LEADING COMMUNITY RISK REDUCTION

Sink or Swim: Is St. Petersburg Fire & Rescue Doing All They Can to Prevent Drowning?

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Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed _____

Abstract

During the last 10 years, the city of St. Petersburg, Florida has experienced significantly higher fatalities due to drowning than the national and state averages. The problem is that St. Petersburg experienced a 300% increase in total submersion incidents in 2006. The purpose of this research is to identify trends in submersion incidents within the city of St. Petersburg and to make recommendations for risk reduction. Descriptive statistics were utilized to answer 5 research questions. 1. What are the similarities in submersion incidents within the city of St. Petersburg, FL? 2. What are the identifiable at-risk factors for submersion incidents within the city of St. Petersburg, FL? 3. What is the current status of drowning prevention efforts in St. Petersburg, FL? 4. What strategies do other departments employ to reduce and prevent submersion incidents? 5. What strategies are feasible for St. Petersburg Fire & Rescue to implement? A comprehensive literature review and statistical analysis, including 2-tailed t-tests and Pearson correlation coefficients, were used to answer all research questions. Results found that, overall, children under 24 had the highest per capita submersion rate. Pools were also the leading location for submersion incidents. No correlations between submersion incidents and ethnicity or socioeconomic status were found. Recommendations include increasing public education efforts, canvassing, and requiring CPR certification with construction of new pool or purchase of an existing pool.

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Introduction

The city of St. Petersburg is located at the southern most tip of the peninsula of Pinellas County, Florida. This peninsula is geographically located on the west central coast of Florida. The city of St. Petersburg encompasses approximately 40% of Pinellas County and is surrounded by 244 miles of coastline shared by the Gulf of Mexico, Boca Ciega Bay, and Tampa Bay.

The sub-tropical climate, miles of coastline, and large number of available swimming pools provide relief from the summer heat. However, this exposure has also accounted for an average of 22 drowning deaths per year in Pinellas County over the last ten years (Pinellas County Office of the Medical Director [PCOMD] Annual Report, 2007, p. 21). Specifically, St. Petersburg has contributed to nearly 32%, or seven, of these drowning deaths per year over the most recent six and one half years (PCOMD, St. Petersburg Submersion Incidents, 2007).

The problem is that the city of St. Petersburg, Florida experienced a significant increase of 300% in total submersion incidents in 2006. The purpose of this research is to identify trends in submersion incidents within the city of St. Petersburg, Florida and to make recommendations for risk reduction.

This research will utilize descriptive methods to answer the follow research questions.

1. What are the similarities in submersion incidents within the city of St. Petersburg, FL?
2. What are the identifiable at-risk factors for submersion incidents within the city of St. Petersburg, FL?
3. What is the current status of drowning prevention efforts in St. Petersburg, FL?

4. What strategies do other departments employ to reduce and prevent submersion incidents?
5. What strategies are feasible for St. Petersburg Fire & Rescue to implement?

Background and Significance

St. Petersburg Fire & Rescue's mission statement states, "St. Petersburg Fire & Rescue is committed to serve all citizens of our community by promoting, protecting and improving their health, safety and quality of life through exceptional emergency service and education" (St. Petersburg Fire & Rescue [SPFR] Strategic Plan, 2007, p. 18).

In support of this mission, St. Petersburg Fire & Rescue (SPFR) employs 357 personnel distributed over five divisions; Emergency Management, Operations, Rescue, Prevention, and Safety & Training. SPFR utilizes twelve fixed fire station facilities which include ten Basic Life Support (BLS) engine companies, three Advanced Life Support (ALS) engine companies, four BLS truck companies, ten (ALS) rescues, one heavy rescue, and one squad unit. Three specialty teams are also utilized in Technical Rescue, Hazardous Materials, and Water Rescue. Figure F1 illustrates the geographical position of the city of St. Petersburg in the peninsula of Pinellas County as well as each fire station location and response area as defined by the Geographic Information System (GIS).

The city of St. Petersburg is approximately 63 square miles in size and enjoys 244 miles of coastline comprised of the Gulf of Mexico, Boca Ciega Bay, and Tampa Bay (SPFR Standard of Cover, 2007). The population is 250,000, making St. Petersburg the fourth largest city in Florida. The median age and household income is 39.3 years and $34,597 respectively (United States Census, 2000). The average temperature is 73.7 degrees

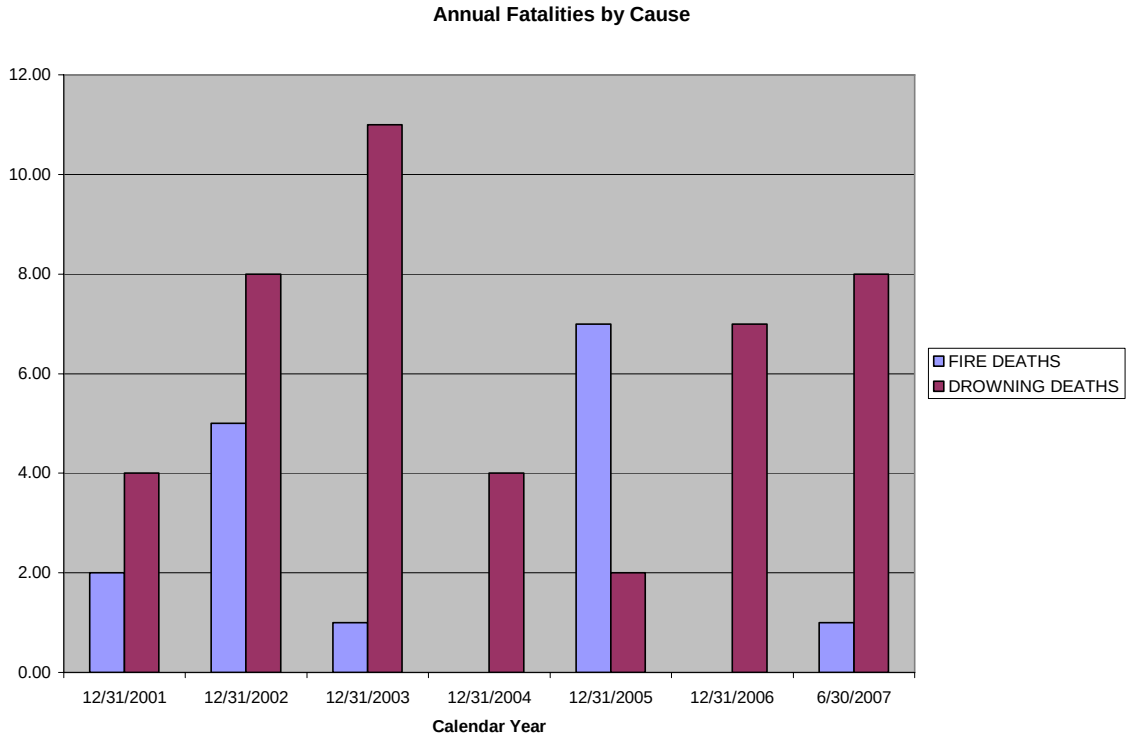
Fahrenheit and the average number of days of sunshine is 361 (SPFR Standard of Response Coverages [SOC], 2007).

SPFR responded to over 46,000 calls for service in 2006 (SPFR Annual Report, 2007). Emergency Medical Services (EMS) commanded 86% or nearly 39,000 of these calls for service (SPFR Annual Report, 2006). Although, SPFR continues to respond to a working structural fire approximately every three days, statistically, the traditional fire related response is declining. Considerable efforts in code enforcement, plans review, and public education have presumably contributed to this decline.

The Prevention Division utilizes three public education specialists in addition to their fire inspectors, plans reviewers, arson investigators, Deputy Fire Marshals, and the Fire Marshal. Two public education specialists are funded by the Prevention Division and one is funded through the Rescue budget. Public education is an integral part of the mission of SPFR. Three specific areas of community risk reduction have been identified and supported through the Prevention Division. These are fire safety, car safety seats, and fall prevention.

Continued effort is expected to maintain low fatality rates due to fire. The most recent ten year period from 1996 through 2006 yielded an average of three fire related fatalities per year (SPFR Annual Report, 2006). However, fatalities due to drowning occur at the alarming rate of nearly three times the fire related fatalities. Data are not available prior to 2001 for drowning related fatalities within the city of St. Petersburg; therefore, figure 1 compares fire and drowning related fatalities from the calendar year 2001 through June 2007.

Figure 1



Nationally, the per capita drowning rate is 15.5613 deaths per 1 million people (Nationmaster, 2007). St. Petersburg's population at 250,000 should expect 3.89 or less than four submersion related deaths per year. Considering the period from January 1, 2001 through June 30, 2007, the mean number of submersion related deaths is nearly 7 per year (PCOMD, Annual Report, 2007).

Statistics from the State of Florida's Department of Health, revealed that there is a mean statewide drowning fatality rate of 2.07 per 100,000 population from a similar sample period of calendar years 2000 through 2005 (Florida State Department of Health, 2007). St. Petersburg's population would yield an expected drowning fatality rate of 5.18 or approximately five drowning fatalities per year. Therefore, the City of St. Petersburg continues to experience higher than expected fatality rates due to drowning.

The total submersion incidents are the sum of the drowning and the near drowning incidents. Analysis within the city of St. Petersburg over this study period revealed that 35.87% of the submersion incidents involved children under the age of twelve. The city of St. Petersburg's youth population consists of 18.1% or greater than 42,000 under age 14 years and under (Jolley, 2006). In addition, 5.7%, or approximately 14,000, are the age of five years and under (Jolley, 2006). A significant risk of submersion exists for the youth of the city of St. Petersburg.

The United States Fire Administration (USFA) is guided by the following 5-year operation objectives: (United States Fire Administration [USFA], 2002)

1. Reducing by 25% the loss of life of the age group 14 years old and below
2. Reducing by 25% the loss of life of the age group 65 years old and above
3. Reducing by 25% the loss of life of firefighters
4. 2,500 communities will have a comprehensive multi-hazard risk reduction plan led by or including the local fire service
5. To appropriately respond in a timely manner to emergent issues

This research will work directly towards accomplishing USFA goals numbered one and four. It has been established that a substantial number of St. Petersburg's population would fall into the age group of 14 years and below. Historical perspective has revealed that nearly 36% of the population experiencing submersion incidents would fall into this category. Within the state of Florida, drowning is one of the leading causes of accidental injury related death for all ages behind motor vehicle crashes and falls and is more frequent than fire related incidents (Florida State Department of Health, 2007). According to Safe Kids, "drowning is the second leading cause of accidental injury-related death among children ages 1 to 14 and

the leading cause of accidental injury-related death among children ages 1 to 4 (Safe Kids, 2004)."

In regards to USFA goal number 4, this research will serve as an extension to the multi-hazard risk reduction efforts of St. Petersburg Fire & Rescue. Regardless of which data set are utilized, motor vehicle crashes, falls, and fire related incidents account for the three of the four most frequent causes of unintentional injuries resulting in death. The last of the leading causes is the incident of drowning. This research is designed to provide a detailed analysis of the drowning problem within St. Petersburg and to make recommendations for risk reduction.

This study is directly resulting from the Leading Community Risk Reduction course as the second class in the Executive Fire Officer Program. The general concept of expanding the traditional fire risk reduction efforts to a more global approach of community risk reduction is supported by asking the question, "How does the injury (*variable)* problem compare with the fire problem (Leading Community Risk Reduction [LCRR] Student Manual, p. SM 1-18, 2005)?"

This general concept is further supported by conducting a risk analysis of the community. SPFR conducted a similar risk analysis in the accreditation process for the Center for Public Safety Excellence (CPSE) and the Commission on Fire Accreditation International (CFAI) concluding that EMS incidents fell into the high risk and frequency categories. Certainly drowning is a subset of EMS. Although the accreditation process addresses non-fire risks as well, it did not require the further delineation of risk as modeled during LCRR (LCRR Student Manual, p. SM 1-79, 2005). Therefore, that has been completed as part of this study during the development and definition of the problem.

Literature Review

A comprehensive literature review is provided to summarize the body of knowledge currently available concerning the incidence of drowning and the subsequent prevention of the drowning phenomenon. This literature review will focus on three prevailing themes. First, the national problem of unwanted submersion incidents to include the frequency of occurrence, the overall cost, and identifiable factors that may be used as indicators or predictors of unwanted submersion incidents. Second, the existing body of knowledge concerning the general prevention of unwanted submersion incidents will be reviewed. Third, a summary report of the existing research on drowning prevention programs in public safety agencies will be provided. Lastly, a brief summary on how this literature review has guided this research and analysis.

The significance of the drowning problem across the United States is empirically accepted. However, variance does exist as to the order of severity and the actual fatality rates. For example, according to NationMaster (2004) the per capita drowning rate is 15.5613 deaths per one million people. This data may be represented per 100,000 population at a rate of 1.56. The drowning rate of 1.1 per 100,000 population is provided by the National Vital Statistics Reports (Centers for Disease Control and Prevention [CDC], 2004). The Morbidity and Mortality Weekly Report (June, 2004), also by the CDC, presents a fatality rate of 1.18 per 100,000 population. Statistics from the National Safety Council's Injury Facts 2000 as reported by Newell (2001) found that the drowning rate was at 1.4 per 100,000 population in 1999. Statistics from the State of Florida's Department of Health, revealed that there is a mean statewide drowning fatality rate of 2.11 per 100,000 population for the calendar years 1996 through the conclusion of 2005 (Florida State Department of Health, 2007).

This variance, as well as statistical subtleties, presents itself similarly in the following representations. According to Brenner (2003) in a study of *Prevention of Drowning in Infants, Children, and Adolescents*, "Drowning is the leading cause of injury-related death in children (p. 440). Brenner's research continues to reveal that from 1990 through 2000, drowning was the second leading cause of unintentional injury death ages 1 – 19 and the leading cause of injury death among toddlers 12 – 23 months (p. 440). Lastly, Brenner (2003) finds that drowning is the third leading cause of overall unintentional injuries (p. 440).

Safe Kids (2004) found that drowning is the second leading cause of accidental injury-related death among children 1 to 14 and the leading cause among children 1 to 4 (p. 1). Newell (2001) concluded that drowning is the second leading cause of unintentional injury-related death each year for ages 1 through 24 (p. 40). The Morbidity and Mortality Weekly Report (June, 2004), reported that drowning is the 7th leading cause of unintentional injury deaths for all ages and the 2nd leading cause in children ages 1 through 14 years.

Hoebel and Elder (1990) report that drowning is the second leading cause of accidental death in the home, behind fire related fatalities (p. 29). However, it is reported that in the states of Florida, Texas, Arizona, and California drowning is the leading cause of accidental death in the home (Hoebel and Elder, 1990, p. 29). Although this citation is dated, it is supported by Werdmann (1994) who concludes that in the states of Florida, Arizona, and California it is the leading form of injury death among children under five years of age (p. 28). Brenner (2003) also supports these data by a ten year study from 1989 through 1998 which found that Florida had the highest non-boat-related drowning rate for the ages of 19 years or younger.

A review of the literature concerning the costs associated with submersion incidents is provided. Data are not consistent as with the previous analysis, however, the pervasive summation is that it is substantive. For example, Safe Kids (2004) estimates annual costs of $5.7 billion for children under the age of 14 and more than half this amount is accounted for in children with ages 4 and under (p.1). Werdmann's (1994) study found the average cost for acute hospital care secondary to submersion incidents in 1985 was approximately $12,000 per incident (p. 28). Werdmann also found that patients with severe neurological impairment such as brain damage can have expenses exceed $150,000 and long term care account for up to $100,000 per year (1994, p. 28). Lastly, Werdmann estimated the national economic losses ranged annually from $450 to $550 million annually (1994, p. 28).

The United States Consumer Product Safety Commission (CPSC) released Publication No. 359, *How to Plan for the Unexpected: Preventing Child Drownings* in 2001. In this report, costs were estimated at $4,000 per incident for victims who recovered fully and $160,000 for victims with severe brain damage (Consumer Product Safety Commission [CPSC], 2001, p. 1).

Newell (2001) brings these figures into perspective with results from his research that found that annually approximately 64,000 people require hospital care secondary to a near-drowning or submersion incident (p. 40). In addition, it is reported that for every one drowning, 16 near drowning incidents required hospital care (Newell, 2001, p. 40). Lastly, Chandy (2000) estimates that for every reported drowning, 600 unreported near drownings occur (¶ 1, p.1).

The purpose of this research is to identify trends in submersion incidents within the city of St. Petersburg, Florida and to make recommendations for risk reduction. This

literature review will now provide a summation of the identifiable trends and factors associated with the unwanted submersion incidents within the United States of America. Specific analysis of the city of St. Petersburg will be conducted secondary to the literature review in an effort to answer the pertinent stated research question. Thus, these will be reported in the results section.

When considering where the most frequent incident of drowning occurs, it is generally accepted that swimming pools are the number one location. In fact, it is reported that children less than four years of age account for 75% of all pool drownings (Werdmann, 1994; Dickenson, 1995). The CDC (2001) reports that 65% of incidents occurred in a pool owned by the child's family and another 33% occurred in a pool owned by a relative or friend (¶ 6). Safe Kids (2004) also concurs that over half of the drownings in children aged 1 through 4 are pool related.

Additional literature has further analyzed the location of drowning incidents and found that the location may vary within age groups. It is generally accepted that children under the age of four drown in pools of their parents, friends, or relatives (CDC, 2001; Safe Kids, 2004). However, according to Safe Kids (2004), the majority of drownings among infants (< 1 year of age) occur in bathtubs. Brenner (2003) supports these finding with reports of 55% of infant drownings occurring in bathtubs and an additional 12% occurring in buckets (p. 442).

When discussing children ages 5 to 14 years of age, the majority drown in open-water sites (Safe Kids, 2004). Brenner (2003) found that children older than five were more likely to drown in freshwater sites. Statistical analysis found that as the age increased so did the frequency of occurrence. For example, when considering rivers and lakes, Brenner found that

children aged from 5 to 19 had the following representations: 54% for ages 5 through 9; 61% for ages 10 to 14; and 69% for ages 15 through 19 (2003, p. 441).

Brenner's research concluded that these statistics varied with region of the country and socioeconomic status. Specifically, Brenner cited that in Pinellas County drownings were more likely to occur in natural bodies of saltwater for victims older than 11 years of age (2003, p. 442). When discussing the region of the country, Brenner did not provide detail as to causal factors. Although not all inclusive, it may be reasonably assumed that temperature, climate, and easy access to swimming sources contribute to these findings.

Brenner (2003) believes that drowning exhibits the greatest seasonal variation of all unintentional injury fatalities (p. 442). Summer months provide the greatest exposure to water sources for swimming and the temperatures are the most conducive for recreational swimming. Brenner concluded that two thirds of the deaths for victims under 15 occurred between May and August and 39% of these occurred on the weekend (2003, p. 442). Although, supporting information was not specifically found, Safe Kids does utilize an *April Pool's* campaign each year prior to the summer swimming months, presumably due to similar data.

Socioeconomic status is a second area identified by Brenner (2003) as a risk factor for the incident of drowning. It is found that gender, age, socioeconomic status, and race affect the drowning fatality rates (Brenner, 2003). Brenner found that after the age of one, males experienced a higher rate of drowning incidents and that white males had the least frequent occurrence behind American Indian / Alaska Native, African-American, and Asian / Pacific Islanders, respectively (p. 441). Figure F2 succinctly represents the findings of Brenner.

Conversely, another study that Brenner participated in examined only the racial and ethnic disparities in pool related drownings. In this study titled *Swimming Pool Drownings Among US Residents Aged 5 – 24 Years: Understanding Racial / Ethnic Disparities*, the authors found that 75% were male. Within this male population, 47% were African-American, 33% were white, and 12% were Hispanic (Saluja, et al, 2006, ¶ 3). Interestingly it was also found that within these racial and ethnic groups, the majority of African-American, white, and Hispanic victims drown in public, private, and neighborhood pools, respectively (Saluja, et al, 2006, ¶ 3). Finally, the CDC (2003) reports that in 2003, males accounted for 80% of the fatal drownings and that African-Americans from 2002 through 2003 had a increased fatality rate of 1.25 times higher than that of the white population.

When specifically reviewing socioeconomic status, it is believed that income has a correlation with drowning rates. Safe Kids states that children from low income families experience drowning incidents at a rate of 4 to 1 (2004). Brenner (2003) concludes that there is an inverse relationship between drowning rates and per capita income (p. 441). For example, as the per capita income rises the drowning rate would fall; and as the per capita income decreases the drowning rate would increase. Explanatory material would suggest that the lowest income families, for economic reasons, are less likely to utilize safety devices, have inadequate child care, experience overcrowding, and may have a generally substandard environment. However, these findings are not empirically held. For instance, Brenner (2003) found in one study that the drowning rates were highest in cities with higher per capita incomes. This would support the earlier assumption that access and exposure provides significant contribution to the phenomenon of drowning and their respective rates.

Before the literature review addresses specifically preventing unwanted submersion incidents, a brief review is provided. The literature holds that it is generally accepted that drowning is a significant risk to communities by total cost, social cost, and the pure fatality rates in comparison with other community risks. It is generally accepted that children four years and under assume the greatest damage from drowning closely followed by adolescents and extending into the early adult years. There is some evidence, although not universally held, that socioeconomic status is correlated, but not causal in nature. It is further believed that males have the greatest risk of drowning and the greatest risk of drowning in a natural body of water. Within the male group, the African-American subset is most likely to drown in a pool versus a natural body of water, while other minority and ethnic groups are more evenly dispersed and more likely to drown in a natural body of water. Lastly, in all groups, the summer months between May and August account for the greatest number of drownings and within these months, the majority occur on weekends.

The remaining identifiable patterns to the phenomenon of drowning and submersion incidents will be illuminated within the literature review of generally accepted suggestions for prevention. As a result of this literature review, it is evident that a singular approach to drowning prevention would be less than effective. Statistically, rates and percentiles can be extrapolated from any data set. This literature review has revealed that, although drowning is a significant community risk, it has also demonstrated that there are limitations to targeting or marketing specific groups. For example, children under four have both the greatest rate of drowning and drowning in a residential pool. A singular and targeted effort for this age group would allow significant numbers of drownings in other age groups, genders, and economic

status to continue to suffer. Therefore, this portion of the literature review is conducted with a broad brush stroke in an effort to ascertain the most available suggestions.

This literature review has revealed that there are several leading and consistent approaches to drowning prevention programs. These are adult supervision, engineering, and education, in no specific order.

It would be common sense to assume that if the greatest frequency of drownings is found among children, then adult supervision would be one of the primary causal factors. However, research contradicts itself as to the level supervision plays in the drowning problem. All of the literature and research supports the general concept that a lack of supervision is a contributing factor. Where the literature differs is that some of the authors concede that the children were supervised, but with brief lapses in direct supervision. Other literature boldly states that there wasn't adequate supervision. Although a subtle difference, the fact that "good" parents and guardians who are actively watching their children are experiencing these incidents provides a different perspective on the problem and may alter the marketing approach or educational messages of a drowning prevention program. In contrast, the perception that assumes that if a child drowns while in the care of an adult, there was inadequate supervision may provide the reader or receiver of this message to believe that this phenomenon would rest solely with those "bad" parents who don't supervise their children. The fact remains that at the time of drowning there was inadequate supervision, but the latter message may exclude the "good" parent.

The conclusion of the study titled, *Swimming Pool Drownings Among US Residents Aged 5-24 Years: Understanding Racial / Ethnic Disparities* is to target interventions across racial / ethnic groups and particularly adult supervision at public pools (Saluja, et al., 2006, ¶

4). This study did not provide description as to the definition of public pools while other studies differentiated between public and neighborhood pools. Therefore, in this study it may be that the public pools include public accessed pools such as in apartment complexes, hotels, etc.

King County, Washington found in their ten year study that supervision was the most common factor associated with submersions (Brenner, 2003, p. 442). Brenner continues to state that "In most cases, the adult reports leaving the child for a short time to answer the phone or attend to household chores" (p. 442). Werdmann (2004) concurs with Brenner's assessment and concludes that a commonly reported scenario is one in which there was a brief lapse in supervision or the victim was left alone momentarily in the care of a sibling that did not possess the skills to adequately respond to a submersion incident.

