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Panhandle Beach Safety Study

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EXECUTIVE SUMMARY

The mission of the Florida Department of Health (DOH) is to promote and protect the health and safety of all people in Florida. During the summer of 2003, the DOH became concerned when nine people drowned over a two-day period and a total of 12 drowned during a two-month period in the Gulf of Mexico along Florida's Panhandle. The department believed there was a need to determine what factors may have been involved in these tragic events. This study examined the drownings that took place during June through July 2003 in five Panhandle counties – Bay, Walton, Okaloosa, Santa Rosa, and Escambia. The study was designed to provide a descriptive summary of the conditions during the event period and the commonalities among the drowned victims, as well as survey beachgoers concerning the public's understanding and perception of beach conditions and surf safety systems.

The descriptive study found that eight of 12 drowning victims were male, 10 of 12 were from out of state, and three of the 12 had detectable levels of alcohol. The study also found that eight of the 12 that drowned were attempting to rescue someone who was struggling in the water. Most of the persons struggling were later saved. The median age of the drowning victims was 46.5-years-old.

A survey used as part of the study found that there are at least three different flag systems in place in Florida. When given the three flag colors from which to choose, 98 percent of the public knew the red flag meant there were dangerous water conditions, yet 30 percent said they would still enter the water if the red flag were flying.

The primary message of public health is prevention. Keeping people out of the water during dangerous conditions would be the easiest way to prevent drownings. Efforts should be made to discourage people from entering the water on red flag days. Lifeguards may help in preventing people from entering the water and rescuing people that are in trouble. Better education would be useful in understanding the flag system and how to survive a rip current. A combination of these efforts would decrease the toll of Gulf drownings.

INTRODUCTION

The mission of the Florida Department of Health (DOH) is to promote and protect the health and safety of all people in Florida. During the summer of 2003, the DOH became concerned about the number of people who drowned in five counties in Florida's Panhandle. In one two-day period, nine people drowned; and over two months (June-July), a total of 12 people drowned in Bay, Okaloosa, Walton, Santa Rosa, and Escambia counties. As such, the department believed it was important to determine what factors may have been involved in these tragic events.

A study was designed to provide a descriptive summary of the conditions during the event period and the commonalities among the drowned victims, as well as survey beachgoers about their understanding and perception of beach conditions and surf-safety systems. The initial stage of the study, conducted from August 18-31, 2003, consisted of meetings with the stakeholders in each of the five counties to develop a descriptive summary of the drownings and identify any commonalities among the victims. The second stage of the study documented beachgoers' understanding of beach safety conditions and evaluated their knowledge and behavior with respect to beach safety. The Beachgoers' Survey was conducted from August 25 through Labor Day weekend in 2003.

BACKGROUND

A total of 12 drownings occurred in the Gulf of Mexico during June and July 2003 in the five-county Panhandle area. The drownings were distributed among four of the five counties in the study region:

- Walton County: six drownings (all on June 8, 2003)
- Okaloosa County: two drownings (both on June 8, 2003)
- Bay County: three drownings (two on July 2, 2003; one on July 13, 2003)
- Escambia County: one drowning (on June 9, 2003)

Three of the 12 drownings occurred in the morning, and nine occurred in the afternoon. The weather conditions for June 8 and 9, 2003, were examined because nine of the 12 drownings occurred during these two days. On both days, there were high waves offshore and large swells moving onshore over the entire northwest Florida coastline including the counties in our study. Although it is difficult to identify certain spots as being candidates for unsafe swimming conditions using weather reports, the entire northwest Florida coastline would have been affected. Red flags to warn swimmers to stay out of the water were flying over nearly the entire northwest Florida region. The conditions during this two-day period were similar to those that occurred on Labor Day weekend (August 30-September 1, 2003), when four drownings occurred. The weather report for Labor Day was also similar; there were high waves over a large area of the Panhandle (Beeler, 2003).

The distribution of Gulf drowning deaths by county and date readily shows the clustering of drowning fatalities. This occurrence is, at least in part, attributable to the adverse conditions present at a given place and time.

Other Studies
A number of studies have examined some of the risk factors commonly associated with drownings at beaches. A study in Pinellas County found that children under the age of 11 were more likely to drown in a swimming pool, but those 11-years-old and older were more likely to drown in oceans (Nichter, 1989).

