WASTING WATER

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OUTLINE

- INTRODUCTION: THE PROBLEM
- SOLUTIONS
- ONGOING PROBLEM
- CBA RESULTS
- RECOMMENDATIONS: NOUS
- CONCLUSIONS

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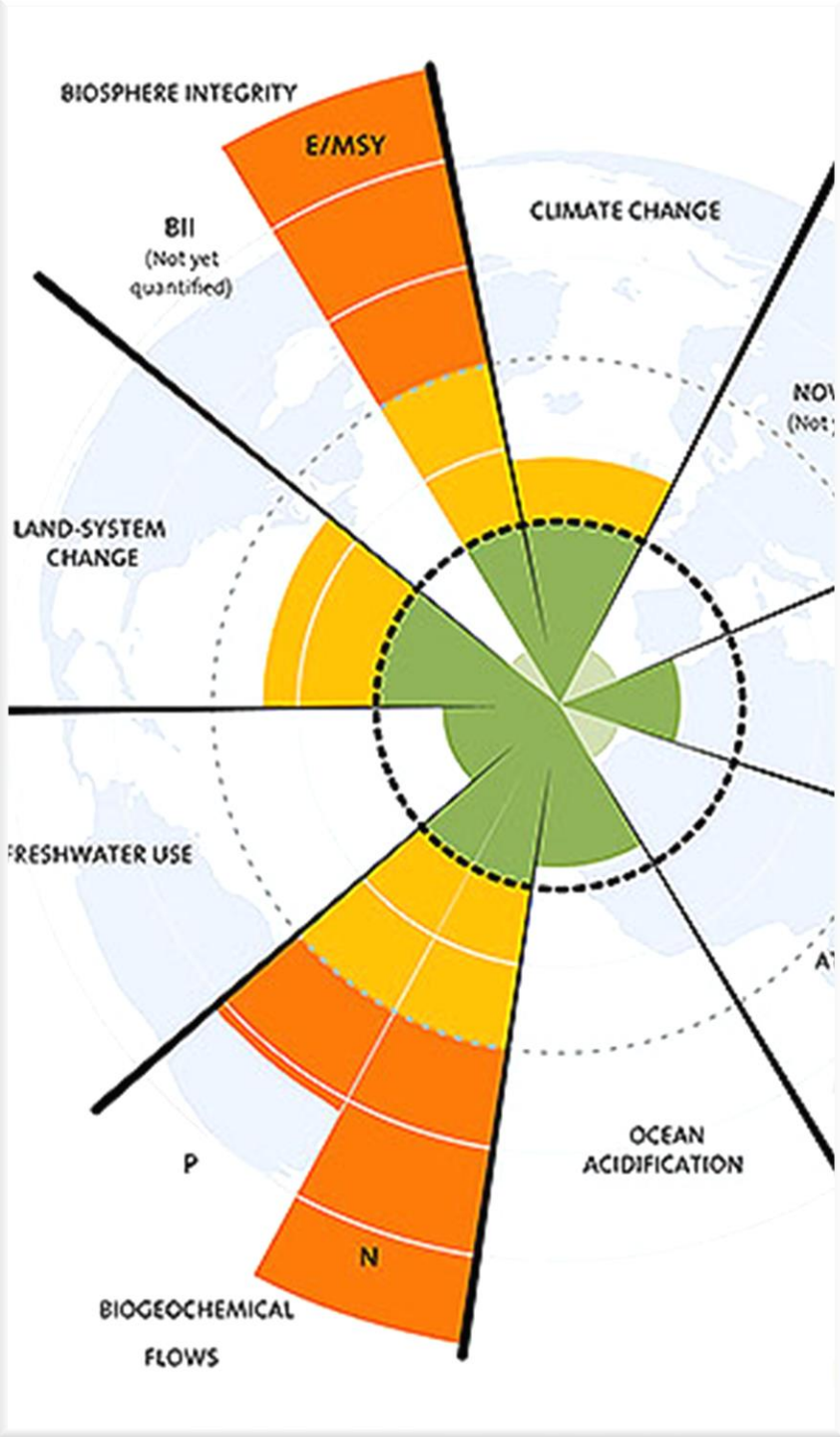

PROBLEM: ECOLOGICAL ECONOMIC VIEW

- BIOCHEMICAL FLOWS
  - P & N HAVE EXCEEDED PLANETARY BOUNDARIES (STEFFENN ET AL. 2018; SEE BLACKWELL & GEMMILL 2020 FOR CONTEXT)
- LOCAL CONTEXT
- ECOLOGICAL ETHICS – DUMPING WASTEWATER INTO A RECEIVING ENVIRONMENT IMPACTS:
  - OTHER SPECIES AND ECOSYSTEMS
  - UNETHICAL IF IT IS ANOTHER COMMUNITY'S WASTE
    - POLLUTES THE COMMUNITY'S ENVIRONMENT
    - DEGRADES THEIR OPPORTUNITY SET: REC & TOURISM, ECONOMIES, COMMUNITIES
  - UNECONOMICAL BY DEFINITION – 'WASTING WATER'
    - 'EFFICIENT OUTCOME IS' ONE WHERE WASTE IS MINIMIZED OR NIL

INTRODUCTION: A NATIONAL PROBLEM

UNTIL 2018 VERY LITTLE KNOWN ABOUT AUSTRALIA'S 181 COASTAL OUTFALLS

HOW MUCH WATER THEY DISPOSE INTO COASTAL WATERS?

WHERE THEY ARE LOCATED?

WHAT NUTRIENTS THEY DISPOSE OF?

WHAT IMPACTS THEY HAVE FOR PEOPLE?

PROBLEMS PERSISTED WITH NO NATIONAL APPROACH TO WASTEWATER OUTFALLS

01

Solution:

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02

Institutional/governance systems that better serve the people that are adversely impacted

03

Therefore 2nd part of the title – 'transparency'

04

National Outfall Database ('NOD')

Marine Biodiversity Hub

National Environmental Science Programme

NOD HAS IDENTIFIED:

Impacts on marine environment and ecosystems obvious but not properly addressed previously by formal institutions

- Australia has 187 coastal wastewater outfalls (Fig. 1) – data for 2015-2019 available
- 1,350GL = almost 3 Sydney Harbours (Fig. 3)
- Dispose of a range of wastes = 0.1% ….+ 99.9% water (Figs. 2&4) – N and P ('Nutrients')
- Impacts of events on people and communication (i.e. transparency)

COASTAL OUTFALL OVERVIEW

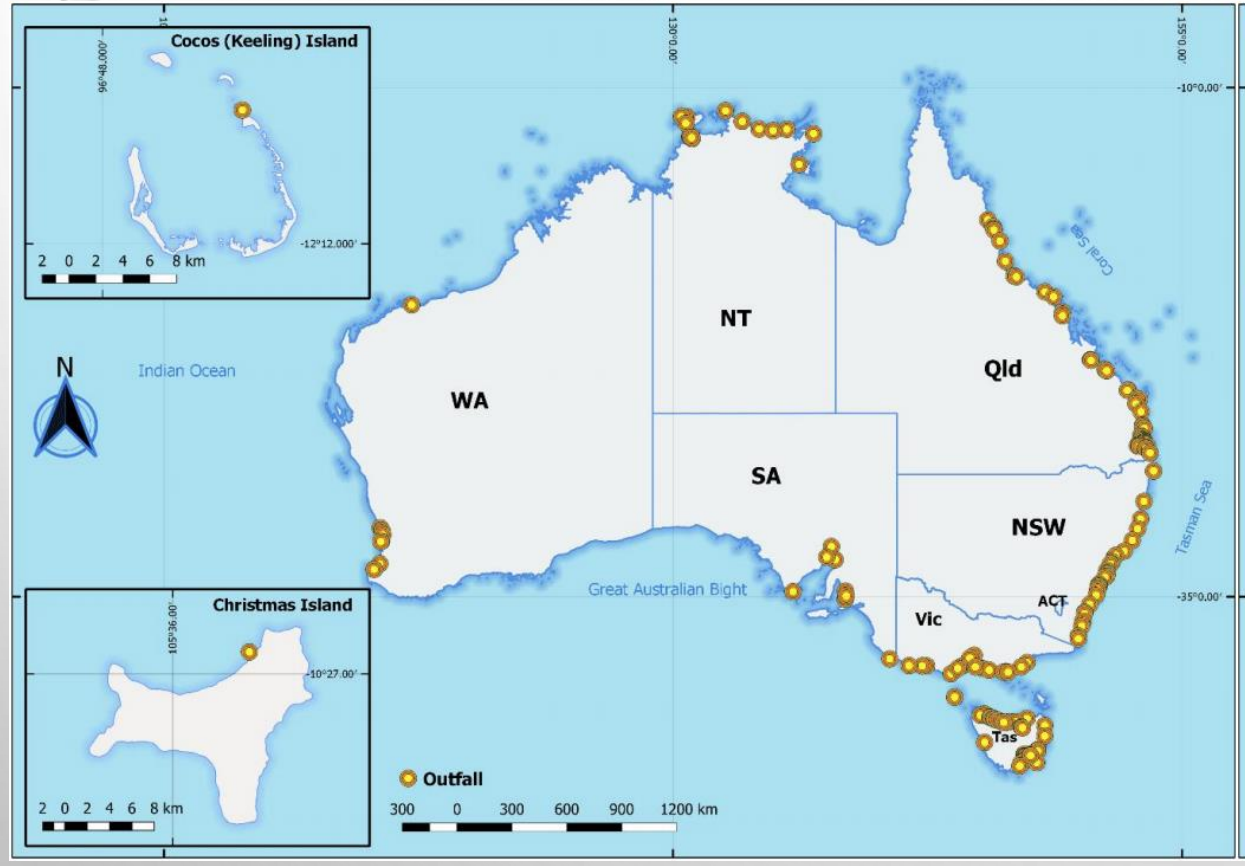

Fig. 1: Australia's Coastal Wastewater Outfalls (Source: Gemmill et al. 2019)