According to Gavin (2004), Safe Kids reports that nearly 90% of drowning fatalities occurred under the supervision of another person (¶ 2). Gavin's continued analysis revealed that 55% of parents believe it is acceptable to let a child swim unsupervised in some circumstances (¶ 4). Additionally, the brief lapses in supervision are accounted for by talking to others (38%), reading (18%), eating (17%), and talking on the phone (11%) (¶ 4).

Safe Kids (2004) report that most children who drown in their family's swimming pool were missing from sight for less than five minutes and were supervised by one or both of their parents (Drownings among children ages 1-4, ¶ 2). The CPSC (2001) concurs with the same five minute time frame at an estimated rate of 77%. Interestingly, Brenner (2003) concedes that lapses in close supervision are inevitable. Therefore, Brenner believes that supervision alone is insufficient as a prevention strategy (p. 444).

The second prevention approach is engineering. When discussing public swimming locations, it is recommended to augment the adult supervision with the capabilities of lifeguards. Therefore, the utilization of lifeguards may be considered both engineering and supervision. Brenner (2003) believes that the presence of lifeguards would likely improve the chances of a positive outcome. Brenner's belief is substantiated by data from the CDC's *Injury Fact Book* (2002) which found that from 1988 through 1997, more than 75% of the drownings at beaches where the United States Lifeguarding Association (USLA) provided coverage were when the beaches were unguarded. Occasions when a USLA beach would be unguarded may include evenings, nights, early mornings, and off seasons. In fact, the CDC supports the utilizations of lifeguards and reports that the probability of drowning at a beach protected by the USLA is 1 in 16 million. Newell (2001) reports that in 1998, the USLA made 63,000 rescues while experiencing 7 drownings in guarded facilities and 111 drownings in non-guarded facilities.

The second area of engineering explored is the use of safety barriers. The use of pool safety barriers are a unanimously accepted practice in the prevention of drowning incidents in pools. Studies have estimated that 4-sided pool isolation fencing could prevent 50% to 90% of childhood drownings (Safe Kids, 2004; Brenner, 2003). The generally recommended dimensions of the four sided isolation fences are 4 feet or 48 inches in height and no more than 2 – 4 inches clearance between the ground and the bottom rail of the fence as well as no more than 4 inches between spindles (CPSC, 2001; Hoebel & Elder, 1990; Hoebel, Elder, et al., 1990). Additional safety devices include door alarms when exiting from the home into the pool area, alarms that activate if the surface of the water is disturbed, and self closing gates.

The next area considered as part of the engineering is part of the incident mitigation system. This area deals with decreasing the chances of morbidity and mortality rather than purely in prevention. The unanimous belief is that the arena that will provide the most positive result and prediction of patient outcomes is in the pre-hospital setting (Quan, Wentz, Gore & Copass, 1990; APCO, 2000; Newell, 2001; Brenner, 2003; Dickenson, 1995).

Specifically, Newell (2001) states that "all studies of submersion injuries point to the need for rapid intervention" (p. 41). While it is found that victims who regain spontaneous breathing and circulation while on scene have little or no significant complications, it is also found that submersion of 25 minutes or longer have poor outcomes. The early response and subsequent attempt to return spontaneous circulation must be viewed as part of a system. The early activation of the 911 system and the response of ALS services are paramount to the resuscitative efforts in the pre-hospital setting. However, the benefit of quality Cardiopulmonary Resuscitation (CPR) prior to the arrival of the local EMS provider has a significant impact to the morbidity, mortality, and neurological outcome (Brenner, 2003).

The research titled, *Outcome and Predictors of Outcome in Pediatric Submersion Victims Receiving Prehospital Care in King County, Washington* found that the two risk factors that occurred most commonly in both fatalities and the severely impaired were submersions greater than 9 minutes and CPR for greater than 25 minutes (Quan, Wentz, et al., 1990, p. 586). Quan and Wentz et al. (1990) discovered that the duration of submersion had a direct relationship with the risk of severe or fatal outcomes. Quan and Wentz et al. reported that there is a 10% risk for less than 5 minutes submersion, 56% risk for 6 to 9 minutes, and 88% risk for 10 to 25 minutes, and finally 100% risk for greater than 25 minutes submersion (p. 586). Although, Quan and Wentz et al. believe that prompt pre-hospital Advanced

Cardiac Life Support (ACLS) is the most effective means of pre-hospital intervention (p. 586), this study also stated that the total elapsed time from the incident to the arrival of King County Medic I was greater than ten minutes in the 91st percentile (p. 588). Therefore, the early intervention of BLS and CPR by bystanders plays a significant role in the expected recovery of victims.

Using a systems approach to the drowning problem would require planning to increase the awareness and knowledge base of the population at large. At a very minimum, subsets of the population such as pool owners or parents of children in the high risk age groups, should be targeted for public education on the phenomenon of unwanted submersion incidents. Public education is generally well received and effective. Quan, Bennet, Cummings, Henderson, and Del Beccaro (2001) conducted a study on drowning prevention and the distribution of prevention oriented educational materials upon discharge of the emergency department. The research showed that parents perceived injury prevention education as useful regardless of the reason for or the duration of the hospital visit (Quan & Bennet, et al., 2001, p. 384).

A factor in the degree of receptability of the information is the messenger. In Quan and Bennet et al. (2001) the messenger was the emergency department. A certain degree of trust and credibility has been earned by the emergency department and therefore adds substance to the message. Public safety agencies such as fire and rescue departments also have this community equity that is vital in the delivery of safety messages and other educational materials. Therefore, it would be a logical assumption for the fire service to embrace yet another layer of community risk reduction in drowning prevention. This sentiment is supported by O'Shea (1991) in *House-Fire and Drowning Deaths Among*

Children and Young Adults. In this study O'Shea states that "it appears that house-fire and drowning death prevention strategies must continue to consider the entire pediatric and young adult population, with special emphasis on the less affluent" (p. 33). Several fire service agencies have launched successful drowning prevention programs in their communities.

Phoenix, Arizona started the Desert Swim Team to organize a community-based drowning coalition with the fire service at the forefront. This program has been very successful and has accounted for a dramatic decrease in drownings in Phoenix. Worley and Simmons (1989) found that there was a direct correlation with the cessation of a statewide drowning prevention campaign and the average age of the drowning victims in 1989. Therefore, the solution is a renewable and continued commitment to public education. The Phoenix Fire Department used their available manpower to jumpstart the educational campaign by canvassing the streets of Phoenix for six nights to get the message out (Worley & Simmons, 1989; Simmons, 1990). The message in this case was the *Just a few seconds* campaign.

The Tucson Fire Department in Arizona was very active in developing a drowning prevention program as well. According to Moreno (1990), participating in injury prevention programs is a win-win for both the community and the fire department (p. 50). The Tucson Fire Department and their drowning prevention coalition successfully secured a grant to pattern a drowning prevention program after the *Learn Not to Burn* campaign focused at the preschool level (Moreno, 1990).

Once again a fire organization took the lead and formed a drowning prevention coalition in Pierce County, Washington. The Pierce County Fire District partnered with the local children's hospital and area preschool providers (Hulse, 1997). The coalition took time

to properly assess and develop an age-appropriate curriculum for the preschool and day care environment (Hulse, 1997). This curriculum has four basic concepts as outlined by Hulse:

1. *Ask First*
    a. Children are taught to overcome their natural curiosity by always asking if it is safe to go into the water and if someone is going to watch them
2. *Be the best dressed*
    a. Children are taught to wear the appropriate protective gear such as personal flotation devices.
3. *If you fall into the water…*
    a. Reinforces the need for children to help themselves such as calling for help, holding onto the side, or standing up in shallow water.
4. *If someone else falls into the water…*
    a. Children are taught what to do if someone else is in danger without compromising their own safety (p. 62).

Numerous miscellaneous prevention messages are available as offered by the CPSC (2001) and Safe Kids (2004) such as never leave a child unsupervised, keep safety equipment and a phone nearby, learn CPR, and remove toys from in and around the pool area. However, the message to be delivered is not of importance for this research. If a recommendation for a public education campaign is warranted, deciding which messages to be included will require its own study to ensure age-appropriate material as well as a risk benefit analysis.

A portion of this literature review was conducted at the Learning Resource Center at the National Fire Academy in Emmitsburg, MD. This review yielded six applied research

projects conducted as part of the Executive Fire Officer Program that would be appropriate to the problem and purpose of this study.

Lorber (2004) received the "Outstanding Research Award" for her work titled *Drowning…The Silent Killer of Children: Should the Fort Lauderdale Fire-Rescue Department Take a Proactive Approach in the Development of a Prevention Program?* Fort Lauderdale was experiencing a significant rate of drowning for children under the age of 5. Lorber provided considerable detail into several of the available prevention programs as well as provided an outline to building coalitions within the community. Surprisingly, out of the 40 surveys returned, only 13 agencies stated they had a drowning prevention program in place (Lorber, 2004). This minimal response points to the assumption that fire service agencies are still reluctant to provide a more holistic approach to community risk reduction rather than traditional fire programs. This research was of particular interest due to similar budget reductions within Fort Lauderdale Fire-Rescue and St. Petersburg Fire & Rescue. The first positions to be lost in less economically advantageous times were in the public education and prevention (risk reduction) divisions. Therefore, Lorber's step-by-step process of building quality and lasting coalitions will prove to be a valuable template for the city of St. Petersburg.

Mike Watson (2006) authored a research study titled, *Stewie the Duck – An Evaluation of the Rialto Fire Department's Drowning Prevention Program.* This research was oriented around a program evaluation of the existing drowning prevention program in the Rialto Fire Department in California. The existing program included firefighter's reading books to school aged children about water safety (Watson, 2006). Watson found that overall the drowning prevention program was well received by both the firefighters and the educators and

that there was evidence the message was being received and understood by the student body. The results showed that community coalitions needed to be strengthened and that some form of the program needs to be continued so the message is received on a regular basis. Watson stated that from an education and prevention standpoint, both drownings and near-drownings need to viewed equally (2006, p.13).

Steines (2004) authored *Reducing the Risk Associated with Construction of an Open Waterway for Area Residents and the Fire Department*. This research was focused on the installation of a drainage waterway through a residential community. This research found that flash flooding secondary to severe thunderstorms presented the most significant risk associated with the waterway. In addition, Steines determined that the fast moving water was the predominant factor in the risk of drowning deaths, not the depth of the water.

In 2003, Scott Brown authored the research titled; *Children are Drowning Without a Sound…Is the Fire Service Listening?* This study is oriented around a drowning problem for children under the age of 5. One of the significant outcomes is the identified need to have a uniform data tracking system in order to both adequately analyze community risk and to measure program success. In contrast to Florida, this California study yielded that of the 14 fire service agencies surveyed, 12 reported that a current drowning prevention program was in place (Brown, 2003, p. 21).

Development of a Swimming Pool Safety Awareness Program is the title of a research study completed by John Jolliff of the Altamonte Springs Fire Department in Florida. This research analyzes significant drowning fatality rates for children aged 14 years and younger (Jolliff, 1995). The purpose was to develop an awareness program specifically for swimming pools. Jolliff (1995) concluded that the key elements of a successful program are education,

legislation, behavioral modification, and continual evaluation (p. iii). A statistic of interest within this study showed that Seminole County, where Altamonte Springs is seated, had the highest drownings in the months of April and October (Jolliff, 1995, p. 4). This is in contrast with Lorber (2004), another Florida city, and the national statistics. The raw data was not provided in this research publication, therefore, a possibility does exist that the author intended to represent the highest drowning rates between the months of April and October rather than in April and October. Regardless, a valid point is made that an individualized assessment of each community is a necessity rather than relying on normalized regional or national data.

Finally, Lockhart (1993) authored the research titled *Childhood Drowning Prevention in Los Angeles County: A Challenge to the Fire Service.* Once again the research was oriented around a childhood drowning exposure for children under the age of five. Lockhart found estimates that only 40% of the near drownings are reported (p. 1). In addition, it is reported that 90% of marriages that experienced a near drowning event resulted in divorce within the following year (p. 1). Of particular importance is one of Lockhart's recommendations that "barriers should be layered using two or more methods…" (p. 16).

This literature review has demonstrated that there is a significant community risk associated with submersion incidents. Although children maintain a high priority in drowning literature, a substantial risk to all age groups continues to exist. Through many minor inconsistencies in the presentation of statistical data, this literature review will specifically guide this research endeavor by conducting an analysis as to the age, gender, ethnicity, and socioeconomic factors as they relate to submersion incidents. This will be conducted in an

effort to prioritize audiences and measure future program performance against standardized data sets.

In addition, based on this literature review, this research will focus primarily on total submersion incidents rather than on drowning fatalities. Also, the research analysis will include the time of year, incident locations, and other identifiable traits. It has been identified that no singular effort will likely yield the results similar to a systematic or layered approach. Therefore, this research, analysis, and subsequent recommendations will be fostered in the vein of a multi-faceted approach based on specific findings for the city of St. Petersburg, Florida.

Procedures

This study is utilizing descriptive statistics to comprehensively evaluate the unintentional submersion incidents within the city of St. Petersburg, Florida. All procedures have been focused on answering five research questions. First, what are the similarities in submersion incidents within the city of St. Petersburg, FL? Second, what are the identifiable at risk factors in submersion incidents within the city of St. Petersburg, FL? Third, what is the current status of drowning prevention efforts in St. Petersburg, FL? Fourth, what strategies do other departments employ to reduce and prevent submersions incidents? Fifth, what strategies are feasible for St. Petersburg Fire & Rescue to implement?

The mean number of drowning fatalities over this study period of 1/1/2001 through 6/30/2007 in St. Petersburg was evaluated against the expected fatality rate for drowning on the national level. A two-tailed t-test for means with unequal variances was performed with an alpha level of .05. This was tested against the null hypotheses that there is no statistically significant difference in fatality rates between the City of St. Petersburg and the United States.

Even though a single-tailed null hypothesis is justified and would provide a higher confidence level, the two-tailed test was chosen in an effort to overcome the variances in reported fatality rates per 100,000 on the national level.

To further define the drowning problem in St. Petersburg, a two-tailed t-test of unequal variances was used to test the null hypothesis that there is no statistically significant difference between the mean drowning deaths and mean fire deaths at the .05 alpha level. Data were compared for January 1, 2001 through June 30, 2007.

Once it was established that there is a statistically significant drowning problem in St. Petersburg, the next procedure was to conduct a literature review. The literature review has been utilized to guide the research direction up to and including the formulation of survey questions and which data sets would be of most benefit to the research goal. The literature review was started at the National Fire Academy's Learning Resource Center (LRC) in January 2007 during the second year EFOP course titled *Leading Community Risk Reduction*. The LRC provides a large fire and emergency service based collection of research, periodicals, and texts. The results from the LRC were then supplemented with additional sources such as internet searches, and national and state safety agencies and organizations. The literature review was strategically separated into general knowledge from a wide variety of sources and research conducted by and for fire and emergency service organizations.

Research to answer question number one utilized a tremendous resource and collection of data provided by the Pinellas County Office of the Medical Director (OMD) and the Pinellas County Computer Aided Dispatch (CAD) system. This author used manual means to organize the data into Microsoft Excel spreadsheets to facilitate data analysis. All submersion incidents from 1/1/2001 through 6/30/2007 were collated into one spreadsheet to run data

analysis on the phenomenon of submersion incidents by month of the year, age, gender, and the location of the submersion incident. Age has been categorized by the following age groups based on both the literature review and the current local data set. Children were identified as less than 12 years of age and classified by two groups; less than 5 and 5 to 11 years of age. In an effort to remain consistent for future trend analysis and standardization of data within Pinellas County, adults are classified as older than 11 years of age. However, based on the literature review, two subsets of adult have been created to include ages 12 to 24 and the remaining adults in the category 25 years of age and older. Next, all submersion incidents were categorized into four locations; pools, waterways, buckets, and bathtubs. The categorical location of waterway was then separated by beach drowning in less than 100 yards from shore and those drownings that were greater than 100 yards from shore.

The same data set provided by the Pinellas County OMD and the Pinellas County CAD system was utilized for much of the research and analysis conducted in an effort to answer the second research question. Once again, data were collected and manually sorted and input into a Microsoft Excel spreadsheet for data analysis. Analysis for this question is focused on identifying factors or relationships that would be useful as indicators or predictors of submersion incidents in St. Petersburg, Florida.

Following models presented in the literature review, data were analyzed to determine the role of ethnicity in total submersion incidents. All St. Petersburg submersion incidents were sorted by the ethnic / racial groups: African-American, Asian/ Pacific Islander, Hispanic, Other, and White, in no specific order. Then each ethnic / racial category was queried to identify the locations of submersion incidents in the previous categories of pools, waterways, buckets, and bathtubs. Each age group subset was then analyzed in an identical

manner to identify the locations of submersion incidents within each age category and corresponding subset.

To determine if the geographic location within the city held any significance to drowning rates, each submersion incident was categorized by the zip code in which the incident occurred. Next, the subsets of total submersion incidents, drowning and near-drowning were analyzed in the same manner by zip code to provide the clearest picture of the geographic influences throughout the jurisdiction. There are 14 zip codes within St. Petersburg and each zip code is identified on a street map of St. Petersburg and presented as an appendix. (Appendix A)

The concept of the geographic locations was then taken a step further to identify trends or indicators in the socioeconomic status. Due to the time provided for this research and the restrictions on patient information, individualized socioeconomic data were not available. Therefore, data were collected and placed in a Microsoft Excel spreadsheet from the United States Bureau of Census 2000. Macro-data, were provided and categorized for income, unemployment, population, median age, homeownership, and educational attainment (High school +; Bachelors degree +). Additionally, the St. Petersburg Permit Department provided a list of every new pool permit obtained since 2000. Each data set were then cross referenced by zip code. Finally, a Pearson correlation matrix was developed to test the null hypothesis that there are no statistically significant correlations between submersion incidents, pool density, and the socioeconomic and demographic factors of income, unemployment, population, median age, homeownership, and educational attainment. This test utilized a two-tailed approach with an alpha level of .05. If this null hypothesis must be rejected, then that would indicate correlation between submersion incidents and one of the independent

variables. If a correlation exists, that would imply further analysis such as a regression analysis to test if that variable is a good predictor of submersion incidents.

The third research question addressed the current status of drowning prevention efforts within St. Petersburg Fire & Rescue. An analysis of historical submersion data was conducted from 2001 through June 30, 2007 to identify relationships between drowning prevention efforts, or lack thereof, and incident rates. Personal interviews were conducted with the Fire Marshal, Drowning Prevention Coordinator, and the Injury Prevention Coordinator. A literature review of the city of St. Petersburg and Florida State Statutes was conducted concerning engineering requirements for pool safety.

Efforts to answer the fourth research question required a survey of other fire service agencies. This survey was guided in part by the literature review. This survey (Appendix B) asked twelve questions in a web-based format. All responses were collected by SurveyMonkey.com. All raw data were then available for download and further analysis, if needed. An attempt to survey the entire population of fire departments in Florida was made by mass email on the Florida State Fire College's A-List. However, a true sample was not identified. For this study, the sample is a sample of convenience. A total of 136 fire departments responded with their contact information (Appendix C). Although not specifically designed, if the estimate is accurate at 306 fire departments in Florida or less, then the response would not meet academic and scientific rigor for sample size at the .05 alpha level (Isaac & Michael, 1997, p. 201). Therefore, the sample size would is not of sufficient size to make inferences about the total population.

Efforts to answer which strategies are feasible for implementation by SPFR were grounded in the literature review. Specific information for SPFR were discovered through interviews and general institutional knowledge.

Assumptions

Since a significant portion of the data utilized in this research is secondary data, it is assumed that all data has been collected in an unbiased, honest, and accurate manner. The primary data such as with surveys and interviews hold the same assumptions that all respondents and interviewees answered honestly, openly, and accurately. It is further assumed that all available research and literature were conducted in an open, accurate, and unbiased manner. It is assumed that data are normally distributed across all zip codes.

Limitations

Limitations affecting data analysis are present in the manner statistical data are collected and presented throughout the literature. All data for comparison are provided in terms of drowning fatalities or deaths, adding to the difficulty for making comparisons to either near-drownings or total submersion incidents. In addition, all data from the Census 2000 are provided as aggregated macro-data collated to zip codes. Therefore, individualized victim analysis for income level, educational attainment, homeownership, and unemployment cannot be analyzed.

St. Petersburg Building Department provided a list of all swimming pools installed since 2000 within the City of St. Petersburg. However, during this study period, this author was unsuccessful in securing the complete list of pool owners for the City of St. Petersburg. Therefore, data analysis in regards to pool density may not be valid. Usefulness of many of the data points, such as prevention, supervision, and barriers, are either not available or

returned at such a low rate as to render them statistically irrelevant as provided by the Pinellas County OMD. The current data set are not sufficiently detailed to provide further analysis into subsets of the general categories. For example, in waterway submersion incidents it is pure conjecture as to whether the incident was a boating accident or a swimmer who ventured off more than 100 yards from shore. Lastly, not all questions for the survey were answered by all respondents.

Definition of Terms

Drowning: Submersion incident resulting in death within the first 24 hours after occurrence (PC OMD, 2007).

Near-drowning: Submersion incident that did not result in death within the first 24 hours (PC OMD, 2007).

Total Submersion Incidents: The sum of both reported drownings and near-drownings.

Mean: A measure of central tendency that is the arithmetic average of a sample (Dodge, 2003, p. 45).

Median: A measure of central tendency that divides a sorted sample group or data set where 50% is higher and 50% is lower than the median value (Dodge, 2003, p. 51).

Mode: A measure of central tendency that indicates the measure that occurs most frequently within a data set (Dodge, 2003, p. 54).

BLS: Basic Life Support is generally limited to airway maintenance, ventilatory support, CPR, splinting fractures, spinal injuries, and first aid (ICMA, 1988, p. 348).

ALS: Advanced Life Support includes all basic life support measures, plus invasive medical procedures such intravenous and pharmaceutical therapy, and the use of adjunct ventilation devices (ICMA, 1988, p. 348).

ACLS: Advanced Cardiac Life Support provided by ALS systems.

EMS: Emergency Medical Services which are traditionally comprised of either BLS or ALS service levels or a combination of the deliveries.

Prehospital: The interval from the time the submersion occurred until the arrival at the hospital's emergency department.

Results

Prior to addressing the specific research questions, this author conducted analyses to establish that the drowning and submersion problem within the city of St. Petersburg is statistically significant. The first consisted of a two-tailed t-test for unequal variances between the mean incidents of drowning experienced in St. Petersburg from January 1, 2001 through June 30, 2007 and the expected mean from the highest available estimate for drowning fatality rates per 100,000 population. Utilizing Microsoft Excel, the means are reportedly 3.67 and 2.16 fatalities per month for St. Petersburg and the United States, respectively. The t-critical value is 2.20 and the reported t-statistic for the two-tail is 2.94 at the alpha level of .05 (Table 1). Therefore, the null hypothesis that there is no statistically significant difference in fatality rates between the city of St. Petersburg and the United States must be rejected.

The significance of this finding is that St. Petersburg is experiencing a fatality rate that is higher than the expected national fatality rate, using the model with the highest national estimate found in the literature review. This can be stated with greater than 95% confidence. In other words, the opportunity to find or duplicate these findings due to sample variance or by pure chance is 5% or less.

