Key Drivers of Households Water Use in South Australia: Practical Implications

Goyder Institute for Water Research Project: Optimal Water Resource Mix for Metropolitan Adelaide

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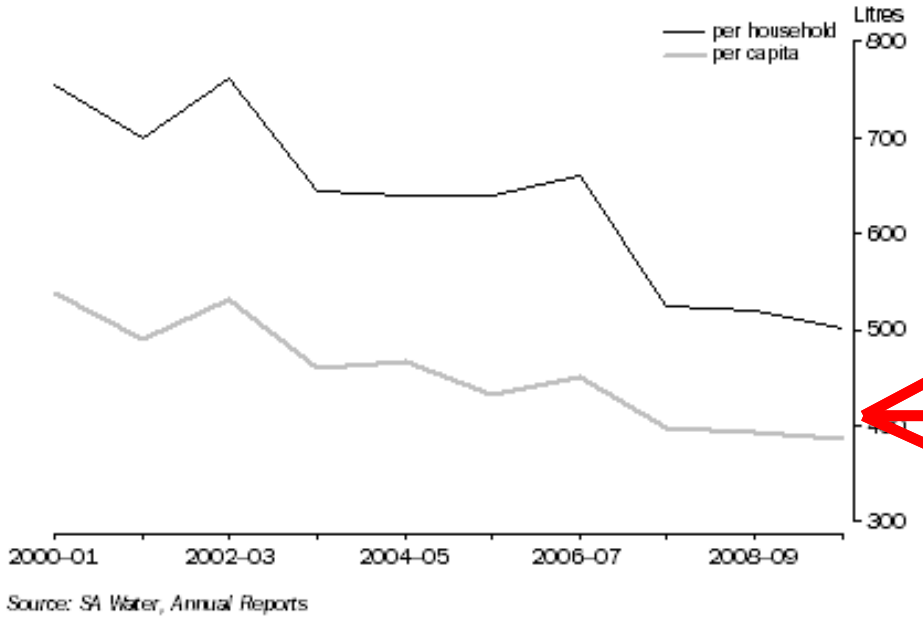
Future water use is difficult to predict

Daily water consumption, residential water per household, total water per capita



Source: SA Water, Annual Reports

Future Water Use?

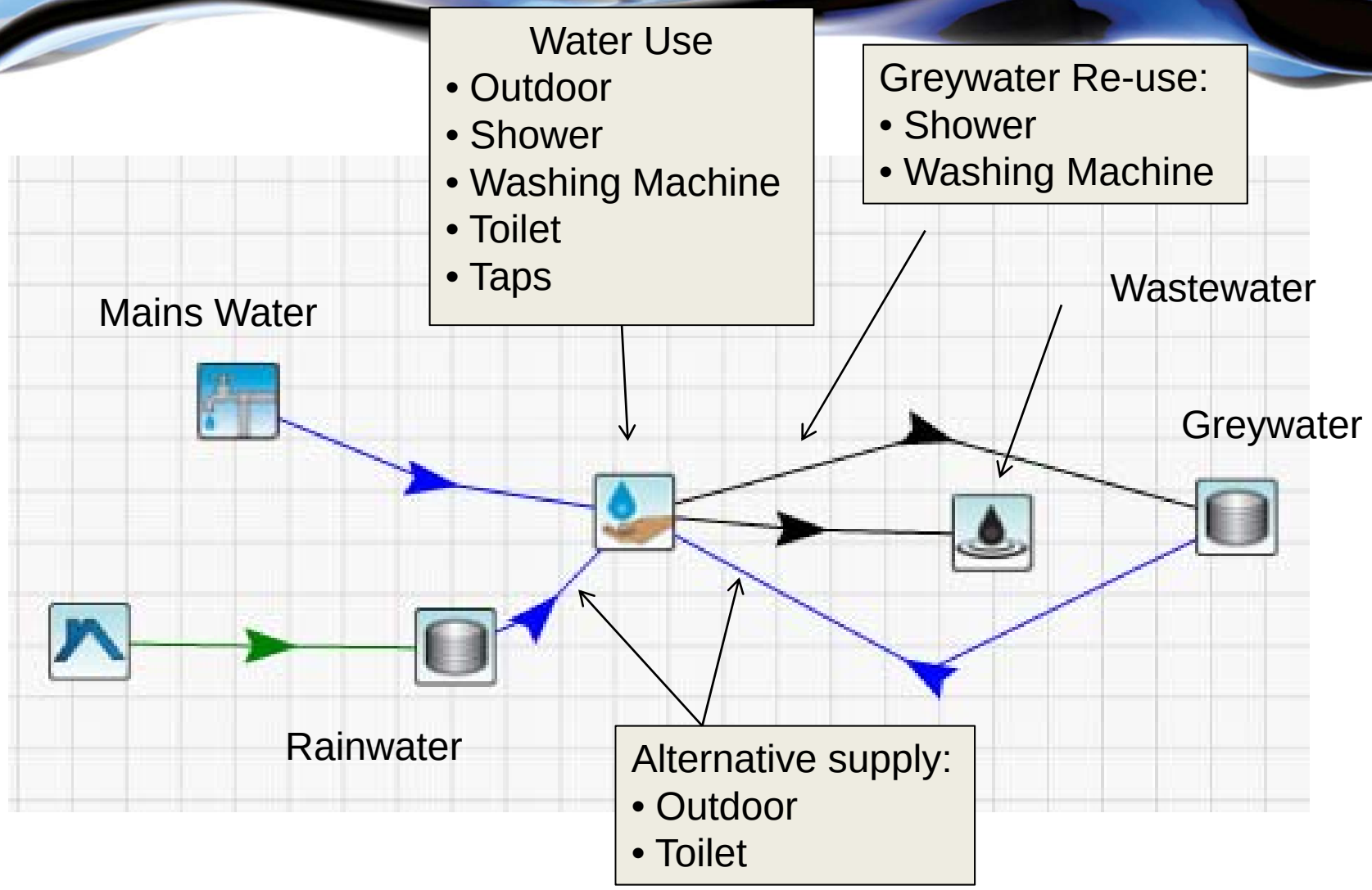
Rebound?

Static?

