SEA SYMPOSIUM '89

Perspectives in Education and Safety on Surf Beaches

-PROCEEDINGS-

Prepared by:

UNITED STATES LIFESAVING ASSOCIATION
AND
FLORIDA SEA GRANT COLLEGE PROGRAM

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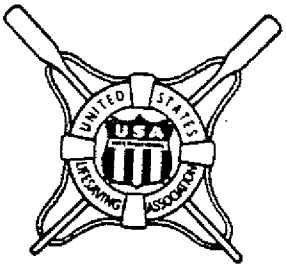

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SEA SYMPOSIUM '89: AN OVERVIEW

John Fletemeyer
President, Southeast Region
United States Lifesaving Association

Each year, millions of people visit surf beaches seeking relaxation and recreation. The large number of beachgoers combined with the many inherent dangers associated with surf beaches is responsible for creating the surf lifesaving industry.

At the heart of this necessary and vital industry are lifeguards. These highly skilled men and women are trained to prevent drownings and other water related accidents. In some cases when prevention is not possible, these individuals must use their skills and training to effect rescues. Each year, surf lifeguards are responsible for saving the lives of thousands of people.

Despite the hard and dedicated work of lifeguards, the surf lifesaving industry faces numerous challenges. These include: dealing with marine hazards, educating the public about aquatic safety on surf beaches, protecting lifeguards from environmental hazards, coping with the various legal ramifications associated with lifesaving, and seeking ways to reduce the shortage of professional lifeguards.

Sea Symposium '89 represents a response to some of these challenges. By bringing together a host of experts with a wide range of professional and educational backgrounds, the objective of this symposium was to suggest new and novel approaches to deal with these challenges.

The first two papers of **Sea Symposium '89** were presented by Marion Clarke (Florida Sea Grant) and Joe Pecoraro (President, United States Lifesaving Association). These individuals stressed the socio-economic importance of surf beaches and the vital service performed by professional lifeguards. They demonstrated from each of their organization's perspectives how they could contribute to beach safety. Both speakers agreed that there was a need for inter-agency cooperation between Sea Grant and USLA. Also both agreed that both agencies should work together to find solutions to some of the problems impacting the surf lifesaving industry.

The third paper was presented by Dr. George Burgess. As an expert on shark attacks, Dr. Burgess provided some insight regarding the factors which contribute to sharks attacks on bathers., Perhaps the most important outcome of Dr. Burgess's paper was his suggestion for USLA to implement a national shark attack reporting network. He stated that his network would be beneficial in extending our knowledge about the nature of shark attack behavior.

The first afternoon speaker was Dr. V.M. Kerensky. His cogent and delightful discussion argued the need for all of us to have well articulated visions and goals. Without these, Dr. Kerensky stated that the quality of our lives is diminished and professionalism will not be attained in our field.

Next, Bill Richardson, Marine Safety Captain of the Huntington Beach Patrol, presented an excellent video on one of USLA's largest and most successful Junior Lifeguard programs. Following the video, Bill gave a number of valuable recommendations to the audience regarding how to start a program. He stressed the need for planning and safety at all times. Perhaps the most important statement made by Captain Richardson concerned the value of Junior Lifeguard Programs in regards to recruiting professional lifeguards. Bill stated that over 50 percent of the Huntington Beach staff came from his Junior Lifeguard Program. This statistic indicates the need

to implement Junior Lifeguard Programs by all beach patrol agencies experiencing lifeguard shortages.

Our next speaker was Dennis Graver, Director of Education for the National Association of Underwater Instructors. Mr. Graver presented a paper on rescue methods recommended for SCUBA divers. During his slide presentation, he demonstrated some special techniques for assisting conscious divers and showed how to transport and ventilate unconscious, non-breathing divers.

Professor Mike Flynn, Associate Professor at the Nova University School of Law, presented his paper on the legal ramifications of surf lifeguarding. At the beginning, Professor Flynn stressed the need to define, "the standard of care." Next he discussed the importance of applying this concept to specific situations. Through liberal use of "real" cases, Professor Flynn helped the audience to be more cognizant of the many legal problems which impacts the surf lifesaving industry.

The final three speakers were Dr. Bill Seaman (Florida Sea Grant), Rick Spadoni (Coastal Planning and Engineering), and Steve Somerville (Broward County Environmental Quality Control Board.) These individuals presented some highly informative information about beach renourishment and artificial reefs.

The first of the three was Dr. Bill Seaman. He focused on the economic importance of beaches in regards to public use. Next was Rick Spadoni who made a strong case for the need for beach renourishment to mitigate the impact of beach erosion. Despite some negative aspects of beach renourishment, he stated the good outweighed the bad. The last speaker was Steve Somerville. His paper and slide presentation demonstrated the economic and recreational value of artificial reefs.

In sum, the speakers of **Sea Symposium '89** presented highly informative and wide-ranging papers on the subject of surf lifesaving. Perhaps the most important outcome of this program was the opportunity it presented speakers and the audience to interact. This interaction was of special significance because both speakers and participants came from diverse areas of the country and the sharing of ideas and experiences was valuable to everyone. Hopefully, future symposiums can be developed which will address other important concerns which relate to surf lifesaving.

A DAY IN THE SUN ON THE BEACH FOR FUN: A SOBERING RESPONSIBILITY!

by

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Florida has over 40,000 visitors to the state annually. Over 85% of these visitors will spend some part of their stay on our beaches and at our waterfront facilities. Combine this group with the resident population that visit our beaches occasionally and/or frequently and you have an exceptional challenge for the waterfront safety personnel. Other states are similar in that people gravitate toward water and waterfront facilities. The multitudes of people that frequent our waterfronts across the nation mandate that water safety personnel keep abreast of current technology and skills in providing a safe waterfront for waterfront visitors.

Beaches are Big Business and an important element of the Recreation Tourism Industry.

In Florida: The Economic Impact of Beaches for fiscal year 89-90 include:

$8.2 billion	in Beach Related Sales
$320,000	in Beach Related Jobs
$1.96 Billion	in Beach Related Payroll
$292 Million	in Beach Related Sales Tax Revenue

Over $97 Million will be spent on Beach Restoration in FY 89-90.

This "Big Business" must be complemented by well trained and competent personnel managing the safety of the visitor on the beach. If they are not competently managed, an array of negative results can occur:

Visitor Injury.
Visitor Death.
Legal Action that can be devastating from the lifeguard all the way up to government officials.
Negative impact on the recreation tourism industry.
Bad Publicity.

Refinement of skills and refreshing waterfront safety personnel of rules, regulations, and procedures are essential to a safe beach environment for visitors. This annual conference is an essential element of ways waterfront safety personnel can keep abreast of current technology, skills and procedures. This Conference is essential to the professional waterfront manager and those aspiring to become involved in the profession to remain on the cutting edge of today's knowledge and technology.

This presentation provides an overview of waterfront safety challenges and sets the stage for the conference highlighting the tremendous responsibilities that face our waterfront safety personnel and their superiors.

This is the first time a Sea Grant program has co-sponsored the National Life Saving Association's Annual Meeting. Sea Grant is interested in research, education and extension programs that will enhance the safety of our beaches and the public that visit them. Many of the Sea Grant's goals are similar to that of the waterfront safety personnel. Sea Grant programs across the nation have expressed interest in participating and cooperating in this type of program in the future. The following overview of the Sea Grant Programs will give insight into the opportunity for future cooperative ventures.

THE NATIONAL SEA GRANT COLLEGE PROGRAM NETWORK: AN OPPORTUNITY FOR COOPERATIVE PROGRAMS!

The Legislation creating the Sea Grant College Program in 1966 was patterned after the Land Grant Program. The structure of the Sea Grant College Program is a little different than that of the Land Grant College Program.

The Sea Grant College Program operates under the U.S. Department of Commerce through the National Oceanic and Atmospheric Administration and is managed by the National Sea Grant College Program office in Rockville, Maryland.

Every coastal and Great Lakes state has a Sea Grant Program. Each program has a Sea Grant director which manages the program in each individual state. Each program has a Marine Advisory Program sometimes called a Sea Grant Extension Program. This is the delivery or education arm of Sea Grant. Each advisory service program is managed by a program leader. This person is the best primary contact for U.S. Life Saving Association members interested in initiating cooperative programs with Sea Grant.

Within Sea Grant there are many structures for staffing. Each program is structured to meet the needs of the state served. Most programs have subject matter specialists who provide sub-program leadership in such areas as recreation, boating, seafood, commercial and recreation fishing, coastal processes, living marine resources, waterfront management and safety, etc.

All programs have field faculty sometimes called field agents. These individuals have responsibility for program delivery in a specific geographic area and sometimes will also have a given program responsibility. They are usually well versed in the characteristics and needs of the area they serve and coordinate extension education programs and technology transfer to marine and coastal clientele they serve.

Most Sea Grant extension programs operate through a "grass roots" Advisory Committee Structure which is made up of representatives of marine and coastal clientele served by the program. Over two-thirds of the programs operate through the Cooperative Extension Service in the respective states.

Each Sea Grant program has three major functions:

* Research: The types of research include basic, applied and demonstration type projects. These programs provide the bulk of the technology transferred through the Sea Grant Extension programs. In many cases the Sea Grant Extension program provides liaison between researchers and clientele to share ideas for research needs and to expedite research projects. There is opportunity for

waterfront safety interests to participate in the competitive research process. Contact your state Sea Grant Director or Sea Grant Extension Program Leader for more details.

* Education: Sea Grant Extension Programs focus largely on education for both youth and adults. Inclusive within the Marine Education element of the program are: school curriculum development, teacher education, youth programming, 4H marine programs, special interest groups, and elder hostels. This element is an exceptional opportunity for waterfront safety personnel to work cooperatively with Sea Grant in education programs for our beach-going public. Cooperative development of educational materials, warning devices, and education programs could have a substantial impact on the knowledge of the publics coming to the beaches. This could well result in a safer and less hostile environment for having fun.

