Strategic Plan for Pompano Beach Fire Rescue – Ocean Rescue Division

What is needed in Pompano Beach Fire Rescue – Ocean Rescue Division in order to improve beach safety and reduce the incidence of drowning?

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Abstract

The problem is Pompano Beach continues to have drowning victims on its beaches. The purpose of the research is to identify any service deficiencies and recommend what changes are needed to improve beach safety in Pompano Beach, Florida.

The descriptive methodology targeted five key questions: a) What factors contribute to the occurrence of ocean safety issues? b) What is the incidence of ocean related problems in Pompano Beach? c) What is the incidence of ocean related problems in the United States? d) What actions are needed by the City of Pompano Beach, Florida to improve beach safety? e) What prevents Pompano Beach from making the changes needed to improve beach safety?

The procedures included a literature review to describe the nature and incidence of beach hazards and how beach safety can be improved. A data review analyzed the current situation in Pompano Beach concerning beach safety compared to recommendations of the Centers for Disease Control and Injury Prevention and the United States Lifesaving Association.

The results described many factors that contribute to the occurrence of ocean safety issues. The incidence of ocean related problems in Pompano Beach over five years showed 51 drowning incidents, 100% occurring on unguarded beaches, resulting in 13 drowning victims. The incidence of ocean related problems in the United States showed nearly 4,000 drowning deaths each year, 50-75% occurring in open water such as oceans. The actions needed by Pompano Beach to improve beach safety are defined in the Fire Rescue Strategic Plan 2008-2018. Pompano Beach has been prevented from implementing the changes due to budget constraints.
The recommendations include adding six lifeguard towers, with the lifeguards and equipment needed to cover the entire beachfront and thus improve beach safety.
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Introduction

In the United States, there are approximately 4,000 people that will die from drowning each year (National Center for Health Statistics, 2000). More significantly, most drowning incidents are preventable according to the Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control. The CDC cites two important strategies for the prevention of drowning: 1) provide lifeguards in public areas frequented by swimmers and 2) encourage the use of aquatic areas that are protected by lifeguards. (Branche & Stewart, 2001, p 1) The United States Lifesaving Association (USLA) compiles data each year to study the incidence of drowning, identify preventable causes and provide drowning prevention strategies. According to the USLA, the majority of drowning incidents in the United States occur at unguarded aquatic areas. In comparison, if a person chooses to swim at a beach that is protected by USLA affiliated lifeguards, the chance that they will die from drowning is significantly reduced to only 1 in 18 million (USLA, 2009, p 4). Given the incidence of drowning in the United States, coupled with the CDC recommendations for drowning prevention and the statistics compiled by the USLA, it would stand to reason that every beach frequented by swimmers should be protected by USLA affiliated lifeguards. In doing so, it would practically eliminate the incidence of drowning at public beaches.

The problem is Pompano Beach continues to have drowning victims on its beaches. The purpose of this research is to identify any service deficiencies and recommend what changes are needed to improve beach safety in Pompano Beach, Florida. The descriptive methodology targets five key questions: a) What factors contribute to the occurrence of ocean safety issues? b) What is the incidence of ocean related problems in Pompano Beach? c) What is the incidence of ocean
related problems in the United States? d) What actions are needed by the City of Pompano
Beach, Florida to improve beach safety? e) What prevents Pompano Beach from making the
changes needed to improve beach safety? The answers to these important questions will help
City management, politicians and the public better understand the problem that exists concerning
the incidence of drowning at the beach in Pompano Beach, Florida and why it is so important to
find ways to improve the situation and thereby reduce the potential risk to the public at large.

Background and Significance

Located in Broward County on Florida’s southeast coast, the City of Pompano Beach has
a population of 104,402. The population swells to nearly 150,000 during the winter tourist
season (September to March), as “snow birds” flock to the warm climate of Pompano Beach.
Within its 25.08 square miles, Pompano Beach has a current land use of 34.6% residential,
15.3% industrial, 10.3% commercial, 6.2% institutional, 6.4% utilities, as well as 27.2% for
transportation, water and recreational (City of Pompano Beach, 2009, b). Two drawbridges at
Atlantic Boulevard and NE 14th Street provide access over the Intracoastal Waterway to the
Barrier Island, as well as a drawbridge over the Hillsboro Inlet which connects the Intracoastal
Waterway to the Atlantic Ocean (City of Pompano Beach, 2009, c). Over the past decade, the
City has experienced a 32% increase in commercial and industrial properties and has annexed
areas totaling 3.57 square miles with a mix of residential, commercial and industrial uses, adding
22,000 residents to the population (Cushman & Wakefield Research Department, 2009).
Although Pompano Beach is considered a major business center, it is also a formidable tourist
destination. As part of the Greater Fort Lauderdale tourism group, the sub-tropical weather in
this coastal community is a magnet for “snow birds” and residents alike that can enjoy the “fun
in the sun” that Pompano Beach has to offer. In addition to land-based activities, Pompano Beach has a wide variety of aquatic endeavors to choose from including boating, sport fishing, scuba diving, surfing and swimming at its beaches.

The City of Pompano Beach has three miles of beachfront stretching from the Hillsboro Inlet to its southern border that is lined with condominiums, hotels and restaurants, as well as public access points with public parking and restroom facilities. The beach is divided into north and south beach by a fishing pier that extends 400 feet into the Atlantic Ocean. Pompano Beach Fire Rescue is responsible for protecting the beaches and ocean waters with its Fire Rescue and Ocean Rescue personnel. The Ocean Rescue operation is a USLA affiliated lifeguard agency. Currently, there are eight lifeguard towers staffed with twelve Ocean Rescue Lifeguards that guard only 0.8 miles of the beach. This leaves an additional 2.2 miles of beachfront outside of the guarded area that they must respond to in an emergency. The ability to respond to ocean rescues outside of the guarded area is extremely time consuming and marginally effective at best. In 2009, there were 1,526,036 persons who attended the beaches in the City of Pompano Beach. It is estimated that half of those frequented the guarded beach area, leaving nearly 763,000 beachgoers who attended the unguarded beach on an annual basis. (Pompano Beach Ocean Rescue, 2009)

