Government of **Western Australia**
Department of **Water**

Survey of urban nutrient inputs on the Swan Coastal Plain

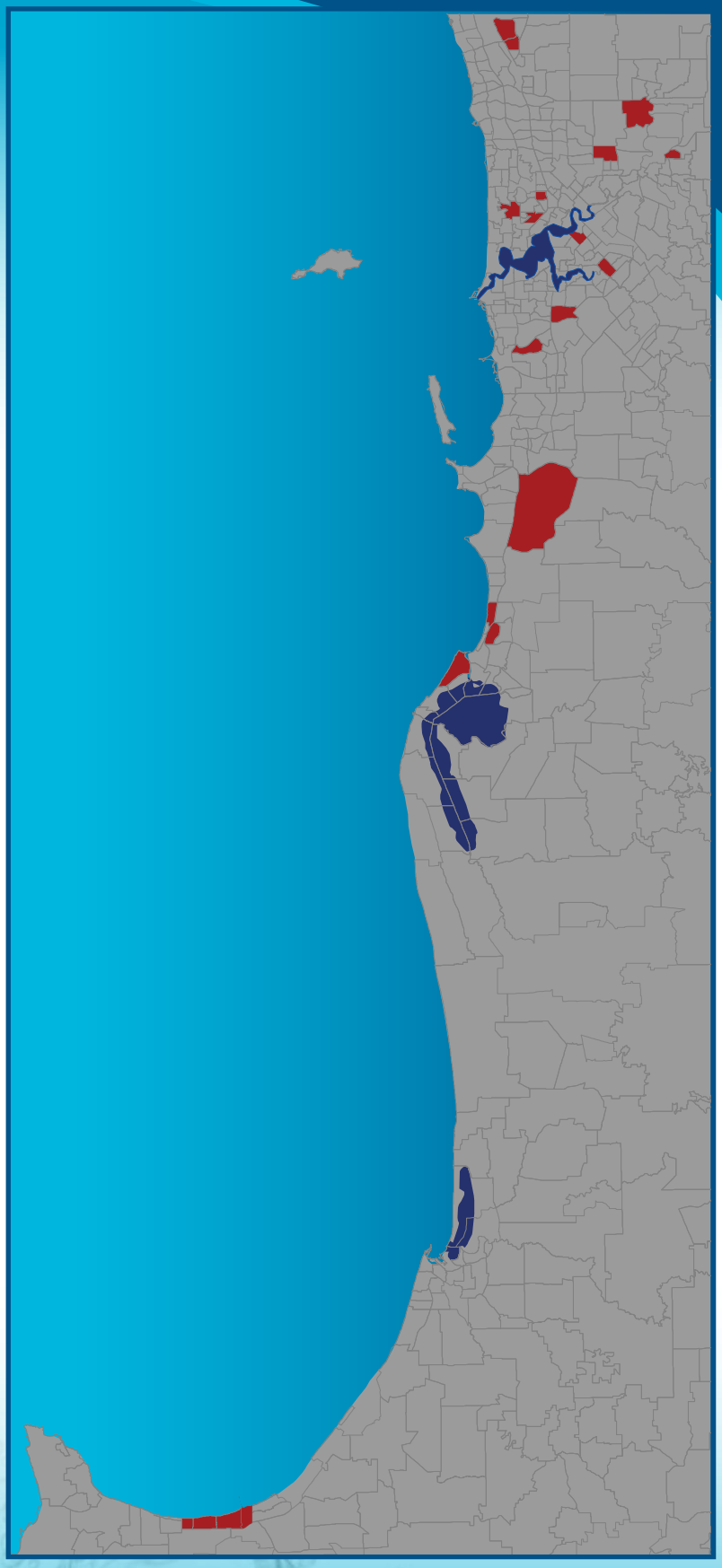
Coastal Catchment Initiative project

The wetlands, rivers and estuaries of Western Australia's Swan Coastal Plain are being adversely impacted by the land uses in their catchments. Excessive nutrients in these waterways can promote algal growth and the associated problems of deoxygenation and fish deaths. As part of the Australian Government's Coastal Catchment Initiative, the Department of Agriculture and Food WA and the Department of Water have surveyed nutrient inputs to agricultural and urban land uses. The resulting data will be used to determine the relative effects of different land uses, and the impact of proposed urban developments.