* Marine Advisory or Sea Grant Extension Services: This is the outreach or education arm of the Sea Grant College Program. Waterfront safety personnel can effectively work with this group to develop programs to enhance the safety of our waterfronts. As a result of Florida Sea Grant's participation in this program, a representative of the U.S. Life Saving Association in Oregon made a presentation to the National Marine Advisory Service Leaders Meeting in Portland, Oregon in later summer of 1989. The awareness created by this presentation will enhance the cooperative efforts among USLA and Sea Grant in the years to come.

The participation of Florida Sea Grant in this program is a landmark that will have a lasting and meaningful impact on water safety education programs around the nation in the years ahead. Each participant is challenged to explore how they might utilize the Sea Grant resources to enhance water safety in their area and to see how they can serve as a program cooperator with Sea Grant in the future.

THE ROLE OF THE UNITED STATES LIFESAVING ASSOCIATION AS AN ORGANIZATION

By: Joseph A. Pecoraro, President U.S.L.A. and General Supervisor of Beaches and Pools - Chicago.

The United States Lifesaving Association goes back in its earliest days to the National Surf Lifesaving Association which operated in California starting in 1964.

In 1978 the door of expansion was opened to include the entire United States active lifeguard associations joined to form the U.S.L.A. It seems that until we found each other, all lifeguard associations thought that they were the only active association in existence.

When the final consolidation was concluded in 1978, the United States Lifesaving Association became an organization which represents professional open water lifeguards in the same terms as professional firemen and policemen are represented by similar organizations. Our goals were to train and educate the public in water safety, prevent drowning, and in general to upgrade lifeguarding and develop better lifesaving equipment.

The United States Lifesaving Association is divided into seven (7) regions. Each region is made up of chapters which elect their own officers who in turn meet at a regional level to elect regional officers. The entire organization is governed by a national board of directors which meets twice a year and is composed of regional delegates who are selected by the regions in proportion to their membership. The national board elects, from its members, an executive board made up of a President, Vice President, Secretary, Treasurer, Recurrent Representative, and an International Liaison Officer. These officers serve for a two year term at which time another election is held. Officers may run for as many terms as they wish.

In order to be an active member of the U.S. L.A., a member must belong to an open water beach lifeguard service and have worked a minimum of eight (8) hours for that respective service in one calendar year. Lifeguards that work year round are permanent members and seasonal guards are recurrent members. We also have associate membership which is available to those who wish to help us, but they have no voting privileges.

At the present time, the U.S.L.A. has a membership of about 9,000 members and we are proud of our accomplishments to date. Our textbook Lifesaving and Marine Safety is the only open water lifeguard textbook and as good as it is we are in the process of revising it. We also have published Guidelines for Open Water Lifeguard Training that took years to put together. The guidelines had to be strict enough to promote extreme safety yet broad enough so that a good lifeguard service using unique techniques because of local terrain would not be hurt. It took about eight (8) years to complete and we all feel it is a good document.

I first joined the U.S.L.A., because I wanted to join an organization that was run by lifeguards who actually manned the stands and boats. I felt that the people on the guard stand should speak for the lifesaving community, not a Red Cross Instructor who never actually worked as a lifeguard. The U.S.L.A. has become a strong influence in the modern day policies of open water lifeguarding and I am proud of that fact.

The competition run by the U.S.L.A. is a very valuable tool for all our members. As the head of a large lifeguard organization that employs over 1,000 lifeguards, the benefits of the

competition have been overwhelming. The guards work out on their physical skills and work with the technical equipment everyday. This makes better and sharper lifeguards out of them. Every time we go to a competition the exchange of ideas between the guards from various parts of the country is unbelievable. In my own agency, we reap the harvest of this exchange constantly as lifeguarding has a never ending need for education and the competitors bring back and disseminate so many good ideas from other parts of the country that our service grows in excellence because of it.

It is a proven fact that the safety of patrons on a U.S.L.A. guarded beach is assured a hundred fold over a beach not guarded by U.S.L.A. guards. The discipline taught to our members through our training has proven itself time and time again. I believe that the young guards of today love the discipline that is given to them and with over forty (40) years of experience, I tell you that the guards of today are bigger, stronger, better swimmers and better lifeguards than ever.

I also believe that the Red Cross is slipping in the field of water safety training. Although I owe all my early training in lifesaving to the Red Cross, I must say that the new material is so watered down that I would not advise anyone to hire a person with just the Advanced Lifesaving or Lifeguarding cards. It is important that you test and train your people and the U.S.L.A. Guidelines are an excellent guide for that training. I feel that it is important for the U.S.L.A. to revise the text book so as to cover much of the material the Red Cross has dropped and also to augment the text with the new innovations that have come into the world of lifeguarding.

In the area of Public Education, our quarterly magazine "American Lifeguard" is on its way to becoming what the American Medical Association's journal is to doctors. It has articles from all over the world and from many sources, yet it has the kind of information the guard on the stand wants to read. An example of the benefits reaped from the magazine is an article written about Santa Cruz Beach and how they established an alcohol free beach. Vic Maceo from Galveston Island Beach Patrol presented the article to his county board and they made Stewart Beach and alcohol-free beach. We all know the problems of alcohol and swimming. Most of our problems in the water and on the beach are alcohol related.

Our Junior Lifeguard program is another accomplishment of which we are very proud. We realize that these Junior Guards are our future and in this day and age when it is becoming more difficult to recruit lifeguards and trained lifeguard shortages are becoming common because of extreme need of training and low pay, the Junior Lifeguard Program is the answer. At a young age the Junior Guard is given training, responsibility and guidance and as they grow up they want to achieve the goal of being a good lifeguard. Our U.S.L.A. Junior Lifeguard Program and competition insures the future of our organization and the safety of tomorrow's bathing public. In Chicago we have over 1,400 Junior Guards in our program. More than 80% of the 1,000 guards needed by the city come from our own Junior Guard Program and believe me we have to struggle for the other 20%.

In closing, since 1978 when I became part of this organization, the U.S.L.A. has enhanced myself and the Chicago Park District Lifeguard Service more than can be expressed. The organization expresses itself in its two mottos "Lifeguards for Life" and "Swim Near a Lifeguard". We are all lifeguards for our entire lives no matter where we migrate and if you swim near a lifeguard you and your family can always feel safe.

Shark Aggression in Nearshore Waters: A Florida Perspective

George H. Burgess

International Shark Attack File

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Although the chances of an average person being killed by a shark while recreating at the beach are markedly lower than for other risks associated with these activities (e.g. drowning and traffic fatalities), the threat of shark attack has traditionally fostered the greatest fear among beachgoers. The danger of injury from acute sunburn, dehydration, lacerations, and spinal trauma is also higher than from shark bite. Nevertheless, shark attack is viewed as the ultimate risk by most beach users, perhaps because humans tend to hold in awe any natural phenomenon that they cannot completely control or understand.

Florida leads the nation in aggressive interaction with sharks and humans and thus serves as a useful case study of what can happen when two competing groups attempt to occupy the same habitat. In this contribution I present an overview of the threat of shark attack in Florida waters, in part utilizing the data base offered by the American Elasmobranch Society's International Shark Attack File housed at the Florida Museum of Natural History, and offer advice to those who frequent nearshore waters in Florida and other areas.

Who Are The Major Players?

All humans entering marine waters inhabited by sharks are potential targets of shark attack, but historical data demonstrate a marked skewness towards young males. This probable is a result of the nature of this group's aquatic activities since it does not reflect proportional human utilization patterns (Baldridge, 1974). In Florida most attacks involve surfers and active swimmers, groups traditionally dominated by young white males.

Three species of sharks have been implicated repetitively as the major attackers of man: the white shark (Carcharodon carcharias), tiger shark (Galeocerdo cuvier), and bull shark (Carcharhinus leucas). White shark attacks in United States waters are largely confined to the West Coast and, to a lesser extent, northern East Coast waters in the Mid Atlantic Bight. In Florida, tiger and bull shark attacks are common, but the undocumented leader may be the spinner shark (Carcharhinus brevipinna), a mid-sized (maximum size about nine feet) animal that normally feeds on fishes and invertebrates. This species is a very common inhabitant of nearshore waters and is frequently seen sharing the same wave with surfers along Florida's east coast. My observations of the wounds of victims from this area and the abundance of this shark in the region leads me to believe that spinners are responsible for the bulk of Florida's attacks. Positive identification of attacking sharks is very difficult, however, since victims rarely make adequate observations of the attacker during the "heat" of the interaction, tooth remains are seldom found, and diagnostic characters for many carcharhinid sharks, including the spinner, are difficult to discern even by trained professionals. The blacktip shark (Carcharhinus limbatus), which closely resembles the spinner, may also be involved. Realistically, almost any shark in the right size range, six feet or greater, is a potential threat to humans.

Where Do Attacks Occur?

Analysis of the pre-1968 data base in the File reveals 110 well-documented attacks from Florida waters. Most attacks (86%) occurred on the east coast from the Georgia border to Key West; 65% were concentrated from Palm Beach County southward through the Florida Keys (Fig. 1). Regional levels of shark attack in Florida are correlated with the relative concentrations of sharks and humans in the water. Shark attacks occur when there are sufficient quantities of sharks and humans occupying the same space, thus most attacks occur in

areas with high human utilization of nearshore waters. The east coast of Florida hosted the largest number of people in the water during this analytical period, leading to the above pattern. Similarly, on Florida's Gulf coast, an area with historically lower levels of human activity, the highest number of attacks were recorded in Sarasota County, the site of well-utilized beaches in Bradenton and Sarasota, and Bay County, home of Panama City, another major tourist area.