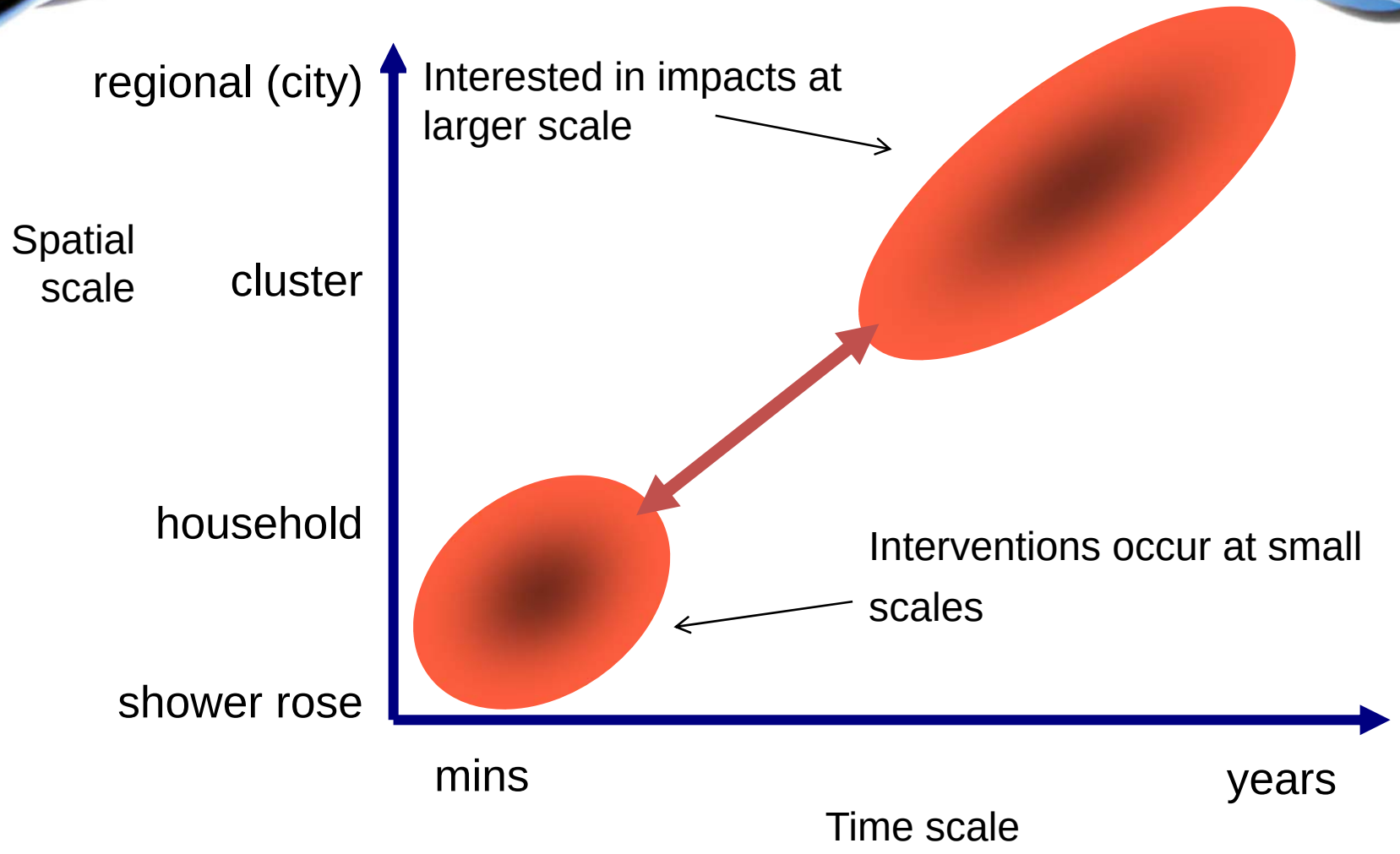
Increase efficiency?

Source: ABS

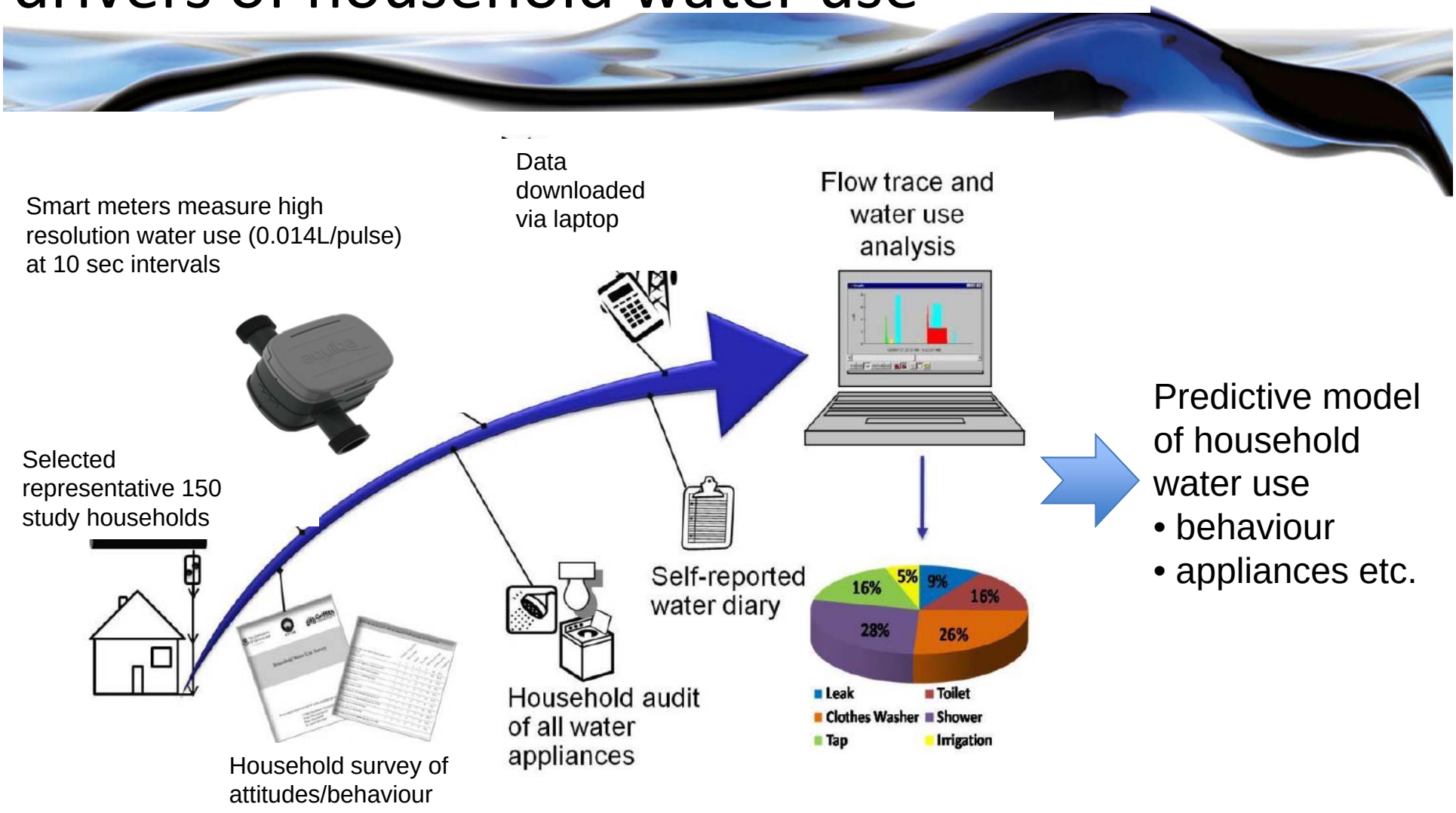
Knowledge of water end use essential for IUWM



What is impact of changes in household water use on larger water supply systems?