Table 1
t-Test: Two-Sample Assuming Unequal Variances

	St. Petersburg Fatalities / Mos	*Expected US Fatalities / Mos*
Mean	3.666666667	2.16
Variance	3.151515152	0
Observations	12	12
Hypothesized Mean Difference	0	
df	11	
t Stat	2.940005233	
P(T<=t) one-tail	0.00672381	
t Critical one-tail	1.795884814	
P(T<=t) two-tail	0.013447621	
t Critical two-tail	2.200985159	

Next a similar two-tailed t-test for unequal variances between the mean fatalities from drowning and fire was conducted over the same study period. The raw data is summarized in Figure 1. Figure 1 represents the annual fatalities by calendar year over the study period and contrasts fire and drowning related fatalities. Drowning rates were nearly 300% greater than that of fire related fatalities. The mean value for fire deaths is 2.29 and drowning deaths is reported at 6.29. The two-tailed t-critical value is 2.17 and the t-statistic is 2.58 at the alpha level of .05 (Table 2). When referring to Table 2 the t-statistic has a negative value because the first data set in the spreadsheet was for fire deaths. Since fire deaths are significantly lower, this value is reported as negative, however, the significance should be reported as an absolute value. The null hypothesis that there is no statistically significant difference in the fatality rates of drowning and of fire within the city of St. Petersburg must be rejected.

These results demonstrate that fatalities due to drowning are more frequent than fatalities due to the incidence of fire. These results exceed the academic and scientific thresholds of statistical significance and therefore can be stated with greater than 95% confidence. In other words, only a 5% opportunity exists that these findings were found as a result of an anomaly or by chance.

Figure 1

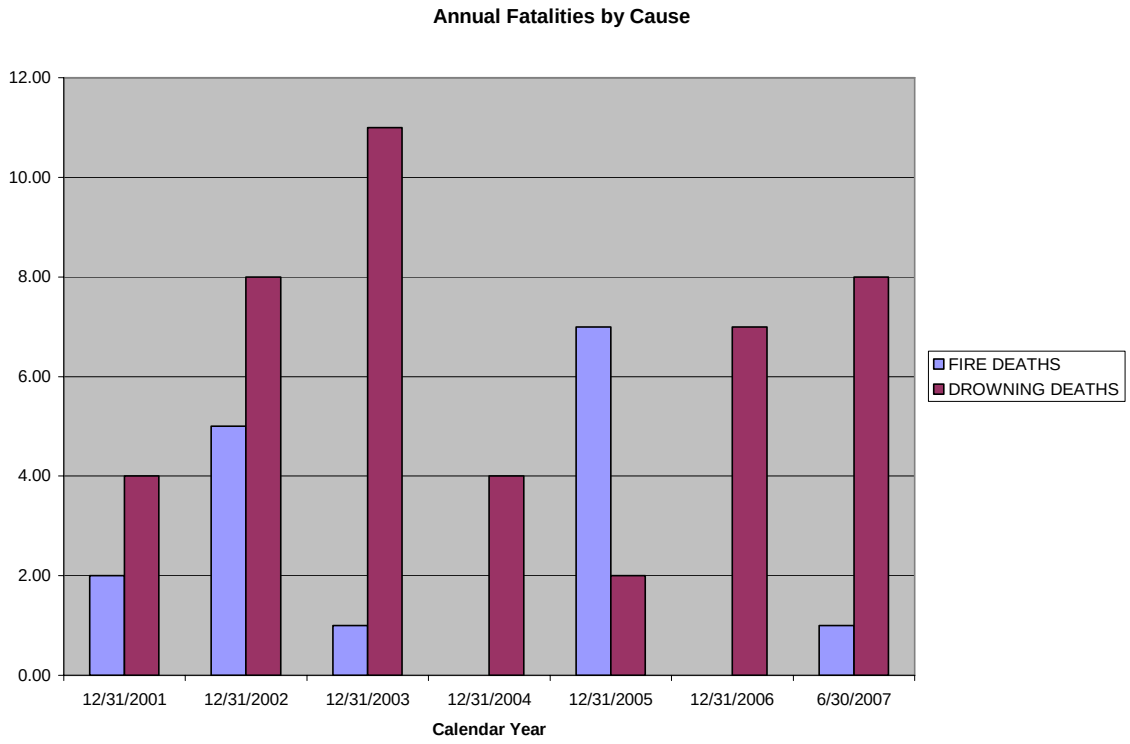


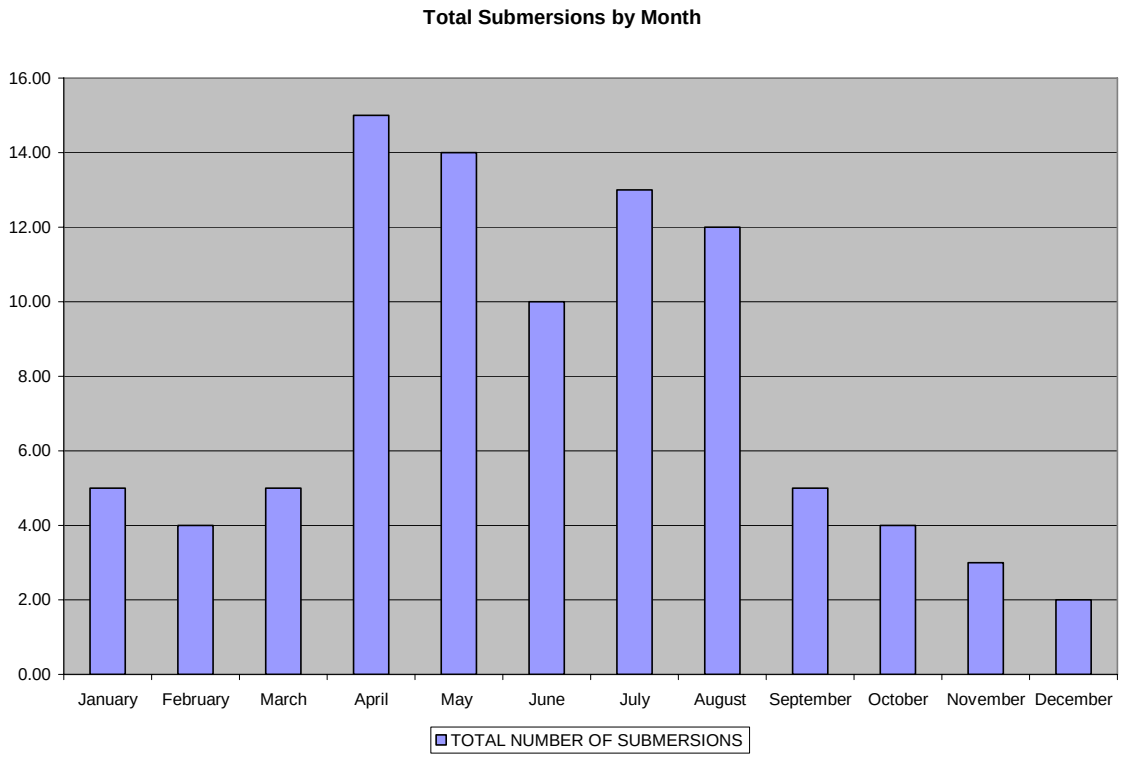
Table 2

t-Test: Two-Sample Assuming Unequal Variances

	FIRE DEATHS	*DROWNING DEATHS*
Mean	2.285714286	6.285714286
Variance	7.238095238	9.571428571
Observations	7	7
Hypothesized Mean Difference	0	
df	12	
t Stat	-2.581257352	
P(T<=t) one-tail	0.012021006	
t Critical one-tail	1.782287548	
P(T<=t) two-tail	0.024042013	
t Critical two-tail	2.178812827	

Efforts to answer research question number one resulted in the following findings. Results found that the majority of submersion incidents (59%) occurred from April through August. Figure 2 illustrates the raw number of submersion incidents during the study period of January 1, 2001 through June 30, 2007.

Figure 2

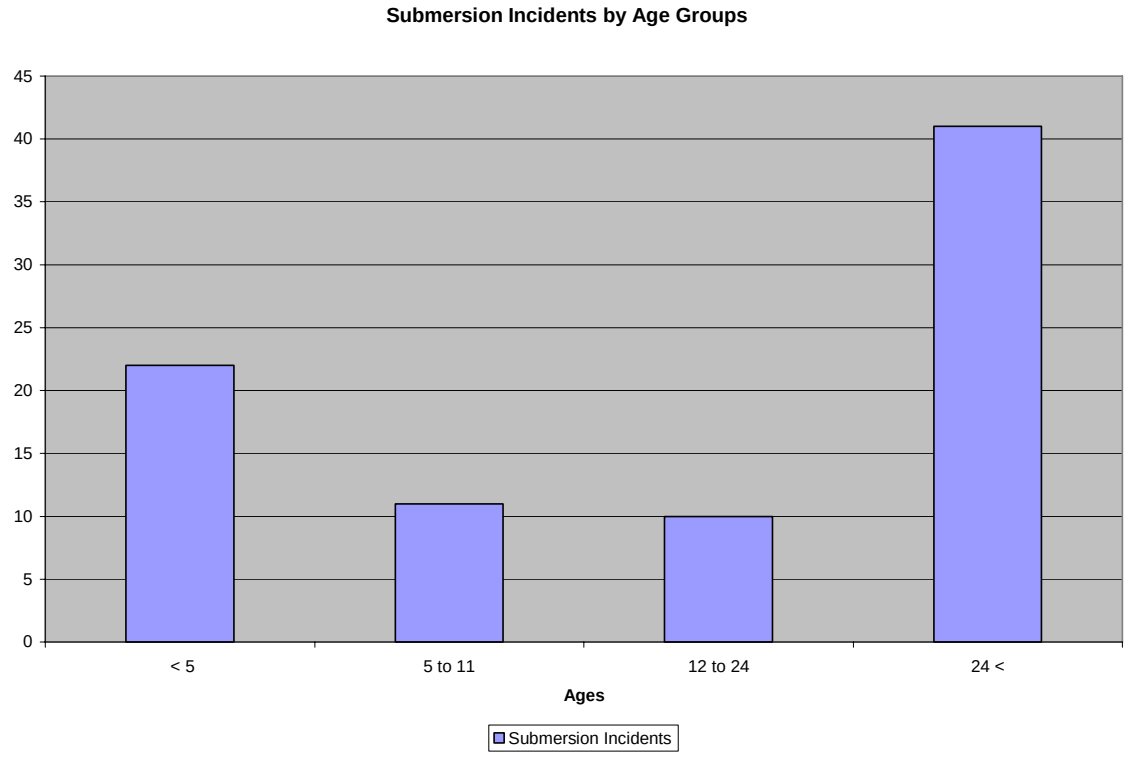


This 6.5 year study period from 2001 through June of 2007 found that there were 92 submersion incidents. Drowning accounted for 44 submersions and near-drowning accounted for 48. Adults (> 11) had the greatest occurrence of submersion incidents at 55, or 60%, and children (< 12) suffered 33, or 36%, for this study period. Descriptive statistics specific to age resulted in the adult mean and mode equaling 46 years of age and the median age 45. Childhood submersions were found to have a mean submersion age of 4, a median of 3, and mode of 1.

Specific to drowning, the average age for drowning victims is 46 years of age and the average age for near-drowning is 17. Drowning accounted for nearly 48% of the total submersion incidents, of which approximately 40% were from adults and 8% from children. Near-drowning accounted for the remaining 52% of the total submersion incidents.

An analysis of submersion incidents by age group revealed that the greatest number of submersion incidents occurred within the age group of greater than 24 years of age. When referring to the raw data in Figure 3, the second age group with the most significant incidence of submersion was less than 5 years of age. Ages 5 to 11 years were next followed closely by the age group of 12 to 24 years of age.

Figure 3

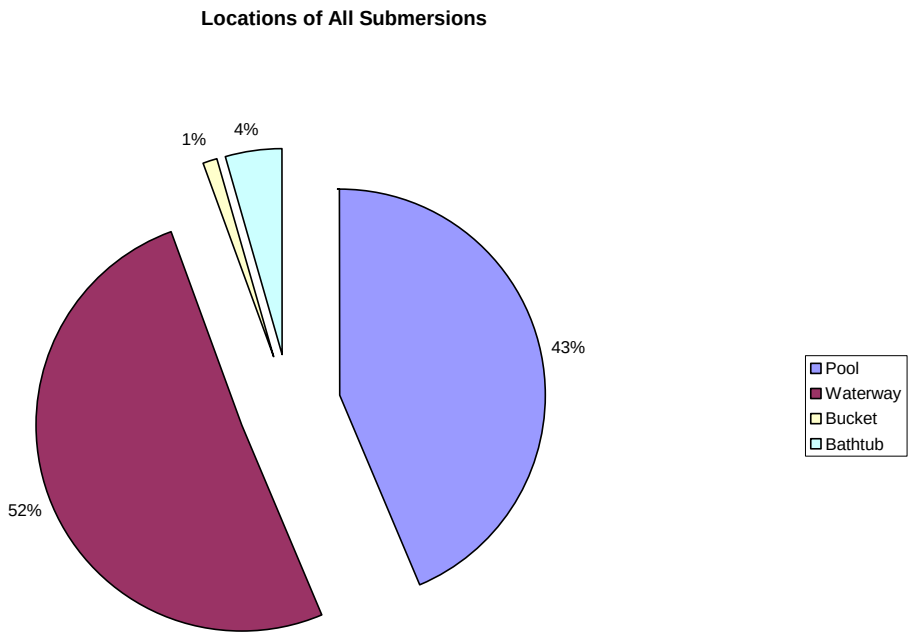


Analysis of the locations where submersion incidents occurred were categorized by occurrence in pools, waterways, buckets, or bathtubs in that order. Figure 4 illustrates that when analyzing all submersion incidents within the study period of January 1, 2001 through

June 30, 2007, the majority or 52% of all submersions occurred in waterways. This statistic is followed by pools, bathtubs, and buckets at 43%, 4%, and 1% respectively.

Further analysis into waterway submersion were conducted and results demonstrated that 65% of submersion incidents occurred at greater than 100 yards off shore and the remaining 35% were found to occur within 100 yards from shore.

Figure 4



Results for research question number one, revealed that that the similarities in submersion incidents within the city of St. Petersburg are that the majority of submersions occur in local waterways in adults over the age of 24 and during the months of April through August.

However, statistically speaking, since the adult age group of greater than 24 is a considerably larger population, the significance of the submersions experienced by children under the age of five cannot be overlooked. Children under the age of five account for

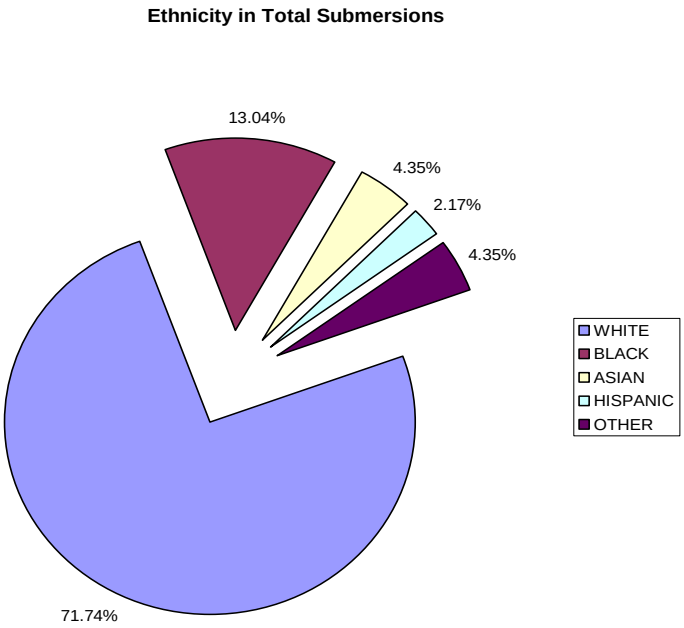
approximately 5.7% of the community and experience greater than 26% of all submersion incidents. Therefore, the per capita submersion rate for children under the age of five is higher than those of the adult group of greater than 24 years of age.

Similarly, if the submersion incidents that occurred at greater than 100 yards offshore were assumed to have occurred in boating incidents, and categorized as such, then the location with the greatest frequency of all submersion incidents would be pools.

Analyses to answer question number two included statistical analysis into the role ethnicity, age, socioeconomic status, demographics, geographic location, and pool density contribute as indicators to submersion incidents.

Analysis of ethnicity for all submersion incidents within St. Petersburg were categorized as White, African-American, Hispanic, Asian / Pacific Islander, and Other in no particular order. As illustrated in Figure 5, the White population accounted for the majority of the total submersion incidents for the duration of this 6.5 year study at nearly 72%. The African-American ethnic group accounted for 13%, followed by the Asian / Pacific Islander and Other at greater than 4% and finally Hispanic at slightly more than 2% (Figure 5).

Figure 5



As directed by the literature review, further analysis into the role ethnicity contributes to total submersion incidents was conducted. Each ethnic group was sorted as to the percentage each submersion location contributed to the overall submersion experience for that group. For example, the White group (Figure 6) was found to have the greatest occurrence of submersions in the waterways at 58%. This was followed by pools, bathtubs, and buckets at 37%, 4%, and 1% respectively. Analysis of the African-American group (Figure 7) resulted in pools accounting for 75% of the submersion incidents and waterways accounting for the remaining 25%. Results for Hispanics, Asian/ Pacific Islanders, and Others were all split 50% for each category (Figures F3, F4, and F5). Hispanics suffered incidents in both pools and bathtubs equally. Asian / Pacific Islanders and Others experienced incidents equally for both the pool and the waterways.

Figure 6

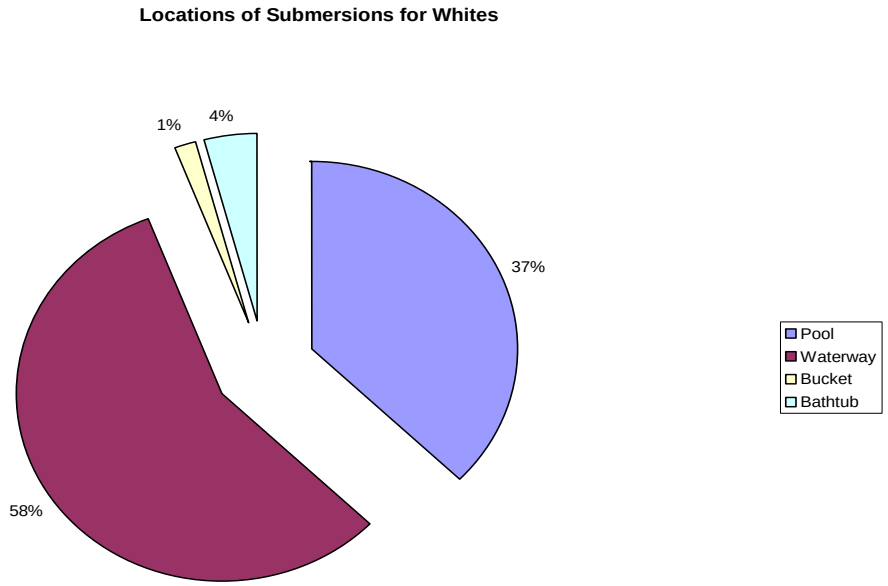
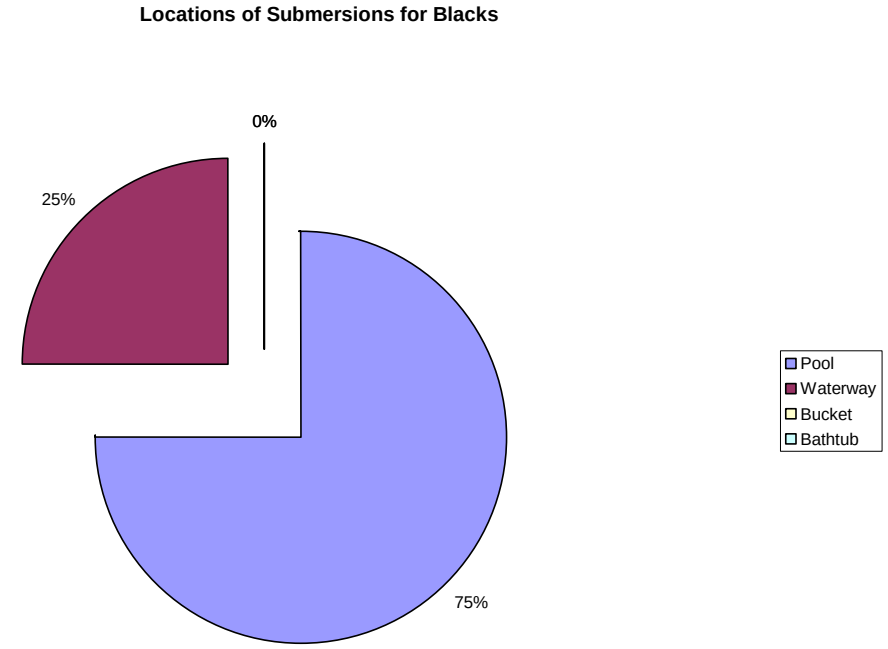
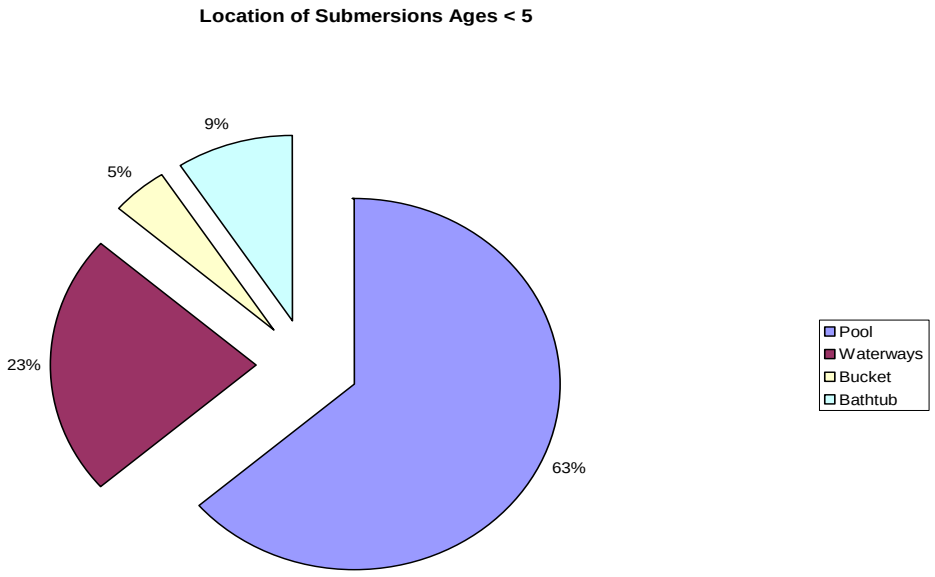


Figure 7



Ages were then sorted to identify patterns or indicators in each age group of less than 5, 5 to 11, 12 to 24, and finally greater than 24 years of age. Figure 8 illustrates the most prolific age group, of less than 5 years of age, experienced the greatest majority of submersions in pools at 63%. Waterways contributed 23% to the total submersion incidents within this age group, bathtubs at 9% and lastly buckets at 5%.

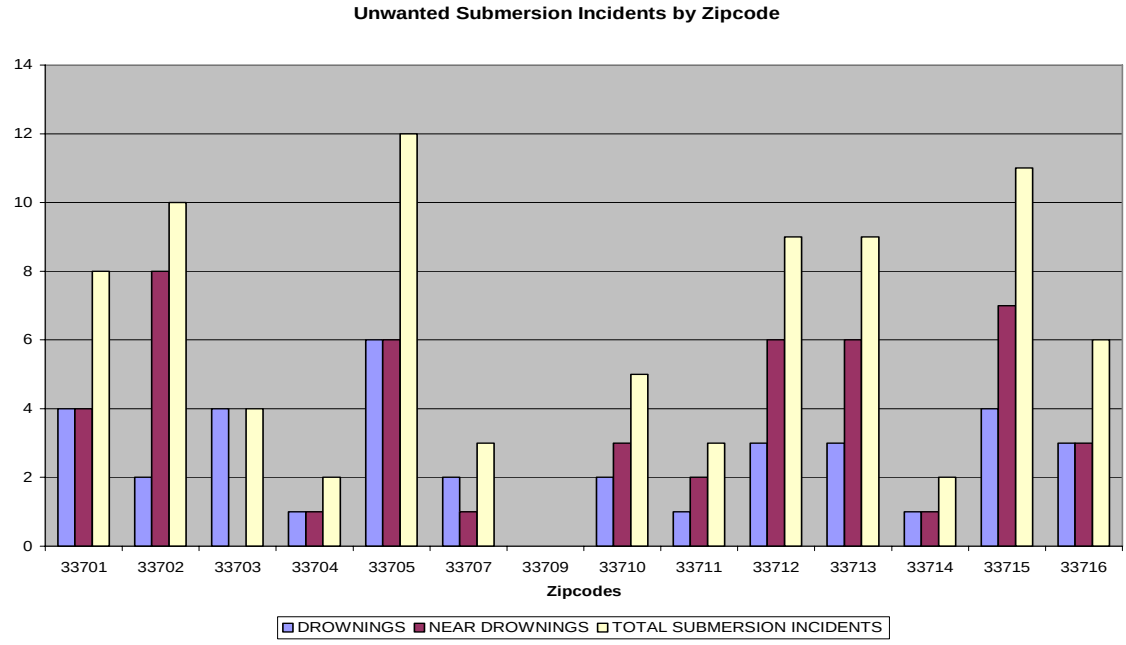
Figure 8



Results for ages 5 to 11 years of age are 73% for pool incidents and the remaining 27% in local waterways. This is an inverse presentation to the age group of greater than 25 years of age which experienced 73% of the submersion incidents in the local waterways and the remaining 27% in pools. The 12 to 24 age group experienced the majority of incidents at 60% in pools and the remaining areas were for local waterways and bathtubs at 20% each respectively. These age groups are presented as Figures F6, F7, and F8 in the order of discussion.