In another report, the United States Lifesaving Association suggested all beach lifeguards be certified at the advanced level and that beaches have a sufficient number of well-equipped lifeguards. The group also encouraged cooperation among all involved parties, such as governmental agencies and private hotels and motels, to improve safety at beaches (Brewster, 2002).

A study in Dade County found that accidental drownings occurred in private pools (21 percent), lakes (27 percent), and the ocean (19 percent) at relatively even rates. A total of 80 percent of these drownings occurred when there was no supervision present, such as parents or other adults (Copeland, 1984; Mackie, 1999). Calder *et. al.* (1990) suggested greater supervision and fencing, where appropriate, to help reduce child drownings. It is interesting to note that their final recommendation is that more research needs to be done in this area.

Alcohol (ethanol) appears to be involved in many drownings. Copeland (1984) found that almost 38 percent of drowning victims in Dade County had detectable levels of alcohol in their systems. Another study found that 59 percent of young adult victims had detectable post-mortem blood alcohol levels (Nichter, 1989).

BEACH SAFETY FLAG PROGRAM

Depending on the county in the Panhandle area, one of three different beach flag warning systems is usually employed: a blue-yellow-red system; a green-yellow-red system (with red indicating the most dangerous water conditions in both of these systems), or a green-yellow-red-red over red-purple system. Blue or green flags indicate that the seas are calm; yellow flags indicate that the seas are rough and caution should be used in the water; red flags indicate hazardous conditions exist, and people should not enter the water. The Panhandle counties each use one of these systems, but may have more than one system in the county if it contains a state park.

Section 380.276, *Florida Statutes*, was enacted in 2002 and required the Department of Environmental Protection (DEP) to develop a cooperative program between the state and local communities “for the display of uniform warning and safety flags at all public beaches along the coast of the state at which warning and safety flags are displayed and lifeguards are on duty." The statute also requires the DEP to develop uniform notification signs that explain the meaning of the displayed flags.

The DEP recently adopted a beach flag warning system based mostly on a system adopted by the International Lifesaving Federation. The sole difference between the DEP system and the International Lifesaving system is that the DEP system includes a green flag, while the international system does not.

The DEP's warning flag standards are:

Green:	Calm conditions. Normal care and caution should be exercised.
Yellow:	Light surf and/or currents are present. Weak swimmers are discouraged from entering the water.
Red:	Rough conditions, such as strong surf and/or strong currents are present. All swimmers are discouraged from entering the water.
Red Over Red:	In accordance with law or regulation, the water is closed to public contact. No one may enter the water. Two flag system.
Purple:	Marine pests, such as jellyfish, stingrays, or dangerous fish are present (not intended to be used for sharks).

These warning standards are designed to clearly communicate the degree of safety in the current surf conditions. The standards also include a double red flag warning to communicate that the water is closed to public contact. This new uniform system, combined with signage, is intended to improve beach safety and reduce drownings. The new system will be used in all state parks and local communities will have the option of using the new system at beaches outside state parks.

The DEP administers a grant program to provide free flags and signs. Information may be found at http://www.dep.state.fl.us/cmp/programs/flags.htm.

Some of the counties have begun to transition to the DEP system. At the time of the study, Bay, Okaloosa, and Walton Counties used the blue-yellow-red flag system; and Escambia and Santa Rosa Counties used a green-yellow-red flag system.

METHODS

Initial Stage

The initial stage of the study consisted of meeting with the stakeholders in each of the five counties to develop a descriptive summary of the drownings and identify any commonalities among the victims. In each county, the DOH epidemiologists met with representatives from the county health department, sheriff's office, fire department, emergency management services (EMS), Department of Public Safety, area hospitals, and the tourist development council. Subsequent to these meetings, teams of epidemiologists were dispatched to these counties to gather as much information as possible about each of the drownings. They obtained reports from the autopsy, as well as from the sheriff's office, EMS, fire rescue, and the lifeguards (where applicable). In addition, the epidemiology teams visited the beaches where the drownings occurred to view the physical environments.

This study only analyzed deaths during the study period in the five counties in which "drowning" was listed as a cause of death on the autopsy report, and the victim drowned in the Gulf of Mexico.

