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Perceptions of rip current myths from the central south coast of England

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ABSTRACT

Rip currents (rips) are the global leading cause of fatalities on surf beaches, yet numerous long-standing misconceptions exist. Evidence of the prevalence of these myths is largely anecdotal. This opportunistic, exploratory study presents perceptions on rip current hazards (n = 187), of members of the public attending an open day at the National Oceanography Centre, Southampton. The survey was undertaken as a fun but informative quiz, aimed at families attending the research-facility. It also explored using such events as a conduit to gain valuable knowledge on the understanding of rip currents and other hazards. While most respondents (81%) knew appropriate escape strategies (swim parallel and stay afloat), only 11% identified what makes rips dangerous (panic), with 44% incorrectly saying that rips suck you under. Rip identification is poor, and many are unaware of the meaning of beach safety flags. This study identifies that safety communication messaging needs to focus on debunking rip current myths, to improve understanding of safe swimming areas; and to reduce panic if caught in a rip.

1. Introduction

1.1. Introduction to rip currents

While beaches are important for social, recreational, cultural, ecological, and economic activities (Stronge, 2005; Martínez et al., 2007), they also represent a risky environment, particularly for bathers (Short and Hogan, 1994; Ballantyne et al., 2005; Matthews et al., 2014). Beach safety management (ILFE, 2005; Hatfield et al., 2012) relies on understanding potential hazards to bathers, swimmers and surfers (Short and Hogan, 1994; Scott et al., 2009). The main natural hazard for bathers on global surf beaches is rip currents, or rips (Klein et al., 2003; Hartmann, 2006; Scott et al., 2007; Short, 2007; Gensini and Ashley, 2010; Arun Kumar and Prasad, 2014; Arozarena et al., 2015). Rips occur inside the surf zone (Short, 2007), which is the area shoreward of the wave break point (MacMahan et al., 2011, Fig. 1). They occur as concentrated, seaward-directed flows (Fig. 1), with velocities on the order of 0.5–2 m s^{-1} (MacMahan et al., 2006; Brander, 2015). Rips are generated by radiation stress-gradients (Longuet-Higgins and Stewart, 1964), created by temporal and spatial patterns in breaking waves (MacMahan et al., 2011). They are often coupled to the bathymetry, where they occur in channels incised into sand bars (Fig. 1), which are visible as areas of wave breaking (Gallop et al., 2011) due to the shallower bathymetry (Fig. 1). These flows are easily capable of transporting bathers offshore into deeper water, often against their will. Current speed in rips varies with water level, wave conditions, and morphology. Rips generally flow fastest at low tide (Brander, 1999). They often circulate as eddies inside the surf zone, from which there may be occasional exits to offshore (Scott et al., 2014). The rate of these exits can be referred as the exit rate. The hazard of rips to swimmers is thought to increase with: (1) current speed inside the rip; and (2) the exit rate from the surf zone (McCarroll et al., 2014a).

1.2. Rip current rescue statistics

On beaches where they exist, rips are often the leading cause of

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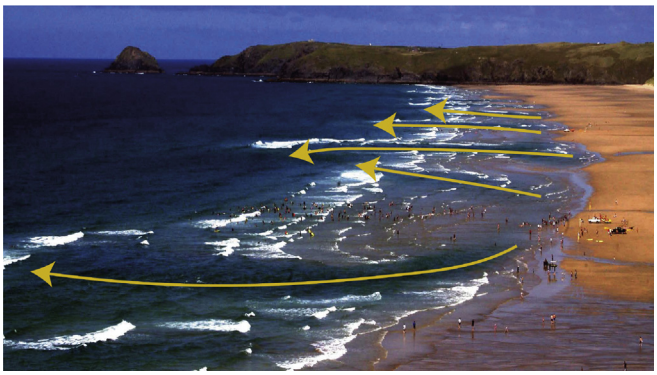

Fig. 1. Photo of Perranporth Beach, Cornwall, UK, showing breaking waves (white) with rip currents in between indicated by darker water. Direction of rip current flow is highlighted by arrows (photo courtesy of Tim Scott).

lifeguard rescues and drowning fatalities (Short, 1999; Scott et al., 2008; Brander and MacMahan, 2011; Woodward et al., 2015). They are a global problem, with annual deaths due to rips averaging 21 in Australia (Brighton et al., 2013), 35 in the U.S. (Gensini and Ashley, 2010), and 39 in India (Arun Kumar and Prasad, 2014). However, due to often incomplete incident reporting, these numbers are likely considerably higher (Brighton et al., 2013).

