



## Australia's National Cadmium Database and National Cadmium Budget

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## Background

- Many industry bodies and State and Federal agencies held data on Cd in foods in disparate databases
- It was difficult to gain an overall picture of the national situation with regard to Cd in foods
- Spatial information available in some databases had not been used previously

## Database generation

- NCMC established a national database for Cd in crops and foods in Australia
- Data from sources such as NRS, FSANZ, state agencies, RDCs and universities was collated into a single database
- The database has >95,000 entries for a wide variety of foodstuffs

# National Cadmium Budget

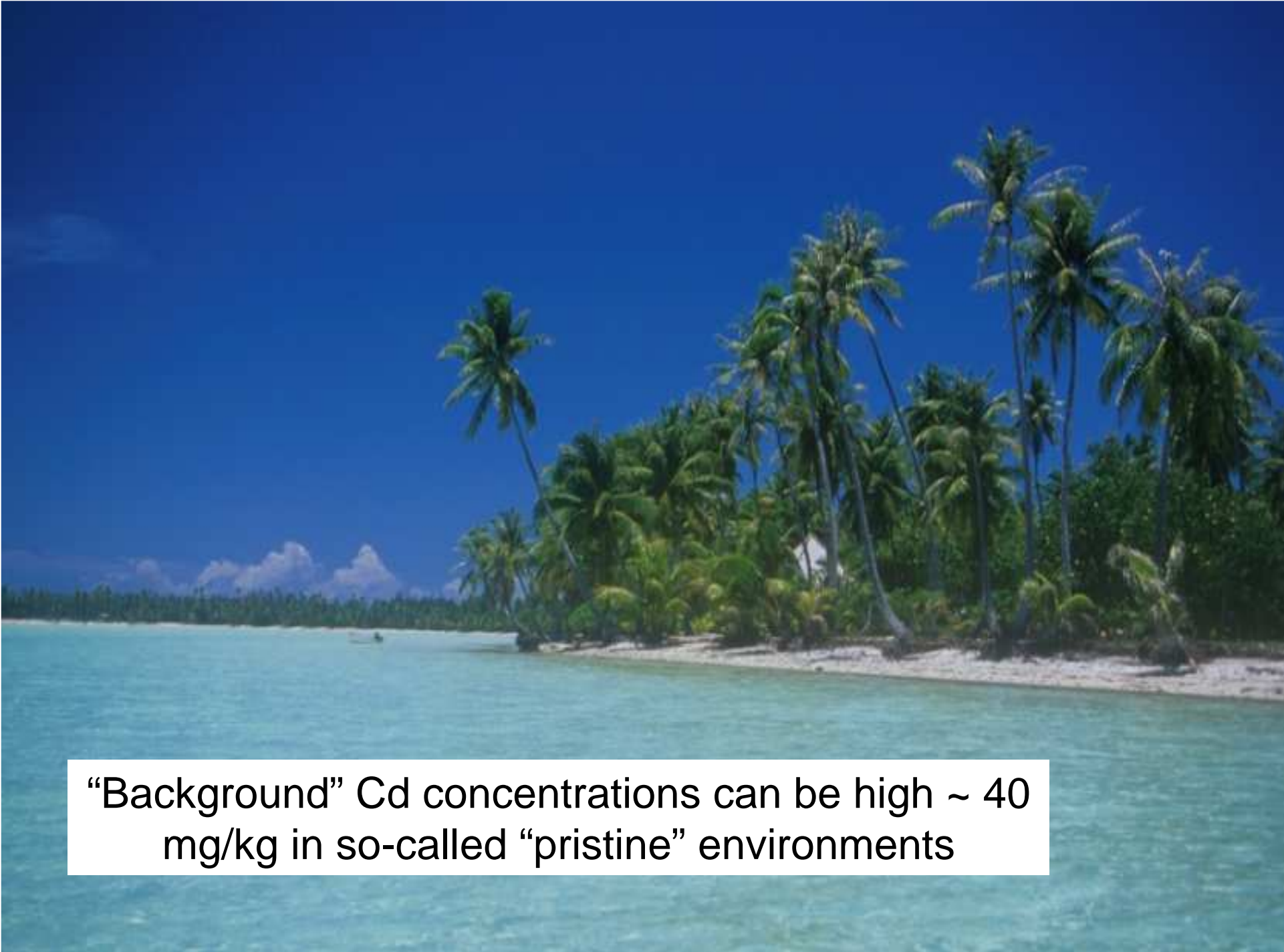
- NCMC developed a national Cd audit of inputs to, and exports from, agricultural soils (crops and improved pastures)
- Unimproved pasture and rangeland areas excluded
- Focus on national rather than farm scale

# Weathering

Natural Cd  
concentrations are  
generally low in many  
soils  
0.01-0.7 mg/kg





A photograph of a tropical beach scene. The foreground shows clear, turquoise water. A sandy beach runs along the middle ground, lined with numerous tall palm trees and other tropical vegetation. The sky is a deep, clear blue with a few small, white clouds on the horizon. The overall scene is bright and sunny.