Objective: Evaluate key behavioural drivers of household water use



150 Study Households represent 65% Metro. Adelaide households

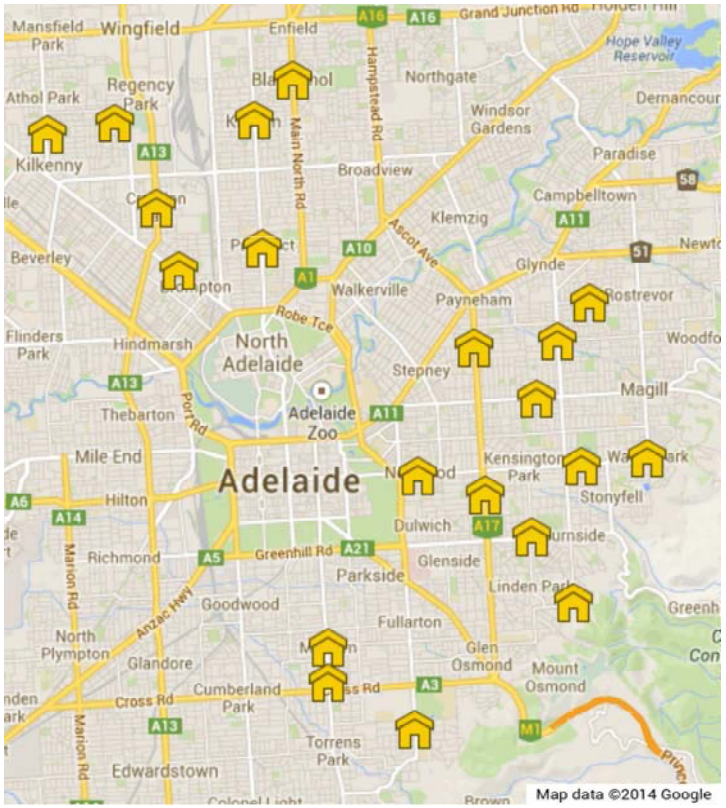
65% representation based on:

- Income
- Family Composition
- Appliance proportion
- Occupancy
- Dwelling Structure

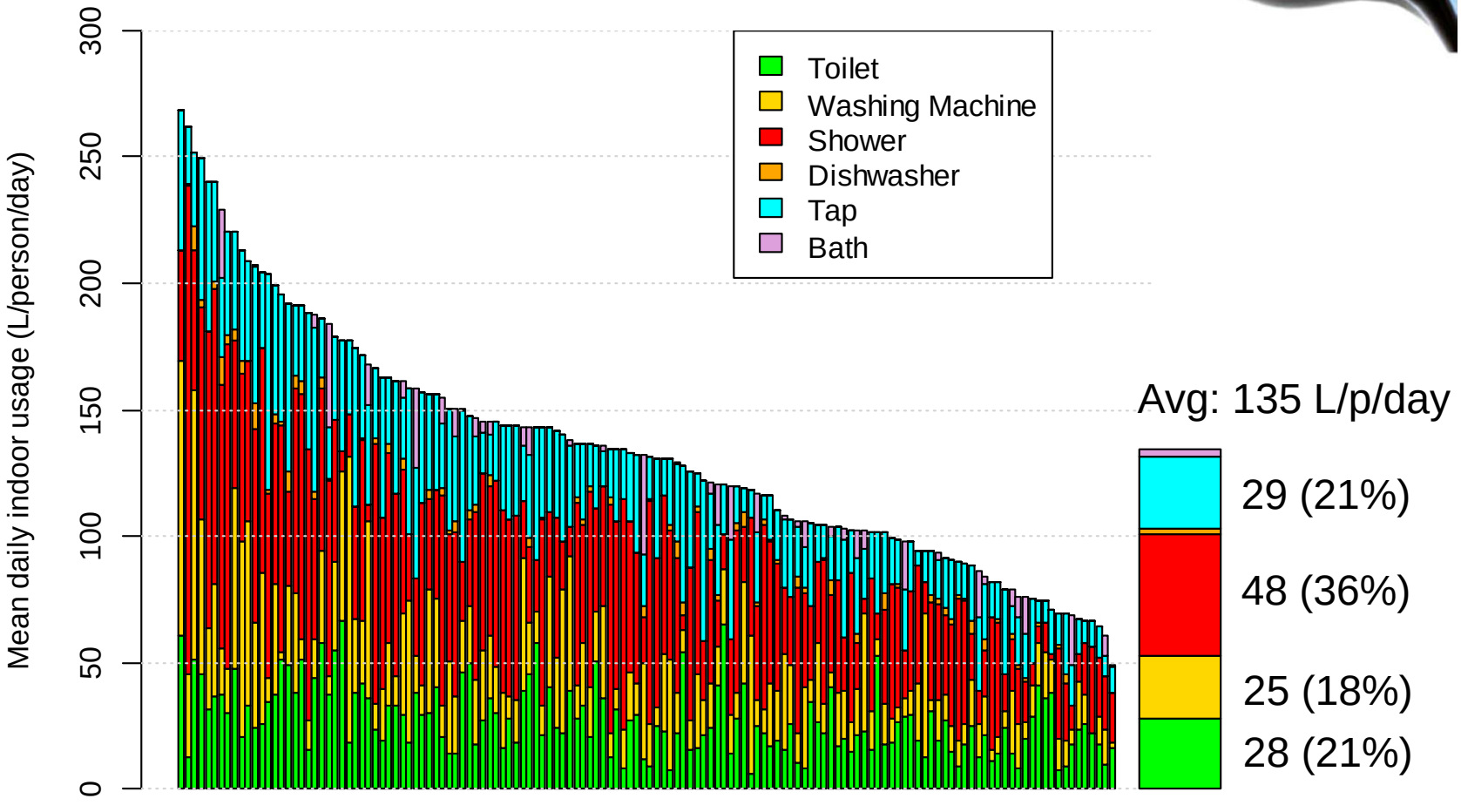
Under-represented:

- Single parent families
- Renters, units etc.
- Newer housing stock

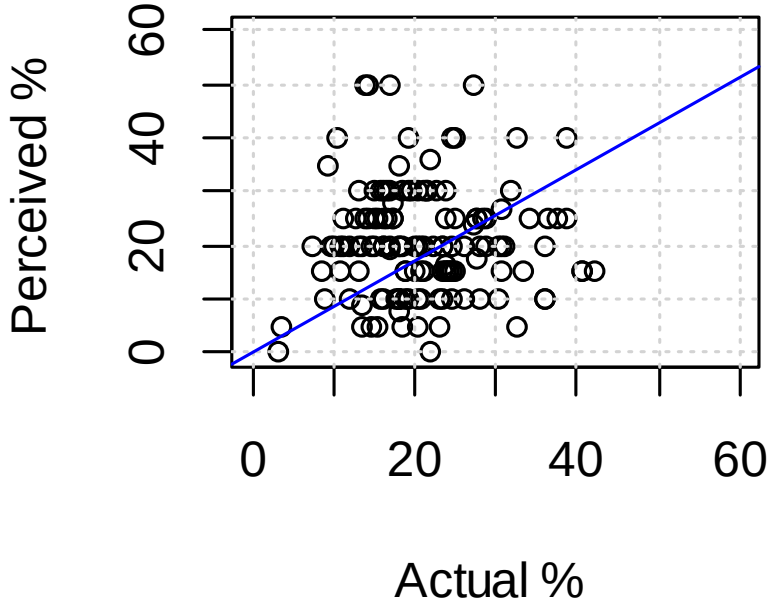
- Owner occupied separate houses



Significant variability in end-use between different households



Households cannot predict their own indoor end use



- Washing machine end use

- ***Households need greater information (e.g. monitoring) to identify cost-effective water saving opportunities***

