

National Epidemiological and Environmental Assessment of Recreational (NEEAR) Water Study

Alfred Dufour, USEPA

Rebecca Calderon, USEPA

Michael Beach, CDC

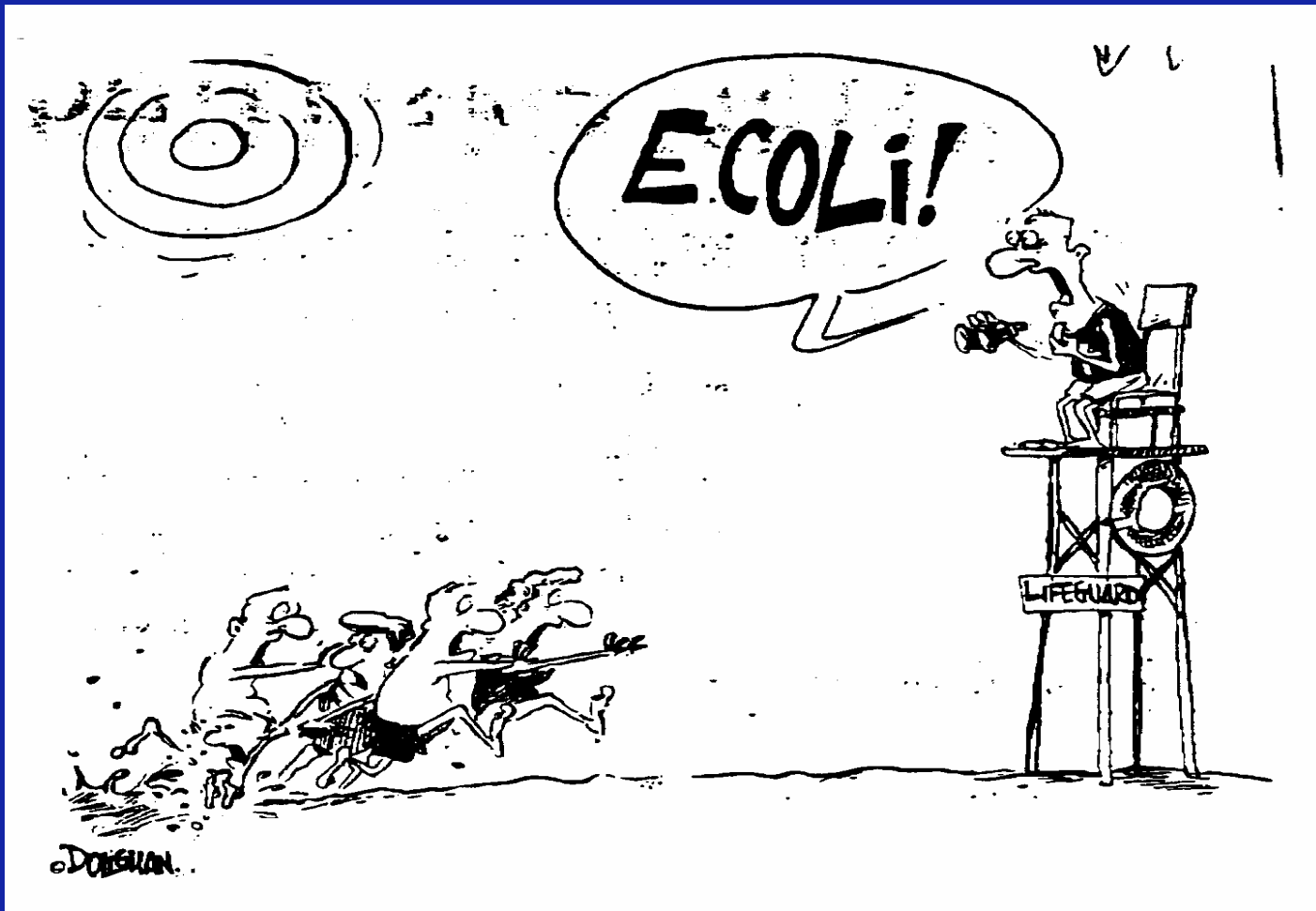
Timothy Wade, USEPA

Elizabeth Sams, USEPA



OVERVIEW

- **BEACHES Act of 2000 from Congress**
 - Determine microbial indicators for beach water quality
 - Develop efficient protocols for monitoring
 - Assess human health risks
 - Provide guidance to beach managers
- **Final Goal: New risk-based water quality guidelines and rapid monitoring methods for recreational waters.**



