	458,059	

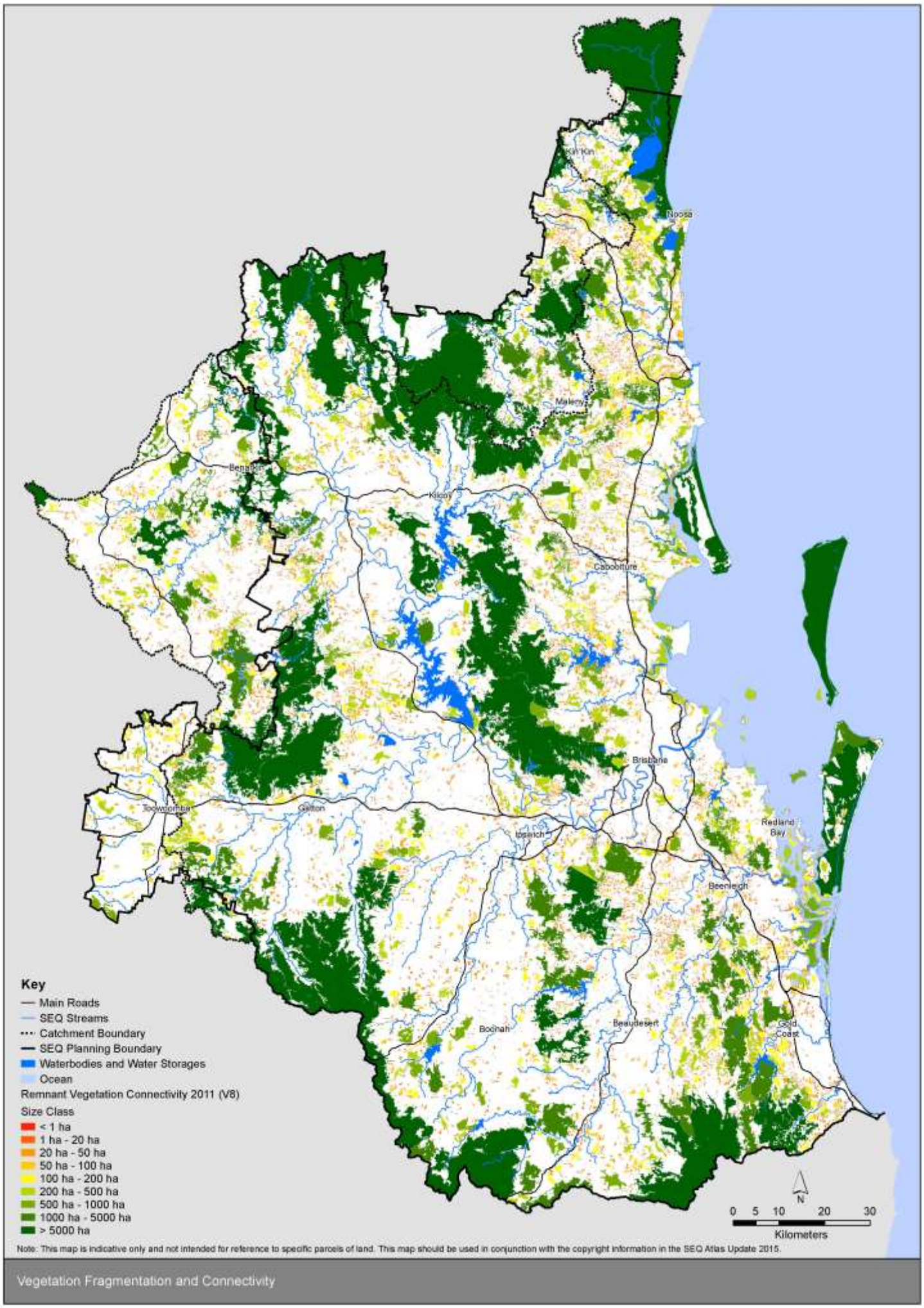
*Fragmentation indicates loss of vegetation from core tracts, by clearing or by splitting portions of core tracts into a smaller, disconnected tracts

Data Limitation

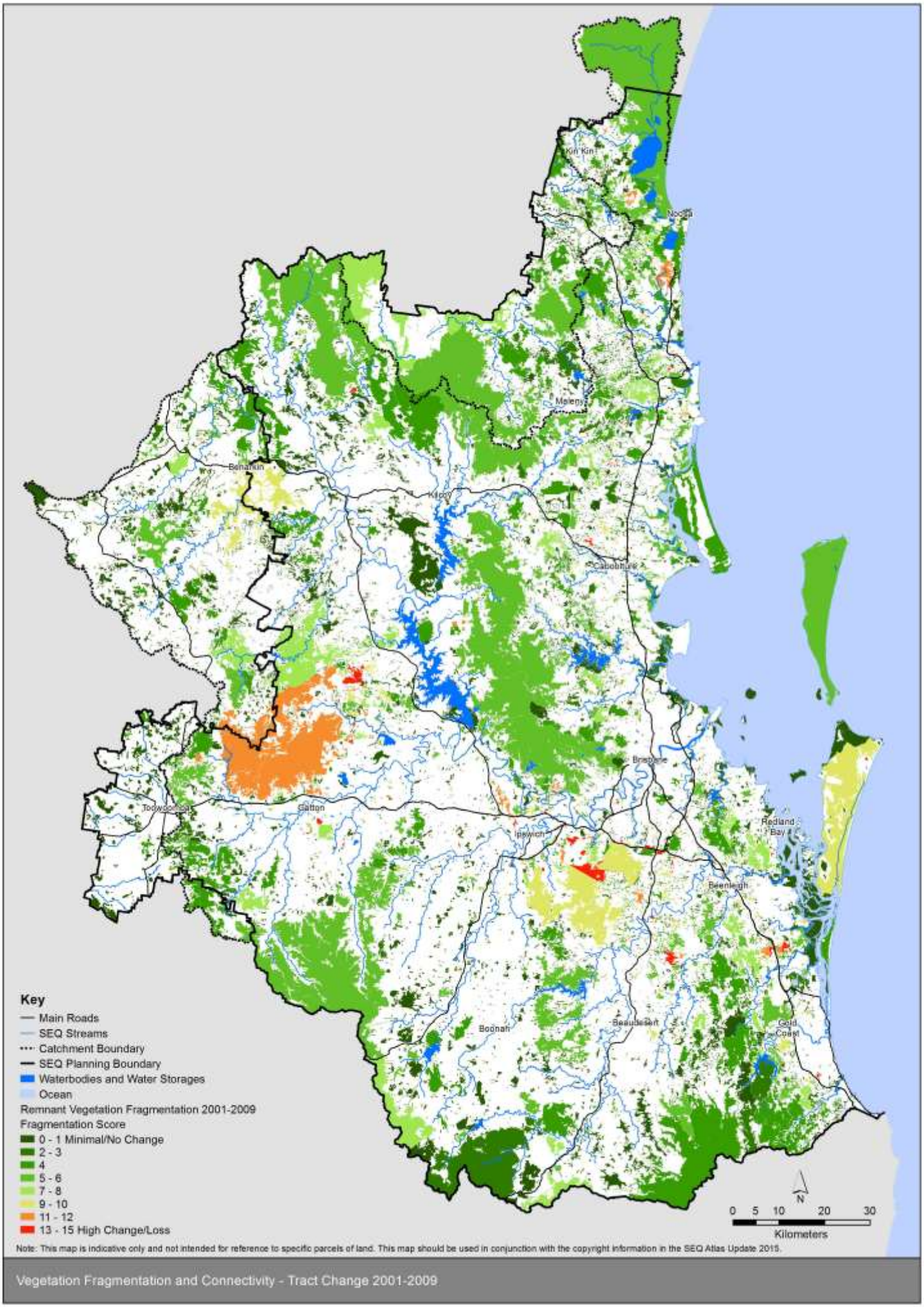
The SLATS woody vegetation data was not used for tract size changes across multiple years due to variability between imagery and remote sensing techniques applied. The woody vegetation data provides a thorough snapshot of tracts and options for reconnecting tracts.

Remnant tracts won't increase in size under the present program of mapping as no new areas are added to the Regional Ecosystems data. (limited areas maybe added as regrowth)

This is an interim product which can identify tract losses over time.



Map 27: Remnant Tracts – Fragmentation and Connectivity



Map 28: Fragmentation index/Remnant Tract size change 2001-2009

NC3 – Wetlands

By 2031, the 2008 extent and condition of SEQ wetlands will be maintained or increased

Rationale

Wetlands assist in the maintenance of water quality and provide habitat and food for fish, birds and animals. Wetlands are a critical part of our natural environment and provide an important range of environmental, social and economic services.

Datasets

Benchmark: Wetland Areas v.3, 2001 extent (DEHP and DSITIA, 2012)
Update: Wetland Areas v.3, 2009 Extent (DEHP and DSITIA, 2012)

Methodology

Datasets adopted in full.

Wetland extent for SEQ was calculated based on 'Wetland Class' field and the presence of Estuarine, Palustrine, Riverine and Lacustrine Wetlands for 2001 and 2009. The wetland class field was used summarise extent as it allows comparison of change in natural and modified systems. Statistics were calculated with and without the inclusion of water bodies to identify loss of wetland vegetation.

Results

Map 28: Natural Wetlands Extent shows all natural, unmodified wetlands (including water bodies).

Table 21: Change in natural wetlands identifies extent of natural, unmodified wetland vegetation between 2001 and 2009.

Table 22: Summary of all wetland types in 2009.

Table 23: Overall change in wetland type.

The SEQ Region has seen a loss in natural wetland vegetation equating to 1,019 ha across the different classes. Palustrine wetlands (billabongs, swamps, bogs, springs, soaks) have experienced the greatest loss with 759 ha. A loss of 216 ha to Riverine wetlands (riparian and fringing waterway vegetation) was also observed.

SEQ features to note (Table 22):

- Large area of Palustrine Wetlands 44,893 ha
- Large area of Riverine Wetlands 42,332 ha
- Large area of Estuarine Wetlands 211,625 ha
- 3,727 ha of modified wetlands with a levee bank
- 23,101 ha of modified wetlands with a dam/weir
- 3,792 ha of artificial wetlands

Loss of Natural wetlands includes conversion to Modified wetlands, which may retain some habitat values.

Table 21: Change in Natural Wetlands (Regional Ecosystem based) Extent 2001-2009

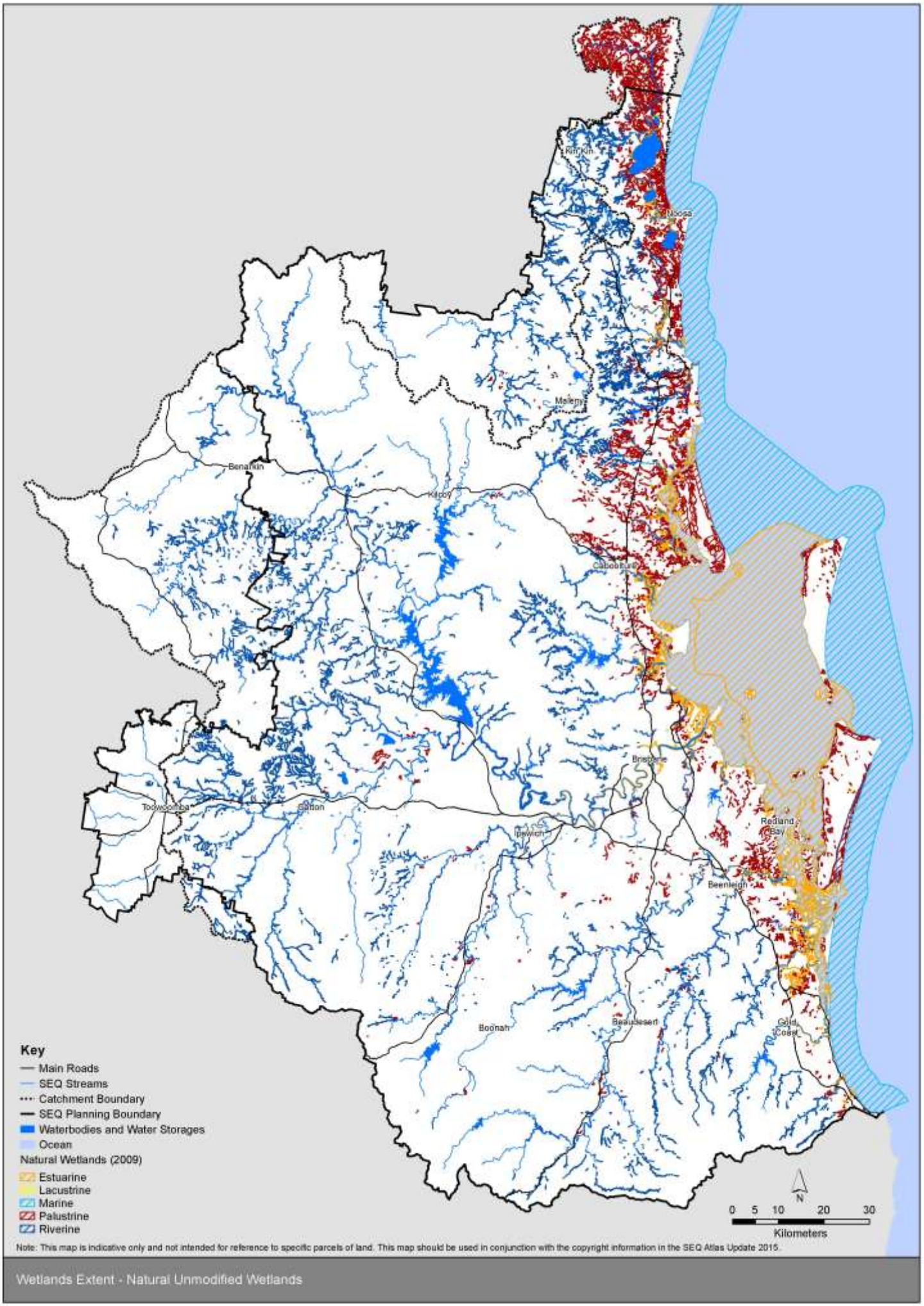
Wetlands 2001	Area 2001 (ha)	Area 2009 (ha)	Loss (ha)	Loss (%)
Estuarine	23,615	23,572	-43	-0.2%
Palustrine	42,856	42,097	-759	-1.8%
Riverine	40,736	40,520	-216	-0.5%
Lacustrine	2	2	0	0.0%
Other	86	86	**0**	**-0.5%**
Regional Total	**107,296**	**106,277**	**- 1,019**	**-1.0%**

Table 22: Wetland Extent 2009

	Wetland Type					
Wetland Class	Palustrine	Lacustrine	Riverine	Estuarine (incl. Moreton Bay)	Other	Total
No modifications observed	44,893	318	42,332	211,625	14,671	313,839
Modified - levee bank	2,665	1,049		7	6	3,727
Modified - canals or irrigation channels		8				8
Modified - changed from estuarine to fresh		33		6		39
Modified - converted to controlled storage		862				862
Modified - dams or weirs		23,101				23,101
Modified - gross mechanical disturbance	20					20
Artificial wetlands - levees on floodplain		881				881
Artificial wetlands - dams, ringtanks		3,792				3,792
Artificial wetlands - channel, canal		1,140		1,553		2,693
Total	**47,578**	**31,185**	**42,332**	**213,190**	**14,677**	**348,962**

Table 23: Overall Change in Wetland Extent 2001-2009 (Regional Ecosystem and Water Bodies)

	Wetland Type					
Wetland Class	Palustrine	Lacustrine	Riverine	Estuarine	Other	Total
No modifications observed	-793	-0	-216	-277	-111	-1,397
Modified - levee bank	84	16	-	0	-	100
Modified - converted to controlled storage	-	348	-	-	-	348
Modified - dams or weirs	-	20	-	-	-	20
Artificial wetlands - levees on floodplain	-	2	-	-	-	2
Artificial wetlands - dams, ringtanks	-	620	-	-	-	620
Artificial wetlands - channel, canal	-	29	-	165	-	194
Regional Total	-709	1,035	-216	-112	-111	-113



Map 29: Natural Wetlands Extent

NC4 – Vulnerable Ecosystems

By 2031, at least 4% of the original pre-clearing extents of vulnerable regional ecosystems will be represented in protective measures

Rationale

To conserve and manage the region's biodiversity values and maintain supporting ecological processes requires a regional system of viable samples of regional ecosystems (REs). This should include a degree of replication to ensure that REs are not further threatened by catastrophic events such as major bushfires and to reduce the long term impacts of climate change. The desired extent of regional ecosystems in protected areas is between 4% and 10% of their original extent with the target of 4% by 2031 suggested by the SEQ NRM Plan Expert Panels as more achievable in SEQ.

Datasets

Benchmark: Regional Ecosystem Distribution Database (REDD)(DERM, 2007)
Remnant Vegetation extract of Regional Ecosystems v.7, 2001 extent (DERM, 2012)
Protected Areas of Queensland (DERM, 2007)
Nature Refuges (DEHP, 2007)

Update: Remnant Vegetation extract of Regional Ecosystems v.7, 2009 extent (DERM, 2012)
Remnant Vegetation extract of Regional Ecosystems v.8, 2011 extent (DERM, 2012)
Protected Areas of Queensland v.6.13 (DNPRSR, 2014)
Nature Refuges (DEHP, 2013)

Methodology

Summarised Pre-clearing and remaining Regional Ecosystem extents for SEQ Bio-provinces (sub-regions) and SEQ region. This included dominant and sub-dominant Regional Ecosystems.

Summarised Regional Ecosystems found within the Protected Areas Estate. Split by Estate type into 2 groups:

- National Park and Conservation Park (higher levels of protection)
- Forest Reserve, State Forest, Timber Reserve, Resource Reserve

Summarised Regional Ecosystems found with Nature Refuges.

Final summary of Regional Ecosystem and the percent protected from Pre-clearing extent.

Queried REDD for Vegetation Management Act Status (clearing status) and Biodiversity Status for each Regional Ecosystem.

Results

Map 29 identifies ecosystems and ecosystem communities containing Endangered, Of Concern and Poorly Conserved ecosystems.

Table 24 identifies the number of ecosystems listed under each status type, and progress towards the target through inclusion of poorly conserved ecosystems in protective mechanisms.

Table 25 identifies losses of Endangered and Of concern ecosystems between 2001 and 2009.

Overall, 35 out of 183 Regional Ecosystems are considered Poorly Conserved with 4% protection. A total of 13,181 ha is needed across the Poorly Conserved Regional Ecosystems to meet the target.

Since the benchmark atlas, 4 Regional Ecosystems have met 4% protection criteria, a further 8 Regional Ecosystems have had large gains towards meeting criteria, and 27 have had little or no change to protective mechanisms.

In terms of Vulnerable Ecosystem, 17 % of the SEQ Regional Ecosystems are Endangered, 32% Of Concern and 51 % Least Concern from clearing (Vegetation Management Act Status).

During the period 2009-2001, a total of 10,477 ha was further cleared with 28 % from Endangered and Of Concern Regional Ecosystems.