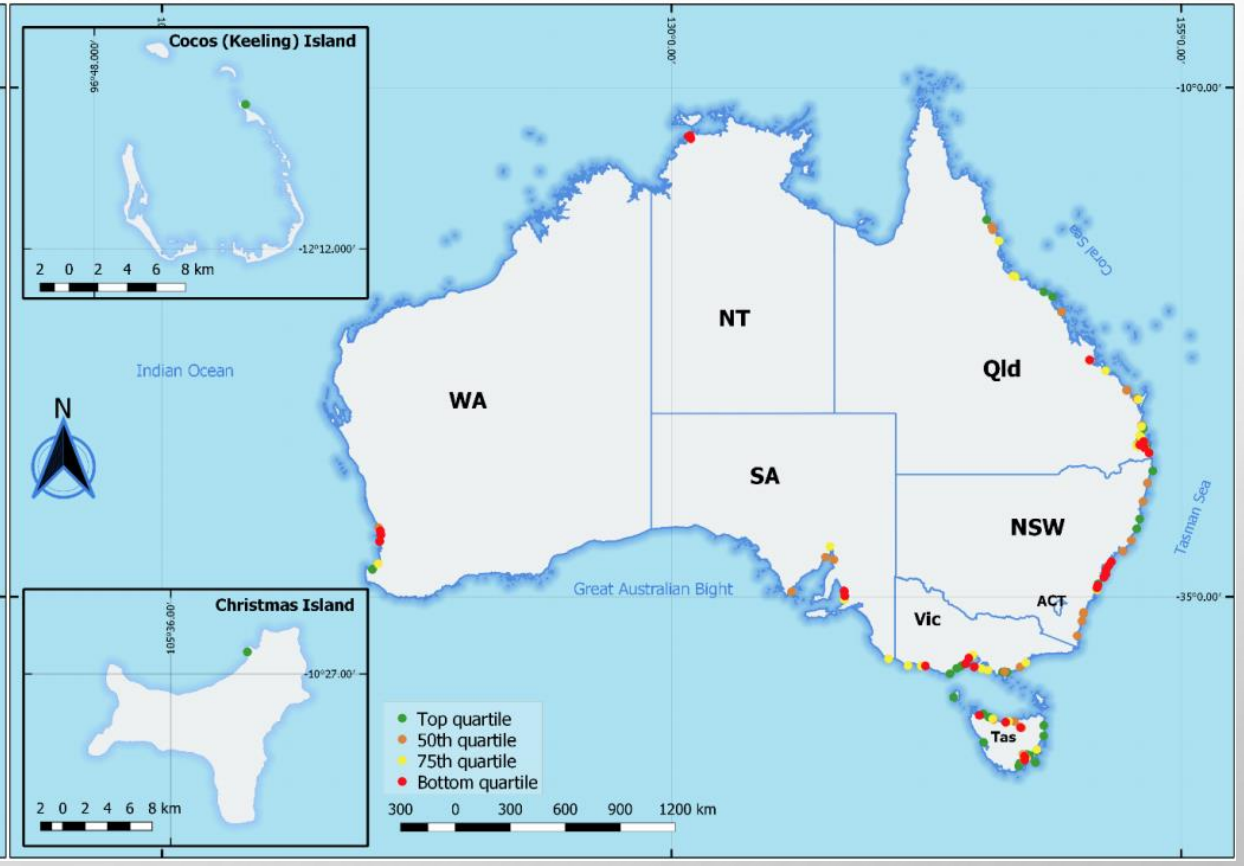

Fig. 2: Nutrient Load Quartile Rank (Source & Notes: Rohmana et al. 2019a; Top quartile lowest nutrient load – Lowest quartile – highest nutrient load).

WASTE OF WATER & NUTRIENTS TO OCEAN

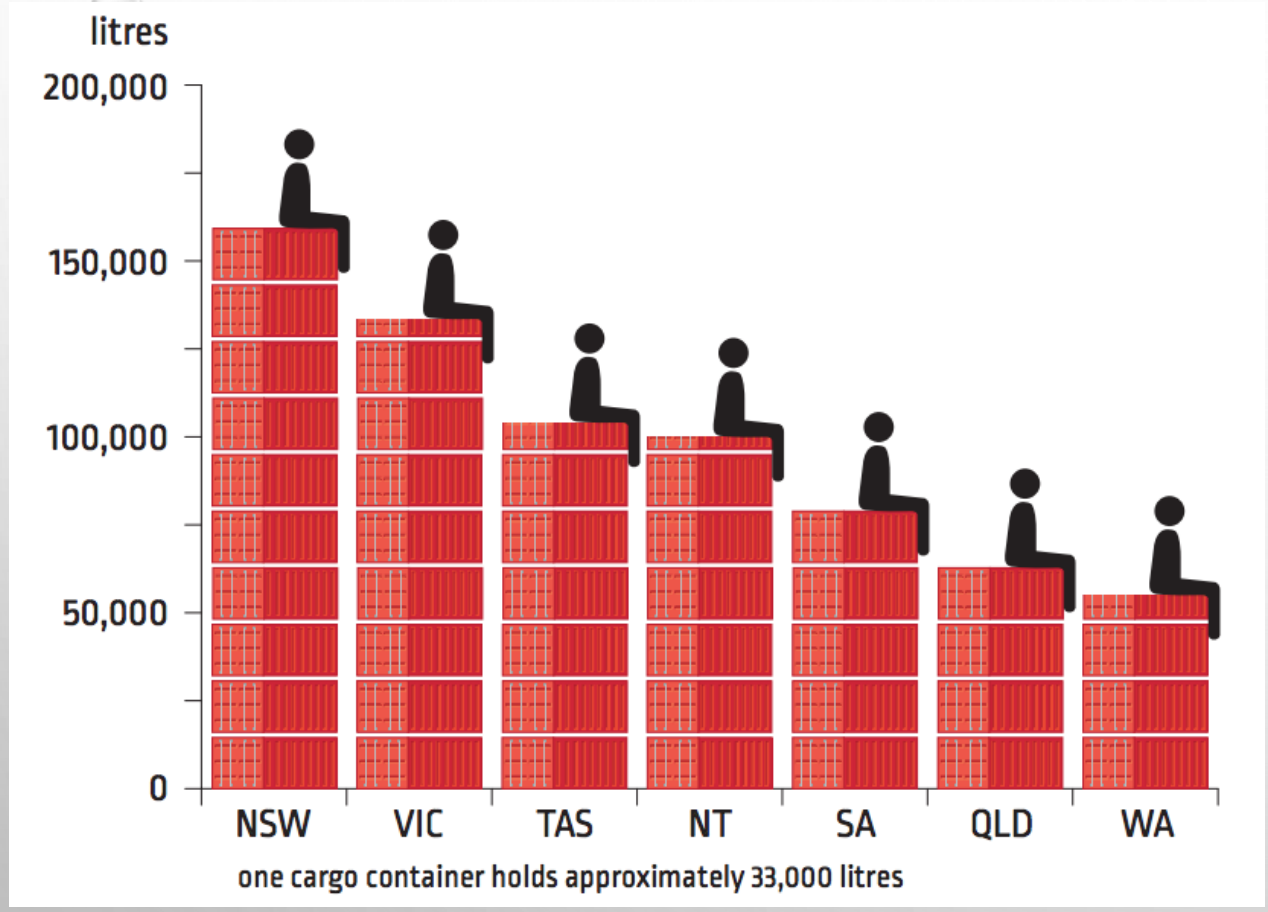

Fig. 3: State per person discharge, 2016 (Source: COF 2018)

