

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

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Sustainability Science

A scenic view of a beach at sunset or sunrise. The sky is filled with soft, colorful clouds in shades of blue, pink, and orange. The sun is visible as a small white circle near the horizon. The ocean is calm with gentle waves breaking on the shore. A few people are visible in the water, and a small island or headland is visible in the distance on the left.



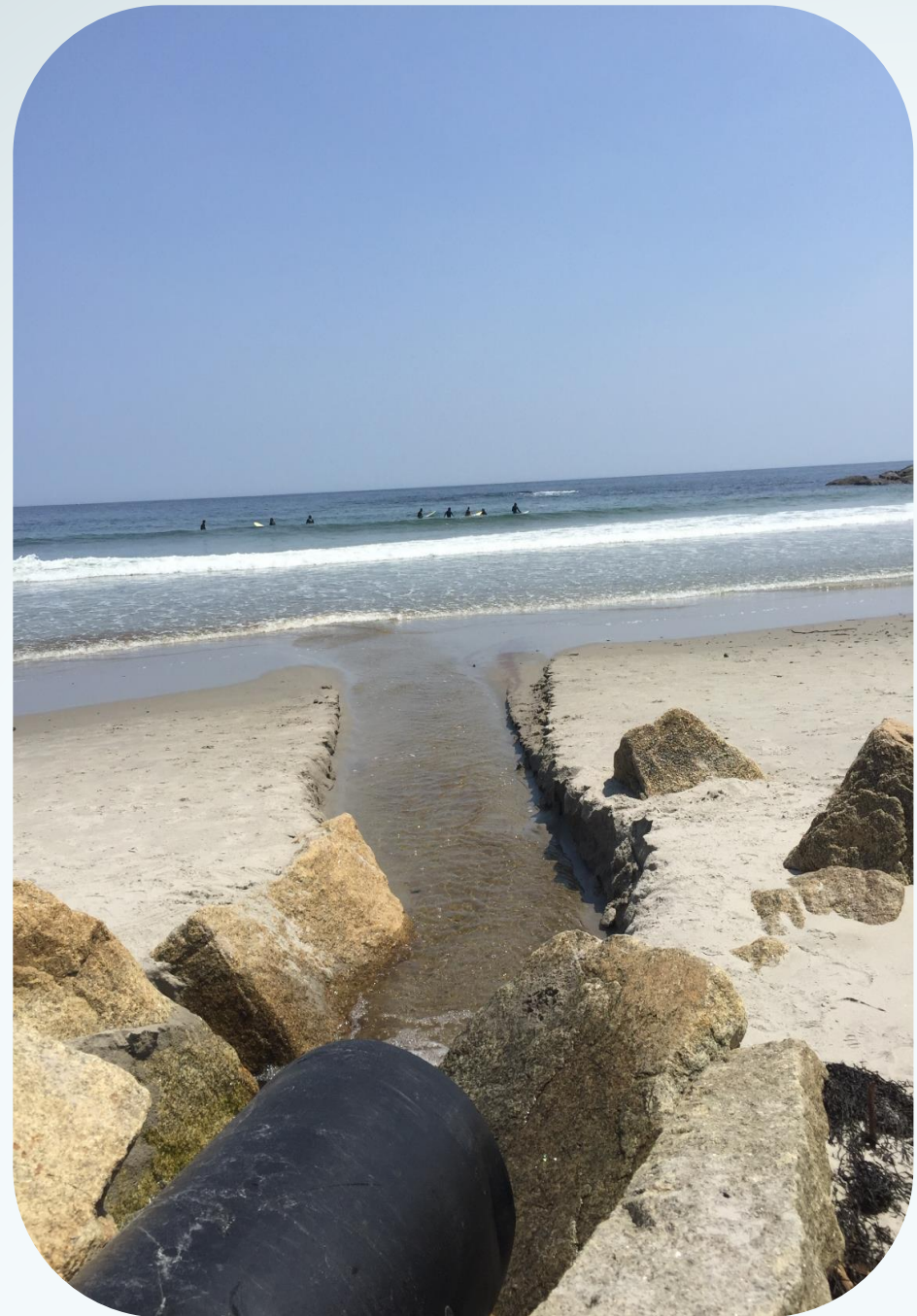
Surfers are especially vulnerable to water pollution

- 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)



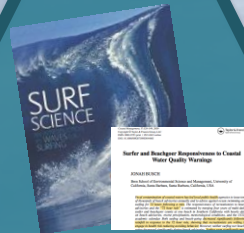
Research Questions

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?