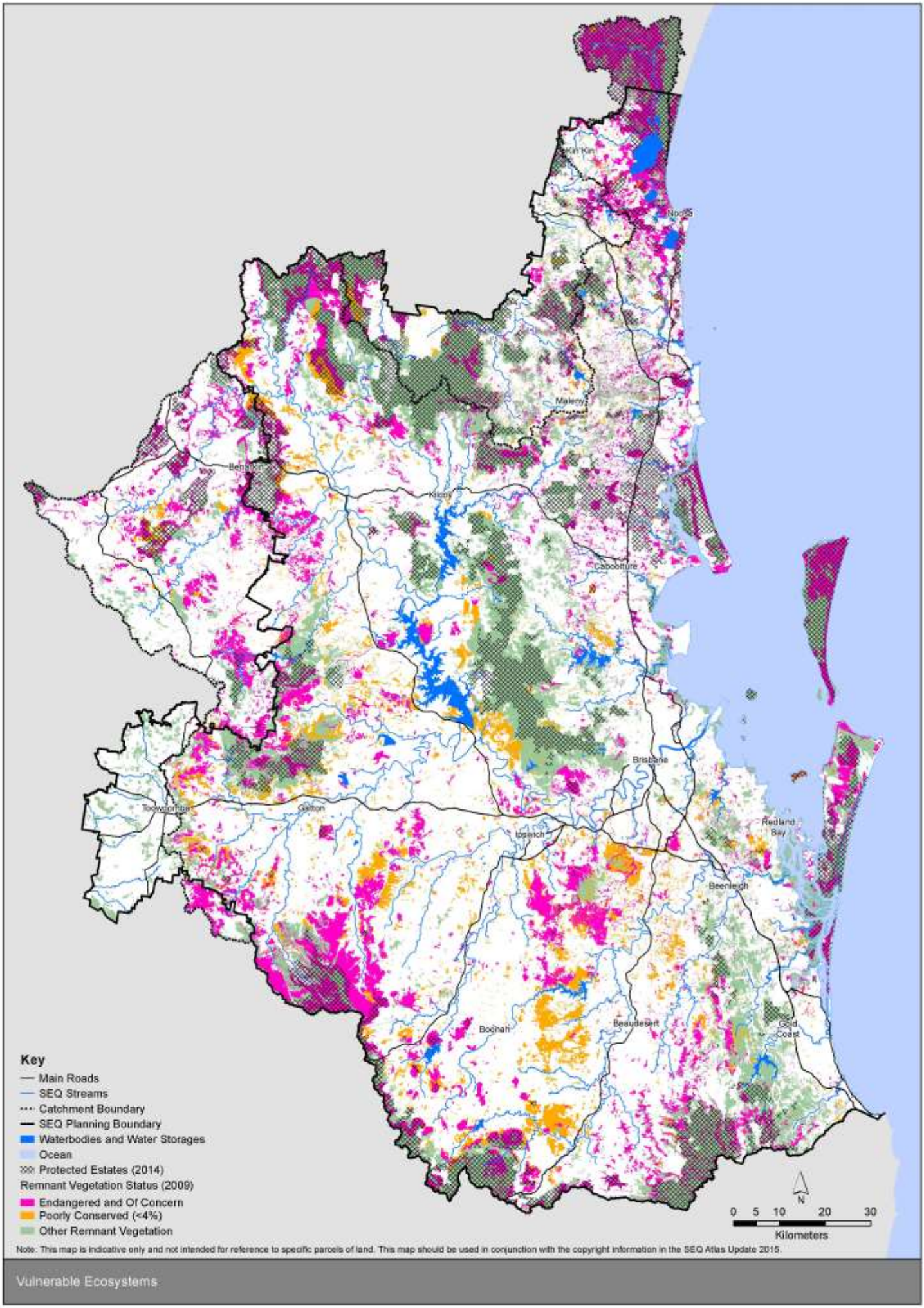
Table 24: Vulnerable Ecosystems Classification and Area 2011 (current)

	Status	Number of REs	Area (ha)
Poorly Conserved	Current (poorly conserved)	39	
	Achieved and Additions (since 2001)	4	2,091
Biodiversity Status	Endangered	37	42,328
	Of concern	70	186,557
	No concern at present	83	575,151
	Total	**190**	**804,037**
VMA Status	Endangered	32	36,061
	Of concern	61	141,133
	Least concern	97	626,842
	Total	**190**	**804,037**

Table 25: Vulnerable Ecosystems Extent Change 2001-2009 (previously)

	Status	Area (ha) 2001	Area (ha) 2009	Area loss 2001-2009
Biodiversity Status	Endangered	44,866	43,446	-1,420
	Of concern	191,668	189,516	-2,152
	No concern at present	587,337	580,431	-6,906
	-	3	3	0
	Total	**823,873**	**813,396**	**-10,477**
VMA Class	Endangered	38,564	37,170	-1,394
	Of concern	145,338	143,829	-1,509
	Least concern	639,969	632,394	-7,574
	-	3	3	0
	Total	**823,873**	**813,396**	**-10,477**

Old Hiddenvale Nature Refuge, Mt Mort



Map 30: Vulnerable and Poorly Conserved Ecosystems

NC5 – Threatened Species

By 2031, the 2008 conservation status of native species will be maintained or improved

Rationale

100% chosen as an in principle commitment to nature conservation.

Datasets

Benchmark: SEQ Biodiversity Planning Assessment V3.5 (DERM).
Update: Back on Track Species Prioritisation Framework (DEHP, 2012)

Methodology

Extracted species information from both sources and compared Conservation Status.

Results

Figure 11 identifies the current conservation status of all listed species in the SEQ Region (excluding Toowoomba Footprint).

Due to the legislative changes (including a change in the species status categories) and the variability in dataset range (extent), it was difficult to compare the data and identify changes.

Table 26 contains only the verifiable changes in status of species.

Overall, 4 species had an improvement in conservation status. These species were:

- Spotted-tailed quoll (southern subspecies)
- Oxleyan pygmy perch
- Hastings River mouse, and
- Three-toed snake-tooth skink.

A total of 22 species further declined in conservation status.

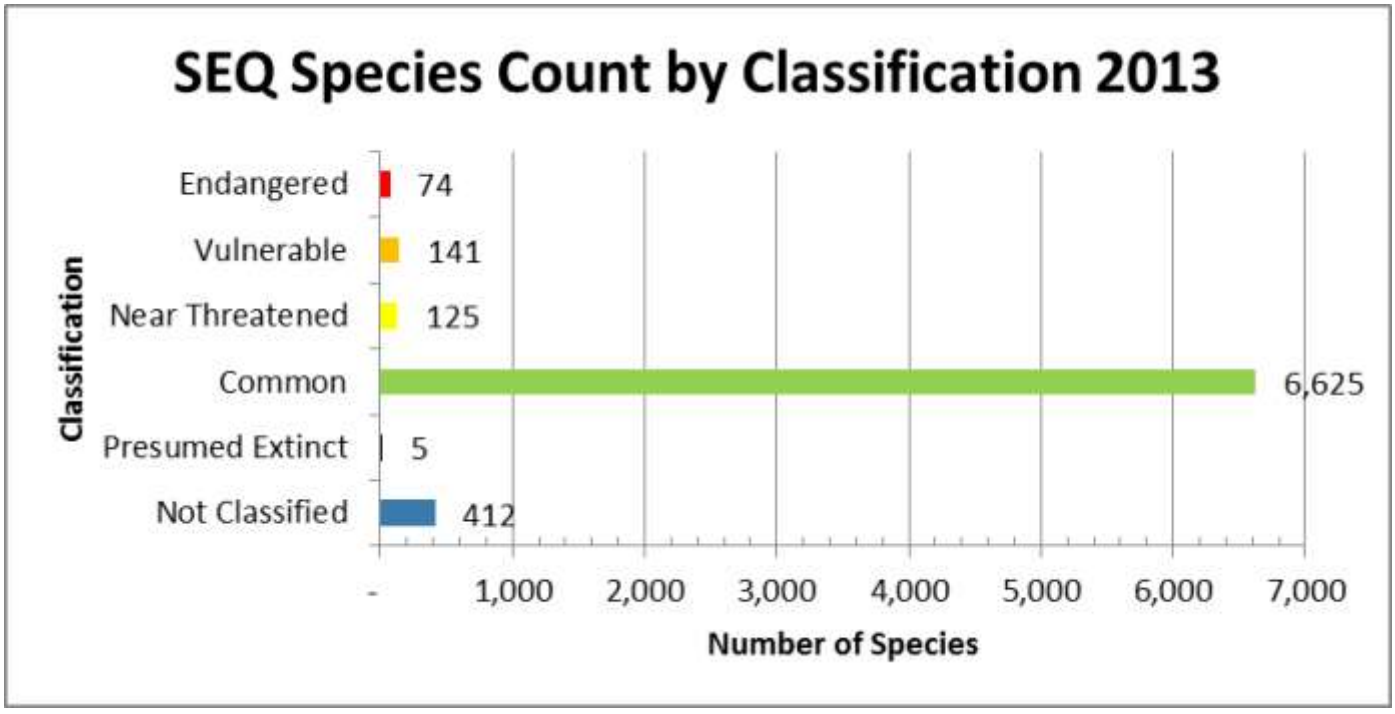


Figure 11: Conservation Status of Species

Table 26: Status Changes for Threatened Species

Scientific Name	Common Name	2009	2013	Change
Dasyurus maculatus maculatus	spotted-tailed quoll (southern subspecies)	Endangered	Vulnerable	Improvement
Nannoperca oxleyana	Oxleyan pygmy perch	Endangered	Vulnerable	Improvement
Pseudomys oralis	Hastings River mouse	Endangered	Vulnerable	Improvement
Coeranoscincus reticulatus	three-toed snake-tooth skink	Vulnerable	Near Threatened	Improvement
Blandfordia grandiflora	christmas bells	Rare	Endangered	Decline
Lenwebbia sp. (Blackall Range)		Rare	Endangered	Decline
Melaleuca irbyana		Rare	Endangered	Decline
Parsonsia largiflorens		Rare	Endangered	Decline
Westringia grandifolia		Rare	Endangered	Decline
Allocasuarina filidens	Mt. Beerwah she-oak	Rare	Vulnerable	Decline
Cassia marksiana		Rare	Vulnerable	Decline
Corynocarpus rupestris subsp. arborescens	southern corynocarpus	Rare	Vulnerable	Decline
Eucalyptus dunnii	Dunn's white gum	Rare	Vulnerable	Decline
Grantiella picta	painted honeyeater	Rare	Vulnerable	Decline
Helicia ferruginea	rusty oak	Rare	Vulnerable	Decline
Lastreopsis silvestris		Rare	Vulnerable	Decline
Leionema gracile		Rare	Vulnerable	Decline
Lepiderema pulchella	fine-leaved tuckeroo	Rare	Vulnerable	Decline
Leptospermum luehmannii		Rare	Vulnerable	Decline
Leptospermum oreophilum		Rare	Vulnerable	Decline
Parsonsia tenuis	slender silkpod	Rare	Vulnerable	Decline
Picris conyzoides		Rare	Vulnerable	Decline
Podolepis monticola	mountain podolepis	Rare	Vulnerable	Decline
Pultenaea whiteana	Mt. Barney bush pea	Rare	Vulnerable	Decline
Tetramolopium vagans		Rare	Vulnerable	Decline
Uromyrtus lamingtonensis		Rare	Vulnerable	Decline

Data Limitation

Data used for update covers a different geographic area with status change difficult to quantify.

Glossy Black-Cockatoo, habitat mapping being prepared for this species

NC6 – Habitat for Priority, Endangered, Vulnerable and Near Threatened Species

By 2031, the 2001 extent and condition of habitat for priority taxa will be maintained or increased

Rationale

Priority Taxa are flora and fauna including:

- Endangered, Vulnerable or Rare (EVR) species,
- Iconic common species,
- Species in danger of being listed as EVR under State or Commonwealth legislation, or
- Species identified in DERM's "Back on Track" species prioritisation process as priorities for conservation action within the SEQ Region.

Core habitat is the areas that provide food and shelter for these plants and animals.

Datasets

Benchmark: SEQ Biodiversity Planning Assessment (BPA) Version 3.4 (DERM)
Brigalow Belt BPA V1.3 (DERM)
Update: SEQ Biodiversity Planning Assessment (BPA) Version 3.5 (DERM)
Brigalow Belt BPA V1.3 (DERM)

Methodology

1. From the BPA v3.4 for the Regional Plan area in SEQ Region
   Selected EVR Criteria A – State and Regional Significance
   Selected Habitat for Priority Taxa Criteria H (H Rating)
2. From the BPA v1.3 for the Regional Plan area in the Brigalow Belt
   Selected EVR Criteria A - Very High, High, Medium Significance
   Selected Habitat for Priority Taxa Criteria H (H Rating)
3. From the BPA v3.5 for the Regional Plan area in SEQ Region
   Selected EVR Criteria A - Very High and High Significance
   Selected Habitat for Priority Taxa Criteria H (H Rating)

The Benchmark is a combination of BPA v3.4 and v1.3.

The update is a combination of BPA v3.5 and v1.3.

Results

Tables 27-28 indicate the extent of different habitat types in the benchmark and update years.

Table 29 identifies change in extent in each category.

Data Limitation

Change in categorisation of Priority Taxa Habitat may be responsible for significant drop in habitat area (as opposed to loss of actual RE area).

Note that change may represent a change in essential habitat mapping methodology as well as loss of vegetation.

No available dataset to assess condition of species remaining habitat.

Table 27: Benchmark year Habitat categories and extent

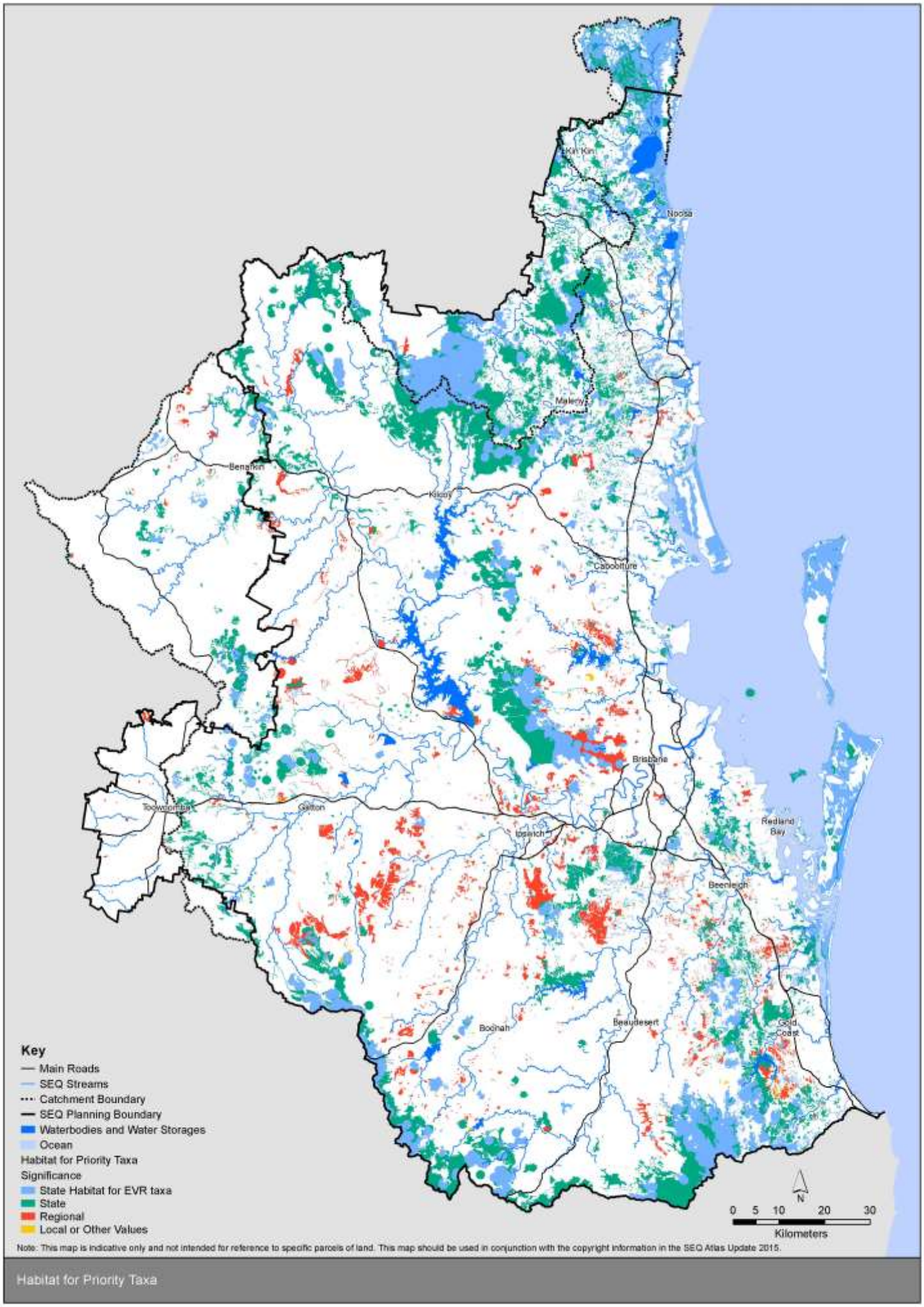
Habitat area (ha)	EVR Taxa					
Priority Taxa	Very High	High	Medium	Low	Other	Total
State	28,854	6,451	79,065	12,925	801	128,095
Regional	55,274	18,120	285,975	143,615	416	503,400
Medium			249	1		250
Local		53				53
Non Habitat	49,661	6,487				56,148
Not Assessed	390	159				549
(blank)		172				172
Grand Total	134,178	31,441	365,289	156,541	1,217	688,666

Table 28: Update year Habitat categories and extent

Habitat area (ha)	EVR Taxa					
Priority Taxa	Very High	High	Medium	Low	Other	Total
Very High	74,752	19,945	80,688	4,422	23	179,830
High	15,212	8,009	7,854	714	8	31,797
Medium	15,385	11,729	15,453	1,420		43,987
Other	97,500	140,678				238,178
Grand Total	202,850	180,361	103,995	6,556	32	493,793

Table 29: Change in Habitat extent over time

	EVR Taxa					
	Very High	High	Medium	Low	Other	Total
Total	68,671	148,919	-261,294	-149,985	-1,186	-194,874



Map 31: State, Regional and Local Habitat for Priority Taxa

RLA1 – Landscape Heritage

By 2031, at least 90% of the 2011 area of regionally important landscape heritage will be retained within each local government area

Rationale

Landscapes are important in preserving environmental, sociocultural and historic connections, including landscapes with cultural significance.

