Exploring Rip Currents

By Spencer Rogers

THE PROBLEM
Rip currents are the leading surf hazard for all beachgoers. The National Weather Service reported at least seven fatalities due to rip currents along the North Carolina coast in 2013, with a total of at least 62 deaths since 1999.

More than 100 drownings due to rip currents occur every year in the United States. The U.S. Lifesaving Association reports 80 percent of all surf rescues are related to rip currents.

On many ocean beaches, rip currents are present every day. Most beaches, on most days, have rip currents with speeds that are too slow to be dangerous for most swimmers. But they still can be a threat to weak or non-swimmers. Rip current speeds are typically 1 to 2 feet per second.

However, when the wave conditions, shape of the offshore beach and tide elevation are perfectly tuned, speeds as high as 8 feet per second have been measured. That is faster than an Olympic swimmer can sprint! Thus, rip currents can sweep even the strongest swimmer out to sea.

PRIOR RESEARCH
Over the last 10 years, rip current research has been refocused from sand transport to beach safety. U.S. West Coast and other international rip current researchers have been finding re-circulation cells beside the offshore-flowing rip current that moves swimmers back to shallow water in a period of minutes.

That means that one strategy to escape those rip currents is simply to float rather than swim parallel out of the rip. This suggestion could alter the national warning information that has been developed by the Sea Grant work, the National Weather Service and other NOAA partners, and the U.S. Lifesaving Association.

The problem is that most research has shown that roughly 10 to 20 percent of the drifters or swimmers are ejected offshore and do not recirculate to shallow water. For a non-swimming victim or exhausted civilian rescuer, that can result in panic, and in some cases, drowning.

Most rip current research has been conducted on large-wave beaches with natural features that produce fast, fixed rip currents that can be studied almost any day.

The rip current hazards on the Atlantic and Gulf coasts are smaller features, often much more ephemeral and much harder to predict. Little previous research has been conducted on those beaches to determine the frequency, velocity and circulation that would threaten potential victims.

The most dangerous rip currents on any particular North Carolina beach typically occur only 5 to 10 swimming days each year and are difficult to predict days in advance.

2014 NC SEA GRANT RESEARCH
Over the last few years, Jamie MacMahan at the Naval Postgraduate School in Monterey, CA and Rob Brander at the University of New South Wales, in Sydney, Australia have refined rip current drifter designs that track the circulation in and around the rip currents.

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Spencer Rogers leads a team to gather data on rip currents in North Carolina.

The drifters float and behave similarly to a swimmer in the surf. With MacMahan and Brander's help, North Carolina Sea Grant and UNC Wilmington have constructed more than 20 drifters for research here.

Deployment procedures are being refined during scheduled deployments during the 2014 summer season, working with local lifeguard programs in New Hanover County and the Outer Banks. The researchers then will go "on call" with local lifeguard programs and National Weather Service forecasters to deploy on short notice on days and times when dangerous rip currents are likely.

Multiple drifters are deployed at one time, scattered around the primary rip current, and allowed to circulate for multiple cycles. Those ejected from the study area are recovered and returned to the study area. On-board GPS units with internal data-loggers record the motion and velocity of each drifter. Data is downloaded at the end of the day for computer analysis.

Initial deployment will be on mild rip current days, with later deployments targeting more severe rip current outbreaks and broader access.

EXPECTED RESULTS

The North Carolina team, based at the Sea Grant office at the UNCW Center for Marine Science, is documenting the velocity, circulation and ejection frequency of East Coast rip currents. The resulting evaluation of the ejection rates and other data will then be compared with existing national messages as well as new messages suggested by research on West Coast, Great Lakes and Australia.

The North Carolina team's data and recommendations will be included in ongoing efforts with the National Weather Service and the U.S. Lifesaving Association to provide warning products and escape procedures in messages to the public. The North Carolina Sea Grant team also will initiate lifeguard training on the existence and use of circulation cells for professional rescue purposes.

For more information on the ongoing national Break the Grip of the Rip *campaign, go to: ripcurrents.noaa.gov.*

For information on Rob Brander's programs in Australia, go to: http://www.scienceofthesurf.com.

Overall project partners:
North Carolina Sea Grant
UNC Wilmington Center for Marine Science
NOAA National Weather Service, Wilmington Forecast Office
Town Lifeguard Programs: Carolina Beach, Wrightsville Beach and Kure Beach

Cooperating partners:
UNC Wilmington Surf Club
Wrightsville Beach Longboard Association
Tony Silvagni Surf School, Carolina Beach
CB Surf Shop, Carolina Beach

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