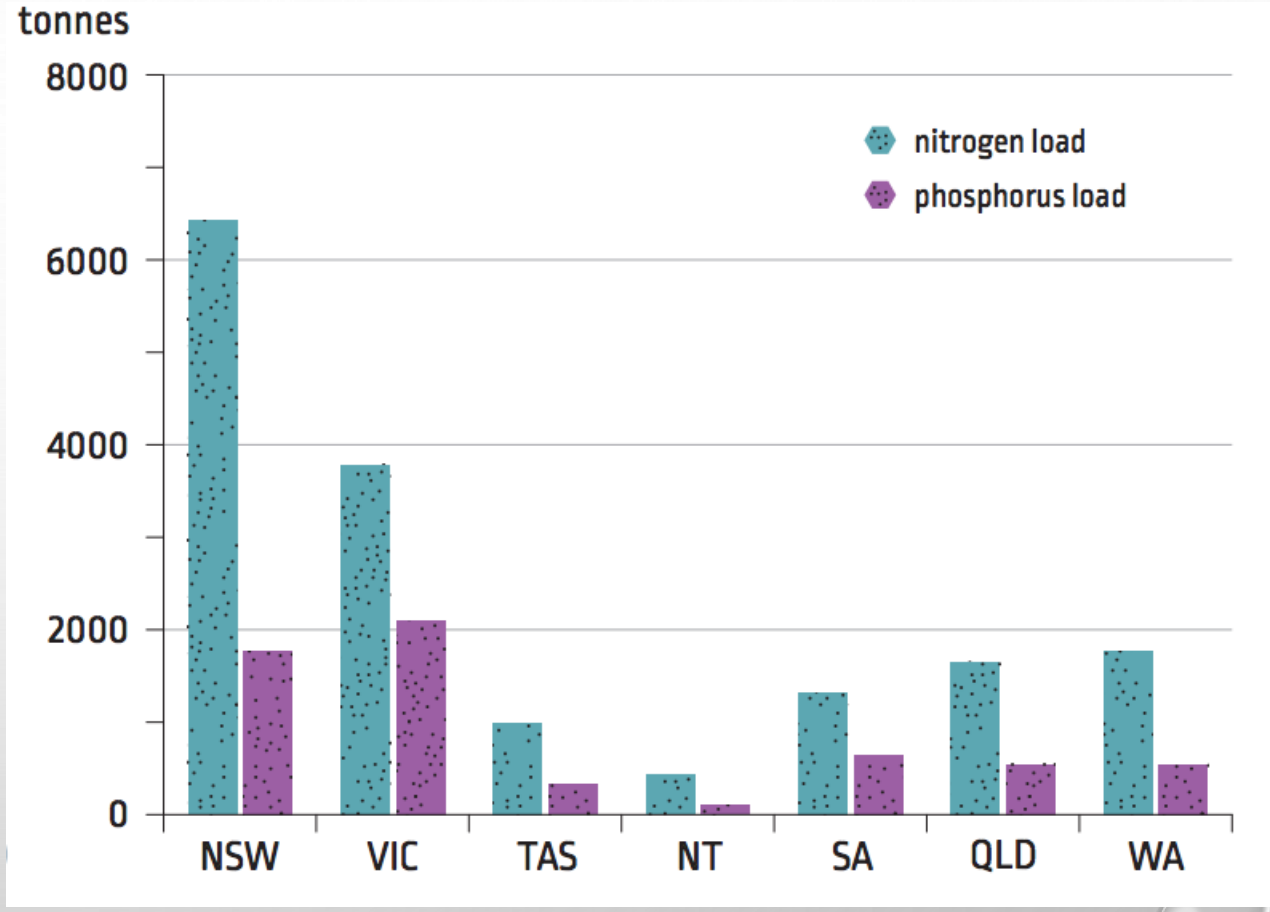

Fig. 4: State nutrient discharge, 2016 (Source: COF 2018)

PEOPLE'S CONCERNS

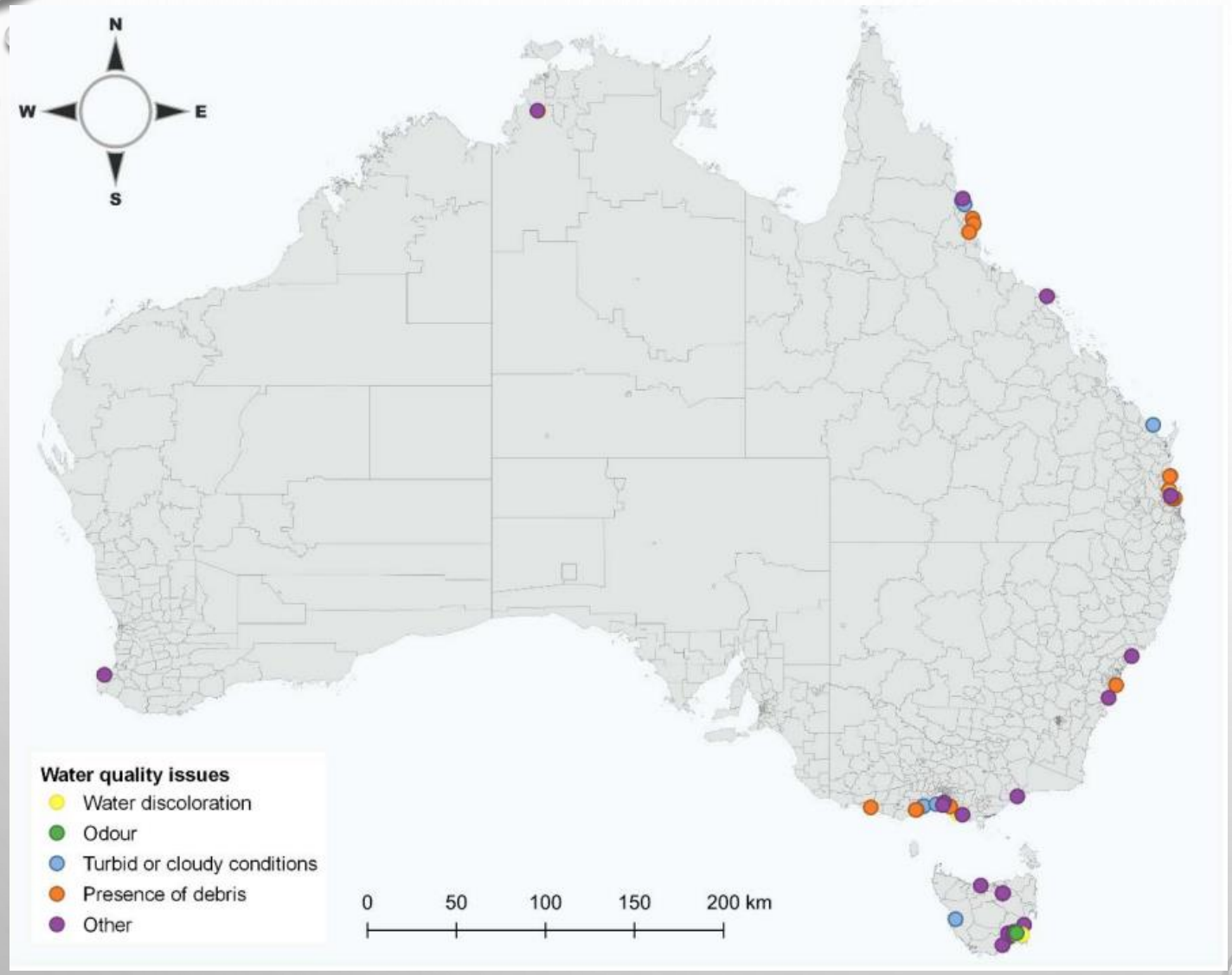

Fig. 5: Water quality issues (Source & Notes: Rohmana et al. 2019b)

- 37/N=77 OBSERVED 1-4 WATER QUALITY EVENTS IN LAST 12 MONTHS – FIG. 2 – ISSUES MOST LIKELY CAUSED BY:
  - HEAVY RAINS, STORMWATER RELEASED AND OTHER POLLUTION SOURCES
- INCREASED USE OF MARINE ENVIRONMENT DID NOT RESULT IN MORE EVENTS OBSERVED/GREATER AWARENESS
- 68% DISAGREED THAT THEY WOULD EXPECT TO BE NOTIFIED OF ANY WATER QUALITY EVENT
- 75% BELIEVED WOULD NOT BE INFORMED IN A TIMELY MANNER OF CHANGES IN WATER QUALITY BY LOCAL AUTHORITIES
- RESPONDENTS AWARE OF AN OUTFALL WERE NOT INFORMED IN A TIMELY MANNER (ONLY 50% THOUGHT SO)

Community Engagement/Transparency?

INTRODUCTION: POLICY CONTEXT

Wasted water is a significant resource in a dry continent with Heightened Uncertainty

- Severe drought
- Raging bush fires
- COVID-19
- Floods
- Shortage of water supplies
- Abatement of negative consequences for:
  - marine & coastal ecosystems and
  - society & culture
- State/Territory responses with Regional Water Strategies etc.