Datasets

Benchmark: Protected Areas of Queensland (DERM, 2007)
World Heritage Areas (DERM, 2005)
Ramsar (DERM, 2006)
Marine Park (DERM, 2008)
Heritage Places Register (DERM)
National Estate Register (AG DEWHA)

Update: Protected Areas of Queensland v.6.13 (DNPRSR, 2014)
World Heritage Areas (DERM, 2005)
Ramsar (DERM, 2012)
Marine Park (DERM, 2008)
Heritage Places Register (DERM, 2014)
National Estate Register (AG DEWHA)

Methodology

Combined and merged datasets to obtain a revised extent of protected and listed areas that contain landscape heritage.

Results

586,783 ha combined area in Benchmark (SEQ Planning region).

Small increase in area with new listings in Heritage Places Register.

Heritage Places Register (Natural Heritage)	**Area (ha)**
Original benchmark (- 2008)	3,921
Revised benchmark (existing property boundary changes)	3,884
Additional gazetted properties (2008-2014)	168
New extent	4,052
Change since benchmark	**+131**

Table 30: Landscape Heritage Area Change

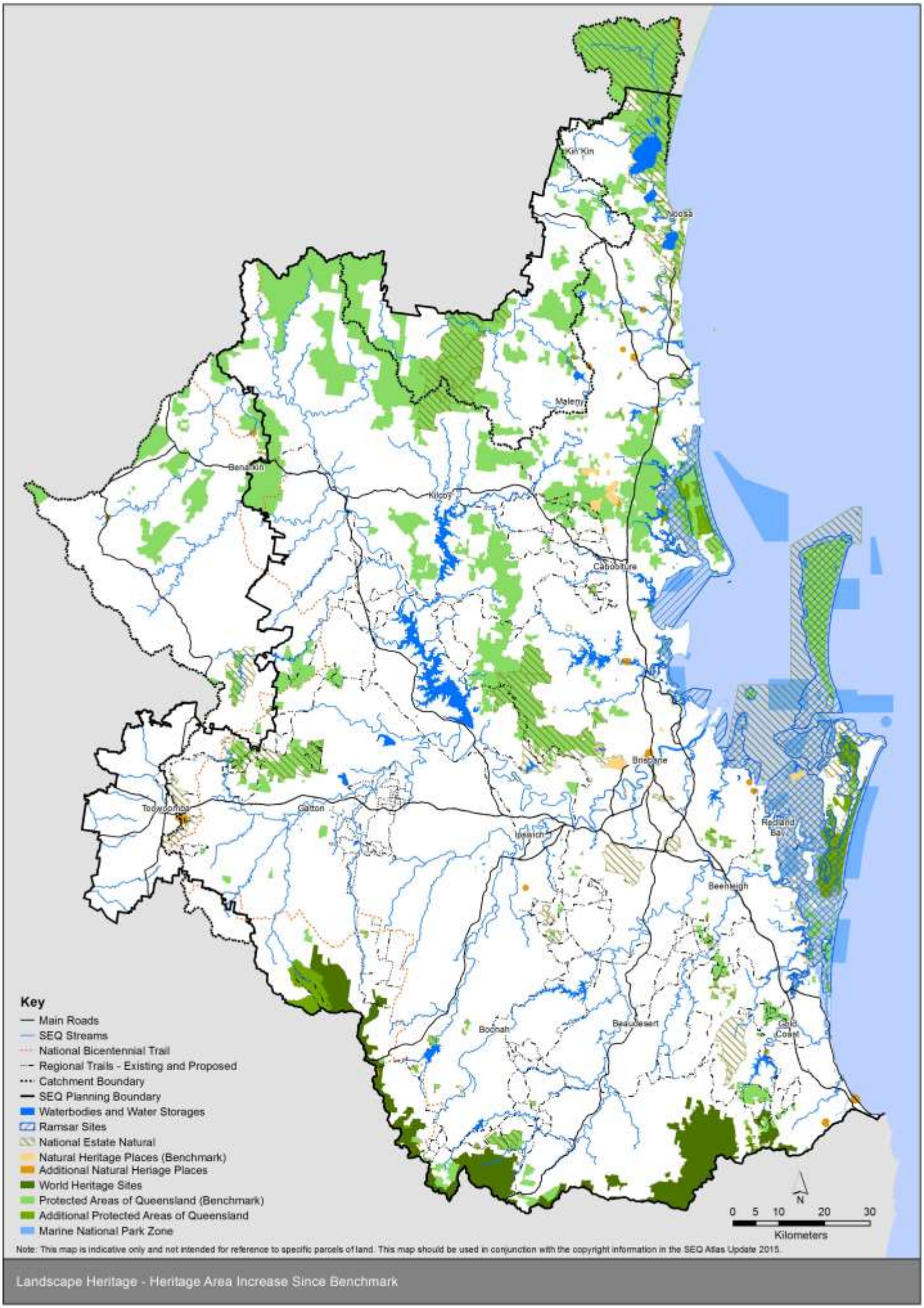
Data Limitation

Needs to be finalised.

Artillery bunker, Bribie Island

Top photo: Glasshouse Mountains

Bottom photo: Indigenous values on Moreton Island



Map 32: Existing and Recently Gazetted Landscape Heritage Areas

RLA2 – Outdoor Recreation Settings

By 2031, the 2011 extent of regional outdoor recreation settings will be maintained or increased

Rationale

A variety of recreational and landscape settings is one of the key attractions to South East Queensland, for both residents and visitors. As many popular recreational activities are traditionally conducted in natural or semi-natural landscape settings, it is important to protect and manage these areas.

Datasets

Benchmark: Land for Public Recreation (DSDIP, 2011)
Protected Areas of Queensland (DERM, 2011)
Landscape Settings (DLGP and SEQC, 2013)
Update: Protected Areas of Queensland v.6.13 (DNPRSR, 2014)

Methodology

The recreation settings dataset is based on the Recreation Opportunity Spectrum (ROS) that was devised for the United States Forest Service (Clarke and Stankey, 1979) to provide natural resource management agencies with a means of managing their outdoor recreation resources.

The range of recreation settings or opportunities is described on a spectrum from developed-urban-modern-industrial to undeveloped-natural-wild-remote. The Greenspace Strategy (Qld Government) adapted the biophysical attributes criteria approach to divide the SEQ region into 5 broad types of settings (Table 30).

Input data included Land Cover, Remnant Vegetation and Woody Vegetation.

Setting 1 is comprised of the areas identified as being least developed (or “most natural”).

Setting 5 is comprised of areas that are most developed (or “least natural”).

This settings scheme can be used to measure the distribution and representativeness of particular settings across the region and within catchment / local government jurisdictions.

Results

Map 31: Recreation settings shows the spread of setting types across SEQ.

Map 32: Protected Recreation Settings identifies State, Local Government and other reserves and corresponding recreation setting.

Table 31 identifies landscape features associated with each of the recreation setting categories.

Table 32 identifies the total area of each landscape setting in SEQ.

Table 33 identifies the proportion of each setting which is public and privately owned.

The region has benefited from the larger ‘Predominantly Natural’ areas being acquired for greater protection (Settings 1 and 2). Limited focus given to date towards categories 3, 4 and 5 which sometimes offer the best option for multiple recreation uses and nature based activities.

A greater mix of land being protected or privately available is required across all recreation settings to allow for different types of activities and experiences.

Data Limitation

Landscape settings has not been updated with 2012 Land Cover data now available.

Table 31: Recreation Setting Categories

Category	Setting
Remnant Vegetation >5,000ha with no roads	1
Remnant Vegetation >5,000ha with roads	2
Remnant Vegetation 1,000ha - 5000ha	2
Remnant Vegetation 200ha - 1000ha	3
Remnant Vegetation 20ha - 200ha	4
Remnant Vegetation <=20ha	5
Non Remnant Vegetation >5,000ha	2
Non Remnant Vegetation 200ha -5,000ha	3
Non Remnant Vegetation 50ha - 200ha	4
Non Remnant Vegetation <=50ha	5
High Energy Beach 500ha - >5,000ha	2
High Energy Beach 100ha - 500ha	3
High Energy Beach <100ha	4
Sand / Mud Bank >100 ha	2
Sand / Mud Bank >20ha - <100ha	3
Sand / Mud Bank <=20ha	4
Tree Plantation	3
Cropland	4
Grass > 200ha	3
Grass >20ha - <200ha	4
Grass <=20ha	5
Bare - Built-up	5
Bare - Non-built-up	5

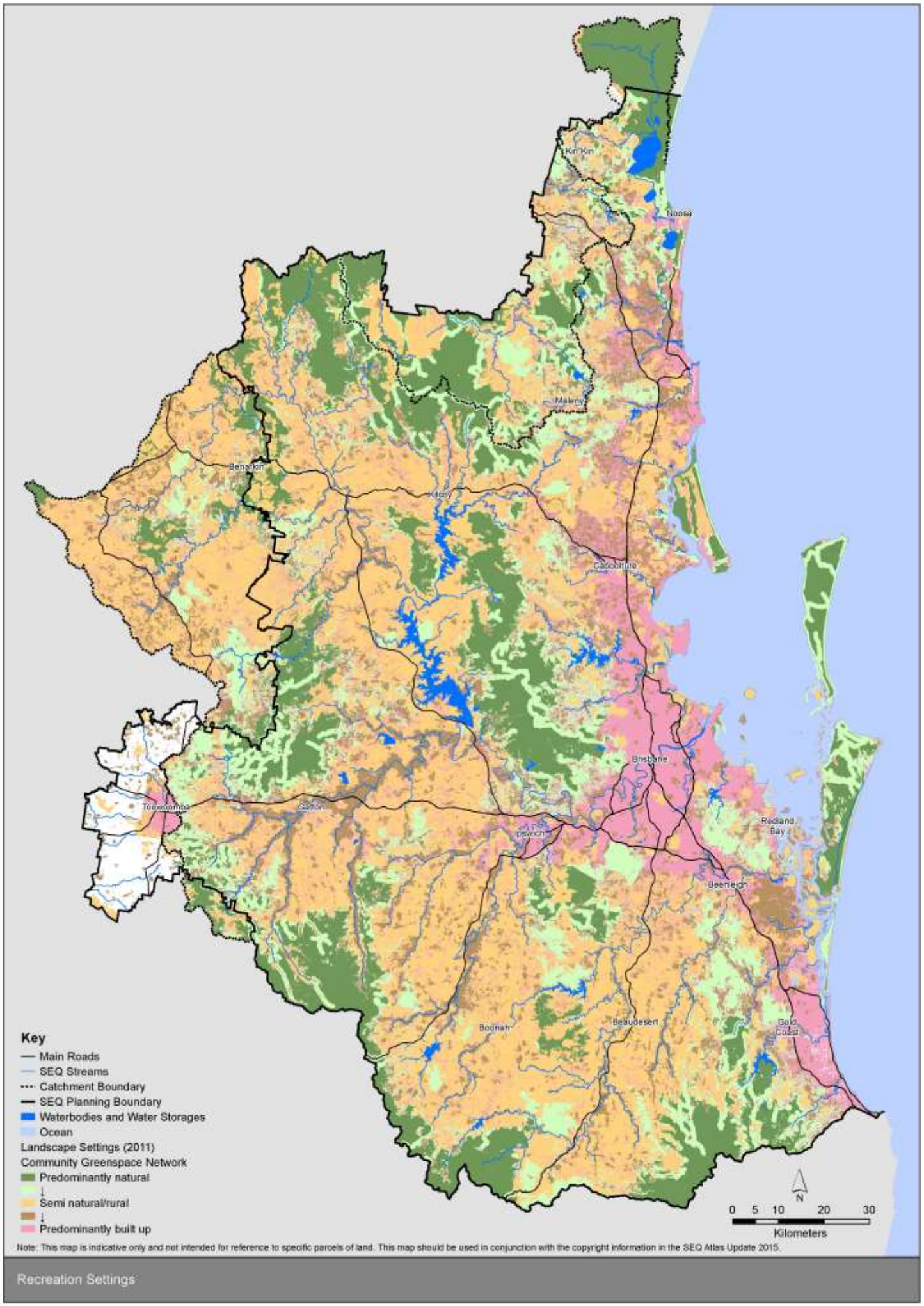
Table 32: Protected Landscape Settings

Landscape Setting	Area (ha)	Protected Area (ha)
1 – Predominantly Natural	377,937	231,264
2	405,228	102,858
3 – Semi Natural/Rural	789,656	95,192
4	275,659	20,767
5 – Predominantly Urban	390,917	30,073
Total	**2,239,396**	**480,154**

Table 33: Landscape Settings Percent of Region*

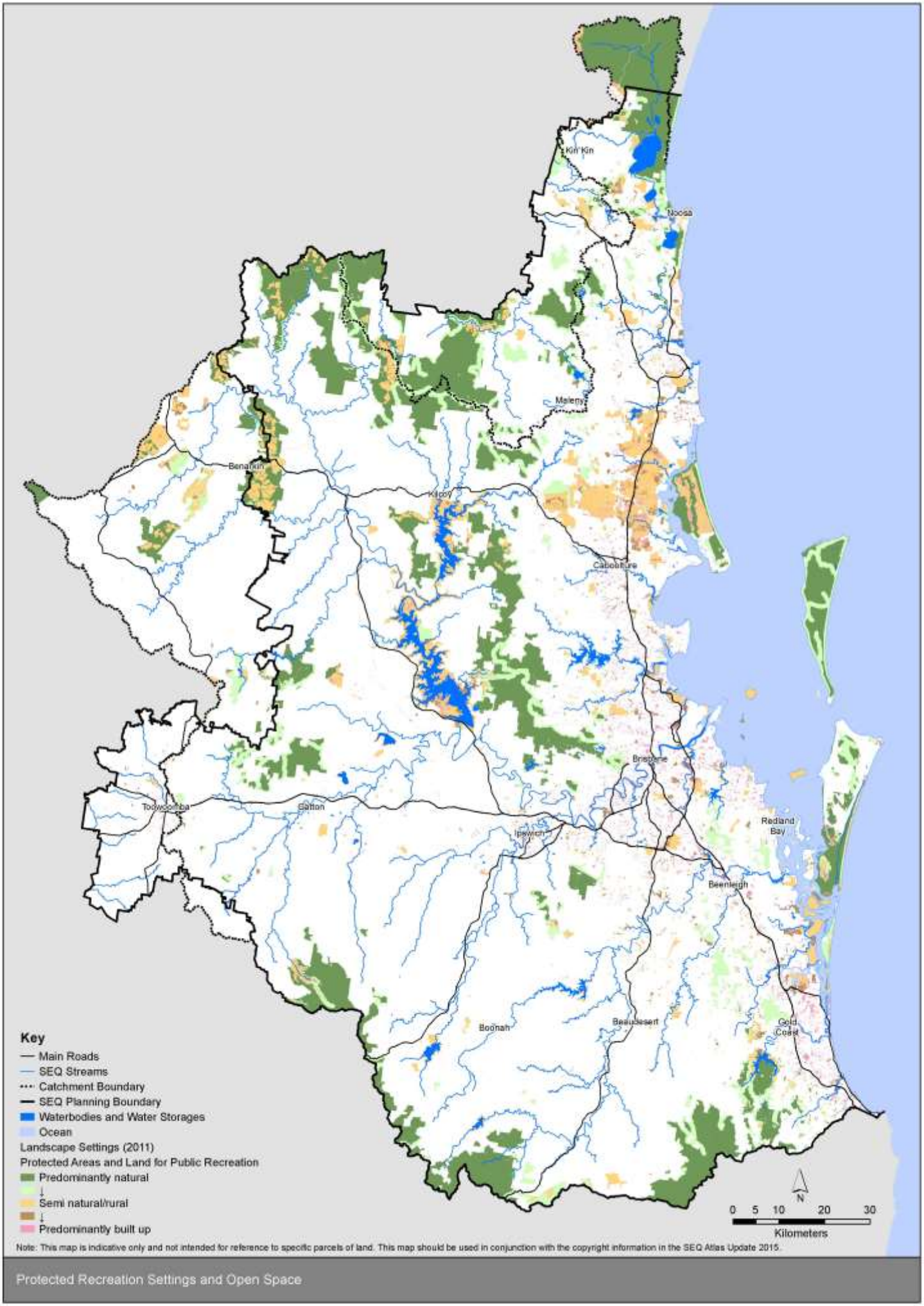
Class	Total Rec %	Unprotected/privately owned %	Protected %
1	16.4%	6.4%	10.1%
2	17.6%	13.2%	4.5%
3	34.4%	30.2%	4.1%
4	12.0%	11.1%	0.9%
5	17.0%	15.7%	1.3%
Total	**97.4%**	**76.5%**	**20.9%**

*2.6% not classified



Recreation Settings

Map 33: Recreation Settings



Map 34: Protected Recreation Settings and Open Space

RLA3 – Outdoor Recreation Demand

By 2031, 90% of the demand for outdoor recreation will be met through a mix of public land, waterways and the voluntary provision of opportunities on private land

Rationale

As the population of South East Queensland continues to grow , more pressure will be placed on existing natural and recreation areas. In some cases, this will result in degradation of the resource if not managed appropriately. It is therefore important to secure additional resources to meet the demands of the future SEQ population.

Our natural and recreational reserves need to expand with increasing population, so to maintain existing values and provide for memorable experiences.

Datasets

Benchmark: Land for Public Recreation (DSDIP, 2011)
Protected Areas of Queensland (DERM, 2011)
Landscape Settings (DLGP and SEQC, 2013)
Update: Urban Footprint (DIP, 2009)

Methodology

ABS data and urban footprint used to identify areas of demand for recreation. Need to consider both short and long distance demand for different recreational experiences. For example, city folk will utilise urban parks during the week and may visit more regional parks during the weekend.