As a part of a descriptive study about the drownings, the DOH staff conducted telephone interviews with the victims' relatives who were on the beach at the time the drownings occurred.

The intent of these interviews was to gather information about the circumstances of the drownings that may not have been available from other data sources. A total of nine interviews were conducted with relatives of the deceased. Three relatives of the deceased did not return repeated calls. Of the nine interviewed, four were not on the beach at the time of the drowning, and therefore, were not able to describe the weather, water conditions, or behavior of the deceased before entering the water. All of the telephone interviews were conducted during the August to September 2003 period. Because of the small number of completed interviews, and because four of the relatives were not on the beach at the time of the drowning, this part of the study aided in the description of some of the drownings, but did not prove useful in terms of an independent analysis. No statistical analysis was done on this data, because of the low number of completed questionnaires.

Stage Two

A Beachgoers' Survey was designed to query beachgoers about Gulf conditions, beach flag warning systems, and swimming habits. In addition, demographic information was collected from each respondent. These interviews were conducted face-to-face on the beach. Respondents were not asked their names and were assured that they would not be identified with their responses. Questions were designed to be answered with yes, no, or with open-ended responses. The administration of one survey required approximately six to eight minutes.

The Beachgoers' Survey was pre-tested on Monday, August 25, 2003. The pre-testing helped to clarify some of the questions that were found to be confusing. The survey administration began the following day.

Ideally, surveys would have been conducted during different water conditions and thus under different colored beach flag warnings. Since the survey was to be conducted over a five-day period, it was impossible to know what color flags would be flying at any given time. An additional 30 surveys were administered over the Labor Day weekend to obtain responses from beachgoers during a holiday weekend and to survey during red flag water conditions.

A total of 12 different interviewers administered the questionnaires. Each interviewer was trained in survey administration and sampling protocol. The interview technique was modeled, and the process for randomly picking people on the beach was explained to the interviewers.

Each county sheriff's office, tourist development council, and county health department was contacted for advice in locating suitable beaches for surveying within the respective counties. Within each county, interviewers were instructed to survey respondents in equal proportions from two separate beaches.

After identifying a beach for the study, the interviewer was instructed to interview one individual from each group of beachgoers in that area. Since some of the questions from the survey involved specific knowledge, the respondent was required not to have heard the question before the survey was administered. As such, only one individual in each group was surveyed. For the same reason, groups within earshot of a previously interviewed respondent were excluded. Only individuals 18-years-old and older were interviewed for the survey. Each respondent participating in the survey needed to have had an opportunity to see a beach warning flag. Most of the time, the flag was in sight of the beachgoer (98.6 percent of the surveys conducted), but on a few occasions, the flag was only visible at the beach access or the point of entry to a particular beach.

Interviewers were given a random number table and directed to use a technique to select a random beachgoer from within each group. Groups ranging in size from one to six individuals were selected. If the person chosen at random within the group did not want to participate, no one else from that group was surveyed. If the beachgoer was alone (a group of one), then that person was necessarily selected.

Survey questions were read to the respondents by the interviewer. Respondents were told that they should answer questions without help from the others in the group. This instruction was repeated before the knowledge questions were asked (for example, describe how you would escape from a riptide or rip current).

Sampling/Power Calculation
Because of the logistical difficulties in conducting a simple random sample of people on the beach, a modified random sampling technique was employed. The sample size was computed based upon a power of 0.80 and a 0.05 level of alpha with an assumption that 50 percent of people on vacation would be able to identify the color of the beach flag flying at the time of survey administration, and 70 percent of respondents who live in the area would be able to correctly identify it (Epi Info 2002, CDC). A total of 206 respondents were needed for the survey. This number was adjusted downward to 200 and divided evenly among the five counties, resulting in the need for 40 surveys to be administered in each of the counties.

Data Entry
The survey data was entered into the Epi Info 2002 database (Epi Info 2002, CDC). The accuracy of the data entry was checked by randomly selecting five of the total 222 Beachgoers' Surveys, then matching the responses from the hard copy of the survey with the database generated record. Only two errors were found in the entry of these five surveys: a misspelled hometown and an incorrect digit in a survey identification number.

