

Water Rescue Awareness Level

Student Manual

Technical Rescue
01-04-0052 (12/07)



Homeland Security
and Emergency Services

Fire Prevention
and Control



Welcome to the New York State Fire Training Program

Water Rescue - Awareness Level

The Division of Homeland Security and Emergency Services recognizes that providing training for paid and volunteer firefighters and related officials is an important part of the services it makes available. Our Office of Fire Prevention and Control (OFPC) places a very high priority on training because we believe it is essential for the men and women of the fire and emergency services in New York State.

The Office of Fire Prevention and Control's programs include the most complete progression of training available today -- beginning with probationary firefighters and extending the full length of a firefighter's career with the fire service. While our training programs address specific fire and arson prevention and control issues, we also encourage expansion and improvement of local training facilities and programs in cooperation with fire companies, municipal corporations and districts.

This course provides an overview of water safety and rescue issues including: hazard assessment, responder safety, risk management, hypothermia, near-drowning, basic water search techniques, basic shore-based rescue techniques, incident management issues, and water rescue equipment.

Your comments and suggestions about this student manual, our training classes or any OFPC program are always welcome. Your input will help us build on our successes and make needed changes, when appropriate.

On behalf of the citizens you serve, we want you to know that your participation and commitment are greatly appreciated.



Albany, NY 12210-2833

WATER RESCUE - AWARENESS LEVEL

ACKNOWLEDGMENTS

The preparation of this course was made possible through the assistance, cooperation and dedication of many people. The Department of State's Office of Fire Prevention and Control wishes to thank the following persons for their role in the development of this course.

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Unit 1

Introduction to Water Rescue

Course Overview and Objectives

Course Overview

The Water Rescue Safety and Awareness course is part of a series of courses designed to develop and enhance your skills as a rescuer. These programs are delivered both in the field and as residential offerings at the New York State Academy of Fire Science to allow you the opportunity to continue your education and training as a rescuer.

This course is designed to introduce Firefighters and EMS personnel to water rescue at the awareness level of response. The course is an informational only course with no hands on training, it is not intended to provide instruction in water rescue skills. To be able to perform water rescues, personnel should obtain hands on training such as the Water Rescue Operations or Swift- Water Technician level courses.

Course Objectives

The overall objective of this course is to enhance the safety of the first responders at water rescue incidents by increasing their knowledge of the hazards of water rescue and the techniques and equipment needed to manage those hazards. At the completion of this course the student shall have:

- An awareness of the risks in water incidents
- The ability to recognize hazards at water incidents
- Knowledge of the NYS water rescue training program
- The ability to identify local water rescue resources
- Knowledge of basic shore based rescue techniques
- Knowledge of water rescue equipment
- An awareness of the risks in water incidents

The 4 hour Water Rescue – Awareness Level course consists of 2 units of instruction covering the following subjects:

Unit 1 – Introduction to Water rescue

Lesson 1.1 – registration, Introduction and Overview

Lesson 1.2 - Introduction to Water Rescue

Lesson 1.3 - Water Hazards & the Dynamics of Moving Water

Lesson 1.4 - Medical Considerations for Water Rescue

Unit 2 - Water Rescue Equipment, Techniques and Incident Management

Lesson 2.1 – Self Rescue & PPE

Lesson 2.2 – Shore Based and Advanced Rescue Techniques

Lesson 2.3 –Water Rescue Incident Management

Course Safety Objectives

- Identify the personal protective equipment needed for water rescue operations.
- Gain an understanding of the safe use of the specialized equipment used in water rescue operations.
- Identify procedures for performing a scene size-up to identify and control hazards, making the rescue area safe.
- Gain an understanding of the importance of redundancy in water rescue systems and operations.

Safety Guidelines

This course is intended to provide first responders with knowledge needed for safe operations at water rescue incidents. It is not intended to train responders in water rescue skills. To master the skills needed for water rescue requires hands on practical skill training including self-rescue and rescue techniques. Attempting rescues or rescue practice, without adequate training, may result in death or injury to personnel.

Introduction to Water Rescue

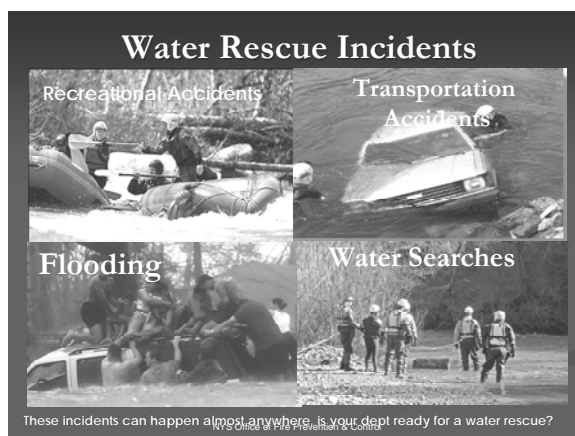
Water rescue incidents can happen in any jurisdiction. These are infrequent but extremely high risk incidents. Due the infrequent nature of these events most departments do not spend much time training or equipping their personnel to handle water rescues. However the hazardous nature of these incidents can place firefighters at extreme risk with rescuers often becoming victims themselves, further complicating the incident.



Drowning Facts

- Second leading cause of accidental death in U.S.
- 4000 lives lost annually in US/300,000 worldwide
- Over half of victims are children
- Almost all victims failed to wear a PFD
- Alcohol and hypothermia are often contributing factors
- Many would be “rescuers” become victims themselves

Water rescue incidents can be caused by many different events and occur in many different locations, from backyard pools to rivers and lakes. Even normally small streams can become swollen torrents in flood conditions. Flooding may involve multiple victims and extended operations. Flash floods often create water rescue incidents at sites with no normal water hazards. Transportation accidents involving water rescue can happen without warning and generate multiple victims. Water Searches often involve only one or two victims, but bring large number of rescuers to the scene – often with little training or equipment.





