Applied Geography 56 (2015) 61–70

Contents lists available at ScienceDirect

Applied Geography

journal homepage: www.elsevier.com/locate/apgeog

"You can't see them from sitting here": Evaluating beach user understanding of a rip current warning sign

Christian Brannstrom*, Heather Lee Brown, Chris Houser, Sarah Trimble, Anna Santos

Department of Geography, Texas A&M University, 810 O&M Building, College Station, TX 77843-3147, USA

ARTICLE INFO

Article history:
Available online

Keywords:
Rip current
Perception
Hazard
Vulnerability
Texas
Surf zone

ABSTRACT

Rip current warning signs complement lifeguards and flags on many beaches globally to alert beach users to the danger of rip currents and to inform beach users about how to identify and avoid rip currents. Although rip current warning signs, such as the sign distributed by the U.S. National Oceanographic and Atmospheric Administration (NOAA), are an important part of any beach safety program, their effectiveness is unknown. Moreover, we do not know how beach users respond to or perceive the rip-current warnings represented graphically and textually. Here we report on a spatially and temporally randomized survey of 392 beach users from three heavily frequented public beaches in Texas (Galveston, Port Aransas, and Corpus Christi) at the height of the summer beach season in 2012. Beach users were asked to respond to the rip current warning sign developed in 2003–2004 by the U.S. Rip Current Task Force. Nearly half of respondents did not notice any warning sign when approaching the beach. When prompted by enumerators with the Task Force sign, 44.5% of beach users found the sign was "helpful" or "very helpful" to their ability to identify a rip current. However, more than half of beach users had difficulty translating the rip current image into a feature observable while standing or sitting on the shore. Many beach users will respond to a warning sign showing the rip current from the perspective of place, rather than the aerial view representing the ocean as space. This realization guides our specific suggestions for improving the current NOAA warning signs.

Introduction

Rip currents ("rips"), a global coastal hazard, are responsible for many drowning deaths and thousands of surf rescues yearly (Brighton, Sherker, Brander, Thompson, & Bradstreet, 2013; Morgan, Ozanne-Smith, & Triggs, 2009; Sherker, Williamson, Hatfield, Brander, & Hayen, 2010; Short & Hogan, 1994). For example, in Australia more people die from rip currents (~21/yr) than floods, shark attacks, and bushfires combined (Brander, Dominey-Howes, Champion, Del Vecchio, & Brighton, 2013). In the United States, ~100 individuals drown each year from rip currents (Carey & Rogers, 2005) although other authors use estimates of 30–40 drownings per year (Gensini & Ashley, 2010). Specifically, drownings and lifeguard rescues relating to rip currents result from beach hydrodynamic and bathymetric conditions and individual and group characteristics (Brander, 2013). The ability of beach users (particularly tourists) to recognize and obey safety information and warning flags reduces the rip current hazard (Wilks, de Nardi, & Wodarski, 2007). Understanding how beach users understand warning signs for rip currents is an important step in the development of appropriate programs and educational materials to increase beach user safety and reduce the hazard associated with rip current development.

Warning signs aim to inform people of the potential hazard and to persuade them to engage in behaviors that will reduce death or injury (Wogalter, Conzola, & Smith-Jackson, 2002; Wogalter & Laughery, 1996). Scholars recognize the importance of integrating social and physical science approaches to rip currents (Brander, 2013; Shaw et al. 2014), which leads to innovative studies of beach safety protocols. For example, Matthews, Andronaco, and Adams (2014) tested the efficacy of warning signs on Australian beaches, reporting that 45% of respondents observed signage; more than 95% of these respondents noticed the hazard symbol. Hatfield, Williamson, Sherker, Brander, and Hayen (2012) found that recipients of a beach safety campaign in Australia showed improved

* Corresponding author. Tel.: +1 979 845 5923.
E-mail address: cbrannst@geos.tamu.edu (C. Brannstrom).

http://dx.doi.org/10.1016/j.apgeog.2014.10.011
0143-6228/

confidence and ability in identifying rip currents compared to a control group.

An unknown number of beach access points in the U.S. have rip current warning signs similar to the one developed by the Rip Current Task Force (Fig. 1), which tells beach users how to escape a rip current and provides a simple illustration of a rip current from aerial perspective. In 2003 the U.S. National Oceanographic and Atmospheric Administration's (NOAA) National Weather Service (NWS) created this task force, comprised of representatives of NWS, Sea Grant, National Ocean Service (NOS), and the United States Lifesaving Association (USLA) (Carey & Rogers, 2005). The primary goal of the task force was to establish consistent rip current education efforts and improve data sharing about rip current rescue data; the primary product of the task force was a rip current brochure and sign template that could be duplicated and posted along boardwalks and beachfronts.