What are the solutions?

SOLUTIONS: DIVERSIFIED PORTFOLIO

1. Upgrade wastewater outfalls to potable (A+)

- Under-utilised resource ☑
- Uses current footprint ☑
- Upgrade current infrastructure system ☑
- Remove externalities ☑
- Use scarce resources more carefully ☑
- Can deliver total of 2 * current supplies ☑
- BUT…. ….What is the cost and what are the benefits ?

2. Greenfield developments

- Invest in new developments with 'closed-loop' water re-use ☑
- Prevents externalities from their source ☑
- Creates a new footprint ☒
- Requires an initial new allocation of water (with possible top-ups) ☒
- BUT… only marginal - mainstream not affected ☒

3. Conservation/restrictions

- Use current supplies more carefully ☑
- Invest in recycling opportunities ☑
- Quickly implemented ☑
- BUT…limited to current storage/supply levels ☒

4. Desalination

- Can have water whenever you need it and to volumes within the system ☑
- BUT…Very costly due to energy demands even with solar power ☒
- Externalities significant: loss of natural assets/large coastal footprint/displacement ☒

5. Build new dams

- Can create more secure supplies ☑
- BUT…Significant cost ☒
- Might not work ☒
- Large footprint ☒
- Displaces current social, cultural and economic footprint ☒
- Significant impact on natural assets and down stream users ☒
- Time to build and commission ☒

COST & BENEFIT ASSESSMENT OF OUTFALL UPGRADES

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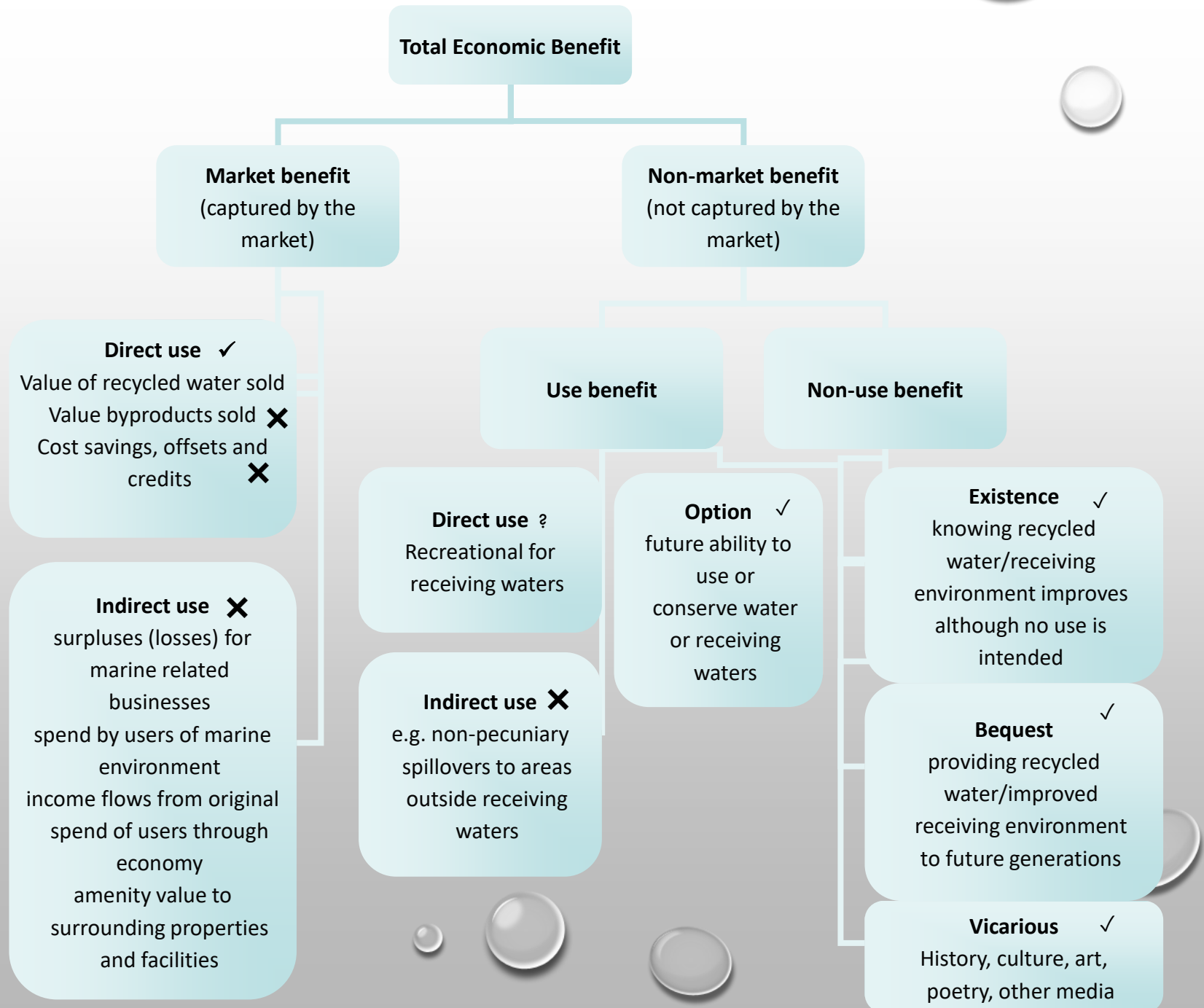
- ASSESS THE BENEFITS OF REUSING AND RECYCLING WATER
- ESTIMATE THE COSTS OF UPGRADES
- COMPARE THE COSTS TO THE BENEFITS TO SEE IF THERE ARE NET BENEFITS
- NET BENEFITS ARE WHERE BENEFITS EXCEED COSTS
- NEED TO ACCOUNT FOR TIME VALUE OF MONEY THROUGH DISCOUNTED BENEFIT AND COST FLOWS
- COF COMMISSIONED A COST AND BENEFIT STUDY TO ESTIMATE THESE FOR AUSTRALIA'S OUTFALLS
- PREVIOUSLY NOT POSSIBLE – BUT WITH NOD NOW POSSIBLE

BENEFITS CAPTURED BY STUDY…. (& NOT CAPTURED)



ADVANTAGES & LIMITATIONS

Advantages:

First macro-scale assessment of costs and benefits in Australia

Provides a comprehensive first pass assessment to help guide further work

Each individual upgrade should undergo a more detailed business case

Limitations

No transportation or pumping costs included

No distinction between primary and secondary upgrades

All upgraded to tertiary A+

Cost estimates are from a large wastewater service provider – naturally advantage large scale recycling systems

Smaller scale systems maybe more efficient/effective (despite economies of scale)

LITERATURE REVIEW KEY FINDINGS (KF)

International best practice – Switzerland CBA of micro-pollutants

Wastewater recycling facilities – resource recovery assets

New, cyclical economy views

Efficiency theory and practice: economies of scale & Micro –v– macro systems

Two key studies of relevance to transferring values – both from Sydney

Other findings….

TABLE. 2: H_20 RESULTS BY STATE TOTALS

States	Estuarine (no.)	Ocean (no.)	Total (no.)	Upgrade* no. percentage (%)	Upgrade^ Flow (GL)	Upgrade* Flow / Total Flow (%)
New South Wales (NSW)	-	29	29	64%	1,229	94%
Victoria (VIC)	-	19	19	63%	84	13%
Queensland (QLD)	40	11	51	53%	221	40%
Western Australia (WA)	-	12	12	83%	209	84%
Tasmania (TAS)	27	14	41	85%	81	89%
South Australia (SA)	-	10	10	60%	113	67%
Northern Territory (NT)	-	14	14	100%	31	100%
Total	**67**	**109**	**176**	**64%**	**1,968**	**64%**

Australian Urban Water Use 2017-18 = **3,200GL[a]**

Thus, recycling opportunity is **62%** of urban water use

Notes and Sources: Synthesis of various items from National Outfall Database (2018). * means outfall systems currently treating to a lower level of treatment at primary or secondary treatment levels. ^Of course, not in all cases, will all this water be re-used and we assume 63% is used. See the methods section Blackwell & Gemmill (2019). a. BOM (2019)