Because water rescues are infrequent events, firefighters often lack even basic training in water rescue. However, as in most technical rescue incidents, it is the Fire Department that is called on to respond when these events do occur.

While departments with high numbers of water related calls are often well trained for water rescues, floods can create water rescue problems in virtually any location, so all emergency response agencies should have some level of training and equipment for water rescue. Most successful water rescues are made by first arriving units. The special hazards of water rescue put the untrained & unequipped rescuer at an extreme high risk. Unlike most technical rescue incidents, in water rescue often there is no time to wait for a specialized team to respond. Flooding causes more deaths per year than any natural disaster – and many of the deaths are would be rescuers – often in locations with little normal water hazards.

The Risk Paradox illustrated below shows the relation of hazard level and frequency to risk. Events such as structure fires & motor vehicle accidents are frequent events for firefighters and as such we develop recognition based decision making skills which allow us to mitigate the high hazards which they present. However, at events which are low frequency, we do not have a chance to build the level of competence needed to overcome the hazards. In addition, at some events we will have time to plan how to deal with the hazards, but the urgent nature of water rescue often does not give us this opportunity.

		Frequency of Incidents	
		HIGH	LOW
HAZARDS	LOW	EMS CALLS	WILDLAND SEARCHES
	HIGH	STRUCTURE FIRES	WATER RESCUE

Rescuers often drown because of a lack of understanding of the risks involved in water rescue and over estimating their skills or abilities. In addition, many drowning victims are children – this often leads to adults taking far greater risks to attempt a rescue than they normally would.

Rescuers Drown Because:

- Fail to wear a PFD
- Overestimate skill / abilities
- Inadequate training & equipment
- Feelings of urgency /need to act
- Under-estimate effects of cold moving water



One leading water rescue expert made the following conclusion “informal estimates in the US, based on the number of firefighter deaths in fires per thousand working fire calls, compared to the number of firefighter deaths per thousand water calls, would seem to indicate that the chances of an American firefighter drowning on duty are 400% higher than those of dying in a working fire!”. The following are a few case studies of water rescue incidents where the outcomes were disastrous. The narratives of these incidents are included in the Appendix.

**Water Rescue Line of Duty Death
Incidents**

- ❖ Slippery Rock, PA
- ❖ Binghamton, NY 1977
- ❖ San Marcos, TX 1992
- ❖ Ohio 2006



The Five Rules of Water Rescue

Some rules are absolute in surface water rescue. While there are some exceptions such as in dive rescue and surf rescue, these rules form the basics of most water rescue training programs.

Five Absolute Water Rescue Rules

- Never wear firefighting PPE for water rescue operations
- Always Wear a PFD within ten feet of water
- Don't enter moving water except as a last resort
- Don't tie rescuers or victims into a rope in moving water.
- Get the appropriate training before an incident occurs.



There are many different water rescue disciplines including; ice/cold water rescue, swift-water rescue, Marine, and Dive Rescue. Each discipline has its own knowledge, skills, equipment, and procedures. What is considered safe in one discipline maybe dangerous in another environment. An example of this is the secure tie in to a safety line used in ice rescue and some dive applications, in moving water this technique has lead to many deaths of would be rescuers.



Many in the water rescue field go by the rule that what may be a standard operating procedure in one water rescue discipline may quickly kill you in another. An example of this are the safety rope tethers used to secure divers & ice rescue technicians to the shore/boat, if used in a swift-water scenario the force of the moving water will trap the rescuer at the end of the rope and drown them.

Water Hazards & the Dynamics of Moving Water

In order to understand the hazards involved in water rescue it is essential to have an understanding of how water flows, the effects of moving water on stationary objects, weather conditions that effect rescuers & victims , and the geological features found on rivers.

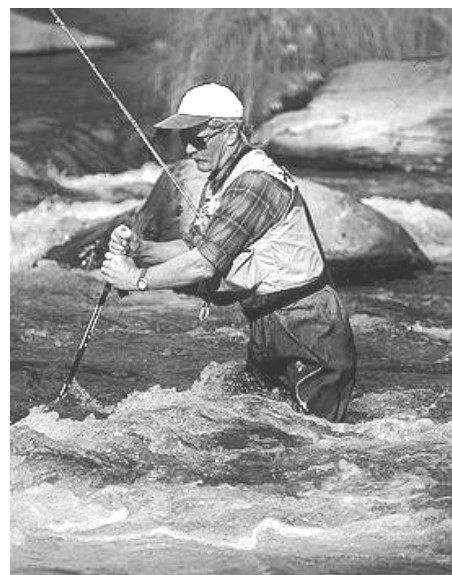
Ice & Cold

Ice and cold water has a dramatic effect on the body. With out the proper PPE for the cold water environment, rescuers can meet the same fate as the victim. Almost all naturally flowing water is significantly colder then normal body temperature so hypothermia is an issue we must address in water rescue, in both patient care issues and in rescuer safety. The average water temperature even in the summer in New York is about 30 degrees cooler then normal body temperature. As we know from our experience and training in firefighting water has a tremendous cooling effect. The cooling effects of water are about 240 times greater then air. Hypothermia can take away our ability to reason and do the tasks needed for rescue.