From 2005 to 2009, Pompano Beach Fire Rescue paramedics responded to 51 drowning calls on the beach. One hundred percent of these calls occurred on unguarded beaches. Of the 51 calls, there were 14 rescues performed, mostly by Good Samaritans. In addition to those who were rescued, there were 13 drowning victims. In one of the incidents, two would-be Good Samaritans became victims themselves, one of whom was a drowning death. During this same
timeframe, there were no drowning calls for Fire Rescue, nor were there any drowning victims in the guarded area of the beach. (Pompano Beach Fire Rescue, 2005 – 2009) Also during this same timeframe, Ocean Rescue lifeguards made 249,216 public contacts, conducted 103,262 preventative actions and performed 287 ocean rescues (Pompano Beach Ocean Rescue, 2005 – 2009). This clearly demonstrates that the presence of USLA affiliated Ocean Rescue lifeguards made the difference between life and death, as all of the drowning deaths occurred where there were no lifeguards.

Although there has been expansive growth in the number of beachgoers over the past decade, the City of Pompano Beach has not increased Ocean Rescue resources proportionally to address the increased need for lifeguard protection. The beach attendance has more than doubled during the past ten years. Yet, during this same timeframe, the Ocean Rescue operation strength has relatively remained the same. (Pompano Beach Ocean Rescue, 2000 – 2009) In fiscal year 2008/2009, the Ocean Rescue operation was moved from the Parks and Recreation Department to the Fire Rescue Department. In fiscal year 2009/2010, Pompano Beach Fire Rescue – Ocean Rescue Division provided ocean rescue services with 17 full-time Lifeguard/EMTs, including the Ocean Rescue Captain and two Ocean Rescue Lieutenants, and 25 part-time lifeguards. (City of Pompano Beach, 2009)

Within the first two years after acquiring Ocean Rescue, Pompano Beach Fire Rescue has improved the Ocean Rescue operation by expanding the lifeguard coverage area through the reallocation of existing resources and replacing all of Ocean Rescue’s emergency vehicles. In addition, Ocean Rescue coverage has been expanded an additional two hours during daylight savings time, with lifeguards working four 10-hour days six months of the year and five 8-hour
days the other six months. This provides the lifeguard coverage needed in the guarded area seven
days a week, 365 days per year. This increase in lifeguard coverage was accomplished with
minimal cost and is part of Fire Rescue’s Strategic Plan of one day providing lifeguard coverage
to the entire three miles of beachfront. (Pompano Beach Fire Rescue, 2010) Unfortunately, the
request for additional expansion to the Ocean Rescue operation was denied in 2010 due to
budget constraints.

The United States Fire Administration (USFA) Operational Objectives include the
reduction of loss of life, both of the public and firefighters and improvement of emergency
medical service response (Department of Homeland Security, United States Fire Administration,
National Fire Academy, 2008, p II-2). In order for the City of Pompano Beach, Florida to better
meet these objectives, it must increase its Ocean Rescue resources sufficient to provide drowning
prevention activities and response to EMS emergencies on the entire beachfront. A concerted
effort to increase revenue must be made by City government, politicians and citizens alike, if this
goal is to be met. Without sufficient revenue, the problem will remain and the objectives of
reducing loss of life from EMS emergencies on the beach will be difficult to obtain. Given the
history of drowning in Pompano Beach, it is unrealistic to think that the City of Pompano Beach
can continue to operate its Ocean Rescue service at its current level without a potential for
serious consequences, including the needless loss of life.

Literature Review

A literature review was conducted that focused on studies regarding incidence of
drowning, drowning prevention, and lifeguard effectiveness through a variety of sources,
including the Centers for Disease Control and Prevention (CDC), National Center for Injury
Prevention and Control, the United States Lifesaving Association (USLA), the World Health Organization (WHO) and other sources that pertained to the subject matter. The material reviewed either spoke to drowning prevention or lifeguard services, or both. In each case, the literature clearly described the need for USLA affiliated lifeguards in order to maximize the prevention of and response to drowning victims.

According to the World Health Organization (WHO), “drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid” (Van Beeck, E., et al., November 2005). WHO reports that males are more likely to die or be hospitalized due to drowning than females and children under five years of age have the highest drowning mortality rates. In United States, drowning was the second leading cause of unintentional injury death in children ages 1-14 in 2000. (World Health Organization, 2000, p 4) The Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control reports that 4,000 people will die from drowning each year in the United States with 50-75 percent of drowning incidents happening in open water such as oceans. The CDC believes that most drowning cases can be prevented if a lifeguard is present. (Branche & Stewart, 2001, p 1) The United States Lifesaving Association (USLA) estimates that the chance of drowning is only 1 in 18 million when you swim at a beach protected by a USLA affiliated lifeguard (USLA, 2009, p 4). According to the CDC, patron surveillance by lifeguards is a critical element to preventing drowning from occurring. This surveillance involves maintaining continuous observation of persons both in and out of the water in order to recognize conditions that may cause injury. Understanding how a person drowns can demonstrate just how important it is for lifeguards to maintain constant patron surveillance. The behavior of exhibiting obvious signs of distress in the water, such as yelling or waving arms is less common than one might think. In most instances,
people are more likely to drown quietly and without the stereotypical distress signs. In many cases, there may only be 20-60 seconds to recognize that someone is drowning before they submerge. This underlines the need for lifeguards and their ability to provide constant surveillance and quick intervention when the need is recognized. (Branche & Stewart, 2001, p 7)