RESULTS OF OUTFALL COSTS & BENEFITS

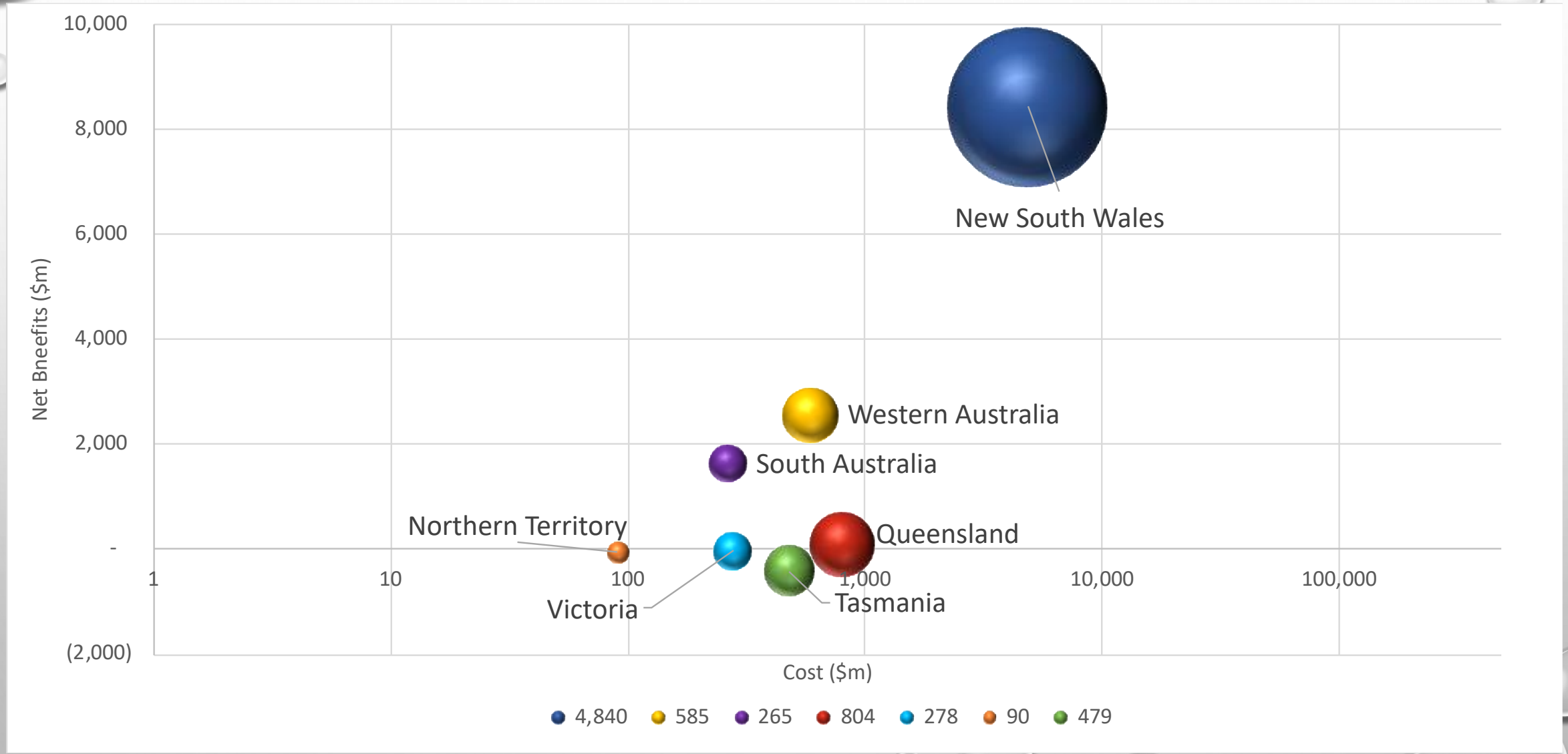
NATIONALLY, NET BENEFITS=

$12-$28 BILLION (2019 DOLLARS)
FOR A COST OF $7.3-10 BILLION

STATE TOTAL BUBBLE GRAPH

INDIVIDUAL [BUBBLE]

FIG.6: RESULTS BY STATE TOTALS (R=9%, T=15)