Whitewater/swift-water

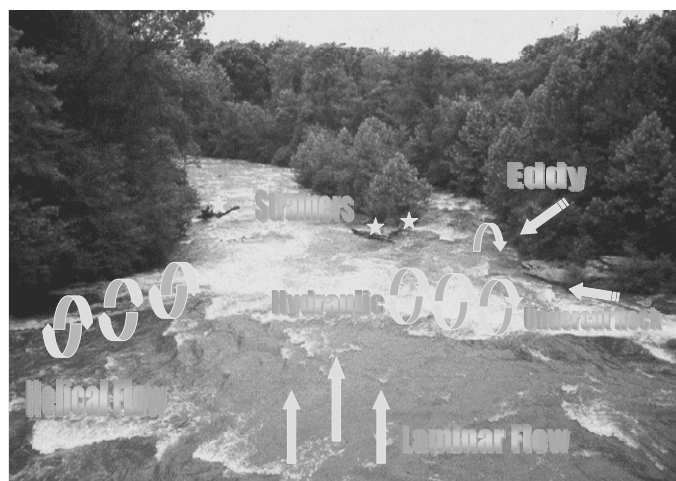
Fast moving water less than 2 feet deep can sweep people and vehicles away (many people attempting to cross flooded roads are swept away each year). With the use of proper techniques, successful wading can be accomplished. People trying to cross such waters are also subject to foot entrapments and being swept into strainers. Fishermen, rafters, and kayakers often are drawn to the fast water sections of rivers and can get into trouble.





Orientation to the river is important to both the river runner and the rescuer. In the rescue service we have adopted some common river orientation terminology from kayakers and rafters. Looking downstream to our right is the river right bank; to the left is the river left bank. These remain river right and river left as our perspective changes.

River features

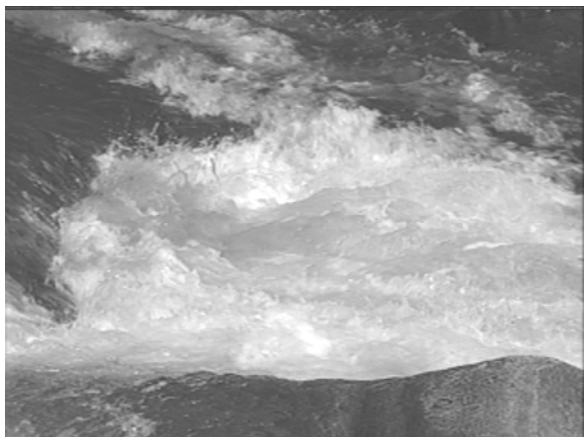


Understanding the features of moving water and some basic river terminology is an important part of preparing for water rescue operations.

Strainers

Strainers are one of the most hazardous features on a river. The force of the water can trap a person or a boat with unbelievable force. Down trees, Log jams, fences, debris, low bridges and other stationary objects allow water to move through but will trap and hold a body.





Hydraulic

A hydraulic, or hole, is a reversal where, due to water pouring over the top of a rock or other obstruction, the current is reversed and forms a washing machine type of current which can trap objects such as boats or swimmers. Some holes are fairly safe and easy to exit via the downstream currents at the ends of the hole.

Kayakers often enter these holes to “surf the wave” the hole forms. However some holes are known as keepers which trap the boat or swimmer and don’t have easy exits. Large holes can have extremely turbulent waters and can flip large rafts and power boats.

Water Falls

Water falls are nearly invisible when approached from upstream. Often the only warning (once you are close enough) is a horizon line across the river and the sound of the falls. By this time, it is often too late to do anything to avoid being swept over the falls. It is always good to know what is downstream of your operations. Rescues of persons trapped at the brink of the falls are extremely challenging and usually require high angle rope rescue



operations. Sometimes highly skilled kayakers will run these extreme whitewater falls. These are highly planned and practiced runs, but even then the potential for something going wrong is very high and even the best kayakers can make mistakes.

Eddy

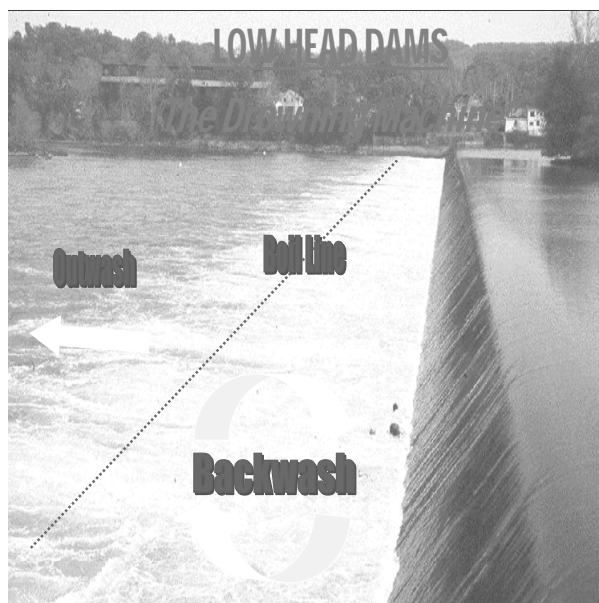
An Eddy is an area of slow moving water that forms behind an obstruction in moving water. Eddys can be safe areas to rest or stage during a rescue. Whitewater boaters often eddy hop their way downstream stopping in Eddys to scout what lies ahead. For rescuers, the eddy provides a place where the water is not moving as fast so rescuers can stay in place. Trapped boats, cars, or even a body may form small Eddys downstream that will allow a rescuer to get out of the main current while they work. It is important to realize however that those are temporary Eddys and the object may again start to move downstream.



Man made Hazards

Dams

Low head dams are manmade hydraulics which are impossible to get out of without assistance. Unlike natural hydraulics these dams have no exit currents at the surface; the backwash recirculates continuously without breaks across the entire dam face. The ends of the dam are often concrete walls. These types of dams are common sites for fatalities as most people who end up in these do not survive the experience. Rescue is extremely difficult but several methods have been developed such as the inflated fire hose rescue technique which allows firefighter to execute a rescue without entering the backwash.



