

Urban Water Security Research Alliance



Measurement of the Decay of Microbial Pathogens in South East Queensland Reservoirs

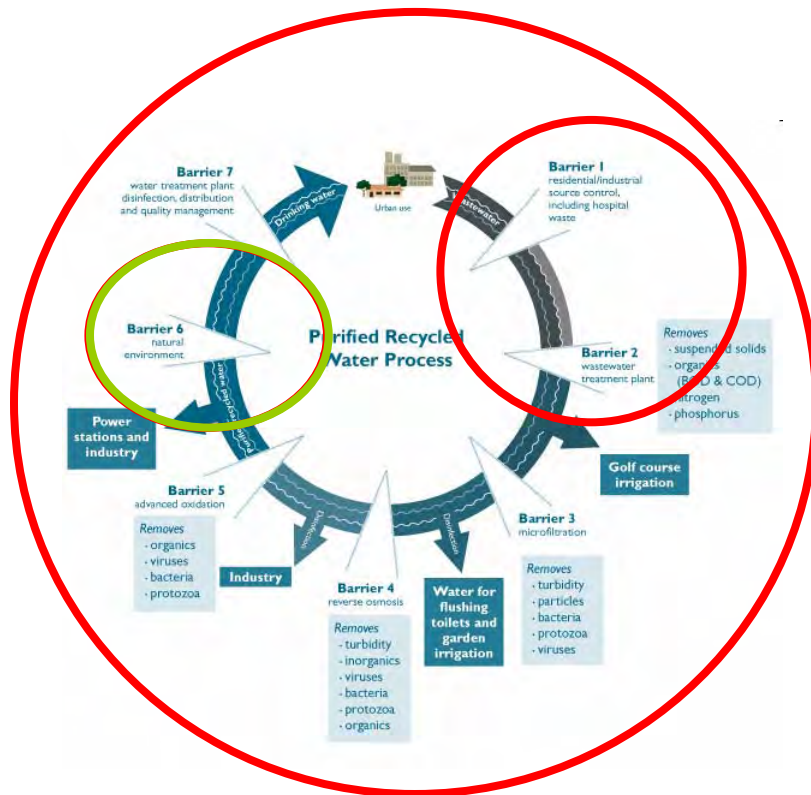
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Purified Recycled Water Project

18 August 2009



PRW Project



- Project aimed to research safety and sustainability of PRW
- Project is divided into three research components
 - Source
 - Reservoirs
 - Advanced Monitoring Techniques

Introduction to Pathogens in SE QLD Freshwater

Multiple sources of pathogens

- ~~Purified Recycled Water~~
- Wastewater treatment plants
- Farm animals and activities
- Wild animals

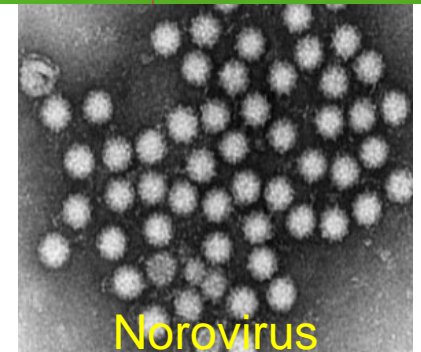
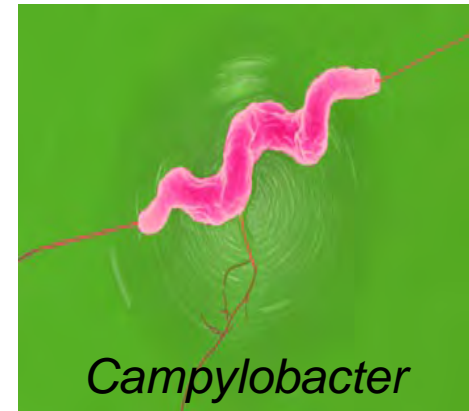


Experiment Research Aims

- To determine pathogen survival in SE QLD freshwater sources
 - Persistence, what drives decay, major potential sources
- To assist predictive modelling and management of pathogen risks in SEQ freshwater
- Research is being undertaken in partnership with Seqwater