Literature
review

Methods



In-depth
interviews



Intercept
survey

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

Rivers and Rivermouths

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

Rain and Runoff

"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."

Sewage, septic, WWTP

"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."

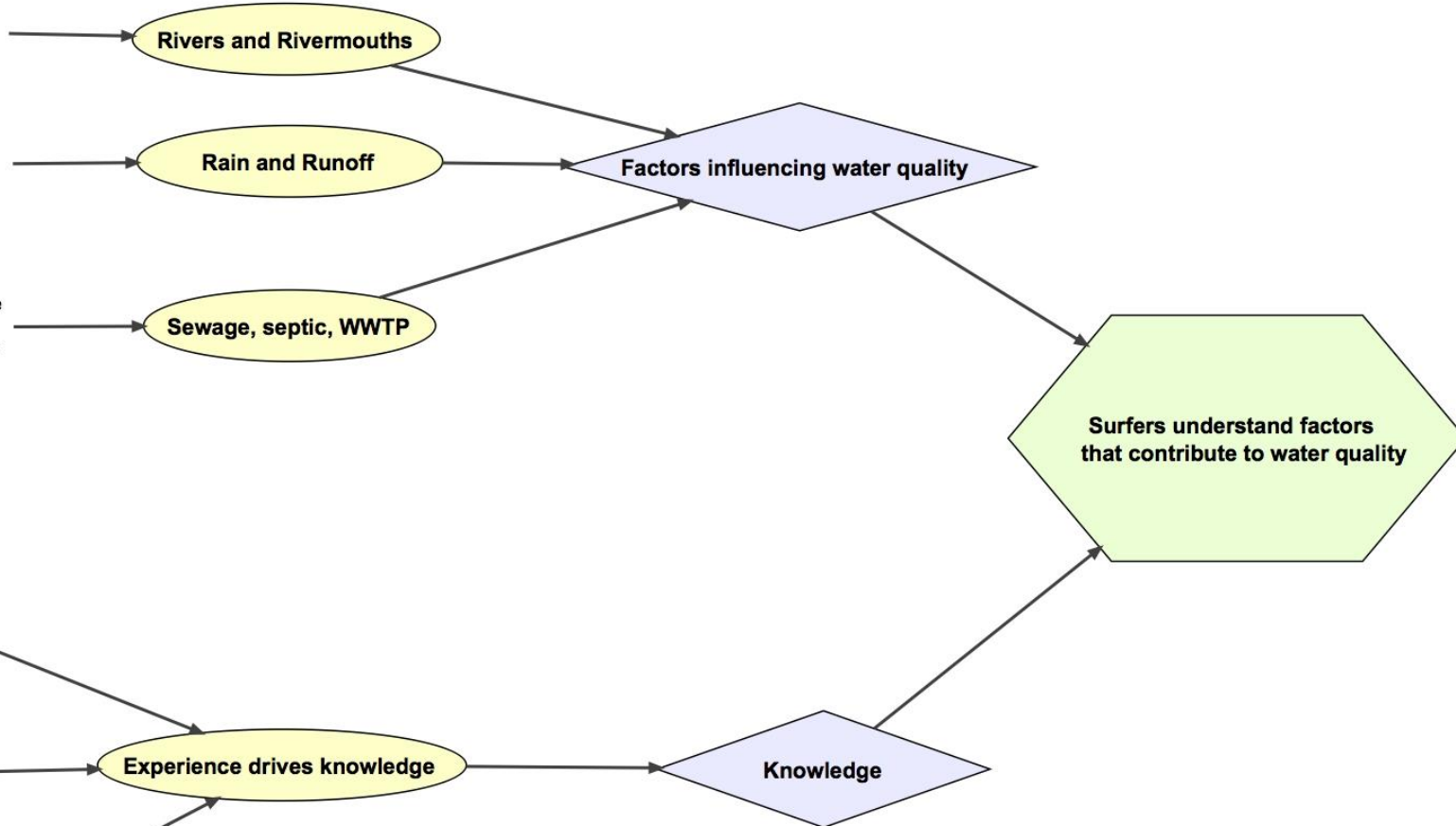
Experience drives knowledge

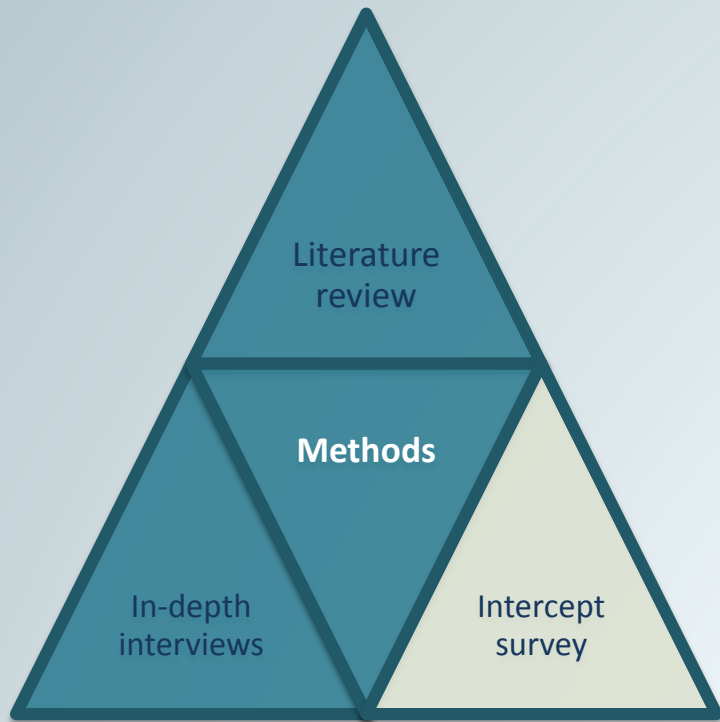
"Just being a wise old man, I am 64 this will be my 51st year of surfing...if you did anything in your life, if you were a gardener, if you did it for 50 years you would have it down"

Knowledge

Factors influencing water quality

Surfers understand factors that contribute to water quality





- 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**?