Man Made Channels

Another type of manmade hazard are the flood control channels and urbanized washes/waterways that run through our cities. Designed to quickly move large amounts of run off away, these concert channels with steep walled sides are traps for anyone caught in their flow.



Floods



Floods can happen in almost any community. In a flood, frequently there are so many rescues that all first responders will be put into service to assist victims. Often these first responders have no training or equipment and take great risks to rescue victims, often in desperate situations. Some give their lives in the effort to save others

Flood Stages

Floods occur in four predicable stages pre-flood, flash flood, river flood, and receding/recovery.

Pre-Flood/High Water Phase: This is when the water table and weather conditions are right for flooding to occur. You should monitor the situation closely and prepare to deal with flood conditions. During this high water stage an increase in recreational whitewater boating activity may occur, along with possible incidents resulting from the increased use.





Flash-Flood/Swift-Water Phase: This is when water is rapidly rising with cars & people being swept away. Most deaths occur during this phase so quick response is needed by trained rescuers. Often there are multiple water rescue calls over a short time, overwhelming local emergency response agencies.

Wide Area/River Flood Phase: This is wide spread flooding with people stranded in buildings. Non-technical evacuations are numerous. People often refuse to leave their homes until the water has engulfed the area, making boat & helicopter rescues necessary. Many people also have pets that need to be evacuated and sheltered.



Receding/recovery Phase: This is when water recedes and dangers may include damaged structures, gas leaks, snakes, bio/chemical contamination, etc. Homes and businesses affected by the flood waters will need to be checked for structural soundness and hazards before cleanup and damage repair can begin. Local, state and federal officials will need to do damage assessments in order to seek funds, as will insurance assessors before claims are paid.

Other Hazards of Floods

Floods present many unique problems for rescuers. What is under the water can be hazardous to rescuers & victims. Fences become deadly strainers, signs and guardrails pin & wreck boats and storm drains can become siphons that can suck people in. The water itself also can become contaminated with sewage, chemicals, dead animals and fuel.



Storm drains and culverts can present a special danger in floods. The suction of the water draining into these utility drains can trap a person against the grate making rescue almost impossible without diverting the flow of water away. A recent case in England killed a man who was trapped for several hours while rescues attempted to free him. Efforts failed and the man succumbed to the cold water.

Medical Considerations for Water Rescue

Introduction

In technical rescue incidents, the goal is to rescue the victim. The medical concerns of the patient need to be addressed during and after the rescue phase. Often, a perfectly executed rescue ends in failure when the patient expires due to his injuries.

Drowning

What is drowning? Drowning is suffocation by water. There are different types of drowning: dry drowning are those events in which the patient becomes submerged in water. When the patient inhales water, the larynx spasms, preventing water & air from entering the lungs. The patient loses consciousness and cardiac arrest will follow. In dry drowning, water does not enter the lungs. If rescued and successfully resuscitated, these patients have fewer complications during recovery.



Wet drowning happens when water does enter the lungs. These patients may suffer further complications after resuscitation such as blood chemistry imbalances and infections. There is not, however, a need to make attempts to clear the water from the lungs. Techniques that have been advocated in the past, such as the Heimlich maneuver, are not beneficial to the patient and delay CPR, which is the most effective means of resuscitation.

Flush drowning happens when a person in rough water is constantly pushed under and then back to the surface, can get a quick breath, but also inhales some water each time. The victim's airway becomes more and more compromised, panic sets in, swimming becomes less effective, and larynx spasm occurs, at which time the victim may lose consciousness. A rafter, with a PFD, that falls out of a boat in heavy whitewater, is not rescued quickly and takes a long swim, may end up flush drowning. Near drowning victims may have aspirated some water and should always be assessed by medical personnel.

When a person enters cold water, the cold water hitting their face causes an involuntary gasp, causing water to be aspirated. To prevent this, cover your mouth with your hand as you enter the water. If water is aspirated a choking affect takes place, you are unable to take in air and panic sets in.. Panic leads to ineffective swimming, which can lead to more aspiration. Follow EMS Protocols and transfer the victim to the nearest medical facility as soon as possible.

Hypothermia

Hypothermia is an issue that must be addressed in water rescue, in both patient care issues and in rescuer safety. Hypothermia can take away our ability to reason and do the tasks needed for rescue. As we know from our experience and training in firefighting, water has a tremendous cooling effect. The cooling effects of water are about 240 times greater than air.



The average water temperature in New York (even in the summer) is at least 30 degrees cooler than normal body temperature. This, combined with water's ability to transfer heat away rapidly, means there is no other environment which puts both victims and rescuers alike at such great risk of becoming hypothermic. Even arctic conditions of alpine mountains are no match for water in stealing body heat.



All rescuers should know the signs and symptoms of hypothermia and how to identify it early in victims, other rescuers, and themselves. Hypothermia is easily treated early but can become life threatening quickly. Follow EMS protocols and transport to a medical facility as soon as possible.

There have been several cases of hypothermia where drowning victims have been successfully resuscitated after being underwater for up to an hour. All efforts to resuscitate these patients should be made.

Trauma

All trauma victims need to be immobilized to protect the c-spine. If the mechanism of injury indicates the possibility of spinal cord injury such as, diving into shallow water, Boat Crashes, vehicle accidents, & falls of more than 10 feet, then rescuers should immobilize the patient on a long spinal board before removing from the water (if possible and patient condition permits).



Unit 2

Water Rescue Equipment, Techniques

And Incident Management

Self-Rescue & PPE

Introduction

All rescuers should be prepared to end up in the water. Basic equipment and knowledge of self-rescue skills are essential to rescuer safety.



Equipment



The first task of self-rescue is to be prepared. Having basic water rescue PPE and equipment is very important to rescuer safety. Most water rescues are made with nothing more than a PFD and a throw bag, but the equipment listed here can be a big help should someone end up in the water. All personnel within 10 ft of the water should be equipped with a PFD.