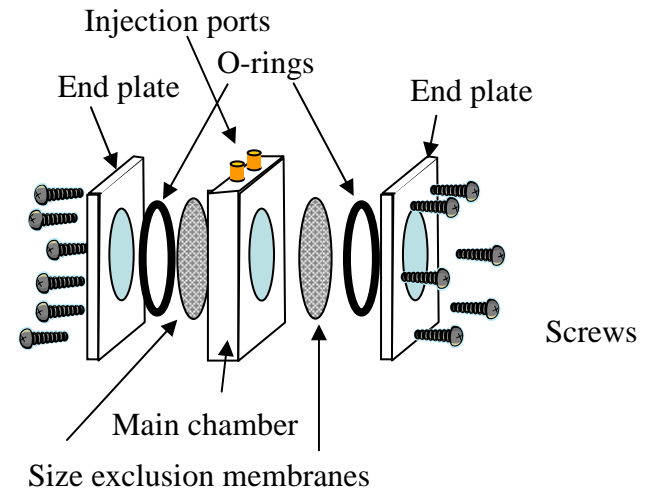
Target Pathogens and Indicators of Interest

- Indicator Microorganisms
 - *E. coli*, enterococci, bacteriophage
- Enteric microbial pathogens
 - Bacteria
 - *E. coli* O157:H7, *Campylobacter*, *Salmonella*
 - Protozoa
 - *Cryptosporidium*, (*Giardia*)
 - Viruses
 - Rotavirus, adenovirus, (norovirus)