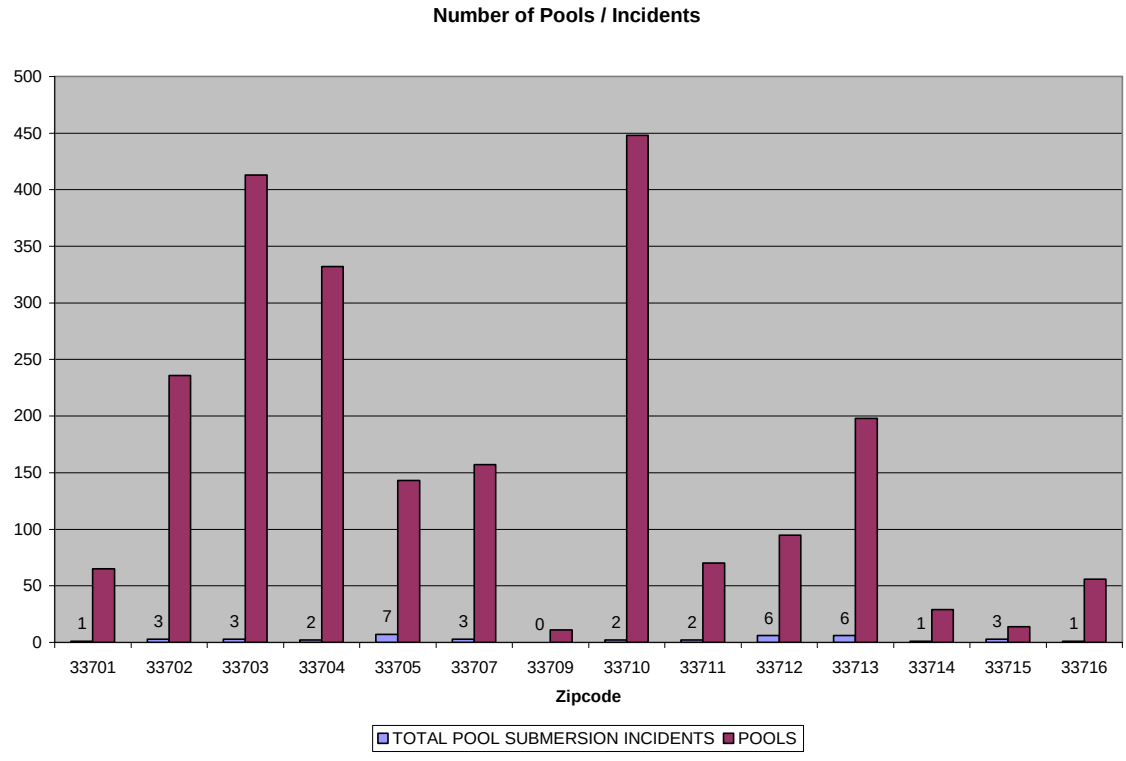
An analysis was conducted to identify if trends existed within geographic locations throughout the city of St. Petersburg. Fourteen zip codes divide the city and were utilized as the unit of measure for geographic location. Data for total submersion, drowning, and near-drowning incidents resulted in the identification of two leading zip codes for total submersion incidents in 33712 with 17 and 33705 with 12. Considering the study period of 6.5 years, 7 geographic regions, or 50% of the zip codes experienced a minimum of 6 submersion incidents. The zip code 33712 also has the highest drowning rate by nearly 2 times the closest zip code in 33705. However, further investigation has revealed that 8 drowning incidents and the corresponding 8 total submersion incidents must be negatively adjusted due to suicides by jumping off of the Sunshine Skyway Bridge. Therefore, zip code 33705 has experienced the most frequent incident of unwanted submersion incidents as illustrated in Figure 9.

Figure 9



Further analysis was conducted to compare pool density with the historical submersion information for each zip code. First, all new pools installed by permit from the City of St. Petersburg's Building Department since 2000 were sorted and cataloged by zip code. There were approximately 2,200 pools installed since 2000 within the city of St. Petersburg. Next, submersion incidents specific to pools were cross cataloged in an effort to identify if a relationship existed between pool density and pool submersion incidents (Figure 10). Zip codes 33710, 33703, and 33704 resulted in the majority of pools (53%) installed since 2005 at 448, 413, and 332 respectively. Results were not conclusive to identify existing relationships.

Figure 10



Therefore the null hypothesis that there is no statistically significant correlation between the number of pools and the number of pool related incidents was employed at the .05 alpha level. Table 3 shows that the Pearson correlation coefficient is .148 and the two-tailed significance is .612. Therefore, the significance is greater than .05 and the null

hypothesis must be accepted. In other words, there is no statistically significant correlation between the number of pools and the number of pool related incidents over the study period of January 1, 2001 through June 30, 2007.

Correlations

Table 3

		Pool Submersion Incidents	Number of Pools
Pool Submersion Incidents	Pearson Correlation	1	.148
	Sig. (2-tailed)		.613
	N	14	14
Number of Pools	Pearson Correlation	.148	1
	Sig. (2-tailed)	.613	
	N	14	14

Socioeconomic and demographic factors of the population of St. Petersburg were then analyzed against the total number of submersion incidents. The null hypothesis states, that there is no statistically significant correlation between total submersion incidents and income, unemployment, population, age, homeownership, educational attainment, or pool density at the alpha level of .05. Table 4 represents the correlation matrix produced by SPSS.

The results are that income has a positive correlation with population at the alpha .05 level and a positive correlation with age and educational attainment (HS + and BA +) at the .01 alpha level. Unemployment exhibits a negative relationship with homeownership, attainment of at least a high school diploma, and pool density at the .05 alpha level. Population has a negative relationship with income and attainment of at least a bachelor's degree at an alpha level of .05. Median age has a positive correlation with homeownership at the .05 level and income at the .01 level. Homeownership exhibits a negative relationship

with unemployment and a positive relationship with age at the .05 level. Lastly, pool density exhibits a negative correlation with unemployment at the .05 level.

A positive relationship indicates that there is a direct or linear relationship between the variables. A negative relationship would indicate that there is an inverse relationship between variables. For example, according to Table 4, as income increases population should decrease. Alternatively, as income increases so does the median age.

Since the variable total submersion incidents did not exhibit a relationship with any other variable, the null hypothesis must be accepted. In other words, there is no relationship between submersion incidents and the socioeconomic and demographic variables tested.

The answer to question number two is that there are limited at-risk indicators or predictors of submersion incidents within the city of St. Petersburg. Therefore, the total submersion problem in the city of St. Petersburg is not related to ethnicity, geography, or socioeconomic status. The population that has suffered the most frequency of submersion incidents is the white male population. Additionally, extrapolating boater data from the waterway category would indicate that pools are the leading locations for total submersion incidents. Specifically, pools remain the leading location of submersion incidents for all ages under the age of 25 years and for the African-American group. Only the 25 years and older age category had more submersion incidents in the local waterways. The Hispanic population experiences the fewest submersion incidents of all ethnic groups.

Pearson Correlation Matrix

Table 4

	Income	Employ	Pop.	Med. Age	Home Owners	% HS +	% BA +	Sub-mersion	Pools
Income	1	-.453	-.573(*)	.684(**)	.305	.782(**)	.839(**)	.057	.002
Employ	-.453	1	-.145	-.398	-.578(*)	-.536(*)	-.306	.419	-.550(*)
Pop.	-.573(*)	-.145	1	-.151	.333	-.403	-.654(*)	.086	.516
Med. Age	.684(**)	-.398	-.151	1	.540(*)	.267	.244	-.124	-.102
Home	.305	-.578(*)	.333	.540(*)	1	.044	-.072	-.250	.357
% HS +	.782(**)	-.536(*)	-.403	.267	.044	1	.913(**)	-.015	.343
% BA +	.839(**)	-.306	-.654(*)	.244	-.072	.913(**)	1	.098	.132
Sub-mersion	.057	.419	.086	-.124	-.250	-.015	.098	1	-.123
Pools	.002	-.550(*)	.516	-.102	.357	.343	.132	-.123	1

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Information was gathered as to the current status of the drowning prevention program within St. Petersburg Fire & Rescue. SPFR is a member of the West Coast Drowning Prevention Coalition. The coalition utilizes private and public partnerships. Specific to the emergency services, area fire departments, All Children's Hospital, and the OMD partner with Safe Kids in this effort.

An interview with the Drowning Prevention Coordinator, Julie Rivard, and the Fire Marshal (Prevention Division Chief) William Jolley was conducted on June 8, 2007. The

results of this interview revealed that since the West Coast Drowning Prevention Coalition is a countywide coalition, occasional efforts such as static displays and education efforts are conducted throughout Pinellas County. Although these deliveries are vital to the consolidated efforts, St. Petersburg may not receive drowning prevention services in several years. In fact, Rivard states, "that the drowning coalition may provide an educational opportunity within St. Petersburg without SPFR's knowledge" (Personal communication, June 8, 2007).

According to Rivard, educational deliveries for both SPFR and the coalition are generally limited to static displays at health and safety fairs, fire station open houses, and special requests. Additionally, SPFR participates in the April Pool's Campaign each year (Rivard, personal communication, June 8, 2007). The drowning coalition also mails out safety and educational material to all pool owners within the county each year that coincides with the April Pool's campaign.

Chief Jolley provided information pertaining to the investment of time and fiscal resources for the drowning prevention program within SPFR. Rivard, the Drowning Prevention Coordinator, receives an annual salary of approximately $40,000. However, drowning prevention is one of many services provided by Rivards' Public Education Specialist position, a broad role, encompassing many duties. According to Chief Jolley, the coordination of drowning prevention utilizes approximately less than 5 hours of Rivard's time per week (Personal communication, June 8, 2007). Public education for fire accounts for 20 – 30 hours per week and car seat safety programs account for the remaining 5 – 10 hours of Rivard's week (W. Jolley, personal communication, June 8, 2007).

Approximately $4,000 per year is allotted for printed materials each year for the public education causes of fire, car safety, falls, and drowning. Drowning prevention

accounts for 10% of this value (W. Jolley, personal communication, June 8, 2007). Therefore, approximately $5,000 in annual salary and 12.5% of the available workweek is allotted specifically toward drowning prevention efforts. Lastly, $400 is provided for printed marketing and educational materials.

A multi-layered approach to drowning prevention is utilized within St. Petersburg. CPR training and swimming lessons are provided throughout the city at little cost to the citizens of St. Petersburg. SPFR is the leading trainer for CPR, First aid, and AED certification within the community. Each of the nine municipally owned and operated swimming pools have an AED onsite, lifeguards, and swimming instructors.

Drowning prevention efforts are not all inclusive to education. Engineering plays a significant, and potentially, leading role in the prevention of submersion incidents. Investigation revealed that Florida State Statute 515 titled the *Residential Swimming Pool Safety Act* requires the installation of residential swimming pool barriers and the delivery of drowning prevention educational materials by all licensed contractors for new installations and during the home buying process for homes with existing pools. These regulations are found in State Statute 515.29 and 515.33, respectively (Florida State Statutes [FSS] 515, 2007). The statute requires the state of Florida to produce these prevention materials free of charge for distribution.

All pools are required to have a 360 degree barrier at a minimum height of four feet. This barrier must be separate from any fencing in the yard unless this fencing is situated on the perimeter of the pool. All gates leading to the pool area must be self closing and open away from the pool. A wall of the house may be utilized as a part of the 360 degree barrier only if there are no doors or windows within that portion of the wall (FSS 515.29, 2007).

A twelve question survey was used to solicit general knowledge from fire departments primarily throughout the state of Florida. There are an estimated 306 fire departments within the state of Florida and 136 surveys were returned. The responses from this convenience sample are presented by survey question in tabular form. Responses are grouped by question style for presentation only. The survey in the order in which it was presented and completed is in Appendix B. Table 5 refers to questions two through four.

Table 5

2. May I contact you concerning the results of this survey?		
answer options	**Response Percent**	**Response Count**
Yes	97.79%	133
No	2.21%	3
answered question		**136**
skipped question		**0**
3. Does your organization have a drowning prevention program?		
answer options	**Response Percent**	**Response Count**
Yes	25.00%	34
No	75.00%	102
answered question		**136**
skipped question		**0**
4. Have your efforts been effective?		
answer options	**Response Percent**	**Response Count**
Yes	77.78%	14
No	22.22%	4
answered question		**18**
skipped question		**118**

Three respondents answered “no” to the question concerning future contact. These respondents’ survey results are included, but their respective contact information is not provided in Appendix C. Results for question number three indicate that of the 136 respondents, 25% or 34 of the departments surveyed have a drowning prevention program within their organization. Conversely, 75% of 136 respondents do not have an

organizationally held drowning or submersion prevention program. Results for question number 4 reveal that of the 18 responses, 14 or nearly 78% of the departments considered their efforts to be successful. Alternatively, 22% or 4 of the responding agencies with a drowning prevention program did not consider their efforts to be effective.

Table 6 summarizes questions eight, nine, and eleven.

Table 6

8. How much time, each week, is allotted specifically toward your drowning prevention program?		
answer options	**Response Percent**	**Response Count**
0-5 hours per week	72.22%	13
5-10 hours per week	16.67%	3
10-15 hours per week	0.00%	0
15-20 hours per week	0.00%	0
20-30 hours per week	0.00%	0
30-40 hours per week	11.11%	2
answered question		**18**
skipped question		**118**
9. Have you utilized coalitions in your efforts?		
answer options	**Response Percent**	**Response Count**
Yes	77.78%	14
No	22.22%	4
answered question		**18**
skipped question		**118**
11. Were you successful in securing alternative funding for your drowning prevention program?		
answer options	**Response Percent**	**Response Count**
Yes	50.00%	9
No	50.00%	9
answered question		**18**
skipped question		**118**

Question number eight resulted in approximately 72% or 13 of the agencies that did operate drowning prevention programs allotted 5 hours per week or less specifically toward drowning prevention activities. According to the results for question number 9, the majority of responding organizations with drowning prevention programs have utilized coalitions at nearly 78%. Lastly, the success rate of the 18 responding agencies with drowning prevention

programs was split 50%. Therefore, half of the responding agencies were successful in securing alternative funding and half were not successful.

Table 7 provides detail in responses to question number five.

Table 7

5. After implementation of your current drowning prevention program, what percentage decrease in submersion incidents did you experience?			
answer options	Response Average	Response Total	Response Count
Percentage	21.83	262	12
		answered question	12
		skipped question	124

Respondents	Percentage
1	10
2	100
3	0
4	0
5	5
6	75
7	0
8	0
9	5
10	0
11	20
12	47

The results for question number five show that of the twelve respondents who answered this question, the average percentile reduction in submersion incidents was nearly 22%. This range for this data set is 100, from 0% reduction to an estimated 100% reduction.

Table 8 provides detail for responses to question number six.

Table 8

6. Which of the following does your organization utilize specifically for drowning prevention program? **Please check all that apply**		
answer options	**Response Percent**	**Response Count**
Public Education	92.59%	25
Swimming Lessons	25.93%	7
CPR Training	59.26%	16
Door to door canvassing	3.70%	1
Other (please specify)	48.15%	13
answered question		**27**
skipped question		**109**

Other (please specify)
City pool Drowning prevention Expo day
Radio, Banners, PSAs
Home Pool Safety Survey
Home Safety Survey Available on Request
Safety days, press releases, scholarships for swimming lessons
PSA on TV, Water Safety/Water Rescue; Home Fire and Life Safety Inspections
PFD loan program
PSA spots, School board presentations, day care visits, contests, literacy groups
Pool Safety Survey
Home Water Safety Checks
Pool safety checks
swimming pool inspections
Public Safety Training

Question number 6 has resulted in the identification of specific tactics and/or approaches that were utilized and to what frequency they were utilized. Twenty-seven organizations responded with the majority, 25 or 93%, citing public education as the leading risk reduction method. CPR training was the next most utilized approach at nearly 60% or 16 agencies. CPR was then followed by "Other" at 48% and swimming lessons at 26%. Open ended responses to *Other* tactics are also outlined in Table 8. These responses were not categorized or analyzed for frequency. Finally, canvassing (or door to door) activities have been utilized at less than 4%, or only 1 agency out of the 27 respondents.

Table 9

7. What are the approximate costs of your efforts?			
answer options	Response Average	Response Total	Response Count
Personnel	48483.21	678765	14
Printed Materials	1612.67	24190	15
Other	22372.22	201350	9
		answered question	16
		skipped question	120

Respondents	Personnel	Printed Materials	Other
1	2	4500	350
2	0	500	
3	3	0	
4	0	0	0
5	50		
6	10		
7	1000	400	0
8	150	40	
9	0	0	0
10	100	0	1000
11	500		
12	0	0	0
13	500	0	0
14	5000	1000	
15	672000	17000	200000
16	0	200	0

The results for question number 7 are ambiguous and provided in Table 9. Failure of this author to correctly word this question and force specific answers resulted in corrupted data. For example, several agencies submitted the number of personnel utilized toward drowning prevention at 0 to 3 personnel. This would be indicative of progressive agencies with formalized submersion prevention programs. Other agencies submitted numeric values that could be interpreted as either the total number of personnel who may participate in some facet of the program or the actual dollar amount of the total salary dedication to submersion prevention activities. Without further definition, this question will not be considered further.

Table 10 outlines responses provided for question number ten.

Table 10

10. If you utilize coalitions, with whom did you partner?	
answer options	Response Count
	13
answered question	13
skipped question	123

Respondents	
1	Health Department, Drowning Coalition
2	Hillsborough Water Safety Team, Safe Kids Coalition, West Coast Drowning Prevention Coalition
3	Drowning Prevention Committee formerly known as the West Central Florida Drowning Prevention Coalition.
4	SWIM Lee - Lee Co Health Dept
5	Health Department, other local fire
6	Department of Health
7	Rocky Mountain Walleye Assoc
8	St. Joseph's Children's Hospital, Tampa
9	Safe Start
10	We partnered with SWIM Lee, Lee County Health Department
11	City pool
12	public & private partnerships
13	YMCA, Baby Proof

Question number 10 resulted in a brief listing of coalitions that other agencies have utilized in their drowning and submersion prevention programs. The open ended responses could be generally classified as coalitions with safety agencies, Departments of Health, children's hospitals, and YMCA's and swimming pools.

Table 11

12. Please list the names of any grants or organizations that assisted in funding your efforts.

answer options	Response Percent	Response Count
Organizations	100.00%	7
Grants	28.57%	2
Other (please specify)	14.29%	1
answered question		7
skipped question		129

Respondents	Organizations	Grants
1	Drowning Coalition - swim lessons	Health Department $3,000.00
2	Plantation General Hospital	
3	Children's Board	Local media that donated air time
4	FL DoH, Safe Kids	
5	RMWA See #10	
6	SWIM Lee, Lee County Health Dept. funded all but personnel costs	
7	USLA (Product and Materials); Safe Kids (Materials); Sheriff's Office (Publications)	EMS Matching Grants; FIND Grants; FRDAP Grants

Table 11 provides detail for responses to the final question number twelve. It is found that seven agencies answered this question and were successful in developing alternative funding sources for their respective drowning prevention programs. Once again, children's hospitals, the Department of Health, United States Lifeguarding Association (USLA), and Safe Kids are the leading agencies to support such community risk reduction. Three of the respondents were successful in obtaining specific funding including an EMS matching grant.

Research question number five has asked which strategies are feasible for implementation by SPFR. An interview / brainstorming session was conducted in an effort to

provide results for this question. This session was largely guided by discovery through the literature review.

Historical perspective was provided by Public Education Specialist Julie Rivard on July 13, 2007. Pinellas County and St. Petersburg experienced a significantly higher rate of submersion incidents in 2003 (Figure 1). The previous high rates of submersions were in approximately 1998 when the Pinellas County Office of the Medical Director took a leadership role by developing the *Submersion Incident Safety Survey* (Appendix D). Data were collected for several years with the use of this tool and other specific tracking mechanisms. A concerted effort in public education and media releases were utilized post 2003 and a dramatic decrease in overall submersion incidents occurred in both 2004 and 2005 (personal communication, July 13, 2007). However, after this focused effort, the submersion problem has returned in 2006 with values 300% higher than in 2005. In fact, more fatalities due to drowning occurred in 2006 than in both 2004 and 2005 combined.

Analysis of the total submersion prevention program within the city of St. Petersburg has revealed that it is a well rounded systems approach to the phenomenon. Limited personnel, time, and educational opportunities are supplemented by CPR training, swimming lessons, lifeguarded public pools, and pool safety barrier statutes. In addition, the mass mailings conducted by the Safe Kids and drowning prevention coalitions, as well as the required educational material required by Florida State Statues, make up a well developed approach to the unwanted submersion incident problem.

Therefore, analysis, and a good measure of common sense, results in the determination that the greatest impact to be expected would be in public education as evidenced by the

sudden flux of incidents in 2003 and the subsequent reaction by the drowning prevention community.

Specifically, the actions that SPFR could take to assist in the reduction of unwanted submersion incidents would be in increasing educational opportunities within the city of St. Petersburg, irrespective of the participation of the coalition. Additionally, the utilization of one person to accomplish the task of reducing the risk of a leading cause of injury and mortality is not sufficient.

Results of the brainstorming session conducted on July 13, 2007 by Chief William Jolley, Julie Rivard, and this author is provided with a brief examination of the feasibility. Table 12 provides an overview of the suggestions provided and a brief summary of the discussion that contributed to the feasibility rating. Feasibility has been categorized as either high, moderate, or low. High feasibility would indicate that the suggestion would be feasible in short notice if approved by administration. Due to severe budget cuts within Florida and SPFR, highly feasible suggestions are considered to have little or no fiscal requirements. A feasibility rating of moderate would indicate that the suggestion may have difficulty with immediate implementation. Low feasibility is indicative of a low probability of this suggestion coming to fruition. A low feasibility rating is not an indication of a poor idea, but rather one that may have a high degree of difficulty for delivery to the implementation stage.

Table 12

Suggestion	Feasibility	Comments
Target groups / areas	Low	Research resulted in no statistically relevant target areas
Canvassing	High	Utilize line personnel – very successful in Phoenix, AZ
Mass Marketing	Moderate	Drowning coalition already conducts mass mailings each April.
Training of line personnel	High	Submersion prevention practices may be employed in a variety of opportunities.
Pool Safety Surveys	High	In conjunction with training and canvassing. Re-emphasis by SPFR to utilize pool safety surveys.
Life Jacket (PFD) Loaner Program	Low	Need more data and additional funding to support this program, however, very successful in Alaska.
Public Education Programs	Moderate	Public Education has one of three positions eliminated recently due to budget cuts. Discussion must occur on how to best expand and implement submersion prevention education.
CPR Training	Moderate	Requirement of CPR certification with the purchase of new or existing pools would require legislative and political support. More information will be required to alter the feasibility rating.
Require Lifeguards at Beaches	Low	Research into beach drownings will need to be conducted to support this suggestion.
Media	High	Utilize media outlets to support the total effort of submersion prevention.
Acquire Grants	Moderate	Extremely competitive and subject to non-renewal.

