

BE WHAT YOU WANT TO BE

# Using Benefit Transfer in Environmental Policy Making: The Australian Perspective

John Rolfe



# Outline

- Follow basic outline set by Robert
- Use of CBA / NMV / BT in Australia
- The hidden benefits of using BT
- Current issues and problems
- Two recent case studies that are problematic
  - Marginal and absolute values
  - Scale issues
  - Substitute issues
- Challenges

# Fractured fairy tales: BT in Australia

- Fairy tale version
  - Goldilocks uses CBA to evaluate all the serious decisions – including entering the house
  - Porridge is carefully flavoured with rigorous non-market valuation experiments
  - BT is used to predict which bed is the softest
- Nightmare version
  - Goldilocks hasn't heard of CBA
  - NMV is a bad thing, to be kept out of the porridge at all costs
  - BT is manipulated by the wolves, each wanting to get Goldilocks into their own bed

# Cost benefit analysis in Australia

- Use and requirements for CBA is patchy at commonwealth level
  - Lower levels of use at state and local levels
- A number of legislative and regulatory requirements for CBA
  - Major NRM projects – e.g. dams
  - Regulation impact statements
  - Part of impact assessment for major projects
- Limited applications in other areas
  - E.g. transport, energy projects

# How do governments evaluate projects?

- More use of CEA and political judgement
  - Alice Springs to Darwin railway
  - National Broadband Network
- A number of internal processes to advise governments of options and tradeoffs
  - As opposed to external or independent processes to provide transparent analysis
- Some use of CBA frameworks by policy groups trying to influence government
  - Oxford Economics released 2009 report on values for protecting the Great Barrier Reef
  - Recent report by Australian Conservation Foundation on the value of a healthy Murray-Darling Basin

# How much is non-market valuation used in CBA in Australia?

- Large number of studies relative to population base
- Limited number of policy applications
  - Most studies are research-initiated
  - Limited acceptance by policy makers
    - Problems with Kakadu CVM study in Australia (about same time as Exxon Valdez in US)
    - Studies often time-consuming and expensive to perform
    - Results not always easy to match to policy situations
    - Difficult to predict outcomes in politically-sensitive environments
- Trend is towards increasing use and acceptance

# Applications of benefit transfer

- Applications have largely been in research domain
  - But many research projects have been funded on the potential for BT to reduce application costs for decision makers
  - Formal requests and uses of BT by government have been limited
    - Study by Morrison et al. 2010 on Murray Darling
  - Informal uses within government quite high
  - Increasing application by interest groups

# Hidden benefits of using BT

- Most researchers consider a specifically designed study as more accurate than BT
- But the search for source studies in BT helps to identify patterns and methodological differences
- Comparisons across multiple studies (e.g. MA) identifies outlier studies
  - And design factors that systematically influence results