“While rescue is one of the primary responsibilities of lifeguards, the most important responsibility must be prevention. Because time is the most critical of all factors, the recognition of potential victims is key to the preventative lifesaving model” (Richardson, 1997, p 2). This proactive approach is the overriding theme to the USLA lifeguard training curriculum. In the USLA’s lifeguard training manual, the chapter on water surveillance is introduced with the following statement: “In emergency medicine there is often reference made to a golden hour – the period of time after a traumatic injury during which effective medical intervention is essential to the saving of a life. In open water lifesaving, such a time frame is an unheard of luxury. Lifeguards measure the opportunity for successful intervention not in minutes, but in moments” (Richardson, 1997, p 5). This statement exemplifies the need for continuous surveillance of swimmers by lifeguards if they are to be successful in preventing drowning. It is the goal of every USLA trained lifeguard to recognize the need and intervene before drowning occurs. Many times this can occur before the victim realizes that they are in danger. The seasoned lifeguard can usually predict who will need help well before an emergency happens and in some cases before the person even enters the water. For the ocean rescue lifeguard, lifesaving must be both preventive and reactionary. (Richardson, 1997, p 9)

There are many factors that contribute to the occurrence of ocean safety issues. Different environmental conditions can create hazards that can be a danger to the unsuspecting swimmer.
Surf or waves can cause visible changes in beaches. Most notably are plunging waves or shore break, which may give support to the formation of rip currents. (Richardson, 1997, p 3) Rip currents are defined as “powerful, channeled currents of water flowing away from shore (that) typically extend from the shoreline, through the surf zone, and past the line of breaking waves” (USLA, 2010). Rip currents are of particular concern, as they are the cause for over 80% of the rescues from drowning performed by surf beach lifeguards. (USLA, 2010) Plunging waves are responsible for most injuries in the surf environment. Backwash is most likely to occur at high tide and during increased surf activity. This phenomenon of returning water to the ocean knocks peoples’ feet from under them and is particularly dangerous to small children and the elderly. Lateral currents or lateral drifts are created when waves coming from an angle to the beach push water along the beach as the waves break. These strong currents can push a swimmer sideways into a rip current and then out to sea. Sand bars can give a false sense of security for waders, as there can be adjacent deeper water with lateral currents that feed rip currents. Inshore holes are depressions in the sand caused by erosion which can be hazardous to small children. (Richardson, 1997, p 4) The topography of the beach can also create hazards such as steep berms, rock projections, cliffs and man-made structures such as jetties and piers. Another environmental condition that can create hazards is the weather itself, for example storms, fog, lightening and waterspouts. Then there are human factors that can contribute to the occurrence of ocean safety issues, such as age, body weight or level of physical conditioning, intoxication, improper equipment or flotation devices, improper attire and disabilities. The lifeguard must be able to recognize these different factors and take preventative action to maintain ocean safety. (Richardson, 1997, p 5-6)
The CDC measures the economic cost of drowning as that of the victim’s economic loss coupled with the value of lost quality of life related to the injury or death (Branche & Stewart, 2001, p 11). The National Safety Council set the economic loss of an unintentional injury death at $790,000 and the comprehensive cost at $2,790,000 in 1997 (National Safety Council, 1997). In comparison, salaries and benefits (50% of costs) for full-time beach lifeguards in South Florida ranged from $26,500 to $32,000. Nearly 77,000 rescues by lifeguards were reported by the USLA in 1997. If only one percent (770) had been a death instead of a rescue, the economic loss would have exceeded $600 million and the comprehensive cost would have surpassed $2.1 billion. (Branche & Stewart, 2001, p 11) To put this into a more manageable perspective, Mael, Seck, and Russell offered an easy way of estimating costs by converting the ratios to a set baseline of 10,000 patrons. Using this method, it can be determined that the total economic costs for not having lifeguards per 10,000 patrons ranges from $202,500 to $4.6 million and the total comprehensive costs per 10,000 patrons ranges from $750,380 to 16.1 million. (Mael, Seck, and Russell, 1999) The World Health Organization (WHO) reported that 45% of all drowning deaths that occurred in the United States in 2000 were among the most economically active segment of the population. WHO estimates the 1997 cost of coastal drowning in the United States was over $273 million in direct and indirect costs. (World Health Organization, 2000, p 6)

The price of not having lifeguards is proven to be extremely costly. Yet there are some areas where government continues to try and avoid the issue in an attempt to save money. This misguided sense of direction can prove to be disastrous for any government. In fact, the Supreme Court of Florida has set precedence on this very issue. In the case of Breaux vs. City of Miami Beach, the Court ruled that municipalities have a responsibility to insure the safety of its beachgoers. (Supreme Court of Florida, 2005) The Court held that “when a municipality, such as
the City of Miami Beach, operates a public beach as a swimming area by having public
restrooms, showers, water fountains, parking, and a beach concessionaire from which it derives
revenues, the municipality has a duty to exercise reasonable care under the circumstances to
those foreseeable users of that swimming area” (Supreme Court of Florida, 2005, p 2). The use
of sovereign immunity as a means to avoid liability for not providing a safe beach area was also
addressed in the Court’s ruling. In the case of Miami Beach, the Court stated “We hold that
based on the undisputed facts, the City controls the beach area and was operating a public
swimming area at the 29th Street location at the time of the accident. Thus, the City had a duty of
care to warn of dangers that were known or should have been known, and is not shielded from
liability as a matter of law based on sovereign immunity” (Supreme Court of Florida, 2005, p
13). This landmark case provides a clear message for those municipalities that operate a public
beach – there are no excuses for an unsafe beach. With this case law in mind, it may prove to be
very expensive for those municipalities that continue to operate public beaches without proper
lifeguard protection.

The United States Lifesaving Association Southeast Region conducted an aquatic safety
assessment and provided recommendations for Brevard County, Florida in 2008. This followed a
series of tragedies in 2007 where ten people died as a result of drowning off the beaches of
Brevard County. Nine of the ten drowning incidents occurred where there were no lifeguards and
most of the victims were tourists visiting from out of state. (McManus, J., et al., 2008) The
authors noted in their executive summary that these tragedies took place in a community where
use of the beach is a key component of its tourism industry. As such, the visitors to the beaches
of Brevard County expected that they would be reasonably protected. The public trust was
violated when the County failed to provide adequate lifeguard protection. (McManus, J., et al.,
This report echoed the opinion of the CDC concerning the protection of public beaches stating that “any responsible community that promotes its beaches for tourism has an obligation to ensure a reasonable degree of public safety on those beaches” (McManus, J., et al., 2008, p 4).