Most attacks occur in nearshore areas, most often inshore of the first sandbar, but commonly between sandbars where sharks are frequently trapped at low tide. Another likely attack site is an area with a steep dropoff in depth such as the margin of a channel. Sharks congregate in these areas because their natural food items also congregate there.

When Do Attacks Occur?

Attacks are most likely to occur during darkness because sharks are most active during this period and because they have a distinct competitive sensory advantage over humans in low light situations. However, most attacks occur by day because human utilization patterns favor diurnal activity. Attacks occur more commonly when waters are murky due to increased turbidity, again owing to the shark's superior sensory capabilities and to an increased chance of the shark making a prey identification mistake.

In Florida shark attacks occur most often in the winter and early spring because:

(1) there are more sharks present during this time period, especially along the east coast, as a result of southward migrations related to lowered water temperatures in the northern parts of their ranges,

(2) more people are on the beaches (read: tourists) and in particular, there is an abundance of people engaged in appropriate interactive activities, especially surfing, during this time of the year, and

(3) there is an increased level of baitfish activity since many prey species exit cooler sound and estuarine waters for warmer, food-rich, offshore areas during these seasons.

North of Florida the pattern is reversed with most attacks occurring during summer months coincident with peak levels of human and shark abundances. I have not sufficiently analyzed Gulf of Mexico data at the time of this writing, but my impression is that if a seasonal pattern exists it mirrors that of the northern East Coast. Along the West Coast, Miller and Collier (1980) and Lea and Miller (1985) indicate that June to November is the prime time for areas south of Point Conception, CA, and July to September for areas north of Point Conception.

How Do Attacks Occur and What Are The Consequences?

I place Florida shark attacks into three discreet categories: "hit and run" attacks, "bump and bite" attacks and provoked attacks.

"Hit and run" attacks represent about 80% of Florida attacks. Typically these attacks occur in the surf zone with surfers or swimmers the normal victims. The victim seldom sees his attacker prior to the bite; wounds are usually confined to a single bite or slash. I consider these attacks to be cases of mistaken identity based on poor visibility conditions and/or the harsh physical conditions present in the surf zone. A predator working this environment faces the same challenges that draw surfers to the area, namely breaking surf and strong wash and current conditions; quick decisions must be made and rapid movements are required to successfully capture prey in this environment. When difficult physical conditions are considered in conjunction with the natural presence of food items in the area plus provocative human activities (e.g. abundant splashing, contrasting colored swimsuits, shiny jewelry, and contrasting tanning, especially involving the soles of feet) mimicking aspects of prey item behavior and appearance, it is not surprising that sharks might misinterpret a human for a regular prey item. I hypothesize that upon biting, the shark quickly realizes that the human is a foreign object, i.e. it is not

the anticipated natural prey or it is simply too large, and immediately releases the victim and does not return. Alternatively, some attacks, specifically those involving slash wounds, might also involve agnostic shark behaviors related to territoriality or dominance.

About 15% of Florida attacks are "bump and bite" attacks. Usually involving divers or swimmers in deeper waters, bump and bite attacks are characterized by the shark initially circling and often bumping the victim prior to the actual attack. Repeat attacks are not uncommon and multiple or sustained bites leading to severe injuries or fatality are the rule. I consider these to be directed attacks that are the ramifications of feeding or agnostic behaviors.

Provoked attacks are rare (about 5%), but may involve repeat or prolonged attacks leading to severe injuries. Divers sometimes instigate shark attacks by chasing or grabbing sharks; in Florida the nurse shark (Ginglymostoma cirratum) is most often the object of such abuse. Normally a docile species that is very tolerant of humans, nurse sharks exhibit bulldog-like tenacity when provoked, and it often has been reported that a nurse's jaws have had to be pried open or the head cut off to terminate an attack. Bathers have infrequently been implicated in provoking sharks; the most recent attack of this nature occurred at Sanibel where a family wading in the shallows inadvertently stumbled over a sedentary shark (thought to be a lemon shark, Negaprion brevirostris) leading to a particularly vicious attack.

A typical shark attack in Florida results in a single bite or slash on the calf or foot. There is no significant loss of tissue in about half of the attacks. Pre-1968 Florida nearshore attacks resulted in just under 18% fatalities, but loss of life is rarer in recent years with the advent of improved medical treatment and emergency services.

Why Do Sharks Attack?

We are still unable to definitely answer this question because there is no rigorous way to experimentally test a shark's attack motivation (Gruber, 1988). However, based on available information on Florida shark attacks, I surmise that 85% or more are related to aggression, fear, or dominance activities of the sharks or from cases of mistaken identity, and only about 15% to directed feeding activity.

The key point, from a purely predictive or preventative point of view, is simply that two groups are competing for the same space and one of them, the shark, has long occupied this habitat utilizing adaptations, both morphological and behavioral, developed over millions of years of evolution. Humans are at a decided disadvantage in this system and as the weaker player must adapt to the situation.

How Do We Adapt To Sharks?

The following advice is given to those who frequent nearshore shallows:

(1) Always swim in groups. Sharks are less likely to attack a group of humans than an isolated individual.

(2) Avoid swimming during darkness or dawn/dusk hours when light is limited and sharks own a competitive sensory advantage.

(3) Do not enter the water if bleeding from an open wound or if menstruating. A shark's olfactory ability is acute.

(4) Avoid wearing shiny objects (jewelry) which approximate the sheen of light on fish scales.

(5) Do not enter the water if sharks are known to be present and evacuate if seen while in the water.

(6) Do not wander too far away from shore. This isolates an individual and additionally places one far away from assistance.

(7) Avoid waters with known effluents or additions of sewage.

(8) Sightings of porpoises do not indicate the absence of sharks. Sharks and porpoises often eat the same food items.

(9) Avoid waters that are being used by sport or commercial fishermen, or that clearly indicate the presence of bait fishes or feeding activity. Diving seabirds are good indicators of such action.

(10) Use extra caution when waters are murky.

(11) Uneven tanning and bright clothing colors should be avoided. Sharks see contrast particularly well.

(12) Refrain from excess splashing. Do not allow pets in the water because of their erratic movements.

(13) Exercise caution when occupying the area between sandbars or near steep dropoffs.

(14) Don't molest sharks!

If the above advise is heeded I feel quite certain that a large number of attacks can be prevented. If an injury occurs it is important to stop bleeding as quickly as possible using direct pressure or a tourniquet. The victim should be treated for shock and transferred as quickly as possible to medical facilities.

The danger of shark attack needs to be put in perspective. The total number of attacks in a given area, such as Florida, is meaningful only if compared to the number of man-hours spent in the water. Such per capita figures are difficult to calculate because we lack data on the amount of time humans spend in the water, but consider this: 35 million tourists visit Florida each year; if each spends only three hours in the water during their visit more than a hundred million man hours are so involved. Even without considering the time spent in the water by native Floridians, it is obvious that my estimate of 15-20 attacks (resulting in less than one death) occurring per year in Florida becomes pretty diluted on a per capita basis. This should not dampen the respect we ought to extend to a danger that is consistently present, but rather it should spread the message that there is no shame in having a shark attack occur on a given beach. Such interactions are statistically expected in the same manner as any other injuries.

Acknowledgments

I thank Perry W. Gilbert and the late Leonard Schultz for their efforts in founding and developing the International Shark Attack File and H. David Baldridge for permission to allow the American Elasmobranch Society to use his analyses of the File's data in our ongoing computerization of the File. My use of the "paper" File in this contribution underscored exactly how valuable computerization will be for future analyses. I thank Stephanie Chase and Melody Lloyd for assistance in data analysis and Paloma Ibarra for preparation of Figure 1. I greatly appreciate the assistance provided by Robert C. Dorion through the Stewart Springer Fund.

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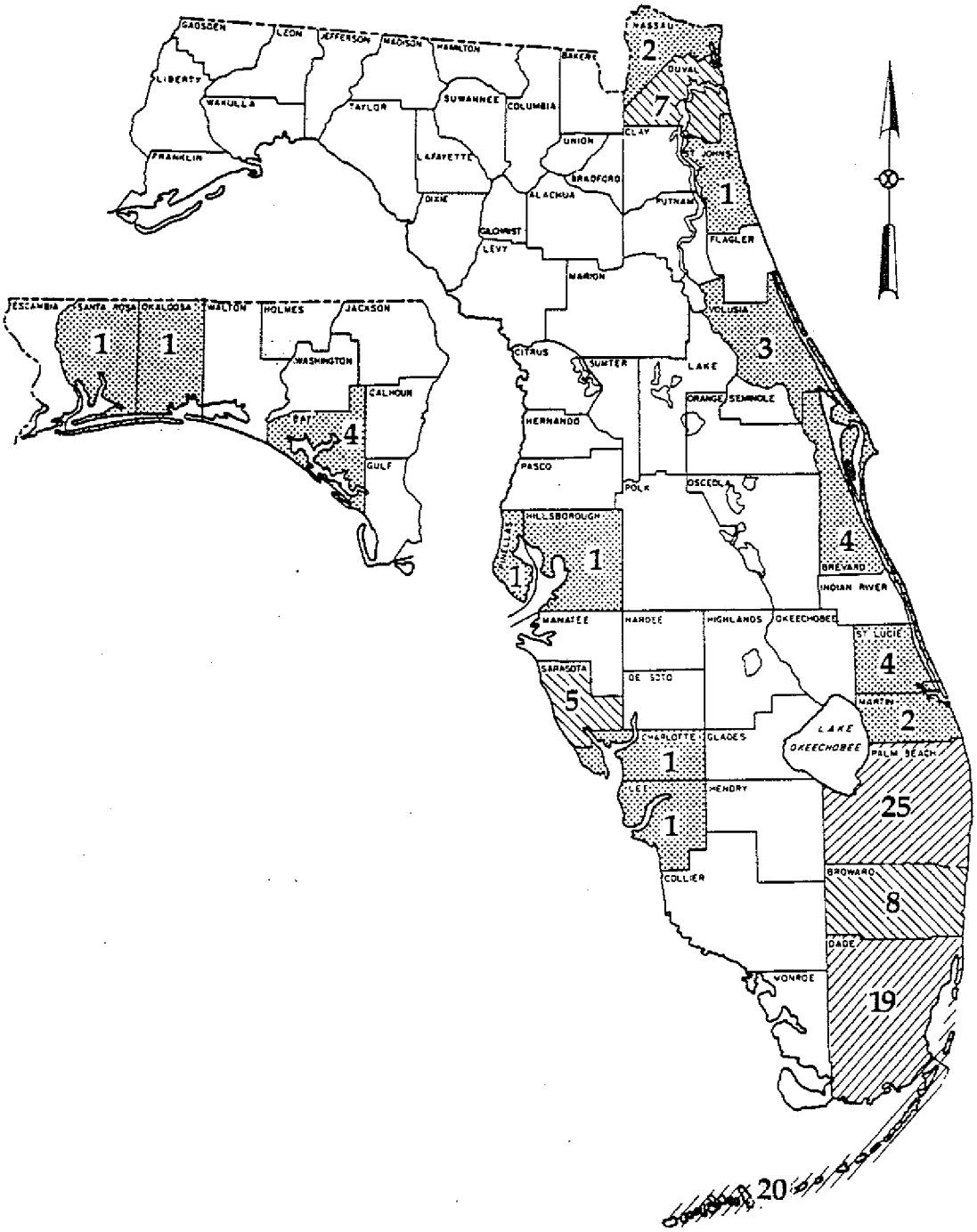