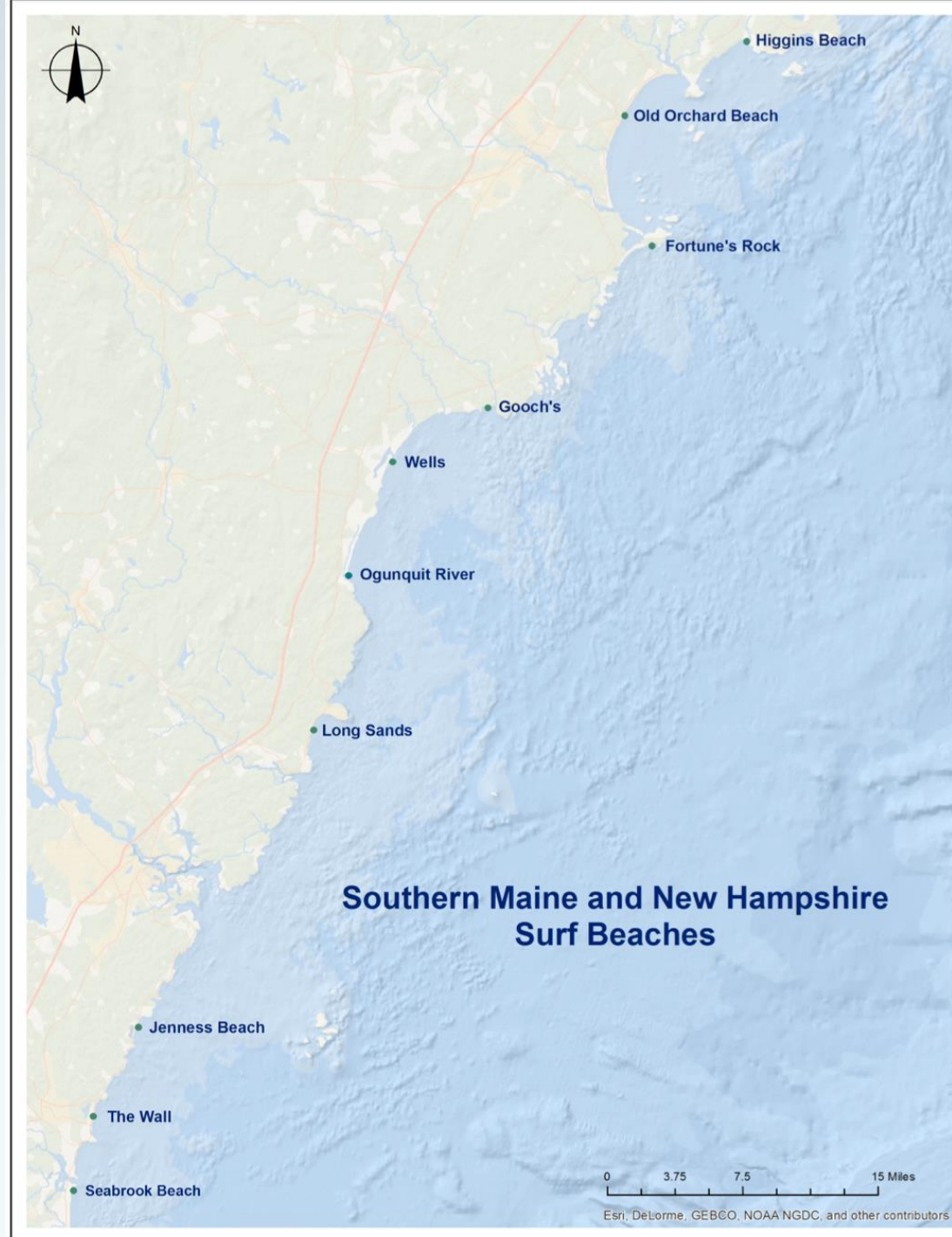
Study Area

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