Results

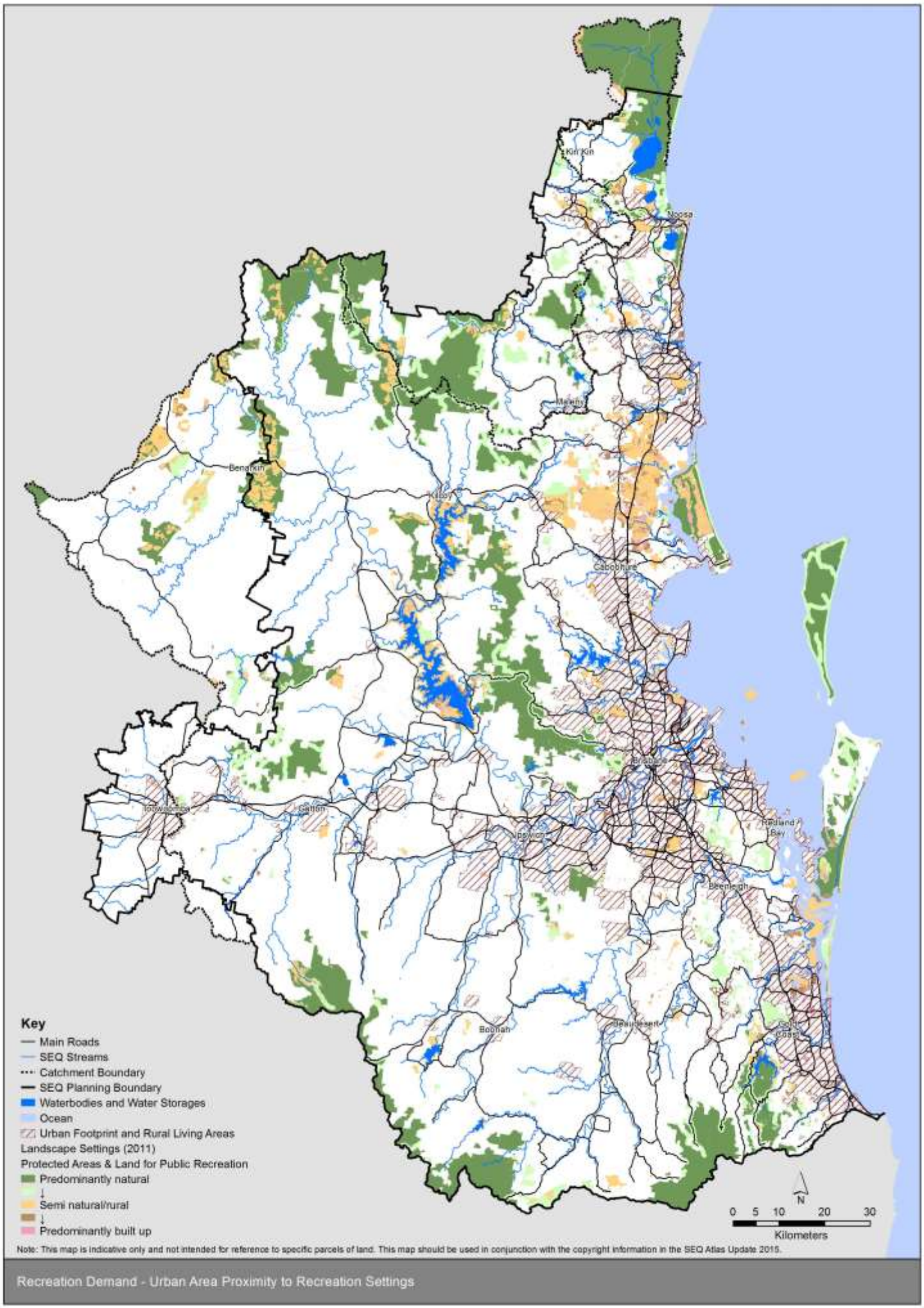
Map 33: Recreation Demand represents areas of high population density and their proximity to potential recreation areas.

Recreation opportunities can also be provided on private land, and properties adjacent to state land would be in a good position to offer recreation and nature based experiences.

Data Limitation

No one specific dataset for this target.

Camping at Andrew Drynan Park, Mt Chinghee



Map 35: Recreation Demand

RLA4 – Regionally High Scenic Amenity

By 2031, the area of regionally high scenic amenity will be maintained or improved from the 2004 baseline

RLA5 – Locally Important Scenic Amenity

By 2031, at least 80% of the 2004 area of locally important scenic amenity within each local government area will be retained

Rationale

Scenic amenity is the measure of a landscape's scenic qualities, reflecting on the psychological benefit that the community derives from viewing the region's wide variety of landscapes. Examples of outstanding scenic qualities include beaches, ranges and farmlands.

Datasets

Benchmark: Scenic Amenity Rating (SEQROC, 2004).
Update: Rapid Scenic Amenity Rating Update (SEQC, 2012)

Low Level of Protection (2014).

Methodology

The 2004 Scenic Amenity Dataset adopted in full.

Selected values 9-10 as Regionally High Scenic Amenity and values 6-8 as Locally Important Scenic Amenity.

Overlayed 2004 Scenic Amenity with Planning Threats (Low Level of Protection).

Developed interim 2012 Scenic Amenity Rating Map, using Land Cover as the key input. Scenic Amenity uses Land Cover as the base to weight what people like to see (Scenic Preference) and how visible (Visual Exposure) it is in different landscape settings. Land Cover refers to the land surface and cover type including grass, cropping, built environment, road and forest.

Results

Table 34 identifies a significant proportion of scenic amenity values which may be affected by future development including:

- 8% of Regionally High Scenic Amenity
- 12% of Locally Important Scenic Amenity

Map 36 identifies the locations of these changes.

Land Cover that rated highly by the community towards Scenic Amenity includes Sandy Beaches (9), Rivers Creek and Dams (8), Forest (7-8), Parkland (7), and Grasslands (6-8).

Scenic Amenity relates to the community preference for different settings based on their land cover, modified by their visibility. Highly desirable visible landscapes across SEQ include the Border Ranges, "Green behind the Gold" (Gold Coast Hinterland), North Stradbroke Island and Moreton Bay, Mt Coottha—D'Aguilar Range, Main Range, and the Blackall Range.

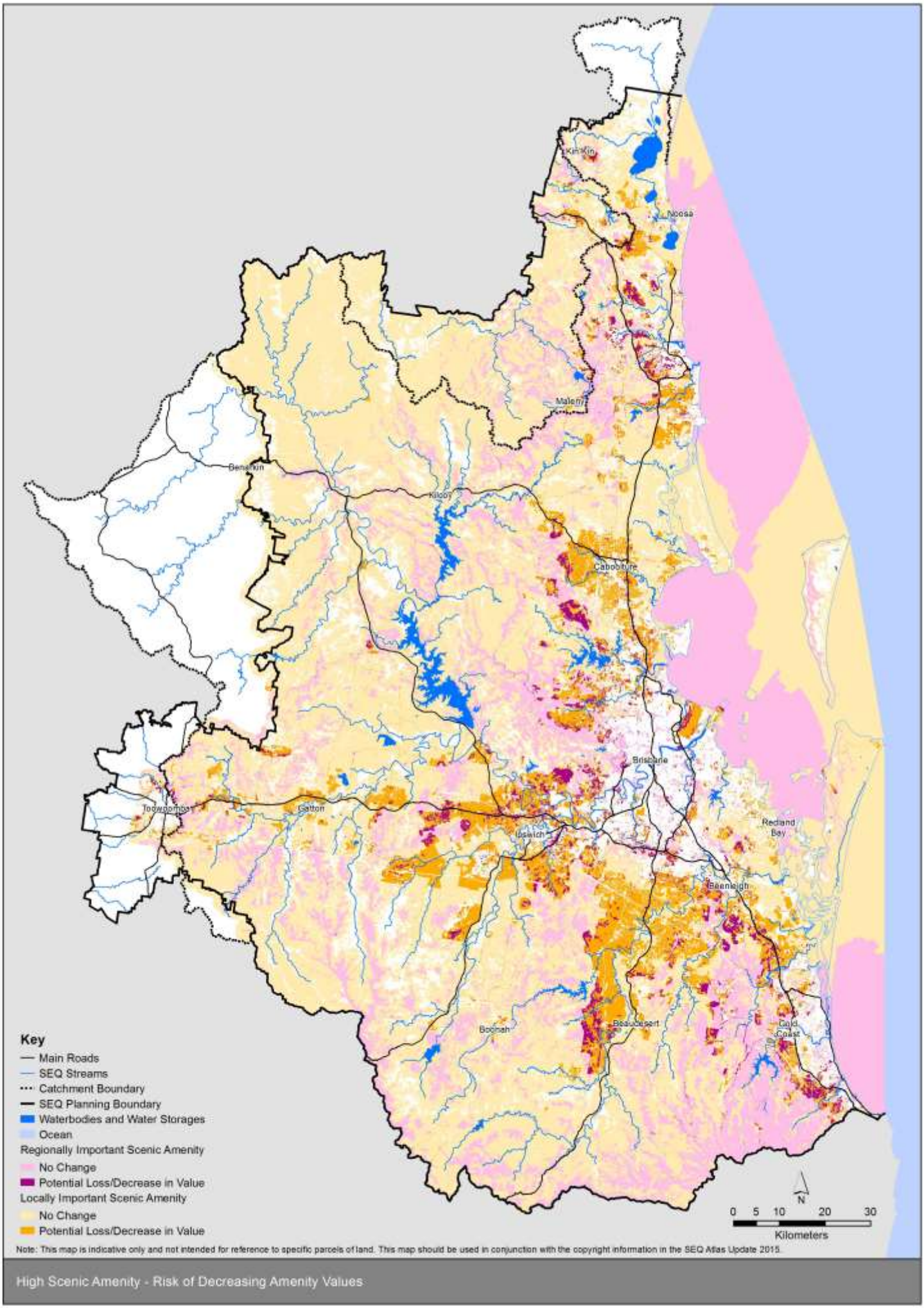
Data Limitation

Land Cover updates available to inform Scenic Amenity Rating. Further work required to update Visual Exposure Mapping.

Score	Area (ha)	Potentially affected	Possible remaining % 2031
Regional Scenic Amenity			
9	499,986	-38,299	92%
10	137,693	-13,381	90%
Total	**637,679**	**-51,680**	**92%**
Local Scenic Amenity			
6	428,997	-54,995	87%
7	674,940	-69,079	90%
8	503,082	-71,757	86%
Total	**1,607,018**	**-195,831**	**88%**

Table 34: Scenic Amenity Scores

Mount Coonowrin, Glass House Mountains



Map 36: Scenic Amenity Future Impacts

W1 – Environmental Flows

By 2031, environmental flows will meet aquatic ecosystem health and ecological process requirements

Rationale

Aquatic habitats can be altered by dams, water extraction, land modification and point source discharges which pollute and disrupt natural flow regimes. Ecosystem processes, the life cycles of aquatic species and the distribution and abundance of aquatic life may be affected where flows are disrupted.

Groundwater discharge from shallow aquifers to surface water systems represents and environmentally critical component of the flow in most rivers.

Datasets

Benchmark: Not set
Update:

Methodology

No agree method to monitor or rate environmental flows across SEQ waterways.

Results

Not currently available.

Data Limitation

No specific data on this target.

W2 – Groundwater Levels

By 2031, 75% of SEQ Groundwater Resource Units will have ground water levels within identified acceptable annual ranges

Rationale

The rate of groundwater recharge varies across SEQ. In some areas, the level of the water table determines whether there is water in the streams. A high rate of groundwater extraction for increasing irrigation and urban use, coupled with extreme weather patterns from drought to flood, is placing groundwater resources across the region under pressure.

Datasets

Benchmark: Groundwater Monitoring Database (DNRM)
Update:

Methodology

Calculated groundwater resource availability using bore water level data for existing bores over a time series.

Water Levels classified into three depth classes based on total water range in bore over life of bore (highest recorded level to lowest recorded level).

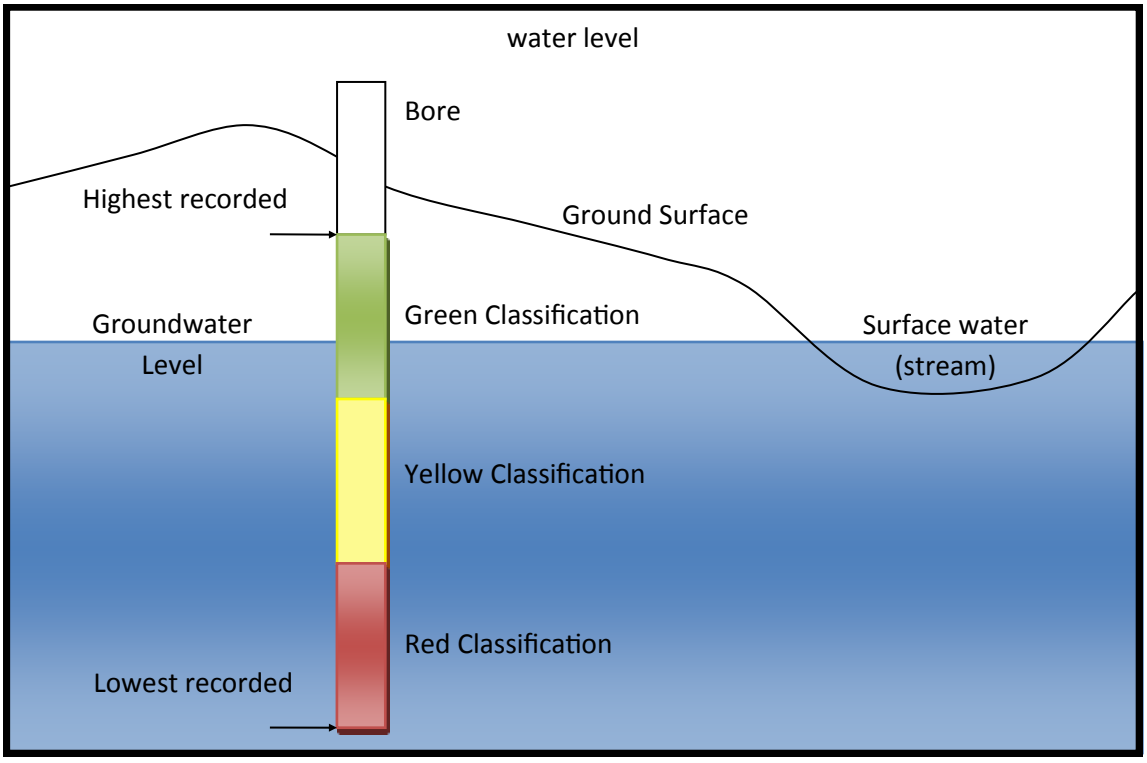
Water levels classified into three categories (low, moderate, high) and used to visualise data .

Records are analysed for each bore to rate how often bore level falls within each of the categories.

Time periods representing droughts and floods selected and displayed for comparison.

Calculated bore statistics including total water range, proximity to other bores and potential yield.

Figure 12: Bore Status Classification Methodology



Results

Figure 12 describes the classification methodology.

Map 34: Groundwater Bore Status identifies the water level category for each bore, based on an analysis of all water level records over the history of the bore.

If more than 50% of records fall within a single category, the bore is classified as being in that category.

Maps 35 and 36 identify the status of each bore during a particular time period.

Map 35 is an example of a drought year and Map 36 is an example of a flood year.

Groundwater levels should fluctuate between high (green) and moderate (yellow), with minimum extraction once levels reach the lowest category (red).

During the time series analysed, the groundwater resource of SEQ is generally pushed to its lower levels in the areas of Redbank Creek (Esk), Lockyer Creek, Warrill Creek and Bremer River, Logan and Albert Rivers, and North Stradbroke Island.

The groundwater levels at the peak of the drought in 2008 mostly fall within the low level category, with Bribie Island still maintaining some medium to high levels.

The 2013 groundwater level snapshot post the 2011 flood event in SEQ shows good recharge in some aquifers, with the Lockyer Catchment displaying high water levels. This also indicates local recharge of aquifers and the importance of maintaining healthy natural catchments to maintain the maximum quantities of groundwater available.

Data Limitation

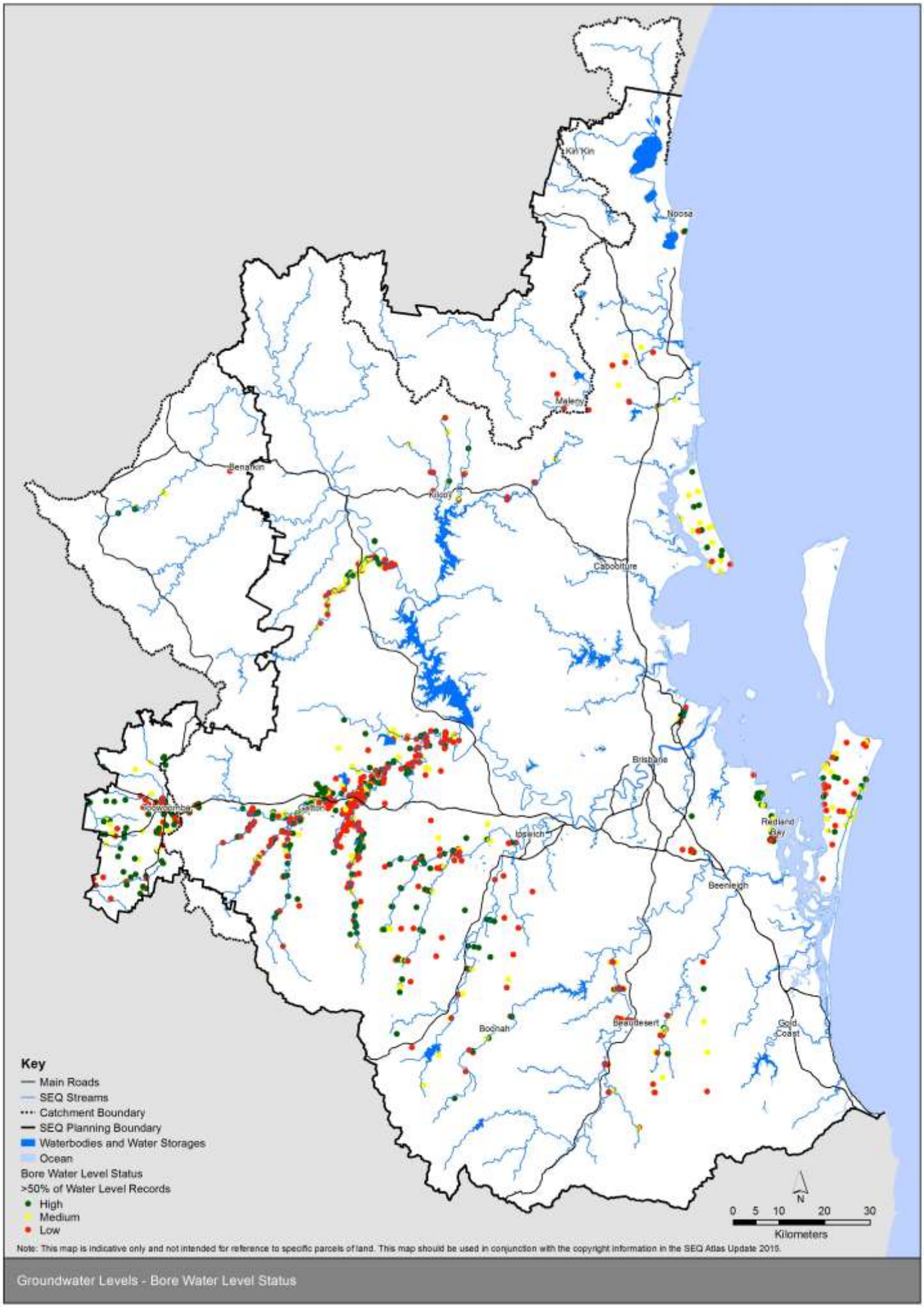
Mapping and analysis provides a snapshot of utilisation of groundwater resources in SEQ.

Potential yield is calculated based on a 2D model which calculates the yield based on total useable water depth. The approach also takes into account the projected water yield zone based on proximity to other bores.