“Background” Cd concentrations can be high ~ 40 mg/kg in so-called “pristine” environments







**GIBSONS**

**PIVOT**  
Fertilisers

**GIBSONS GROUND SPREAD**













# National Cadmium Budget

- Cadmium inputs considered

Phosphatic fertilisers – ABS data

Soil conditioners - ABS data

Biosolids – water industry data

Atmospheric deposition – NPI data

Burning – assumed negligible

Rock weathering – assumed negligible

# National Cadmium Budget

- Cadmium exports considered

Crop exports – ABS data

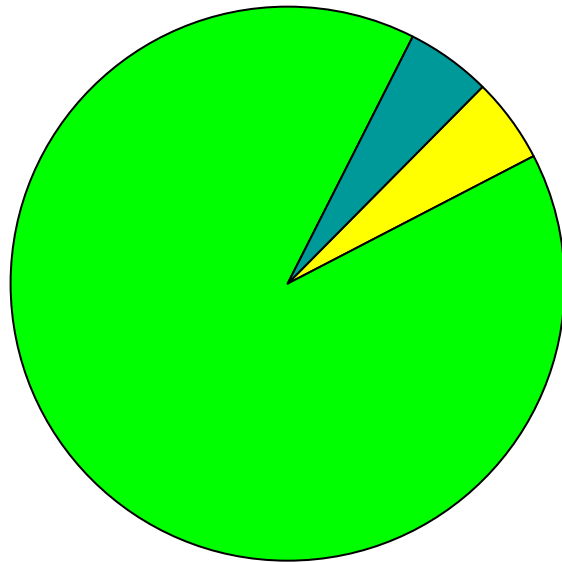
Livestock product exports – ABS data

Erosion – unknown, assumed negligible

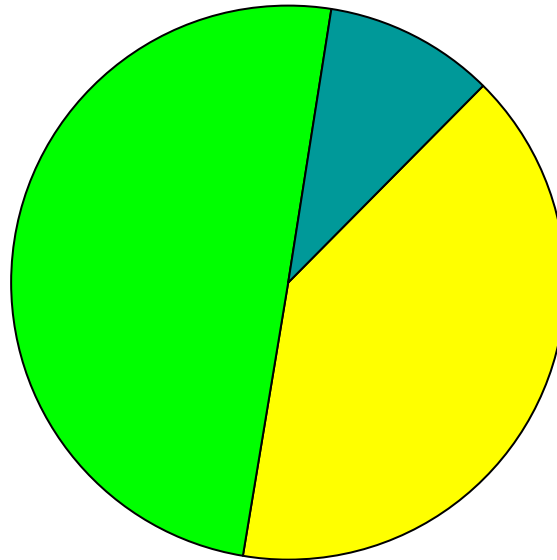
Leaching – unknown, assumed negligible

# Typical relative Cd inputs

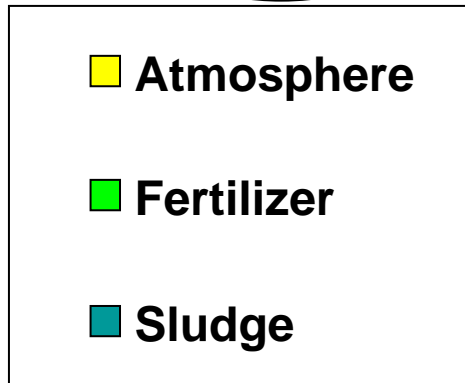
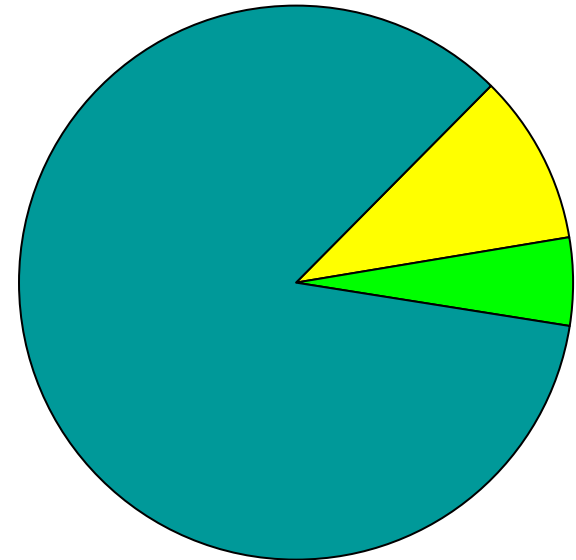
Australia  
Canada  
New Zealand