Discussion

The results of this study have shown that St. Petersburg is experiencing a per capita fatality rate due to drowning at a higher rate than the highest nationally reported per capita value. All of the national per capita drowning fatality rates were found to be between 1.1 and 1.56 (Nationmaster, 2004; CDC, 2004; MMWR, 2004; Newell, 2001). However, St. Petersburg is experiencing an average of nearly seven deaths per year at a fatality rate of 2.7 per 100,000 population (PC OMD, 2007). This is also significantly higher than the mean per capita fatality rate of 2.07 for the state of Florida due to drowning (Florida State DOH, 2007). Statistically, these findings were found to be significant at the 95% confidence level. Therefore, the potential for these findings to occur due to sample variation or by pure chance is less than 5%.

It is reported that drowning is the leading cause for drowning deaths in all children and specifically children under the age of five (Brenner, 2003; Safe Kids, 2004). It is also reported that Florida has the highest fatality rate due to drowning in the United States for children under the age of 19 (Brenner, 2003). Hoebel and Elder (1990) reported that in Florida, drowning is the leading cause of accidental death in the home. Werdmann (1994) states that in Florida, drowning is the leading cause of death for the ages of less than five years.

Interestingly, it is reported that drowning deaths are the second leading cause for unintentional injury for the ages of less than 24, 19, and 14 respectively (Newell, 2001; Brenner, 2003; Safe Kids, 2004; MMWR, 2004). Lastly, Brenner (2003) reports that drowning fatalities are the third leading cause of injury related death for all age groups. For

the state of Florida, drowning is the third leading cause of death for children behind motor vehicle crashes and falls (FS DOH, 2007).

The first research question asked, what are the similarities in submersion incidents within the city of St. Petersburg, Fl? St. Petersburg is experiencing 59% of all submersion incidents between the months of April and August over the study period of 2001 through June 2007. This finding is in concert with Brenner's finding that 66% of the deaths under 15 occurred between the months of May and August (2003, p. 442). When discussing age, adults (> 11) had the greatest of occurrence of submersion incidents at 60% and children (< 12) suffered at 36% within St. Petersburg. The mean age for all adults involved in a submersion incident is 46 years of age, while children remained consistent with the literature at four years of age. Therefore, in St. Petersburg the raw data support the fact that submersions are nearly equally distributed between ages 24 and under and 25 and over, with the adult category of over 25 garnishing the greatest frequency of submersion incidents. However, when considering that the 24 and under community is less than 30% of the total population, this age group has the higher per capita rate for submersion incidents.

When considering location of submersion incidents, the literature designates pools as the leading location for submersion incidents. The literature reports that pool drownings account for 50% to 75% of all occurrences (Werdmann, 1994; Dickenson, 1995; Safe Kids, 2004). In contrast, Brenner (2003) found that as age increases so does the frequency of drowning incidents in waterways versus pools. However, since children experience the greatest percentage of fatalities, pools continue to be the leading location for submersion incidents and death nationwide. Interestingly, Brenner (2003) did conclude that in Pinellas

County children greater than the age of 11 are more likely to drown in a local waterway (p. 442).

St. Petersburg statistics reveal that waterways are the leading location for submersion incidents at 52% followed closely by pools at 43%. Bathtubs accounted for another 4% and buckets concluded the remaining 1%. However, waterway submersion incidents are categorized as greater than and less than 100 yards from the beach. Specific data is not available to establish boating incidents. Therefore, if the assumption is that the submersion incidents that are greater than 100 yards from the beach are boat related, then pools would move to the leading location of submersion incidents, followed by boat related submersions and beach submersions of less than 100 yards from shore. St. Petersburg is performing as expected in accordance with the available body of knowledge.

Research question number two asked, what are the identifiable at-risk factors in submersion incidents within the city of St. Petersburg, FL? The literature provided evidence that socioeconomic status and ethnicity played a significant role in drowning fatalities (Brenner, 2003; Saluja, et al, 2006; CDC, 2003; Safe Kids, 2004). However, in the city of St. Petersburg from 2001 through the midpoint of 2007, there was no correlation between submersion incidents and socioeconomic status or pool density. In fact, in contrast to the literature review the white population experiences the greatest number of submersion incidents at nearly 72%. In addition, accounting for the relative population in each ethnic group, the white community remained the leading at-risk group for suffering a submersion incident. Within the city of St. Petersburg, ethnicity did play a role as to the locations of submersion incidents. For example, it was found that pools accounted for the greatest risk for the African-American community and local waterways for the white community. However,

once again, further delineation of the waterway location would catapult pools into the leading location for whites as well.

St. Petersburg is divided into 14 zip codes. Submersion incidents and pool density were cross tabulated with each zip code to investigate relationships. Although several zip codes stood out as the leading zip codes for submersion incidents, no statistically significant correlations exist between total submersion incidents and pool density at the .05 alpha level. However, one limitation to this specific analysis is that the total population for all pools within St. Petersburg is not known. This author was not able to gather this data prior to the submission date. The data set for pools used in this analysis are all of the new installations since 2000 as provided by the St. Petersburg Building Department.

Research question number three asked, what is the current status of drowning prevention efforts in St. Petersburg? The literature review overwhelmingly supported public education campaigns and pool safety barriers to prevent drownings (Saluja, et al, 2006; Brenner, 2003; CDC, 2001; CPSC, 2001; Safe Kids, 2004; Newell, 2001). In addition, the literature supports the ideal that the most significant impact on a submersion victim's successful recovery is in the pre-hospital setting (Quan, Wentz, et al, 1990; APCO, 2000; Newell, 2001; Brenner, 2003; Dickenson, 1995).

St. Petersburg Fire & Rescue's prevention strategies include all of the generally held concepts of drowning prevention. Utilizing a systems approach to the problem, SPFR provides limited public education that is supplemented by mandatory pool safety barriers, an active CPR training program, and swimming lessons and lifeguards at public swimming pools. Data were not available to identify submersion incidents specifically at municipally owned and operated swimming pools in St. Petersburg; however, the literature supports and

recommends the utilization of lifeguards (CDC, 2002; Newell, 2001). Newell (2001) reported that in 1998 there were seven fatalities at guarded facilities and 111 in unguarded facilities. The CDC (2002) reports that there is a 1 in 16 million chance of drowning death in a USLA guarded facility. All of St. Petersburg's publicly operated swimming pools have lifeguards. However, further study should be conducted to identify the significance of waterway drownings that are less than 100 yards from the beach. Once this data has been formulated, then discussion should be held as to the posting of lifeguards at these "public" beaches.

Research question number four asked, what strategies do other departments employ to reduce and prevent submersion incidents? The literature review has mixed reviews as to the number of fire departments with submersion prevention programs in place. Lorber (2004) found that only 13 departments out of 40 had submersion prevention programs. The survey results revealed that of the 136 departments that responded to the survey, only 25% or 34 of the fire departments have a submersion prevention program within their organization. This finding is in concert with Lorber as both studies were conducted within the State of Florida. However, it was found that in one California study twelve out of the 14 organizations studied had drowning prevention programs (Brown, 2003).

Further survey results showed that nearly 78% of all fire departments that had a submersion prevention program considered it to be successful with most respondents reporting an average of 22% reduction in submersion incidents. Overwhelmingly, 93% of the organizations utilized public education and 60% utilize CPR training programs. Interestingly, less than 4%, or 1 organization, utilized canvassing as part of their submersion prevention program. The Phoenix Fire Department reported significant results with the utilization of this technique (Worley & Simmons, 1989).

The survey also found that the majority, or 72% of the respondents, spent less than five hours per week on submersion prevention efforts, as does SPFR. Coalitions were utilized 78% of the time and successfully securing alternative funding was split in half at 50%. Findings for estimated fiscal contributions for this effort were not effective and therefore will not be presented.

A summary discussion must be provided prior to addressing research question number five. St. Petersburg is experiencing significantly higher per capita fatalities secondary to drowning than those experienced in the United States and in Florida. Explanation of the greatest at-risk groups is ambiguous. For example, in St. Petersburg adults have the greatest frequency of submersion incidents. However, per capita children accept the greatest propensity for experiencing a submersion incident. Therefore, efforts to target children alone would allow the greatest number of submersion incidents to remain unaddressed. In contrast, targeting the adult population would allow the group with the greatest percentage of deaths per population, but a less frequent submersion rate, to go unattended.

Similarly, a waterway is the leading location of submersion incidents in St. Petersburg. However, all locations for lakes, ponds, and greater than and less than 100 yards from shore were included in the waterway category. It was found that 65% of the waterway submersions occurred at greater than 100 yards offshore. Further delineation of the waterway category would then allow the location of pools to become the leading location of drowning for all ages. Without any alterations to the data set, pools are the leading location for drowning in children. Therefore, the assumption could be made that pools would be the likely target for renewed awareness efforts. However, the greatest numbers of submersion incidents are occurring in waterways.

Socioeconomic indicators such as age, ethnicity, income, unemployment, homeownership, population, and educational attainment were found to have no significance as to the number of submersion incidents within St. Petersburg. Geographic location and pool density also proved to be less than useful as a predictor of submersion incidents. Therefore, there are no specific indicators or at-risk groups observed in the city of St. Petersburg. Socioeconomic status and ethnicity has no relationship to the submersion problem in St. Petersburg. These findings only support strategic planning for age and location of submersion incidents.

It is this author's opinion that although percentiles and proportionalities are important tools for strategic planning and risk identification, for this risk, attention to raw numbers should play an equal if not greater role in the strategic planning of immediate submersion prevention efforts. This author believes that a strategically planned long term commitment that begins with the education of children in elementary and pre-school's would experience synergistic effects over the following 20 years. A submersion prevention community mindedness would develop as this group matures that would transcend all categories of age, ethnicity, and submersion locations.

The current status of submersion prevention efforts in the city of St. Petersburg as a whole are well developed. The combination of statutory pool safety barrier requirements and educational materials in conjunction with mass mailings by the drowning coalition, April Pool's day efforts, CPR training, rapid fire/EMS response times, and pools with AED's, lifeguards, and swimming lessons have comprised this holistic effort. Therefore, the arena in which potential improvement can be made is in the public education efforts provided by SPFR and the coalition, either independently or collaboratively. The estimated time of less

than five hours per week by a single individual out of 357 employees may not the best utilization of available resources. SPFR has the ability to utilize additional resources by institutionalizing community risk reduction, which includes submersion prevention efforts. In these efforts, emphasis can be placed on preventative educational opportunities, marketing campaigns, and increased CPR training.

Research question five asked, what strategies are feasible for St. Petersburg Fire & Rescue to implement? Results of a brainstorming session provided multiple suggestions that were categorized as to the degree of feasibility. All suggestions were presented in the results section. However, suggestions that received the highly feasible rating are canvassing, training of line personnel, re-emphasis on pool safety surveys, and a media blitz. All of the above suggestions are within the direct control of SPFR with little or no fiscal restrictions.

Overall the approach to submersion prevention in the city of St. Petersburg is well developed. However, there are strategies that can be employed by SPFR to supplement the current efforts that should significantly reduce the submersion experience with little financial impact. The implications of the results of this study point toward the fact that a singular effort in any area studied will not provide a significant impact on the overall submersion problem in St. Petersburg. As a leader in community risk reduction, SPFR should be cautious to keep a global view of these efforts and therefore prevent unwitting participation in special interests of members of the coalition. It is not this author's intent to undermine the value of coalition building, it is rather the intention to maintain an acceptable degree of autonomy in the process where, as a leader, SPFR can utilize coalitions to benefit its interests and assist others with their interests, but not lose sight of the entire scope of the submersion problem in St. Petersburg.

Recommendations

The city of St. Petersburg is experiencing a per capita drowning rate that is significantly higher than the average per capita drowning rate for the nation and the state of Florida. The purpose of this study is to identify trends in submersion incidents within the city of St. Petersburg, FL and to make recommendations for risk reduction. The following recommendations are a direct result of the findings of this study.

Recommendations specifically related to submersion prevention activities:

1. It is recommended that SPFR utilize on-duty personnel in submersion prevention efforts such as:
    a. Risk Reduction Training in Submersion Prevention
    b. Pool Safety Surveys
    c. Canvassing
    d. April Pool's Day

Currently, one individual contributes approximately 12.5% of their work week towards submersion prevention efforts. The overall community approach to submersion prevention is well-developed. Therefore, one area where improvement may be made is in the time devoted to this significant community problem.

2. It is recommended that a labor-management task force is created by January 31, 2008 in an effort to cooperatively and strategically plan on how to best utilize available resources.

This task force should consist of the Operations Division Chief, Prevention Division Chief, Drowning Prevention Coordinator, Rescue Division Chief and four labor members to include a Firefighter/EMT, a Firefighter / Paramedic, a Lieutenant, and a Captain.

3. It is recommended that the department Public Information Officer conduct regular media events and releases concerning submersion prevention in conjunction with traditional public education deliveries.

The media can be a powerful tool with free advertising. The department should strategically incorporate media events and releases as part of the overall approach to submersion prevention. This will not only get the message to a large audience but also contribute to the department's community equity.

4. It is recommended that the department incorporate drowning and submersion prevention programs into their current school-based delivery of fire prevention.

The success of a submersion prevention program for a diverse community such as St. Petersburg may be found in the long-term reduction of submersion incidents. Building a community of risk reducers can and should begin at the pre-k and elementary school levels. It is recommended that SPFR incorporate submersion prevention as part of this delivery or as a stand alone delivery with the traditional fire messages as a model for success.

5. It is recommended to conduct further research into waterway drownings. Specifically, boating related incidents in comparison to true beach incidents.

The literature has suggested that the great majority of boating related incidents resulting in death did not involve the use of a personal flotation device (PFD). If data suggests the need, SPFR should investigate the use of life jacket (PFD) loaner programs at city boat ramps. Additionally, when discussing beach related incidents, if the data supports it, recommendations may be made to officially operate publicly accessible beaches as designated public beaches with certified lifeguards.

6. It is recommended to increase the number of citizens within St. Petersburg that are CPR and AED certified.

The literature supports the need for immediate pre-hospital intervention, as it is the largest predictor of patient outcome. In a general sense, the more of the community that is trained in quality CPR, the greater the chance of experiencing a submersion in the presence of someone who is properly trained to initiate CPR. Specifically, it is recommended that the local governing body require certification in CPR as part of the permitting process for new and refurbished residential pools.

7. It is recommended that the organization continue to maintain current deployment models for BLS and ALS service levels.

St. Petersburg Fire & Rescue continues to provide excellent service with one of the most competitive response and deployment models in the country. The significance of early ALS resuscitative efforts is supported unanimously in the literature. Therefore, it is recommended that as part of the entire submersion prevention program within the city of St. Petersburg, the current deployment and staffing models should be considered the minimal level of service.

8. It is recommended that SPFR become a leading member in the West Coast Drowning Prevention Coalition.

The autonomy of efforts within the city of St. Petersburg may be diluted as part of the county wide effort in Pinellas. SPFR, taking a leadership role, may serve the community well in coalition resources as well as solidify its community equity and authority when delivery submersion prevention information.

Future readers and researchers of this study may want to focus on several issues within this construct. First, the breakdown of variables also waters down the statistical findings. For

example, the location of waterways may be further delineated to lakes, drainage ponds, beaches, and boating incidents if desired. It is this author's opinion that at some threshold the myriad of proportionalities and statistical conversions will "muddy' the waters into non-standardized reporting. This leads to the second recommendation that future research make a concerted effort to standardize reporting for submersion and drowning incidents.

Each researcher in the literature review provided a subtle difference in the presence of statistical findings. For example, first…..in the home; first … in Florida; first….unintentional injury under 5; first….in children; first….in children under 24, 19, 14, and 11 respectively, etc. Statistically, comparative data will be much more credible when all reporting mechanisms are standardized, such as in age of children.

Future research in communities across the United States and regionally will depend on the available data set. Therefore, it is recommended that research is conducted to develop and adopt a uniform reporting instrument similar to Appendix D that will provide the full measure of the required and standardized data for community leaders and researchers to make inferences and data based decisions. It is this author's opinion that the subtleties in reporting are in direct relation to the available data of convenience in research.

Lastly, this research stopped short of recommending specific public education messages. It is this author's opinion that this should be left to the community's personalized risk and historical experience.

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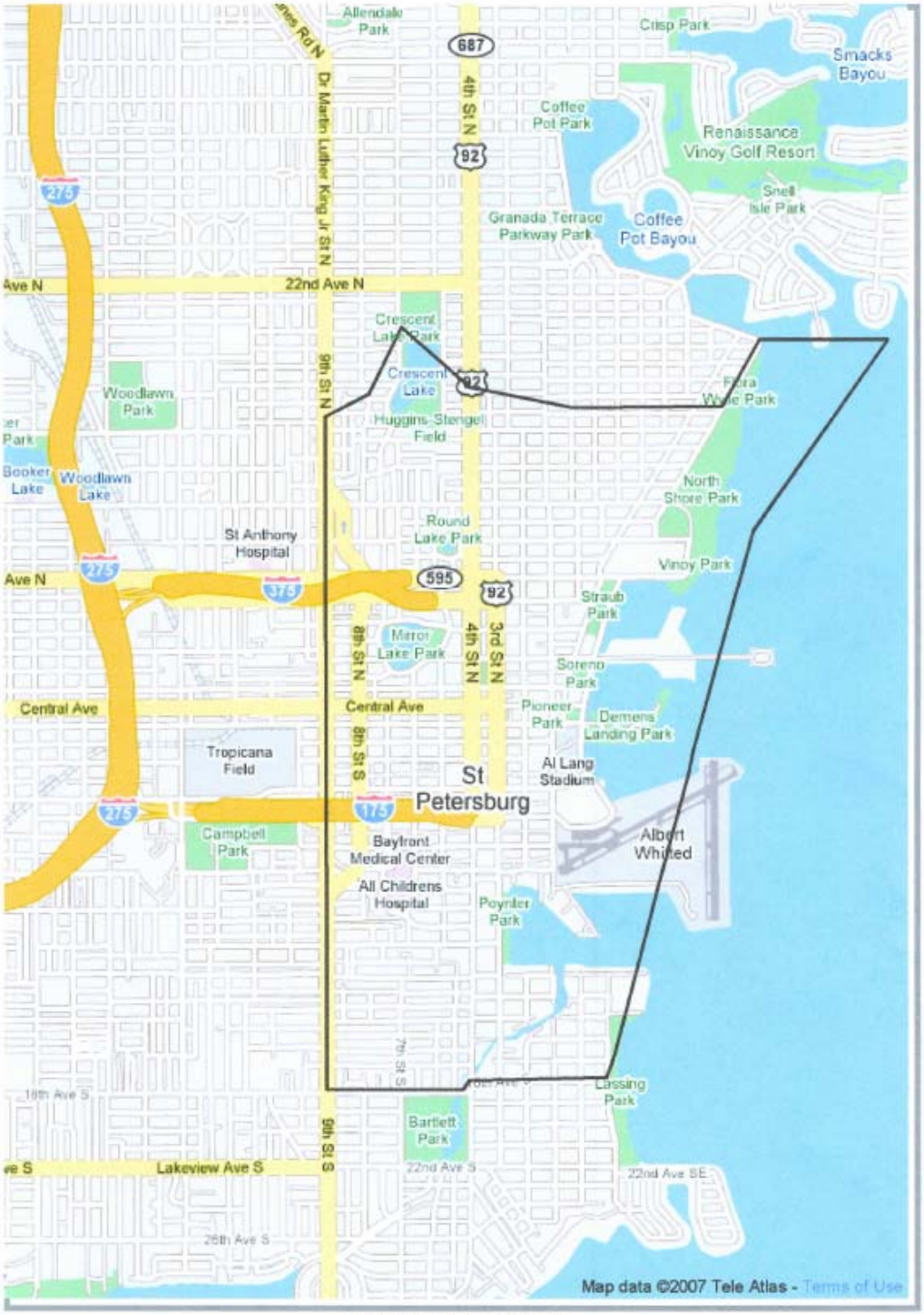
Appendix A



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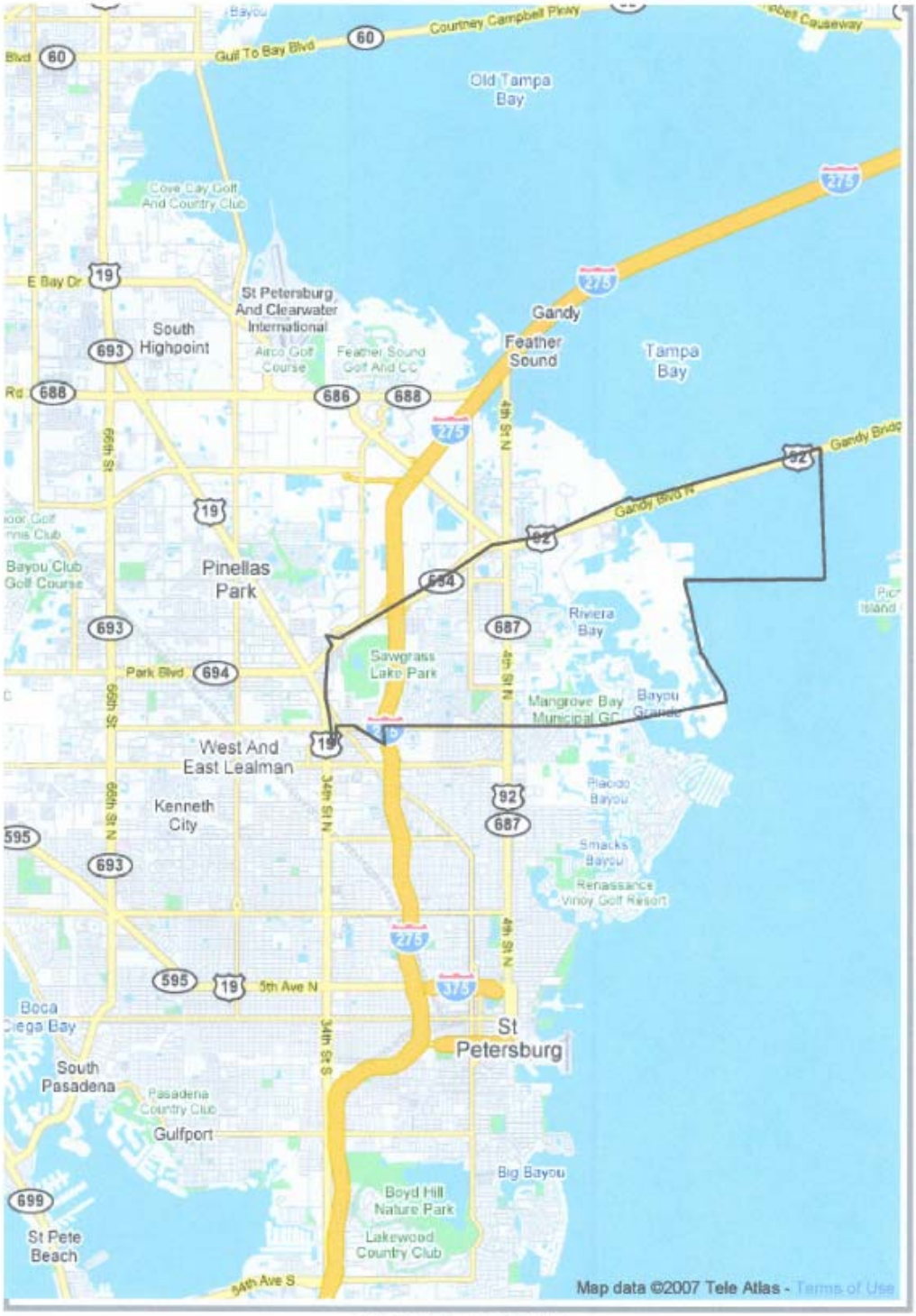