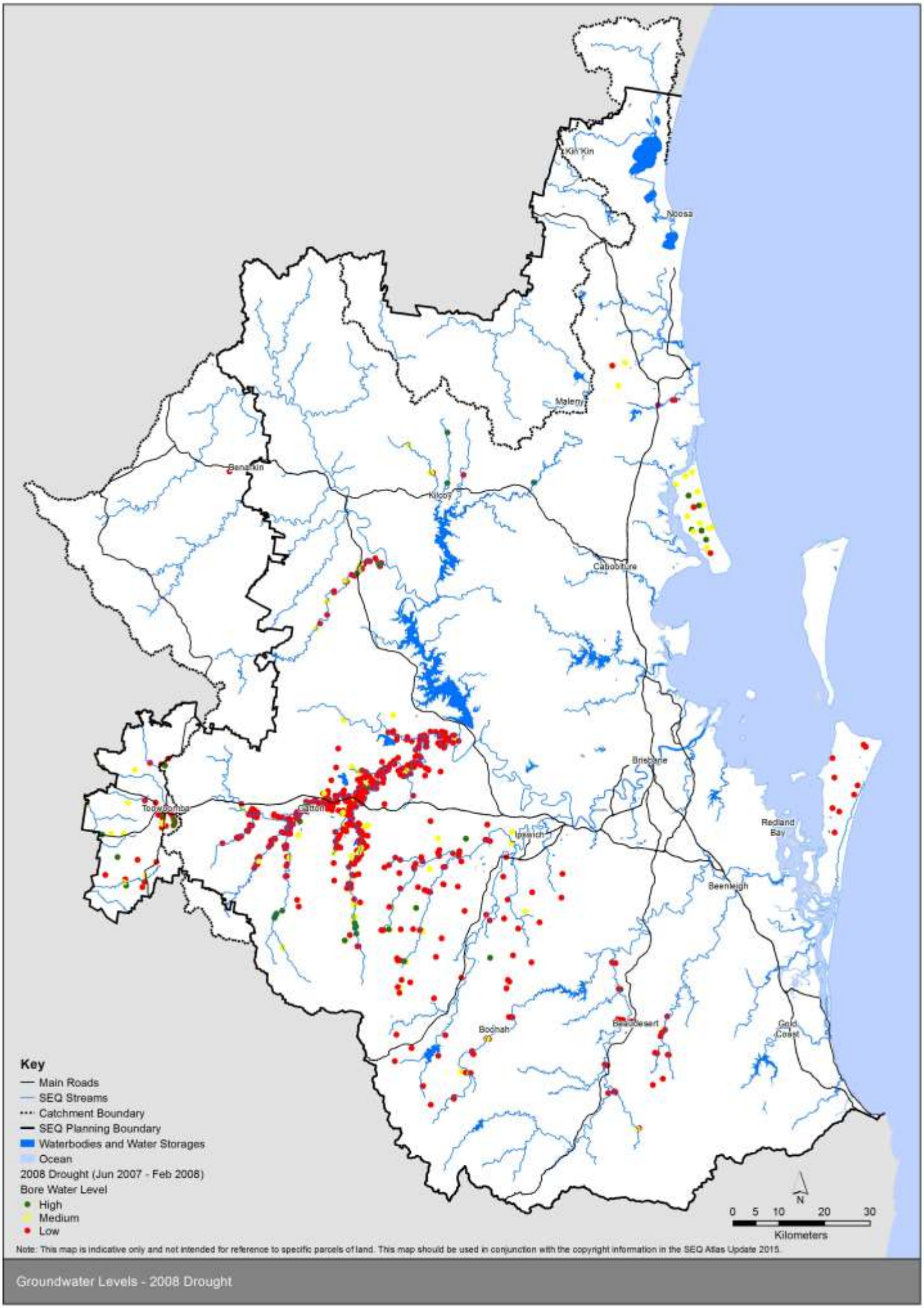
It does not take into account the depth/elevation of a bore in relation to surrounding bores.

Further Reading:

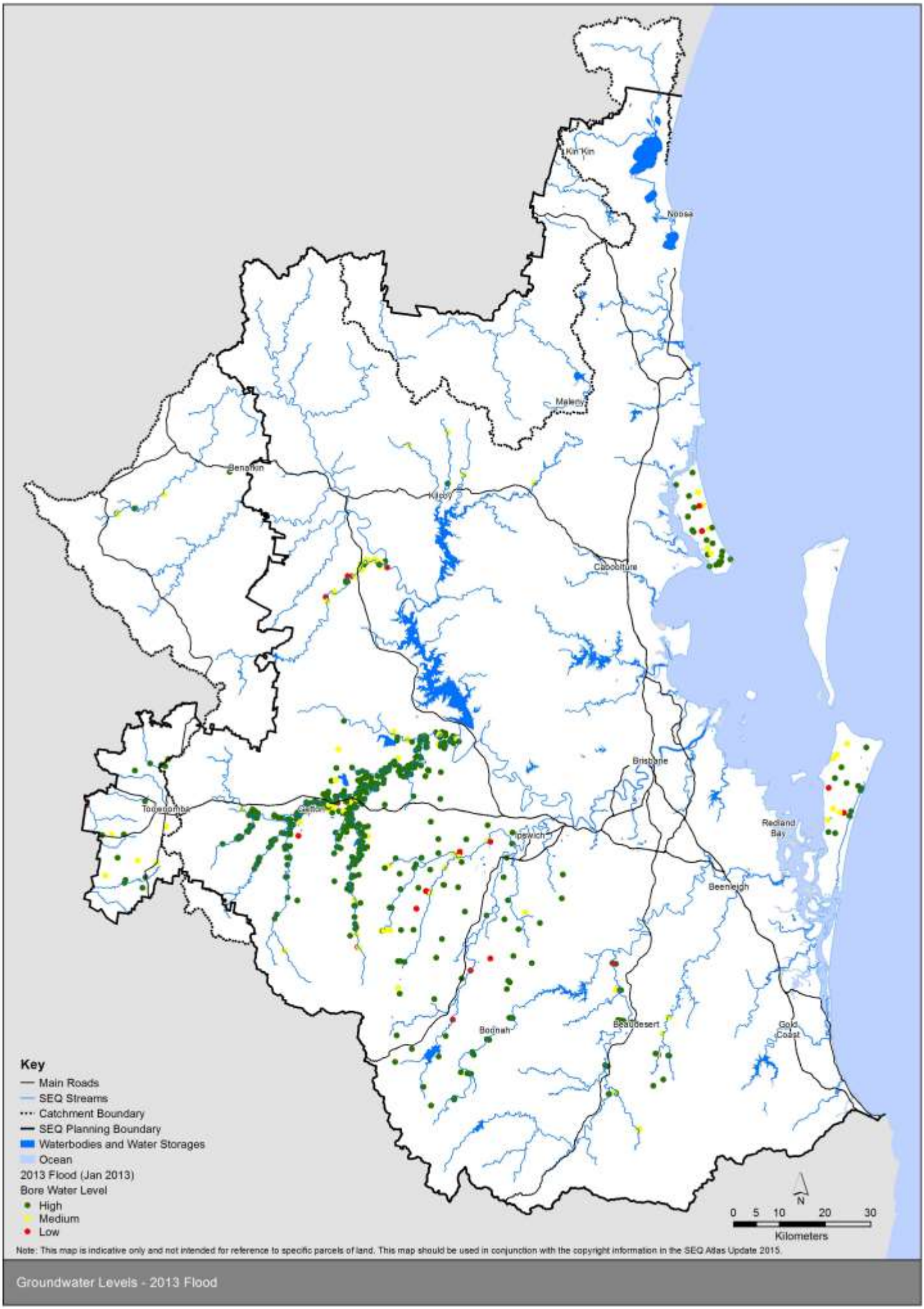
Zhou, Guoy etal (2015) Global pattern for the effect of climate and land cover on water yield. Published article in Nature Communications.



Map 37: Groundwater Bore Status over Water Level Monitoring Period



Map 38: Bore Groundwater Levels during a Drought Period



Map 39: Bore Groundwater Levels during a Flood Period

W3 – Groundwater Quality

By 2031, ground water quality (nutrients and EC measurements) in all SEQ Groundwater Resource Units will be within identified acceptable annual ranges

Rationale

The value of groundwater will depend on its quality, especially in terms of salinity levels and pollutant concentration. Changes to land cover and land use can impact on surface runoff and groundwater quality, reducing the useability of groundwater as a resource. Nutrient sources include organic waste and wastewater, synthetic fertilisers and soil processes. Other sources of groundwater contamination include pesticides, leaks from landfills and fuel dumps, residential and factory waste, and salinity which render it unusable and undrinkable.

If managed appropriately and used within sustainable limits, groundwater is currently directly valued at approximately $7bn a year, and could easily contribute significantly more to the Australian economy in the future.

Datasets

Groundwater Monitoring Database (DNRM)

Methodology

Requires analysis.

Results

Not currently available.

Data Limitation

Dataset requires analysis.

Further reading: Deloitte Access Economics (2013) Economic Value of Groundwater in Australia. National Centre for Groundwater Research and Training.

W4 – Groundwater Dependent Ecosystems

By 2031, the condition of groundwater ecosystems and groundwater dependent ecosystems will be within identified acceptable annual ranges

Rationale

Groundwater in aquifers and caves support unique ecosystems with a variety of organisms which spend their whole life underground and are subject to extremely uniform conditions compared with surface life. Groundwater interacts with surface water and these interactions support the structure and function of groundwater dependent ecosystems including springs, streams, wetlands and swamps.

Datasets

Benchmark: Groundwater Dependent Ecosystem Atlas (BOM, 2012)
Groundwater Dependent Ecosystems Areas (DEHP and DSITIA, 2014)

Methodology

Datasets adopted in full.

Results

Map 37 identifies surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs.
Map 38 identifies ecosystems that may rely on the subsurface presence of groundwater – this includes all vegetation ecosystems.
Table 35 analyses identified groundwater dependent ecosystems (including total area of ecosystems and number of distinct ecosystems).

Table 35: Groundwater Interaction Potential

Interaction	SubSurface Interaction		Surface Interaction		Total (ha)
	Count	Area (ha)	Count	Area (ha)	
High potential for GW interaction	5,349	124,431	3,448	72,066	96,498
Moderate potential for GW interaction	6,614	231,221	2,149	23,782	255,004
Low potential for GW interaction	6,016	156,874	444	2,588	59,462
Identified in previous study	3	446	55	3,511	3,957
Total	**17,982**	**512,973**	**6,096**	**101,947**	**614,920**

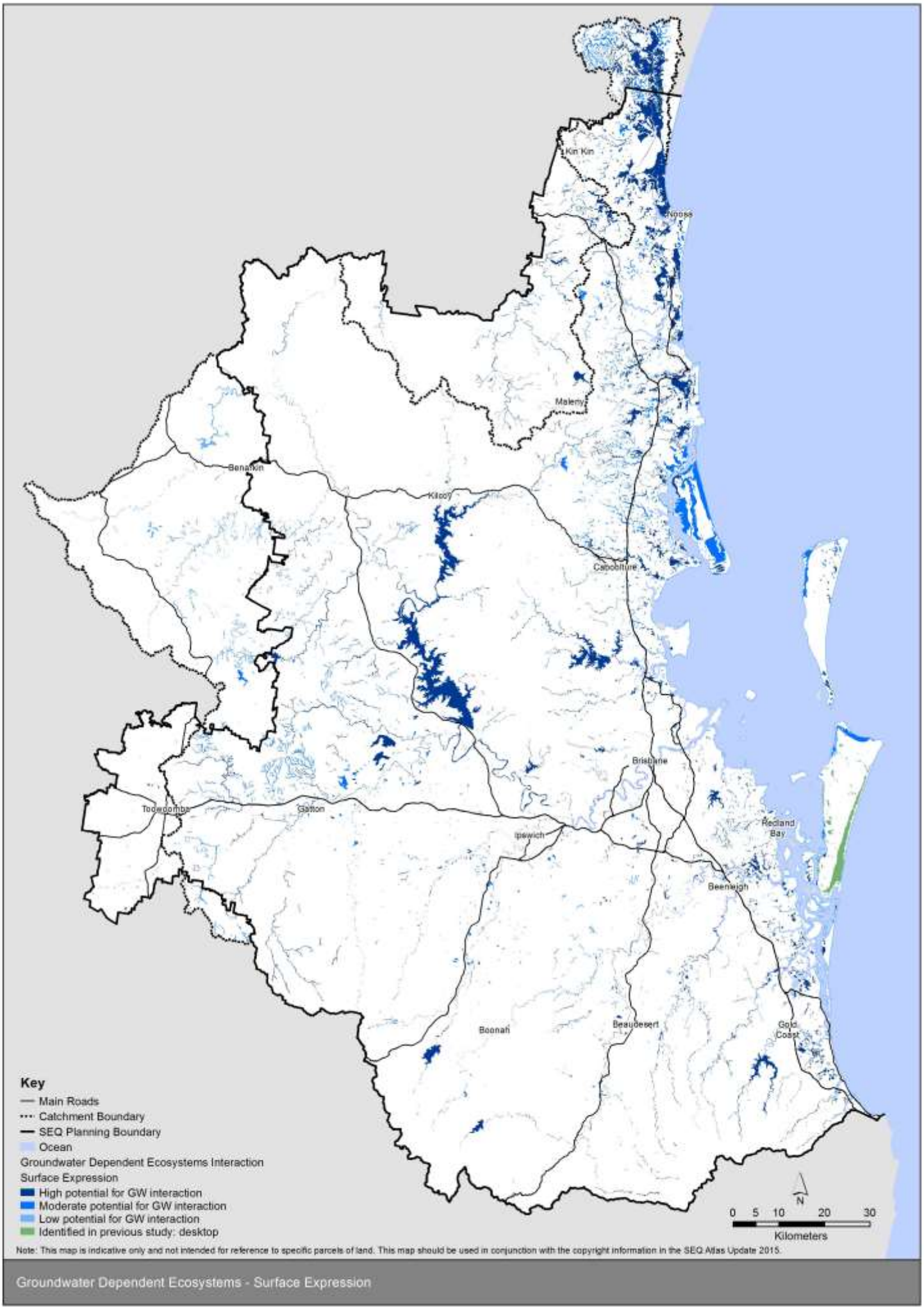
GDE Surface Areas: Surface expression GDEs are ecosystems that are dependent on the discharge of groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services. Surface expression GDE area features include wetlands and regional ecosystems that have some surface groundwater dependency.

GDE Surface Lines: Include drainage lines that have some surface groundwater dependency.

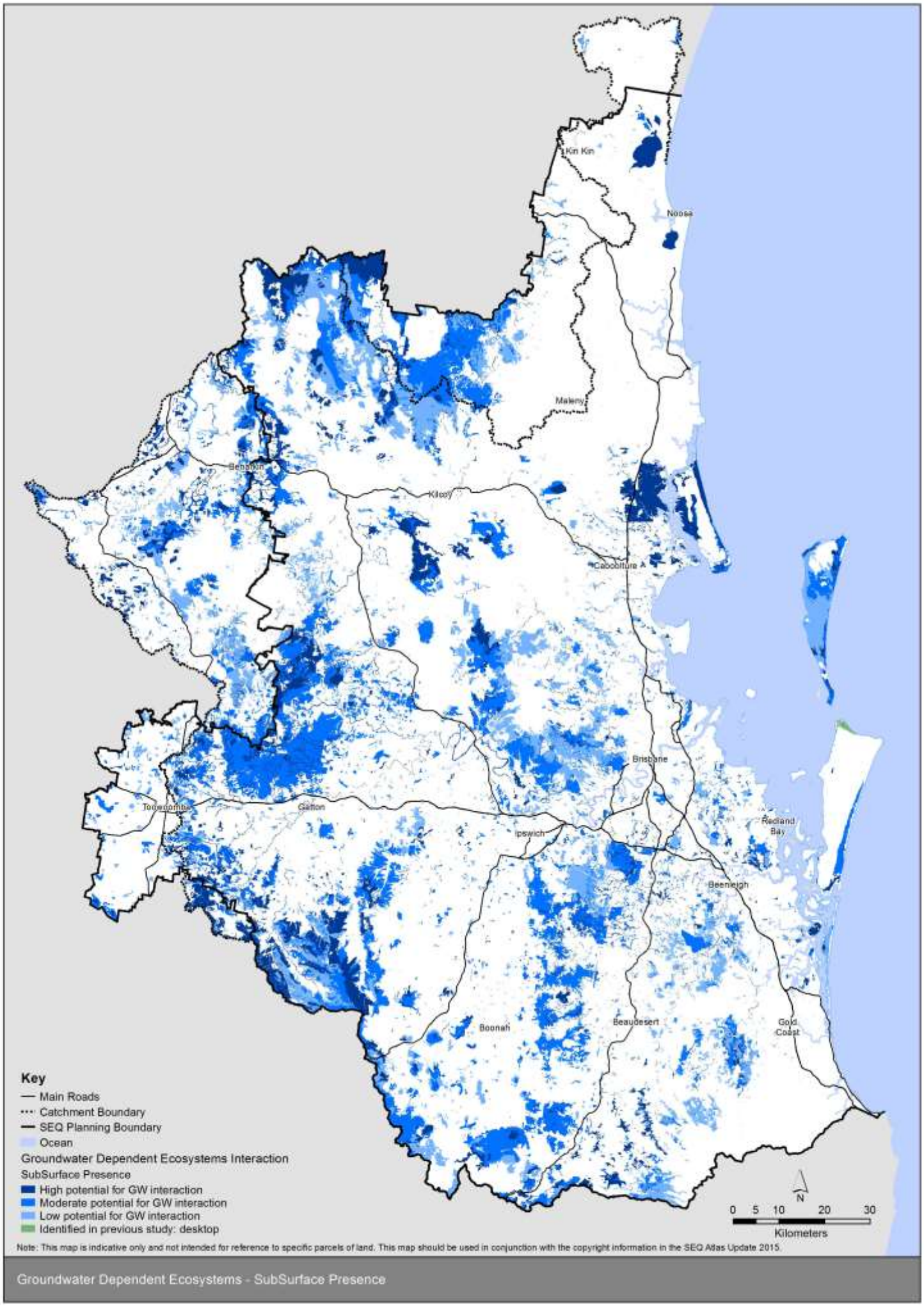
GDE Terrestrial Areas: Include riverine wetlands and treed (deep rooted) regional ecosystems that have some sub-surface groundwater dependency.

Data Limitation

Count of surface interaction groundwater dependent ecosystems may be an overestimate due to some duplicates existing in the dataset.



Map 40: Ecosystems Which Rely on the Surface Expression of Groundwater



Map 41: Ecosystems Which Rely on the Subsurface Presence of Groundwater

W5 – High Ecological Value Waterways

By 2031, High Ecological Value waterways in SEQ will maintain their 2008 classification

Rationale

High priority areas that represent critical aquatic and riparian habitat and areas which make an important contribution to waterway health (including water quality) in the region need to be protected and conserved.

High Ecological Value (HEV) waterways are effectively unmodified or other highly valued systems, typically (but not always) occurring in national parks, conservation reserves or in remote and/or inaccessible locations. Monitoring the ongoing health of these areas acts as a regional indicator of the ecological health of waterways.

Datasets

Benchmark: Environmental Values (EV) and Water Quality Objectives (WQOs) for Moreton Bay/South-east Queensland (DEHP, 2010)

Update: No update currently available.

Methodology

Dataset adopted in full.