The Ocean Rescue operation in Brevard County, Florida has some similarity to Pompano Beach, Florida in that it is part of the Brevard County Fire Rescue Department. There are also some similarities concerning lifeguard coverage and the incidence of drowning deaths. In addition, both Pompano Beach and Brevard County promote the use of their beaches to residents and tourists alike. These similarities, along with the comprehensive nature of the report were influential in the assessment and recommendations for Pompano Beach, Florida. In Brevard County, Ocean Rescue was moved under the newly formed County Fire Rescue Department in 2005. However, Brevard County Fire Rescue had not made any effort to examine the effectiveness of their Ocean Rescue Operation. This ambivalence persisted after nine drowning deaths occurred in its first two years of overseeing Ocean Rescue. Even the widespread media attention to these drowning deaths did not seem to faze County decision makers. The apparent apathy of government toward these incidences of drowning on its beaches prompted private citizens to appeal to members of the United States Lifesaving Association Southeast Region to conduct the aquatic safety assessment described in this literature review. (McManus, J., et al., 2008, p 4)

In the Brevard County report, a series of best practices were highlighted in order to provide recommendations for improvement of beach safety. A multi-pronged approach was given that began with public education. As a cost-efficient method of promoting beach safety,
proactive public education programs should educate the public on beach safety before they arrive at the beach. This effort would continue on their arrival at the beach by the lifeguards themselves. Learn-to-swim programs not only improve the public’s ability to swim, but also their knowledge about water safety, including the understanding of rip current. (McManus, J., et al., 2008, p 10) As stated previously, rip currents are defined as “powerful, channeled currents of water flowing away from shore (that) typically extend from the shoreline, through the surf zone, and past the line of breaking waves” (USLA, 2010). The USLA reports that rip currents are the cause for over 80% of the rescues from drowning performed by surf beach lifeguards. (USLA, 2010) Junior lifeguard programs educate young people about water safety while they have a chance to work with USLA affiliated lifeguards during these informative summer programs. They also can be a good source for recruiting new lifeguards, as well as a source of revenue for the lifeguard agency. Off-site public education can be used to promote beach safety through public service advertising via radio, television, newspaper and the like. Water safety information can be made accessible to tourists through brochures at hotels, as well as welcome videos in hotel rooms. (McManus, J., et al., 2008, p 11) On-site passive public education includes flags that advise of ocean conditions, as well as signs that explain beach and water ordinances and identify local hazards such as rip currents (McManus, J., et al., 2008, p 12-13). On-site active public education is conducted by the lifeguards themselves to inform beachgoers about beach rules and safe practices through public contacts. On-site active public education would also include preventative actions performed by lifeguards to avoid drowning scenarios. Another approach is the separation of incompatible activities such as surfing and swimming or fishing and swimming. On the beach, this may include separating ball games from those who are sunbathing. Local ordinances can be used to help support this effort. This approach supports the
enjoyment of a variety of beach activities while ensuring the safety of all who attend the beach and its waters. (McManus, J., et al., 2008, p 14)

Although public education and separating incompatible activities can help reduce the chance of injury or death, by themselves they cannot prevent drowning from occurring. Even the best programs will not be able to reach everyone who attends the beach. Still there will be others that, despite previous water safety education and physical training, will overestimate their abilities or be overwhelmed by unexpected water conditions. In addition, medical problems such as respiratory ailments, seizures and heart attack may suddenly cause the swimmer or beachgoer to require immediate assistance. The need for lifeguard services is essential during these emergencies. Without the presence of a lifeguard during these times of crisis, there would undoubtedly be an adverse outcome. For a swimmer in distress, the absence of a lifeguard may result in their death. (McManus, J., et al., 2008, p 15) In fact, USLA statistics show that the chance of drowning death when there is a USLA affiliated lifeguard present is only 1 in 18 million (USLA, 2009, p 4). The CDC reports that most drownings are preventable through the use of lifeguards on public beaches (Branche & Stewart, 2001, p 1). The USLA Guidelines for Open Water Lifeguard Agency Certification provides the minimum recommended qualifications, training and equipment for beach lifeguard agencies (USLA, 2007).

The Brevard County Fire/Ocean Rescue operation is a USLA certified agency. At first glance, one would ask why then did these drowning deaths occur, as the ocean rescue lifeguards were in compliance with USLA standards. The problem was not an issue of whether or not the lifeguards were properly trained, but rather it was an issue of the lack of adequate lifeguard coverage. While the USLA agency certification program addresses the qualifications, training
and equipment for beach lifeguard agencies, it does not address periods of operation, hours of coverage, or minimum staffing levels for a lifeguard agency. These critical factors are left up to the local agency and play a key role in whether the lifeguard agency will be effective. In Brevard County, the records imply a pattern of understaffing, which resulted in poor lifeguard coverage during crucial time periods, as a causative factor for the repeated tragedies. (McManus, J., et al., 2008, p 16-17)

