Exploring the Local Ecological Knowledge of Surfers in Maine and New Hampshire

Sophia Scott & Dr. Shannon Rogers

Plymouth State University

Environmental Science & Policy
Center for the Environment
Sustainability Science
Surfers are especially vulnerable to water pollution

- Surfers go to the beaches more often
- Surfers spend longer periods of time in the water
- Surfers get totally immersed
- Surfer ingest more water
- Surfers can get cuts or scrapes
- Storms bring big waves (and poor water quality) that surfers love to ride
What do we already know about surfers?

• Surfers ingest up to 10X more water than the average beach goer (Stone et al. 2000)

• Risk and self reported GI illness in PWN surfers (Harding et al. 2014)

• Surfers care about their environment (Martin & Assenov 2014, Wheaton 2007, Ward 1996)

• Surfers as stewards of the environment (Lazarow et al. 2009, Taylor 2007, Brymer et al. 1994)

• Surfers have socio-economic role in coastal communities (Slotkin et al. 2009)
Research Questions

RQ 1. To what extent are surfers in Maine and New Hampshire aware of the potential risks of pathogens and diminished water quality? Where does the knowledge of pathogens come from (what are the sources of this knowledge)?

RQ2. What are the attitudes and behaviors of this group towards perceived risk of harmful pathogens? How does knowledge of pathogens drive the decision to surf or not to surf during storm events?

RQ3. Could co-production of knowledge within this group raise awareness of potential risks and increase the ability of individuals to make more informed decisions about when to enter the water?
In-depth interviews

Methods

Intercept survey

Literature review
In-depth interviews

Methods

Intercept survey

• Where do you get your information on surf spots of conditions?
• Do you think surfing is a risky sport?
• What risks, if any, do you associate with surfing?
• Have you surfed during a) storms b) a posted beach water quality advisory?
• Have you ever noticed anything about the water that would make you question its quality?
• Do water pollution concerns impact your decision to surf? Do you consider this a risk?
• Have you ever attributed getting sick to surfing?
• Would you be interested in knowing about water quality conditions at your local surf spot?
• How would you like this knowledge shared with the surfing community?

"...on any big rain the water dumping out from all of the inland waterway, (river, streams, marshes, everything), changes the water quality."

"...after major rain event or any major snow melt, consistent onshore winds, you question the [water] quality."

"We talk about the capacity for waste treatment. It just depends where the outflow is and how the currents are ... I've seen corn in the water in OOB and I'm like, 'eh I'm getting out', cause you know how it is this corn."

"I think just paying attention, you know, being a surfer the majority of my life, you just start to pick up on things and you know, old timers pass on knowledge and stuff like that"

"You acquire this information (about surf conditions) from being out there surfing for a long time, you become an amateur meteorologist if you're a surfer."

"Just being a wise old man, I am 64 this will be my 51st year of surfing...if you did anything in your life, if you were a gardener, if you did it for 50 years you would have it down"
• Where do you get your information on surf spots of conditions?

• Do you think surfing is a risky sport?

• What risks, if any, do you associate with surfing?

• Have you surfed during a) storms b) a posted beach water quality advisory?

• Have you ever noticed anything about the water that would make you question its quality?

• Do water pollution concerns impact your decision to surf? Do you consider this a risk?

• Have you ever attributed getting sick to surfing?

• Would you be interested in knowing about water quality conditions at your local surf spot?

• How would you like this knowledge shared with the surfing community?
Study Area

Maine
- Higgins
- OOB
- Fortune’s Rock
- Gooch’s
- Wells
- Ogunquit River Mouth
- Long Sands

New Hampshire
- Jenness Beach
- Bass Beach
- North Hampton
- The Wall
- Seabrook
Who surfs in southern Maine and New Hampshire?

