

# Sunlight Inactivation of Bacteria in Open-Water Unit Process Treatment Wetlands: Modeling Inactivation Rates

## Research Group:

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## Background:

- Constructed wetlands can be used as a natural, low cost and low energy technology for wastewater treatment.
- Constructed wetlands have the ability to remove pathogens from wastewater effluent through sunlight inactivation
- Previous studies used Idexx media for collecting wetland bacteria monitoring data, instead of mTEC agar
- Photoaction spectra are functions that consist of wavelength-specific sensitivity coefficients that describe the biological response of an organism to radiation

## Research Questions:

1. Can we develop predictive photoaction spectrum models for endogenous inactivation of *E. faecalis* and *E. coli*?
2. How does the selected growth media affect the apparent inactivation rate of *E. coli*?

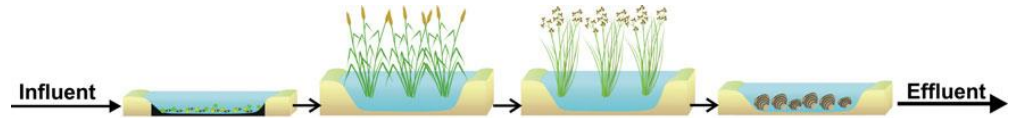
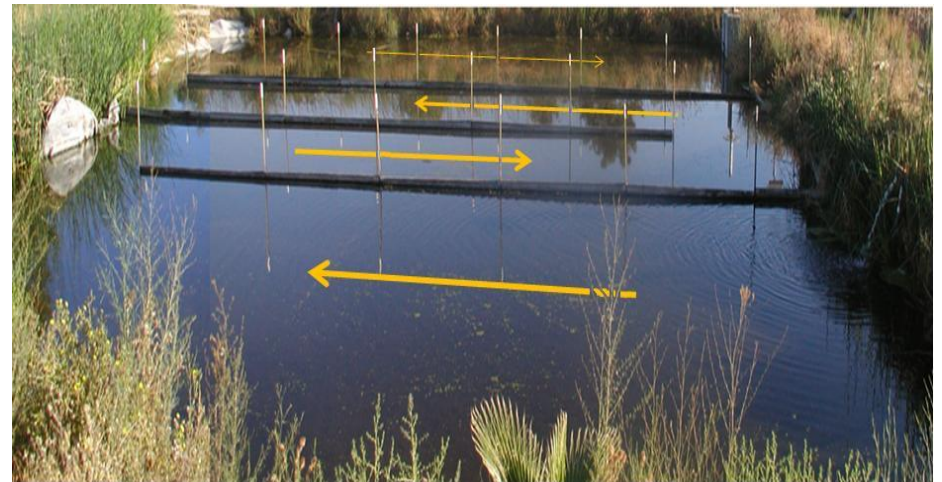


Figure credit: Jasper et al. 2013. *Env. Eng. Science*. 30: 421-436



Study site: Discovery Bay, CA



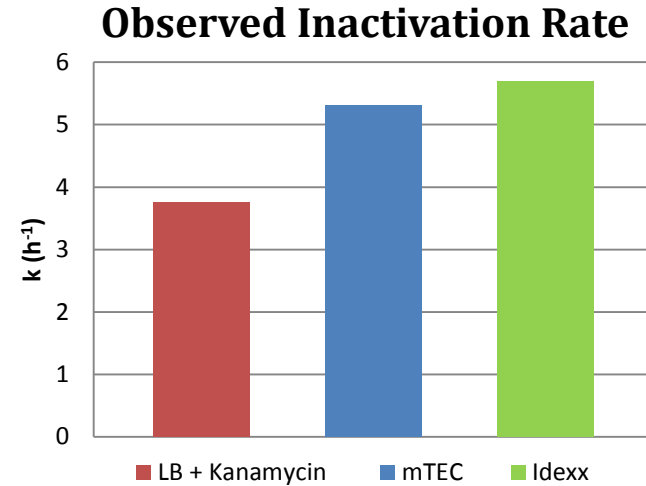
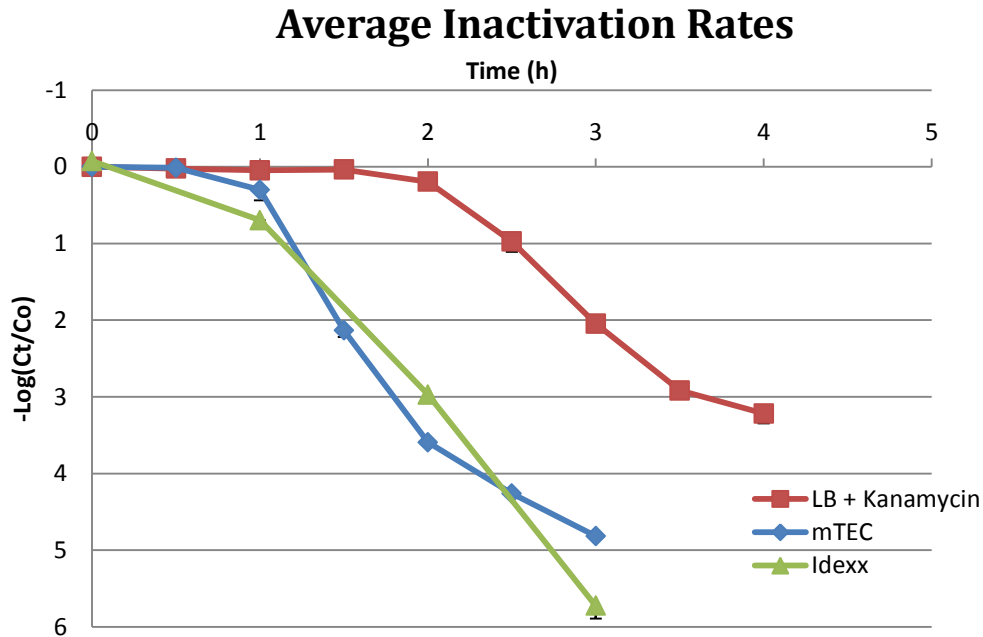
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## Results:



Growth Media	k observed
LB + kanamycin	3.8
mTEC	5.3
Idexx	5.7

## Conclusions:

- Non-selective media (LB + kanamycin) is less damaging to bacterial growth, resulting in a lower observed inactivation rate.
- Due to the similarity in observed inactivation rates between mTEC agar and Idexx media it is possible to use monitoring data found in previous studies to validate our photoaction spectrum model.

## Future Research:

- Validate our photoaction spectrum model using Idexx monitoring data
- Create photoaction spectrum for environmental *E. coli* and *E. faecalis*