Results

Map 40 identifies marine and freshwater ecosystems classified as being of high ecological value, including intent for the waterway (maintain or achieve).

Table 36 identifies the type and extent of High Ecological Value Waterways in SEQ and Moreton Bay. Note that statistics include all areas indicated on the map.

Areas of High Ecological Value align mostly with National and Marine Parks, focussing on state and federally owned or controlled lands. In addition, some areas have been identified as Highly Disturbed including Knapps Creek, Lower Teviot and Lower Lockyer Creek.

Table 36: Description of High Ecological Value Waterways

Descriptor	Freshwater		Marine		Total (ha)
	Count	Area (ha)	Count	Area (ha)	
High Ecological Value maintain	143	333,106	30	135,244	468,350
High Ecological Value achieve	-	-	8	7,934	7,934
Moderately Disturbed	1	30	11	98,544	98,574
Highly Disturbed	3	13,304	-	-	13,304
Total	**147**	**346,440**	**49**	**241,722**	**588,162**

W6 – Waterways Maintenance and Enhancement

By 2031, scheduled water quality objectives (WQO) for all SEQ waterways will be achieved or exceeded

Rationale

Management focused on achieving or maintaining the WQOs is necessary to support agreed Environmental Values and provides the most secure approach to minimising the social, economic, public health and environmental risks associated with a decline in water quality in SEQ waterways.

Datasets

Benchmark: The South East Queensland Environmental Values Scheduled Plan v2.0 (DEHP, 2013)

Methodology

Map 41: EV scheduled plans.

For further information see the relevant Plan:
www.ehp.qld.gov.au/water/policy/schedule1/moreton_bay_southeast_queensland_scheduled_evs__wqos.html

Results

Detailed plans have been developed for each of the identified waterways, as specified in Table 37.

Figure 13 shows the combined average grades for marine, estuary and freshwater systems in SEQ.

The combined average for marine grades showed elevated scores from 2001 to 2007 followed by declines in 2008-09 and a gradual recovery to 2014.

The combined average estuarine grades showed slight variation over the time period 2000-2014 fluctuating in a narrow range of C to C– to C+. There was a slight downward trend from C to C- from 2000-2009, with a gradual recovery to approaching a C+ in 2014.

The combined freshwater average grades from 2000-2014 showed a slight variation between C– and C, with slight peaks above C in 2004 and 2011.

Figure 14 shows the combined median grades for SEQ. This shows a greater level of variation between catchments than is revealed by the combined average. The median value is the mid point of grades (50% of catchment grades above the combined grade and 50% of grades below).

The combined median grades for estuaries show more significant variation, with a downward trend from 2000 to 2006, and then an improvement rom a D to a B– by 2014.

The combined median also indicates that some marine areas may have remained depressed for longer after the 2009 floods than is indicated by the combined average score.

Table 37: Developed Plans for Environmental Values and Water Quality Objectives

Plan ID	Name
WQ1381	Mary River
WQ1401	Noosa River
WQ1411	Maroochy River
WQ1412	Mooloolah River
WQ1413	Pumicestone Passage
WQ1421	Pine Rivers and Redcliffe Creeks
WQ1422	Caboolture River
WQ1423	Brisbane Creeks - Bramble Bay
WQ1431	Brisbane River Estuary
WQ1433	Mid Brisbane River
WQ1434	Oxley Creek
WQ1435	Sandy, Six Mile, Wolston, Woogaroo and Goodna Creeks
WQ1436	Bremer River
WQ1437	Lockyer Creek
WQ1438	Upper Brisbane River
WQ1439	Stanley River
WQ1441	Moreton Bay
WQ1453	Redland Creeks
WQ1454	Logan River
WQ1455	Albert River
WQ1461	Nerang River
WQ1462	Coomera River
WQ1463	Broadwater
WQ1464	Currumbin and Tallebudgera Creeks
WQ1465	Pimpama River

Figure 13: Healthy Waterways Combined Average Report Grades 2000-2014 for SEQ

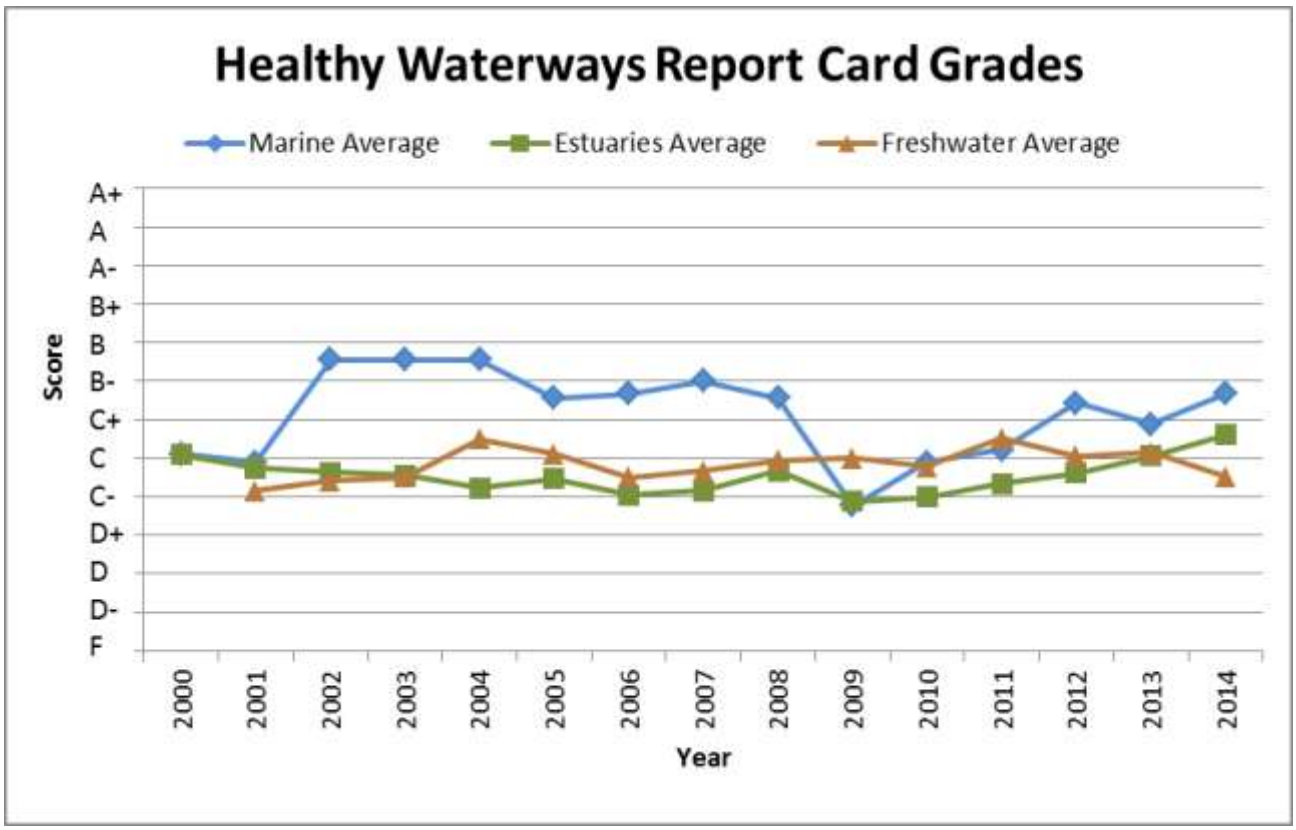
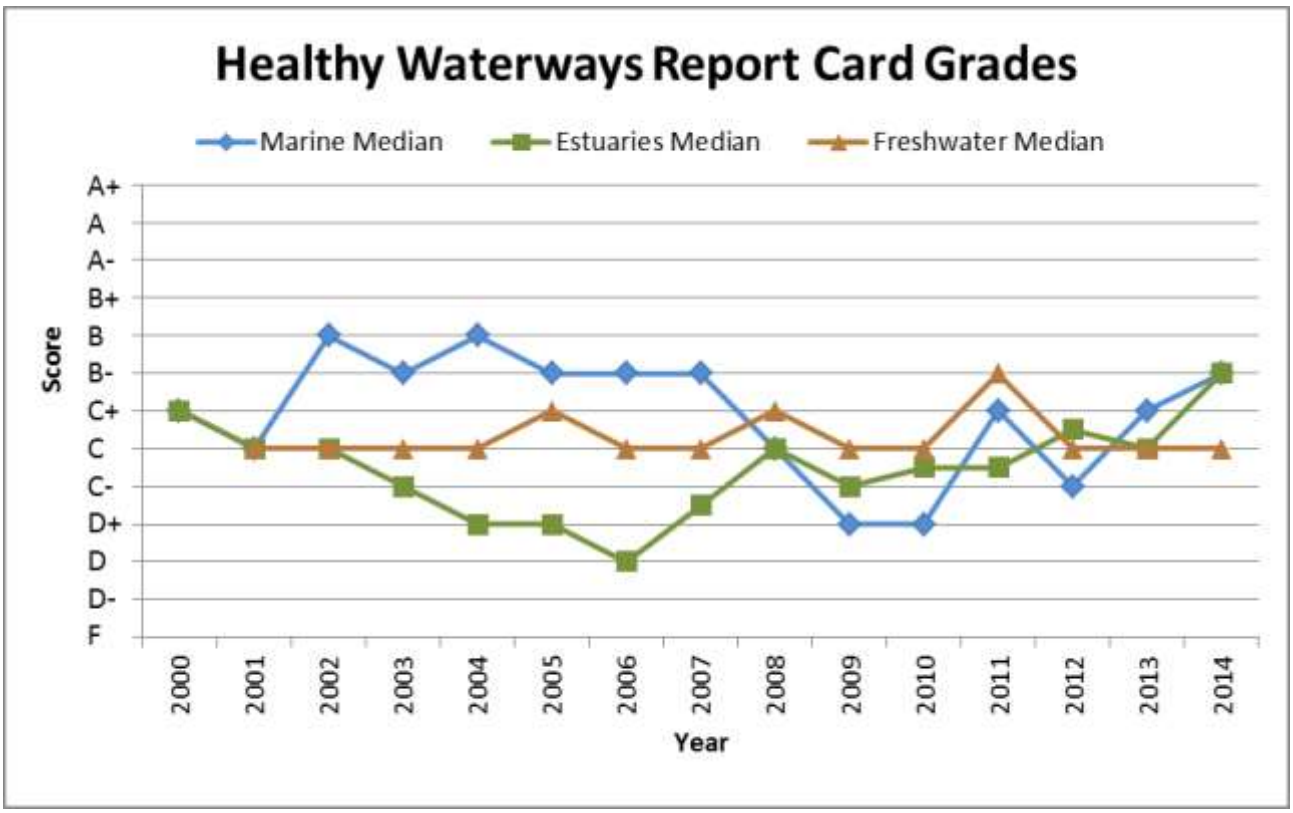
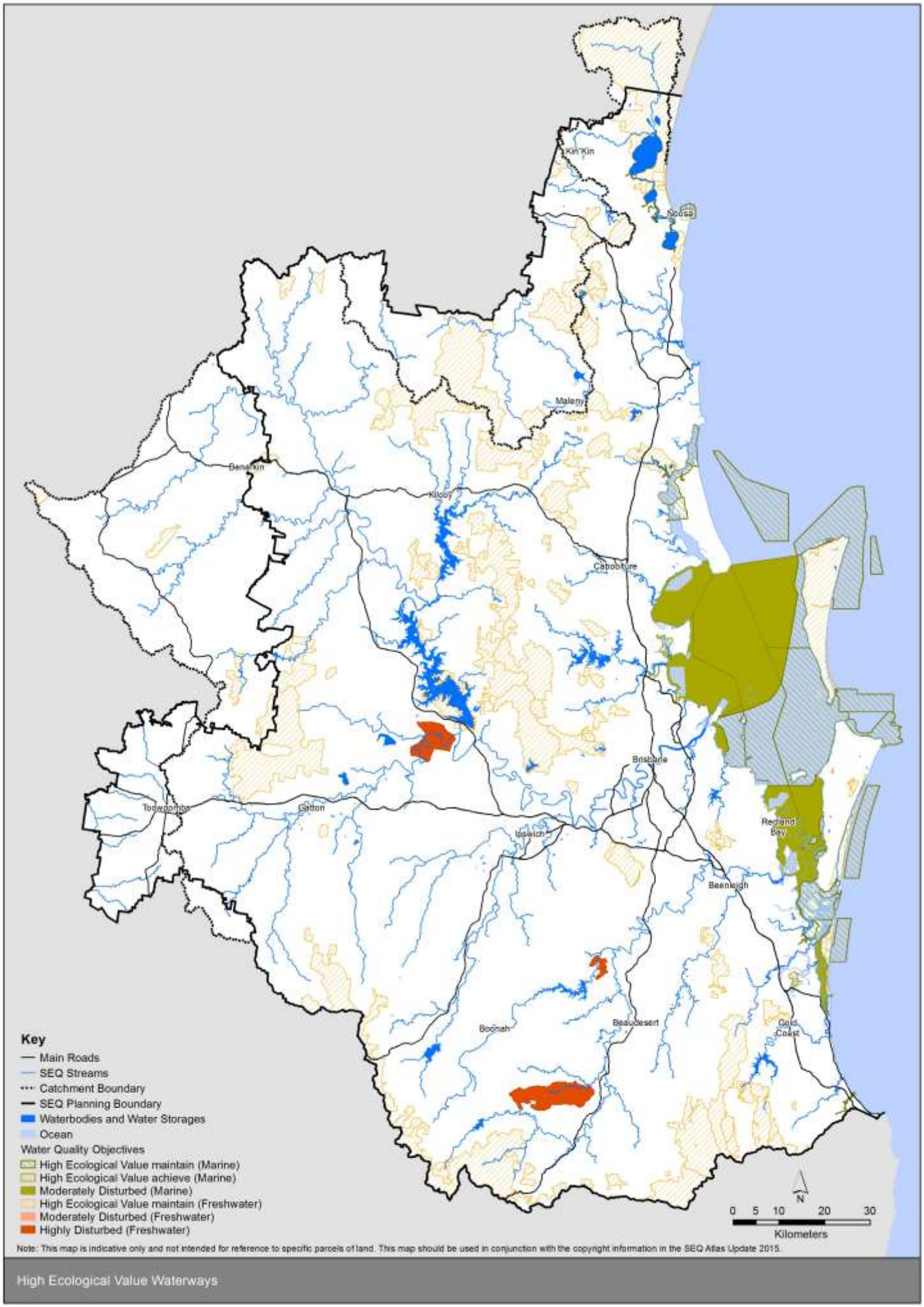


Figure 14: Healthy Waterways Combined Median Report Grades 2000-2014 for SEQ





Map 42: High Ecological Value Waterways

Map 43: Waterway Scheduled Plan Areas

W7 - Waterway Restoration

By 2031, waterways that are currently classified as ranging from slightly to moderately disturbed and/or highly disturbed will have their ecosystem health and ecological processes restored.

Rationale

The health of waterways is dependant on land management and catchment health, and affects downstream ecosystems and estuarine reaches including Moreton Bay.

Datasets

Benchmark: Subcatchment Health Index (SEQC, 2014)
Update: No update currently available.

Methodology

The subcatchment health analysis identifies risk to water quality based on 5 indicators and applied to a management unit or subcatchment.

Indicators were chosen that have an impact on water quality and aquatic ecosystems and include:

1. Stream Health based on presence or absence of riparian vegetation (% area)
2. Cropping Area (% area)
3. Built-up Area (% area)
4. Forested Area (% area)
5. Erosion Risk (% area)

A four class scoring system was adopted for each indicator with high risk being 4, low risk score of 1. The indicators were combined for a total risk score of 20.

Results

Subcatchments that rated high with a greater risk to water quality (Score 18—20/20) included:

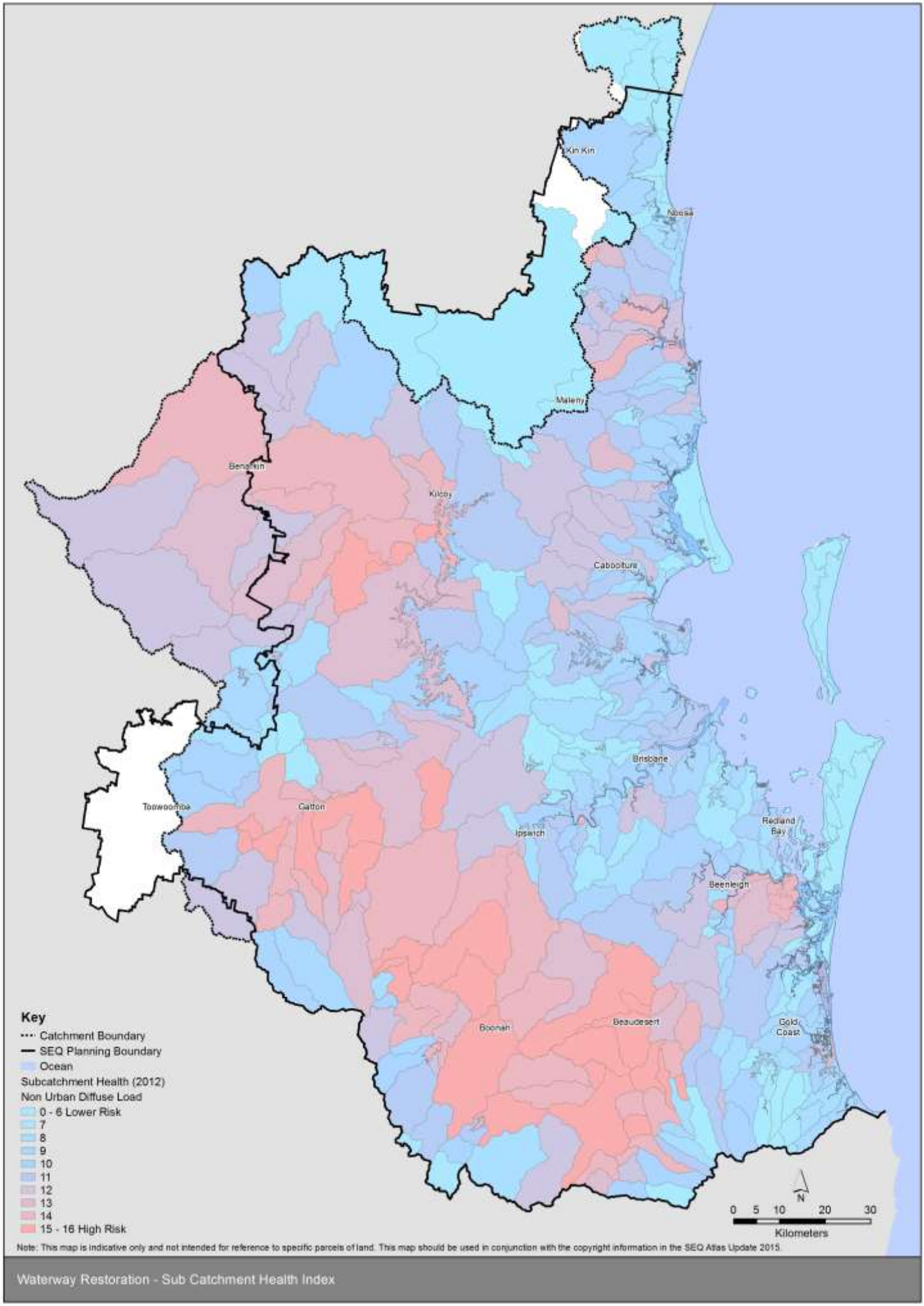
Middle Logan River (Allan Creek), Tenthill Creek (Lower Blackfellow and Flagstone Creeks), Middle Warrill Creek, Middle Bremer River, Middle Albert River (Kerry Creek), Plain Creek, Lower Pimpama, Lower Creekbrook Creek, Lower Lockyer Creek.