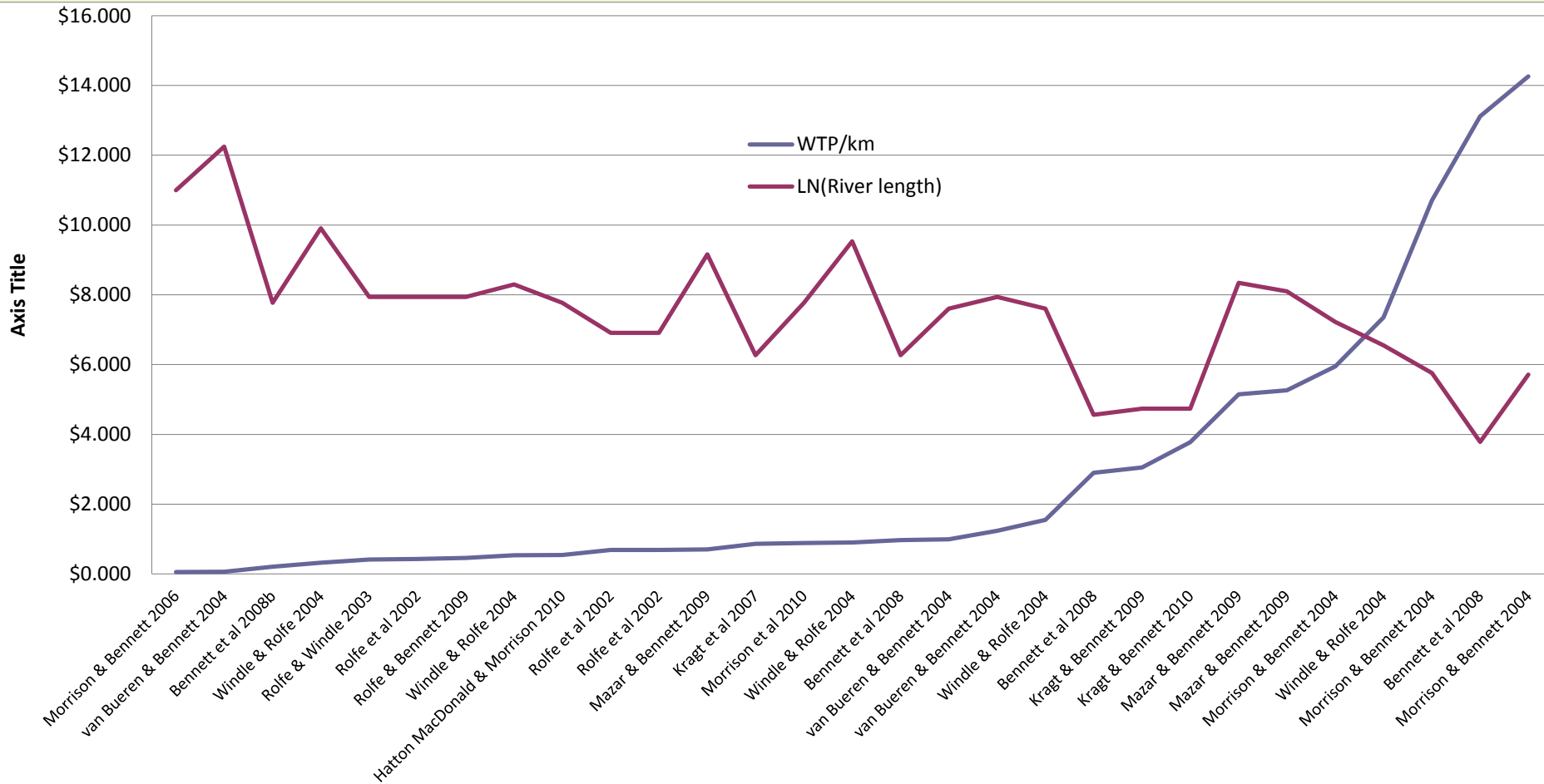
# Meta-analysis of river protection values in Australia

- Collated results from CM studies that assessed WTP for healthy rivers
  - Studies between 2000 and 2010
  - Varied by design and methodology
    - Asset being valued (healthy waterways, river vegetation, ecological assets, river recreation)
    - Definition of asset (kms of waterways, % of waterways, area of healthy vegetation in river systems, etc)
  - Converted all values to WTP / household / km of river in good health
    - Adjusted by CPI to 2010 values
    - lump sum equivalent at 15% discount rate

<b>Author</b>	<b>Catchment</b>	<b>River length</b>	<b>WTP/km</b>
van Bueren & Bennett 2004	General Australia	209,118	\$0.06
Bennett et al 2008b	Murray	2,375	\$0.20
Windle & Rolfe 2004	Murray Darling	20,000	\$0.32
Rolfe & Windle 2003	Fitzroy basin	2,800	\$0.41
Rolfe et al 2002	Fitzroy basin	2,800	\$0.43
Rolfe & Bennett 2009	Fitzroy basin	2,800	\$0.46
Windle & Rolfe 2004	Fitzroy basin	4,020	\$0.53
Hatton MacDonald & Morrison 2010	Murray	2,375	\$0.54
Rolfe et al 2002	Comet/Nogoa	1,000	\$0.69
Rolfe et al 2002	Dawson	1,000	\$0.69
Mazar & Bennett 2009	Namoi	9,500	\$0.70
Kragt et al 2007	Goulburn	529	\$0.86
Morrison et al 2010	Murray	2,375	\$0.89
Windle & Rolfe 2004	Great Barrier Reef	13,750	\$0.90
Bennett et al 2008	Goulburn	529	\$0.97
van Bueren & Bennett 2004	Great Southern	2,000	\$0.99
van Bueren & Bennett 2004	Fitzroy basin	2,800	\$1.23
Windle & Rolfe 2004	SE Queensland	2,000	\$1.55
Bennett et al 2008	Moorabool	96	\$2.90
Kragt & Bennett 2009	George	114	\$3.05
Kragt & Bennett 2010	George	114	\$3.78
Mazar & Bennett 2009	Hawkesbury	4,200	\$5.15
Mazar & Bennett 2009	Lachlan	3,300	\$5.26
Morrison & Bennett 2004	Murrumbidgee	1,369	\$5.95
Windle & Rolfe 2004	Mackay Whitsunday	700	\$7.35
Morrison & Bennett 2004	Clarence	316	\$10.70
Bennett et al 2008	Hawkesbury	44	\$13.12
Morrison & Bennett 2004	Gwydir	302	\$14.26
Morrison & Bennett 2004	Georges	96	\$54.08
Morrison & Bennett 2004	Bega	58	\$87.58