Figure 1. Number of pre-1968 shark attacks in Florida by county based on reports available in the International Shark Attack File.

JUNIOR LIFEGUARD PROGRAMS

by:

BILL RICHARDSON, CAPTAIN

CITY OF HUNTINGTON BEACH - MARINE SAFETY DIVISION

Introduction

On the West Coast, Junior Lifeguard Programs have become an essential tool in the development of lifeguard and marine safety personnel. The outstanding public relations aspects not withstanding, Junior Lifeguard training is a major benefit to the youth who participate in the programs as well as the agencies who run them.

The primary benefit to the agency is the resource of potential lifeguards, who, through their Junior Guard training, become extremely proficient lifesavers.

The benefits to the community are measured by the quality of the training given these youths and the public safety awareness that must be a major part of that training.

Junior Guard programs should be aligned closely with a lifesaving agency in order to maintain the service oriented attitude necessary for the development of appropriate training in the specialized field of lifesaving while maintaining instructional personnel who can provide for the safety of the program's participants.

Administration

In considering the development of a Junior Guard Program, an agency must obviously be concerned with cost and where the money is to come from.

Basically, there are three sources for the monetary support necessary for a successful J.G. Program.

The first is making the program self-supporting, the second is a fully-sponsored program and the third is a fully agency supported program.

To accomplish any of these, the following factors must be known:

A. Personnel Cost - actual cost of the instructors; based on the number of participants per instructor ratio and the length of the program.

B. Operational Costs: Based on the type equipment and materials used in the program and the extent of the program content.

In a fully sponsored program, the costs are borne by a benefactor or sponsor outside the participants and agency.

In an agency sponsored program, the costs are included in a specific budget and paid for entirely by the agency.

Both of these options rarely come to fruition and the self-supporting or shared responsibility type of program is usually necessary.

To illustrate a self-supporting program let me use Huntington Beach as an example.

The program is geared to handle 650 youths.

Personnel costs are based on 25 youths per session, two sessions per day. This equates to 13 instructors. We also have found it necessary to add two program coordinators.

The program is eight weeks long with approximately 10 additional days for prep work, overtime and securing the gear after the program ends. This totals 50 days per instructor as approximately $85 per day or $4,250 per instructor. $4,250 times 13 = $55,250.

The program coordinators put in approximately 60 days per year at about $114.50 per day or $13, 740.

Instructors	$ 55,250
Coordinators	$ 13,740
Total Personnel Costs	$ 68,990
Total Operational Costs	$ 70,000
TOTAL COST	$138,990

Includes *supplies, *equipment, and *travel costs, awards, printing, etc. (*reimbursable)

To offset the total cost we charge a $140 registration fee (650 X 140 = $91,000) and the cost of *uniforms and *travel back to the participants money *reimbursed equals $46,000 for a net cost to the city of $1,990. This for a program running approximately 160 hours and impacting potentially 650 youths.

If less participants register we reduce proportionally 650 youths.

If less participants register we reduce proportionally the number of instructors while maintaining the 50:1 ratio.

Staffing

As previously mentioned we have held the position that instructional staff must have a sound lifesaving background and indeed should still be qualified for lifesaving duty.

The obviousness of the requirement should be evident in that providing for at least minimum safety of the participants should fall on those running the program. The knowledge we hope to impart to the participants is best taught by those with experience.

If one of the goals of your program is to develop future lifeguards this necessity becomes even more evident.

Program

The program should have set minimums regarding age and swimming ability. We further believe it is necessary to pre-test applicants to insure this minimum swimming ability.

In Huntington Beach we use a 100-yard pool swim in less than one minute and fifty seconds, treading water for five minutes and swimming underwater for about thirty feet. We feel these requirements indicate the sound basic swimming ability necessity for the safety of the participants in our program under the potentially hostile ocean environment we work with.

These requirements can be redefined based on the environment your program will be working in.

Program Content

Program content is as important to the participants as safety is to the participants and the agency.

Most programs focus on water activities and competition. We have, however, attempted to be more rounded in providing training in first aid, lifesaving techniques, and very basic environmental and marine ecosystem awareness.

We have added field trips to appropriate aquatic and marine related facilities to keep the program interesting and fun.

The older youths receive more extensive training in safety related activities. However, all the kids are taught how to save a life both at and away from the beach.

In order to establish goals for the participants we have developed several classifications:

Junior Lifeguard	1st and 2nd Lieutenant
Safety Aide	Captain

There are specific requirements to attain each classification based on physical abilities, exams for lifesaving and first aid skills. In the case of the captains, an oral board similar to those required for a job interview.

The objective of this program is to establish specific, attainable goals in attempting to build the individuals physical prowess and self-esteem. Each and every Junior Guard receives a certificate of completion. Other classifications receive certificates for the specific classification attained and a special patch.

Although competition is not the primary premise upon which we base our program, competition does give those so inclined a means of testing their skills against other J.G.'s. This also aids in the development of the competitive spirit necessary in today's world. And, as so aptly stated in the video, we are after all developing responsible young adults.

Our programs have developed competition at the intra-crew, inter-agency, regional, national and occasionally international levels.

Discipline

We have found discipline to be an important part of our program because we are dealing with a hazardous environment. However, we attempt to make discipline a game in which both the youth disciplined and the instructor wins. The youth wins in not being given unwarranted negative discipline and the instructor wins in maintaining control over his charges.

Should a real problem develop, procedures have been worked out to involve the instructors and/or coordinators with the parents if needed.

Conclusion

Whatever the format of your program and whatever the benefits to the community and agency, the primary benefit is to the youth in teaching them respect for the ocean, for the environment, for others and for themselves.

RESCUE TECHNIQUES FOR SCUBA DIVERS

By Dennis Graver, Director of Education

National Association of Underwater Instructors (NAUI)

Problems

A diver from Texas surfaced normally from an uneventful dive in Cozumel. His snorkel had separated into two pieces before the dive, so he had left the remnants on the dive boat. A slight chop resulted from a mild wind blowing across the surface of the water. The diver wore an excessive amount of weight and had a new, but ill-fitting personal flotation device. Upon surfacing, the diver discovered it was difficult to keep his head high enough to breathe, and inflated his buoyancy compensator, but to no avail. His wife was his buddy. She challenged him to a race to the boat, and left him behind. The young man inhaled some water, again added air to his buoyancy compensator with no effect, inhaled some more water, and lost consciousness. The next thing he recalls is being treated in the emergency room of the local clinic.

Divers drown quietly. It is rare for a distressed diver to signal for assistance. Many divers wear more weight than they should. This makes them exert excessively, which leads to overbreathing of their equipment, which results in a feeling of suffocation, which results in panic. All scuba divers have a gauge to measure the amount of air remaining, but the gauge is a passive device that is of no value if ignored. A common genesis of scuba diving accidents is running out of air from failure to adequately monitor the air supply. Divers are restricted and burdened by equipment. Breathing and motion are impaired by weight suits. Those equipped for excursions below the surface of the water spend extended periods of time in and under the water and can suffer from the effects of hypothermia even when wearing exposure suits. Additional complicating physiological effects include changes in heart rhythm, which can lead to heart failure, especially in divers over the age of 45.

Pressure-related maladies, although preventable, contribute to the majority of scuba fatalities. Lung overexpansion injuries from breath-holding ascents while breathing compressed air are the most serious injuries with which a rescuer must cope. A lung rupture can cause a blockage of circulation to the brain, producing immediate unconsciousness, cessation of breathing, and serious neurological damage similar to that of a stroke. The rescuer must be prepared to administer continuous artificial respiration throughout the rescue of such a victim.

Problem Recognition

Although divers are trained to wave an arm as a distress signal or to blow a whistle, these actions are rarely, if ever, taken by distressed divers. A rescuer must be alert to signs which include a mask that is missing or propped upon the forehead, the absence of a mouthpiece, a chin-up position where the struggling diver is gasping for air, and a diver with any of these signs who is alone at the surface. Failure to respond to signals or voice communications is another sign of distress. The vast majority of diving accidents occur or manifest themselves at the surface of the water, so lifeguards can provide more benefit as rescuers than they may feel they can.