PFDs (Personal Flotation Device)

The US Coast Guard rates PFDs for specific uses. For rescue, Type 3 and Type 5 are the best. Type 1 and Type 2 should not be used for rescue work due to being bulky and hard to don. Type 4 pfd's are throwable devices only. Type 3 and 5 PFDs vary in both function and style. The best PFD for use will be one designed for the specific type of water environment you deal with, i.e.: whitewater vests for swift-water, work/utility vests for marine boat crews, and Type 5 swift-water PFDs for in-water swiftwater rescues.



The Type 5 swiftwater rescue technician (SRT) PFD consists of a whitewater recreational type PFD with high floatation (over 20 lbs) with a built-in Quick Release Harness for safety line attachments. These SRT vests also feature extra pockets for gear, reflective materials, attachment points for tethers and a rescue knife (each rescuer should carry a knife for cutting lines should someone become entrapped in them). All PFDs for rescue work should not only have high floatation but should be easily adjustable and be highly visible. They should be customized by attaching a whistle, a knife, and some type of light for night use. Pockets to stow survival and safety gear are also a good idea.



Thermal Protection



Wetsuits provide good thermal protection and some abrasion protection. Wetsuits allow water to enter the suit then trap it so it heats up to near body temperature. Wetsuits are inexpensive when compared to drysuits, but need to be fitted closely to the individual.

Dry suits provide the best overall protection from cold water. Insulated clothing worn under suit can be changed to meet the needs of the environment. This is the suit of choice for most swift-water and flood rescue teams since it provides not only protection from the cold water but also for contaminated flood waters. Suits can range in cost from \$250 to over \$1000, depending on construction and features.



Ice rescue suits are bulky and have inadequate seals for moving water, so the suit may fill with water in some conditions. The harness on ice suits is also dangerous in moving water and must not be used. Never allow any rescuers to enter swift-water with ropes tied into these non-releasable ice rescue harnesses. Teams that respond to swift-water rescue incidents in these suits most likely do not have appropriate training for moving water rescues and should be placed into shore based assignments.

Helmets

Helmets are a good idea for all rescue personnel. These helmets provide good head protection, are light weight and openings to drain water. Avoid the use of fire helmets as the pressure of water on the extended rim can cause injuries.



Basic Equipment Cache

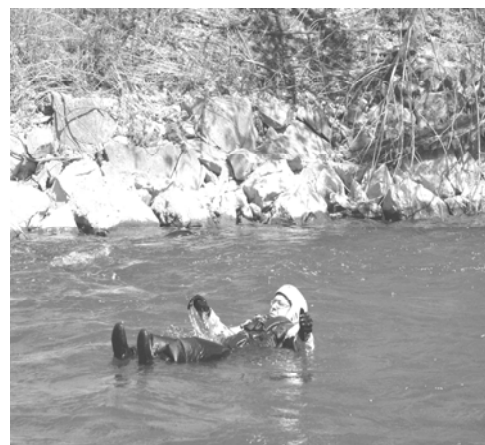


Because basic water rescue equipment is both inexpensive and easy to carry, all emergency response vehicles should be equipped with basic water rescue equipment since we never know when and where we will encounter a water rescue situation.

A basic water rescue equipment kit should include, as a minimum, PFDs, helmets and throw bags for 4 rescuers.

Self-Rescue Skills

Self-Rescue is an essential skill that is taught and practiced extensively in both the operations and technician level water rescue training programs. All personnel operating on, in, and around moving water should learn and practice these skills. Should you fall into the water during a rescue, self-rescue may be your only way out. Should you find yourself in moving water, the first thing to do is turn onto your back with your feet downstream and on top of the water. Control your position in the water by a back ferry, backstroking toward the shore with your head pointed toward the upstream shore. Do not panic. Breathe when your head is out of the water, timing the waves and troughs. Do not attempt to stand up until you are in very shallow water (1 foot or less).




Shore Based and Advanced Rescue Techniques

Introduction

While this course is not intended to give you skills needed for water rescue, we recognize that there are times when untrained personnel will be called on to perform rescues. Flash flood incidents often end up forcing all emergency personnel into water rescue activities. This section gives a plan of action to follow in such circumstances. Having and following a water rescue incident action plan will keep rescuers safer, and lead to quicker rescues. Follow the rescue sequence by using the lowest level of rescue appropriate for your level of training and the given situation. Awareness level personnel should only deploy shore based rescue techniques. While the shore based techniques listed here can be used by awareness level personnel with a relative amount of safety, it is strongly recommended that all personnel be trained to the operations level for effectiveness and rescuer safety.

Rescue Sequence

- Talk victim through a self-rescue /call for help
- Reach – Victim with pole, paddle....
- Throw - Shore based rope rescues
- Row - Boat based rescues
- Go - Swimming rescues
- Helo – Helicopter rescues



NYS Office of Fire Prevention

Shore Based Rescue Skills



Gaining information during a scene size-up should not be overlooked. Often during water rescues, the need for information about the victims location and situation are the two most important aspects of a rescue.

Scene control is very important in water rescue; having a good command presence will help to prevent free-lancing and unsafe actions. Set up a staging area away from the scene so command can select the best trained personnel for assignments and keep the scene free of unnecessary apparatus and personnel. Ensure that all personnel assigned to the incident have correct water rescue PPE.



If spontaneous rescuers are present, a quick assessment of their actions and equipment should be made. If they are untrained, unsafe, or lacking basic equipment, they should be removed from the scene for their own safety. However many kayakers and raft guides have advanced water rescue training and can be very helpful. The best way to determine if they are trained is to



look at their PPE. SRT vests, helmets and dry-suits indicate they are ready for the environment. Those in type 2 PFD's, recreation or play rafts, and jeans are best removed before they complicate the rescue.