TOP 16 NATIONAL OUTFALLS BY NET BENEFIT

Fig. 7: Bubble size by Net Benefit

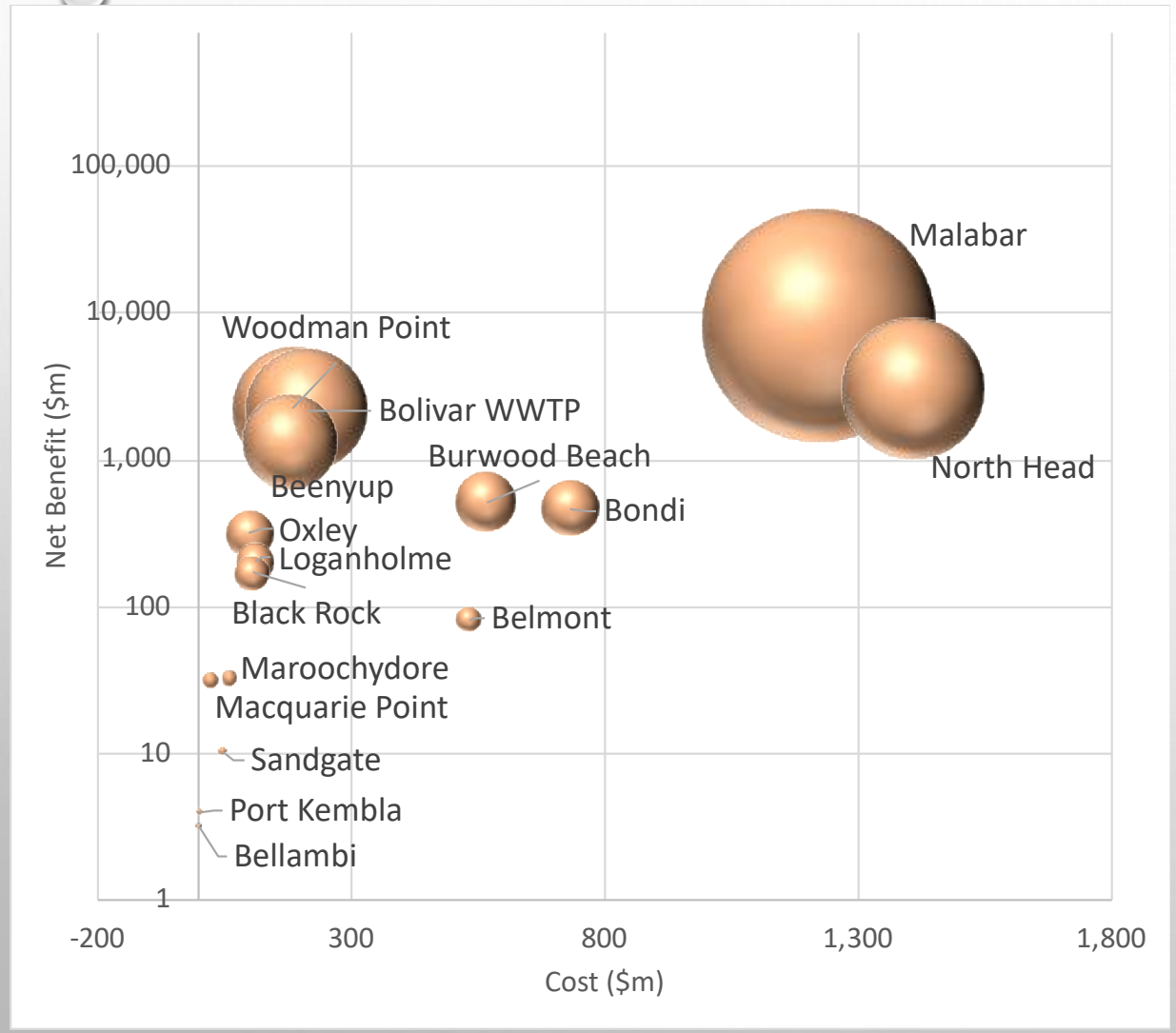
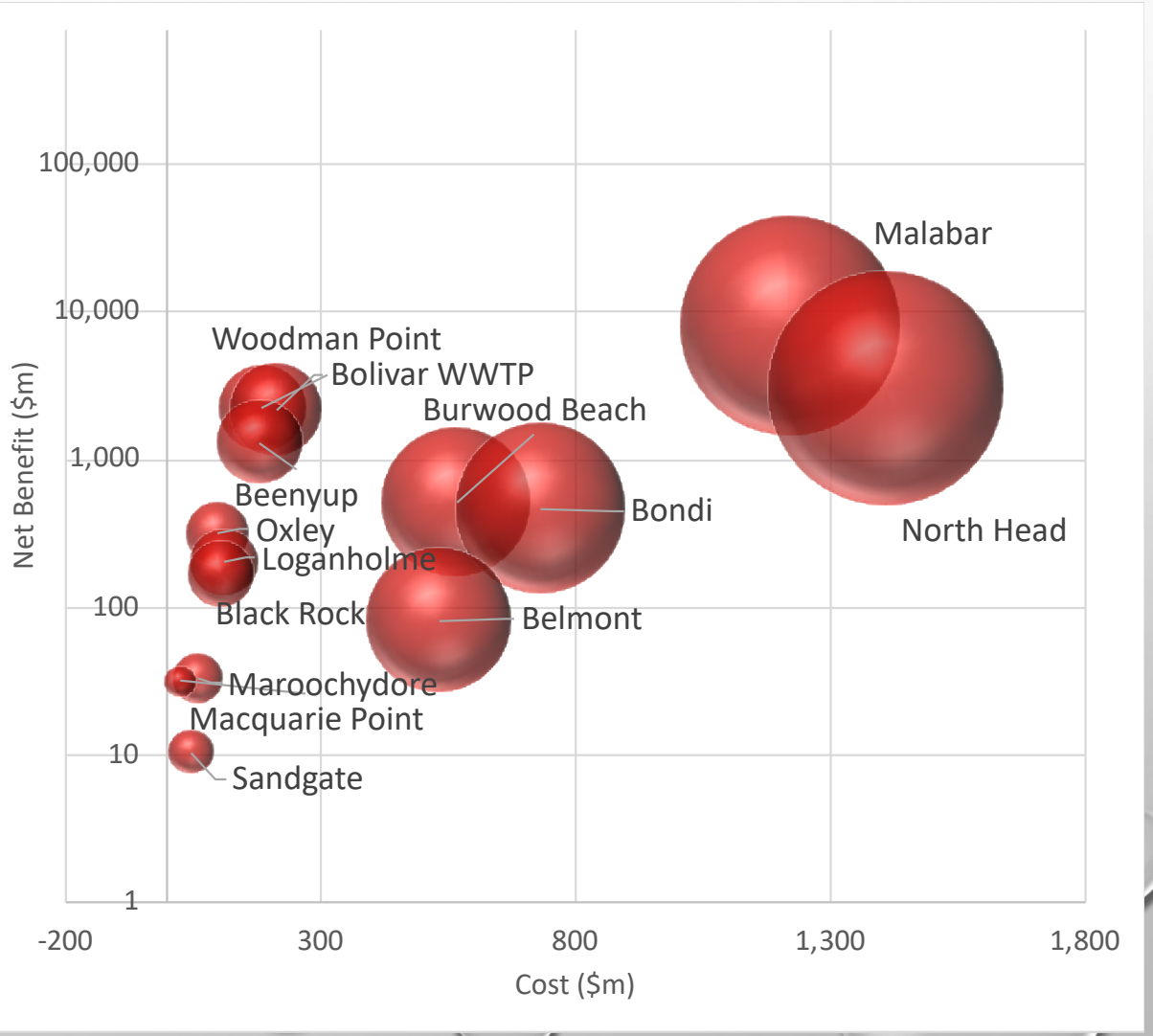
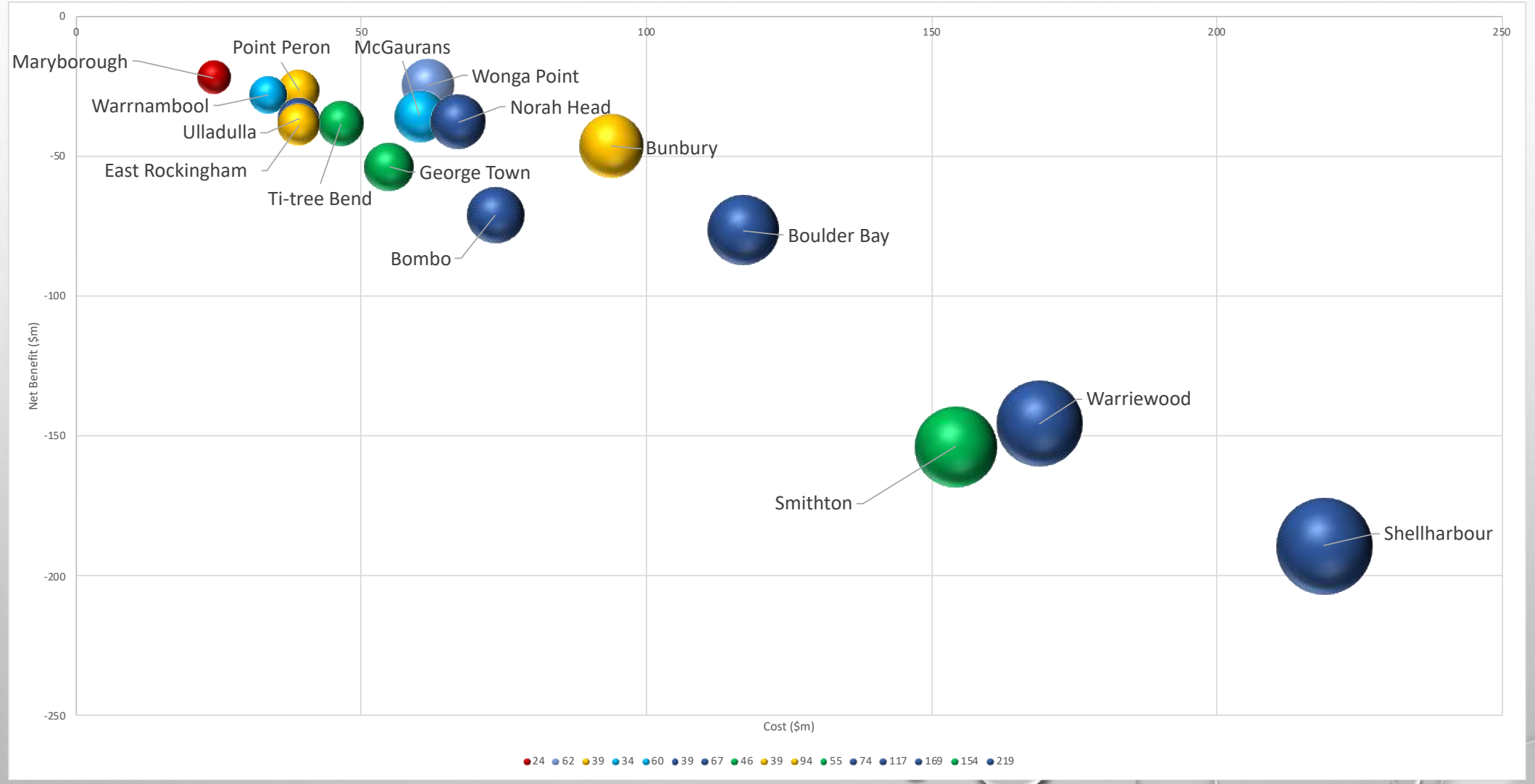