The NOAA warning sign combines two geographical concepts in visual form. First, it shows an aerial and oblique view of a rip current, with relatively calm but cloudy (not blue) water surrounded by waves. This representation depicts the rip current as abstract or undifferentiated space (Crang & Thrift, 2000), viewed from an oblique perspective above the surf zone—a view from "nowhere." It could be any beach, at any time, even though rip current scientists have determined the spatial variability of hydrodynamic forces and topographical states responsible for the generation of rip currents. The sign includes visual clues to rip currents including the wedge of apparently calmer and potentially turbid water between areas with more intensive wave breaking. The greatest risk from rip currents may occur under low to moderate surf conditions that, ironically, are conducive to rip current development and encourage beach users to enter the water with confidence (Houser, Barrett, & Labude, 2011). The NOAA sign does not have text encouraging beach users to identify a rip current in the surf zone, unlike the sign reported in McKay, Brander, and Goff (2014: 83). Indeed, the NOAA rip current sign was not intended to teach the general population to identify a rip. As communicated by Brewster (personal communication, 2011), the U.S. is "a big country with myriad hazards, people are bombarded with safety information, and the chance that a kid from rural Alabama who gets a bit of information in some science class is going to remember it when he goes to Pensacola Beach [for example] is very unlikely." However, regardless of the intent of the sign's designers, the prominent image of a rip current on the sign and attempts to post the sign on beaches indicate that its function and visual argument constitute an invitation to beach users to identify a rip current. This interpretation is consistent with current practice; geographers who analyze visual materials normally consider how images are comprised internally (e.g. graphic elements) and how viewers interpret images (Roberts, 2013).

Second, the NOAA sign shows the rip current as a place of experience (Cresswell, 2004). A swimmer feels the "grip of the rip" and is advised to swim parallel to shore rather than "fight the current." This experience is unforgettable. It is particular and contingent, felt by individuals who often show signs of panic and distress as they are moved out to sea at rates that can exceed 2 m/s. Slower rip currents (<1 m/s) can pose a hazard if a weak swimmer attempts to swim directly back to shore against the current rather than "break the grip of the rip" as highlighted on the NOAA sign.

Analyzing how beach users interpret the standard rip current warning sign builds upon Brander's (2013) argument for integrating human and behavioral aspects of rip currents into the study of rip currents as hydrodynamic process. He asks, "how successful have we [rip current scientists] been at communicating scientific knowledge of rips to the general public?" (Brander, 2013, p. 123). A useful approach for analyzing rip current warning signs, based on Wogalter et al. (2002), emphasizes sign effectiveness and whether beach users pay attention to the sign and comprehend its primary message. Ultimately the change in behavior (if any) depends on cognitive–affective processes such as attitudes and motivation influenced by past experience and willingness to participate in risky behavior, and whether the sign provides a perceptual or motivational warning (Wogalter & Laughery, 1996). In this framework, the NOAA warning sign prompts two cognitive processes relating to beach user understandings of the beach as a place: to comprehend the imperative to swim parallel to shore and to translate the illustration into a feature observable in the surf zone from the perspective of the beach user.

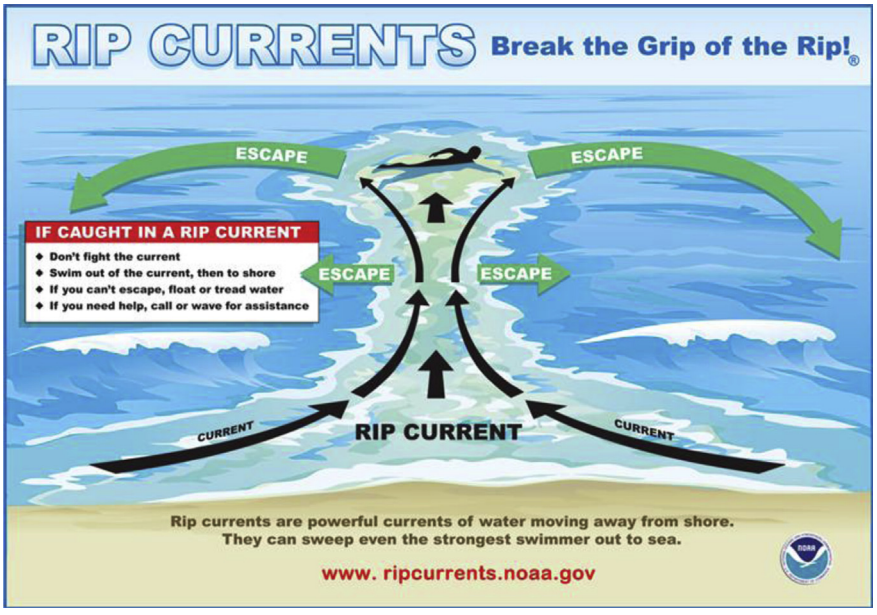

Fig. 1. Rip current warning sign produced by the Rip Current Task Force, credited to U.S. National Oceanographic and Atmospheric Administration (NOAA).