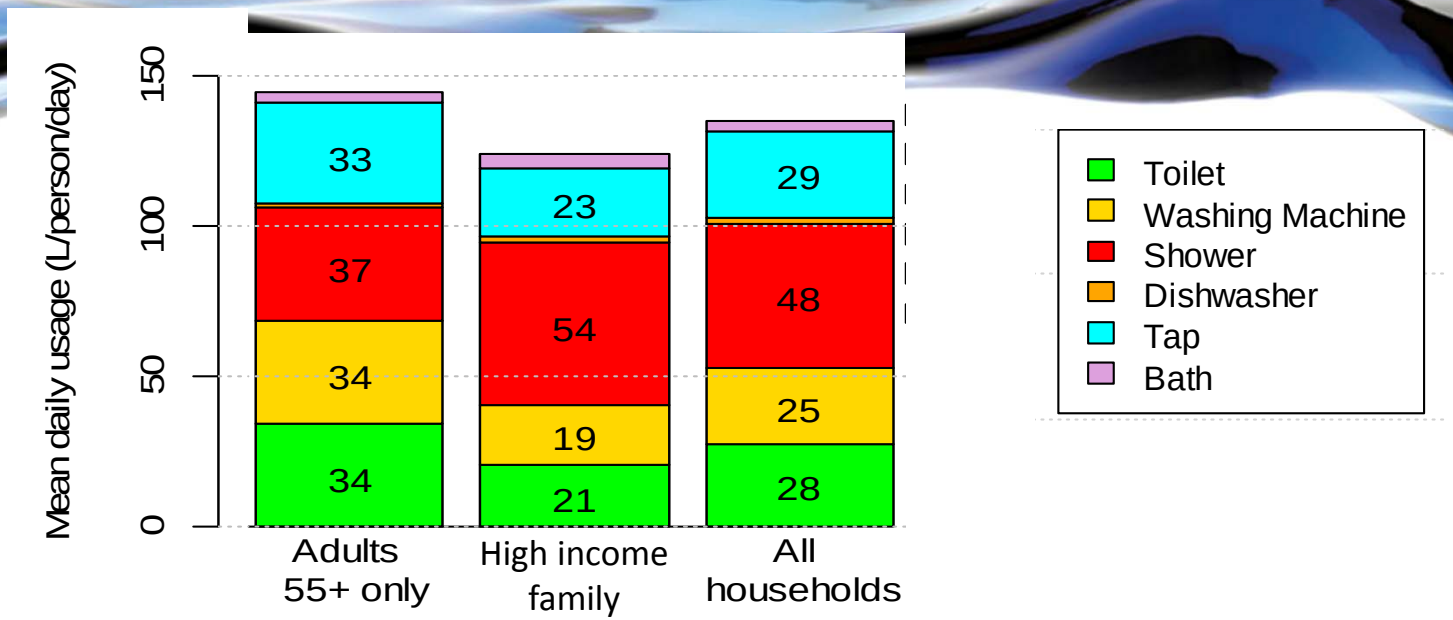
Front loading washing machines offer biggest water saving potential

	Showers (<9L/min)	Toilet (6/3L)	Washing machine (front loader)	Total
Current %	43%	35%	55%	-
Potential Savings (L/p/day)	5.5	5.1	8.7	19.3 (15% indoor)

- No behaviour difference (freq/duration) with water efficient appliances (e.g. longer showers)

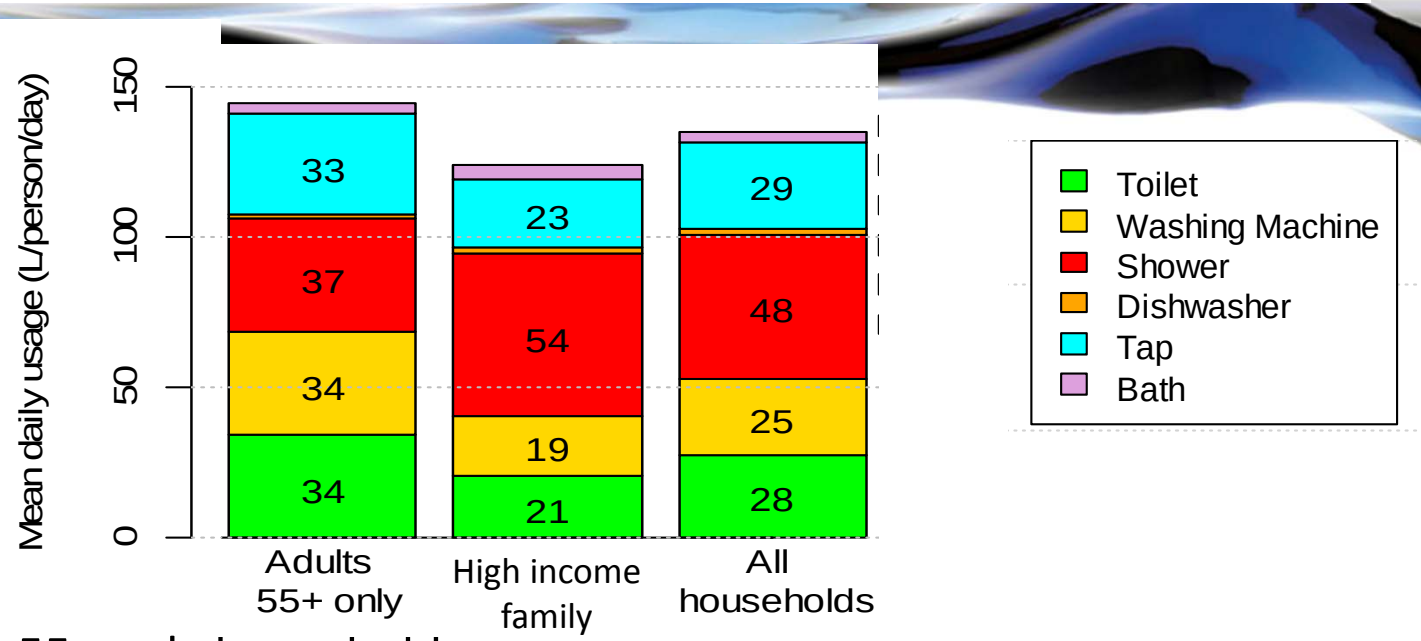
- ***Schemes that encourage uptake of efficient washing machines are encouraged***