Subcatchments that rated high with poor riparian cover (Score of 4/4) included:

Middle Logan River (Allan Creek), Middle Bremer River, Lower Nerang River, Tenthill Creek , Middle Logan River (Knapp Creek), Middle Lockyer Creek (Lower Ma Ma, Middle Laidley Creek,), Upper Brisbane River (middle catchment), Middle and Upper Teviot Brook, Middle Bremer River, Plain Creek, Purga Creek, Middle Warrill Creek.

Data Limitation

Dataset requires analysis.



Map 44: Waterway Restoration

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/ condition	Update (trend monitoring) Data Set	Update Year extent/ condition	Why have this target?
AIR and ATMOSPHERE					
A 1 Greenhouse Gases By 2031, the region will make an equitable contribution to the national and regional targets for reduction in greenhouse gas emissions.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.			Australia has one of the world's highest per capita emissions rates. NOTE: Not all greenhouse gas emissions are recorded in the NPI, so target dataset is indicative only.
	DRAFT: National Pollutant Inventory datasets for SEQ Airshed	National Pollutant Inventory time series (graph)	National Pollutant Inventory data for Carbon Monoxide emissions in the SEQ Airshed for available years (2000 -2012)	DRAFT: National Pollutant Inventory time series (graph)	
A 2 Air Quality By 2031, the levels of air pollutants in the SEQ air shed will be at or below the quality objectives in the appropriate Schedule of the Environmental Protection (Air) Policy 2008.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.			Air quality affects other natural resources, particularly Nature Conservation targets. Particular compounds can cause growth defects and death in fauna and flora when exposed at certain quantities over certain time periods.
	DRAFT: National Pollutant Inventory datasets for SEQ Airshed	DRAFT: National Pollutant Inventory time series (graph)	National Pollutant Inventory data for Carbon Monoxide, Fluoride, NOx, sulfur dioxide emissions and particulate matter <10um in the SEQ Airshed for available years (2000-2012). Regional Ecosystems	DRAFT: National Pollutant Inventory time series (graph)	
A 3 Thermal pollution By 2031, SEQ thermal pollution will be at or below 2003 levels.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.			Thermal pollution affects other natural resources, particularly Nature Conservation targets. Higher than naturally occurring temperatures can cause life cycle changes, stress and death in fauna and flora when exposed over certain time periods.
	DRAFT: Satellite thermal data (Landsat Thematic Mapper Satellite imagery) Landsat Band 6 thermal infrared data.	Thermal Characterisation of subcatchments completed. Preliminary analysis of subcatchment thermal pollution load completed.	Satellite thermal data (Landsat Thematic Mapper Satellite imagery) Landsat Band 6 thermal infrared data. Compare to hard surface proxy heat maps to check accuracy/ complement.	No update currently available	
A 4 Noise Pollution A 4 Noise Pollution By 2031, SEQ noise pollution will be at or below 1998 levels.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.			Noise pollution affects the behaviour of some fauna. It can cause previously suitable habitat to become unsuitable for particular species, and in some cases affect the ecology of an entire area (e.g. a pollinator species abandons an area due to noise pollution, causing reduced recruitment of plant species resulting in lowered resilience and ability to recover from extreme events).
	DRAFT: Assign decibel readings to roads layer and measure noise propagation. Information needed includes decibel readings for different types of roads, DEM and average weather readings for the region.	No benchmark currently available.	No update available.	Would require a dedicated monitoring program?	
A 5 Light Pollution By 2031, SEQ light pollution will be at or below 1998 levels.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.			Light pollution affects the behaviour of some fauna. It can cause previously suitable habitat to become unsuitable for particular species. NOTE: The OLS has no on-board calibration and the gain settings are not recorded in the data stream. The digital number (DN) values are not strictly comparable from one year to the next. We recommend users perform an intercalibration prior to direct comparison of the DN values across the time series. For discussion on these points contact chris.elvidge@noaa.gov.
	DRAFT: Web stable lights 2006 from DMSP-OLS Night-time Lights Time Series.	Map Extent	Change in Web stable lights 1992-2012 analysis of DMSP-OLS Night-time Lights Time Series	Map Extent. For more accurate result, may require intercalibration.	

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/condition	Update (trend monitoring) Data Set	Update Year extent/condition	Why have this target?
COASTAL AND MARINE					
CM 1 Seagrass, saltmarsh and mangroves By 2031, the extent of seagrass AND mangrove ecosystem (including saltmarsh) in bays and estuaries is greater than or equal to that in 1988 and 2001 respectively.	Seagrass Cover (DPI&F, 1984-1988).	The total area of seagrass meadows in 1988 was 27,085 ha. Total recorded extent for region (1998-2012) is 44,830ha.	Moreton Bay Seagrass meadows 2011 (EHMP, UQ, QPWS)	Total change in seagrass meadows of Moreton Bay was an increase of 2,267 ha.	Seagrass is an indicator of the health of Moreton Bay. Seagrass extent, density and type provides a measurable indicator of the health of the Bay and waterways. Mangrove forests provide important habitat and nursery areas particularly for juvenile fish, crabs and prawns. A reduction in the extent or condition of mangroves may indicate a loss in the functionality of our coastal and marine areas.
	Coastal Vegetation - Land Zone 1 features captured from Regional Ecosystem Dataset 2001 extent, Version 2 (Department of Environment and Resource Management, DERM).	Coastal vegetation (mangroves, saltmarsh and samphire) 2001 extent (Version 2) was 21,287 ha.			
	DRAFT: Coastal Vegetation - Land Zone 1 (dominant and subdominant) ecosystems captured from Regional Ecosystem Dataset 2001 extent, Version 7 (Department of Environment and Resource Management, DERM).	DRAFT: Coastal vegetation (mangroves, saltmarsh and samphire) 2001 extent (Version 7) was 22,724 ha.	DRAFT: Coastal Vegetation - Land Zone 1 (dominant and subdominant) ecosystems captured from Regional Ecosystem Dataset 2009 extent, Version 7 (Department of Environment and Resource Management, DERM).	DRAFT: Coastal vegetation (mangroves, saltmarsh and samphire) 2009 extent (Version 7) was 22,683 ha (loss of 42 ha).	
CM 2 Coral By 2031, the condition and spatial distribution of soft and hard corals is maintained at 2005 levels.	Moreton Bay Reef (DERM, 2004).	2,856 ha of reef. This figure includes some island area including Mud Island. Recorded coral was 1,351 ha in 2004.	Updated Reef Extent, with additional reefs recorded (DERM, Reefcheck 2014)	Combined coral and reef extent is 4,363 ha, excluding any island areas above sea level.	Over time in SEQ, submerged rocky outcrops have been colonised by hard and soft corals and other inverte-brates, making rich reefs and habitat for a wide variety of marine life.
	Moreton Bay Coral (DERM, 2004).		DRAFT: Condition monitoring (Reefcheck)	Statistics and graphs.	
CM 3 Headlands, Beaches and Dunes By 2031, the condition of open coastlines (headlands, beaches and dunes) is at or better than in 2006.	Landcover (SEQC, 2006) High Energy Beach (SEQC, 2006)	The area of the Beach Buffer Zone that was disturbed has been used as an indicator of condition of the coastline. A total of 310 ha was disturbed within the Beach Buffer zone including non vegetated (218.69 ha), road (62.09 ha), canal (0.73 ha), and irrigated crop and pasture (29.04 ha). A total of 4,009 ha of beaches and sand.	Not comparable due to change in landcover mapping methodology. DRAFT: Landcover (SEQC, 2012) DRAFT: High Energy Beach and buffer (100m) (SEQC, 2006)	A total of 414 ha was disturbed within the Beach Buffer zone including non vegetated (258 ha), road (152 ha), and crop and pasture (4 ha).	Headlands, beaches and dunes provide barriers and vegetation to buffer the effects of extreme weather events such as cyclones and storm surges on life, property and infrastructure. High Energy Beach refers to the Ocean Beach. (see Glossary)
	DRAFT: DCDB 2006 (DERM/DNRM) DRAFT: High Energy Beach and buffer (100m) (SEQC, 2006)	Parcel count for disturbed areas (easement: 266, freehold: 3,813) and protected areas (Nat Park: 59, Reserve: 246, Covenant: 3)	DRAFT: DCDB 2014 (DERM/DNRM) DRAFT: High Energy Beach and buffer (100m) (SEQC, 2006)	Increase in number of disturbed area parcels or fragmentation (easement +40, freehold +1,205) and protected areas (Nat Park +11, Reserve: +14, Covenant +8) Overall, decrease in State land and lease land.	
CM 4 Fish Stocks By 2031, wild fishery stock condition will be sustained at sufficiently high levels to support commercial, recreational and indigenous cultural fisheries, based on the 1995–2005 benchmark (ten-year rolling average).	No agreed dataset for original Atlas.	Benchmark and monitoring program to be developed based on Fisheries Performance Measurement System for recreational and commercial catch data (Queensland Primary Industries and Fisheries).			Measuring the quantity of fish, crab, prawns and other species provides an indication of the productivity and health of our coastal waters.
	DRAFT: Moreton Bay Marine Park protected zones (NPRSR, 2009) Fish Habitat Zones of Schedule 3 Fisheries Regulations (NPRSR, 2014)	DRAFT: Fish habitat zones as a surrogate for fish stocks. Fish Habitat Area: 48,435 ha Moreton Bay Marine Park: - Conservation Park Zone: 26,030 ha - Habitat Protection Zone: 104,040 ha - Marine National Park Zone: 54,291 ha *Note: datasets may overlap	No update available.		

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/condition	Update (trend monitoring) Data Set	Update Year extent/condition	Why have this target?
COASTAL AND MARINE					
CM 5 Marine Species By 2031, the extent and condition of the habitat of bottlenose and indo pacific humpback dolphins, dugongs, sharks, turtles and wader birds is equal to or greater than that in 2001 for each species.	SEQ Waders (DERM, 1998) Turtle Rookery	Total Wader habitat 65,828 ha includes Pumicestone Passage and beaches etc. of which 445 ha is Critical Wader Habitat including high roost sites. 9 Turtle Rookeries identified in SEQ.	Total Wader habitat 63,588 ha includes Pumicestone Passage and beaches etc. of which 445 ha is Critical Wader Habitat including high roost sites. 9 Turtle Rookeries identified in SEQ.	No Update	The presence of iconic species is an indicator of the health of our coastal and marine environments and is a key contributor to the tourism industry.
	Dolphin Density, Dugong Density, Turtle Density (based on Wildnet records, DERM 2007).	Map Extent			
	DRAFT: Dolphin Density, Dugong Density, Turtle Density (based on High Precision Wildnet records, years 1981-2001; DERM 2007).	Map Extent 229 high precision species records identified for this time period.	DRAFT: Dolphin Density, Dugong Density, Turtle Density (based on High Precision Wildnet records, years 1994-2014; DERM 2007).	Map Extent 287 high precision species records identified for this time period.	
			DRAFT: Shark Density (based on High Precision Wildnet records, years 1994-2014; DERM 2007)	Map Extent	Presence of top predators is an indicator of the health of our coastal and marine environments.
CM 6 Coastal Algal Blooms By 2031, the extent and frequency of coastal algal blooms (CAB) are reduced from 2002-2005 benchmark (3 year rolling average).	Lyngbya monitoring 2002-2012 (DERM/DEHP 2012)	Map Extent	Lyngbya monitoring 2002-2012 (DERM/DEHP 2012)	Map Extent	Algal blooms in estuarine and marine waters of SEQ have been increasing in frequency and extent since the mid-1990s. Algal blooms impact on water quality, biodiversity, human health, and the recreational and commercial values of coastal waterways
CM 7 Coastal Wetlands By 2031, the extent (ha) of SEQ coastal wetlands connecting fresh and marine habitat (including fish passage) is equal or greater than that in 2007.	Wetland System (DERM, Version 2 October 2009)	Total Coastal Wetlands is 22,738 ha (Estuarine Wetland Class).	No update available		Coastal wetlands provide critical habitat and key ecosystem functions within the coastal zone. The connection of coastal wetlands to other water bodies such as rivers, creeks, estuaries and oceans is a critical component for ecosystem function.
	DRAFT: Wetland System (DERM, Version 3, 2001 Extent) - revision of benchmark year to 2001	DRAFT: Estuarine wetlands (including Bay) and other wetlands with coastal influences (<5m above HAT) - 260,170 haof which Natural coastal wetlands - 254,767 ha Estuarine wetlands (NOT including Bay) and other natural wetlands with coastal influences (<5m above HAT) - 59,104	DRAFT: Wetland System (DERM, Version 3, 2009 Extent)	DRAFT: Estuarine wetlands (including Bay) and other wetlands with coastal influences (<5m above HAT) - 260,011 ha (loss of 159 ha) of which Natural coastal wetlands - 253,908 ha (loss or conversion of 859 ha). Estuarine wetlands (NOT including Bay) and other natural wetlands with coastal influences (<5m above HAT) - 58,484 ha (loss or conversion of 620 ha)	
COMMUNITY					
C1 By 2031, natural resource managers, government and non-government organisations will be resourced and working together to implement the SEQ NRM Plan.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.			The region has a history of voluntary community action supported by industry and government investment. The majority of the region is managed by private landholders. Enhancing and maintaining the capacity and ability of the community to engage in planning, implementation and monitoring of local actions to support achievement of regional targets is therefore a priority.
	DRAFT: Project density based on SEQC and partner projects, accounting for number of projects and size of projects.	Map Extent			

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/condition	Update (trend monitoring) Data Set	Update Year extent/condition	Why have this target?
LAND					
L 1 Secondary Salinity By 2031, the area of secondary salinity in SEQ will be at least 10% less than in 2008.	Salinity Extent Mapping for SEQ (DERM).	Total area of salinity identified is 17,699 ha.	DRAFT: Updated additional study areas Salinity Extent Mapping for SEQ (DNRM, 2009) Landcover (2009)	Updated area is 17,728 ha (increase of 29ha may be due to survey effort rather than recorded expansion of benchmark salinity areas).	The ability of our land assets to efficiently meet the needs of existing and future communities require that they are not impacted by salinity or soil health decline in general.
	Updated additional study areas Salinity Extent Mapping for SEQ (DERM)	To achieve the target of 10% less salinity, the new extent must be 15,929 ha. (10% is 1,770 ha)	DRAFT: Subcatchment Health (salinity) SEQC		
L 2 Good Agricultural land By 2031, >90% (>266,667ha) of SEQ good agricultural land at 2004 is available for sustainable agriculture.	Agricultural Land Classes (DERM, 2004).	Total area of A, B and C Class lands equates to 1,414,185 ha. Target of 90% is 1,272,766 ha. (19,050 ha of agricultural lots less than or equal to 1 ha).	Not comparable due to change in mapping methodology	Not comparable due to change in mapping methodology	The ability of the SEQ Region to produce food and fibre is fundamental to meeting the needs of existing and future communities. The number of small lots allows a measure of fragmentation and potential impacts on productivity.
	DRAFT: Land Use 1999 (DERM) Land Use Change (QLUMP, 2014)	DRAFT: Land use change - Agriculture: 15,967 ha of agricultural land has gone to other uses (including grazing) - Grazing: 36,079 ha of grazing land has gone to other uses (including agriculture) - Forestry: 84,200 ha of forestry has gone to other uses	DRAFT: Land Use Change (QLUMP, 2014)	DRAFT: Current extent 2013 (excluding Toowoomba) - Agriculture: 91,699 ha (loss of 15,967 ha) - Grazing: 1,202,199 ha (loss of 36,079 ha) - Forestry: 152,360 ha (loss of 84,200 ha) Some grazing and forestry areas have been converted to conservation status	
L 3 Soil Acidity By 2031, the area of acidified agricultural soils within SEQ will be reduced by 50% from the 2008 baseline.	Soil Acidity Risk Mapping (DERM). Further analysis of organic matter data required. Any targets or sampling need to relate to the National Soil Health Monitoring Framework released soon.	Total of 57,110 ha high risk soil acidity area. Target of 50% as per target is 28,555 ha.	No update available.		The ability of our land assets to efficiently meet the needs of existing and future communities requires that they are not impacted by soil health decline.
L4 Organic Matter By 2031, the level of soil organic matter (carbon in t/ ha) in agricultural soils will be higher than in 2008 or baseline year.	Suggested project to establish representative soil sampling sites across the region for sampling at 5 yr intervals.	No benchmark available for original Atlas.			
	DRAFT: Organic soil carbon stock mapping (CSIRO)		DRAFT: Organic soil carbon stock mapping (CSIRO)		
L 5 Acid Sulfate Soils By 2031, the area of "severe" soil acidification caused by the disturbance of ASS is lower than that in 2008.	Acid Sulfate Soils Risk mapping (DERM, 2006)	Total mapped extent of Acid Sulfate Soils 2006 is 72,233 ha.	Acid Sulfate Soils Risk mapping (QLD Govt., 2012)	Total mapped extent of Acid Sulfate Soils 2012 is 108,926 ha increase of 36,063 ha may be due to survey effort rather than recorded expansion of benchmark ASS areas).	Acid Sulfate Soils (ASS) are formed through natural processes and are generally covered over by other soils. However, when ASS are exposed to air by drainage or digging and then wet again, highly acid drainage water is produced. Acid runoff causes a range of detrimental impacts to the environment, coastal development, fishing and agricultural industries
	Acid Sulfate Soils by Land Cover (SEQ Catchments, 2006).	Non Vegetated/Disturbed 28,744 ha (40%) of total risk area	Acid Sulfate Soils by Land Cover (SEQ Catchments, 2009).	Non-vegetated/Disturbed: 26,522 ha (2009) NOTE: not comparable to previous disturbed extent due to change in methodology.	
	Land less than 5 m (SEQ Catchments, 2008)		No update available.		