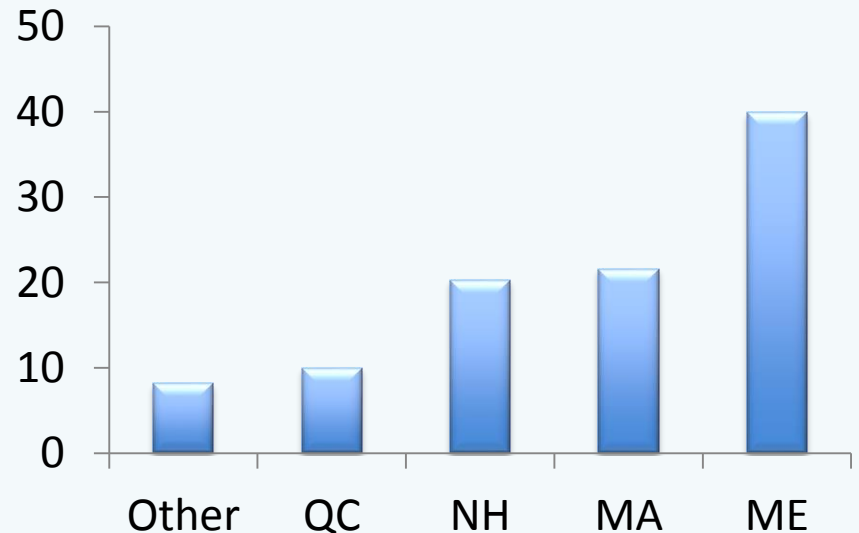
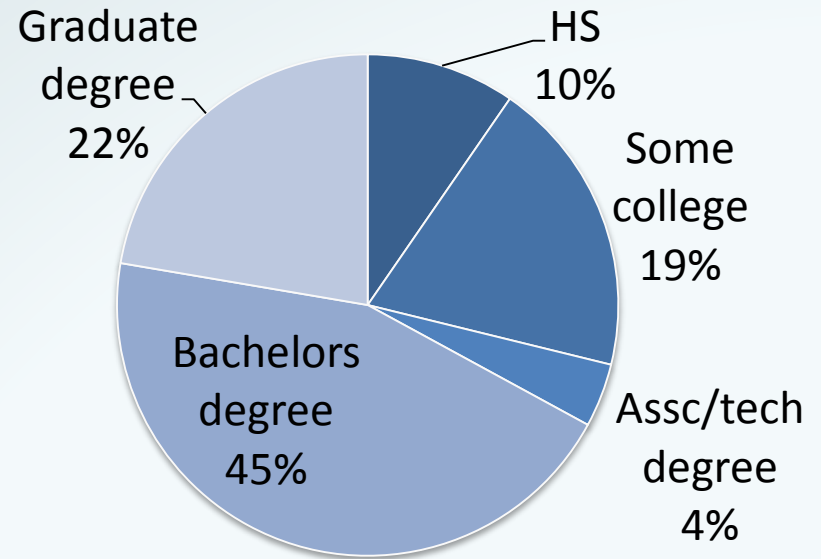
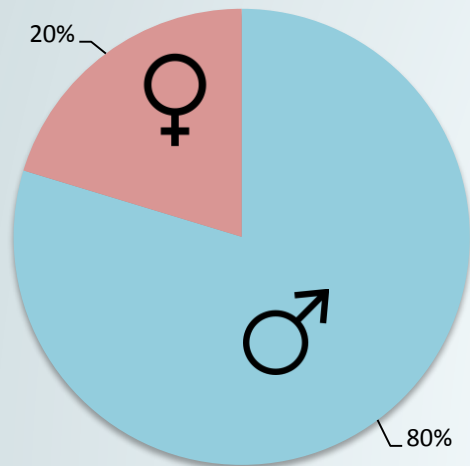
Range: 0-52