Some personnel with gear should be sent downstream to backup rescuers should the victim or a rescuer float downstream. Also send someone upstream with a radio to warn command of debris coming downstream and warn boaters off the river.

Throw Bag

The best and fastest water rescue device is the water rescue throw bag consisting of 50 -75 feet of floating rope stuffed into a small bag. It can be quickly deployed to a victim with little training. The use of a throw bag requires practice for the best accuracy. One must be careful in swift water not to be pulled in by the force of the current on the victim, so a belay stance is needed to control the rope. In swift water, the force of the current causes the victim to pendulum into the shore downstream so it is not necessary to “pull” them in.



A homemade version of the water rescue throw bag can easily be made from a beach jug and 40 to 70 feet of rope. These home made throw bags are packed and thrown the same way as a throw bag. While the range is not as good as a regular throw bag, the jug will float if inverted.



Advanced Water Rescue Skills

It is important to be able to recognize the capabilities of technician level water rescue teams. The next few pictures will show some techniques that swift-water rescue teams should have the capability to perform.



While we stress not trying to stand up while in moving water, with training and practice teams can effectively wade in moving water up to about 4 ft deep by using each other for support. These skills allow a fast way to get rescuers across a river or out to an accident site safely.

Line systems require time to set up but can provide a safe way to reach and evacuate victims. Line systems can be used to support an entrapped person while a rescue is set up.





The use of a boat in rough or moving water requires training and practice. Inflatables are highly recommended due to their inherent stability in rough water.

If the hazard to rescuers is such that a boat could be easily swept away, in many cases a tethered boat system can provide a working platform where needed.



While contact rescues put the rescuer in a high hazard environment, there is often no other choice. With an unresponsive victim there may be no other means of quick rescue. A properly trained rescue swimmer with appropriate PPE can effect rescues in moving water quickly. Here, one type of swimming rescue (often referred to as a live bait rescue) is shown. Using a line attached to a quick release tether allows another rescuer

to pull or pendulum the swimmer and the victim back to shore.

An important first step toward developing a water rescue response is planning. A hazard assessment can help to determine what the local needs are, followed by planning for how to respond to water incidents.

RIVER HAZARD SURVEY

☐ NATURAL OBSTACLES ☐ MANMADE OBSTACLES

BODY OF WATER _____

DESCRIPTION OF HAZARD _____

LOCATION (Local land marks) _____

ACCESS ROUTE _____

ACCIDENT SITE HISTORY _____

ADDITIONAL HAZARDS — ☐ Dam ☐ Electric lines ☐ Chemical ☐ Other (specify) _____

SITE NAME _____

TYPE OF MARKINGS _____

WIDTH UPSTREAM _____ DOWNSTREAM _____ HEIGHT _____

DEPTH UPSTREAM _____ DOWNSTREAM _____ SLOPE _____

CONDITION AND TYPE OF CONSTRUCTION _____

LOCATION — Jurisdiction

FIRE/RESCUE DEPT. _____	LAW ENFORCEMENT _____
Address _____	Address _____
Phone _____	Phone _____

CONTACT PERSON (Keys, gates, discharges, lock and dams, etc.) _____

Phone _____

CONDITION OF RESCUE SITE

☐ Good ☐ Fair ☐ Poor

AREA AVAILABLE _____

PHOTO _____

OBSTACLES _____

TERRAIN _____

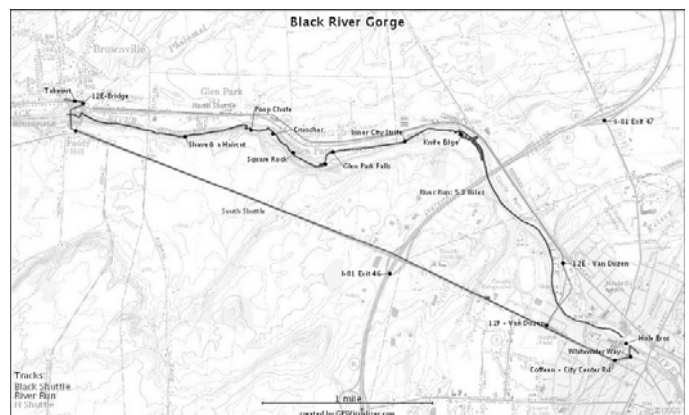
To show entire hazard area
and any unusual features.

Continued on back? ☐ Yes ☐ No

DATE _____ COMPLETED BY _____ PAGE _____ of _____

A hazard survey can identify the potential trouble areas and how best to respond to them. A hazard survey can be done for each area in your jurisdiction and kept on file to reference in emergencies.

Mapping projects have become much easier to do with computer mapping programs. A topographical map can be customized for local information and printed as needed.





A resource list of local water rescue resources can also be a great help in identifying where assistance can be found and what capabilities are available.

There are a very wide variety of boats used for "rescue work". Be sure that both the boats and crews are able to deal with the type of hazards encountered at an incident.



Like boats, helicopters are useful only if they have crews trained for the conditions. Most helicopter crews have little or no training for water rescue. The US Coast Guard has the best water rescue capabilities and can respond quickly. Some areas of New York are within one hour response time, most are within a two hour response time. The State Police have some water rescue capability but you should check on local availability.

It is important to monitor weather conditions and react before flooding occurs. The national weather service and others have flash flood prediction web sites. These can be very informative and give you the opportunity to be proactive rather than reactive.



Appendix

Swift-water Accident Reports

Compiled from the American Whitewater Accident database, FF close calls, and other sources.

This is an excellent resource for information on swift-water incidents. Its main objective is to share information to prevent kayak and canoe accidents. It has over 800 whitewater incident reports listed by both state and year of occurrence.