The *Survey of urban nutrient inputs on the Swan Coastal Plain* was designed to determine nitrogen and phosphorus input rates (kg/ha/year) – including fertiliser and waste from cats and dogs – for urban residential lots with varying characteristics, namely:

- lot size
- age of dwelling
- type of dwelling
- location
- whether occupied by the property owner or lessee.

Information was sought on each household's area of lawn and garden, types of garden plants, watering methods and times, pets, pet-waste disposal methods and fertilisation practices. Approximately 7000 surveys were delivered to 17 locations (shown in red on the map) in Western Australia's Swan-Canning, Geographe Bay and Peel-Harvey catchments. Of these, 1206 surveys were returned (17.2% response rate). The survey methodology, data analyses and results are presented in Kelsey, P, King, L & Kitsios, A 2010, *Survey of urban nutrient inputs on the Swan Coastal Plain*, Water Science technical series, Report no. 24, Department of Water, Western Australia. This leaflet contains a summary of the results.

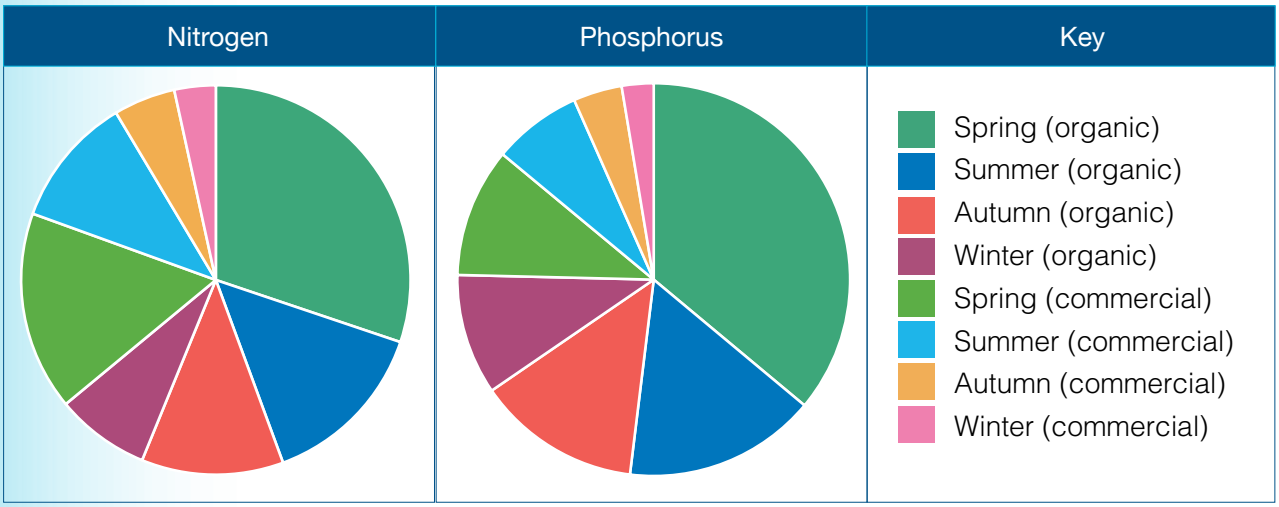


Results

- There was a large range of nutrient inputs for dwellings with similar characteristics, with some applying nutrients at greater rates than market gardeners.
- Most nutrient inputs were from fertilisation of gardens.

Breakdown of inputs (by weight):	Nitrogen	Phosphorus
Garden	70%	81%
Lawn	21%	12%
Pets	9%	7%

- 64% nitrogen and 75% phosphorus fertilisation was organic (by weight) – such as manures, mulches and composts.
- During the past 10 years there appears to have been an increase in the number of dwellings with no native plants in their gardens.
- The seasonality of fertiliser application for organic and inorganic (commercial) fertilisers:



- Most nutrients were applied in spring (46%) – the start of the growing season
- No differences were apparent between the Perth metropolitan area and the regional centres of Mandurah and Busselton.

Statistical analyses

Statistical analyses (Kruskal-Wallis non-parametric tests) revealed significant differences between nitrogen and phosphorus input rates (kg/ha/year) for properties with different characteristics; that is, lot size, lot age, dwelling type, location and whether occupied by owner or renter.