STUDY APPROACH

INDICATORS

- Identify new indicators of fecal contamination of recreation water
- Develop and Evaluate methods for measuring new indicators
- Develop sampling protocol for measuring indicators
- Methods:
 - Rapid PCR (Quantitative Polymerase Chain Reaction)*
 - Raptor (Fiber Optic - Fluoroimmunoassay)*
 - AATI (Flow Cytometry - Fluoroimmunoassay)*

STUDY APPROACH EPIDEMIOLOGY STUDIES:

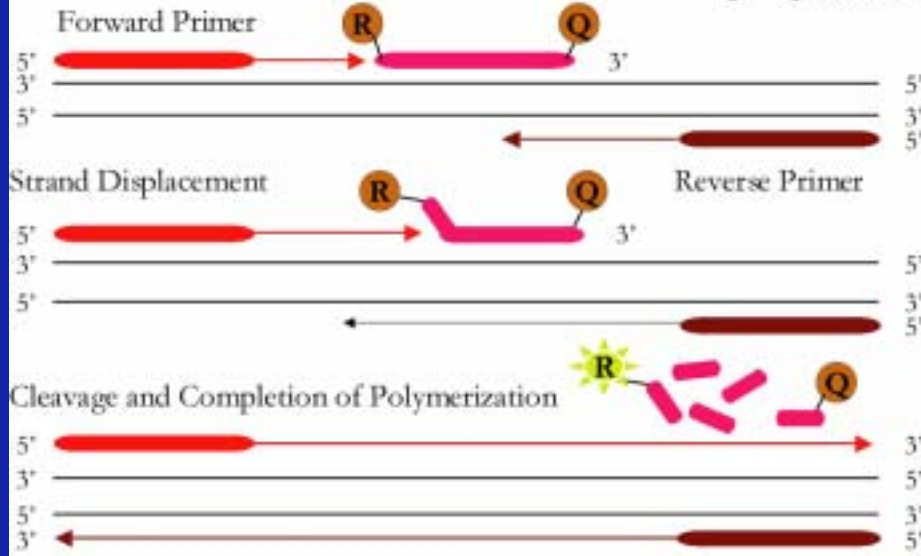
- Study design
 - Prospective cohort
- Target group
 - Beachgoers
- Data collection
 - Beach interview
 - Telephone interview
- Health effects
 - Gastrointestinal, Respiratory, Skin, Ear, Eye

BEACH SELECTION

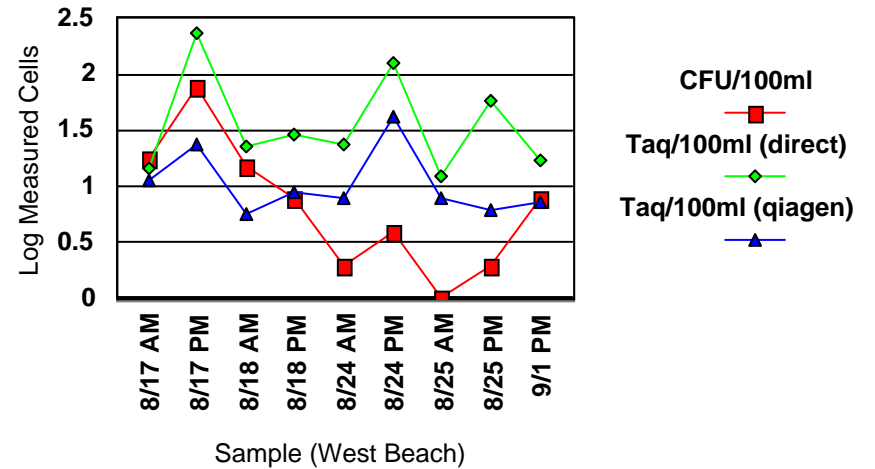
- Fresh water and marine water
- Multiple sites
- Water quality within guidelines
 - Some evidence of point source contamination
- Designated recreational area
- Possibility to recruit 300-400 swimmers per day