Mode: 10

Member of environmental or surf group

Yes: 26.1%

No: 73.9%



Knowledge of factors contributing to water quality

Factors influencing water quality	No. of references	No. of sources	Quotation
Animals	5	7	<p>“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!”</p> <p style="text-align: right;">-F, 58, ME</p>
Rain and runoff	26	13	<p>“... on any big rain the water dumping out from all of the inland waterways; rivers, streams, marshes changes the water quality.”</p> <p style="text-align: right;">-M 58, NH</p> <p>“After a major rain event or any major snow melt and consistent onshore winds, you question the quality [of the water].”</p> <p style="text-align: right;">-M, 23, ME</p>
Smells	12	7	<p>“[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.”</p> <p style="text-align: right;">-M, 31, ME</p> <p>“...After it rains is when everything smells bad.”</p> <p style="text-align: right;">-F, 25, ME</p>

LEK of Maine and New Hampshire Surfers

Evidence of LEK	Number of references	Number of sources	Quotation
Experience drives knowledge	9	6	<p>“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</p> <p>“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</p>
Surfing life style yields LEK	10	5	<p>“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</p>
Stewardship	20	9	<p>“I think surfers in general were [more aware of environmental issues] but me especially and people that I knew were pretty aware that it didn’t smell right or that something wasn’t right. To this day, some of the really big storms and heavy rains dumps [and impacts] the water quality. It has nothing to do with direct pollution anymore.” -M, 58, NH</p> <p>“This sport has given me a huge interest in the coastline, the beach, property development, and just a respect of nature really.” -M, 27, ME</p> <p>“I think most surfers that you’ll find are pretty environmentally conscious.” -M, 46, NH</p>