Fig. 8: Bubble size by Cost



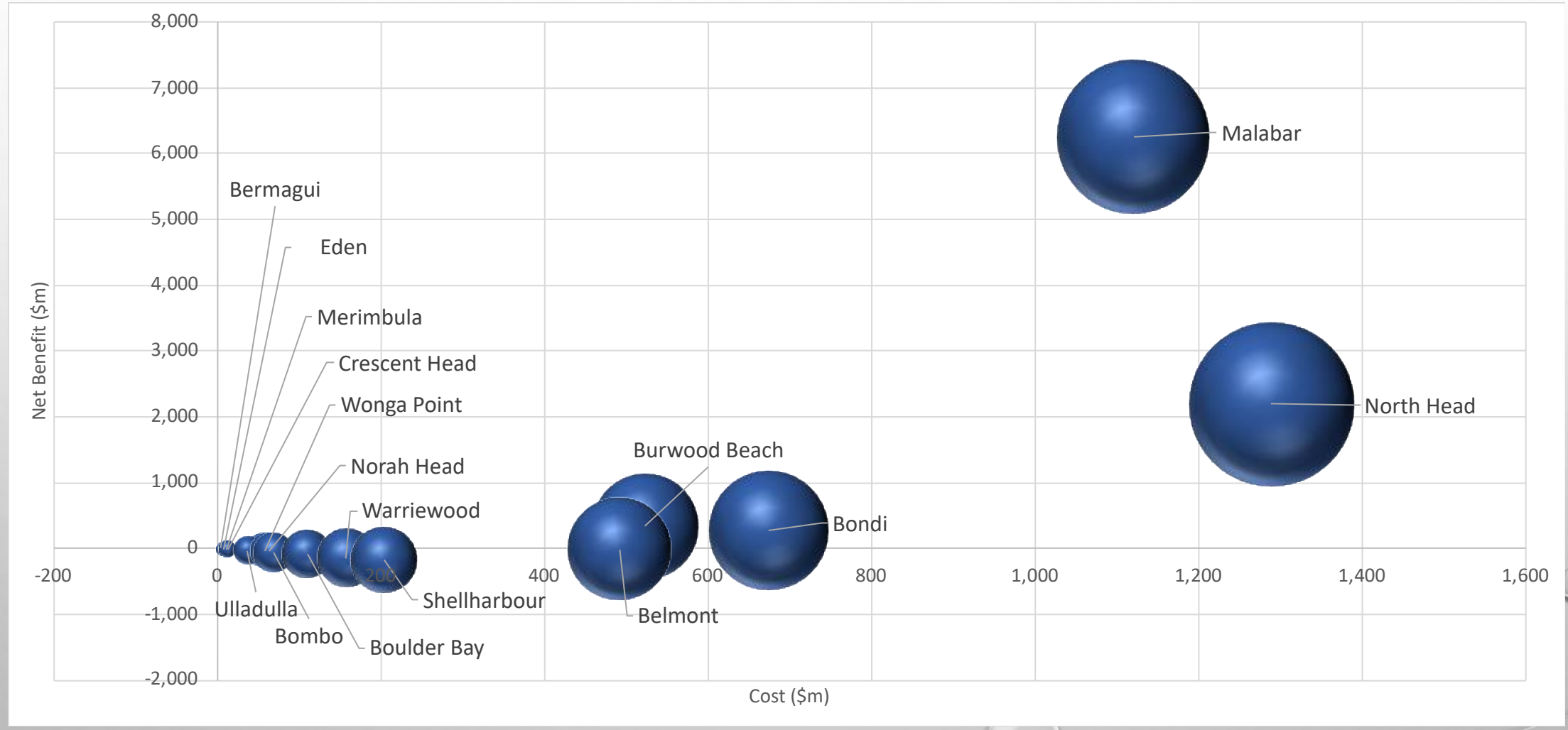
BOTTOM 16 NATIONAL OUTFALLS

Fig. 9: Bubble size by Cost, Bubble colour by State



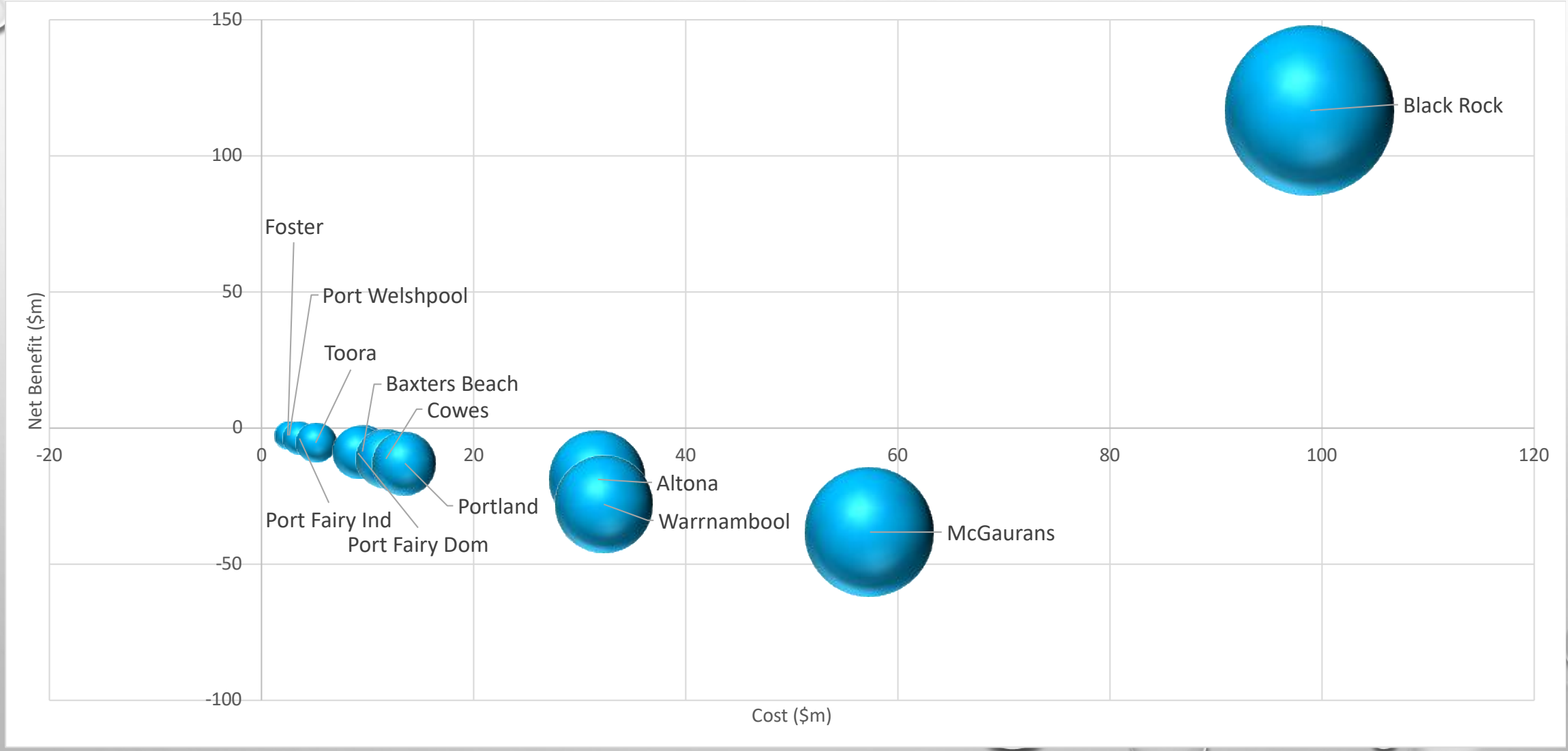
NSW OUTFALLS

Fig. 10: Bubble size by Cost



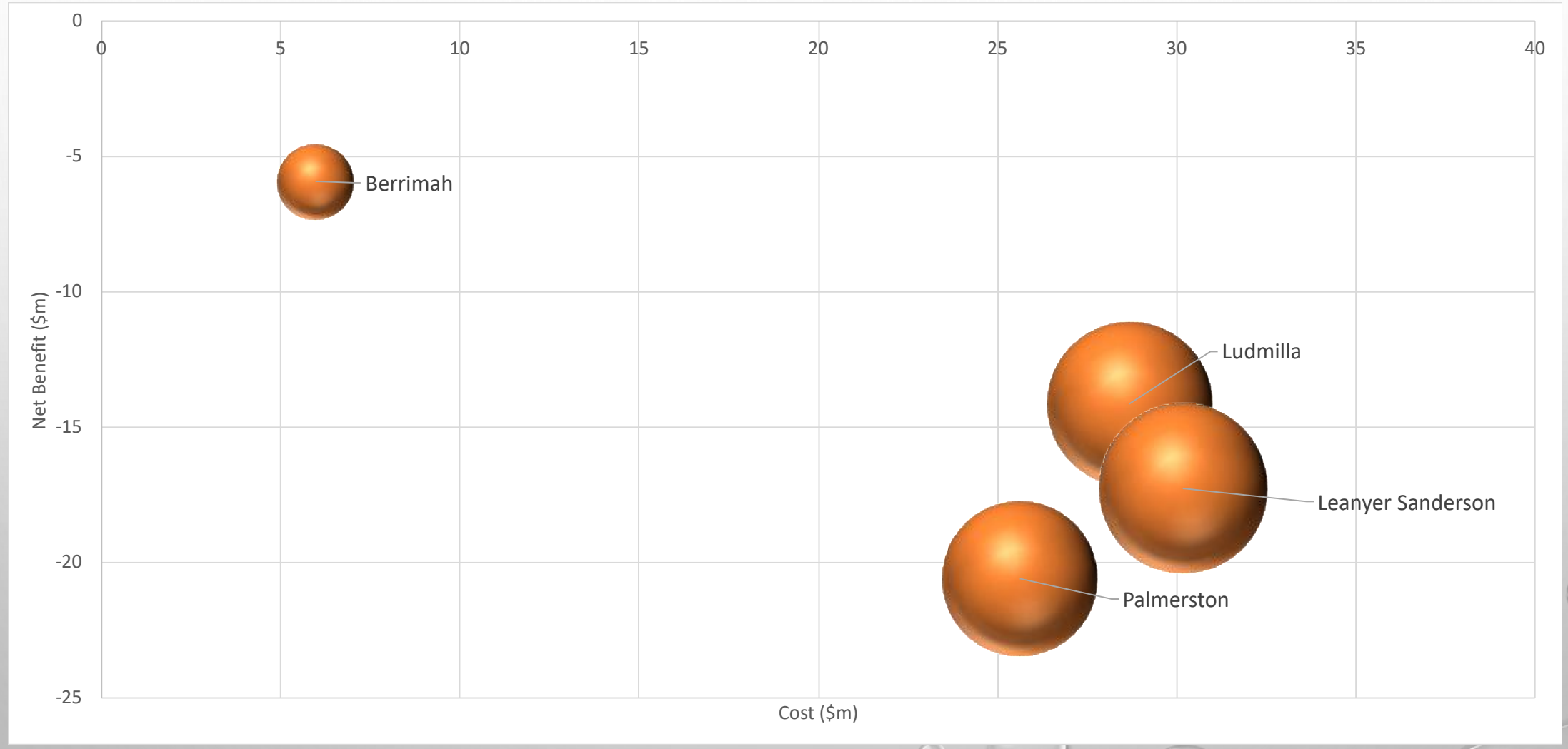
VIC OUTFALLS

Fig. 14: Bubble size by Cost



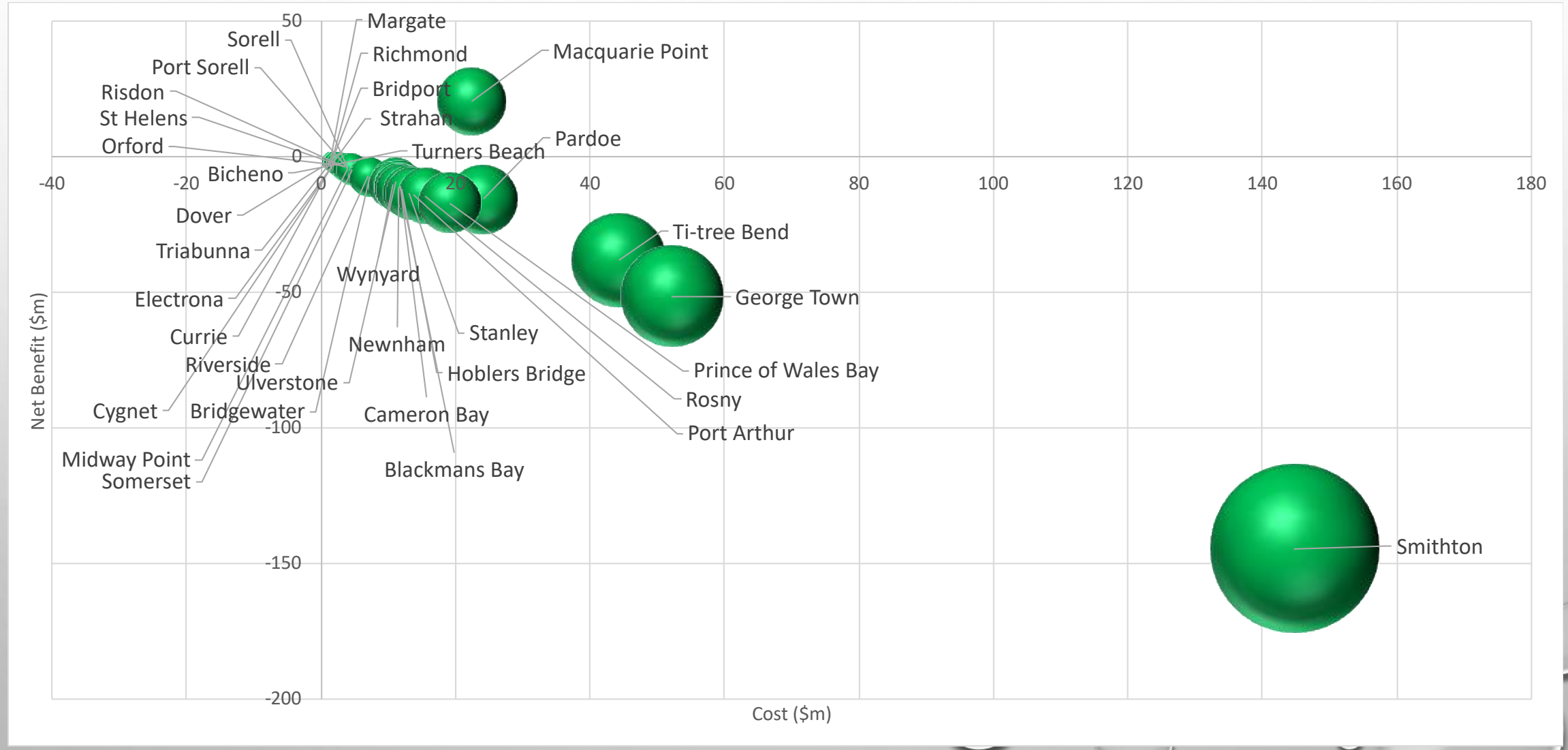
NT OUTFALLS

Fig. 15: Bubble size by Cost



TAS OUTFALLS

Fig. 16: Bubble size by Cost



TRANSPARENCY AND COMMUNITY EMPOWERMENT

- TRANSPARENCY = COMMUNITY LICENSE + COMPANY LINE
- GIVING COMMUNITIES TOOLS, SUPPORT AND CAPACITY TO CONTRIBUTE CONSTRUCTIVELY IN DESIGNING THEIR WATER INFRASTRUCTURE
- CLEAN OCEAN FOUNDATION = HONEST BROKER

- EXPERIENCE – COMMUNITIES DISEMPOWERED BY SCIENCE – NEED TO SPEND MONEY ON INCLUSIVENESS
- THEREFORE, NOUS STRATEGY IS CARROT FOR COMMUNITY ENGAGMENT
- MICROPLASTICS & PFOS\PFAS – DRIVING FUTURE WATER TREATMENT UPGRADES

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TRANSPARENCY RECOMMENDATIONS

All coastal outfalls to Tertiary Class A+ standard of recycled water by 2030 or Equiv. to Eastern Treatment Plant Melbourne

Community Support through Engagement and Transparency

National Outfall Database - innovative collaboration

National Standards for WTP data including transparency

Economic Instruments for Improved Societal Outcomes

Circular Economy, Lifecycle Approach and Plant Description – Purple Pipes New or retrofit (Syd CBD, WSAA)

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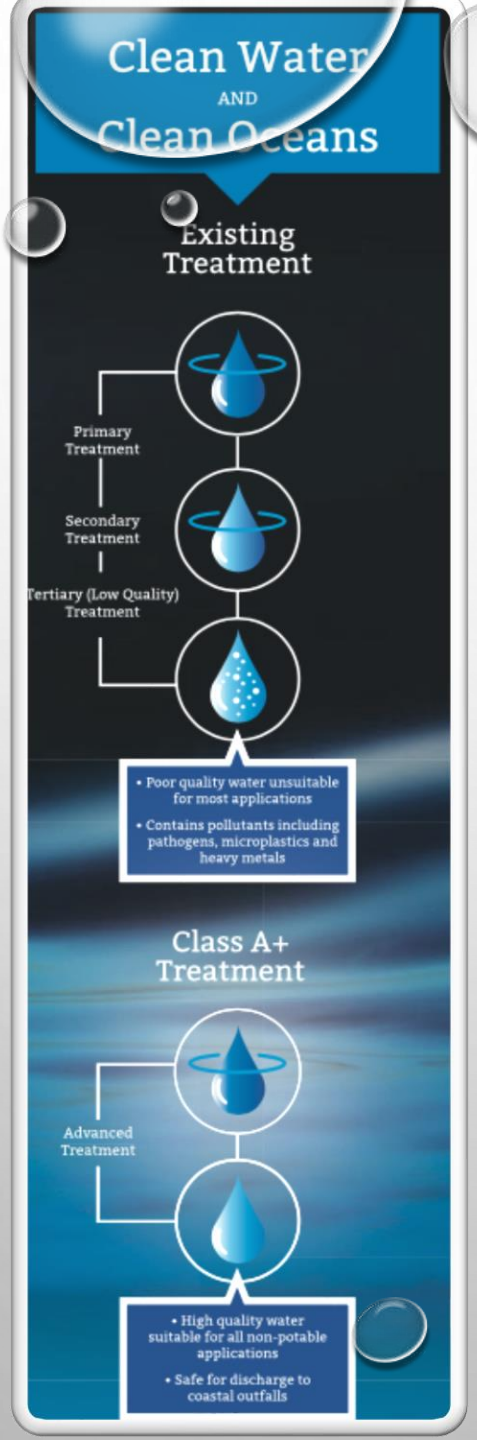

THE NOUS FIVE-POINT PLAN

1 **Class A+ by 2030**