Distinct household usage types require target demand management



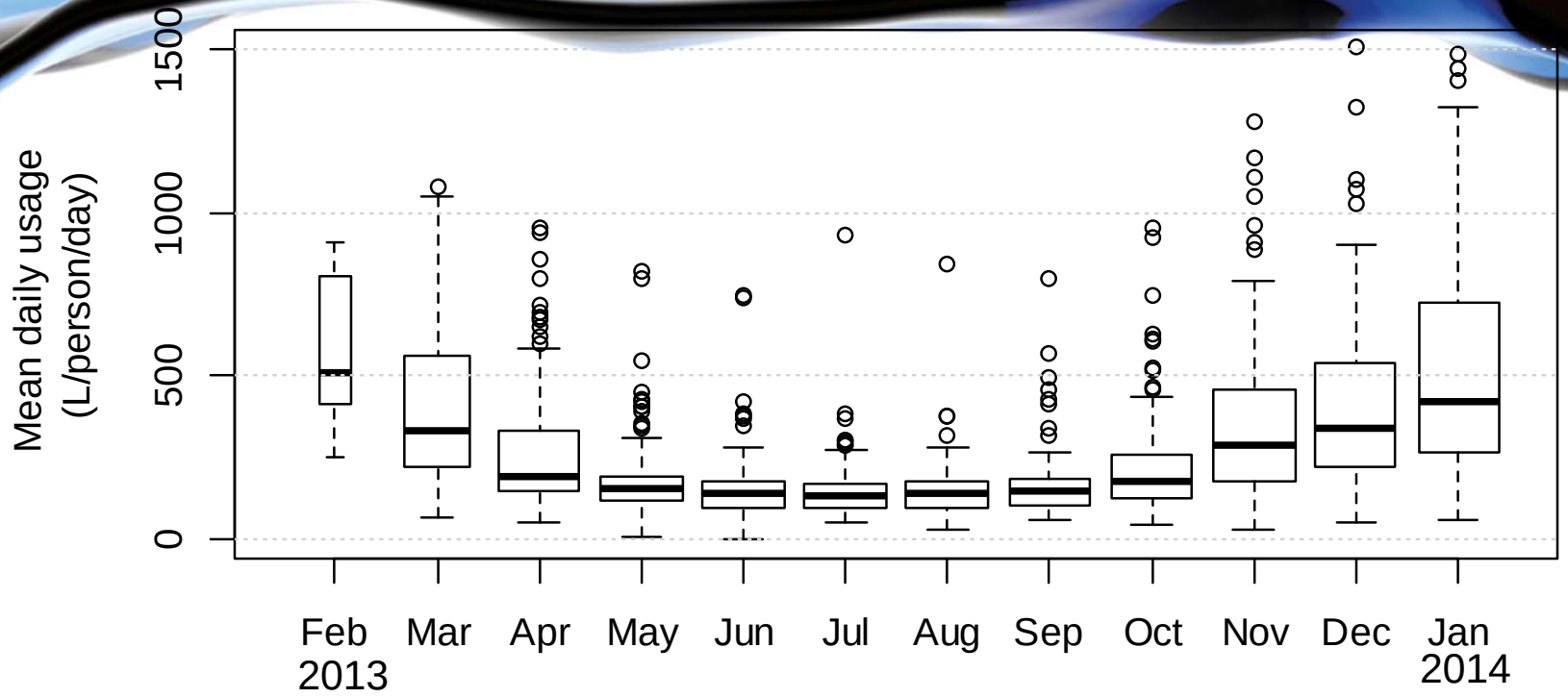
- High income family households
  - Very shower high use, but lower washing machine and toilet use
  - Less likely to think they are water conservers (longer showers)
  - Indoor use low, due to efficient washing machines and lower toilet frequency
  - Water saving potential should target shower behaviour (e.g. shower timers)

Distinct household usage types require targeted demand management



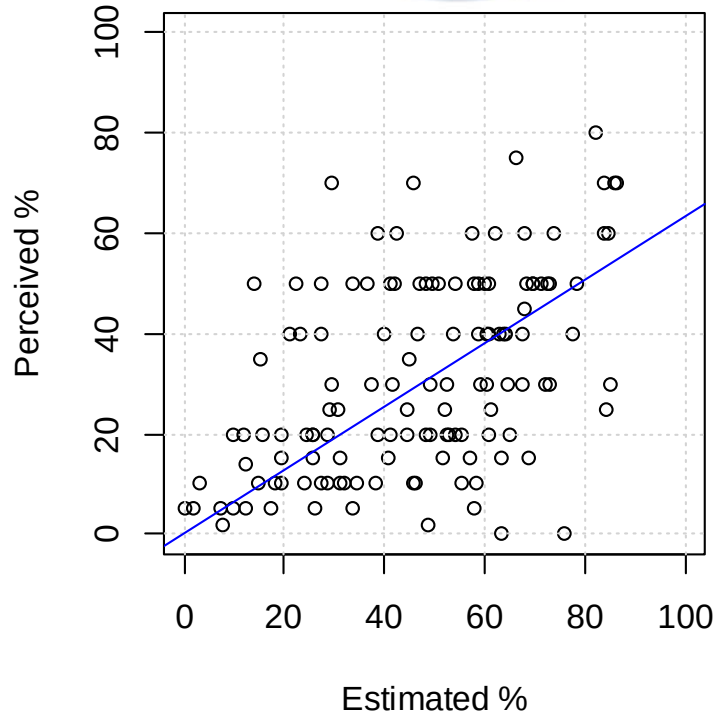
- Adults 55+ only households
  - Lower shower use, but higher washing machine and toilet use
  - Likely to think they are water conservers (shorter showers)
  - Indoor use high, due to inefficient washing machines and higher toilet use frequency
  - Water saving is from efficient washing machines
- ***Likely to be growing household usage type as population ages***

Strong Seasonal Impact on Water Use



- Winter: 153 L/p/day, Summer: 500 L/p/day
- Approx. 40% of total household water use

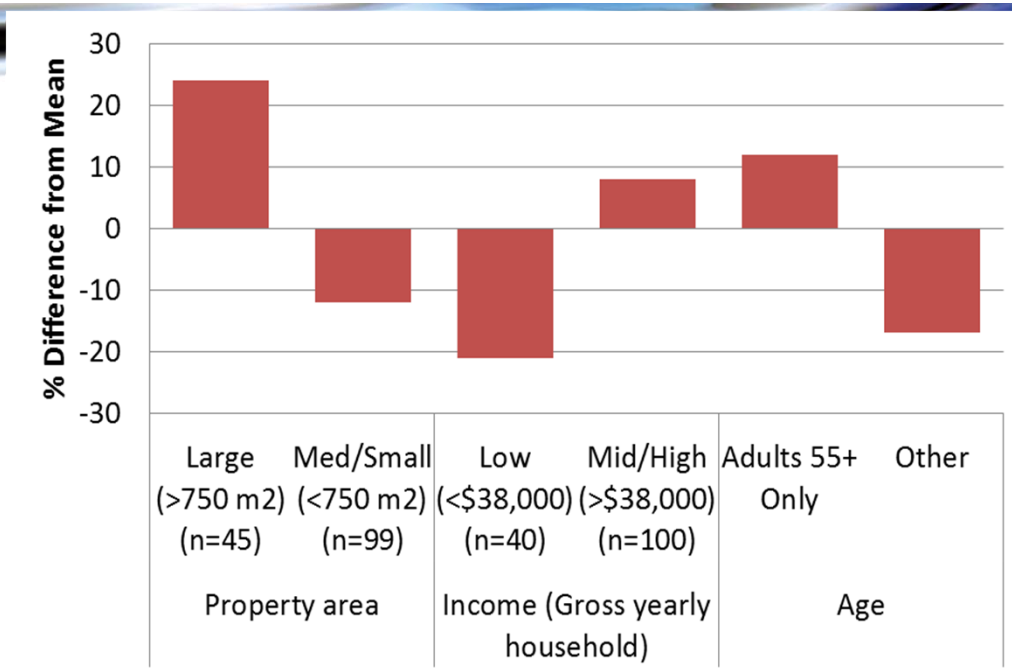
Households cannot predict their own seasonal end use



- Seasonal end use (outdoor, evap air conditioners etc.)