Europe - average

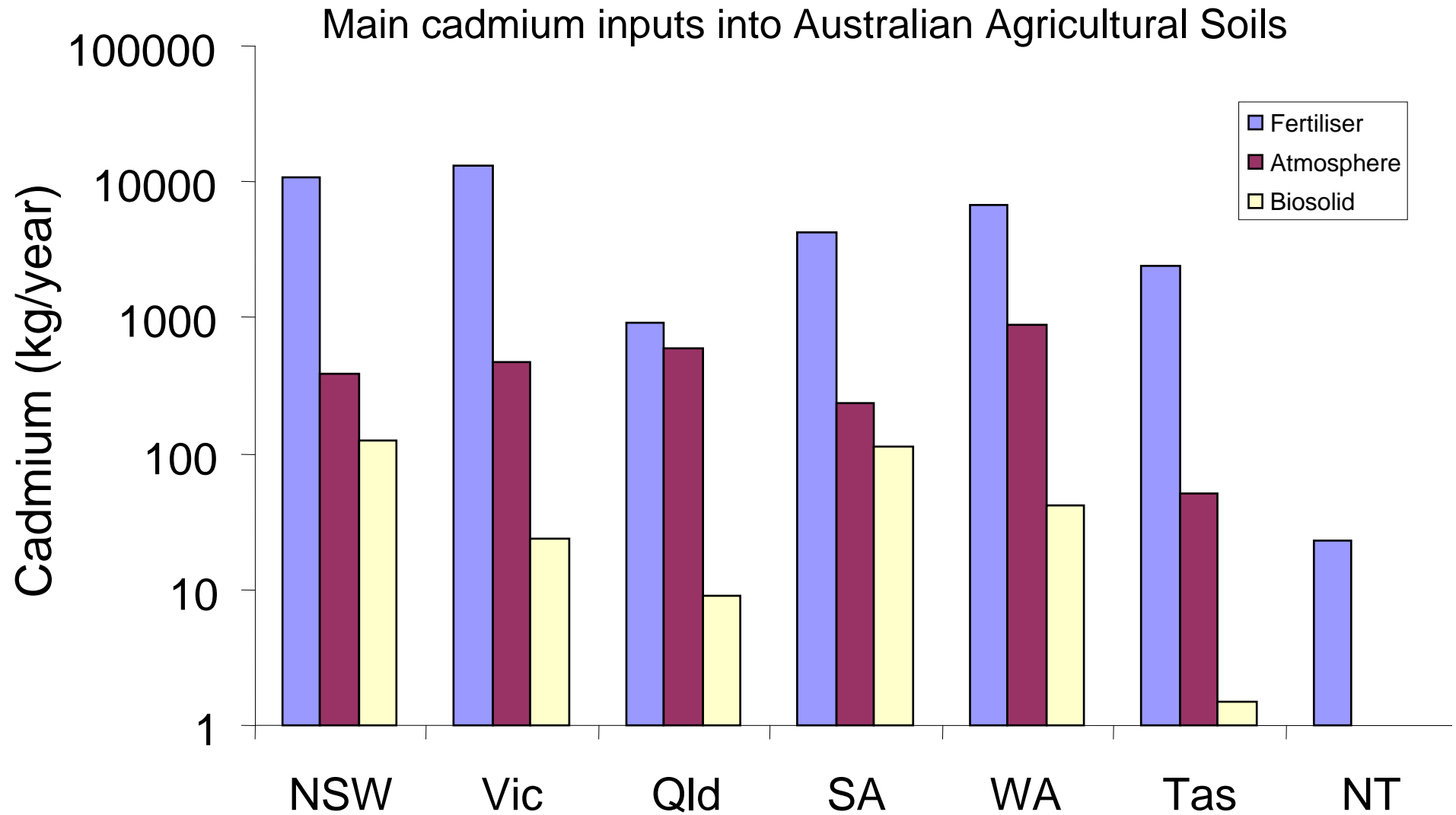


Biosolid site

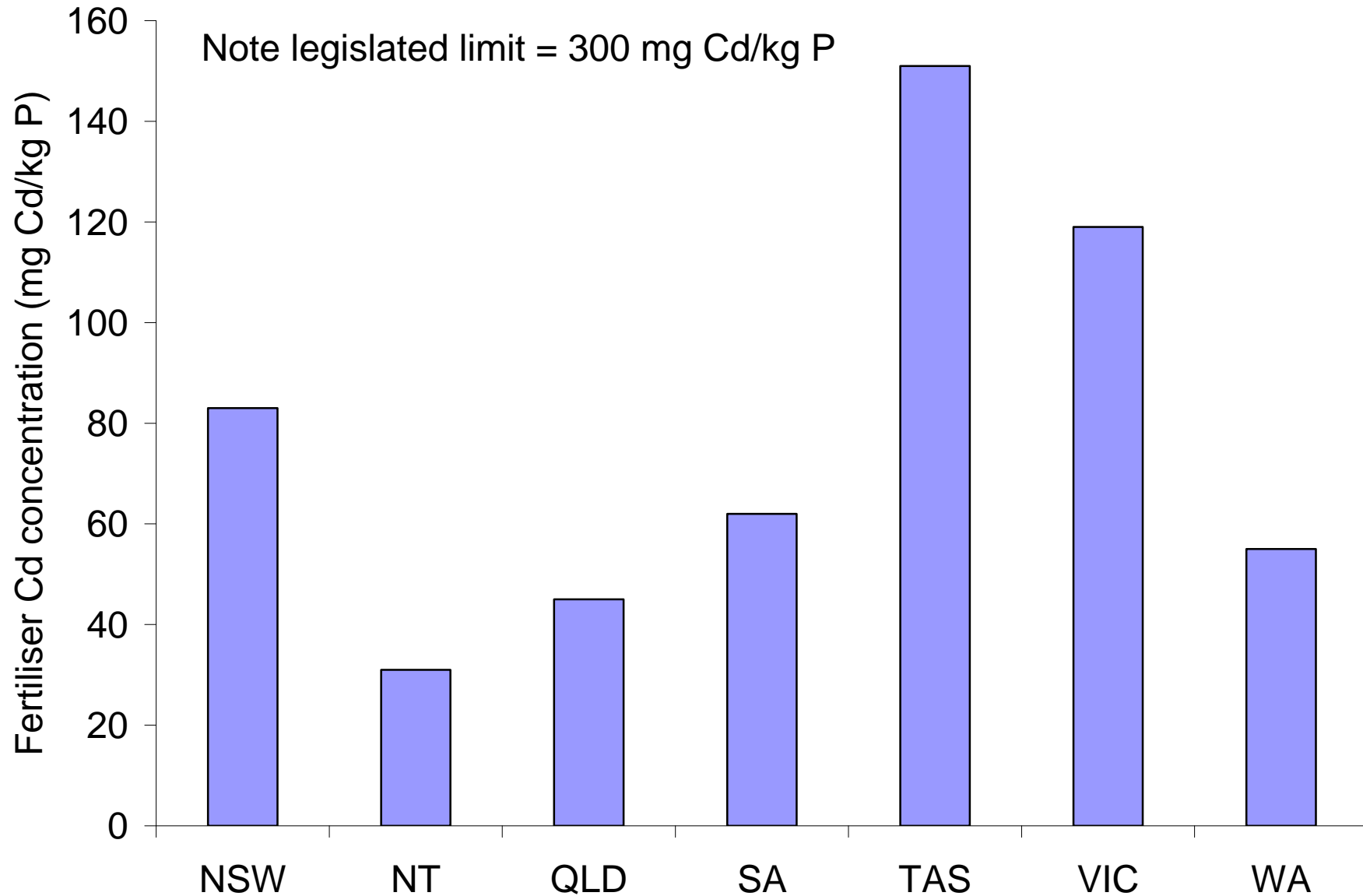




# Cadmium inputs (kg/year)



# Fertiliser quality by State

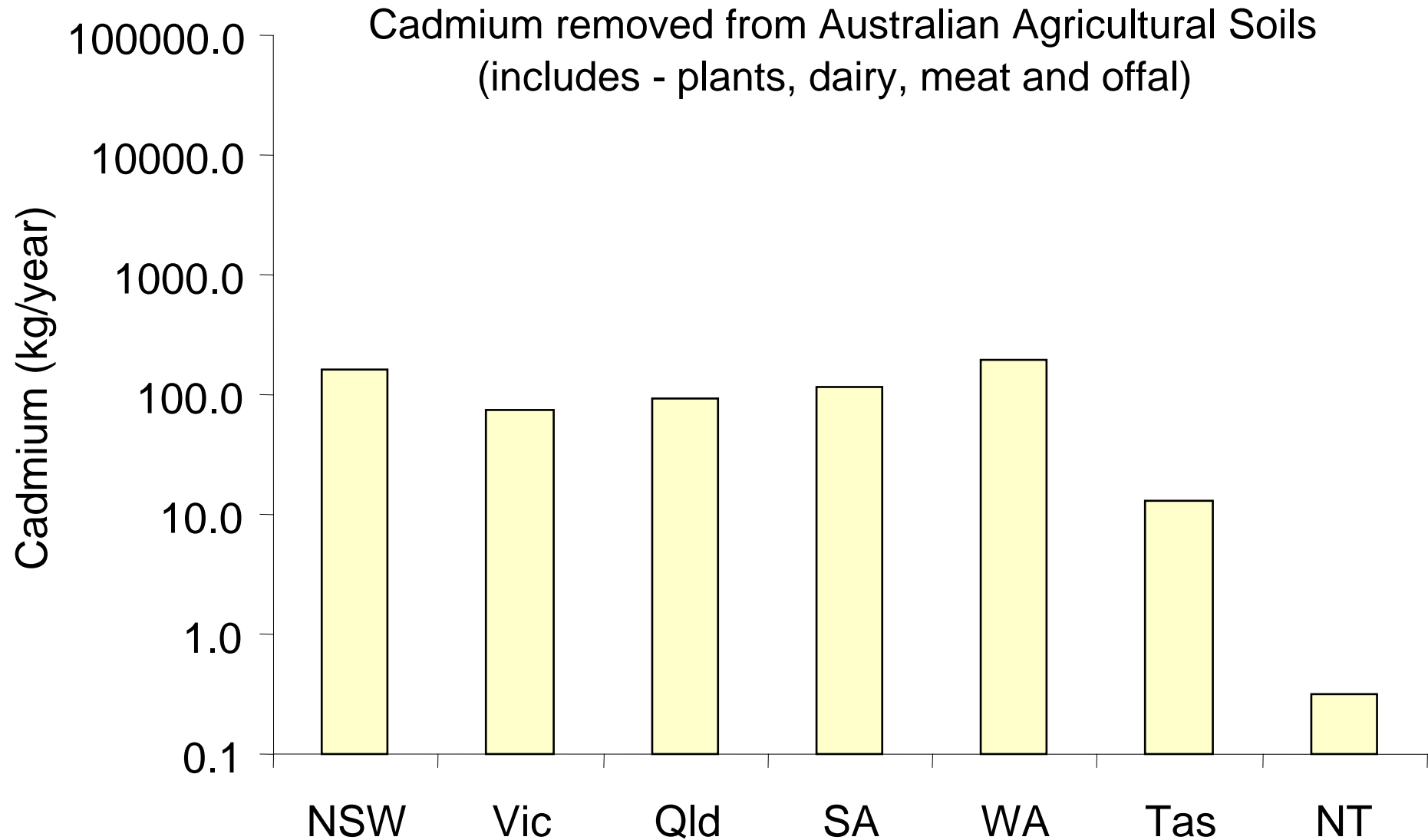


# Cadmium inputs (kg)

	NSW	Vic	Qld	SA	WA	Tas	Aust <sup>5</sup>
<b>Inputs</b>							
Fertilisers	9380	11700	887	4200	4570	1560	32000
Soil conditioners	460 – 890	560 – 1100	85 – 170	180 – 340	330 – 660	92 – 190	1700 – 3300
Other soil amendments and sprays	-	-	-	-	-	-	-
Municipal biosolids	120	24	9	110	41	2	310
Green wastes	-	-	-	-	-	-	-
Atmospheric deposition	670	1,900	350	430	630	140	4100
Rock weathering	-	-	-	-	-	-	-
<b>Total inputs</b>	<b>11000</b>	<b>14000</b>	<b>1300</b>	<b>4900</b>	<b>5600</b>	<b>1800</b>	<b>38000</b>