Data Analysis
The data analysis of the Beachgoers' Survey was conducted using Epi Info 2002. Basic frequencies for the categorical variables were calculated, and the means procedure was used for the continuous variables. Two-way tables were constructed to explore univariate relationships between selected outcome variables and the explanatory variables. Chi-square tests were used to test for statistical significance. P-values at or below the 0.05 level of alpha were determined to be significant. Using Epi Info 2002, three logistic regression models were constructed to examine multivariate relationships between selected outcome measures and the explanatory variables. Specific two-way interactions were assessed in the model, and any interactions meeting statistical significance at the 0.05 level of alpha were included in the model.

Response Rates
Each interviewer kept a record of the number of beachgoers who completed a survey, as well as those who refused to complete a survey. If the beachgoer refused to answer the survey and gave a reason for not wanting to participate, the reason was recorded.

Response rates were calculated for each interviewer and for the five-county sampling area as a whole. The overall response rate was 85.7 percent. Eighty-five percent of beachgoers who were approached during the Tuesday to Thursday (August 26-28) study period agreed to participate in the survey; and, 90.9 percent of the potential respondents agreed to answer the survey questions during the Labor Day weekend (August 30-31).

BEACHGOERS' SURVEY RESULTS

Twelve interviewers administered the beachgoers' survey from Monday, August 25 through Thursday, August 28, and on Saturday, August 30 through Sunday, August 31, 2003, on the Florida Panhandle beaches in Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties. There were 222 surveys completed:

- 192 were completed August 26–28 during blue/green or yellow flag conditions.
- 30 were completed August 30–31 during red flag conditions.

Table 1.
Surveys Completed by County
(Number of Respondents (n)=222)

Counties	**August 26-28** (blue/green and yellow flags)	**August 30-31** (red flags)	**All Dates**
Escambia	40	10	50
Santa Rosa	40	0	40
Okaloosa	40	10	50
Walton	40	10	50
Bay	32	0	32
Total	**192**	**30**	**222**

Respondents' Demographics

The overall age of respondents ranged from 18- to 78-years-old with a mean age of 41.7 and the median age of 42. More than half the respondents were females (62.2 percent) and 37.8 percent were males.

The majority of the respondents were White/Caucasian (94.6 percent) with 1.8 percent Black/African-American, and 3.7 percent of another race. English was the first language for 94.1 percent.

Responding to a question about the highest level of education attained, more than half of the respondents reported having a college or associate degree (53.6 percent); 9.9 percent had a master's or doctoral degree; 33.3 percent had a high school diploma or equivalent; and, 3.2 percent had less than a high school education.

Most (97.3 percent) lived in the United States; of those 31.9 percent were Florida residents, 12.5 percent were from Georgia, 9.3 percent lived in Alabama, and 46.3 percent were from other states.

A total of 68.5 percent of all respondents reported being on vacation, away from the city or town in which they lived. Of those surveyed over the Labor Day weekend, 86.7 percent reported being on vacation, away from the city or town in which they live. There were 52.7 percent who reported living within 30 miles of an ocean or Gulf during some period of their lives.

More than half of the respondents rated themselves as good or excellent swimmers (61.7 percent) with 27.0 percent indicating they were fair swimmers, 7.2 percent as poor swimmers,

and 4.1 percent as non-swimmers. However, the number of respondents who reported the number of 25-yard pool lengths they were able to swim without stopping did not necessarily match their rating of perceived swimming ability.

Table 2
Number of Self-Reported 25-Yard Pool Lengths
Able to Swim Without Stopping
(n=222)

# of 25-Yard Pool Lengths	Percent
0	5.9
1-2	31.1
3-4	21.2
5-10	15.3
More than 10	20.7
Do Not Know	5.9

The Beach
Most (88.7 percent) of the respondents reported previously visiting the beach where they were surveyed. The amount of time they had been on the beach the day of the survey ranged from two minutes to eight hours with the mean amount of time on the beach at one hour and 43 minutes and the median time at one and a half hours.