Preparation

To effect proper rescues of scuba divers requires knowledge, training and equipment. Special courses in Dive Rescue Techniques are available, and anyone with the potential requirement for scuba rescues is encouraged to complete this training. Familiarity with diving equipment, diving maladies, and rescue techniques can be rapidly acquired in a scuba rescue training program lasting only one day. Local scuba instructors may be contacted to arrange training sessions for lifeguards. The acquisition of a scuba certification is also a good means to become knowledgeable about underwater activities and related dangers.

The minimum recommended equipment for scuba lifesaving includes mask, snorkel, fins and a flotation device. The rescuer must be able to see underwater, swim down to a victim, and have the hands free to work on a victim.

Procedures

Aiding a diver in distress may be as simple as instructing and calming an individual or as complex as recovering an unconscious, non-breathing injured victim who will require continuous resuscitation. Due to varying circumstances, equipment and conditions, there are no rigid procedures for dive rescue. There are, however, a variety of techniques which have proven to be effective and which may, when used individually or in combination, provide the desired outcome in the rescue situation. There are two keys to rendering assistance to conscious, breathing scuba divers who are experiencing difficulties. The first is to establish buoyancy, and the second is to help the diver regain control of respiration. A distressed diver tends to establish a degenerative breathing pattern that is rapid and shallow and which ultimately leads to panic. IF the diver can be made buoyant and made to breathe deeply, problems can be quickly resolved. The best way to make a diver buoyant is to extend flotation to him or her. The next way is to use the diver's equipment to establish flotation. This includes discarding the diver's weight belt and/or inflating the diver's personal buoyancy flotation device. The diver's buoyancy compensator may be inflated in several ways, which emphasizes the need for equipment familiarity. Another, but less desirable way to establish buoyancy for a distressed diver is for the rescuer to be buoyant and establish contact with the diver. This should be done as a last resort, but the action should definitely be taken as it appears the victim is severely exhausted and barely able to remain at the surface. It is very important to prevent a diver from losing consciousness and sinking. Accident reports show that the chances of reviving an exhausted diver who loses consciousness and sinks beneath the surface are poor.

A diver who is conscious, struggling and overexerting may be assisted with flotation, instructions to help resolve a problem and to regain control of respiration, and possible assistance in reaching an exit point. Modified tired swimmers carries and other standard assists may be employed to aid the tired diver.

Surfacing the Unconscious Diver

If it is necessary to dive and recover an unconscious diver, the prime consideration is getting the person to the surface and ventilating him or her. Problems related to lung overexpansion from breath-holding only apply to a conscious diver, so no attempts to expel air from an unconscious diver are required. Decompression sickness is caused by too rapid an ascent. How long and how deep the diver has been beneath the surface should not be a concern when rescuing a submerged diver until after the diver's life has been saved. A living, bent diver can be treated for decompression sickness. Buoyancy should be established by dropping the victim's weight belt and/or inflating the victim's buoyancy compensator. This should cause the victim to begin rising toward the surface.

In-Water Artificial Respiration

Several methods of artificial respiration (AR) are possible in the water. All require practice and modifications from standard AR procedures. Mouth-to-mouth AR is a very effective technique and should be used if the water is calm. Mouth-to-nose AR can be effective for slightly choppy conditions, and mouth-to-snorkel can be used for rough water. The latter is a complicated procedure requiring training and frequent practice. The best all-around method for in-water AR is the use of a "pocket mask", which seals both the nose and the mouth, keeps the victim dry compared to other techniques, and is relatively simple to apply. The best place to learn all of these techniques is in a Dive Rescue Techniques course.

Transporting the Non-breathing Diver

An unconscious, non-breathing diver may require cardio-pulmonary resuscitation (CPR), which cannot be administered in the water. It is essentially impossible to detect the pulse of a diver in the water. Although artificial respiration should be performed throughout a rescue, it is usually wise to transport the victim to an exit point so he or she can be removed and administered to more appropriately. Removal of most of the diver's equipment may make transporting him or her easier. The weight belt, mask and snorkel should already be

removed to establish buoyancy and permit AR. Removal of the diver's scuba unit reduces drag, but the unit should be left in place to provide buoyancy if the diver is not wearing an exposure suit. Procedures have been developed for removal of the equipment by a rescuer without interrupting AR. These procedures can also be learned and practiced during a Dive Rescue Techniques program.

Egress Technique

Perhaps the most difficult part of the rescue of a scuba diver is the removal of an unconscious, non-breathing victim from the water with no interruption or with a minimal interruption of artificial respiration. Various techniques for single and multiple rescuers have been developed for shallow, sloping exits; vertical lift exits; boat exits; ladder exits; etc. Although pictures and verbal descriptions of several such egress techniques are included in this presentation, the best means to acquire familiarity with these techniques is completion of a Dive Rescue Techniques program.

Summary

Dive rescue techniques are different than those for rescuing swimmers, and many of the techniques developed for the rescue of scuba divers can be used to more effectively rescue non-divers. All lifeguards would benefit from the development of dive rescue skills and are recommended to complete a Dive Rescue Techniques program. Obtaining certification as a scuba diver is also desirable and recommended.

BEACH HAZARDS: AN OVERVIEW OF THE LEGAL LIABILITY FOR DANGEROUS BEACH CONDITIONS

By: Michael Flynn
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For adults and children alike, visiting a local beach to enjoy the sun and the water is a welcome respite from the pressures and pace of the work a day world. Oh, how we wish that our day at the beach would not end! However, for Corrine Swaner and Raymond Spina who were sitting on the beach admiring the moonlight at the Santa Monica City Park in California, only to be run over by a car speeding along the beach, life was not a beach![1] For Orla Ralph, sunbathing at Daytona Beach, only to be crushed by a runaway beach buggy, her thoughts were quickly turned to coping with pain rather than the best suntan lotion for her to use.[2] Or for Tommy Kaczmarczyk, who traveled to Honolulu Hawaii for some beach time only to be swept out to sea by the Pacific Ocean current, his mind was on survival not on how to spend the top prize money for the upcoming tanning contest.[3]

Despite the fact that most people use public and private beaches without incident, unperceived and ignored beach hazards lay in wait. Aquatic professionals have a healthy respect for the ocean, the power of a river, the unnerving calm of a lake and gear up to safely encounter and negotiate any hazard. On the other hand, when most non-professionals go to the beach, the feeling of freedom, adventure, or just plain fun may momentarily overtake their judgment and lead to tragedy. It only takes that one moment!

The purpose of my presentation is not to sound the alarm for the beach closure, but rather to try to provide some insight into how the law attempts to balance the interests of beachgoers, beach property owners and operators, and beach workers in dealing with hazardous beach conditions; in other words "beach law."

Standard of Care

Beach law has its roots in the same principles of tort law that govern people who own, occupy or use any type of land. For the most part, whether it is publicly or privately owned beach front property, the same rules of law apply.[4]

A beach hazard may be defined as that kind of condition which creates a substantial risk of injury even to people who exercise reasonable care when engaging in beach activity.[5] For example, constructing a pier and allowing it to remain despite the fact that the pilings are rotted and the pier appears to be collapsing into the water, is the type of condition, that even if swimmers use reasonable care, creates a serious risk of injury.[6] Or as a further example, designating a swimming area in a section of the water that contains a deceptively strong rip current, creates a risk of injury even for a competent swimmer.[7] In these and similar situations, the owner of public or private beach area will be liable for injury to people who use the beach area for failing to warn or otherwise correct the hazardous condition if:

1. The risk of injury to beach users in unreasonable;

2. The hazardous condition was created by the owner of the beach property or was allowed to exist by the owner despite his knowledge of the hazardous condition;

3. The hazardous condition, although known to the owner, is not obvious, a matter of common knowledge, or actually known by the beach user; and

4. The owner's failure to warn or correct the hazardous condition was a substantial factor in causing the beach user's injury.[8]

In analyzing these elements that may result in the imposition of liability upon the beach property owner,

it is important to note that when referring to the owner of beach property, the law also means to include the owner's employees and agents. Also, by setting out these standards to be applied to beach law, the conduct of the beach user must also be taken into account in determining ultimate liability. To illustrate these two points, think back to the situation of Tommy Kaczmarczyk on the beach in Hawaii. If the beach owner employs beach workers who were aware of the strong rip current in that section of the Pacific Ocean, the beach owner would also have that knowledge and may be found liable for failing to warn Tommy of such danger. On the other hand, if the presence of the rip current was obvious or a matter of common knowledge to all beachgoers or if Tommy actually knew of the dangerous rip current because the beach workers told him or posted warning signs to that effect, then Tommy's choice to encounter the danger may absolve the beach owner from liability for his injury.

How the foregoing standard of care will be applied to the latest beach craze, the jet ski, presents some interesting practical policy and legal issues. In perhaps the unenviable position of following in the footsteps of the three wheel All-Terrain Vehicle lawsuits and huge damage awards, the jet ski looms as troublesome for the beach proprietor. For example, a Florida teenager, riding a rented jet ski on a city beach, decided to swerve in front of a friend's boat and wiped out. To paraphrase the news account, the jet ski rider was chopped up be the boat's propeller and eventually died.[9] In applying the principles of beach law to this situation, important questions must be addressed. Should the city or, for that matter, a private beach owner be held accountable for the foolish act of a teenager riding an unstable water rocket? Is it the beach owner's responsibility to aggressively patrol beach areas so as to insure that jet ski riders are either prohibited from riding in certain designated areas or are stopped from engaging in conduct that endangers the well being of other beach goers, swimmers, and boaters? Who is going to pay for all of this patrolling? How much patrolling is enough? Although, most may agree that the foregoing jet ski rider's injuries were primarily self-inflicted, most states use a comparative standard and allow the jet ski rider to recover from third parties based on a comparison of fault. The exposure for the beach proprietor may be staggering.