Several factors must be considered by the local agency in order to properly staff their ocean rescue operation. First are the periods of operation. For many lifeguard agencies in Florida, 365 days a year, eight hours per day operational periods are required due to the year-round warm weather. It may also be necessary to stagger shifts and use 10-hour shifts to provide lifeguard coverage during the hours when people are at the beach. (McManus, J., et al., 2008, p 16) The second factor is area of responsibility. It is not feasible for any lifeguard agency to provide lifeguard protection at every access to the beach. In order to determine a fiscally responsible area of responsibility, it is necessary to study the areas of the beach for level of usage and occurrence of high hazards. Providing lifeguard coverage in these areas is a cost-effective way for lifeguard agencies to provide a reasonable level of beach safety. According to the USLA report, the areas in need of lifeguard protection are where “people are most likely to swim, where infrastructure and attractions exist that make it convenient to swim, where unusual hazards exist, and where historical incidents demonstrate a need” (McManus, J., et al., 2008, p 18). Areas protected by lifeguards should be clearly marked and swimmers should be encouraged to use these areas. “If the goal is drowning prevention, lifeguard services must be placed conveniently, where people are known to swim and likely to swim” (McManus, J., et al., 2008, p 18). When placing lifeguard towers, they should be spaced so that there can be overlapping surveillance and
emergency backup. Proper spacing is usually determined by the time it takes for a lifeguard to respond to an incident and perform a successful intervention. Areas where there are public attractions, hotels, restaurants, and multiple public beach access points may attract large crowds. The existence of large crowds on the beach should also be taken into consideration when determining spacing as surveillance in these areas may be difficult, thus necessitating a closer spacing of the lifeguard towers. In 2007, Brevard County only had a total of 13 lifeguard towers which covered a 23-mile stretch of beachfront from Cape Canaveral to Melbourne Beach. This left huge gaps between lifeguard towers and more than half of the over 50 miles of beachfront without lifeguard coverage of any type. (McManus, J., et al., 2008, p 19)

Once operational periods and areas of responsibility are established with proper placement of lifeguard towers, staffing levels and staffing locations should then be determined. Staffing levels should be adequate to ensure that there is lifeguard coverage in areas where swimmers are present sufficient to prevent drowning deaths and respond to other emergencies in spite of variations in crowd size and water conditions. In other words, staffing locations should follow the crowd. Typically, the beach crowd will be drawn to areas where there is beach parking and public access points, as well as close proximity to restaurants and restroom facilities. Beachside hotels and areas where amenities such as beach chairs, Jet Ski and other water craft are also places where crowds tend to congregate on the beach. Failure to provide lifeguards in these locations will prove disastrous. In Brevard County, seven of the ten drowning deaths in 2007 happened close to a hotel, condominium, or restaurant. In fact, nine of the ten were non-residents and of those, seven were from out of state. In all, there were nineteen drowning deaths over the past three years in Brevard County, the majority of which occurred on unguarded
beaches. This clearly demonstrates the need for better lifeguard coverage in areas where not only residents, but tourists tend to frequent. (McManus, J., et al., 2008, p 20-21)

While determining staffing levels and locations, the need for backup and breaks should also be considered. Oftentimes, there are several victims that are caught in a rip current that require rescue. Rescue of multiple victims, as well as major medical emergencies will require several lifeguards to quickly and effectively handle the situation. There should be enough staff to not only handle these emergencies, but also be able to continue surveillance of the water at the same time. Backup lifeguards should be readily available to fill in the gaps. Improper staffing levels will slow response to these and other emergencies. Most importantly, slow response time accompanies most drowning deaths. As backup is crucial to response times, breaks are necessary to maintain constant vigilance of swimmers. Lifeguards must be able to maintain continuous surveillance of the water in order to identify swimmers in need of assistance in a timely manner. Regular breaks are needed in order to maintain this level of discipline and acuity. Extremes in the environment also necessitate breaks. Additionally, breaks are required to meet the basic needs of the lifeguard such as using the restroom, eating, and stretching one’s legs. As a rule of thumb, lifeguards should not be assigned water surveillance for more than one hour at a time, with fifteen-minute breaks in between. In addition, breaks allow for exercise, as USLA certification requires daily exercise be afforded to all lifeguards in order to maintain the physical fitness needed to perform their job. (McManus, J., et al., 2008, p 22-23)

The final component to ensure adequate lifeguard services is equipment. Lifeguards require basic equipment such as rescue flotation devices, fins, mask, snorkel and first aid kits. In order to improve their rescue capabilities, equipment such as rescue boards, binoculars, all-
terrain vehicles and rescue water craft such as boats and personal water craft are needed. The use of land vehicles and water craft will help to reduce the need for personnel, especially in providing backup. These different types of rescue vehicles and water craft provide a rapid means for backup in remote places, rapid transport of rescue equipment and personnel, better supervision, ability to provide roving patrols, as well as a high level lifeguard presence throughout the beach. Rescue boats can prove to be essential in providing rapid response to rescue multiple victims in rip currents and high surf conditions. Brevard County Fire/Ocean Rescue had only two personal water craft and only one was equipped with a rescue sled. There were only six all-terrain vehicles with limited capabilities and three four-wheel drive vehicles with lights, siren, and a public address system. This equipment was all that was available for ocean rescue response to over 50 miles of beachfront. Obviously, the response capabilities were extremely limited. (McManus, J., et al., 2008, p 23)

This lack of response capability coupled with sparse lifeguard coverage is of great concern, considering the high incidence of drowning deaths on unguarded beaches in Brevard County. Although the ocean rescue operation is a USLA certified agency, it lacked the level of staffing and equipment needed to provide adequate lifeguard coverage to over 50 miles of beachfront. There was a lack of prevention activities, as well as no assessment of the drowning incidents and ocean rescue capabilities. Given the extremely high incidence of drowning deaths, the need for improvement in beach safety in Brevard County was very apparent. A myriad of recommendations were cited in the USLA report, which followed the best practices highlighted throughout the report. (McManus, J., et al., 2008, p 34-38)

Procedures
Research Methodology

The purpose of this research is to identify any service deficiencies and recommend what changes are needed to improve beach safety in Pompano Beach, Florida. The descriptive methodology targets five key questions: a) What factors contribute to the occurrence of ocean safety issues? b) What is the incidence of ocean related problems in Pompano Beach? c) What is the incidence of ocean related problems in the United States? d) What actions are needed by the City of Pompano Beach, Florida to improve beach safety? e) What prevents Pompano Beach from making the changes needed to improve beach safety? To better describe the problem, a literature review was used to answer question #1 and set the direction for the other questions. Based on the findings of the literature review, an extensive data review followed that sought to answer questions #2 and #3. The information in the literature review was then analyzed to better understand how to approach questions #4 and #5. This methodology provided evidence-based recommendations for the City of Pompano Beach to implement in order to improve beach safety and reduce the incidence of drowning.

