Using Real Time Monitoring Data for Public Health Protection in Ocean Waters

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Small Sea Changes: Big California Impacts workshop at SIO
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• Traditional water quality test methods do not provide accurate warnings for water contact
  i. Results at least 24 h after sample collection
  ii. High temporal and spatial variability of bacteria in surf zone
• Re-samples fail to confirm in 83% of dry weather SSM exceedances
• For beaches near outlets/ on-going sources, this results in involuntary health risk for ocean users
To put it visually...

mis-notification of water quality
Study Area For Real Time Monitoring Alternative

Tijuana River Diversion
Contamination of beaches when river flows enter the Tijuana Estuary

Beach Closure beach mile days (BMDs) caused by Tijuana River compared to SSO closures:

- 84%
- 83%
- 45%
- 81%
- 70%
- 79%
- 91%

Graph showing the percentage of beach mile days (BMDs) related to Tijuana River and SSO closures from 2000 to 2006.

<table>
<thead>
<tr>
<th>Year</th>
<th>Tijuana River related closure BMDs</th>
<th>SSO closure BMDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>84%</td>
<td></td>
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<td></td>
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<tr>
<td>2006</td>
<td>91%</td>
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</tbody>
</table>

Legend:
- Green bar: Tijuana River related closure BMDs
- Black bar: SSO closure BMDs
How to protect public health against episodic northward flows?

- A six month seasonal closure of Imperial Beach shoreline could cripple the economy
- Environmental Health needed a real time measurement to verify observations of northward moving currents
- $$ + Scripps Institution of Oceanography = alternative technology solution
Ocean surface current mapping

- 3 high frequency radars produce hourly data on surface current magnitude and direction
- Radar coverage overlap focuses on ocean currents 1 km offshore from Tijuana Estuary mouth
- Data posted in real time on San Diego Coastal Ocean Observing System web page.
  
  http://www.sccoos.org/data/tracking/IB/
Time history of CODAR derived ocean currents at the Tijuana River Estuary entrance.

Current Measurement location is approximately 1km offshore.
San Diego Coastal Ocean Observing System (SDCOOS), part 3
San Diego Coastal Ocean Observing System (SDCOOS), part 4
Evaluation of SDCOOS data

- A limited test comparing the plume tracker position with water quality data found overall accuracy rate between 57 and 80%.

- Weekly comparison of SDCOOS data, water quality data, and field observations between 2004 and 2006.
  - Better agreement during wet weather
  - Additional inputs needed to improve accuracy of plume tracker model: surf zone currents and river flow rate
Management Implications for DEH

- SDCOOS web page has facilitated the use of info relevant to closure decisions

- Plume tracker model does not replace need for qualified human input

- Serves to validate closure decisions

- Can act as an early warning for northward flows
Pilot Application of SDCOOS real time monitoring technology

• Overall, successful in providing more confidence to DEH beach closure decisions
Roles for non-profits organizations to improve ocean observing technology

- Collect additional samples during times of suspected contamination to calibrate plume trajectory model