



# Sludge stabilisation quality in regional wastewater treatment plants - update

Biosolids Workshop  
RMIT University City Campus: 29 August 2017

Deborah Pritchard, Hannah Rigby, Karen Schwarz, Simon Toze, Jatinder Sidhu,  
Yolanta Gruchlik, Shu Zhao, Yan Lin, Bradley Clarke, Nancy Penney, Elliot Lee

Department of Environment and Agriculture  
Curtin University



Curtin University

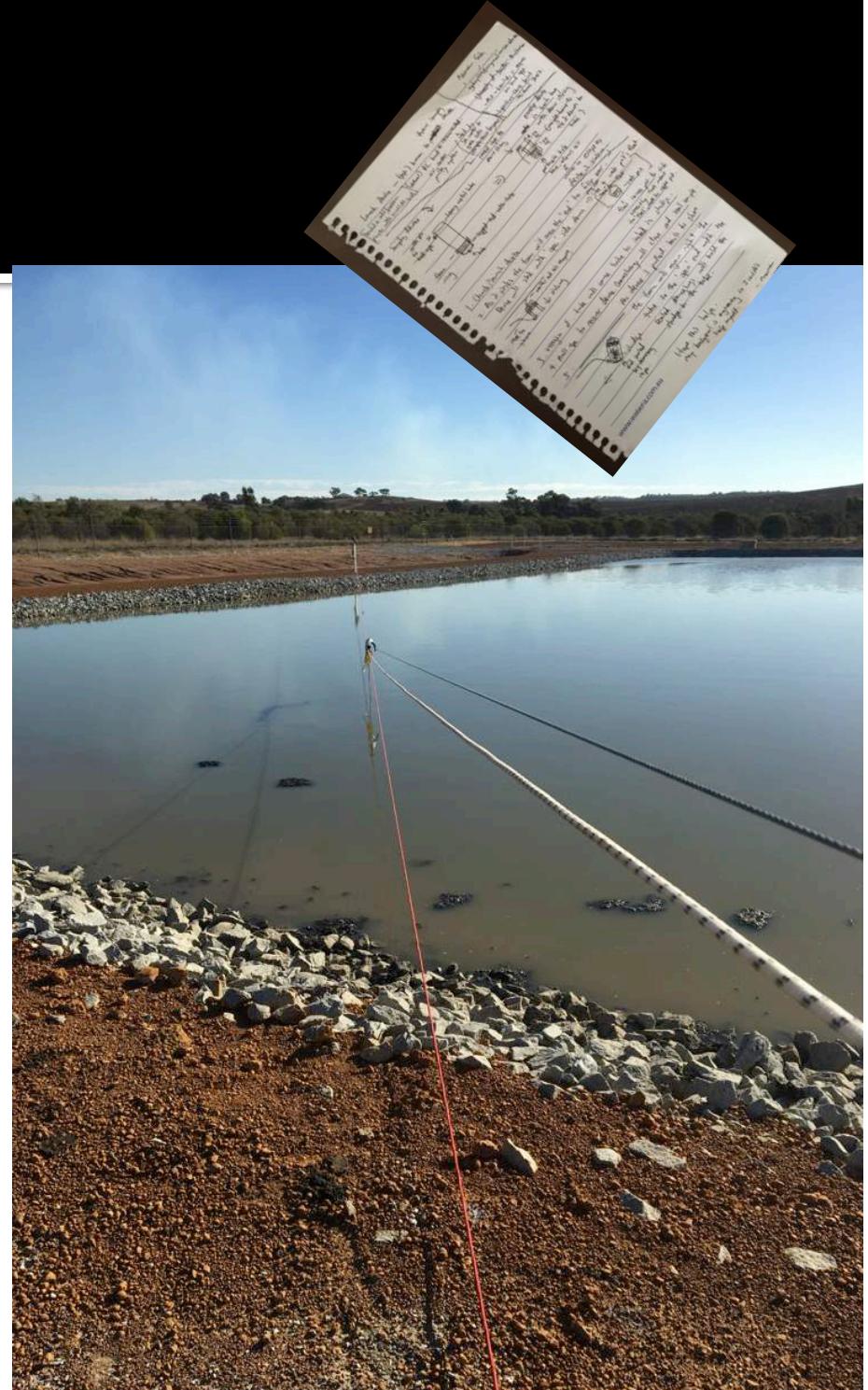
# Background

- Are current DEP Guidelines\* used for biosolids relevant in sludge stabilisation ponds?
  - Identify suitable parameters to validate the effectiveness of the treatment process in regional WWTP facultative ponds.
  - How do we measure facultative ponds that are in constant flux?
  - Focus on pathogen reduction, degradation of organic compounds (e.g. odours, nitrogenous compounds etc).