- ***Households need greater information (e.g. monitoring) to identify cost-effective water saving opportunities***

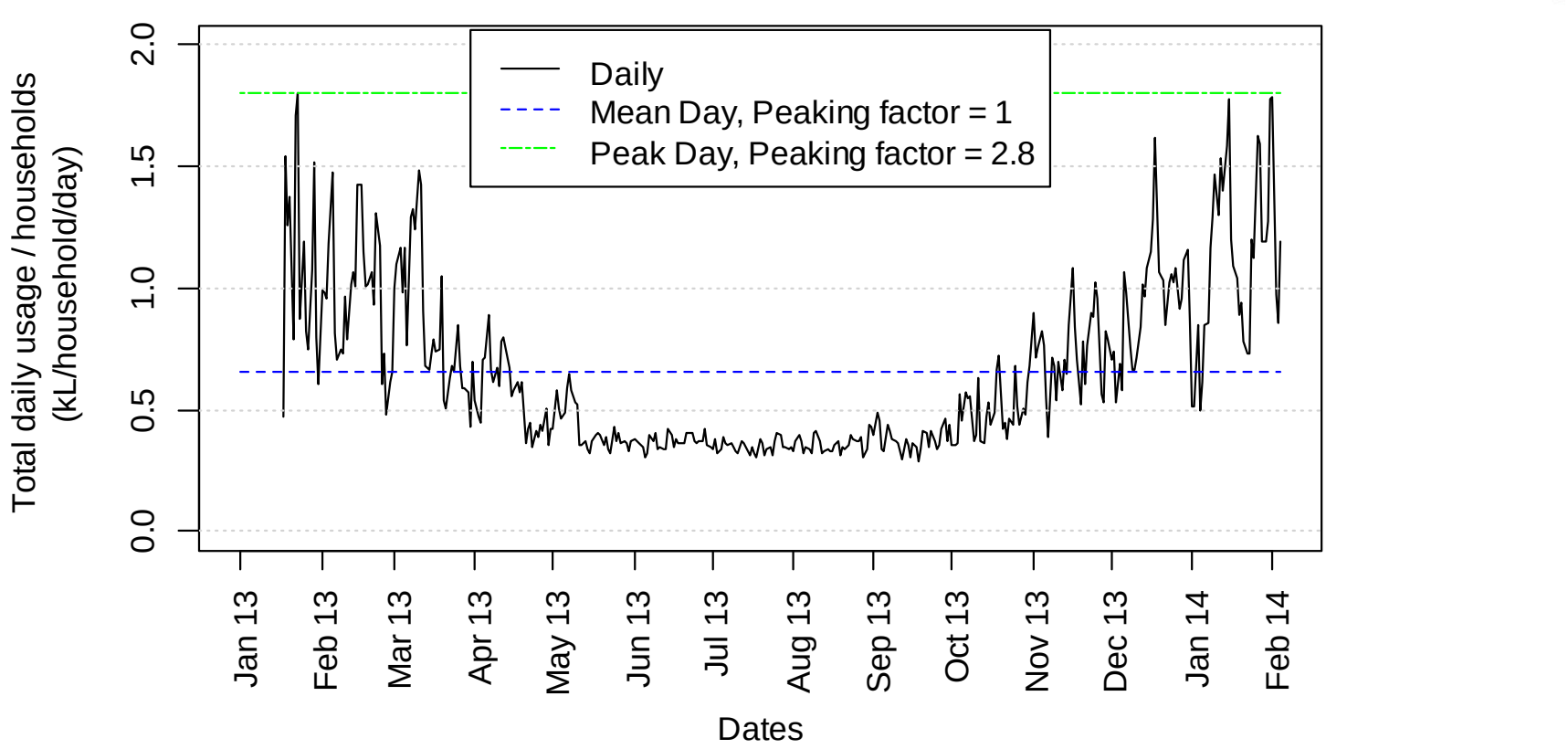
Strong variability in seasonal water use between households



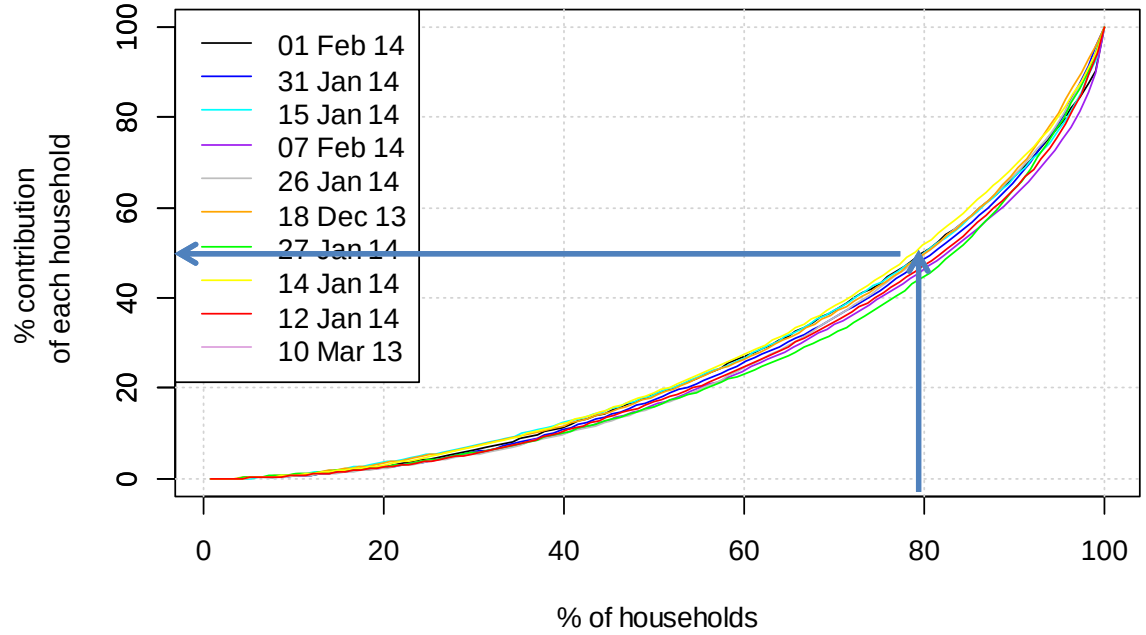
- Larger property area increases use (25%)
- Lower income decreases use (20%)
- Adults 55+ only increases use (12%)