Table 3
Color of Flag During Survey Interview
(n=222)

	Number of Interviews	Percent of Interviews
Blue/Green	90	40.6
Yellow	102	45.9
Red	30	13.5

Respondent Knowledge of the Flag Flying at the Time of the Survey
There were 154 respondents (69.4 percent) who knew the correct flag color flying the day of the survey without looking around to see it during survey administration, and 68 (30.6 percent) did not know the flag color. The mean length of time on the beach the day of the survey, for those respondents who knew the correct flag color, was one hour and 59 minutes with a standard deviation of 82 minutes. Of those surveyed who did not know the correct color, their mean time on the beach was one hour and 39 minutes with a standard deviation of 95 minutes (ANOVA Test P-value = 0.1275). Respondents who said they knew the correct flag color flying reported having been at the beach longer; however, the difference was not statistically significant.

However, knowledge of the flag color varied depending on the actual flag flying.

Table 4
Respondents Actually Knew the Correct Flag Color Flying
(n=222)

Actual Flag Color Flying	YES		NO	
	Number	Percent	Number	Percent
Blue/Green	46	51.1	44	48.9
Yellow	84	82.4	18	17.6
Red	24	80.0	6	20.0

(X^2 uncorrected 2-tail p-value < 0.0001)

There appears to be an association between the flag color flying and the respondent's knowing what color flag is flying.

Table 5
Respondents Knew the Correct Flag Color Flying
By Having Visited that Beach Before
(n=222)

	Correctly Identified Flag Color Flying			
	YES		NO	
	Number	Percent	Number	Percent
Never visited beach before	12	48.0	13	52.0
Visited beach before	142	72.1	55	27.9

(X^2 uncorrected 2-tail p-value= 0.0139**)**

Respondents who had visited the beach before were more likely to be able to identify the color flag flying at the time of the survey.

The Flag System
The majority of respondents (197 or 90 percent) were able to correctly put the three flag colors in their correct order (n=219); 22 respondents (10 percent) could not. There were 115 respondents (89.1 percent) who correctly ordered the blue-yellow-red flag system, and 14 (10.9 percent) who were not able to correctly order the three flags in that system. With the green-yellow-red flag system, 82 respondents (91.1 percent) were correctly able to order the flag system, while 8 (8.9 percent) could not (X^2 uncorrected 2-tail p-value= 0.63). There was no statistically significant difference in respondents' ability to order the flags under the two flag systems.

Most of the respondents (215 or 98.2 percent) knew that a red flag was the most dangerous of the flag colors (n=219); only four respondents (1.8 percent) did not know red was most dangerous.

Respondents' Gulf Experience (day of survey)
There were 140 respondents (63.1 percent) who had been in the Gulf on the day they were surveyed; 82 (36.9 percent) had not been in the Gulf at the time of the survey.

Table 6
Respondents Who Had Been in the Gulf the Day They Were Surveyed by Actual Flag Color Flying (n=222)

	Been in the Gulf			
	YES		NO	
	Number	Percent	Number	Percent
Blue/Green	63	70.0	27	30.0
Yellow	59	57.8	43	42.2
Red	18	60.0	12	40.0

(X^2 uncorrected 2-tail p-value= 0.2046)

There does not appear to be an association between flag color flying and the respondent having been in the Gulf.

Table 7
Respondents Who Said They Would Go Into the Gulf Knowing the Flag Color Flying and the Associated Meaning of that Flag Color (n=222 for each color)

	YES		NO		MAYBE	
	Number	Percent	Number	Percent	Number	Percent
Red (Danger, No Swimming, No Wading)	67	30.2	147	66.2	8	3.6
Yellow (Exercise extreme caution while swimming or wading)	178	80.2	29	13.1	15	6.8
Blue/Green (Conditions are favorable for swimming. Exercise caution.)	209	94.1	5	2.3	8	3.6

Slightly more than one-third of the respondents, who knew the meaning of the flag color, said they would or might go into the water when a red flag was flying.

Rip Currents

The majority of the respondents (200 or 90.5 percent) said they knew what a rip current (also known as a riptide or undertow) was, while only 21 (9.5 percent) said they did not know. There were only 75 respondents (33.9 percent) who reported having been caught in a rip current that knocked them off their feet at some point in their lives, and 146 (66.1 percent) who had never experienced a rip current.

Only 90 respondents (40.7 percent) were able to properly describe how to get out of a rip current and 131 (59.3 percent) could not properly describe what to do. Respondents needed to mention swimming parallel to the shore to be scored as a correct answer.