  - \* Rigby and Narendranathan (2010): Thermotolerant coliforms E.coli 2 log reduction , VSR >38%, anaerobic digestion 20 days @ 35° C



◆ Water Corporation, Hopetoun, WA

# Challenges



- Used a flying fox design (40 m) to overcome logistics with taking pond samples.
- Maintain constant sampling depth in sludge layer.

# Microbial Sampling

- Measure survival of 5 microbial indicator organisms measured in sludge layer in sentinel chambers.
- Sentinel chambers designed to prevent leakage of microbes.
- 9 sampling events over 100 days.
- Background sludge samples collected.



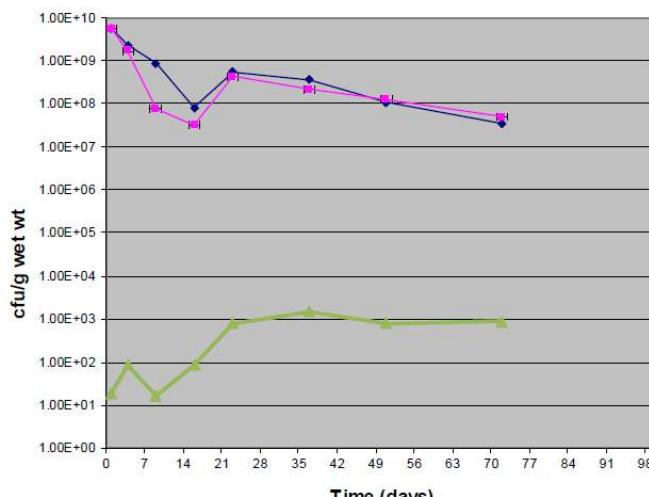
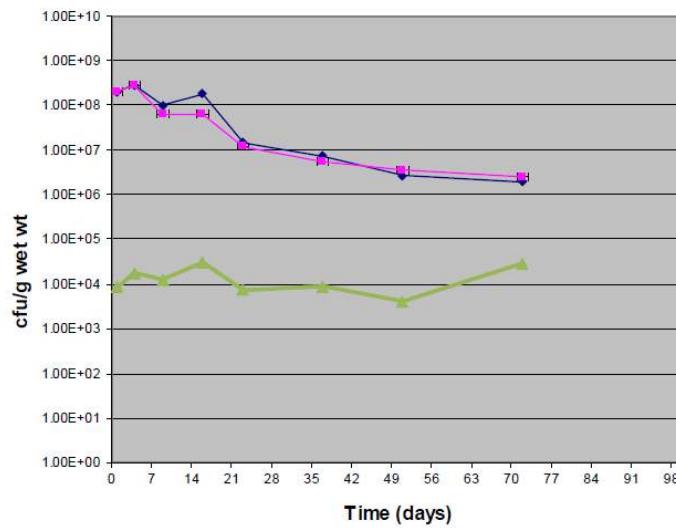
- Adenovirus
- E.coli
- Enterococci
- Bacteriophage-MS<sub>2</sub>
- Somatic coliforms