TaqMan Assay

R = Reporter
Q = Quencher

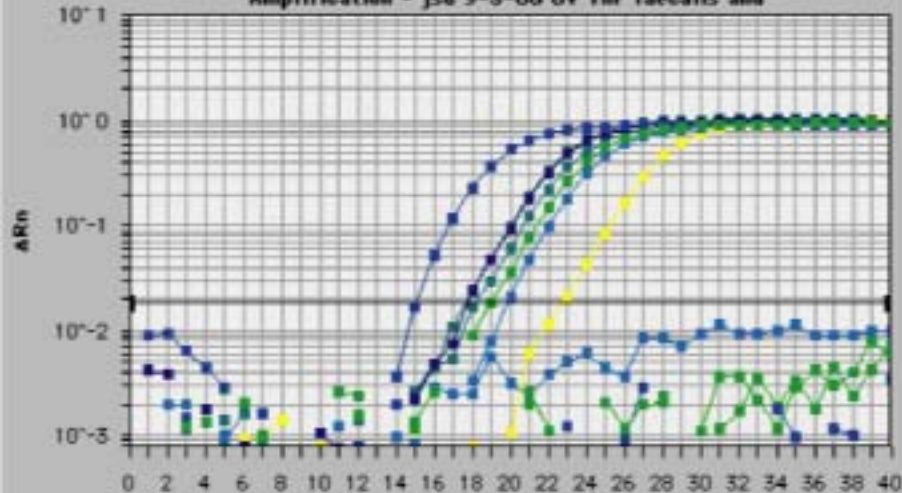


TOTAL ENTEROCOCCI IN UNSPIKED SAMPLES*



*Excluding data from potentially contaminated DNA extracts

Amplification - jsd 9-3-00 UV thr faecalis and



RAPTOR



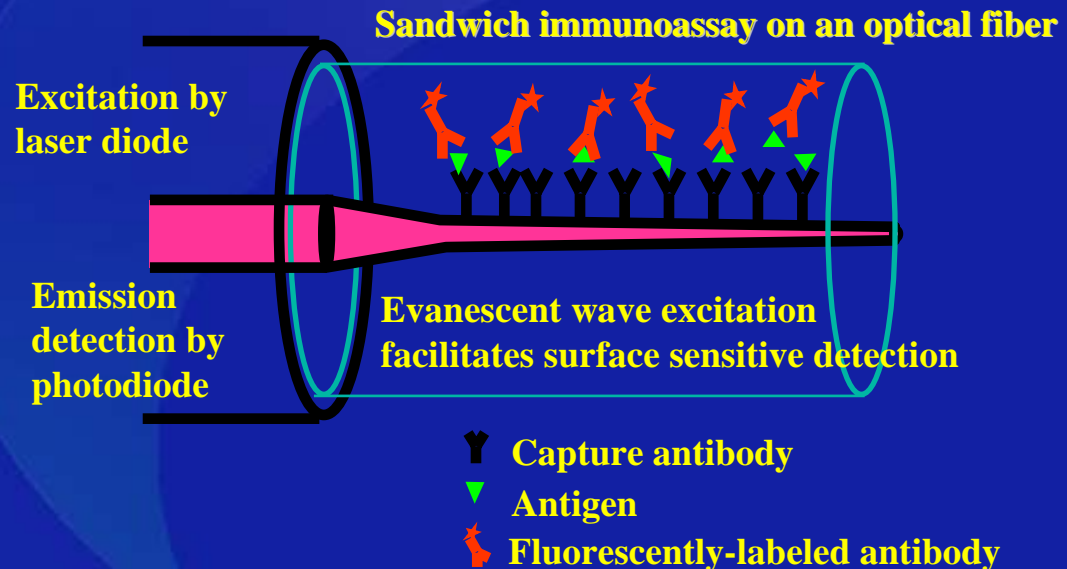
- Semiautonomous Operation
- Four Agent Capability (LCD readout)
- Disposable Test Coupon (30 cycles)
- 13 lbs Fully Operational
- Fabricated at Research International