Literature Review

A literature review was conducted to describe the nature and incidence of beach hazards and how beach safety can be improved. The direction of this review was focused on the services that would improve beach safety. Drowning statistics and ocean rescue services were specifically targeted. Articles and research from Internet searches were the primary source for gathering the initial information and identifying the applicable information. This literature review also sought to describe the incidence of drowning and best practices for drowning prevention. The literature review began at the National Fire Academy’s Learning Resource Center (LRC) in Emmitsburg,
Maryland in February 2010. This initial step was unsuccessful in finding previous applied research material on this subject. This followed with an extensive Internet search on the subject using Google. The Internet search targeted a variety of sources, including the Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control, the United States Lifesaving Association (USLA), the World Health Organization (WHO) and other sources that pertained to the subject matter. In the literature review, the material studied either spoke to drowning prevention or lifeguard services, or both. In each case, the literature clearly described the need for USLA affiliated lifeguards in order to maximize the prevention of and response to drowning victims. During the literature review, key points were highlighted in each source and compared to the other sources for commonalities and validation. The literature review was then focused on information found in the Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control report *Lifeguard Effectiveness* and the United States Lifesaving Association (USLA) Southeast Region report *Aquatic Safety Assessment and Recommendations Brevard County, Florida*. This proved to be valuable in formulating a direction for the research project and assisted in developing the results and recommendations. The review also sought to identify any historical significance in the City of Pompano Beach budgeting process that might have contributed to the problem. Analysis of city growth, revenues, and priorities were evaluated and compared to the growth, revenues and priority given to ocean rescue services. This part of the review sought to identify a causative effect as to why ocean rescue services were deficient. It was also valuable in determining what the major obstacles might be in improving ocean rescue services, as it relates to the budget. The analysis of the budget process was important in being able to understand why the city has not been able to implement changes to ocean rescue identified in this research that would improve beach safety.
Each step of the literature review was used to validate the recommendations that would ultimately be formulated for the completion of this research project.

Data Review

A data review was used to evaluate the current situation in the City of Pompano Beach, Florida concerning the ability of its Fire Rescue Department to provide ocean rescue services and improve beach safety. The data compiled and studied by Pompano Beach Fire Rescue was first to be evaluated. This included data from the computer aided dispatch (CAD) database and the EMS Patient Care Report database, as well as statistics from the Ocean Rescue Division. After review of fire department data, an evaluation of other data within the City of Pompano Beach government was conducted. This included data from the Budget Office, Planning Department, and Utilities Department. This data review was used to correlate the trends found in the literature review and further identify actions needed to address the problem. This data review developed a clear picture of the current situation in the City of Pompano Beach, Florida and the status of its ocean rescue capabilities in relation to the incidence of drowning on its beaches. The data studied was then compared to the recommendations of the Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control and the United States Lifesaving Association (USLA). This set the tone for the results of this research and where the recommendations should be directed.

Assumptions and Limitations

The information evaluated from the literature review in this research project is assumed to be reliable. It is also assumed that the data evaluated in the different data bases studied is
accurate and presents a true picture of the current situation in Pompano Beach, Florida. One limitation is that this research project does not include an implementation plan that addresses costs and a definitive revenue source(s) to fund the enhancements needed.

Results

The problem is Pompano Beach continues to have drowning victims on its beaches. The purpose of this research is to identify any service deficiencies and recommend what changes are needed to improve beach safety in Pompano Beach, Florida. The descriptive methodology targets five key questions each of which will be addressed on an individual basis.

Research Question 1

What factors contribute to the occurrence of ocean safety issues?

There are many factors that contribute to the occurrence of ocean safety issues. Different environmental conditions can create hazards that can be a danger to the unsuspecting swimmer. Surf or waves can cause visible changes in beaches. Most notably are plunging waves or shore break, which may give support to the formation of rip currents. (Richardson, 1997, p 3) Rip currents are defined as “powerful, channeled currents of water flowing away from shore (that) typically extend from the shoreline, through the surf zone, and past the line of breaking waves” (USLA, 2010). Rip currents are the cause for over 80% of the rescues from drowning performed by surf beach lifeguards. (USLA, 2010) Plunging waves are responsible for most injuries in the surf environment. Backwash is most likely to occur at high tide and during increased surf activity. This phenomenon of returning water to the ocean knocks peoples’ feet from under them and is particularly dangerous to small children and the elderly. Lateral currents or lateral drifts
are created when waves coming from an angle to the beach push water along the beach as the waves break. These strong currents can push a swimmer sideways into a rip current and then out to sea. Sand bars can give a false sense of security for waders, as there can be adjacent deeper water with lateral currents that feed rip currents. Inshore holes are depressions in the sand caused by erosion which can be hazardous to small children. (Richardson, 1997, p 4) The topography of the beach can also create hazards such as steep berms, rock projections, cliffs and man-made structures such as jetties and piers. Another environmental condition that can create hazards is the weather itself, for example storms, fog, lightening and waterspouts. Then there are human factors that can contribute to the occurrence of ocean safety issues, such as age, body weight or level of physical conditioning, intoxication, improper equipment or flotation devices, improper attire and disabilities. The lifeguard must be able to recognize these different factors and take preventative action to maintain ocean safety. (Richardson, 1997, p 5-6)

Research Question 2

What is the incidence of ocean related problems in Pompano Beach?

From 2005 to 2009, Pompano Beach Fire Rescue paramedics responded to 51 drowning calls on the beach. One hundred percent of these calls occurred on unguarded beaches. Of the 51 calls, there were 14 rescues performed, mostly by Good Samaritans. In addition to those who were rescued, there were 13 drowning victims. In one of the incidents, two would-be Good Samaritans became victims themselves, one of whom was a drowning death. During this same timeframe, there were no drowning calls for Fire Rescue, nor were there any drowning victims in the guarded area of the beach. (Pompano Beach Fire Rescue, 2005 – 2009) Also during this same timeframe, Ocean Rescue lifeguards made 249,216 public contacts, conducted 103,262
preventative actions and performed 287 ocean rescues (Pompano Beach Ocean Rescue, 2005 – 2009). These incidents are broken down by year in Appendix A.