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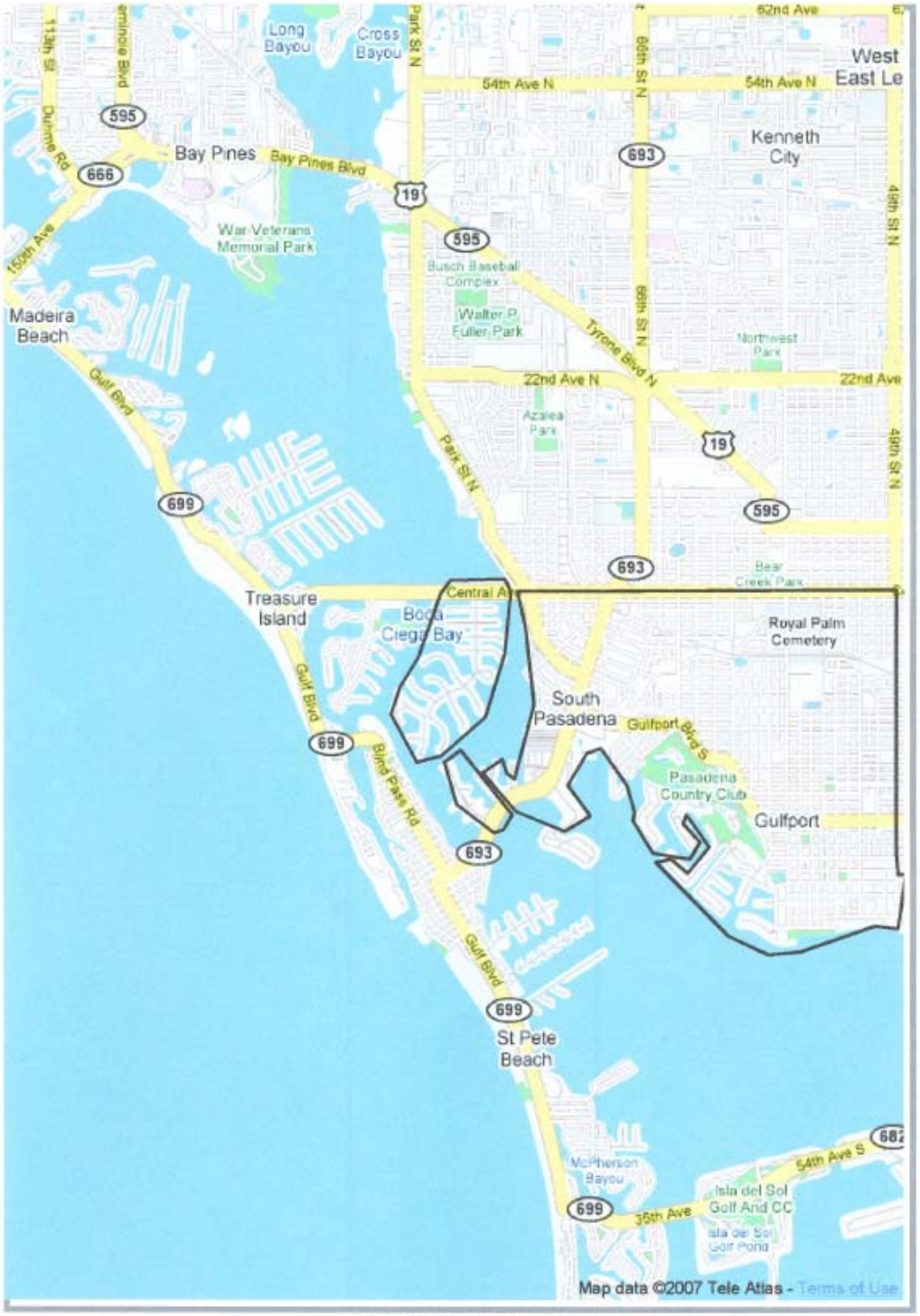

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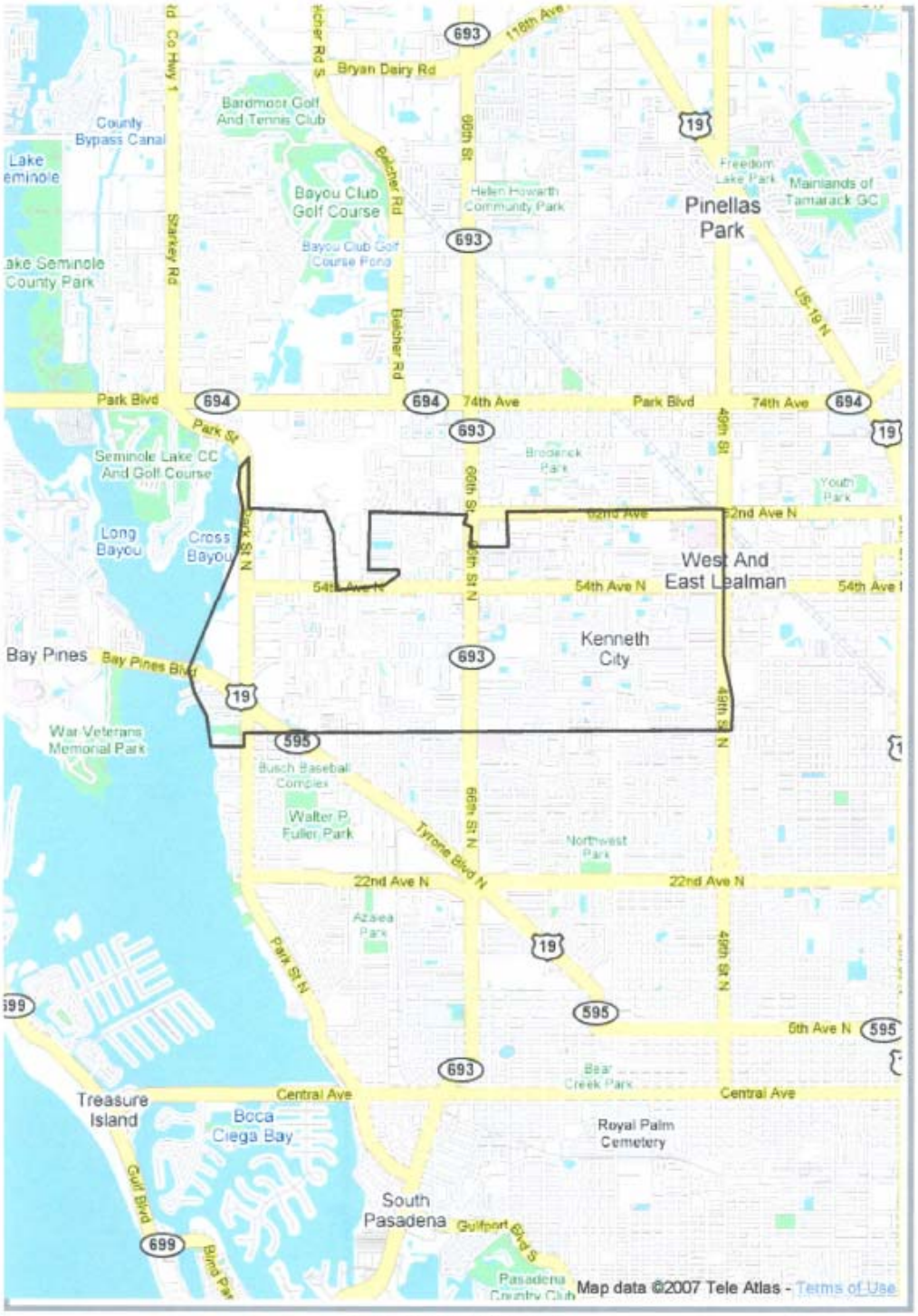

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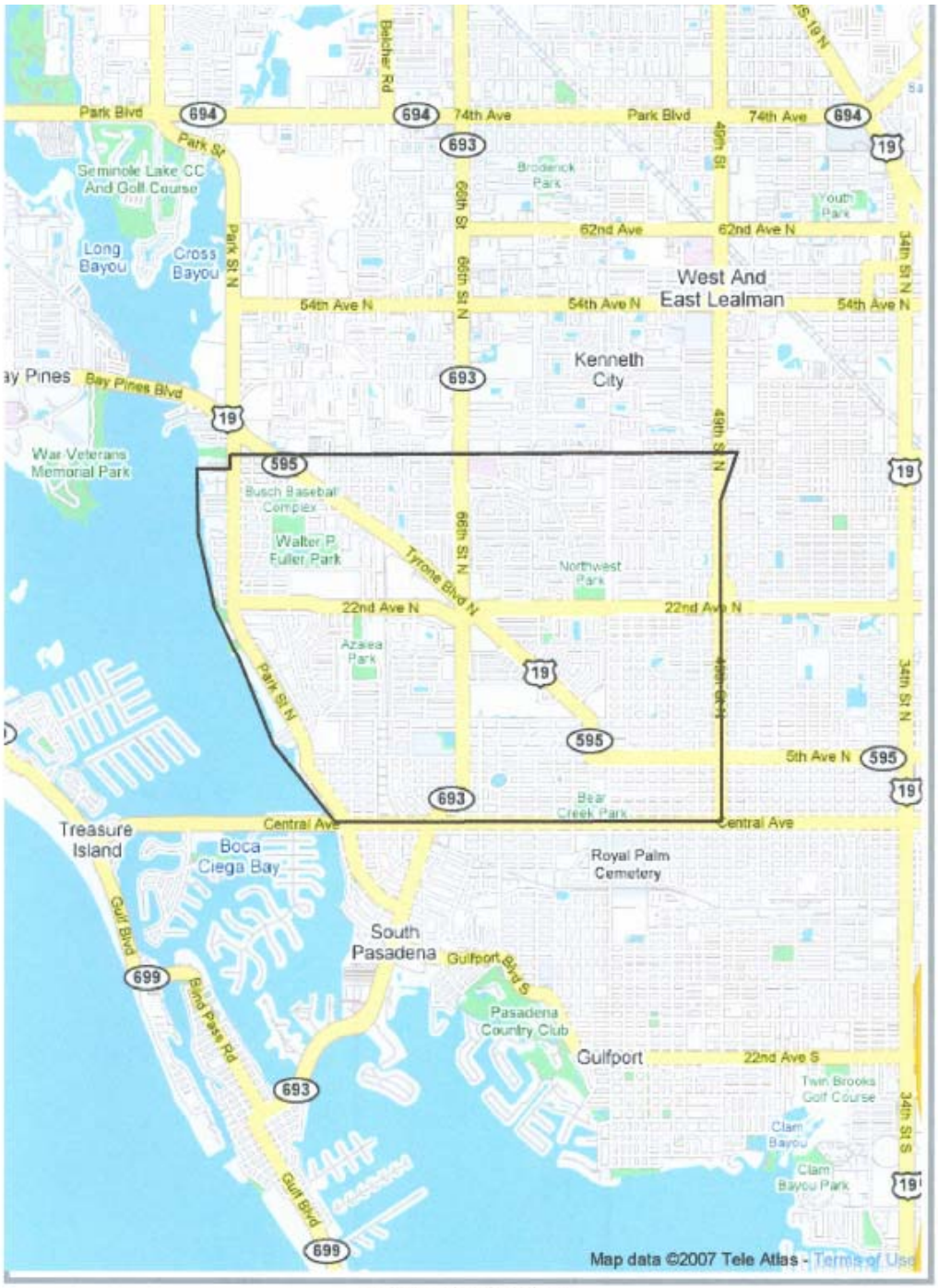

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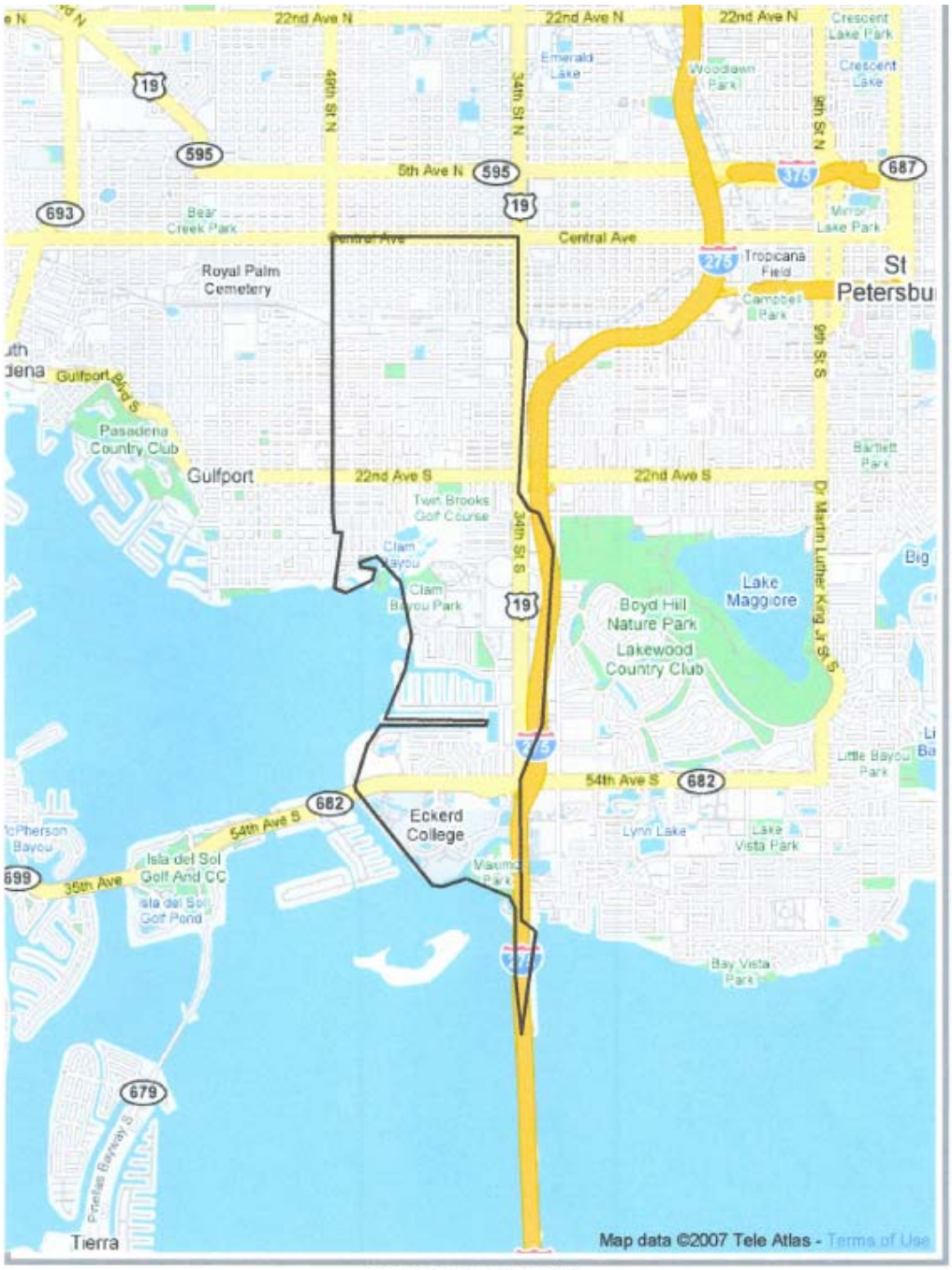

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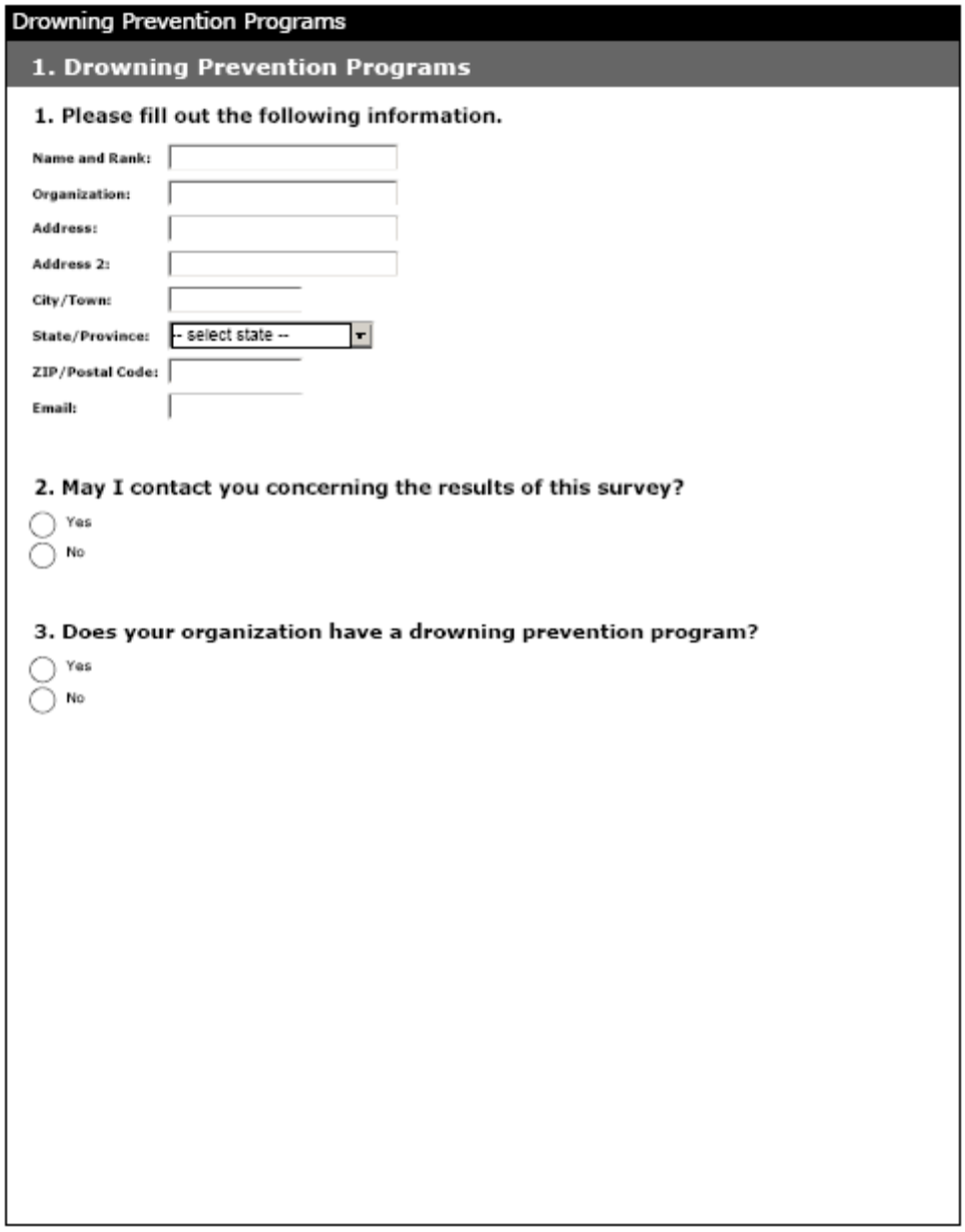
Appendix B



Drowning Prevention Programs

1. Drowning Prevention Programs

1. Please fill out the following information.

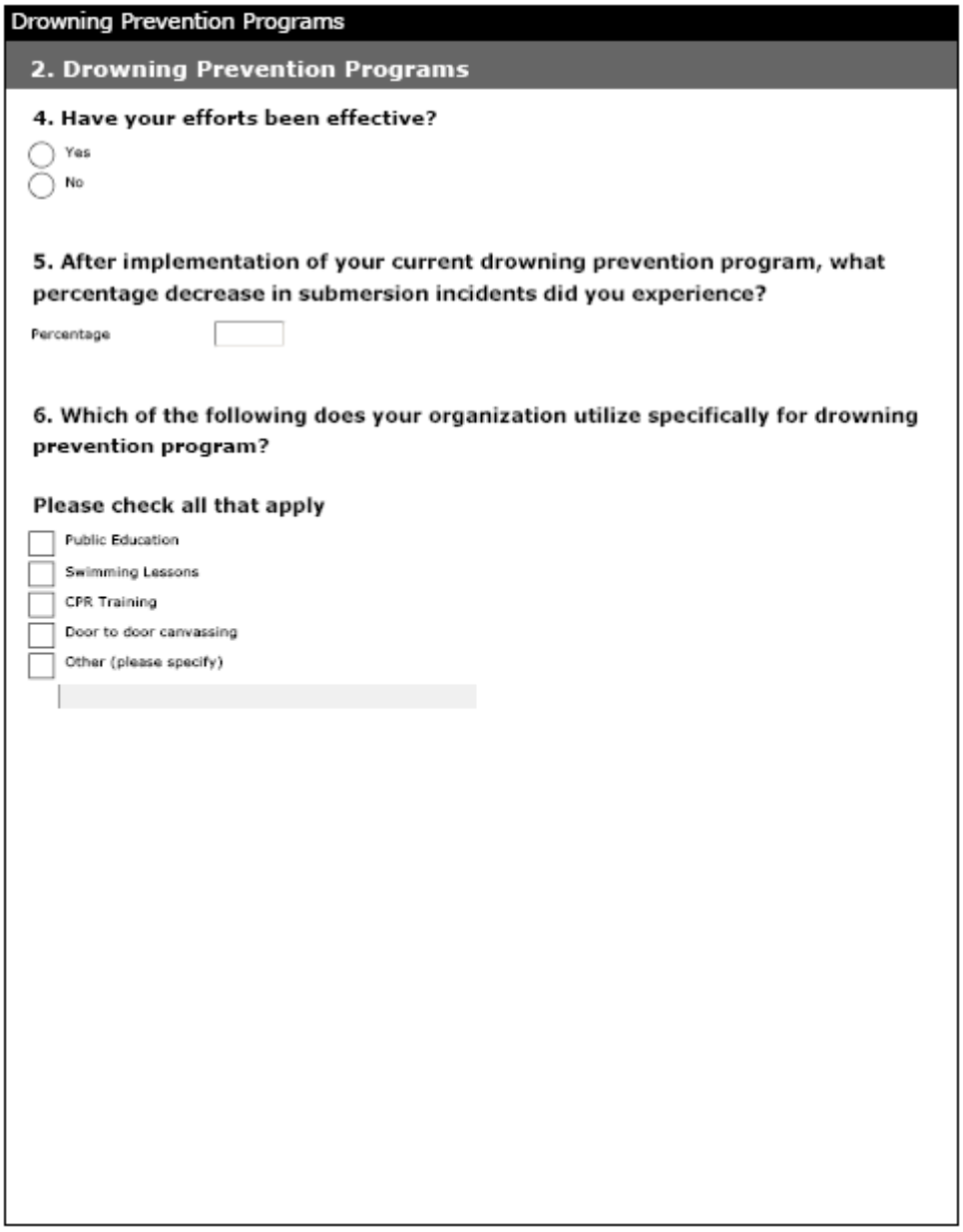
Name and Rank:
Organization:
Address:
Address 2:
City/Town:
State/Province: -- select state --
ZIP/Postal Code:
Email:

2. May I contact you concerning the results of this survey?

- Yes
- No

3. Does your organization have a drowning prevention program?

- Yes
- No



Drowning Prevention Programs

2. Drowning Prevention Programs

4. Have your efforts been effective?

- ◯ Yes
- ◯ No

5. After implementation of your current drowning prevention program, what percentage decrease in submersion incidents did you experience?