Table 8
Respondents Who Were Able to Properly Describe How to Escape From a Rip Current by Vacation Status
(n=221)

	Yes		No	
	Number	**Percent**	**Number**	**Percent**
On Vacation	51	33.8	100	66.2
Not On Vacation	39	55.7	31	44.3

(X^2 uncorrected 2-tail p-value= 0.002)

Vacationers were less likely to be able to describe how to escape from a rip current.

MULTIVARIATE LOGISTIC REGRESSION

Three logistic regression models were constructed to examine multivariate relationships between selected outcome measures and the explanatory variables.

Model 1
Outcome: The respondent knew the correct flag color flying when the survey was administered. (Respondent was instructed not to look around when responding to this yes/no question) (n=222).

Table 9
Knew Correct Flag

	Number	Percent
Yes	154	69.4
No	68	30.6

Variables Associated with Knowing the Correct Flag Color Flying:

- Flag color flying – When the red flag was flying, respondents were 3.2 times as likely to know the correct flag color flying compared to when a blue or green flag was flying. When the yellow flag was flying, respondents were 4.9 times as likely to know the correct flag color flying compared to when a blue or green flag was flying.

- Visited this beach before – Respondents who had previously visited this same beach were 3.2 times as likely to know the correct flag color flying.

- Entered the Gulf during red flag conditions (yes/no) — This was in the model to control for confounding, but was not significantly associated with the outcome.

Model 2
Outcome: The respondent reported that he/she would enter the Gulf knowing that a red flag was flying and that it meant "danger, no swimming or wading." (Yes/No; Maybes were not counted as yes or no.) (n=214).

Table 10
Would Enter Gulf Knowing Red Flag Was Flying

	Number	Percent
Yes	67	31.3
No	147	68.7

Variables Associated with Going into the Gulf During Red Flag Conditions:

- Age – Older respondents were less likely to report that they would enter the Gulf during red flag conditions.

- Flag color flying – When a red flag was flying, respondents were 10.2 times as likely to state that they would enter the Gulf during red flag conditions compared to when they were asked if they would enter during red flag conditions when a blue/green flag was flying. When a yellow flag was flying, respondents were 2.0 times as likely to state that they would enter the Gulf during red flag conditions compared to when they were asked if they would enter during red flag conditions when a blue/green flag was flying.

- Entered Gulf today — Respondents stating that they had been in the Gulf on the day of the survey were 3.1 times as likely to say they would enter during red flag conditions compared to those who had not been in the Gulf.

- Gender – Males were 2.1 times as likely to say they would enter during red flag conditions compared to females.

- Lived within 30 miles of an ocean or the Gulf at some point in their lives – Respondents who had lived within 30 miles of an ocean or the Gulf at some point were 2.7 times as likely to say they would enter during red flag conditions.

- Properly describing how to escape from a rip current – Those respondents who knew how to escape from a rip current (swim parallel) were 2.3 times as likely to say that they would enter the Gulf during red flag conditions.

- On vacation – This was in the model to control for confounding, but it was not significantly associated with the outcome.

Model 3
Outcome: Respondent properly describing how to escape from a rip current (needed to say something about swimming parallel to the shore) (Yes/No) (n=221)

Table 11
Properly Described How To Escape From A Rip Current

	Number	Percent
Yes	90	40.7
No	131	59.3

Variables Associated with Rip Current Escape Knowledge:

- ♣ Age – Older respondents were more likely to be able to describe proper escape technique.

- ♣ Fitness – Those respondents reporting an excellent level of fitness were more likely to be able to describe proper escape technique. Fitness is self-reported from one to five, with one being very poor fitness and five being excellent fitness.

- ♣ Entered the Gulf during red flag conditions – Those respondents who said they would go into the Gulf during red flag conditions were 2.8 times as likely to be able to describe proper escape technique.

- ♣ Swimming ability – Those respondents who said they were good or excellent swimmers were 4.7 times as likely to be able to describe proper escape technique.