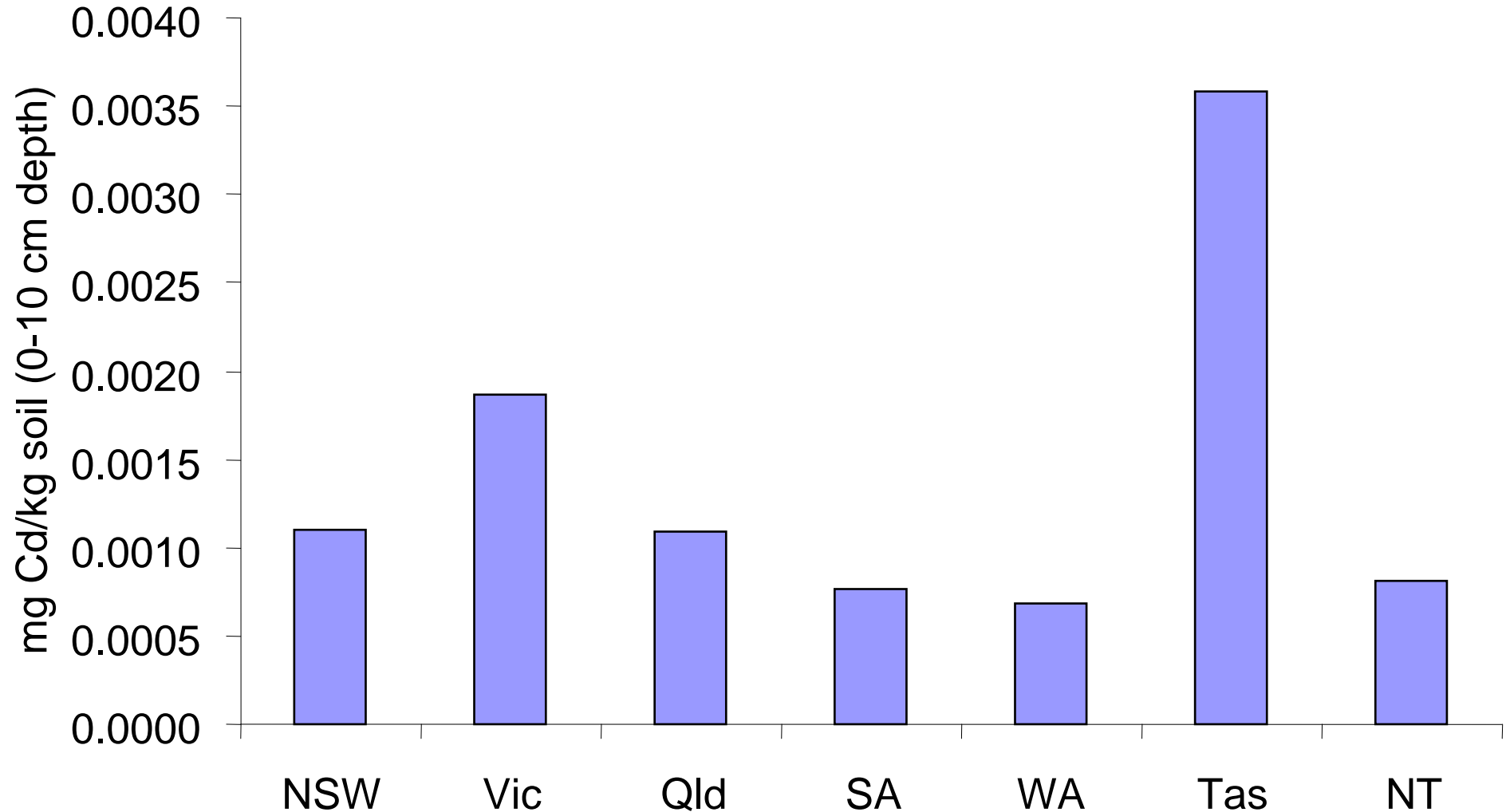


# Exports of Cd in produce (kg/year)



# Net increases in soil Cd concentration

Annual average increase in soil cadmium concentrations



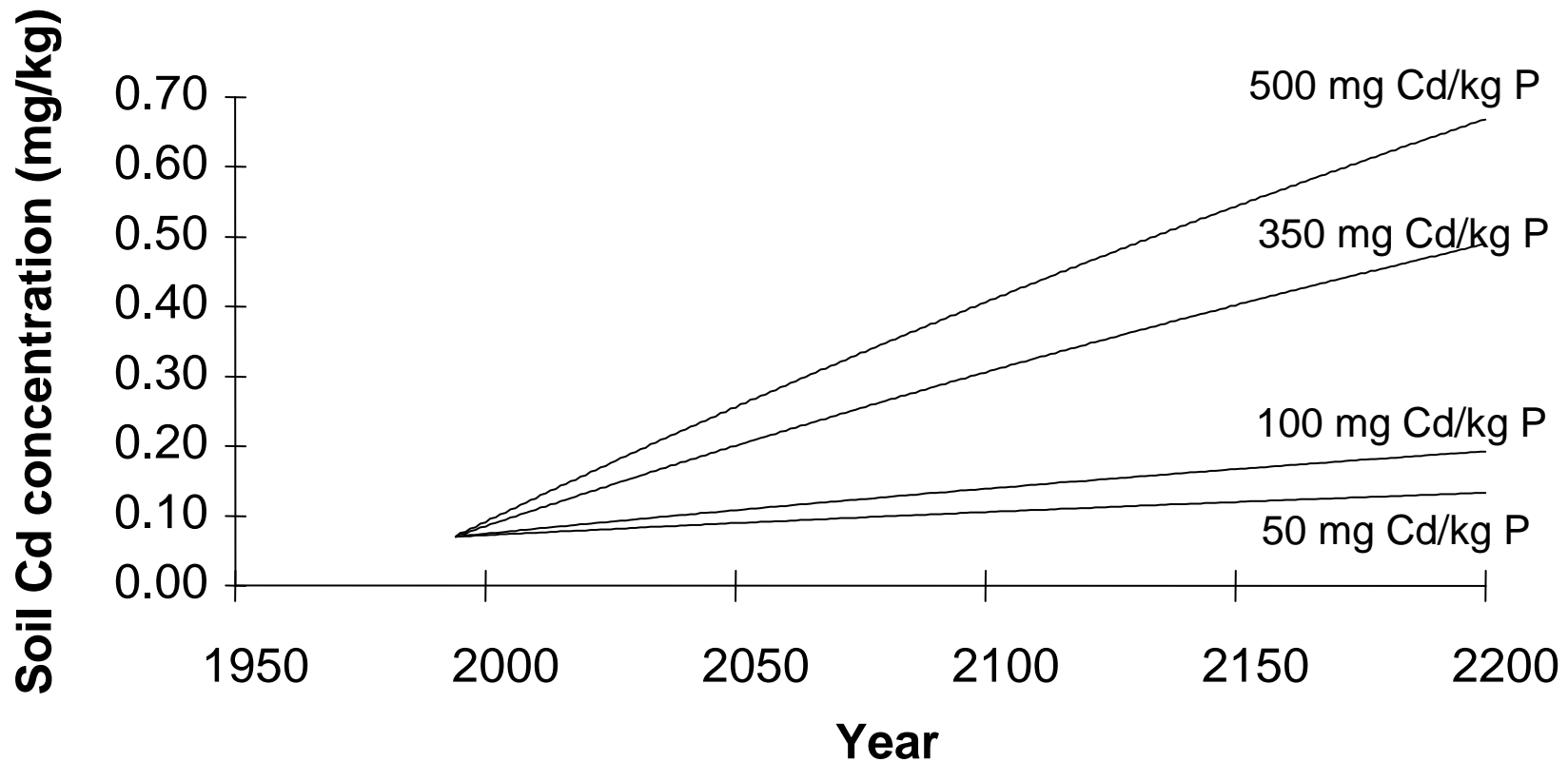
# Cadmium exports (kg)