Percentage

6. Which of the following does your organization utilize specifically for drowning prevention program?

Please check all that apply

- ☐ Public Education
- ☐ Swimming Lessons
- ☐ CPR Training
- ☐ Door to door canvassing
- ☐ Other (please specify)

Drowning Prevention Programs

3. Drowning Prevention Programs continued

7. What are the approximate costs of your efforts?

Personnel

Printed Materials

Other

8. How much time, each week, is allotted specifically toward your drowning prevention program?

- ◯ 0-5 hours per week
- ◯ 5-10 hours per week
- ◯ 10-15 hours per week
- ◯ 15-20 hours per week
- ◯ 20-30 hours per week
- ◯ 30-40 hours per week

9. Have you utilized coalitions in your efforts?

- ◯ Yes
- ◯ No

10. If you utilize coalitions, with whom did you partner?

11. Were you successful in securing alternative funding for your drowning prevention program?

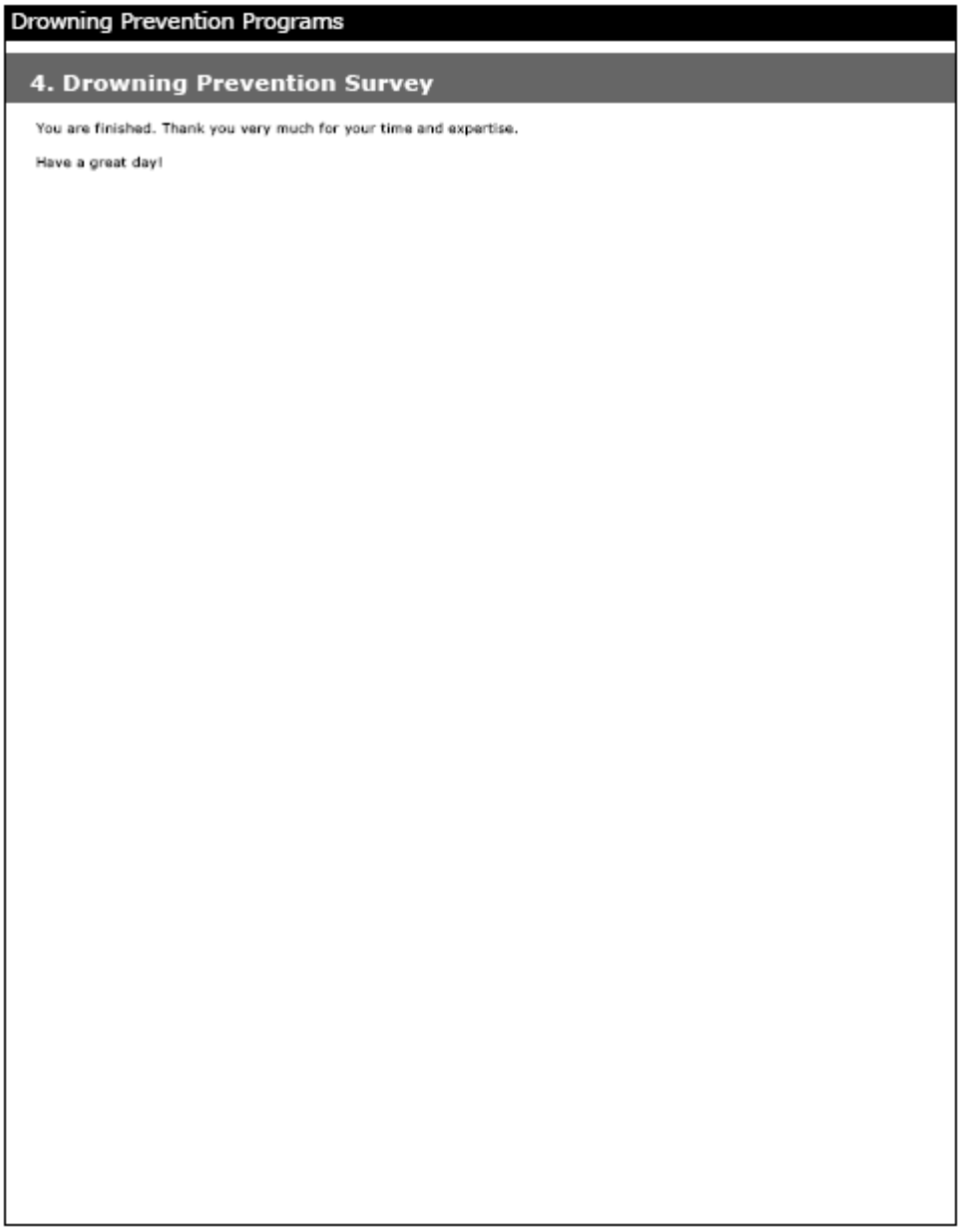
- ◯ Yes
- ◯ No

12. Please list the names of any grants or organizations that assisted in funding your efforts.

Organizations

Grants

Other (please specify)


Drowning Prevention Programs
4. Drowning Prevention Survey
You are finished. Thank you very much for your time and expertise.
Have a great day!

Appendix C

Survey Respondents

Respondents	Name and Rank:	Organization:	Address:	City /Town	Stat	ZIP/Postal (	Email:
1	Dave Schmaltz Deputy Chief	Miami Township Division of Fire/EMS	2710 lyons Rd	Miamisburg	OH	45342	dschmaltz@miamitownship.com
2	Richard Barineau Captain	Tallahassee Fire Department	2964 Municipal Way	Tallahassee	FL	32304	barinear@talgov.com
3	Dean O'Nale	Oldsmar Fire Rescue	225 Pine Ave North	Oldsmar	FL	34677	donale@ci.oldsmar.fl.us
4	Diane Kessluk, Fire & Life Safety Educator	Winter Park Fire Rescue	343 W. Canton Avenue	Winter Park	FL	32789	dkessluk@cityofwinterpark.org
5	Brian Stoothoff, Battalion Chief	Ocala Fire Rescue	410 NE 3 Street	Ocala	FL	34470	bstoothoff@ocalafl.org
6	William McElligott Division Chief	Dunedin Fire Department	1042 Virginia St	Dunedin	FL	34698	firemarshal@dunedinfl.net
7	Krista Ott- Risk Reduction Specialist	Gainesville Fire Rescue	1025 NE 13th St	Gainesville	FL	32601	ottkk@cityofgainesville.org
8	George Cooper / Fire Fighter	Concord Volunteer Fire Department	4838 Fairbanks Ferry Road	Havana	FL	32333	concordvfd@yahoo.com
9	Ed Healy FF/EMT-P	Monroe County Fire rescue	63rd Street	Marathon	FL	33040	wordhealys@aol.com
10	Chief Robert Meyer	Francis VFD	P O Box 2802	Palatka	FL	32178	rmeyer@claysheriff.com
11	Lt JohnD MCCommon	Kissimeee Fire Dept	200 W Dakin Ave	Kissimmee	FL	34741	Jmccommon@kissimmee.org
12	L. Puddin Race, Education Coordinator	St. Lucie County Fire District	2400 Rhode Island Avenue	Fort Pierce	FL	34950	puddin@slcfd.org
13	Rob Hancock, Fire Chief	Punta Gorda Fire Dept.	1410 Tamiami Trl	Punta Gorda	FL	33950	rhancock@ci.punta-gorda.fl.us
14	Joel Gordon - Battalion Chief	Plantation Fire Dept.	550 NW 65 Ave	Plantationq	FL	33317	jgordon@psd.plantation.org
15	W.J. Trinder Sr. Fire Chief	Jasper Fire Rescue Dept.	208 W. Hatley Street	Jasper	FL	32052	fcbt301@yahoo.com
16	Lt. Robert Kruger .	MCFR	3230 se maricamp road	ocala	FL	34471	robert.kruger@marioncountyfl.org
17	BEN BENGSTON TRAINING OFFICER	SOUTH TRAIL FIRE DEPT.	5531 HALIFAX AVE	FT.MYERS	FL	33912	STFD13OPS@YAHOO.COM
18	Bob Alden, Deputy Fire Chief	Fort Walton Beach Fire Department	5 Hollywood Boulevard NE	Fort Walton Beach	FL	32548	balden@fwb.org
19	Daniel Hickey Capt. Fire Mashal	The Villages Public Safety	1231 Bonita Blvd	The Villages	FL	32162	Dan.Hickey@vccdd.org
20	David R. Edmonds, Fire Chief	Boca Grande Fire Department	360 E. Railroad Ave	Boca Grande	FL	33921	boca301@comcast.net
21	Victoria Yeakley, Public Education Coordinator	Hillsborough County Fire Rescue	3210 S. 78th St.	Tampa	FL	33619	yeakleyv@hillsboroughcounty.org
22	Dayton Saltsman, Fire Chief	South Pasadena F. D.	911 Oleander Way S	South Pasadena	FL	33707	firechief@ci.south-pasadena.fl.us
23	Christie Knudsen, PIO	South Trail Fire & Rescue	5531 Halifax Ave	Fort Myers	FL	33912	stfd14@yahoo.com
24	Lieutenant Jo-Ann Lorber	Fort Lauderdale Fire-Rescue	528 NW 2 St	Fort Lauderdale	FL	33309	Jlorber@fortlauderdale.gov
25	Robert Melendez,Lieutenant	Broward Sheriff's Office Dept. F/R	2601 W. Broward Blvd.	Ft. Lauderdale	FL	33312	robert_melendez@sheriff.org
26	Deputy Fire Chief Kathy Weaver	Volusia County Fire Services	125 W. New York Ave. Suite 220	DeLand	FL	32720	kweaver@co.volusia.fl.us
27	Captain Shayne Stewart	Okaloosa Island Fire District	104 Santa Rosa Blvd.	Fort Walton Beach	FL	32548	sstewart@oifd.org
28	Assistant Chief Gary D. Jordan	North Bay Fire Control District	1024 White Point Road	Niceville	FL	32578	gdjordan@northbayfd.org
29	Greg Anglin	Melbourne Fire Department	1500 Hickory St.	Melbourne	FL	32901	ganglin@melbourneflorida.org

Survey Respondents

Respondents	Name and Rank:	Organization:	Address:	City /Town	State	ZIP/Postal C	Email:
30	John Rayno, Asst. Chief/Fire Marshal	St. Augustine Fire Department	101 Malaga Street	St. Augustine	FL	32084	Jrayno@ci.st-augustine.fl.us
31	Joseph E. Parker Division Chief	North Bay Fire District	1024 Whitepoint Road	Niceville	FL	32578	jeparker@northbayfd.org
32	VINCE KIFFNER CAPTAIN	PLANT CITY FIRE RESCUE	604 E ALEXANDER ST	PLANT CITY	FL	33563	vkiffner@plantcitygov.com
33	Judy Thigpin, K9 Handler	Williston Fire Dept K9 Team	4221 N.W. 22nd Terrace	Gainesville	FL	32605	k9sar_judy@juno.com
34	James Squittieri, Engineer	Golden Gate Fire Controll & Rescue District	4741 Golden Gate Pky.	Naples	FL	34116	squittieri@ggfire.com
35	Lt. Trisha Dunkelmann	City of Delray Beach Fire-Rescue	501 W. Atlantic Ave	Delray Beach	FL	33444	dunkelmann@ci.delray-beach.fl.us
36	Rick Rogers Emergency Response Coordinator	Progress Energy	15760 W. Powerline Street	Crystal River	FL	34428	richard.rogers@pgnmail.com
37	Lieutenant Inspector Abe Quintanilla	Golden Gate Fire Rescue	14575 Collier Blvd.	Naples	FL	34119	quintanilla@ggfire.com
38	Lt. John DeLonjay	Lynn Haven Fire & Emergency Services	1412 Penssylvania Avenue	Lynn Haven	FL	32444	Fireinspector@cityoflynnhaven.com
39	Michael Gonzalez Division Chief	Tampa Fire Rescue	808 E. Zack St.	Tampa	FL	33602	michael.gonzalez@tampagov.net
40	Lt. Jill Danigel	Edgewater Fire-Rescue	PO Box 100	Edgewater	FL	32132	jdanigel@cityofedgewater.org
41	LISA THOMPSON	ST.CLOUD FIRE RESCUE	900 MINNESOTA AVE	ST. CLOUD	FL	34769	lthompson@stcloud.org
42	Battalion Chief Leonard W. Turner	Longwood Fire/Rescue	205 S. Milwee Street	Longwood	FL	32750	lturner@longwoodfl.org
43	Gary Swearingen	Panama City Fire Department	600 E. Business Hwy 98	Panama City	FL	32401	gary.swearingen@cityofpanamacity.com
44	Lt. Wayne Semenick	Flagler County Fire Rescue	1769 East Moody Blvd. Bldg #3	Bunnell	FL	32110	FFMedic@cfl.rr.com
45	No Contact Requested	Polk County Fire/Rescue	Station 8	Winter Haven	FL	33884	No Contact Requested
46	Herb Smith Fire Chief	City of Okeechobee Fire Dept	55 SE 3rd ave	Okeechobee	FL	34974	hsmith@cityofokeechobee.com
47	Megan Shephard	Kissimmee Fire Department	101 N. Church St.	Kissimmee	FL	34741	mshephard@kissimmee.org
48	Daniel Olson	South Kitsap Fire and Rescue	1974 Fircrest Dr SE	Port Orchard	WA	98366	dolson@skfr.org
49	Alvin Gregg	Volusia County Protective Services TF-9	1300 Red John Rd.	Daytona Beach	FL	32124	agregg@co.volusia.fl.us
50	Ken Burgman Division Chief	Port Orange Fire Rescue	1090 City Center Blvd	Port Orange	FL	32129	kburgman@port-orange.org
51	Chief Roy I. Tremain	City of Eustis Fire Department	100 W. Norton Avenue	Eustis	FL	32726	tremainr@ci.eustis.fl.us
52	Ronnie Long / Lieutenant	Orange City Fire Rescue	215 N. Holly Ave	Orange City	FL	32763	rlong@ci.orange-city.fl.us
53	Stephen Marsar	FDNY	618 Farmers Ave	Bellmore	NY	11710	stephenmarsar@yahoo.com
54	Tim Koepsell Div Chief	Oviedo fire Rescue	310 Alexandria Blvd	Oviedo	FL	32765	tkoepsell@cityofoviedo.net
55	Anna Stewart, Manager	Drowning Prevention Coalition of Palm Beach County	50 South Military Trail Suite 101	West Palm Beach	FL	33415	astewart@co.palm-beach.fl.us

Respondents	Name and Rank:	Organization:	Address:	City /Town	State	ZIP/Postal C	Email:
56	James Butscher LT	Marion county Fire rescue	3855 SE 48 Street	Ocala	FL	34480	j34480@firehousemail.com
57	Fred Kunz	Miramar Fire Rescue	14801 SW 27 St	Miramar	FL	33026	fckunz@ci.miramar.fl.us
58	Battalion Chief Kristine Gray	Daytona Beach Fire Department	301 S. Beach St	Daytona Beach	FL	32114	graykristine@dbfd.us
59	Duane Kann, Deputy Fire Chief	Orlando International Airport Fire Rescue	1 Airport Blvd	Orlando	FL	32827	dkann@goaa.org
60	Matt Altman	Longboat Key Fire-Rescue	5490 Gulf of Mexico Dr.	Longboat Key	FL	34228	maltman@longboatkey.org
61	Battalion Chief Chris Hays	Marion County Fire Rescue	3230 SE Maricamp Road	Ocala	FL	34470	CHays911@aol.com
62	Douglas Higley	Pinellas Suncoast Fire & Rescue	401 1st St.	Indian Rocks Beach	FL	33785	dhigley@tampabay.rr.com
63	Bill Lefkowitz	Central Florida Fire Academy	2966 W. Oak Ridge Rd	Orlando	FL	32809	blefkowitz@fireacademy.org
64	MIKE GURR LT.	POMPANO BEACH FIRE RESCUE	120 SW 3RD STREET	POMPANO BEACH	FL	33060	MONGURR@AOL.COM
65	Chief Melvin M. Stone	Tallahassee Community College Fire Academ	444 Appleyard Drive	Tallahassee	FL	32304	stonem@tcc.fl.edu
66	Lt. David A. Sebben	Monroe County Fire Rescue	490 63rd Street	Marathon	FL	33050	sebben-david@monroecounty-fl.gov
67	L.J. White, Captain	Citrus County Fire Rescue	3600 West Soveriegn Path	Lecanto	FL	34461	lawrence.white@bocc.citrus .fl.us
68	Pamela DeMeo, Prevention Specialist	City of Naples Fire	355 Riverside Circle	Naples	FL	34102	pdemeo@naplesgov.com
69	District Chief SW May	Orlando Fire Dept, retired	5731 Abercorn drive	Orlando	FL	32812	wmay303891@aol.com
70	Thomas DiBernardo, Division Chief	Sunrise Fire Rescue	777 Sawgrass Corp Parkway	Sunrise	FL	33325	tdibernardo@cityofsunrise.org
71	Julie Downey/ Assistant Chief	Davie Fire Rescue	6901 Orange Dr	Davie	FL	33314	jdowney@davie-fl.gov
72	FF/EMT Bruce Jordan	Madison Fire Rescue	253 SW Horry Ave	Madison	FL	32340	bjordan_mfr@yahoo.com
73	Asst Chief Tony Lohrman	Niceville Fire Department	102 Armstrong Ave	Niceville	FL	32578	tlohrman@niceville.org
74	henry Hartzner, Captain	Temple Terrace Fire Department	124 Bullard Pwy	Tample Terrace	FL	33617	hhartzner@templeterrace.com
75	Rick Sanda, Cpt	City of Miami FD	11002 sw 117 st	Miami	FL	33176	sanda1001@msn.c
76	Capt. Jada Marshall	Hillsborough County Fire Rescue	2526 Charlie Taylor Rd	Plant City	FL	33566	marshallj@hillsboroughcounty.org
77	David King, Captain	Ormond Beach Fire Department	22 S. Beach St.	Ormond Beach	FL	32175	kingd@ormondbeach.org
78	Jeff Atkinson, Captain	C asper Fire-EMS	200 N David	Casper	WY	82601	jatkinson@cityofcasperwy.com
79	David Felt, Captain	Hernando Beach Vol. Fire Dept.	PO Box 3109	Spring Hill	FL	34611-3109	hbfdlt51@aol.com
80	FF Stan Priester	Lake County Fire Rescue	315 West Main Street	Tavares	FL	32778	spriester@co.lake.fl.us
81	Lt. Doug Killane	Stuart Fire Rescue	800 Martin Luther King Jr. Blvd	Stuart	FL	34994	dkillane@ci.stuart.fl.us
82	Gerona Captain	St. Johns County Fire Rescue	4455 Avenue A, Suite 100	St. Augustine	FL	32095	jgerona@co.st-johns.fl.us

Respondents	Name and Rank:	Organization:	Address:	City /Town	State	ZIP/Postal C	Email:
83	Anna Stewart, Manager	Drowning Prevention Coalition of Palm Beach County	50 South Military Trail Suite 101	West Palm Beach	FL	33415	astewart@co.palm-beach.fl.us
84	Jack Fillman Assistant Chief	Lake County Fire Rescue	315 West Main St. Suite 411	Tavares	FL	32778	jfillman@lakecountyfl.gov
85	Dan Booker - Division Chief	Margate Fire Rescue	600 Rock Island Road	Margate	FL	33063	dbooker@margatefl.com
86	Nick LoCicero Rescue Division Chief	Tampa Fire Rescue	808 E Zack St	Tampa	FL	33602	nick.locicero@tampagov.net
87	Walt Reed; Deputy Fire Chief	Coral Gables Fire-Rescue	2815 Salzedo Street	Coral Gables	FL	33134	wreed@coralgables.com
88	Alexis Rothring, PIO/Pub Ed	San Carlos Park Fire District	19591 Ben Hill Griffin Pkwy	Fort Myers	FL	33913	rothring@sancarlosfire.org
89	Captain Smith	Palm Beach	300 N County Road	Palm Beach	FL	33480	bradshaw@townofpalmbeach
90	Ivo Ceciliano Lead Paramedic	Coral Springs Fire Department	9551 W. Sample Rd	Coral Springs	FL	33065	iceciliano@coralsprings.org
91	Driver Engineer/PM Karen Barber	Polk County Fire Services	PO Box 1458	Bartow	FL	33831	karenbarber@polkfl.com
92	Ashley Teat FPS	AHCA	51 Seminole Drive	Debary	FL	32713	teata@bellsouth.net
93	Deputy Chief Roger West	Nassau County Fire Rescue	96135 Nassau Place	Yulee	FL	32097	rwest@nassaucountyfl.com
94	Tim Gilsrud, Captain	Coon Rapids Fire	11155 Robinson Dr	Coon Rapids	MN	55433	TGilsrud@comcast.net
95	Kris Scholz PEO/PIO	Palm Harbor Fire Rescue	250 West Lake Road	Palm Harbor	FL	34683	kscholz@palmharborfd.com
96	John Reilly B.C	NNFD	1885 Vetrerans Park Dr	Naples	FL	34109	jreilly@northnaplesfire.com
97	George Bessler, District Chief	City of Seminole Fire Rescue	11195 70 Avenue	Seminole	FL	33772	gbessler@ci.seminole.fl.us
98	Paul B Sumner (Sgt) Driver	Miami Beach Fire-Rescue	2300 Pine Tree Drive	MiamiBeach	FL	33140	psumner@miamibeachfl.gov
99	Dave Williams, Section Chief	St. Johns County Fire Rescue / Beach	366 A1A Beach Blvd	St. Augustine Beach	FL	32080	beach@co.st-johns.fl.us
100	John Meizoso	Miami Dade Fire Rescue	9300 NW 41 St	Miami	FL	33176	meizoso@miamidade.gov
101	Matt Brown Fire Lieutenant/Paramedic	Lakeland Fire Department	730 E. Main Street	Lakeland	FL	33801	matt.brown@lakelandgov.net
102	Lt. Tad Cervantes	Columbia County Fire Dept.	130 NW hernando St.	Lake City	FL	32025	tadcervantes@yahoo.com
103	No Contact Requested	Hialeah Fire Dept	19741 NW 8 Street	Pembroke Pines	FL	33029	No Contact Requested
104	John Dilks	Tallahassee Fire	312 N Adams St	Tallahassee	FL	32301	dilksj@talgov.com
105	steve lunt, capt	sunrise	11730 nw 42 st	sunrise	FL	33323	terahedon@aol.com
106	Barry List FF/PM	Flagler Beach Fire Dept	320 S Flagler Ave	Flagler Beach	FL	32136	skippie687@gmail.com
107	B/C Jeff Bennett	Leesburg Fire Department	210 S Canal St	Leesburg	FL	34748	jeff.bennett@leesburgflorida.gov
108	Rodney Malpass FF/PM	Palm Harbor Fire	250 West Lake Rd	Palm Harbor	FL	34683	rmalpass@palmharborfd.com
109	Captain Chuck Baird	Cobb COunty Fire and Emergency Services	1427 Paddocks Court	Powder Springs	GA	30127	chuckbaird@bellsouth.net
110	Lt. Tim Moody	Marion County Fire Rescue	3230 SE Maricamp Rd	Ocala	FL	34479	Timothy.Moody@marioncountyfl.org
111	Rick Merryfield, Battalion Chief	Eau Claire Fire/Rescue	216 S Dewey St	Eau Claire	WI	54701	rick.merryfield@eauclairewi.gov
112	Bob Furci	Brevard County Fire Rescue	1040 S Florida Ave	Rockledge	FL	32955	robert.furci@brevardcounty.us