Mean age: 33.7
Range: 18-69

Average yrs. surfing: 11.4
Range: 0-52
Mode: 10

Member of environmental or surf group
Yes: 26.1%  No: 73.9%
Surfers know a lot about the water they surf in
<table>
<thead>
<tr>
<th>Factors influencing water quality</th>
<th>No. of references</th>
<th>No. of sources</th>
<th>Quotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td>5</td>
<td>7</td>
<td>“You see nasty things on the beach sometimes. You’ll see a rubber glove or diapers and dog poop. I think people have no idea. I’ve been on the beach, in my wetsuit with my surfboard in hand and I’ll say ‘You gotta pick up after your dog!’ And he’ll just look at me and say, ‘It’s going to rinse away with the tide.’ And I’m like, ‘Guess what? It’s not exactly what I want to be surfing in!’”</td>
</tr>
<tr>
<td>Rain and runoff</td>
<td>26</td>
<td>13</td>
<td>“… on any big rain the water dumping out from all of the inland waterways; rivers, streams, marshes changes the water quality.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>“After a major rain event or any major snow melt and consistent onshore winds, you question the quality [of the water].”</td>
</tr>
<tr>
<td>Smells</td>
<td>12</td>
<td>7</td>
<td>“[The water] smelled like toilet. It was really, really, really gross. I tried to paddle around [the foam] but it was everywhere. It stunk for a long time until the tide shifted and started going back in and then we got a break.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>“…After it rains is when everything smells bad.”</td>
</tr>
<tr>
<td>Experience drives knowledge</td>
<td>9</td>
<td>6</td>
<td>“I think just paying attention, you know, being a surfer for the majority of my life, you just start to pick up on things. And you know, old timers pass on knowledge and stuff like that.” - M, 32, NH</td>
</tr>
<tr>
<td>Surfing lifestyle yields LEK</td>
<td>10</td>
<td>5</td>
<td>“Just being a wise old man. I am 64 and this will be my 51st year of surfing... If you did anything in your life, if you were a gardener, if you did it for 50 years you would have it down I think. So it’s just learning and seeing what’s out there and experiencing” - M, 64, NH</td>
</tr>
<tr>
<td>Stewardship</td>
<td>20</td>
<td>9</td>
<td>“The thing about surfing that’s cool is that it’s not just a sport, it’s an all encompassing lifestyle. It’s the only thing that has taken a hold in my life... Being at the beach a lot, you’re aware of your surroundings, most people are aware of their surroundings, but when you’re surfing you’re immersed in your environment and you love it. ... You never see a basketball player staring at a basketball court but surfers are always staring at the water” - M, 27, ME</td>
</tr>
</tbody>
</table>

- M, 58, NH

- M, 27, ME

- M, 46, NH
## Cross-tabulation of years surfing group by surfer noticing questionable water quality, with column percentages

<table>
<thead>
<tr>
<th>Number of years surfing</th>
<th>Have you ever noticed something in the water that would make you question its quality?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Total</td>
</tr>
<tr>
<td>0-4</td>
<td>66</td>
<td>17</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>79.5%</td>
<td>20.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td>5-9</td>
<td>29</td>
<td>23</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>55.8%</td>
<td>44.2%</td>
<td>100.0%</td>
</tr>
<tr>
<td>10-15</td>
<td>33</td>
<td>45</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>42.3%</td>
<td>57.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>16+</td>
<td>19</td>
<td>38</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>33.3%</td>
<td>66.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>147</td>
<td>123</td>
<td>270</td>
</tr>
<tr>
<td></td>
<td>54.4%</td>
<td>45.6%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### Hypothesis:

Number of years surfing will have an impact on whether or not a surfer has noticed something in the water that would make them question its quality.

\[
\chi^2(3) = 35.95, \ p = .000
\]

### Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>35.950a</td>
<td>3</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>37.766</td>
<td>3</td>
<td>.000</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>34.387</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>270</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 23.69.
Water quality is a risk to some surfers

Survey Respondents

- Drowning: 72%
- Injury: 22%
- Others in the water: 6%
- Rocks/Reef/Shallow Bottom: 72%
- Hit by board: 22%
- Conditions: 6%
- No risks: 0%
- Sea life: 0%
- Knowledge: 0%
- Other: 0%
- Hypothermia/Cold: 0%
- Lifestyle: 0%

Is water quality as a risk?

- Yes: 72%
- No: 22%
- Not here: 6%
Surfers want to know about water quality at their local surf spot

Water pollution and the decision to surf...

Yes, water quality Impacts my decision to surf

44%

No, water quality does not impact my decision to surf

56%

Surfers want to know about water quality through...

- Surf forecasting website: 55%
- Posted at beach: 18%
- Surf shop: 12%
- Social media/text alert/app: 9%
- Other: 6%
Surf research helps us understand social and ecological components of an important Coastal System

- Findings from interviews and surveys are being used to inform water quality testing and communication protocols
- Include water quality information on surf forecast websites/apps
- Post information at beach during times when surfers are in the water
- Broadly supports the importance of integrating key stakeholders into sustainability science research
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