RAPTOR PLUS COUPON

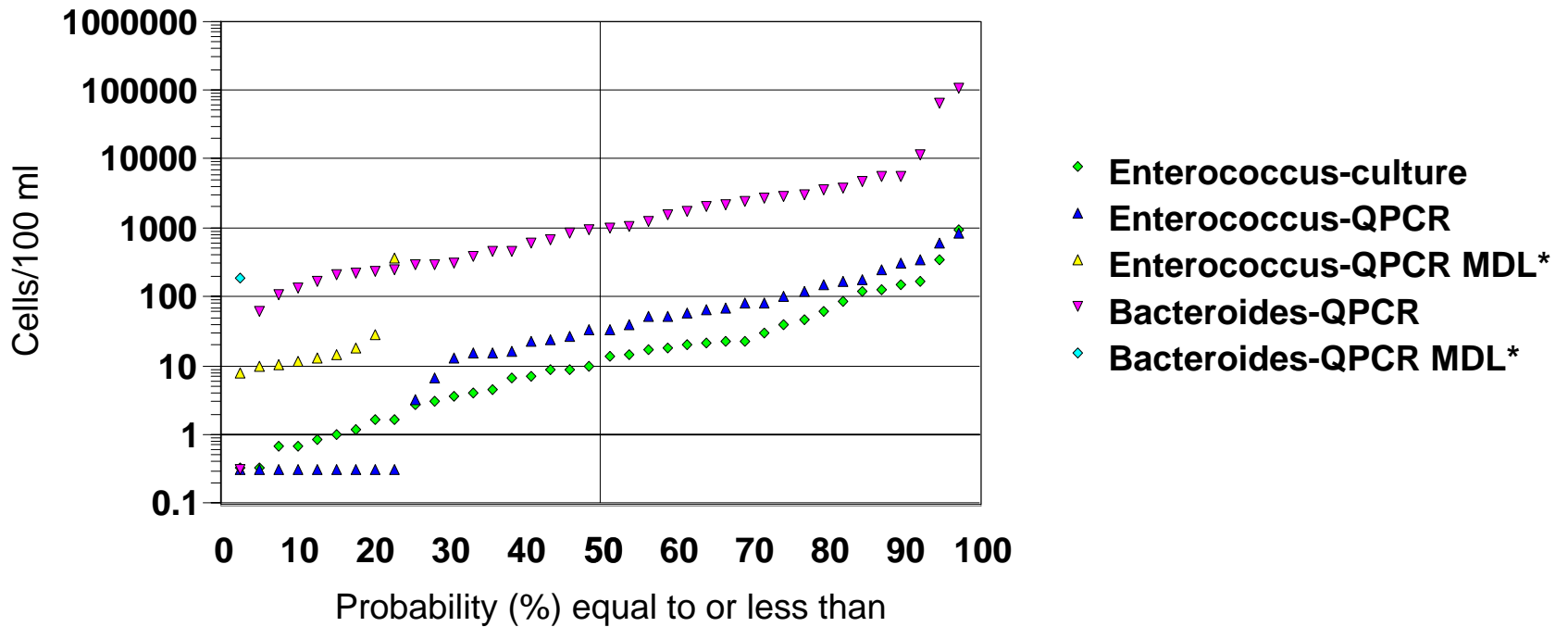


- ADVANTAGES
- Smaller
- Simpler
- Separate Channels and Reagent
- No Cross Talk

FIBER OPTIC BIOSENSOR TECHNOLOGY



Distribution of Bacterial Densities in Lake Michigan Water Samples by Culture and QPCR Methods



*MDL: minimum detection limit

WEST BEACH PILOT STUDY 2002

- 7 days of surveying
- 1282 household interviews attempted
- 838 households completed beach interview and at least one follow up interview
- 1934 individual completed interviews

SYMPTOMATIC ILLNESS IN RESPONDENTS REPORTING SWALLOWING OF WATER 2002

Swallowed Water	GI	Resp
Yes	13%	17%
No	8%	9%
Relative Risk	1.50* (1.03-2.19)	1.63* (1.18-2.25)
	*p<0.05	

NEEAR Water Study Timeline