- ***Targeted approach to design and management of water use systems is required***

Peak Daily Water Use Occurs in Summer



Small proportion of households contribute to peak demand

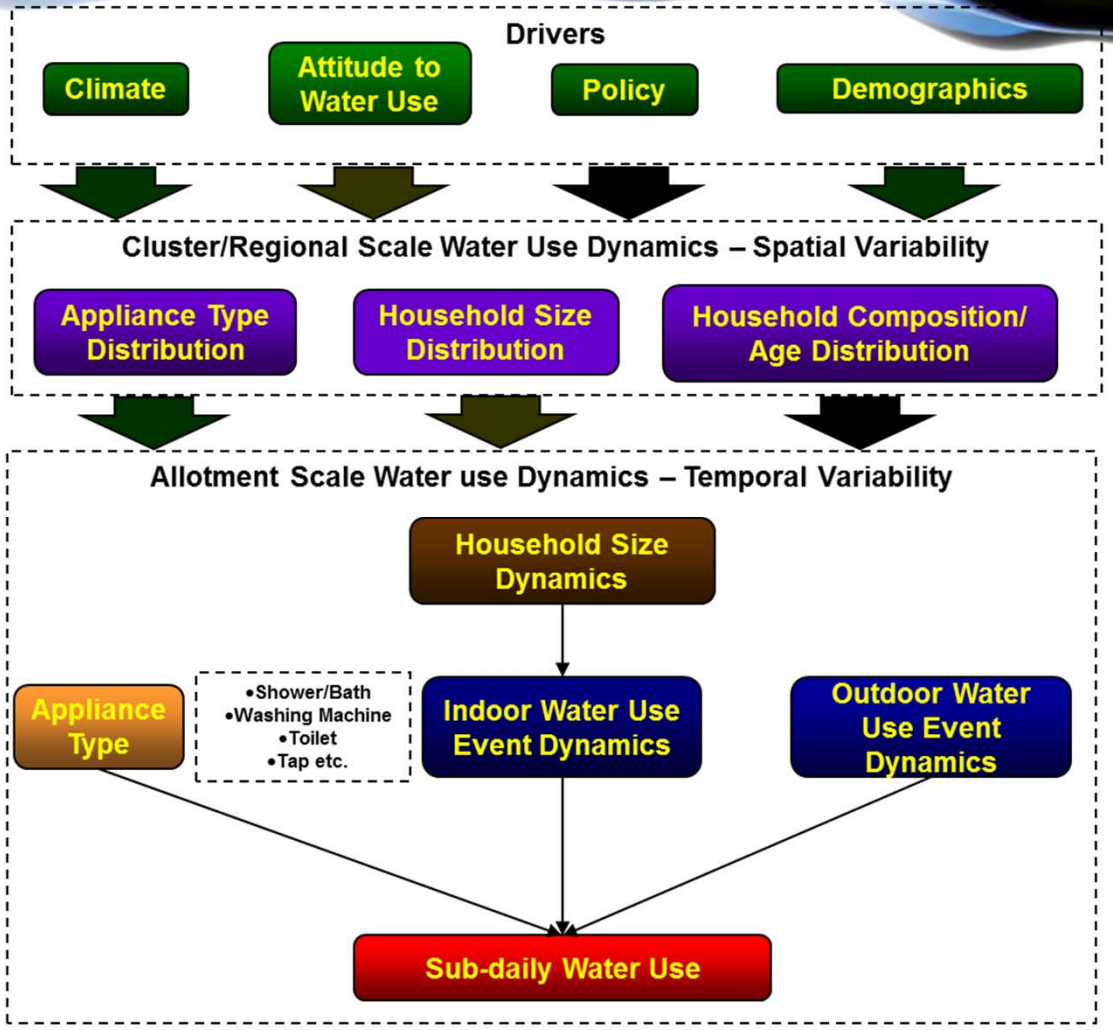


- Contribution of each household to peak daily demand

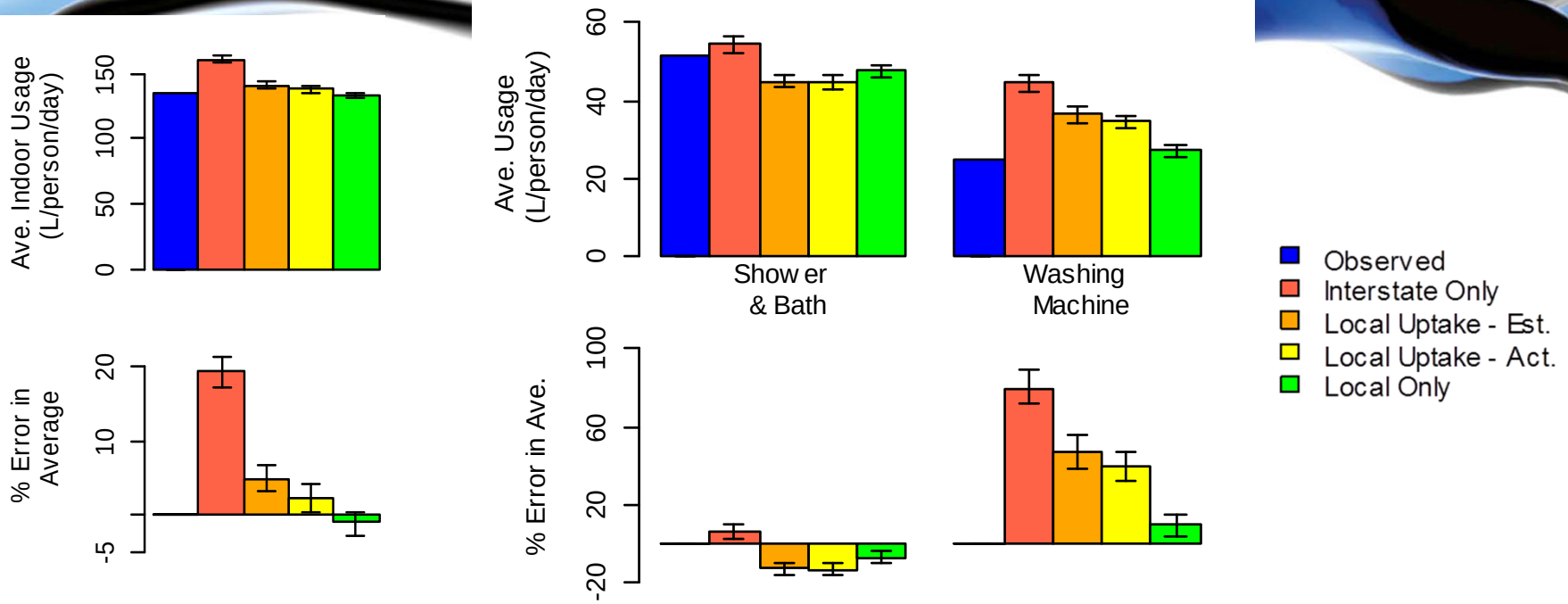
- 20% of households contribute to 50% of volume on peak demand days
- ***Significant opportunity to reduce peak demands and infrastructure costs by targeting "high peak" households***