Input rates for different lot sizes:

Lot Size	Area (m^2)	Nitrogen (kg/ha/year)	Phosphorus (kg/ha/year)
Very small	≤ 400	23.4	6.9
Small	401 - 600	91.2	22.8
Medium	601 - 730	101	26.4
Large	> 730	74.2	18.0
All lots		84.1	19.7

Input rates for different lot sizes and dwelling ages:

Lot Size	Area (m^2)	Nitrogen (kg/ha/year) ≤ 2 years old	Nitrogen (kg/ha/year) > 2 years old	Phosphorus (kg/ha/year) ≤ 2 years old	Phosphorus (kg/ha/year) > 2 years old
Very small	≤ 400	68.6	23.4	19.4	6.9
Small	401 - 600	115	87.6	33.2	20.3
Medium	601 - 730	177	92.9	43.7	24.7
Large	> 730	119	74.0	30.4	17.0
All lots		147	78.2	38.6	18.6

Variability due to dwelling type is captured by lot size variability. Other differences due to location (suburb) and occupancy were apparent, as discussed in the report.

Comparison of nutrient input rates for urban residential and rural land uses

The nutrient input rates derived from rural and urban nutrient surveys (Table 1, Figure 1 and Figure 2) will be used to determine the relative impacts of different land uses. Because the residential developments replacing rural land uses generally have greater nutrient inputs, appropriate urban designs that minimise fertiliser application and allow on-site nutrient capture are necessary to protect adjacent streams, wetlands and estuaries.

Table 1 **Nitrogen and phosphorus input rates for rural* and urban** land uses**

Landuse	Nitrogen (kg/ha/year)	Phosphorus (kg/ha/year)
Piggery	629.3	144.7
Turf farm	432.8	14.5
Dairies	145.1	25.5
Annual horticulture (vegetables)	142.6	126.9
Urban residential (601 - 730m^2)	100.6	26.4
Urban residential (401 - 600m^2)	91.2	22.8
Beef grazing	86.4	12.7
Mixed grazing	79.5	9.9
Urban residential (> 730m^2)	74.2	18.0
Horses	70.1	13.2
Lifestyle block	49.2	3.4
Cropping	46.7	8.4
Sheep	34.7	2.5
Perennial horticulture (orchids)	27.2	12.3
Viticulture	23.5	25.4
Urban residential (< 400m^2)	23.4	6.9
Tree plantation	12.6	8.2

* *Rural values determined from DAFWA farm-gate nutrient budgets undertaken in the CCI project*