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

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

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

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

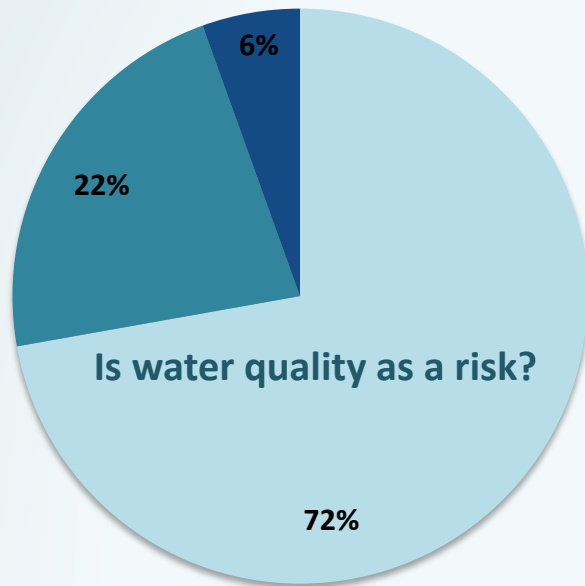
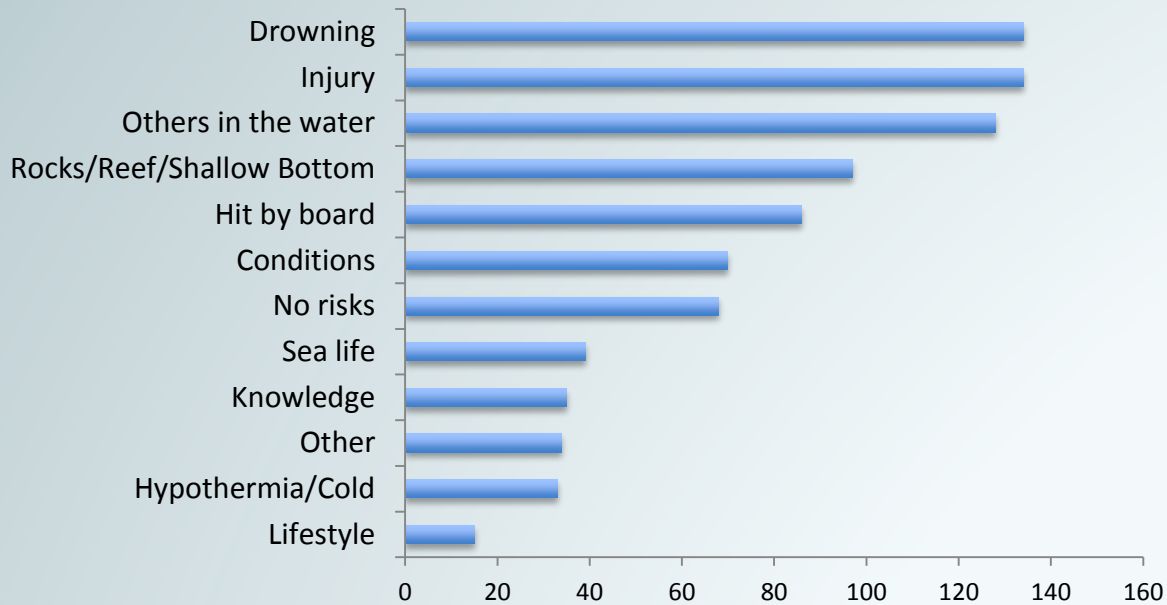
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.950 ^a	3	.000
Likelihood Ratio	37.766	3	.000
Linear-by-Linear Association	34.387	1	.000
N of Valid Cases	270		

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



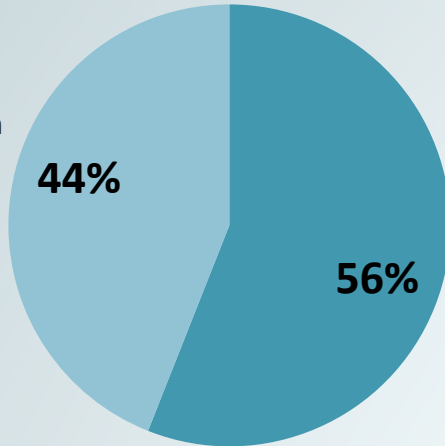
- Yes
- No
- Not here



Surfers want to know about water quality at their local surf spot

Water pollution and the decision to surf...

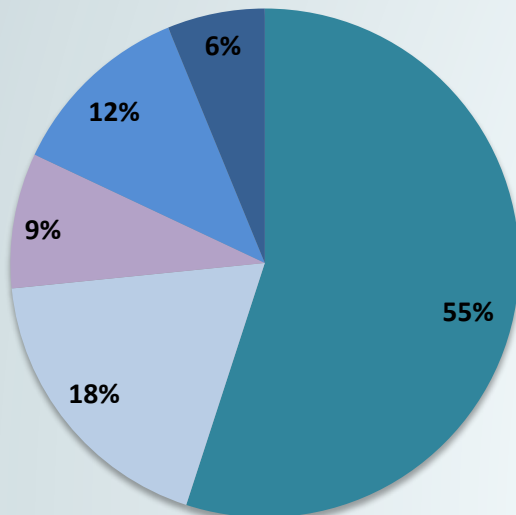
Yes, water quality
Impacts my decision
to surf



No, water quality
does not impact
my decision
to surf



Surfers want to know about water quality through...



- Surf forecasting website
- Posted at beach
- Surf shop
- Social media/text alert/app
- Other

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





Surfers!

NEST colleagues

Shannon & committee members

Trina & Malin, Liza & Aubrey



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A wide-angle photograph of a sunset or sunrise over the ocean. The sky is filled with soft, wispy clouds in shades of blue, pink, and orange. The sun is a small, bright white circle on the horizon. The ocean is dark with white-capped waves breaking near the shore. Several people are visible in the water, some standing and some sitting. The overall mood is calm and contemplative.

Questions?