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/ condition	Update (trend monitoring) Data Set	Update Year extent/condition	Why have this target?
LAND					
L6 Soil Erosion By 2031, the extent of erosion from hill slopes and gullies will be reduced by 50% from the 2008 baseline.	Erosion Risk 2008 (SEQC). The adoption of 4 data sets to identify potential erosion areas. Data layers include Stream Bank Hazard (no trees on waterways), Low Grass Cover (<30% cover), Landslip Hazard (areas with a slope of 12-45 degrees with no woody vegetation), and outputs of the revised universal soil loss estimate (RUSLE).	Total area of high and very high soil erosion risk is 255,026 ha. Target is to reduce risk area by 127,513 ha.	Erosion Risk 2012 (SEQC) Four data sets identifying potential erosion areas. Data layers include Stream Bank Hazard (no trees on waterways), Low Grass Cover (<30% cover), Landslip Hazard (areas with a slope of 12-45 degrees with no woody vegetation), and outputs of the revised universal soil loss estimate (RUSLE). Some layers have been updated with more recent data.	Total area of high and very high soil erosion risk is 344,079 ha. NOTE: not all layers in this dataset have been updated, so erosion extent may be less than mapped	Degradation from soil erosion, both on site (e.g. gullies loss of nutrients) and offsite (damage to infrastructure, siltation of dams, increased cost for treatment of water supplies) is difficult to quantify but includes considerable private and public community costs.
L 7 Grazing Land Condition By 2031, 75% of grazing land in SEQ will be in a 'good' condition.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.			The management of grass cover to manage soil erosion and mass movement (landslip) is fundamental to the sustainable management of land resources. Improving land condition increases the productive potential of grazing lands and enhances biodiversity.
		Land Use extent: - Grazing: 36,079 ha of grazing land has gone to other uses (including agriculture)	DRAFT: Land use (2011-2013) Grazing land classes DRAFT: Land Use 2011-2013 Land use change	DRAFT: Current extent - Grazing: 1,202,199 ha	
L8 Land Contamination By 2031, existing contamination sites and off-site impacts will be reduced; and no new sites will be created over the 2008 baseline data.	Dataset from Department of Environment and Resource Management (DERM) – not available at this time.	No benchmark currently available.	Not measurable		Soil contamination can potentially cause sickness or death in people, plants and animals. Long-term soil contaminants such as persistent organochlorine pesticides (dieldrin and heptachlor), cadmium, lead and high energy radiation are more insidious because they can accumulate to unacceptable levels in food plants and farm animals without causing visible harm to their host.
L9 Extractive Resources By 2031, extractive resources within "Key Resource Areas" in SEQ will be available for their highest use with no net loss of other environmental and landscape values.	Key Resource Area (KRA) and Separation Area databases (DERM, 2007).	Total Key Resource Area is 10,329 ha. The Separation Area is 18,536 ha which provides a buffer to the KRA's.	DRAFT: Regional Ecosystems (V7, 2009 extent) and BPA (V3.5, 2006)	Graph of values	Mining and extractive resources are protected by a State Planning Policy which allows these resources to be accessed. This creates potential conflicts for the achievement of other RCTs such as Nature Conservation. Having a target for extractive industry in the SEQ NRM Plan enables the offsetting requirements of this industry to achieve a no net loss of other environmental and landscape values as represented by other RCTs. The Update identifies some of the other NRM target values present in Key Resource Areas which will be affected by extraction.

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/condition	Update (trend monitoring) Data Set	Update Year extent/condition	Why have this target?
NATURE CONSERVATION					
NC1 Remnant and Woody Vegetation By 2031, the 2001 extent of regional vegetation cover – including both remnant vegetation (35%) and additional non-remnant woody vegetation (22%) – will be maintained or increased.	Remnant Vegetation based on Regional Ecosystems of Queensland Version 4.0 (DERM, 2003) and Version 4.1 (DERM, 2004), 2001 extent.	Total Remnant is 810,685 ha (35%).	No update available.		There is a broad recognition that at least 30% remnant vegetation cover is required to maintain a minimum level of species and ecosystem function throughout a region. Studies have also indicated a progressive decline of species and greater rate of extinctions with incremental habitat loss.
	DRAFT: Remnant Vegetation based on Regional Ecosystems of Queensland Version 7.0, 2001 extent (DERM, 2012)	GSEQ: Total Remnant is 911,183 ha (35.5%).	DRAFT: Remnant Vegetation based on Regional Ecosystems of Queensland Version 7.0, 2009 extent (DERM, 2012)	GSEQ: Total Remnant is 900,204 ha (35.0%) -loss of 10,979ha	
	Woody Vegetation based on 2001 Statewide Land and Tree Study (SLATS) (DERM, 2009)	Total Woody Vegetation is 646,128 ha (28%).	Woody Vegetation based on 2011 Statewide Land and Tree Study (SLATS)	GSEQ: Total Woody Vegetation is 456,503 ha (%). NOTE: current extent is not comparable to Benchmark due to variability in data from year to year.	
	Queensland Herbarium Report on Clearing and Status of Regional Ecosystems (DERM)				
NC2 – Vegetation Fragmentation and Connectivity By 2031, there will be no net fragmentation of larger tracts (greater than 5000 ha), and 20% of priority smaller tracts (less than 5000 ha) will be better connected than the 2003 baseline.	Remnant Vegetation based on Regional Ecosystems of Queensland Version 4.0 (DERM, 2003) and Version 4.1 (DERM, 2004) Woody Vegetation based on 2001 Statewide Land and Tree Study (SLATS) (DERM, 2009) SEQ Roads based off State Digital Road Network (DERM, 2007)	Core Tracts (larger tracts >5000 ha) of which there are 21 in SEQ. Total number of non core (smaller tracts 100ha – 5000 ha) is 362 in SEQ. Priority non core tracts (20% of 362) is 72 i.e.. need to connect at least 72 smaller tracts to the 21 larger tracts.	Not measurable	Not measurable	Large areas of vegetation and vegetation corridors support ecological processes that are important if the region is to maintain its rich biodiversity and clean air and water.
	DRAFT: Remnant Vegetation based on Regional Ecosystems of Queensland Version 7.0, 2001 extent (DERM, 2012)	See tables	DRAFT: Remnant Vegetation based on Regional Ecosystems of Queensland Version 7.0, 2009 extent (DERM, 2012)	See tables	
NC3 Wetlands By 2031, the 2008 extent and condition of SEQ wetlands will be maintained or increased.	Wetland System (DERM, Version 2 October 2009)	Total extent of wetlands is 162,742 ha.	No update available.		Wetlands assist in the maintenance of water quality and provide habitat and food for fish, birds and animals.
	Wetland System version 3, 2001 Extent (DSITIA 2012)	GSEQ: Total extent of wetlands is: 596,087 ha Total extent of natural wetlands is: 561,851 ha	Wetland System version 3, 2009 Extent (DSITIA 2012)	GSEQ: Total extent of wetlands is: 595,947 ha (loss of 146 ha). Total extent of natural wetlands is: 560,425 (loss or modification of 1,426 ha).	

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/condition	Update (trend monitoring) Data Set	Update Year extent/condition	Why have this target?
NATURE CONSERVATION					
NC4 Vulnerable Ecosystems By 2031, at least 4% of the original pre-clearing extents of vulnerable regional ecosystems will be represented in protective measures.	Regional Ecosystem Distribution Database (REDD) (DERM, 2007) Remnant Vegetation based on Regional Ecosystems of Queensland Version 4.0 (DERM, 2003) and Version 4.1 (DERM, 2004) Protected Areas of Queensland v.6.13 (DERM 2007) Nature Refuges (EHP 2007)	154 Regional Ecosystems (REs) in SEQ; 102 of these are identified as Least Concern and have greater than 4% in reserve (protected); The remaining 52 are vulnerable REs made up of: - 29 REs have less than 4% in reserve (protected) including 10 Endangered, 12 Of Concern and 7 Not of Concern; o 12 REs are Of Concern; o 11 REs are Endangered.	No update available.		The large number of REs that we currently have in SEQ work together to carry out the ecological processes that provide ecosystem services. We do not know what it might mean for the ability of the region to provide these services if we were to start losing REs. We need to maintain or improve the number and type of REs that we have in protective measures if we are to ensure the ongoing provision of important ecosystem services.
	DRAFT: Remnant Vegetation based on Regional Ecosystems of Queensland Version 7.0 (DERM, 2009), 2001 extent. Protected Areas of Queensland (DERM 2007) Nature Refuges (EHP 2007)		DRAFT: Remnant Vegetation based on Regional Ecosystems of Queensland Version 7.0 (DERM, 2009), 2009 extent. Version 7.0 (DERM, 2009), 2009 extent. Protected Areas of Queensland v.6.13 (NPRSR 2014) Nature Refuges (EHP 2013)	190 Regional Ecosystems (REs) in SEQ; 97 of these are identified as Least Concern. The remaining 93 are vulnerable or Endangered REs Since 2001, 4 of the 39 Poorly Conserved Res have achieved 4% protected status. 35 Res remain Poorly Conserved.	
NC5 Threatened Species In 2031, the 2008 conservation status of native species will be maintained or improved.	SEQ Biodiversity Planning Assessment V3.5 (DERM).	Refer to Appendix C for full list of Endangered Vulnerable and Rare (EVR) and Back on Track species.	Back on Track species prioritisation framework (DEHP 2013)	74 species are listed as Endangered 141 species are listed as Vulnerable 125 species are listed as Near Threatened.	To maintain a healthy natural environment that supports the region's rich biodiversity, the conservation status of these species should be improved or maintained.
NC6 Habitat for Priority Taxa By 2031, the 2001 extent and condition of habitat for priority taxa will be maintained or increased.	SEQ Biodiversity Planning Assessment V3.4 (DERM).	Total area is 689,610 ha which includes Core Habitat for EVR (165,628.5 ha) and Priority Taxa (632,740.5 ha).	SEQ Biodiversity Planning Assessment V3.5 (DERM).	Category descriptions have changed.	In order to keep taxa from becoming endangered, vulnerable, rare we need to keep the core habitat or those areas that provide food and shelter for these plants and animals.
	Brigalow Belt Biodiversity Planning Assessment V1.3 (DERM).		Brigalow Belt Biodiversity Planning Assessment V1.3 (DERM).	DRAFT:	
	Wildnet (DERM, 2007).				

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/condition	Update (trend monitoring) Data Set	Update Year extent/condition	Why have this target?
REGIONAL LANDSCAPE AREAS					
RLA 1 – Landscape Heritage By 2031, at least 90% of the 2011 area of regionally important landscape heritage will be retained within each local government area.	Protected Areas of Queensland (DERM, 2009) Ramsar (DERM) Heritage Places Register (DERM) Marine Park (DERM, 2008) World Heritage Areas (DERM, 2005) National Estate Register (AG DEWHA)	Combined area is 586,783 ha.	Protected Areas of Queensland v.6.13 (NPRSR 2014) Heritage Places Register (DERM) 2014	DRAFT: Update of datasets to include newly gazetted properties 131 ha of additional Natural Heritage	Landscapes are important in preserving environmental, sociocultural and historic connections, including landscapes with cultural significance.
RLA 2 – Outdoor Recreation Settings By 2031, the 2011 extent of regional outdoor recreation settings will be maintained or increased.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.			A variety of recreational settings is one of the key attractions of South East Queensland, for both residents and tourists. As many popular recreational activities are traditionally conducted in natural or semi-natural settings, it is important to preserve these areas.
	DRAFT: Land for Public Recreation (DSDIP, 2011) Protected Areas of Queensland (DERM 2011) Landscape Settings (DLGP, SEQC 2013)		DRAFT: Land for Public Recreation (DSDIP, 2011) Protected Areas of Queensland (NPRSR 2013)	20.9% of potential recreation settings are protected. More than 75% of settings are privately owned.	
RLA 3 – Outdoor Recreation Demand By 2031, 90% of the demand for outdoor recreation will be met through a mix of public land, waterways and the voluntary provision of opportunities on private land.	No agreed dataset for original Atlas.	No benchmark available for original Atlas.	No update available.		As the population of South East Queensland increases (in line with current policy), more pressure will be placed on existing recreation areas. In some cases, this will result in degradation of the resource. It is therefore important to secure additional resources to meet the demands of the future SEQ population.
	DRAFT: Census: number of residents per statistical district Land for Public Recreation (DSDIP, 2011)	DRAFT: Comparison of number of people in a statistical area and area of protected landscape settings			
RLA 4 – Regionally High Scenic Amenity By 2031, the area of regionally high scenic amenity will be maintained or improved from the 2004 baseline.	Scenic Amenity Rating (SEQROC, 2004).	Total area of Regionally Significant (Value 9-10) Scenic Amenity is 637,607 ha.	Scenic Amenity update project LOP (DLGP, SEQC, 2008)		Scenic amenity is the measure of a landscape's scenic qualities, reflecting the psychological benefit that the community derives from viewing the region's wide variety of landscapes. Examples of outstanding scenic qualities include beaches, ranges and farmlands.
RLA 5 – Locally Important Scenic Amenity By 2031, at least 80% of the 2004 area of locally important scenic amenity within each local government area will be retained.	Scenic Amenity Rating (SEQROC, 2004).	1,606,211 ha locally important scenic amenity.	Scenic Amenity update project LOP (DLGP, SEQC, 2008)		Scenic amenity is the measure of a landscape's scenic qualities, reflecting the psychological benefit that the community derives from viewing the region's wide variety of landscapes. Examples of local scenic qualities include parks, waterways, view sheds and local landmarks.
TRADITIONAL OWNERS					
T01 By 2031, Traditional Owners and Aboriginal people will be resourced and working together with natural resource managers, government and non-government organisations to implement the SEQ Natural Resource Management Plan and the Cultural Resource Management Plan.	The capacity of Traditional Owners and Aboriginal People will be enhanced as part of the implementation of SEQTOA's Cultural Resource Management Plan and suitable indicators identified to benchmark and measure this target.	No benchmark available for original Atlas.			Recognition of Traditional Owners as natural resource managers is one of the Guiding Principles of the *SEQ NRM Plan*. Although shaped by human occupants for tens of thousands of years prior to 1824, the region's lands, waters, atmosphere and biodiversity were unaffected by the impacts of development. Non-Aboriginal settlement has had impacts. Natural resource planning, management and action can be guided by holistic traditional knowledge and values: the spiritual and respectful attitudes to "country" of the Traditional Owners are a key to the recovery of significant values. A key activity is to achieve active involvement of Aboriginal and Torres Strait Islander peoples in community planning and decision making and ensuring they are engaged in business about their country.

SEQ NRM Plan RCTs	Benchmark Data Set	Benchmark Year extent/ condition	Update (trend) Data Set	Update Year extent/cond'n	Why have this target?
WATER					
W 1 Environmental flows By 2031, environmental flows will meet aquatic ecosystem health and ecological process requirements.	No agreed dataset	No benchmark available for original Atlas.	No update available.		Downstream habitats can be altered by dams, water extraction, land modification and point source discharges which disrupt natural flow regimes. Ecosystem processes, the life cycles of aquatic species and the distribution and abundance of aquatic life may be affected where flows are disrupted. This occurs in most waterways in SEQ and it threatens the long term viability of aquatic ecosystems.
	DRAFT: Subcatchment Health Index as surrogate for environmental flows				
W 2 Groundwater levels By 2031, 75% of SEQ Groundwater Resource Units will have ground water levels within identified acceptable annual ranges.	DERM to develop a methodology to establish acceptable range based on historic data. Monitoring programs exists in a number of groundwater systems. Further programs to be assessed.				The rate of groundwater recharge varies across SEQ. In some areas, the level of the water table determines whether there is water in the streams. A high rate of groundwater extraction for increasing irrigation and urban use, coupled with expanding drought conditions, is placing groundwater resources across the region under pressure.
	DRAFT: Groundwater Monitoring Database (DNRM)	See Map	Groundwater Monitoring Database (DNRM)	See Map	
W 3 Groundwater quality By 2031, ground water quality (nutrients and EC measurements) in all SEQ Groundwater Resource Units will be within identified acceptable annual ranges.	DERM to develop a methodology to establish benchmark and ongoing monitoring building on work in the Lockyer.	No benchmark available for original Atlas.	No update available.		Rapid population growth is increasing the area of rural residential areas and urban developments with a corresponding increase in septic and sullage wastewater discharges which can seep into the groundwater system. Urban areas also present a wide variety of groundwater pollution sources including fuel stations, industrial sites, contaminated sites, dumps and landfills. Agriculture and intensive industry are other potential sources of increased nutrient concentration in groundwater.
	Groundwater Monitoring Database (DNRM)	No benchmark currently available.	Groundwater Monitoring Database (DNRM)	Requires analysis	
W4 Groundwater dependent ecosystems By 2031, the condition of groundwater ecosystems and groundwater dependent ecosystems will be within identified acceptable annual ranges.	Wetland System (DERM, Version 2 October 2009) Regional Ecosystems, Version 5.0 (DERM, 2005)	Combined total is 82,384 ha.	No update available.		Groundwater in aquifers and caves supports unique ecosystems with a variety of organisms which spend their whole life underground and are subject to extremely uniform conditions compared with surface life. Groundwater interacts with surface water and these interactions support the structure and function of groundwater dependent ecosystems including springs, streams, wetlands and swamps.
	DRAFT: Groundwater Dependent Ecosystems Atlas (BOM 2012)	GSEQ: Subsurface Dependence: 575,178 ha, Surface Dependence: 116,146 ha			
W 5 High Ecological Waterways In 2031, High Ecological Value waterways in SEQ will maintain their 2008 classification.	Environmental Values (EV) and Water Quality Objectives (WQOs) for Moreton Bay/South-east Queensland (DERM, 2007)	As mapped.	No update available.		High ecological value (HEV) waterways scheduled under the Environmental Protection (Water) Policy (EPP) 1997 are effectively unmodified or other highly valued systems, typically (but not always) occurring in national parks, conservation reserves or in remote and/or inaccessible locations. High priority areas that represent critical aquatic and riparian habitat and areas which make an important contribution to waterway health (including water quality) in the region need to be protected and conserved.
	The South East Queensland Environmental Values Scheduled Plan Outline v2.0 (DEHP, 2013)	For further information see the relevant Plan: *www.ehp.qld.gov.au/water/policy/schedule1morton_bay_southeast_ queensland_scheduled_evs__wqos.html*			
W 6 Waterways maintenance and enhancement In 2031, scheduled water quality objectives for all SEQ waterways will be achieved or exceeded.	Environmental Values (EV) and Water Quality Objectives (WQOs) for Moreton Bay/South-east Queensland (DERM, 2007)	No benchmark available for original Atlas.	No update available.		This target includes potable or drinking water supplies from streams and dams. The achievement of this target is crucial for the supply of clean drinking water. Management focused on achieving or maintaining the WQOs necessary to support agreed Environmental Values (EVs) provides the most secure approach to minimising the social, economic, public health and environmental risks associated with a decline in water quality in SEQ waterways.
	DRAFT: South East Queensland Management Intent for Waters v2.0 (DEHP, 2013)	High Ecological Value Waterways: 489,588 ha Moderately Disturbed Waterways: 98,574	No update available.		
W 7 Waterways Restoration By 2031, waterways classified as ranging from slightly to moderately disturbed and/ or highly disturbed will have ecosystem health and ecological processes restored.	Ecosystem Health Monitoring Program (SEQ HWP)	No benchmark currently available.	No update available.		The health of waterways is crucial to the health of receiving waters such as Moreton Bay.