# Inverse relationship between WTP and Log of river length

Strong inverse relationship between WTP and geographic scope



# Values for River health / Healthy waterways (\$/km)

<b>Author</b>	<b>Catchment</b>	<b>WTP (\$/km)</b>
Windle & Rolfe 2004	Fitzroy Basin	\$0.18
Windle & Rolfe 2004	Murray Darling	\$0.32
Rolfe & Windle 2003	Fitzroy Basin	\$0.41
Rolfe et al 2002	Fitzroy Basin	\$0.43
Rolfe & Bennett 2009	Fitzroy Basin	\$0.46
Rolfe et al 2002	Comet/Nogoa/Mackenzie ri	\$0.69
Rolfe et al 2002	Dawson river	\$0.69
Mazar & Bennett 2009	Namoi	\$0.70
Windle & Rolfe 2004	Great Barrier Reef	\$0.90
Windle & Rolfe 2004	SE Queensland	\$1.55
Mazar & Bennett 2009	Hawkesbury/Nepean	\$5.15
Mazar & Bennett 2009	Lachlan	\$5.26
Windle & Rolfe 2004	Mackay Whitsunday	\$7.35

# Values for vegetation along rivers (converted to \$/km)

Author	Catchment	WTP (\$/km)
Morrison & Bennett 2006	all NSW state rivers	\$0.01
Bennett et al 2008b	Murray Darling	\$0.01
Morrison & Bennett 2004	Murrumbidgee	\$0.14
Hatton MacDonald & Morrison 2010	Murray Darling	\$0.54
Morrison & Bennett 2004	Gwydir	\$0.67
Morrison & Bennett 2004	Clarence	\$0.69
Morrison et al 2010	Murray Darling	\$0.89
Kragt et al 2007	Goulburn	\$0.91
Bennett et al 2008	Goulburn	\$0.94
Morrison & Bennett 2004	Georges	\$2.03
Kragt & Bennett 2009	Georges	\$3.05
Bennett et al 2008	Moorabool	\$3.30
Kragt & Bennett 2010	Georges	\$3.78
Morrison & Bennett 2004	Bega	\$6.02
Bennett et al 2008	Hawkesbury/Nepean	\$13.49

# Current issues and problems

- Results demonstrate that there are pools of values suitable for BT
  - Analysis can help to identify some of the factors that influence values
  - Continuing work to refine BT applications
- Problems
  - Applications by consultants with limited technical knowledge
  - Major methodological errors
  - Searching for the BIG numbers

# Issue 1: Marginal versus absolute

- The Costanza error
  - Taking marginal values for a small change and applying it as average values for the whole asset
    - Used to estimate values for global ecosystems
  - Takes no account of diminishing marginal utility
  - Not appropriate to value total values in this way
- But ... Oxford Economics (2009) used this approach to value the Great Barrier Reef
- Many researchers apply part-worths as average values (instead of an average of marginal values over a range)

# Applying BT to the Great Barrier Reef

- In 2009, Oxford Economics assessed the total value of the GBR at \$51.4 billion
  - Loss from potential total bleaching of the GBR, caused by potential climate change
  - Used 100 year time frame, and 2.65% discount rate
- The assessment is flawed
  - Non use values are extrapolated from marginal changes in local case studies to the whole GBR
    - Treats marginal values as average values
    - Assumes that the asset can be valued (instead of marginal changes in protection)

## Issue 2: The Geographic scope issue

- Geographic scope issue occurs when per unit values are different between:
  - Small areas compared to large areas
  - Small proportions framed vs large proportions
- Good theoretical reasons to expect this
- Meta analysis shows scope is important
- Work on GBR shows that per unit protection values for local case studies can not be transferred to whole region without adjustment (downwards)