Federal Government to commit to upgrading all wastewater treatment plants (WTPs) to discharge only Class A+ water from coastal outfalls by 2030, making available up to 50% of the cost of the WTP upgrades.

2 **National perspective is critical**
Economic outcomes are assessed from both local and national perspectives to ensure less profitable through essential outfalls receive upgrades.

3 **Supporting regions most in need**
Outfalls to be classified to give priority not just to the size of reuse economic benefit but also to consider those located in areas severely affected by drought, fire, loss of tourism or other economic hardship.

4 **Clean water fast-track process**
Expert panel of stakeholders and regulatory authorities to be convened ASAP to cut red tape, develop selection criteria and expedite approvals for a 2020 round of projects.

5 **Inland areas also need support**
Many inland regional towns and cities discharge wastewater into waterways. The NOUS plan must be enhanced to also include upgrades to inland treatment plants and form part of NOD.

POSITIVE POLICY IMPACT: NATIONAL OUTFALL UPGRADE STRATEGY - NOUS,

(COF, ND)

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CONCLUSIONS

- Significant opportunities for federal, state and local governments to harness much needed water resources
- Prevents waste of water and negative impacts on coastal ecosystems and communities
- Transparency recommendations will result in correct incentives for a better performing system
- Net benefit to society from doing so without the costs and adverse consequences of desal + **Ecological Economics**
- Builds resilience and further adaptive capacity to heightened uncertainty

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