** *Urban input rates are those for different lot sizes; age of dwelling not considered*

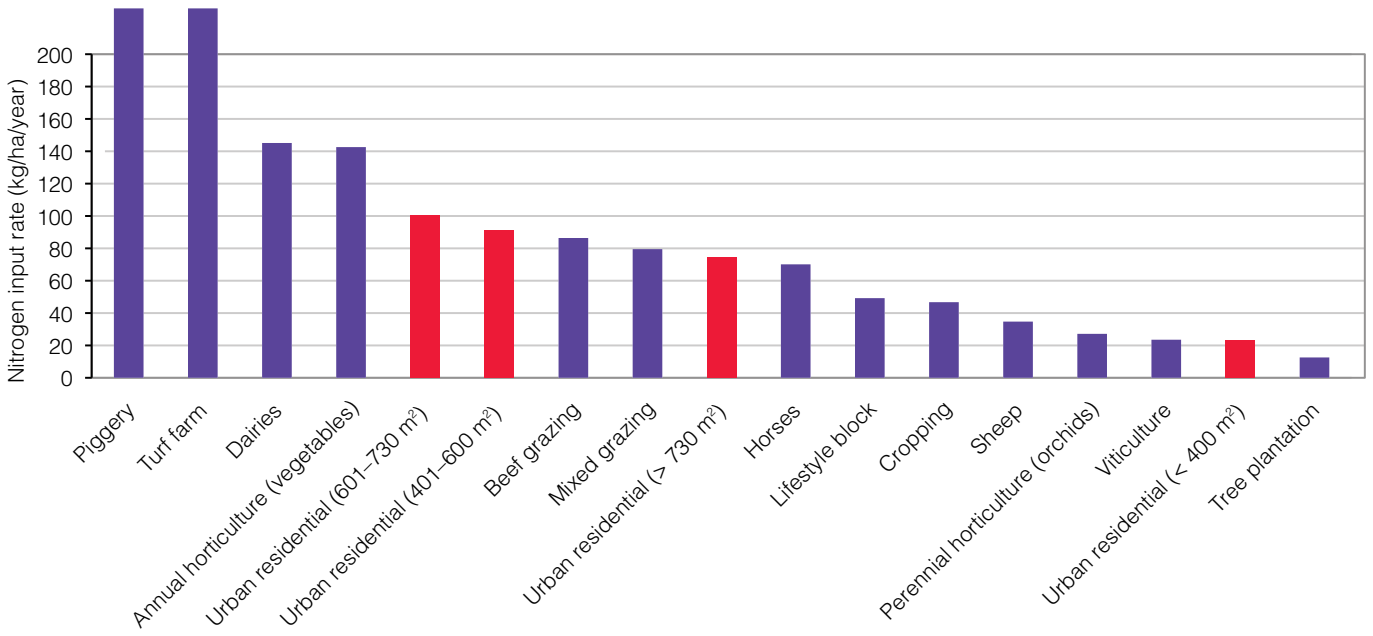


Figure 1 **Nitrogen input rates for rural and urban residential land uses**
('piggery' inputs of 630 kg/ha/year and 'turf farm' of 433 kg/ha/year not fully displayed)

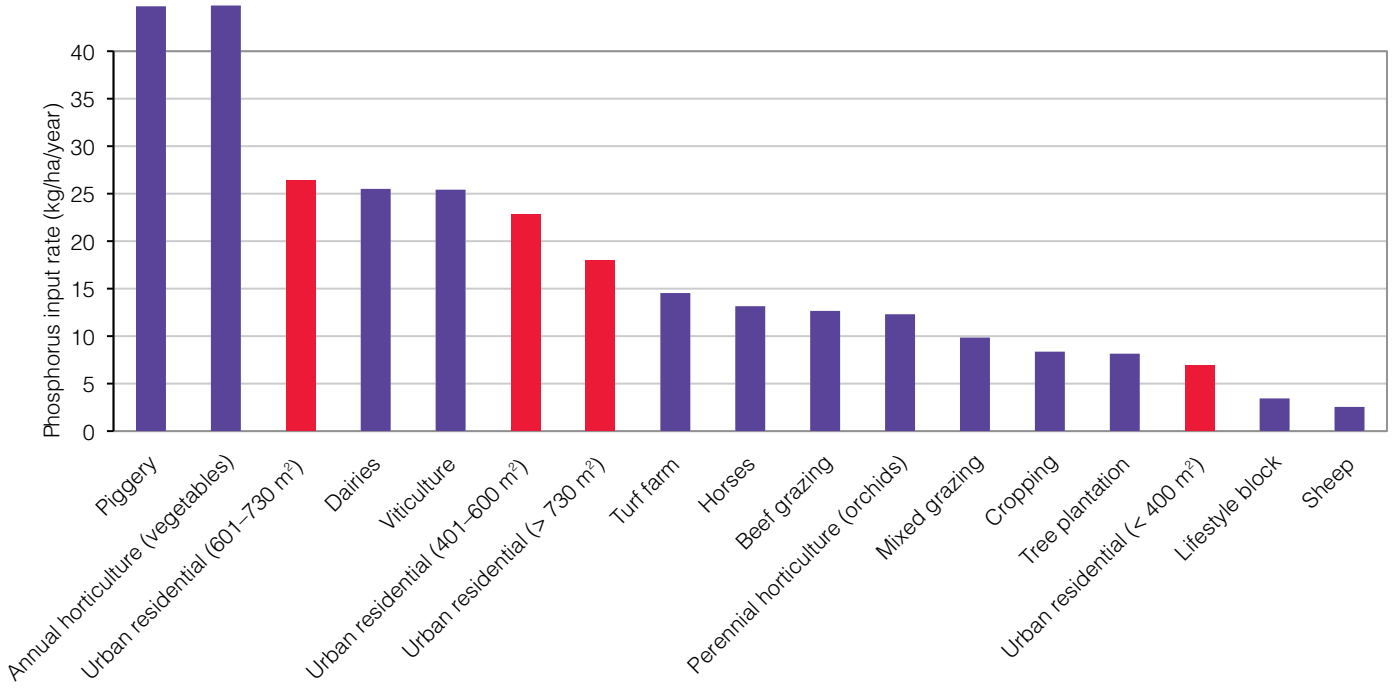


Figure 2 **Phosphorus input rates for rural and urban residential land uses**
('piggery' inputs of 145 kg/ha/year and 'annual horticulture (vegetables)' of 130 kg/ha/year not fully displayed)

Australian Government

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For more information contact:
Artemis Kitsios or Peta Kelsey
Water Science branch Water Resource Management division
Department of **Water** www.water.wa.gov.au