DISCUSSION

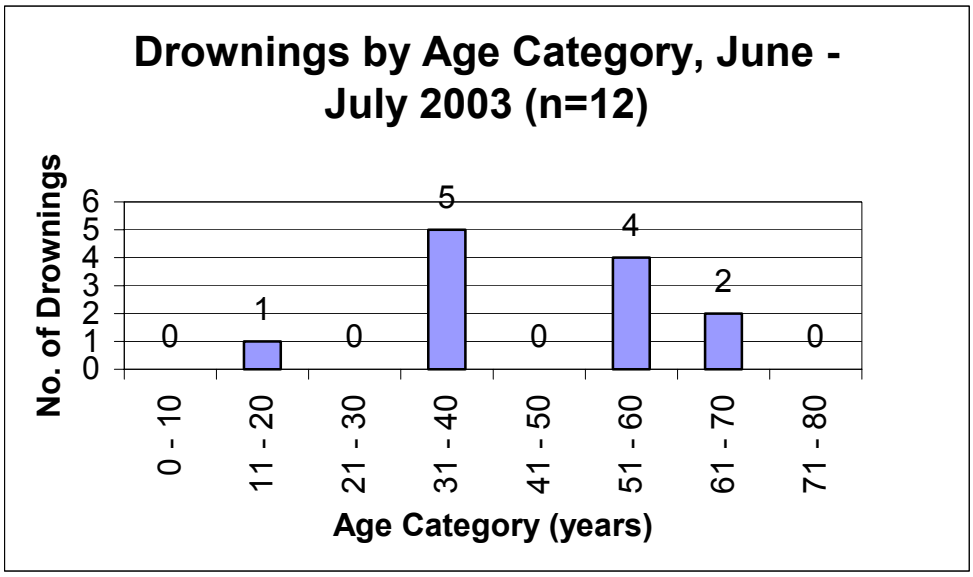
Telephone Interview

The beach flag warning system is a public warning system designed to alert beachgoers to the present water conditions. One noteworthy finding during the telephone interviews was that 11 of the 12 drownings occurred while red flags were flying, which indicated the need to stay out of the water. It also is important to note that a total of 11 of the 12 drownings occurred on beaches that did not have lifeguards present. One of these drownings occurred at 5:22 p.m., which was 22 minutes after the lifeguard had finished working for the day.

A total of eight of the 12 drowning victims were attempting to rescue someone else when they drowned. Six of the eight people who were being rescued did make it back to shore safely, while the remaining two drowned. Four of the eight people being rescued were unknown to the individual who attempted to rescue them, while the remaining four persons being rescued were related to the person attempting to save them.

Eight (66.7 percent) of the 12 drowning victims were male. The 12 drowning victims ranged in age from 15- to 66-years-old, with the median age at 46.5. The distribution of the victims' ages can be seen in Figure 1.

Figure 1.



Body mass index (BMI) for this group ranged from 17.8 to 35.4. The BMI was examined as a surrogate for aerobic condition of the victims. Using the BMI, four out of the 12 drowning victims were overweight and one was obese. These frequencies of excess weight are consistent with the broader population of Florida. Aerobic condition of victims was not thought to have contributed to their drowning.

Alcohol did not contribute to the majority of these drownings. Of the 12 medical examiner reports received, only three decedents had any measurable amount of alcohol in their systems [0.01 grams per deciliter (g/dL), 0.09 g/dL, and 0.142 g/dL].

As mentioned earlier, the telephone survey was a description of some of the factors that may have contributed to the drownings. Because of the small number of completed interviews, this part of the study did not prove useful for independent analysis. The Beachgoers' Survey was used for analyzing the knowledge and behavior of individuals visiting the Panhandle beaches.

Beachgoers' Survey

The respondents to the Beachgoers' Survey were predominantly female. This was true for the surveys conducted during the weekdays (62.2 percent female) as well as the Labor Day weekend (60.0 percent female). Mean and median age for all 222 respondents was approximately 42 years, and the great majority (94.6 percent) of the beachgoers were white. Most of the demographic data were similar for those surveyed during the week and on the weekend. As expected, more of the respondents reported being on vacation, away from the place where they lived, during the Labor Day weekend (86.7 percent) compared to those surveyed during the preceding week (65.6 percent).

Overall, respondents were able to correctly order the three colored flags 90 percent of the time, with 89.1 percent of the respondents knowing the order under the blue-yellow-red system, and 91.1 percent knowing the order under the green-yellow-red system. This difference in percentage was smaller than expected and not statistically significant. A total of 98.2 percent of the respondents knew that the red flag indicated the most dangerous water conditions when

given the three colored flags from which to choose. However, only 88.7 percent reported knowing that a beach flag warning system was in place before being asked this series of questions. Just less than 70 percent of the 222 respondents knew what color flag was flying when asked. This figure indicates that an area for improvement exists in educating the beachgoer and making flags more visible. On red and yellow flag days, respondents identified the correct flag color 80.0 percent and 82.4 percent of the time, respectively.