Research Question 3

What is the incidence of ocean related problems in the United States?

The Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control reports that 4,000 people will die from drowning each year in the United States with 50-75 percent of drowning incidents happening in open water such as oceans. (Branche & Stewart, 2001, p 1) The United States Lifesaving Association (USLA) estimates that the chance of drowning is only 1 in 18 million when you swim at a beach protected by a USLA affiliated lifeguard (USLA, 2009, p 4). From 2005 to 2009 USLA lifeguards conducted 24,305,672 preventative actions and conducted 352,431 ocean rescues. During this same timeframe, there were 436 drowning deaths on unguarded beaches and 93 drowning deaths on beaches with lifeguards. (USLA, 2005-2009) The USLA national statistics are broken down by year in Appendix B.

Research Question 4

What actions are needed by the City of Pompano Beach, Florida to improve beach safety?

The City of Pompano Beach needs to implement the recommended enhancements outlined in the Fire Rescue Strategic Plan 2008-2018. The specific enhancements include the placement of six additional lifeguard towers, along with the lifeguards and equipment needed to cover the additional areas. This will provide coverage of the entire three miles of beachfront in Pompano Beach from the Hillsboro Inlet to its Southern border. The City of Pompano Beach
should continue its proactive public education approach to improve beach safety, including its learn-to-swim and junior lifeguard programs and look for ways to improve the number of participants. (Pompano Beach Fire Rescue, 2010)

Research Question 5

What prevents Pompano Beach from making the changes needed to improve beach safety?

The main reason that the deficiencies remain is the fact that the City of Pompano Beach lacks the revenue necessary to fund the enhancements necessary to correct the deficiencies. This is due in part to the recent Florida tax reform initiatives that have decreased the amount of property tax revenue. This was exacerbated by the plunge in the housing market, which caused the assessed property values to fall dramatically. The failing U.S. economy also played a role, as it contributed to the property tax reduction equation, as well as it reduced sales tax revenues from the State of Florida. To further compound the problem the city chose to reduce the ad valorem millage rate (city property tax) over the past decade. In short, the City currently lacks the ability to pay for improvements to the Fire Rescue Department’s Ocean Rescue operation that will enable it to provide lifeguard coverage to entire three miles of beachfront.

Discussion

The Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control reports that most drowning cases can be prevented if a lifeguard is present. (Branche & Stewart, 2001, p 1) The United States Lifesaving Association (USLA) estimates that the chance of drowning is only 1 in 18 million when you swim at a beach protected by a USLA affiliated lifeguard (USLA, 2009, p 4). According to the CDC, patron
surveillance by lifeguards is a critical element to preventing drowning from occurring. This surveillance involves maintaining continuous observation of persons both in and out of the water in order to recognize conditions that may cause injury. Since time is the most important factor, the recognition of potential victims is crucial to the preventative lifesaving model (Richardson, 1997, p 2). It is the goal of every USLA trained lifeguard to recognize the need and intervene before drowning occurs. Many times this can occur before the victim realizes that they are in danger. For the ocean rescue lifeguard, lifesaving must be both preventive and reactionary. (Richardson, 1997, p 9)

The United States Lifesaving Association Southeast Region conducted an aquatic safety assessment and provided recommendations for Brevard County, Florida in 2008. This followed a series of tragedies in 2007 where ten people died as a result of drowning off the beaches of Brevard County. Nine of the ten drowning incidents occurred where there were no lifeguards and most of the victims were tourists visiting from out of state. (McManus, J., et al., 2008) The authors noted in their executive summary that these tragedies took place in a community where use of the beach is a key component of its tourism industry. As such, the visitors to the beaches of Brevard County expected that they would be reasonably protected. The public trust was violated when the County failed to provide adequate lifeguard protection. (McManus, J., et al., 2008, p 3) This report echoed the opinion of the CDC concerning the protection of public beaches stating that “any responsible community that promotes its beaches for tourism has an obligation to ensure a reasonable degree of public safety on those beaches” (McManus, J., et al., 2008, p 4).
There are many factors that contribute to the occurrence of ocean safety issues. Different environmental conditions can create hazards that can be a danger to the unsuspecting swimmer. Some examples include plunging waves, rip currents, backwash, lateral currents, sand bars, and inshore holes. (Richardson, 1997, p 4) Rip currents are of particular concern, as they are the cause for over 80% of the rescues from drowning performed by surf beach lifeguards. (USLA, 2010) The topography of the beach can also create hazards such as steep berms and man-made structures such as jetties and piers. Another environmental condition that can create hazards is the weather itself, for example storms, fog, lightening and waterspouts. All of these environmental hazards exist in Pompano Beach, Florida. In fact, the very first international rip current symposium was held in South Florida and used Pompano Beach for its rip current studies. Then there are human factors that can contribute to the occurrence of ocean safety issues, such as age, body weight or level of physical conditioning, intoxication, improper equipment or flotation devices, improper attire and disabilities. (Richardson, 1997, p 5-6) Pompano Beach is no stranger to these human factors. It can be plainly said that Pompano Beach has all the hazards needed at its beaches to create serious ocean safety issues.