Survey Respondents

Respondents	Name and Rank:	Organization:	Address:	City /Town	State	ZIP/Postal C	Email:
113	FF. Eliseo Flecha Jr.	Cape Coral Fire, Rescue, and Emergency Management Services	PO Box 150027	Cape Coral	FL	33915-0027	eflecha@capecoral.net
114	Philip Aldrich Lieutenant	Lake County Public Safety	390 Park Glen Drive	Tavares	FL	32778	Paldrich@lakecountyfl.gov
115	Mark Boynton, Deputy Chief	Keene Fire Department	32 Vernon St	Keene	NH	03431	mboynton@ci.keene.nh.us
116	BC RANDY PORTER	PALAYKA FIRE DEPT.	100 N 11th. ST.	PALATKA	FL	32177	FIRE21@GBSO.NET
117	Vincent Fioretti Battalion Chief	City of Sanford	1303 S. French Ave	Sanford	FL	32771	fiorettv@sanfordfl.gov
118	No Contact Requested	North Naples Fire Rescue	1885 Veterans Park Dr.	Naples	FL	34110	No Contact Requested
119	Robert Beck, Training Chief	Winter Springs Fire Dept	102 North Moss Rd	Winter Springs	FL	32708	bbeck@winterspringsfl.org
120	Dee Hawkins - PIO/Public Education	Charlotte County Fire/EMS	26581 Airport Road	Punta Gorda	FL	33982	denise.hawkins@charlottefl.com
121	Lt. Donovan Miller	Lake County Fire Rescue	315 W Main Street	Tavares	FL	32778	drmiller@co.lake.fl.us
122	James Branca Sr./ Operations Supervisor	Highlands County Fire Service	6850 West George Blvd	Sebring	FL	33875	jbranca@hceoc.org
123	Lt. Tammy Riddle	Broward Sheriffs Office	2601 W. Broward Blvd	Ft. Lauderdale	FL	33314	Tammy_Riddle@sheriff.org
124	J Malphurs /Public Ed Coordinator	Alachua County Fire Rescue	P.O. Box 548	Gainesville	FL	32602	jmalphurs@alachuacounty.us
125	Paul Anderson, Jr., Assistant Chief	Clermont Fire Department	439 W. Hwy. 50	Clermont	FL	34711	panderson@clermontfl.org
126	David Faer	Deltona Fire Department	1685 Providence Blvd	Deltona	FL	32725	dfaer@deltonafl.gov
127	Garret Olson, Deputy Chief	Scottsdale Fire Department	8401 E. Indian School Road	Scottsdale	AZ	85251	gmolson@scottsdaleaz.gov
128	Batt Chief Edward K. Simeona	Honolulu Fire Dept	636 South St	Honolulu	HI	96813	esimeona@honolulu.gov
129	David Mogen, Inspector	Miami Beach Fire Rescue Fire Prevention Division	1680 Meridian Avenue, Second Floor	Miami Beach	FL	33139	dmogen@miamibeachfl.gov
130	Chad Roberson District Fire Chief	St. George Fire Protection District	13686 Perkins Road	Baton Rouge	LA	70810	fcroberson@stgeorgefire.com
131	David Cloud LT. Fire Inspector	Avon Park Fire Department	123 E. Pine Street	Avon Park	FL	33825	dcloud@avonpark.cc
132	Greg Kirby, Coordinator	Seminole County Fire Rescue	150 Bush Blvd	Sanford	FL	32773	gkirby@seminolecountyfl.gov
133	Christopher Khanna Firefighter/Paramedic	Martin Coutny Fire Rescue	800 Monterey Rd	Stuart	FL	34953	ckhanna@martin.fl.us
135	Stephen Cousins, Captain	City of Edgewater Fire Rescue	PO Box 100	Edgewater	FL	32132	scousins@cityofedgewater.org
136	Larry Taylor FF/Medic	Desioti County Fire Rescue	1985 Carlstrom field Rd	Arcadia	FL	34266	rescue101@hotmail.com

Appendix D

Submersion Incident Safety Survey

** Conducted in accordance with Florida State Statute 401.425 **

1- **Date of Incident:** _____

2- **Age:** _____ (Years/Months/Days)

3- **Sex:** _____ (Male/Female)

4- **Race:** _____

5- **EMS Incident #:** _____

6- **Police Report #:** _____

7- **Incident Site Name:** _____

7- **Address:** _____

8- **City:** _____

9- **State:** _____ 10- **ZIP:** _____

☐ Suicide

☐ NOT Preventable

Situation Factors

11- Activity

- A- ☐ Bathing
- B- ☐ Boat Accident
- C- ☐ Boating
- D- ☐ Body Boarding
- E- ☐ Diving
- F- ☐ Fall
- G- ☐ Fishing
- H- ☐ Motor Vehicle Accident
- I- ☐ Scuba Diving
- J- ☐ Snorkeling
- K- ☐ Surf Boarding
- L- ☐ Swimming
- M- ☐ Wave Runner
- N- ☐ Wind Surfing
- O- ☐ Other (explain)
- P- ☐ Unknown

12- Environment

- A- ☐ Darkness
- B- ☐ Water Condition
- C- ☐ Weather
- D- ☐ Other (explain)
- E- ☐ Unknown

13- Location

A- ☐ **Pool**

Pool Type

- B- ☐ Above Ground
- C- ☐ In Ground
- D- ☐ Temporary

Pool Ladder(s)

- E- ☐ Usable inside pool ladder
- F- ☐ Usable outside pool ladder (above ground pool)
- G- Installation Date: _____

Pool Ownership

- H- ☐ Private Residence
- I- ☐ Commercial (hotel/motel)
- J- ☐ Commercial (condo/apartment)
- K- ☐ Government (community/recreation center)
- L- ☐ Other (explain)
- M- ☐ Unknown

- N- ☐ Hot Tub
- O- ☐ Gulf/Bay < 100 yds
- P- ☐ Gulf/Bay > 100 yds
- Q- ☐ Intercoastal
- R- ☐ Lake/Pond
- S- ☐ Canal/Creek
- T- ☐ Ditch/Runnoff

- U- ☐ Tub
- V- ☐ Toilet
- W- ☐ Bucket
- X- ☐ Other (explain)
- Y- ☐ Unknown
- Z- ☐ Water Visibility ____ in feet

Safety Equipment/Measures

14- Safety Measures

- A- ☐ Pool Alarm
- B- ☐ Screen Enclosure
- C- ☐ 4 Sided Fence
- D- ☐ Pool Cover
- E- ☐ Pool Barrier
- F- ☐ Lifeguard
- G- ☐ Self Locking doors
- H- ☐ Poolside Telephone
- I- ☐ Other (explain)
- J- ☐ Unknown

15- Floatation Devices

- A- ☐ Kickboard
- B- ☐ Life Jacket
- C- ☐ Swim Fluggles
- D- ☐ Other (explain)
- E- ☐ Unknown

16- Entrapment Involvement

- A- ☐ Bottom Vent
- B- ☐ Side Vent
- C- ☐ Other (explain)
- D- ☐ Unknown

Human Factors

17- Victim

- A- ☐ Unattended Child
- B- ☐ Cardiac
- C- ☐ ETOH/Drugs
- D- ☐ Non-Swimmer
- E- ☐ Seizure
- F- ☐ Florida Resident ____ years
- G- ☐ Visitor at Incident Site
- H- ☐ Other (explain)
- I- ☐ Unknown

18- Caretaker

- J- ☐ ETOH/Drugs
- K- ☐ Non-Swimmer
- L- ☐ Florida Resident ____ years
- M- ☐ Prior to Incident - Water Safety Informed
- N- ☐ Prior Incidents
- O- ☐ Visitor at Incident Site
- P- ☐ Knew CPR
- Q- ☐ Other (explain)
- R- ☐ Unknown

19- Caretaker Relationship to Victim

- A- ☐ Alone
- B- ☐ Babysitter
- C- ☐ Friend
- D- ☐ Grandparent
- E- ☐ Parent
- F- ☐ Sibling
- G- ☐ Spouse
- H- ☐ Other (explain)
- I- ☐ Unknown

20- Caretaker distraction

- A- ☐ Answer Phone
- B- ☐ Answer Doorbell
- C- ☐ Laundry Room Appliances
- D- ☐ Family sleeping and child wandered away
- E- ☐ assumed other person was watching child
- F- ☐ Other (explain)
- G- ☐ Unknown

Comments (and Other explainations)
(when providing an explaination for a survey item - reference the item i.e 14(b)=Safety Measures-Screen Enclosure)

Form Completed by: _____ **Date Completed:** _____

After completetion of the survey and comments - FAX to the Office of the Medical Director (FAX # -582-2076)
FAX Date: _____

an ACROBAT PDF version of this form can be obtained from the internet at: medcontrol.com
If you have received this FAX in error, please inform the sending source and destroy this form.

Appendix E

PINELLAS COUNTY EMS & FIRE FOR SAFE KIDS
POOL SAFETY SURVEY

NAME:

ADDRESS:

DAY PHONE: EVENING PHONE: FIRE DISTRICT:

POTENTIAL HAZARDS: ❒ Pool (Inground) ❒ Pool (Above Ground) ❒ Spa ❒ Bathtub ❒ Pond ❒ Lake ❒ Gulf ❒ Canal ❒ Buckets ❒ Other

PINELLAS COUNTY CPR INFORMATION LINE — 588-8074	YES	NO***
➥ *Have you or a family member experienced a near drowning in a pool?*	❒	❒
ESSENTIAL SAFETY MEASURES IN PLACE:		
Direct adult supervision	❒	❒
Child (3 years or older) "Knows How To Swim"	❒	❒
Child (3 years or older) has taken swimming lessons	❒	❒
Caregiver knows how to swim	❒	❒
Caregiver knows CPR	❒	❒
Locks/Alarms on pool doors	❒	❒
Above ground pool stairs removed	❒	❒
Life ring, rescue rope, floatation devices in pool area	❒	❒
Fence surrounds water hazard	❒	❒
Fence has a gate	❒	❒
Gate is self-latching	❒	❒
Gate is locked	❒	❒
Pool area clear of toys	❒	❒
Pool area clear of electrical hazards	❒	❒
Covered electrical outlets	❒	❒
Pool telephone available	❒	❒
Child knows how to use 9-1-1	❒	❒
Pool chemicals and supplies locked up in secured area	❒	❒
ADDITIONAL SAFETY MEASURES IN PLACE:		
Pool alarm in use (type)	❒	❒
Pool cover in use (type)	❒	❒
Child (2 years or less) "Knows How To Swim"	❒	❒
Child (2 years or less) has taken swimming lessons	❒	❒

*****If NO is marked for any questions, please add comment/recommendation.**

Date and Time: Completed by: Department:

White - Citizen *Yellow - Registry/Office of the Medical Director* *Pink - Department Contact*

Appendix F

Fire Station Locations and Service Districts

Figure F 1

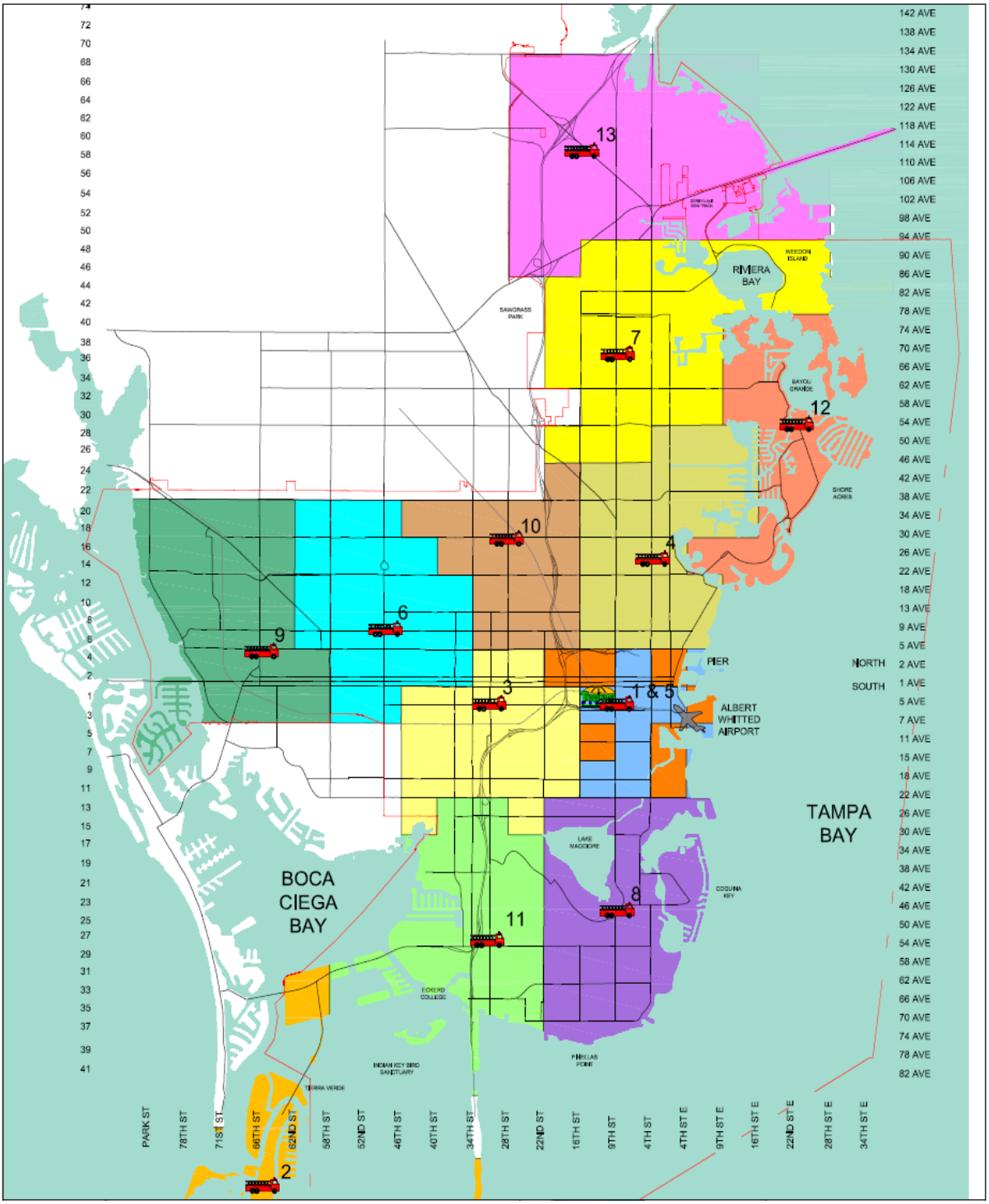
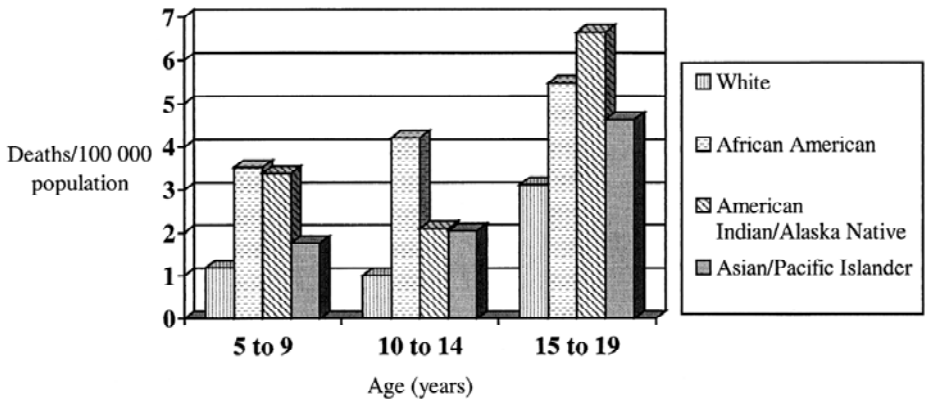


Figure F 2

Unintentional drowning rates among males by age and race (United States, 1996-2000)



Brenner, R. A. et al. Pediatrics 2003;112:440-445

PEDIATRICS®

Figure F 3

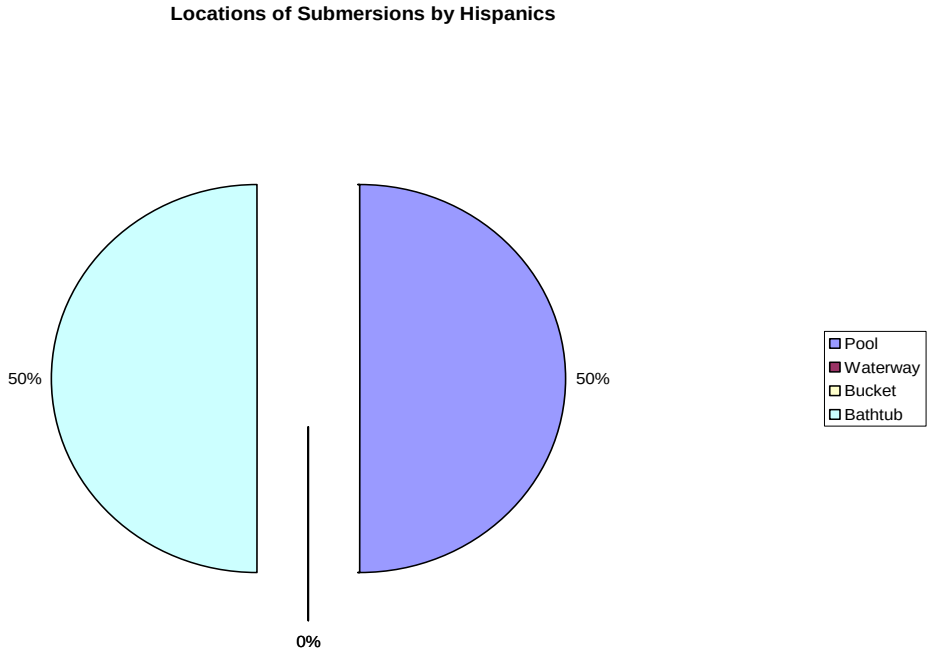


Figure F 4

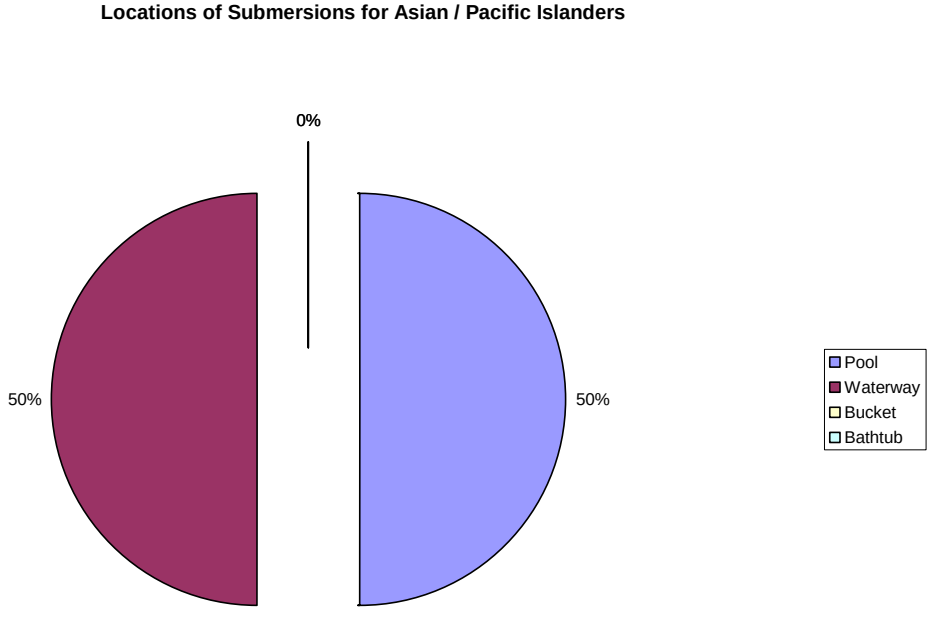


Figure F 5

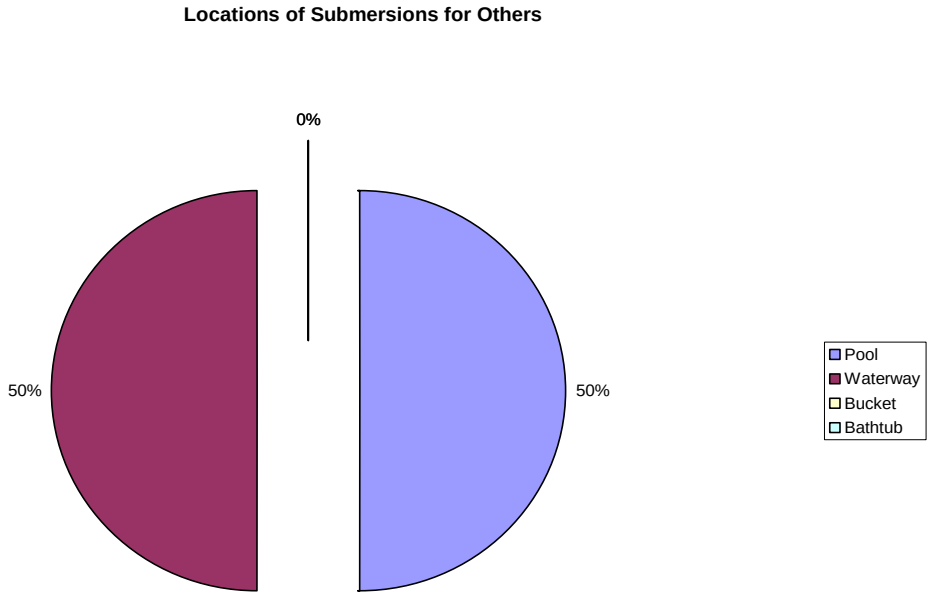


Figure F 6

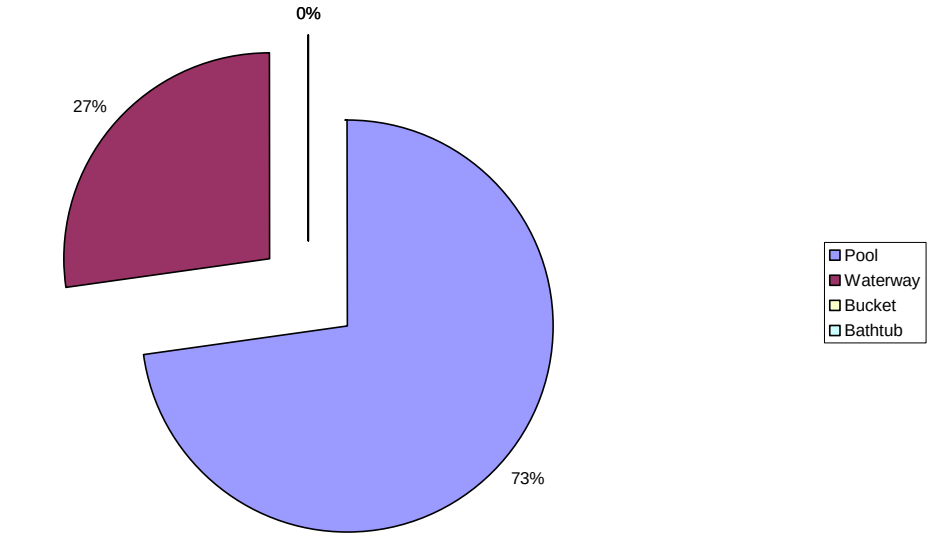


Figure F 7

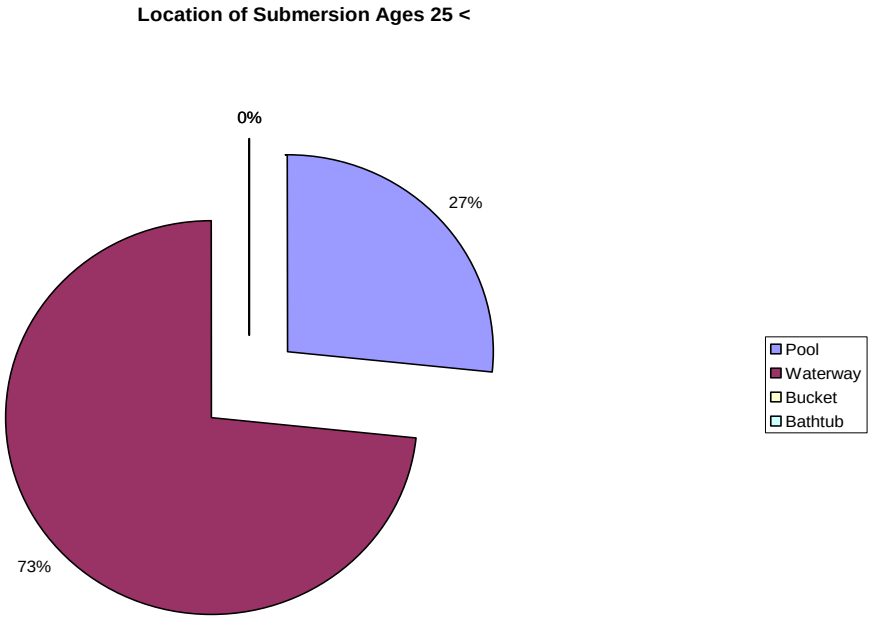


Figure F 8