No state has quite figured out how to deal with the jet ski problem. The Florida legislature is the first to propose any type of jet ski legislation. In Florida, the proposed legislation would require the following:

1. A person must be at least 14 years old to operate a jet ski and at least 16 years old to rent a jet ski (the logic of the age difference escapes me!);

2. Prohibit the use of jet skis in non-daylight hours;

3. A jet ski rider must wear a flotation device;

4. All jet skis must be equipped with automatic shut off switches that will shut down the engine when a rider falls off; and

5. The owner/operator of a jet ski or the renter of a jet ski must acquire a minimum amount of liability insurance to cover the cost of injuries to others caused by the use of the jet ski.[10]

This proposed legislation at least recognizes the danger that jet skis present to beach safety and is a step forward. However, the proposed legislation fails to address the real problem of beach owner liability for jet ski injuries. Hopefully, all of the state legislatures will recognize the hazard posed by jet skis and respond promptly to avoid any further uncertainty and injury.

Lifeguards and Beach Owner Agents/Employees

No discussion of beach law would be complete without mention of the precarious position occupied by the beach owner's workers, most importantly the lifeguard. No longer, if ever, is the movie-type qualities of a lifeguard the telling requirements for a lifeguard job. To the beach owner, the lifeguard is the first line of water safety expertise and the first line of defense to liability. To the beach user, the lifeguard is the first line of emergency assistance and the first line of protection from beach hazards. The importance of the lifeguard or other beach worker in beach law cannot be understated.

The lifeguard, for purposes of the law, is considered just like a lawyer, engineer, or other skilled person; a professional bound to a professional standard of care. In short, the lifeguard is bound to act as a professional lifeguard would act, that is to possess the skill and training necessary to be a lifeguard and to perform as a skilled lifeguard would perform under the same or similar circumstances.[11] For example, in the case of Orla Ralph who was injured at Daytona Beach, the lifeguards immediately called for emergency assistance, rendered first aid, and maintained order so that the medical technicians were able to minimize the injuries of Ms. Ralph. These lifeguards were life savers. On the other hand, take for example, the lifeguard patrolling a stretch of beach, who on a particularly hot day and after a three beer and marijuana lunch, stumbled while trying to aid a swimmer, spraining an ankle. Instead of calling for assistance, the lifeguard abandoned the beach to have the ankle x-rayed. The swimmer, who almost drowned, was rescued but suffered permanent brain damage due to oxygen loss.

Fitness, vigilance, judgment and rescue training are what the court's evaluate to see if the lifeguard passes the legal muster.[12] In evaluating the conduct of a lifeguard it is important to remember that the actions and knowledge of the lifeguard may be attributed to the beach owner which in turn may expand greatly the legal liability of the beach front owner.

Governmental Immunity

As an aquatic professional or perhaps even a beach owner, you may question, if there is this much exposure to liability, why allow beach use? Why own beach property? Why be a lifeguard? Can the lure of beach life be that potent? There is some relief from this burden of liability for the publicly owned beach. Most state legislatures have seen fit to grant to cities, counties and the state itself some form of immunity from liability for certain kinds of beach hazards.[13] Although each state may go about granting this immunity in different ways, the grant of immunity is usually based on either:

1. The government will not be held liable for injuries caused by natural conditions of unimproved beaches; or

2. The government will not be liable for injuries occurring on non-revenue generating beaches.

Most states either grant the governmental entity complete immunity or limit the amount of money that an injured person may recover.[14] In addition, this immunity would also extend to public employees, namely lifeguards, who act within the scope of their job.

For example, Steve Fuller and three of his friends visited the beach area at San Lorenzo Point in Northern California looking for the ultimate dive spot. Steve found an isolated portion of the beach and climbed 15 to 20 feet up the rock formation to make his dive. This was Steve's last dive![15] The beach area from where Steve dove contained no park facilities; was out of view of any lifeguards; and unsupervised by beach workers. Despite the fact that the city posted no sign warning of danger, the state may well be immune from liability because the beach area involved may be considered unimproved. Likewise, Johnny Davis was fishing on a public lake and had jumped in the water in an attempt to untangle some fishing line. Instead Johnny became entangled in some underwater weeds and drowned.[16] The state maintained this lake as a fishing lake and despite the fact that Johnny did have to buy a fishing license, the state may escape liability either because the weeds were a natural condition in an unimproved lake or because the primary purpose for the state to maintain that lake was not to make money but to provide a recreation spot to sport fish.

In analyzing the application of governmental immunity it is important to note that the immunity does not extend to private owners of beach property or absolve even the government from any willful or deliberate conduct that causes harm; that is setting hidden traps or the like.[17]

Even with immunity, all states still impose liability on the governmental entity for its own negligent acts.[18] For example, despite the fact that the beach area may not generate revenue or be unimproved, if the government employed lifeguard actually knew or should have known of Steve Fuller's Point Lorenzo jump then

immunity from liability would not extend to protect the government or its employees from exercising due care in the performance of their duties. Another prime example of the limits of governmental immunity can be illustrated in the case of a lifeguard who actually knew that the area frequented by swimmers, although unimproved beach front, was inhabited by sharks.[19] In that case, the governmental entity would not be able to hide behind the cloak of immunity in failing to warn of the danger.

In short, immunity may be some protection for the government owner of beach property if they chose to do nothing; but if the government acts they must, just as the private owner of beach property, act with reasonable care.

As you can see, beach law is not all sport. Even for lawyers, the twists and turns of beach law can be a maze. However, the aim of the law is to place liability with the person who owns, occupies, or uses beach property and permits or creates dangerous beach conditions without rendering that person absolutely liable for all beach hazards. The court's continue to struggle with drawing the line of liability for beach hazards. But just like sand on the beach, beach hazards will never be completely washed away.

ENDNOTES

1. Swaner v. City of Santa Monica, 198 Cal. Rptr. 208 (Cal. App, 2 dist. 1984.

2. Ralph v. City of Daytona Beach, 471 So. 2d 1 (Fla. 1983).

3. Kaczmarczyk v. City & County of Honolulu Hawaii, et al, 656 p.2d 89 (Haw. 1982).

4. Butler v. Sarasota County, 501 So.2d 579 (Fla. 1986).

5. Kleinke v. City of Ocean City, 394 A.2d 1257 (N.J. 1978); Swaner, supra; Fuller v. State of California, 125 Cal. Rptr. 586 (Cal.App. 1 Dist. 1975).

6. Beikrich v. City of Jacksonville Beach, 159 So.2d 898 (Fla.App. 1 Dist. 1964).

7. Kaczmarczyk, supra.; Butler, supra; Tarshis v. Lahania Investment Corp., 480 F.2d 1019 (9th Cir. 1973); Bucher v. Dade County, 354 So.2d 89 (Fla.App. 3 Dist. 1978).

8. Swaner, supra.; Ralph, supra.; and Butler, supra.

9. Fort Lauderdale News-SunSentinel, May 2, 1989.

10. Florida Senate Bill 142 and House Bill 234, 1989 Florida Legislative Session.

11. Kaczmarczyk, supra; Williams v. City of Baton Rouge, 214 So.2d 138 (La. 1968); Cutler v. City of Jacksonville Beach, 489 So.2d 126 (Fla.App. 1 dist. 1986); City of Santa Cruz v. Superior Court of Santa Cruz County, 244 Cal.Rptr. 105 (Cal.App. 6 Dist. 1942)

12. Kaczmarczyk, supra.; Cutler, supra; Lindsey v. DeVaux, 123 p.2d 144 (Cal. 1942).

13. Annotation, Municipal operation of Bathing Beach or Swimming Pool as Governmental or Proprietary Function for Purposes of Tort Liability, 55 A.L.R. 2d 1434 (1957); Butler, supra.; Cutler, supra; Glover v. City of Mobile, 417 So.2d 175 (Ala. 1982).

14. West's Ann.Cal.Gov. Code as 831.2 (1988); Florida Statutes 768.28 (1988); N.J. Stat. Ann. 59:2-7 and 59:4-2 (West 1986).

15. Fuller, supra.

16. Hill v. City of Lakeland, 466 So.2d 1231 (Fla.App. 2 Dist. 1985).

17. Glover, supra.; Bucher, supra.

18. Ralph, supra.; Butler, supra.; Bucher, supra.; City of Santa Cruz, supra.

19. Wamser v. City of St. Petersburg, 339 So. 2d 244 (Fla.App. 2 Dist. 1976).

FLORIDA'S FUTURE COAST: ARE BEACHES THAT IMPORTANT?

Dr. William Seaman, Jr.
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The topic of this presentation is beach safety, in keeping with the theme of the conference. My title, "Florida's Future Coast: Are Beaches That Important?" may seem self-evident, because an audience such as this would agree completely -- or you wouldn't be attending a meeting such as this. My intent is to take a broader view of "beach safety", and challenge you to consider a broader definition.

If everybody thought beaches were really that important, would we have been finding medical wastes on the beaches off the East Coast last year? Obviously, somebody is not coming from the same point of view in terms of beach hazards, beach cleanliness and so forth. Also, along these lines, would you find miles of beach erosion caused by ill-timed, ill-placed construction? My point is that indeed beaches are important, but maybe groups such as this (USLA) need to do more in terms of promoting general awareness and understanding of beaches, so that their role is properly recognized by private and public interests.

The three areas I present to you are an overview of Florida's beaches, a description of so-called waterfront-dependent issues, and finally the "safety" of Florida beaches.