The City of Pompano Beach has three miles of beachfront stretching from the Hillsboro Inlet to its southern border. The beach is divided into north and south beach by a fishing pier that extends 400 feet into the Atlantic Ocean. Pompano Beach Fire Rescue is responsible for protecting the beaches and ocean waters with its Fire Rescue and Ocean Rescue personnel. The Ocean Rescue operation is a USLA affiliated lifeguard agency. Currently, there are eight lifeguard towers staffed with twelve Ocean Rescue Lifeguards that guard only 0.8 miles of the beach. This leaves an additional 2.2 miles of beachfront outside of the guarded area that they must respond to in an emergency. The ability to respond to ocean rescues outside of the guarded
area is extremely time consuming and marginally effective at best. In 2009, there were 1,526,036 persons who attended the beaches in the City of Pompano Beach. It is estimated that half of those frequented the guarded beach area, leaving nearly 763,000 beachgoers who attended the unguarded beach on an annual basis. (Pompano Beach Ocean Rescue, 2009)

The research clearly demonstrates that most ocean drowning incidents occur where there are no lifeguards and Pompano Beach is no exception. From 2005 to 2009, Pompano Beach Fire Rescue paramedics responded to 51 drowning calls on the beach. One hundred percent of these calls occurred on unguarded beaches. Of the 51 calls, there were 14 rescues performed, mostly by Good Samaritans. In addition to those who were rescued, there were 13 drowning victims. In one of the incidents, two would-be Good Samaritans became victims themselves, one of whom was a drowning death. During this same timeframe, there were no drowning calls for Fire Rescue, nor were there any drowning victims in the guarded area of the beach. (Pompano Beach Fire Rescue, 2005 – 2009) Also during this same timeframe, Ocean Rescue lifeguards made 249,216 public contacts, conducted 103,262 preventative actions and performed 287 ocean rescues (Pompano Beach Ocean Rescue, 2005 – 2009). This clearly shows that the presence of Pompano Beach’s Ocean Rescue lifeguards made the difference between life and death, as all of the drowning deaths occurred where there were no lifeguards.

It is obvious that there is a need to increase the lifeguard coverage on Pompano Beach in order to reduce the incident of drowning on its beaches. Even with the accepted high level of expertise and professionalism found in the Pompano Beach Fire Rescue Ocean Rescue lifeguards, the high incidence of drowning cannot be overcome without a solution aimed at eliminating the identified shortfalls in service delivery. One of the limitations to funding the
needed changes has been the downward trend of the property tax revenue due to the tax reduction initiatives in Florida. This was further damaged by the housing market crash, which reduced the assessed property values exponentially. Yet the problem remains that Pompano Beach continues to have drowning victims on its beaches. Unfortunately, the solution to eliminating the deficiencies in ocean rescue services comes with a price. The age old dilemma of how to pay for it has reared its ugly head once more.

The consequences of not improving ocean rescue services can be more costly than one can imagine. The CDC measures the economic cost of drowning as that of the victim’s economic loss coupled with the value of lost quality of life related to the injury or death (Branche & Stewart, 2001, p 11). The National Safety Council set the economic loss of an unintentional injury death at $790,000 and the comprehensive cost at $2,790,000 in 1997 (National Safety Council, 1997). To put this into a more manageable perspective, Mael, Seck, and Russell offered an easy way of estimating costs by converting the ratios to a set baseline of 10,000 patrons. Using this method, it can be determined that the total economic costs for not having lifeguards per 10,000 patrons ranges from $202,500 to $4.6 million and the total comprehensive costs per 10,000 patrons ranges from $750,380 to 16.1 million. (Mael, Seck, and Russell, 1999) Since there are more than 760,000 patrons that attend the unguarded beaches annually, the economic cost in Pompano Beach for not having lifeguards in these areas ranges from $15,390,000 to $349.6 million and the comprehensive cost ranges from $57,028,880 to over $1.2 billion.

The question of whether providing full ocean rescue coverage on its beaches is achievable for Pompano Beach is much more than just an issue of cost. One must also consider the legal consequences of not providing adequate lifeguard coverage on its beaches. The
argument could easily be made in a court of law that Pompano Beach has a legal obligation to provide adequate lifeguard coverage on all three miles of beachfront. In fact, there is legal precedence that speaks to this issue (Supreme Court of Florida, 2005). This landmark case provides a clear message for those municipalities that operate a public beach – there are no excuses for an unsafe beach. The cost of a negligence charge against the City of Pompano Beach and potentially its employees could be far reaching, beyond any monetary liability. Of course we must not forget the cost to the victims of these deficiencies. For some it could cost them their very lives. The real question is what risk are the politicians and most importantly the public willing to take in the name of saving money. For some, the cost may be more than they bargained for.

As previously stated, not having lifeguards on all three miles of beachfront in Pompano Beach equates to loss of life. Although the cost of saving a life is minimal when one considers the small cost of lifeguards, the cost of losing a life can be catastrophic. In the final analysis, the true benefit of saving a life is priceless.

Recommendations

The problem that Pompano Beach continues to experience drowning incidents on its beaches must be addressed. These incidents can be life threatening for some and demand a solution that can be implemented in an expeditious manner.

The recommendations for addressing the deficiencies in Ocean Rescue services already exist in the *Pompano Beach Fire Rescue Strategic Plan 2008-2018* (Pompano Beach Fire Rescue, 2010). One of the key objectives of the plan was to improve ocean rescue coverage to
include the entire three miles of beachfront. The action steps for this objective include the following:

- Add four additional lifeguard towers on North beach
- Add two additional lifeguard towers on South beach
- Add one additional ATV on North beach
- Add one additional ATV on South beach
- Add one additional Jet Ski with rescue sled on North beach
- Institute two 2-guard towers on North beach
- Institute two 2-guard towers on South beach
- Add one additional supervisor for a total of three per day
- Increase daily staffing from 12 to 23
- Add Webcams at the Pompano pier looking north and south with feed to Ocean Rescue Headquarters
- Add Webcam at the Hillsboro Inlet with feed to Ocean Rescue Headquarters

Implementation of these recommendations will provide lifeguard coverage to the entire three miles of beachfront and thus improve beach safety, which will ultimately lead to the reduction or complete elimination of drowning incidents in Pompano Beach.
Reference List


City of Pompano Beach, (2009), a. *Budget Office data base*. Pompano Beach, FL: Author.

City of Pompano Beach, (2009), b. *Planning Department data base*. Pompano Beach, FL: Author.

City of Pompano Beach, (2009), c. *Utilities Department data base*. Pompano Beach, FL: Author.


### Appendix A

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<tr>
<th>Pompano Beach Incidents</th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
<th>2006</th>
<th>2005</th>
<th>5-Year Total</th>
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<td></td>
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<td></td>
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<td>2</td>
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### USLA National Statistics

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