<b>Outputs</b>	<b>NSW</b>	<b>Vic</b>	<b>Qld</b>	<b>SA</b>	<b>WA</b>	<b>Tas</b>	<b>Total</b>
Plant products other than feed	160	72	89	120	200	13	810
Offal and milk	3.3	2.5	2.8	1.7	0.9	0.2	12
Leaching beyond root zone (assumed nil)	-	-	-	-	-	-	-
Soil erosion	-	-	-	-	-	-	-
<b>Total</b>	<b>160</b>	<b>74</b>	<b>92</b>	<b>120</b>	<b>200</b>	<b>13</b>	<b>820</b>



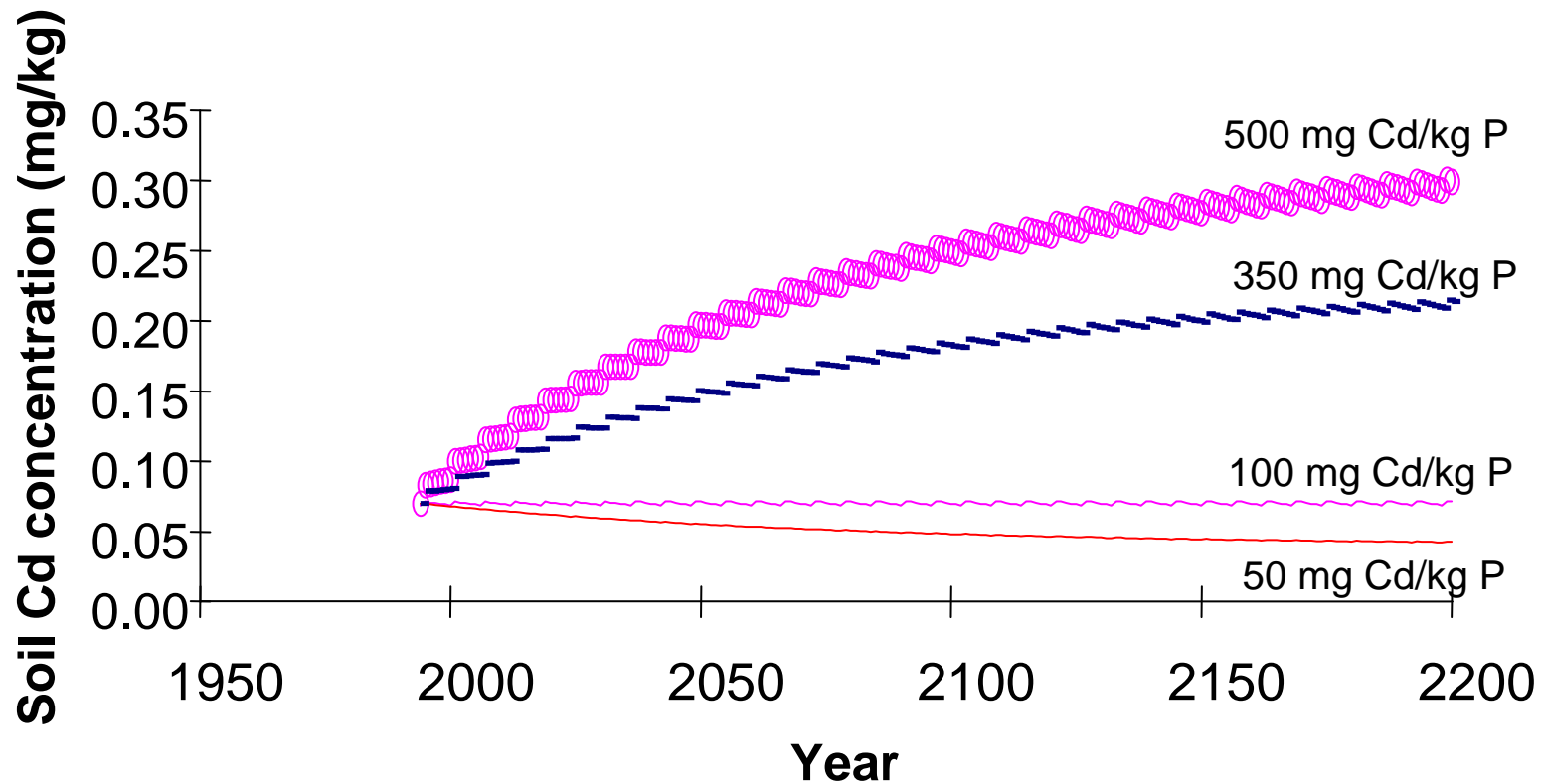
# Typical system modelling

Effect of different cadmium levels in fertilizers on soil cadmium in a wheat/pasture cropping system on a loamy soil.