Objective: Provide reliable predictions of household end-uses

BESS:
Behavioural
End-Use
Stochastic
Simulator
A Urban Water
Use Framework

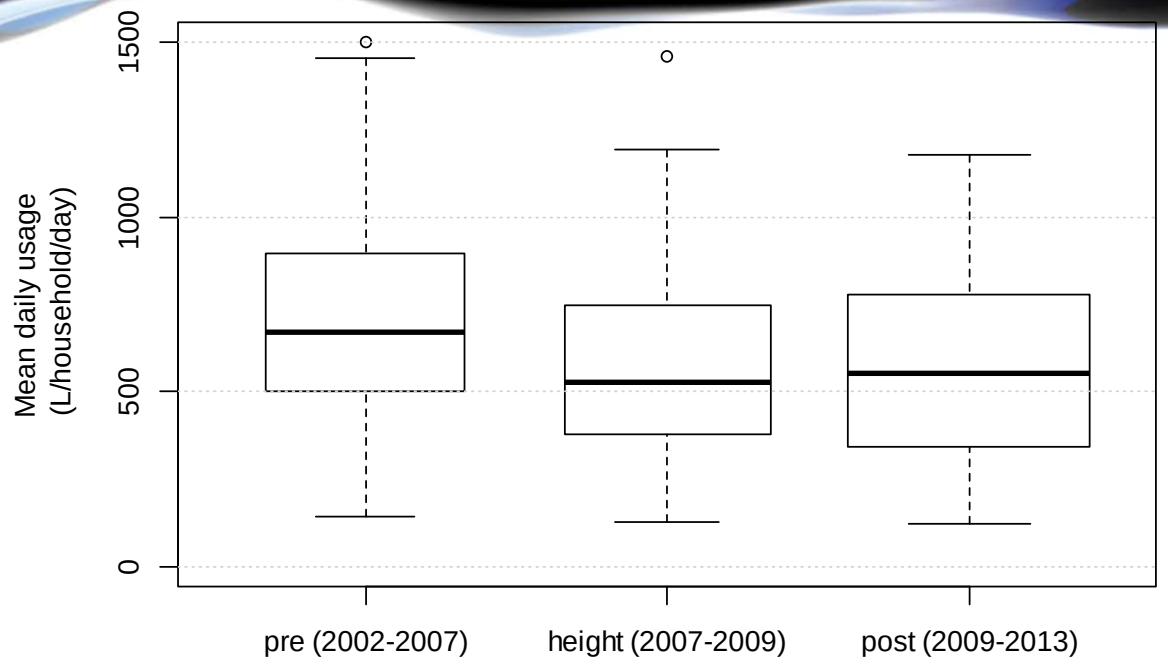


BESS provided reliable end-use predictions with local data



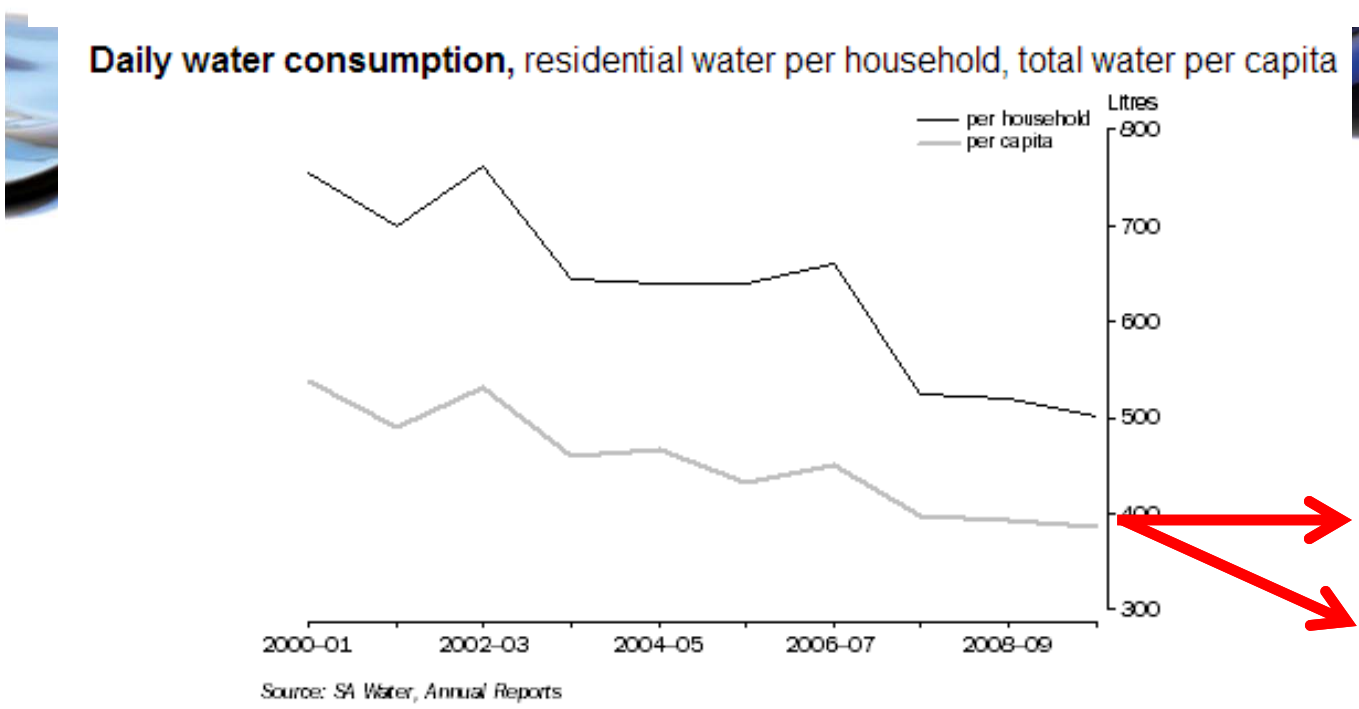
- BESS provides reliable end-use predictions for households with similar characteristics
- Further development needed improve transferability of end-use predictions (include household usage types).

Drivers of decrease in demand during 2007-2009 drought



- During 2007-2009 drought, 15% decrease in water use
- BESS estimates 50% dec. due to uptake efficient appliances, 50% decrease due to decrease in outdoor
- Will reduced post-drought demand continue?

Predictions of Future Demand



Future Water Use?

- Demand Management (uptake of water efficient appliances) reduce household demand by 7%, wastewater volumes by 11%
- Future reductions are lower – demand hardening → 100% uptake
- Does not include behavioural change – lower limit

Summary

- Identified key drivers of household water use in Adelaide
  - Smart metering , analysis and surveys
- Identified practical opportunities for more targeted approaches for water system management and design
  - Reduce water use, reduce infrastructure costs
- Future research
  - Longer term monitoring, seasonal water use 40%, but highly variable due to climate
  - Improved modelling of end-use
  - Include “under-represented” households