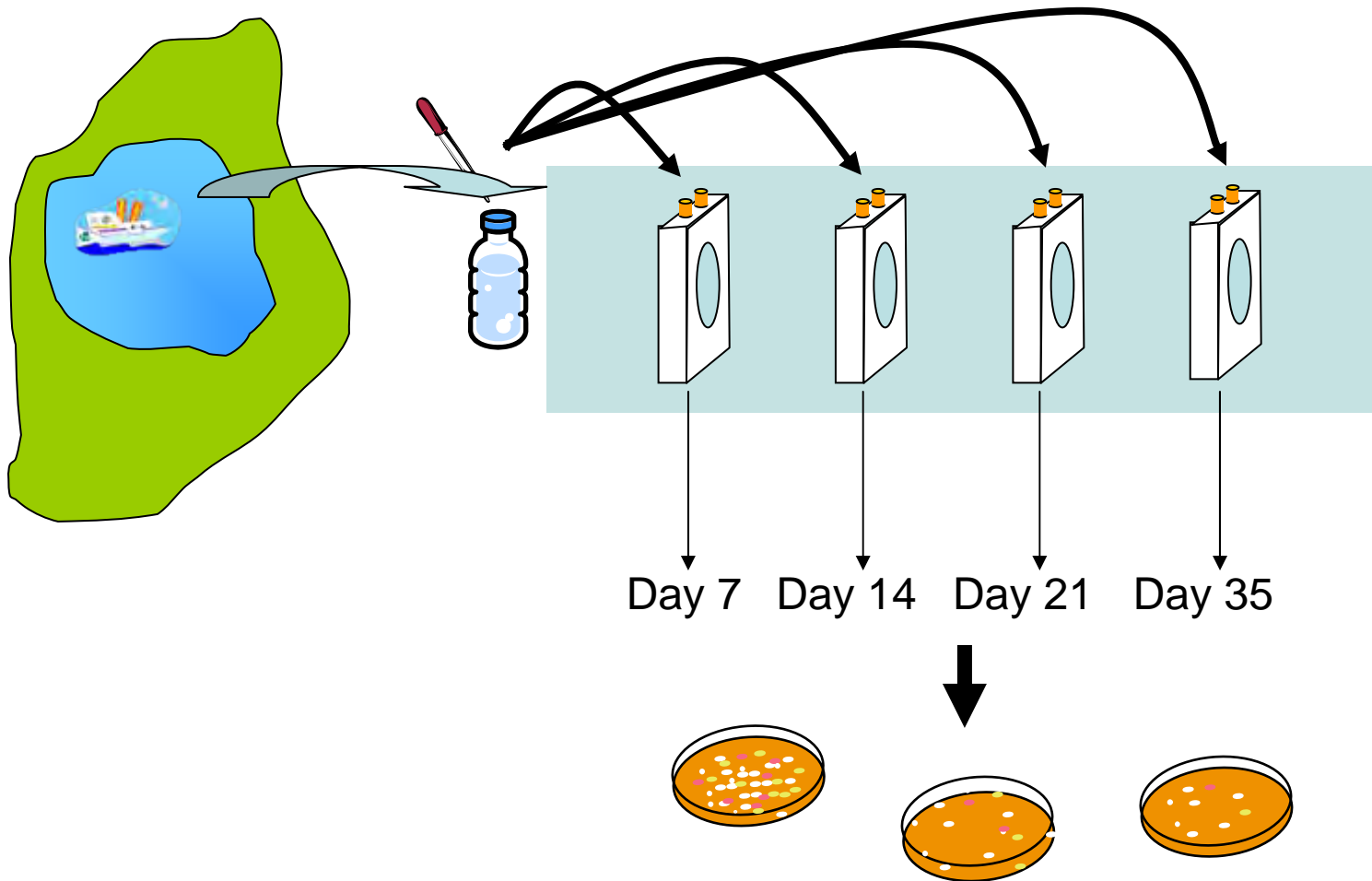


Measuring Pathogen Decay

- Decay is measured *In-Situ*
- Diffusion chambers used to retain pathogens
- Conditions within chambers can be modified or controlled
 - Presence/absence of native microbiota
 - Sediment
 - Depth