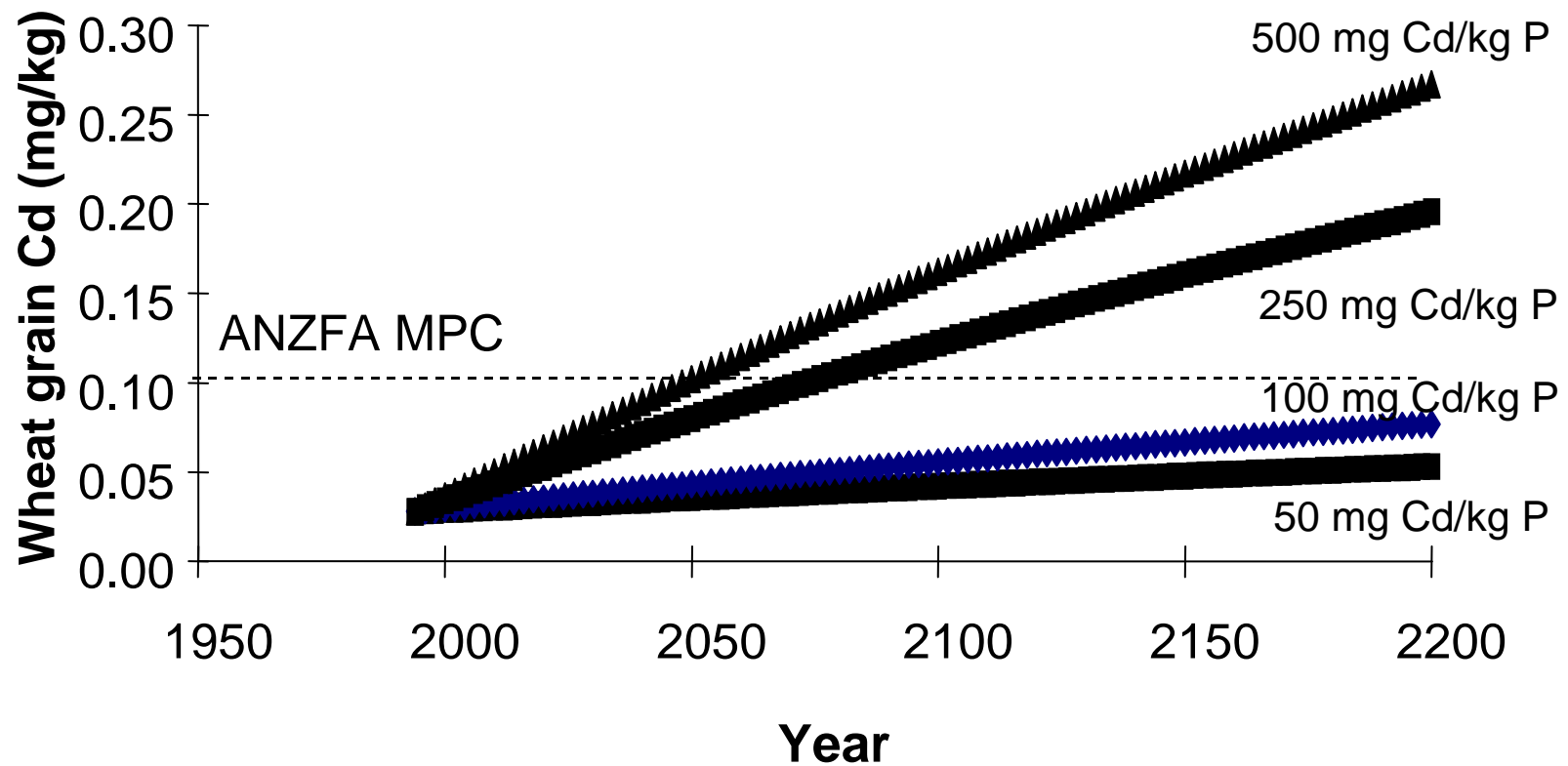
# Typical system modelling

Effect of different cadmium levels in fertilizers on soil cadmium in a potato/pasture cropping system on a sandy acidic soil.



