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Water quality and the perception of risk: A study of Georgia, USA, beachgoers

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1. Introduction

Under the BEACH ACT, the United States Environmental Protection Agency (EPA) mandates that states routinely monitor and promptly notify the public and local governments when beach water quality exceeds acceptable values (National Science Center for Environmental Publications (NSCEP), 2016). This study focuses on the perception of risk among Georgia (US state) beach visitors related to polluted water. Funded by the Georgia Department of Natural Resources, this research examines what conditions define coastal waters as being polluted for these visitors. Even though recreational beaches are potent tourism-driven economic engines, there is a paucity of data within the United States on beachgoers' risk perception and definition of a polluted beach. This study seeks to address the gap between routine beach water quality notifications and public awareness in coastal Georgia, USA.

1.1. Location and economic impact

The state of Georgia is unique among the fifty states. No part of the Georgia mainland directly fronts the ocean. Instead, a series of tidal and barrier islands separates the southeastern Georgia mainland and the Atlantic Ocean. These Sea Islands extend from Florida up the Atlantic Coast and into South Carolina. Historically these islands have been host to varied communities including the Guale Indians, Gullah/Geechee communities, colonial pirates, fishing industries, millionaire beach enclaves, the military, and contemporary tourists. Today the Sea Islands are popular tourist destinations with Glynn County, Georgia, marketing their local islands as the Golden Isles. With Georgia offering at the time of this study the largest tax credit in the U.S. to filmmakers, Georgia in 2015 tied with Louisiana as the third most common site for film production in the world after California (#1) and the United Kingdom (#2) (Hensley, 2016). As a result, historic Savannah and various coastal locations are increasingly featured in films.

The Georgia Department of Economic Development estimates 102 million tourists visited the state in 2015 including nearly a million overseas visitors. These visitors generated $61 billion in spending in 2016 and supported more than 450,000 jobs (Georgia Department of Economic Development, 2017). A 2015 economic study of Tybee Island, the recreational beach destination closest to Savannah, finds the island's beaches draw 1,044,000 annual visitors who generate $93 million in on-island business revenue and $8.7 million in governmental revenue from sales taxes, lodging taxes, and parking fees. Analysis of spending comparing tourists from different areas (local people, Georgians from other parts of the state, and out-of-state tourists) finds per capita spending on Tybee is highest among Georgia residents from other parts of the state. Significantly, more than 60% of both local and non-local Georgia visitors as well as 49% of out-of-state visitors report they would go to beaches outside of the state if erosion or other forces took away Tybee's beaches (Barber et al., 2015). Beaches are big business in Georgia with a large impact on the local and state economies.

1.2. Existing research on beach users and perception

Beach users expect certain experiences when visiting for recreational activities, and certain factors support or take away from these experiences. For example, the Tybee Island economic analysis quotes a visitor who was interviewed as she was leaving the beach because of a high tide: “Without a beach, what's the point?” (Barber et al., 2015). A British study similarly finds that beach users report beaches to be more restorative when the tide is low, temperatures are cooler, and air quality is better (Hipp and Ogunseitan, 2011). In a survey of beachgoers in Portugal, visitors report three key aspects to perceptions of beach quality: 1) water quality, 2) litter, and 3) safety. Visitors to more remote Portuguese beaches value scenic beauty more while visitors to that country's urban beaches report a desire for expanded facilities and parking (Vaz et al., 2009). Similarly, while visitors to Spanish beaches identify the provision of beach facilities and equipment as components of beach quality, local residents emphasize retaining beaches in a more natural state and curbing crowding and environmental degradation. In this same study, visitors also were less disturbed by beach crowds which residents conversely identified crowds as taking away from beach quality (Roca et al., 2009).

Maintaining water quality and shorelines, however, is expensive and involves in Georgia a heavy burden of trash. For example, a 2015 study of 20 Georgia beach sites reports finding 180 kg to 1,000 kg of plastic debris on both heavily visited and remote beaches (Lee and