It was expected that knowledge of the flag color would improve on red flag days, because often there are lifeguards or other public safety personnel (on some beaches) advising people of the adverse water conditions, and additional warning signs are often present. The logistic regression model identified the flag color flying and having visited the beach before as predictors of correctly identifying the flag color at the time of the survey, both of which are intuitive. Certainly, familiarity with the beach could be associated with knowing the location of the flagpoles.

A total of 67 of the 222 respondents (30.2 percent) reported that they would go into the Gulf knowing that a red flag was flying and that it meant danger, no swimming or wading. A logistic regression model was created for the outcome of entering the Gulf during red flag conditions. Decreasing age, having been in the Gulf that day, being male, having lived within 30 miles of a Gulf or ocean, and knowing how to escape from a rip current were all associated with a willingness to go into the Gulf during red flag conditions. Interestingly, but not surprisingly, people were much more likely to say they would go into the Gulf during red flag conditions, if a red flag was currently flying. In theory, beachgoers were willing to stay out of dangerous waters; but, when faced with the immediate decision of whether or not to go in during dangerous conditions (that is, being surveyed on a red flag day), they were much more likely to state that they would enter the water. A total of 61.5 percent of respondents on the red flag days said they would go into the water knowing that a red flag was flying.

The respondents' knowledge of how to escape from a rip current was less than ideal. Only 40.7 percent of respondents gave an answer that indicated swimming parallel to the shore, which was necessary to be scored as a correct answer. Another 23.5 percent of the respondents mentioned not fighting the current and 35.7 percent of the respondents mentioned neither of these escape techniques. A two-by-two table indicated that vacationers were less likely to know how to escape rip currents, which would be expected due to less familiarity with the Gulf, although, it was not found to be statistically significant in the logistic regression model. The logistic regression model indicated that increasing age, a higher level of fitness, better swimming ability, and a willingness to go into the Gulf during red flag conditions were all associated with knowing how to escape from a rip current.

STUDY LIMITATIONS

Possible limitations of this study include a sampling design that was not entirely random, although, significant efforts were made to randomize the selection of respondents within a given area. Despite limited financial resources, sampling was conducted in five different counties in a short period of time. Because of the large number of beaches and counties from which respondents were sampled, meaningful comparisons between beaches and counties were not possible. The sample taken is representative of beachgoers during the last week of August 2003. Whether these beachgoers are representative of those frequenting the Florida Panhandle beaches throughout the summer is unclear. Lastly, since sampling was conducted among those sitting on the beach, the study design did not allow for interviewing people who

were in the water. By limiting the study to the people on the beach, some sampling bias may have been introduced into the study. Perhaps qualitative interviews with people exiting the water could be incorporated into future studies, especially during red flag conditions.

CONCLUSION

As mentioned earlier, a total of eight of the 12 drowning victims were attempting to rescue someone else when they drowned. Six of the eight people who were being rescued did make it back to shore safely, while the remaining two drowned. Rescuers put themselves at risk when trying to rescue another individual. This number could be reduced if people were not in the water on red flag days, and hence, not in need of being rescued. This study found that 11 of the 12 drownings occurred on beaches that did not have lifeguards present. Communities might consider increasing the number of lifeguards supervising the Gulf beaches. Communities should consider adopting a uniform warning flag system.

In summary, efforts should be made to increase awareness among beachgoers about the flag color flying, since a full 30 percent of the respondents were not able to correctly identify the proper color. In addition, methods for minimizing the number of people in the Gulf during red flag conditions would also be useful. Consideration should be given to providing greater authority to lifeguards and law enforcement officials in preventing people from entering and removing people from the water. Finally, better educational efforts with respect to surviving rough surf conditions may be warranted. This could be accomplished with signage at all entrances and access points to beaches, as well as through collaboration with governmental agencies, beach property rental agencies, hotels, and motels to educate visitors about water safety. These strategies could all prove useful in reducing the human toll exacted by Gulf drownings.

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