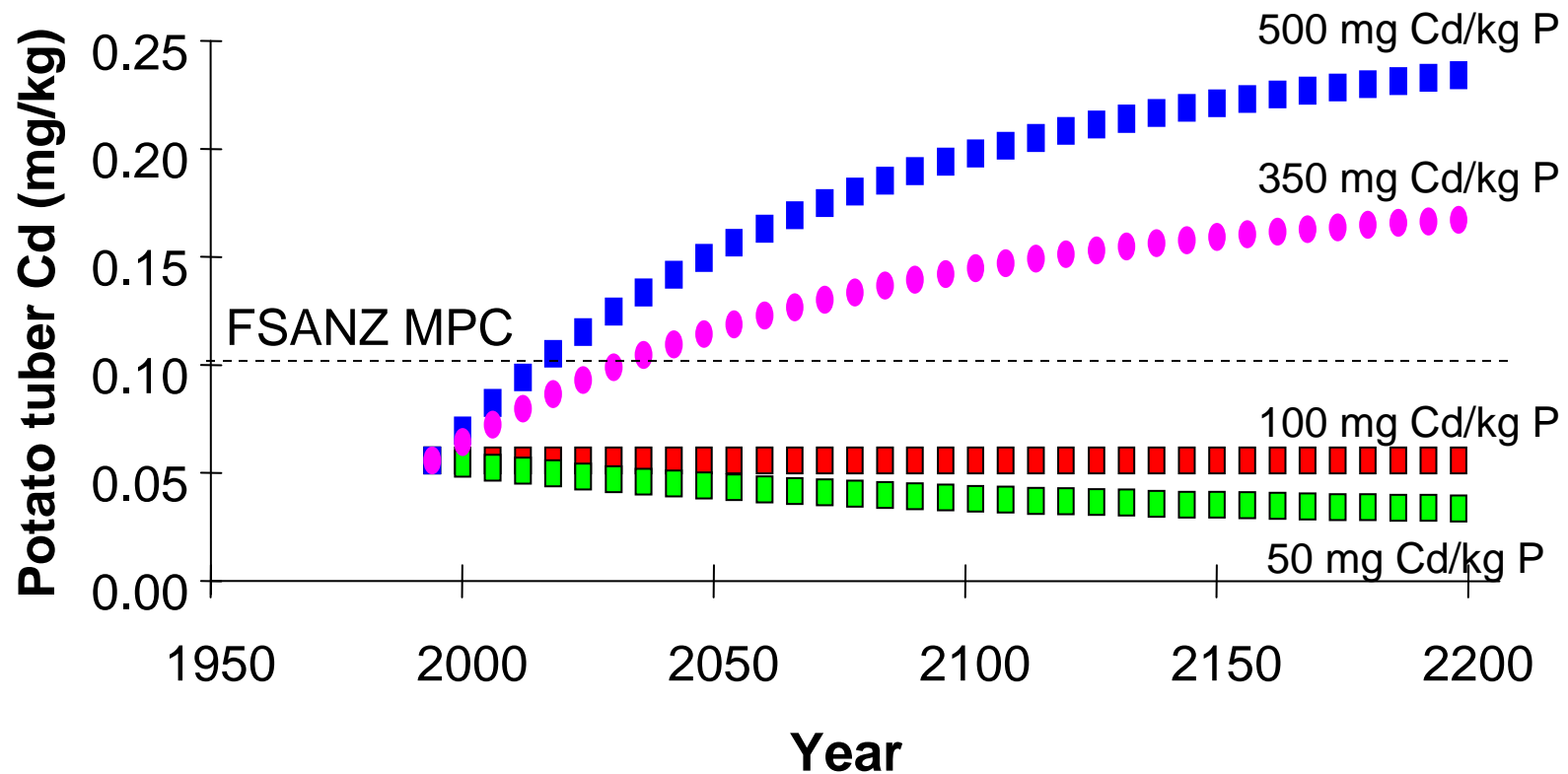
# Typical system modelling

Effect of different cadmium levels in fertilizers on wheat grain cadmium in a wheat/pasture cropping system on a loamy soil.



# Typical system modelling

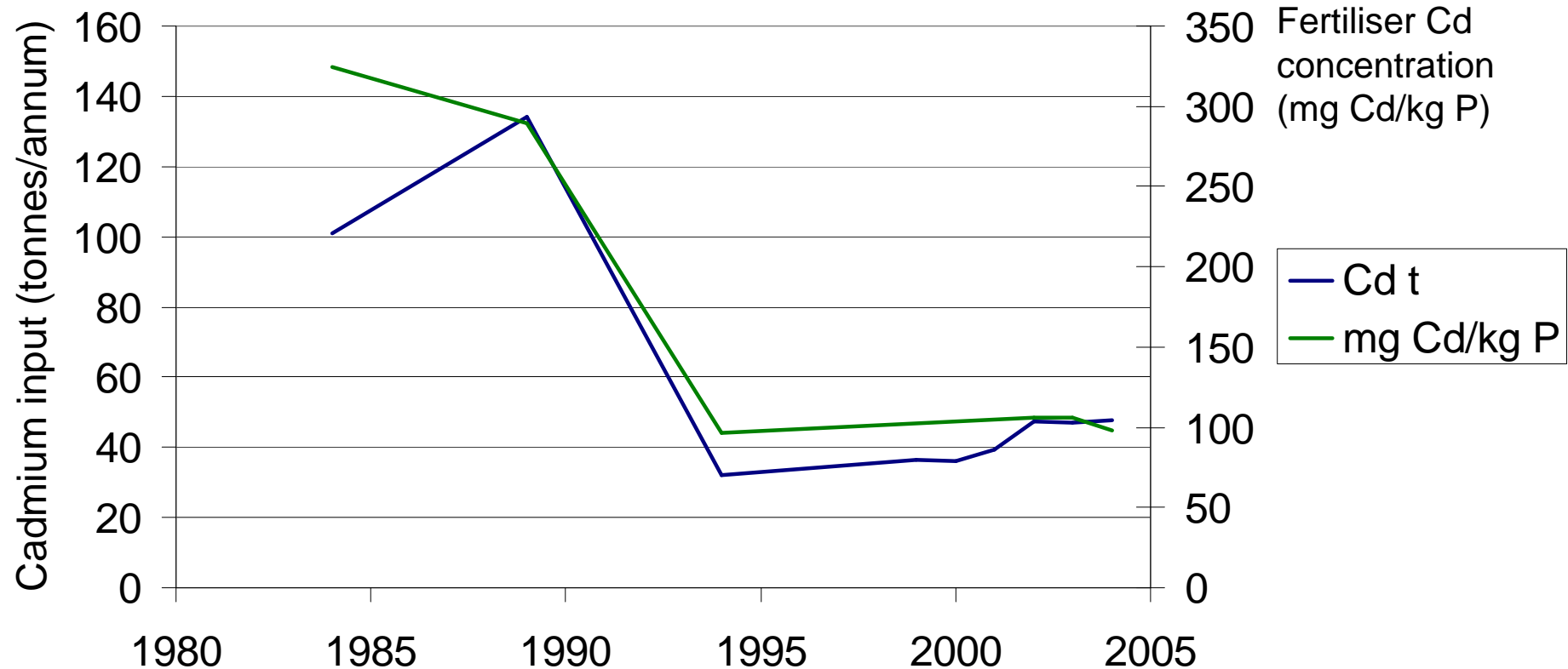
Effect of different cadmium levels in fertilizers on crop cadmium in a potato/pasture cropping system on a sandy acidic soil.





# Time trends in cadmium in fertilisers

## Historical Cd (t and mg/kg P)



## Conclusions

- Virtually all Australian produce meets national and international food quality standards
- Small pockets of high Cd in produce occur due to local soil, environmental and agronomic factors
- High risk produce is now well known for targeted monitoring

## Conclusions

- The national balance of Cd in Australian agriculture is uncertain due to lack of data for Cd leaching, Cd transport in soil erosion, and Cd fluxes due to burning
- The dominant source of Cd added to agricultural soils is phosphatic fertiliser
- Best guess Cd balances suggest that Cd is still accumulating in most Australian agricultural soils – average centennial increases will be of the order of 0.1-0.2 mg/kg in topsoils in most States, assuming fertiliser usage remains unchanged

# Acknowledgements



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Thank You