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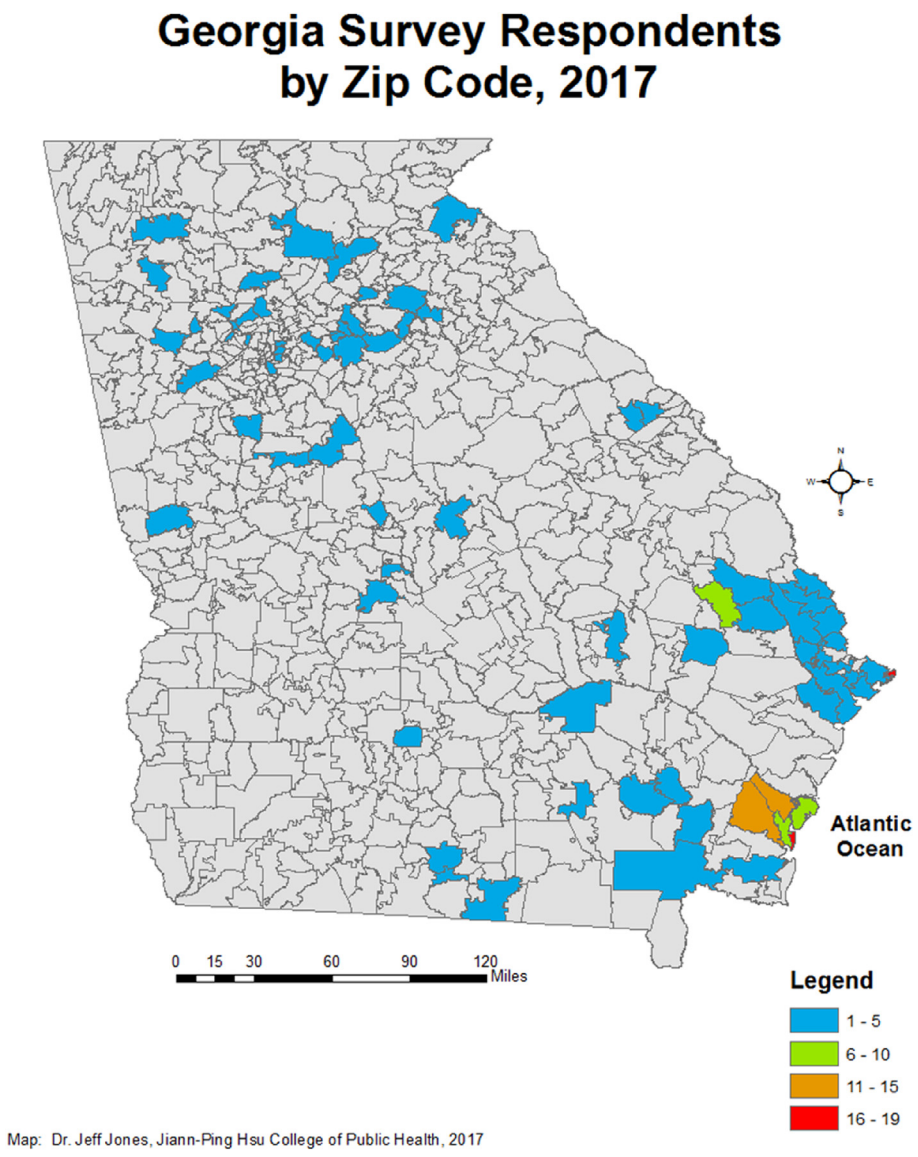

Fig. 1.

Sanders, 2015). Yet there is an economic upside to investing in removing beach trash. One study computes that improving water clarity increases spending per visitor by around $50 and improving trash elimination from a beach increases spending by $98 per visitor (Loomis and Santiago, 2013).

From toddlers with dirty diapers to adults urinating while swimming offshore, humans and other animals (Converse et al., 2012) can create a toxic stew of pathogens for beachgoers. How humans use beach environments also influences water quality and health risks. Waterborne pathogens spike during swimming seasons on weekends when bather density is highest (Benevente and Aslan, 2015). Swimmers and individuals wading in the surf can also stir up pathogens in underwater sand and create their own non-point sources of pollution (Graczyk et al., 2010). One study also estimates that individuals who choose to swim in coastal waters will ingest 25–50 times the water of someone such as a kayaker who will have more limited contact with seawater (Dorevitch et al., 2011). As one would expect from greater exposure, swimmers also experience a significant increase in rashes and itching after being in seawater compared to non-swimmers. Interestingly, this difference is not found in individuals who swim in freshwater lakes or rivers (Yau et al., 2009).

Risk perceptions are known to vary among people. Prior research finds a perception division between local residents and visitors using beaches for recreational activities. Local residents tend to rate their local beach quality higher than do visitors. Local residents who are more attached to their community similarly rate local beaches higher than residents who are not as attached (Bonaiuto et al., 1996). A British study drawing on qualitative focus groups also identifies that individuals approach issues of risks related to coastal bathing within a larger context of their personal ideas about power, authority, and trust (Langford et al., 2000).

While there are numerous studies of the levels and types of waterborne pathogens collected in American recreational waters, there are relatively few published studies which we were able to identify on what defines a 'polluted' beach to the public and how these beachgoers perceive their risk from waterborne pathogens. This particular study seeks to offer results drawn from beachgoers to the heavily visited Georgia Sea Islands' beaches.

2. Materials and methods

Data collection for this study consisted of a quantitative survey asking beachgoers about their perceptions of risk, beach water quality, and beachgoers' demographics. Researchers recruited participants