Full database is available for viewing or reporting swift water accidents at:

www.americanwhitewater.org/accidents/

OPEN CANOEIST TRAPPED IN SINKING CANOE

Norman's Kill River near Guilderland, NY

Date: March 17, 1990

Volume: High

Classification: II

DESCRIPTION: The Norman's Kill is a local class II run, which on that day was badly swollen due to recent rains and snowmelt. The victim, Dr. George Leshner, 64, was a scientist who had done considerable research on heart drugs. He was a trained, but still inexperienced paddler, running tandem in an inexpensive touring canoe with low-hung plastic molded seats with an inner tube for center flotation. The boat apparently tipped and swamped in fast-moving flat water. His partner bailed out, but Leshner stayed with the canoe. At this point the inner tube popped free, and Leshner found that he could not extricate his foot. He was washed into a strainer, where his friends tried so hard to rescue him that they stripped some of his clothing from his body. The rescue was made by Officers Mark Jones and Dan McNalley, experienced paddlers and police paramedics. With shore support from local firefighters they were able to release the victim. CPR was begun at once, and Dr. Leshner was flown to Albany Medical Center where he was pronounced dead.

Accident Database: Accident #723

River: Slippery Rock

The next two accidents involved novice paddlers who encounter strainers while running moderate white water. Slippery Rock Creek, a popular destination for intermediate kayakers in Western Pennsylvania, was the scene of a tragic triple fatality on April 8th. The Pittsburgh Post-Gazette reported that Neil Balcer, 23, met his death while running the Class II lower stretch of Slippery Rock below Eckart Bridge. Balcer, a novice paddler, spotted a downed tree just above the Harris Bridge takeout. He flipped while taking evasive action and made several roll attempts before washing into the strainer. He became solidly pinned about 20 feet from shore. His PFD and helmet washed off and were recovered in an eddy below. Boaters in the vicinity rushed to the scene, but there was nothing they could do. When firefighters arrived, paddlers told them that Balcer had been underwater for 45 minutes and was clearly dead. They suggested that they use a chain saw to cut the downed tree loose from shore. But the dive team from the Unionville Volunteer Fire Department had another plan. They elected to have two men approach the strainer from upstream. Lines from shore were tied to static harnesses (which have no quick release), a procedure which has resulted in many firefighter deaths nationwide. In addition, the two men were connected by an additional line which created a serious snag hazard. Minutes later something went terribly wrong. It's not clear if the pair lost their footing or something became snagged, but the ropes pulled Anthony Murdick 25, and Scott Wilson, 25, under water. Both men, married with young children, were killed. A few minutes later the ropes were ordered cut, but by then it was too late. The pair were dead when they washed ashore below Harris Bridge. The next day firefighters cut the downed tree at the shoreline, allowing Balcer and his kayak to wash free. This incident teaches us the importance of swift-water rescue training, and that we shouldn't take unnecessary risks to recover a person who is already dead.

Accident Database: Accident #182

River: Kaaterskill Creek

Section: High Falls to Catskill South of Albany, NY

Date: March 31, 1993

DESCRIPTION: On March 31, 1993 Catskill Creek, a popular early-season Class III run, was running bank-full due to recent and snowmelt. Temperatures were in the 60°'s, but the banks were snow covered. Six high school kids in three canoes attempted the run. They wore no wetsuits or drysuits; clothing consisted of foul weather gear and work boots. PFD's were worn, but no flotation was used in the canoes. About a half mile from the put-in a canoe wrapped around a tree about 5 feet from the bank, trapping one of the boys. The state police were called; the officers took considerable time making the rescue and hassled boaters who were in the area and trying to help. They also refused to start CPR on one boy, who was not breathing but could possibly have survived because of the cold water. A second boy was hospitalized for hypothermia.

Ohio Firemen Bring 'em Back Alive:

River: Great Miami

Location, Dayton, Ohio

Date: June 1, 1981

Accident Description: On June 1, 1981, a group of four people, inspired by a rafting trip taken in West Virginia the previous spring, launched a pair of small vinyl rafts into the Great Miami River . The air was warm, but the water was high as a result of recent rains. The group, which was wearing life jackets, proceeded without incident until they went over the first major dam in Dayton, OH . They knew the dam was there, but as they put it “we’d been whitewater rafting and it didn’t look bad”. They soon found that appearances can be deceiving, as all of them became caught in hydraulic below. This incident had all the makings of a real tragedy. But fortunately, this came under the jurisdiction of the Dayton Fire Department, an active participant in the State of Ohio ’s innovative river rescue program. Once the men arrived at the scene, two of the victims were retrieved by an inflated fire hose extended into the hydraulic. This technique, developed in Dayton , has been described in previous issues of the RSTF. The other members of the party were plucked out using an aerial ladder extended horizontally. One victim was badly bruised by huge logs which were also trapped by the current, but the others were unharmed

Ohio Firefighter Dies Rescuing Teens From Water June 25, 2006

At 1:18 pm, on June 22, 2006, the Wellington Fire District responded to a 911 call for a water rescue, in Wellington Township. The department's Dive Rescue members responded to the call, with initial reports of two juveniles, in the water. The initial attempt to save the juveniles, who had attempted to drive their vehicle through the road closed barricades and rushing water, was unsuccessful. During a second attempt to reach the juveniles, Diver Allan "Buz" Anderson, Jr. entered the water, attached to a safety line. Water conditions rapidly deteriorated and he was overcome by the water current. At that point, the diver was extricated by rescue personnel using his attached safety line.

While Anderson was being removed, additional personnel successfully reached the two victims and removed them safely from the water. After Anderson was removed from the water, medical care was initiated by fire and EMS personnel. He was eventually transported by Lifeflight to Cleveland Metro Hospital. Resuscitation efforts at the hospital were unsuccessful.