# GBR case study results

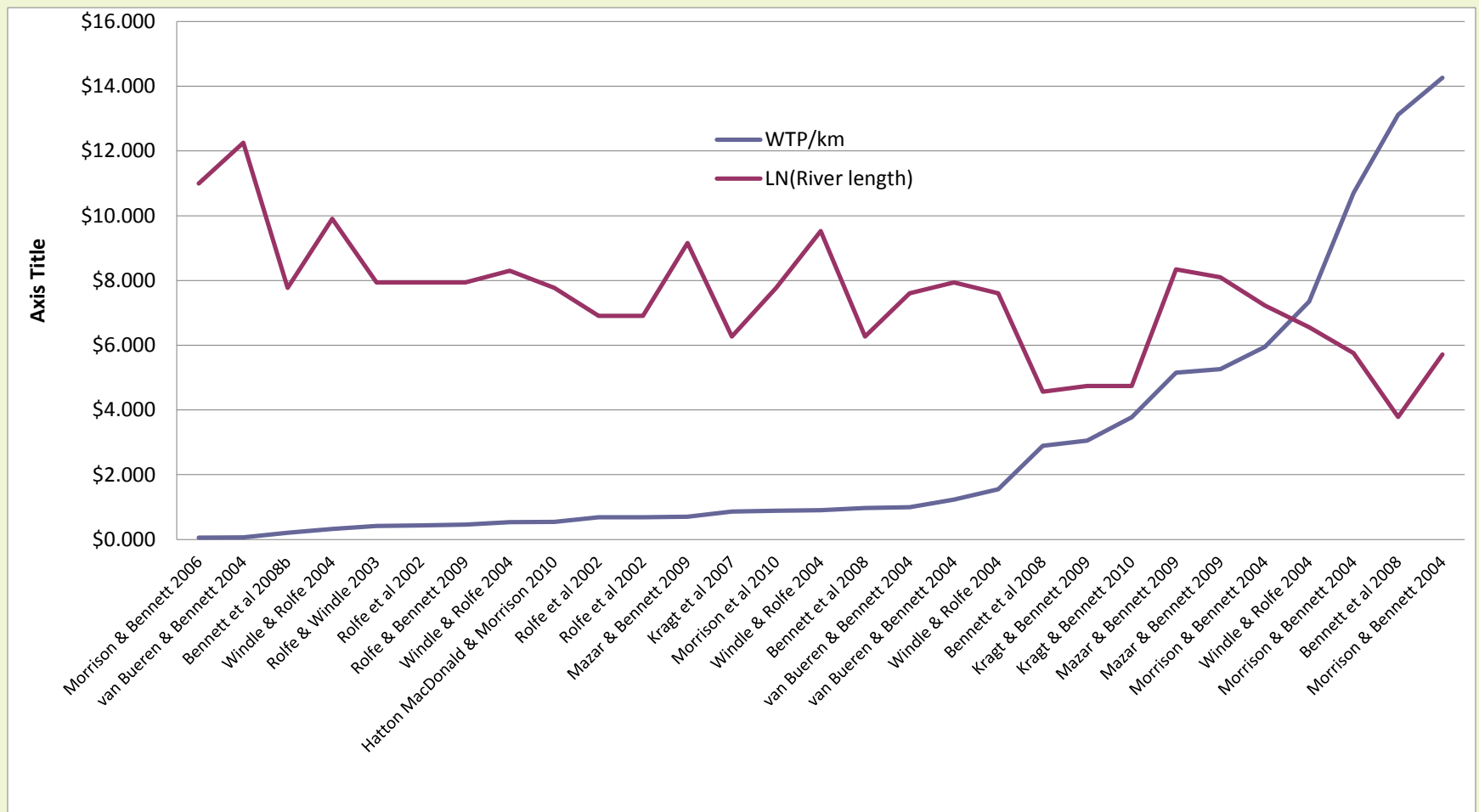
- PWs are similar for same % changes
- PWs for absolute changes vary with geographic scope

	Brisbane			
	<i>Reef</i>	<i>Fish</i>	<i>Seagrass</i>	<i>SUM</i>
<b>Whole GBR</b>				
Mean WTP (per 1%)	\$12.45***	\$8.00***	\$6.10***	\$26.55
Mean WTP (per sq km/species )	\$0.06***	\$0.53***	\$0.01***	\$0.60
<b>Regional GBR</b>				
Mean WTP (per 1%)	\$9.67***	\$9.09***	\$5.00***	\$23.76
Mean WTP (per sq km/species )	\$0.19***	\$0.60***	\$0.04***	\$0.83
<b>Local GBR</b>				
Mean WTP (per 1%)	\$10.78***	\$15.55***	\$5.18**	\$31.51
Mean WTP (per sq km/species )	\$4.27***	\$15.79***	\$9.44**	\$29.50