Florida's Beaches

By any linear measure Florida has more beach than any other state in the lower 48 certainly. There are 1300-1400 miles of coastline and if you stretch that out to include all the little bays and creeks, it's about eight or nine thousand miles. That's more than the rest of the Gulf states and almost as much as the whole Atlantic Coast combined. Thus seashore is a tremendous resource in Florida. That makes for a lot of management issues.

Florida has over 700 miles of sandy beach, and about a third of that beach is "critically eroding." In other words there are severe problems that need some sort of redress before buildings are damaged due to beach erosion, or before bathing beaches are lost.

The beach not only attracts tourists, but three out of every four new people moving to Florida want to live very close to the beach, perhaps in waterfront condominiums. What we're seeing in Florida is that we are caught in a vise of sorts, losing beach or experiencing damage to beach on the one hand; more people demanding beach on the other hand.

A few facts and figures about the economic role of the beach are instructive. These data are very hard to come by and we had to commission a Sea Grant research project a few years ago to generate them; I'm not sure that similar statistics exist for a lot of other states. Five years ago there were over 13 million persons over age 18 who used Florida beaches in a given year. That equated to 148 million beach days. That's a lot of people to guard, or to keep track of.

The economic impact of all these beach users (that is, residents and tourists over the age of eighteen) is rather extraordinary. They generated $4.5 billion in sales in Florida. That was 2.8 percent of the entire gross sales in the State of Florida. So we're talking about a bedrock of Florida's economy. There were 180,000 jobs generated by beaches five years ago. That was four percent of Florida's employment. Finally, 69 percent of Florida residents feel that Florida beaches are either moderately or severely overcrowded or crowded, which raises the question of demand again.

Florida Coastal Environments

The second part of this presentation is a brief rundown of the major coastal systems of Florida, beyond simply beaches. Beaches in and of themselves are a multi-billion dollar environment, but we have a lot of other

related multi-billion dollar marine activities that depend on a reasonably clean and productive coastal environment. For example, Florida has more recreational angling days than any other state in the country, so again we have a large economic investment tied to our environment if only sportfishing in considered. If you drive to the coast from here you'll see mangrove wetlands and salt marshes and other kinds of aquatic habitats that are really the cradle for many of Florida's fisheries. Eighty to ninety percent of all the fishes we land in Florida for seafood and for sport spend some part of their life cycle in these coastal waters. And that's not unique to Florida.

Many folks drive past America's wetlands and think, "what a worthless piece of real estate, it's just grass and muck." As professionals we know the value of these systems, but to a large degree the general public doesn't know about them or how important they are. So again that's part of the responsibility of groups such as this, to educate.

Florida Beach Safety

Finally, I'd like to talk about the safety of Florida beaches. Not from the aspect of rup currents and so forth, as concerns to individual swimmers, but more from the aspect of preserving beach opportunities to meet growing demands for beach recreation and the kinds of services and activities USLA is involved with. One example of a threat to beaches is erosion, a process that costs millions of dollars per mile for renourishment. So the question is how do you prevent erosion or find a way not to worry about it.

Also, there's encroachment on the beach and also on the overall waterfront. An issue in Florida, for example, is how much longer can certain marinas (the so called "mom and pop" marinas) stay in business to sustain boating in the state, when condominium builders would like to buy that marina and put up a much more valuable waterfront condominium? This is a tough issue, and we need to address what absolutely has to be on the water and what can be located elsewhere.

Plastic litter on the beaches suddenly is in everyone's eye. Pollution is another threat we can think about. And then finally think of policy issues, such as limiting access to beaches. In contrast with such threats, we also need to be thinking along the lines of how to enhance beach opportunities, not just through sand renourishment but by providing improved access and other kinds of services.

Summary

There are four take-home messages:

Beaches, especially clean accessible beaches, are economically valuable, and this presentation has given you some numbers to show you how valuable they are.

The coastal system is more than just beaches. It includes bays and wetlands and habitats we used to think were worthless. Those too are economically valuable from the standpoint of fisheries and boating.

There are conflicts between water-dependent needs and non-essential waterfront activities, and somewhere in our zoning commissions we need to be paying more attention to what's really vital on the coast.

Beach safety is more than the accident-related and physical safety aspects of swimmers. We really must think of what a "Future Beach" is going to look like -- and are we even going to have it?

BEACH EROSION CONTROL ALTERNATIVES

by:
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INTRODUCTION

Beach Erosion

Beach erosion has become a serious problem in the United States and throughout the world. There are a number of reasons for the occurrence of beach erosion. One factor is the trend of rising sea level. As the sea level rises, destructive ocean waves encroach further inland, eroding the beach and damaging buildings and structures located along the coastline. Additionally, the recreational beach, so important to coastal residents and tourists, is destroyed by the erosion. The rate of sea level rise may increase in the future with the warming of the earth's atmosphere due to the much-publicized "Greenhouse Effect." However, much of the existing erosion can be attributed to the activities of man, unrelated to atmospheric warming.

In addition to rising sea level, other causes of erosion have been identified by engineers and scientists. In most coastal areas, sand is transported along the shoreline by the littoral drift system, with a net movement of sand in a particular direction. When sand movement along the coastline is interrupted or sand is prevented from entering or is removed from the littoral drift system, beach erosion can occur. The excavation or improvement of inlets along the coastline impacts the littoral drift sand movement and supply. Inlet jetties impound sand which would normally move unimpeded along the coastline. Inlets also draw sand into the interior waterways on flood tides or transport sand into deeper water offshore on ebb tides. Loss of a portion of the sand source also effects beach erosion. Some of the sand found on the beaches of the United States is transported from uplands by rivers and streams which flow to the ocean. Navigation projects interrupt sand movement to the coastline, resulting in a reduction in sand entering the littoral drift system. Beach erosion can also result from the use of coastal structures which may trap of divert sand. Regardless of the cause, the lack of sand in the littoral drift system may result in beach erosion, and with it the potential for massive property damage and loss of the beach as a recreational resource.

Beach Erosion Control Alternatives

Three general alternatives are available to control beach erosion where there is development of the coastline. The first potential alternative is retreat from the coastline, an option that may be reasonably employed under certain circumstances. Retreat, however, may not be practical nor justified in many developed areas. In areas where coastal development has not occurred, regulation of development may be the best solution. The regulations may range from building siting and/or construction restrictions to total prohibition of the development. The second alternative is often referred to as "hardening" of the coastline. Structures can be employed to protect upland property by creating a barrier between the property and the erosive forces, or to trap sand carried along by littoral drift. The third major alternative is to restore the beach by placing sand through dredging, trucking or other means. This is considered the "soft" solution for erosion control, most closely approaching a natural beach system while preserving development along the shoreline.

Retreat From The Beaches

A solution which has been employed in some areas of the country is to retreat from an eroding coastline. This involves relocation of buildings further upland to safer ground. This solution may be applicable to areas of extremely high erosion rates or where the nature of the development (small easily-relocatable buildings) lends itself to the relocation procedure. It is not a practical solution for dense development, development of high economic value or multi-storied buildings as it may be physically and/or economically impractical to move the structures. In the event that extreme predictions for sea level rise occur in the next century, abandonment of coastal areas may be the only available alternative.

Structural Alternatives

Seawalls:

Seawalls are usually employed to save buildings or roads in danger of erosion damage or loss. They are massive walls constructed to protect upland areas from heavy wave action. The average cost to install a properly-designed ocean seawall can exceed $1,000 per linear foot. Seawalls provide protection landward of the structure but will not provide protection to beaches seaward of the wall. Seawalls may impact downdrift beaches by removing sand from the beach system because the sand is contained behind the seawalls. The downdrift beaches do not receive the benefit of sand contained behind the walls and may erode at an accelerated rate as a result. Seawalls are generally not constructed on beaches with high public recreational use because the walls do not preserve the beach.

Revetments:

Much like seawalls, revetments are constructed for storm protection but do not restore or preserve the beach. Revetments are coastal structures designed to reflect waves and preserve upland property. They are constructed in two ways; either as a structure parallel to the coastline and resembling a fortified wall in appearance or as an armor layer of rock placed over a dune or berm in the back portion of the beach.

Groins:

Groins are structures which resemble walls and are constructed perpendicular to the shoreline. Groins extend from the back beach area into the water and are designed to trap littorally transported sand. The sand pockets trapped by groins, termed "sand fillets" create a buffer zone between storm waves and the back beach being protected by the groins. However, groins can adversely impact downdrift beaches in two ways. First, groins can trap and hold the littorally transported sand. The erosion of downdrift beaches can accelerate because they are sand starved due to the sand-trapping ability of the groins. Secondly, littorally-transported sand not trapped by the groins is forced further offshore and may bypass a significant stretch of the downdrift beach before wave action returns the sand to the nearshore zone. As a result, groins are considered a viable solution in areas where downdrift beaches may be adversely impacted. Groins can be used to preserve a recreational beach, but may create safety problems. Swimmers can be thrown into groins by ocean waves and/or dangerous currents can be created around groins.

Breakwaters:

Breakwaters or artificial reefs are structures which are designed to protect beaches from wave action by dissipating wave energy. A decrease in wave energy, will, in turn, result in sediment deposition and reduced sediment transport out of the area of breakwater influence. Thus, these structures function much like groins by "trapping" littorally-transported sand. If a breakwater or artificial reef does capture littorally-transported sand, it can result in significant downdrift beach erosion by decreasing sand movement to downdrift beaches.

Breakwaters can be emergent or submerged structures. Emergent breakwaters trip all waves and have the greatest potential for building the beach behind the structure and causing downdrift beach erosion. Submerged breakwaters dissipate wave energy by acting as a selective wave trip. Larger and steeper waves are most affected by the presence of an underwater breakwater. However, achieving and maintaining the desired result can be very difficult. An improperly designed, constructed or maintained structure can have no effect on the beach, or may accelerate erosion downdrift of the structure. Breakwaters can also create dangerous currents for swimmers. Waves breaking over a breakwater can cause a build-up of water behind the structure. As water accumulates behind the breakwater, the water flows back into the ocean around the ends of the structure and can sweep swimmers into deeper water.