Of the 613 coastal drowning deaths recorded in Australia from 1 July 2004 to 30 June 2011, 293 (48%) were at a beach location. Of these beach drowning deaths, at least 44% were attributable to rip currents (Brighton et al., 2013). In the UK in 2013, of 381 reported water-related fatalities, 93 (24.4%) were classified as occurring at the coast/shore/beach, second only to 124 (32.5%) in rivers (National Water Safety Forum, 2014). In 2014, of 2507 total lifeguard rescues by the Royal National Lifeboat Institution, the largest proportion (1138, 45.4%) were attributed to rip currents as the environmental cause (RNLI, 2014). The leading activities which lead to rescues were body boarding (799) and swimming (660) (RNLI, 2014).

1.3. Rip current myths

While our understanding of the physical behaviour of rip currents is well established (Shepard et al., 1941; MacMahan et al., 2006; Gallop et al., 2011; Bruneau et al., 2013), significantly less is known about how the public understand this important and common hazard. There has traditionally been communicative information disconnects between rip current scientists, beach safety practitioners and beachgoers, leading to gaps in knowledge regarding the rip hazard (Brander and MacMahan, 2011). In response, a growing field of social science-based rip studies has emerged attempting to address this problem. Several recent studies examined the demographics, behaviour and rip and beach safety knowledge of beachgoers and the general public (Drozdzewski et al., 2012, 2015; Caldwell et al., 2013; Brannstrom et al., 2014; Woodward et al., 2015). However, very few studies have been able to assess the perceptions of infrequent beachgoers and, in particular, children (<18 years old), of the rip current hazard. Moreover, there are several misleading myths about rip currents that are at odds with rip current science, such as the notion that rips suck you under (Brander and MacMahan, 2011; Leatherman, 2013), or that breaking waves (white water) is a dangerous place to swim (Brannstrom et al., 2014). Just how persistent and prevalent these myths are in the public vernacular is largely anecdotal and yet to be quantified. This is important because overcoming rip current misconceptions remains a communication barrier for many beach safety organisations in their education efforts.

1.4. Project description

This contribution describes results from a survey questionnaire undertaken at the National Oceanography Centre, University of Southampton (NOCS), on the central south coast of the UK, on 25 April 2014, during the annual 'Ocean and Earth Day'. The main purpose of this family-orientated open day was for the public, and particularly children, to learn about research at NOCS and get hands-on experience. The survey was undertaken as a fun but educational quiz, aimed at improving understanding of the public perception of rip currents; and to provoke discussion about the misperceptions about rip currents. It was also an ideal opportunity to learn more about public knowledge on rip currents and beach safety. The aim of this study is therefore to gain an appreciation of the perception of adults and children members of the public on rip current myths and (potential) misunderstandings. Moreover, this study explored using such research facility open-days as a conduit to gain valuable knowledge on the understanding of rip currents and other hazards.

2. Methods

The survey method and questions received ethical approval by the University of Southampton Research Governance Office. The survey gained 187 respondents (10.8%) from a total number of 1731 visitors that attended the NOCS open day, which gives a margin of error of ±7% at the 95% confidence level. Of the 1731 visitors, 58% were adults and 42% children. People were recruited by advertising on a large screen, and posters that welcomed visitors to test their knowledge of beach safety with a rip current quiz. The goal was to recruit as many visitors as possible to take the survey, which therefore, had to be relatively short. Upon entering the open day, visitors were asked their postcodes. Eighty nine percent ($n = 503$) of 563 groups were from the south coast coastal cities of Southampton (79.5%, $n = 447$), Portsmouth (5.5%, $n = 31$), and Bournemouth (4.5%, $n = 25$). The remaining 8.5% ($n = 48$) were mostly from the inland areas of NW London, Salisbury, Reading, and Guildford, with 12 people (2.13%) from further afield in England. While the exact demographic breakdown of the survey respondents is not known, observations suggest that they represented an even mix of ages and genders.

The 187 respondents were asked a series of ten multiple choice questions that were displayed on a large screen. Each individual was provided with a handheld numeric keypad to select their answer, which was recorded electronically by a computer. As described in the following section, some of the questions had more than one correct answer. Participants could only select one answer, which may include 'all of the above' where specified. On occasion, individuals began the survey after it had already started and several left before it was completed. For each question, this is taken into account in percentages of responses. At the end of the survey, a graph of participant responses was displayed, followed by the correct answers. This primed follow up educational discussions about rip currents and associated myths and misunderstandings.

3. Results and discussion

Below, the survey questions are given, followed by the list of possible answers in italics, with the correct answer(s) underlined. A brief discussion of results for each question is provided. Percentages of answers are shown graphically in Fig. 3.