# Sampling Cage – the 'Titanic'

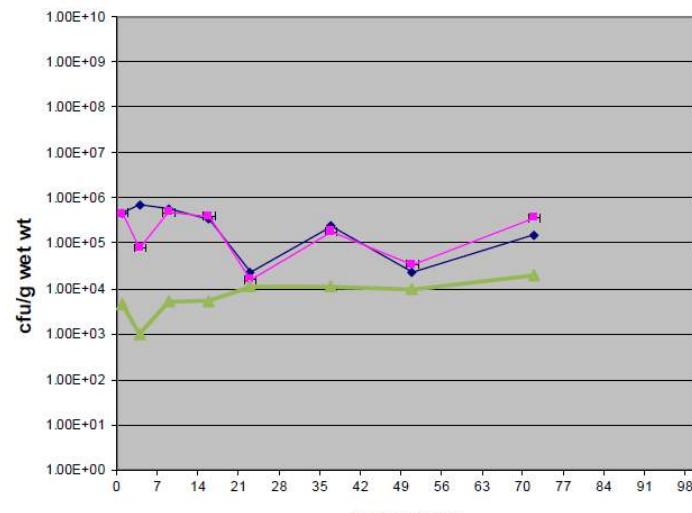
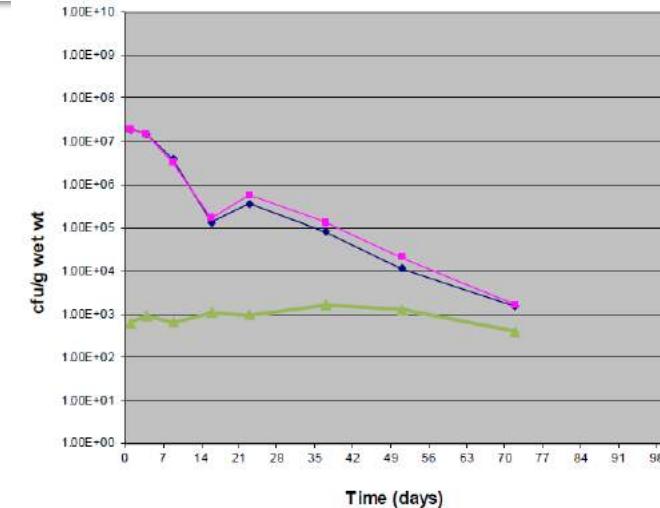


- 4 chambers at 2 depths (n=8 sentinel chambers per sampling)
- 3 pond sludge samples
- Pond temperature & light intensity recorded using HOBO dataloggers (2 hr intervals)
- Pond temperature, pH, dissolved oxygen, nitrites and turbidity datalogged (daily) using a TROLL-9000
- Manual testing; pH, EC, DO, temperature

# Microbial inactivation over time

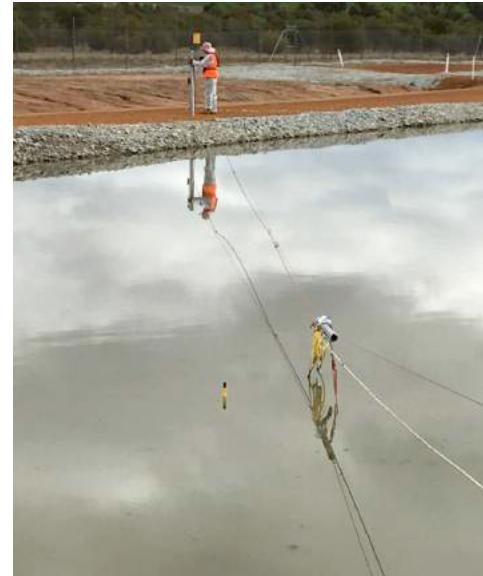


Clockwise from left:  
E.coli, Enterococci,  
Somatic coliphage,  
Bacteriophage MS2



# Organics and Odours

- 3 samples collected from 'Sea-dog' for 10 sampling events over 100 days. 'Sea-dog' attached to cage suspended in sludge layer 40 cm from bottom of pond.



# Decay kinetics

- Plan to mathematically model decay kinetics and inactivation of microbial indicator organisms over time for any given temperature or pond conditions taking into account initial loading rate and pond flow.
- Examine relationship with organic compounds\* in sludge layer and other parameters.

\*UV-Vis spectroscopy (change of humus and nitrogenous organic matter), Fluorescence (Ex/Em pairs) in different solvents, Odours as products of degradation.

# Team

- **Curtin University:** Deborah Pritchard, Karen Schwarz
- **EAD Solutions UK:** Hannah Rigby
- **CSIRO:** Simon Toze, Jatinder Sidhu
- **CWQRC:** Yolanta Gruchlik
- **RMIT:** Bradley Clarke, Shu Zhao, Yan Lin
- **Water Corporation:** Nancy Penney, Clarissa Kusnanto, Elliot Lee