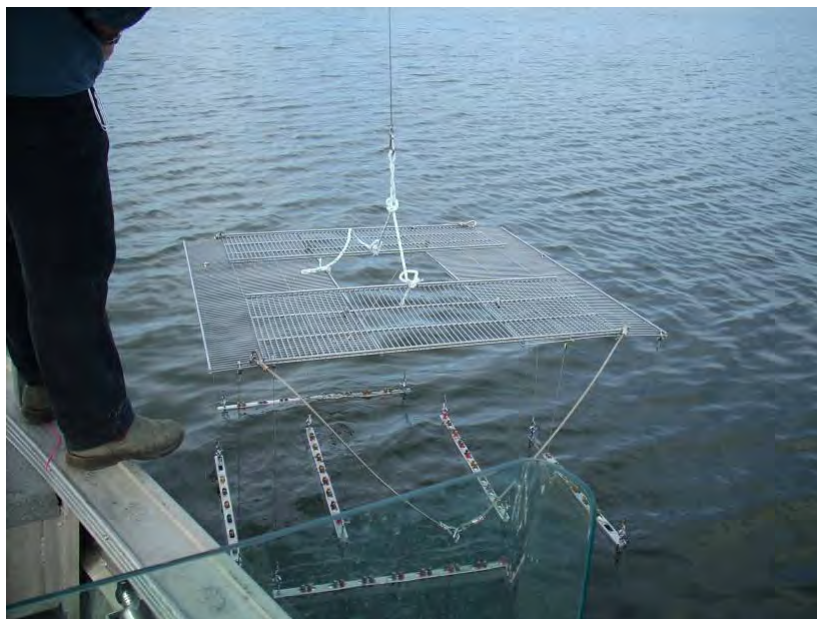
Methodology



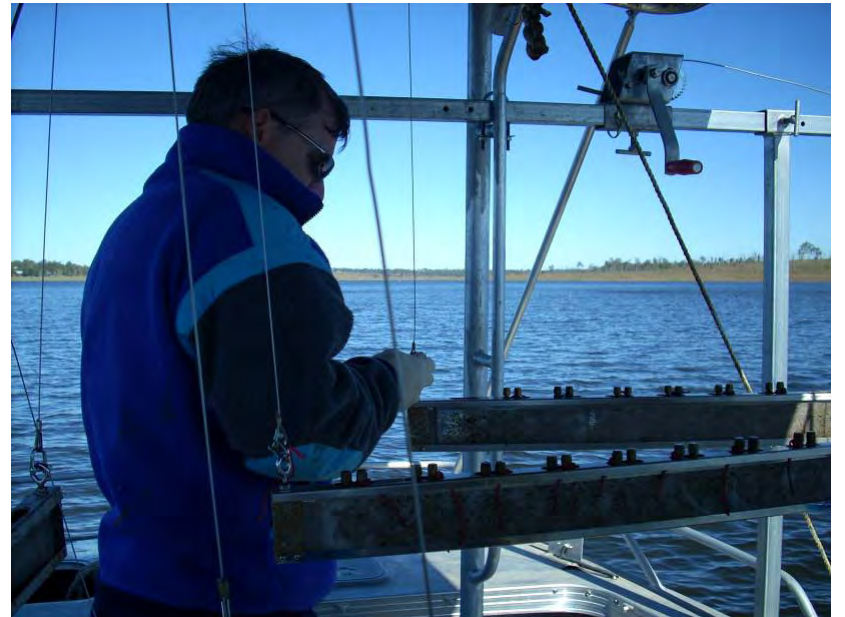






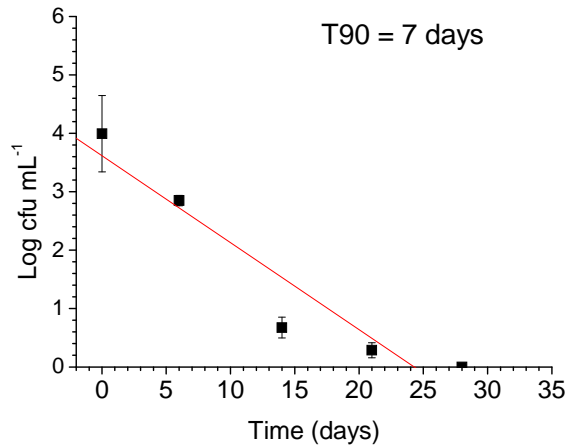




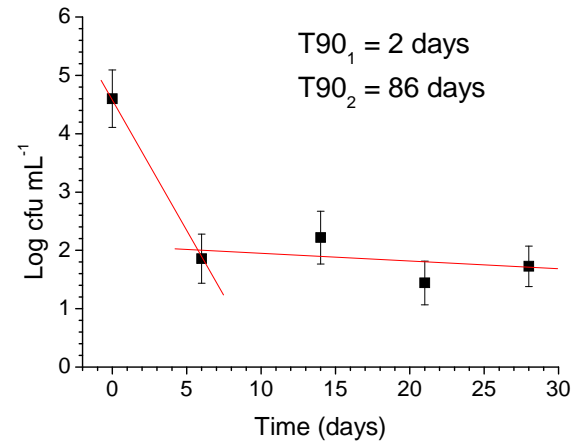


Initial Results of Microbial Attenuation *Bacteria*

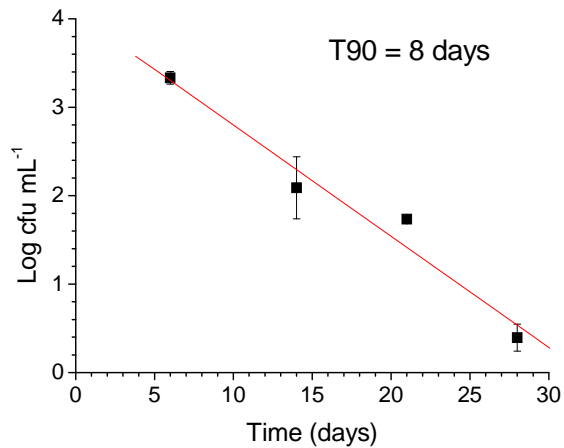
Salmonella



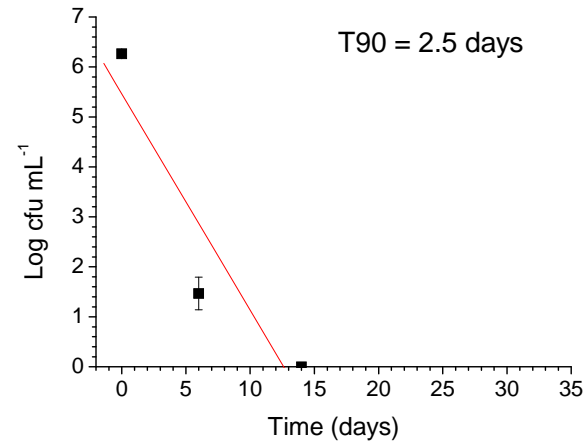
E. coli O157:H7



Campylobacter

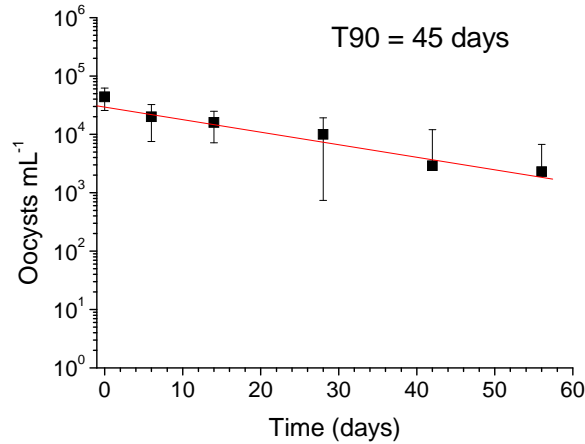


Enterococcus

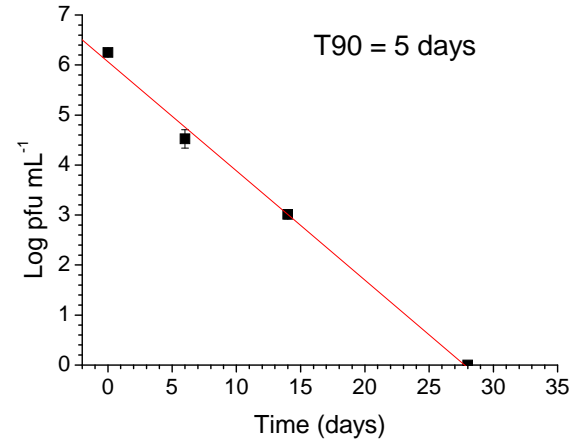


Initial Results of Microbial Attenuation Viruses and *Cryptosporidium*

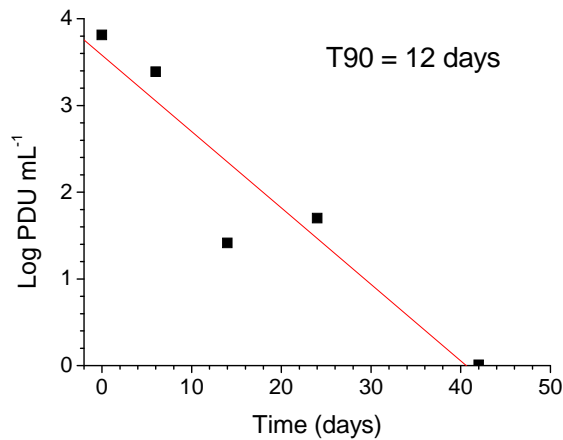
Cryptosporidium oocysts



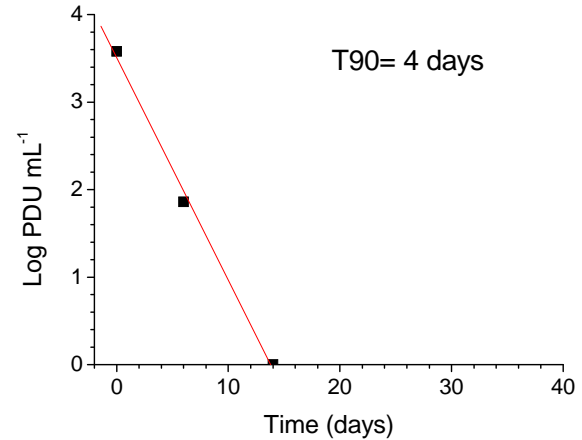
MS2



Adenovirus



Coxsackievirus



Decay Rates From First Experiment

Microorganisms	T90 (days)	
	<i>In-Situ</i>	Laboratory
<i>Enterococcus</i>	2.5	3
<i>E. coli</i> O157:H7	2; 86	6
<i>Campylobacter</i>	8	ND
<i>Salmonella</i>	7	ND
<i>Cryptosporidium</i>	45	84 (<i>Giardia</i>)
MS2	5	8
Adenovirus	12	8
Coxsackievirus	4	ND

Next Stages of Research

- Re-examine decay of bacterial indicators and pathogens
- Determine influence of native microbiota
- Impact of sunlight
- Influence of sediment
- Start to incorporate findings into Seqwater hydrologic models



Thank you



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