# Applying BT to the Murray Darling basin

- ACF argued that value of improving the environment of the basin is \$9B
  - Took BT assessed for basin by Morrison and Hatton MacDonald (average of or selected relevant studies)
  - Extrapolated values from individual case studies across every basin in Murray-Darling
- Geographic scope effect means that unit values for protecting the whole basin will be much lower than unit values for small bits
  - No adjustment for scope effects in ACF study

# Unit values lower for larger geographic scope

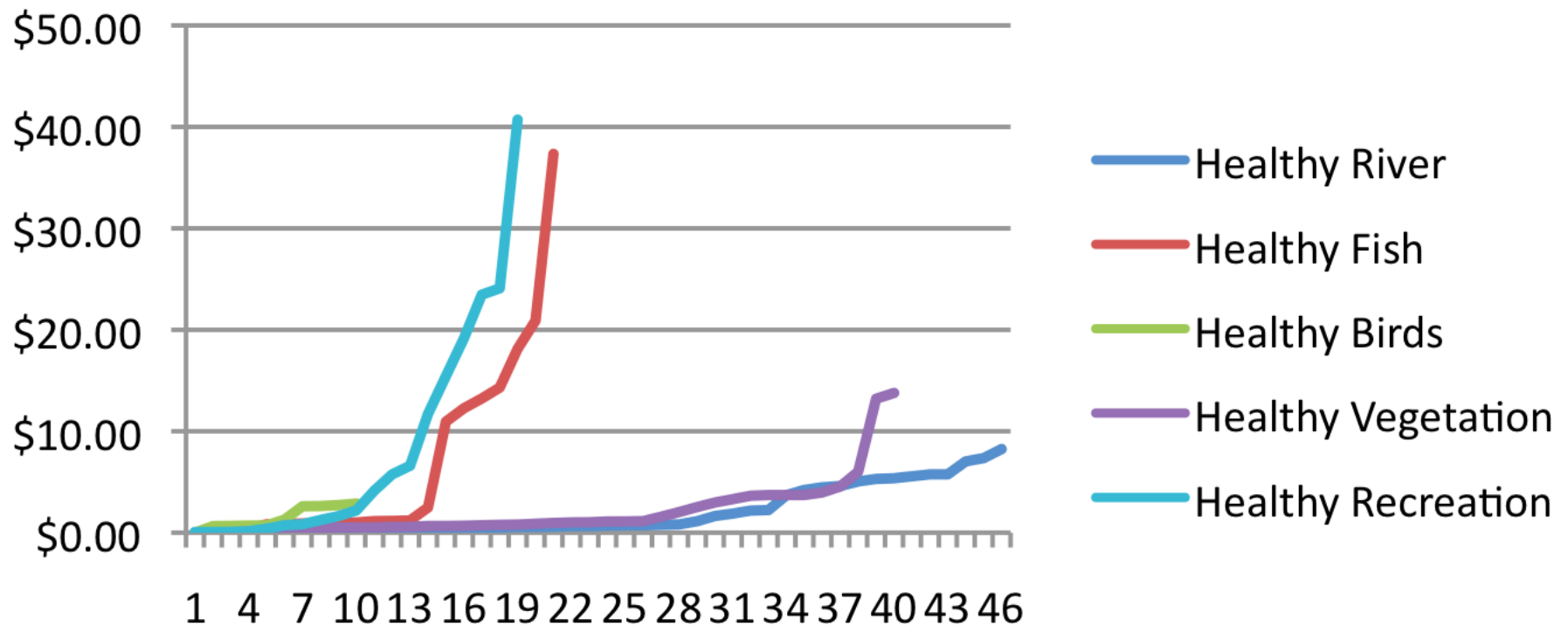


## Issue 3: substitution effects

- Losses or improvements in environmental assets can generate substitution effects
- Important to consider the net impact
- Oxford Economics estimated loss of recreation values to GBR without considering that people may switch to other sites

# The adding up problem from MA

- Part-worths for Healthy Waterways often smaller than values for component items
- Although GBR study showed adding up is not always an issue



# Substitution and the Murray study

- ACF (and Morrison et al.) estimate values for the Murray-Darling Basin and the Coorong as additive
- Coorong is part of the Murray system
  - If every river in the MDB is repaired to good health, logical to expect that Coorong will also benefit
  - Should not treat as independent asset
- Potential substitution between *Waterbird breeding* and *Waterbird species*

# BT in Australia: fairytale or nightmare?

- Ongoing interest in BT is welcome
- Starting to see more effort into BT applications
- Ongoing work to understand BT issues
  
- Methodological: Several issues with BT remain
- Application: Difficult for non-specialists to apply BT and avoid pitfalls
- Political: Use of BT by interest groups looking for big numbers is a problem