Beach Restoration

Beach restoration can be accomplished by mechanically or hydraulically pumping sand from an offshore or interior sand borrow area onto a beach. Beach restoration provides both storm protection against the destructive forces of waves and restores the recreational area of the beach.

A restored beach most closely approximates a natural beach in response to storm waves. As large, storm-generated waves strike the beach, sand is carried offshore and deposited in a sandbar. As the bar grows, it causes the larger incoming waves to break farther offshore, providing protection to the beach, upland property and structures. When the storm subsides, the majority of the sand stored in the sandbar is transported back to the beach by gentle, short-period waves. However, a percentage of the sand is sacrificed in each storm. As a result, the beach may eventually require nourishment.

An often-used analogy to beach restoration is to paint a house. The paint protects the house, but as weathering breaks the paint down, the house must eventually be repainted. The paint in not only aesthetically pleasing, over time the paint is "sacrificed" to protect the house. Beaches, likewise, are sacrificed to protect the upland structures in developed areas. For this reason, beach restoration is a viable alternative in developed areas or where beaches are important to the local economy.

The frequency at which additional sand must be added depends on a number of variables. The most important variable is storm activity which causes the majority of beach erosion. The characteristics of the sand source, such as grain size, is also a factor in the longevity of the beach restoration project. For example, if all other variables are equal, medium or coarse grained sand will erode more slowly than fine sand. The location of the beach in relation to coastal structures or inlets is also an important factor. For example, restored or natural beaches downdrift of inlets generally erode faster because sand flow is interrupted or diverted by the inlet.

As previously described, beach restoration provides storm protection by rebuilding the beach and providing a buffer of sand for storm protection. Another benefit is that beach restoration adds sand to the overall "sand budget" of the natural beach littoral system. Much of the sand lost from the project area is transported to beaches downdrift of the project site. Thus, even the erosion of a restored beach can provide a benefit to the overall system.

Planting of beach vegetation can be used to supplement the beach restoration effort. A planting program to establish desired species of native beach vegetation is an inexpensive approach to reducing wind erosion of the beach and "storing" sand in the event of a major storm.

Depending on where stabilization is desired, species should be selected to insure survival and growth. The protection of the upland portions of sandy shorelines can be accomplished through the creation of barrier dunes or the stabilization of existing dunes. Native beach vegetation can be used to initiate the building of barrier dunes, and is adapted to the more severe environment of the beach area. Barrier dune formation can occur naturally, but it is usually slow and in some instances may not occur at all. Placement of native beach vegetation traps sand and accelerates dune development.

SUMMARY

Beach erosion control alternatives for developed beaches fall into three general categories including retreat from the coastline, structural protection, and beach restoration. While retreat from the coastline may be applicable in some instances, this solution is not viable in highly-developed coastal areas or in areas economically dependent upon the beach. Structures such as seawalls and revetments are employed to protect upland buildings and roads, but do not preserve the beach. Groins and breakwaters trap sand on the beach at site specific locations, but can deprive downdrift beaches of sand, creating greater beach erosion problems in those areas. Beach restoration involves placement of sand on eroded beaches. The upland receives storm protection and the beach is restored for recreational use.

BROWARD COUNTY ARTIFICIAL REEF PROGRAM

by
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The Broward County Artificial Reef Program has come a long way since that windy, stormy, night in November, 1984 when the Thanksgiving storm brought ashore, to exclusive Palm Beach, the freighter "Mercedes I." What started out as an unexpected visitor to socialite Mollie Wimots's backyard ended up as the most famous of all artificial reefs and placed Broward County boldly on the SCUBA diving map.

Since the sinking of the Mercedes I in March of 1985, Broward County has continued to place artificial reefs in depths of water to maximize environmental benefits as well as to create exciting dive destinations for resident and tourist divers. The environment is benefited in two primary manners. Substrate is created that allows algae and barnacles to attach themselves to a stable surface. Within a few months, invertebrates such as hydroids and anemones readily cling to the blanket of primary growth covering the artificial reef. Eventually, the reef becomes populated by "higher level" invertebrates such as sponges, soft corals and hard corals.

While the evolution of growth on an artificial reef takes place, fish, lobsters, and crabs also make themselves homes on the structure. Often, too much is made of an artificial reef's attractiveness to large adult gamefish. What is often overlooked, especially at shallower reefs, is the reef's suitability as a nursery area. The more interstitial spaces (nooks and crannies) and the more complex in its design, the more the reef will benefit the environment. Juvenile fish and baitfish will fill the crevices of the reef, feeding on the luxurious carpet of living organisms while being protected from larger predators. The artificial reef allows juvenile and sub-adult fish to mature in relative safety. The profile of the reef, or the height off the ocean floor, is important in its attractiveness to fish for three primary reasons. The vessel creates a current shadow, allowing fish to escape the strong force of the Gulfstream. Also, as the Gulfstream pushes against the vessel, the deeper, colder, and the nutrient-richer water is forced up and over the reef, bringing these nutrients to the pelagic bait and gamefishes. Finally, the reef provides a "visual key in an optical void." This is what marine biologists call "something in a lot of nothing." Fish visit the reef often as a center for their feeding forays, searching for considerable distance around the wreck but returning occasionally to use the reef as a reference point in the middle of a vast ocean of sameness.

Another extremely important environmental benefit of artificial reefs, yet often overlooked, is the mitigation that it provides for stress on the natural coral reefs in the area. Broward County has over 38,000 registered boaters. With year-round boating, diving, and fishing, resident and tourist boaters place tremendous pressure on natural reefs by anchoring on reefs, touching, kicking, and overturning corals in search of lobster, pulling snagged fishing lines across coral heads, and many other benign-looking activities which, added up, create considerable damage to natural reefs, user pressure on the natural reefs is lessened.

The diving-oriented artificial reefs in Broward County are diverse in type, depth, and level of diving difficulty. With any wreck dive, inherent safety concerns are paramount. Wreck diver certification is extremely beneficial and most all dive facilities in Broward County have such programs. Another word of caution, although there are many days off Broward County where there is 100+ visibility and no current where snorkelers can paddle around, viewing a massive ship lying in 110 feet of water, there are also days when visibility is bad, the current strong, and the ocean rough. It pays off to assess the situation before leaving the dock and again at the wreck site. It is better to abort a planned dive than to end up in trouble. The wreck will be there for many decades into the future to plan another dive.

Although the Mercedes I is the most famous of all the wrecks off Broward County, there are many others; both larger and smaller, deeper and shallower, and older and newer. Throughout the twenty-four miles of Broward County's coast, there are sixteen major wrecks and numerous smaller artificial reefs available to SCUBA divers. All of these wrecks are within one mile of shore and no further than six miles from an inlet. This makes most wrecks just a few minutes from the dock and just a few minutes from each other.

The oldest wreck, one that the Artificial Reef Program cannot claim, is the Copenhagen. This coal-powered vessel sunk in 1898 in 25' of water. It was later bombed by Navy pilots for practice during WWII. Still today, 90 years later, the wreck and the adjacent reef ledge is home to numerous fish and lobster. This is an area where giant manta rays are observed on a regular basis.

The Wreck Triangle is a one-mile by 1/2-mile area in which four major wrecks form a triangle. The Rebel, Jim Atria, and Mercedes I are on the base line, with the Jay Scutti forming the western point. Although close in proximity, the diversity of each dive is pronounced. The Jay Scutti, a 100' tugboat (surrounded by two steel sailing yachts) lies in 70' of water and is one of the easiest and most popular of all the wrecks. Connected to the Scutti by a 3" diameter hawser, the Pride (a 95' sleek sailboat) lies just 100 feet to the south. The third vessel, the B.H. Lake, rests 150 feet to the northeast.

Not much more can be said about the Mercedes I that is not already written. Every season, the 200' ship (lying in 97' of water) becomes more beautiful as the blanket of growth evolves and different species of fish migrate on and off the wreck. Although it is tremendously popular as a daytime dive, the Mercedes I becomes alive at night as the coral and anemones extend themselves to feed.

At the northern tip of this triangle is the Rebel, a 150' Norwegian freighter. Lying in 110' of water, the Rebel does not receive the diving pressure as that of her more famous sister, Mercedes I. Luxuriant growth and hugh fish abound. Right in the center of the triangle is the newest ship, Jim Atria. This 240' freighter was sunk in September of 1987. She rests in 112' of water, however she is lying on her port side. This makes the wreck an interesting but challenging dive. It is easy to become disoriented and some divers report feelings of vertigo due to visual surroundings being 90 degrees off center. However, even without penetrating the ship, the Jim Atria is a fascinating adventure.

Six miles to the south of Port Everglades Inlet are the Tennexo Platforms. In 1985, Tenneco Oil brought two and a half oil production platforms from Louisiana and placed them on the Broward/Dade County line. Three of the deck sections stand in 105' of water, towering to 60' below the surface. The steel grating of the platform has become an unbelievable substrate for growth. Because the platform sits so high off the ocean floor, there is almost no sediment (slit clay or sand) that can cover the delicate invertebrates which have attached. As a result, these platforms have become a fantastic coral garden with colors rivaling any reef in the Caribbean.

Like a snowflake, no two wrecks or reefs off Broward County are the same. Some wrecks take multiple dives to explore completely. Other wrecks can be seen in a half-tank dive but are near enough to a natural reef to finish the dive. With numerous dive charter boats to choose from, running half-day, full-day, and night trips, Broward's reefs and wrecks are waiting to be explored.