Al "Buz" Anderson was 47 years old. He served on the Wellington Fire District's Dive Rescue team for four years and was a trained swift water rescue diver with fifteen years experience. Buz was married to his wife Julie for 20 years and had four children.

VT Woman Dies During Boat Rescue

SPRINGFIELD, Vt.— A rescue boat crew made several unsuccessful attempts to free an injured woman as their boat capsized in the Connecticut River, trapping her beneath the overturned boat, where she drowned, authorities said.

Virginia Yates, 64, of Rockingham, was stepping on a dock when she slipped Tuesday, injured her head and fell into the river, said Sgt. Craig Morrocco of the Fish and Game Department. A fire and rescue crew from Cornish brought Yates onto their brand-new, flat-bottomed airboat and strapped her onto a backboard. But as the boat headed to a waiting ambulance at a landing, it started taking on water and capsized, Morrocco said Tuesday.

“She was strapped to the backboard and she was strapped into a gurney,” Sullivan County Attorney Marc Hathaway said, a standard precautionary measure. Officials said yesterday that after several attempts to save Yates the boat sank. Crew members were rescued by a passing boat and Yates’ body was recovered an hour later. The boat remained stuck in the mud at the bottom of the river yesterday. Divers planned to attempt to dislodge it today. Officials said Yates was conscious when the rescue boat arrived at the dock.

Five people were on board the boat when it sank. Officials say the circumstances surrounding the sinking are under investigation.

Yates’ friends said they don’t know why she needed to be strapped in.

“Why would you take a 64-year-old lady that’s got a little bump on the head and a strained ankle and strap her into a situation where if there was an accident, she couldn’t get out?” said her friend, Tracy Snide. Edgar Emerson, of Bellows Falls, said he and Yates were on their way to visit friends when she slipped getting out of his pontoon boat. She had cuts and bruises on her head and arms and might have broken her ankle, so he made sure she was seated on the shore before he boated to Hoyt’s Landing to find a cell phone and call 911.

Five Ways to Survive a Swiftwater Rescue

by Slim Ray

Swiftwater rescue is dangerous, no doubt about it. In flood-filled 1995, at least three firefighters died while attempting in-water rescues, and several other rescue personnel narrowly escaped with their lives. Sadly, most of these tragedies were due to lack of knowledge and training. Swiftwater rescue often gets shunted off to specialist outfits like dive teams, or lumped in with very generalized water and ice rescue programs. To many agencies, "water rescue" means dragging the lake for a drowning victim. While these may be the most common scenarios, they are not necessarily the most dangerous.

Swiftwater is different, and far more deadly. Why?

First, the force of moving water is deceptively high, and it increases exponentially with the speed and volume of the water. A six mph current pushes against a person's body with a force of about 134lbs, but a twelve mph current pushes with a force of 538lbs, or four times as much. Thus, a person pushed against an obstacle, or held by a rope in the current, is in grave danger. Rescue boats, including hovercraft, can suddenly flip in the powerful current differentials of a flooded river.

Second, things happen very quickly. Agencies are often confronted with a moving incident as a victim (and often would-be rescuers as well) wash down rivers and flood channels at speeds of up to fifteen miles an hour, often crossing jurisdictional boundaries in the process.

Third, some common safety practices, like the use of lifelines and safety tethers, are downright dangerous in moving water. Safety gear and personal protective equipment intended for other disciplines can do more harm than good in a swiftwater rescue.

Because of this, and since swiftwater rescues make up only a very small proportion of most rescue agencies' calls, it's easy to get "sucker punched." One recent study showed that, over the past 20 years, water incidents accounted for 1% of total firefighter deaths. This may not sound like much until you consider that water rescue calls typically make up only 1-2% of the total incidents of a typical fire

company. The conclusion is that while these incidents may be infrequent, they are extremely dangerous.

Before they can even consider making effective rescues, public safety personnel (a broad category including fire, EMS, rescue squads and law enforcement) must be able to ensure their own safety to a reasonable degree. Many of these fatal accidents and near misses could have been prevented by having a basic knowledge of swiftwater and by observing a few simple rules.

Rule 1. DON'T wear turnouts or other bulky service clothing. Firefighting turnouts work very well to protect firefighters from heat and flaming debris, but were never meant to be worn in the water. While it's a myth that heavy clothing will "drag you down," it is true that bulky, heavy, water-soaked clothing is hard to swim in and gives little thermal protection in the water. Any would-be swiftwater rescuers are strongly advised to wear a wet- or drysuit for thermal and physical protection while in the water. Law enforcement personnel should also leave firearms and similar gear on shore.

Rule 2. DO wear a life jacket. A Personal Flotation Device (PFD) is the most important piece of personal protective equipment for rescues in or near the water. While any PFD is better than none, one meant for swiftwater is much better. Choose a snug-fitting US Coast Guard Type III or V designed for whitewater boating or rafting with 25-35lbs of flotation. Avoid ski vests, Type I PFDs (too bulky), and Type II "horsecollars," since these last have a nasty habit of coming off over your head. And finally, buckle it before you go-an unsecured PFD is no PFD at all!

Rule 3. DON'T enter moving water except as a last resort. Any rescuer who enters swift water-in a boat or by swimming- greatly increases his personal risk level. This is especially true of untrained personnel, who often have to be rescued themselves.

Before entering the water, consider other alternatives first. Use the simple mnemonic RETHROG-REach, THrow, Row, Go. Unless you have had swiftwater-specific training, it's a good idea to stay with reach and throw. The first step might be to try to talk a victim into self rescue. Often an obvious route of escape will be overlooked. Or perhaps you can reach them with a pike pole or paddle and pull them to safety. Or you may be able to throw them a rope and pull to shore. These options are much safer than going in the water. Yet all too often, a rescuer's first instinct is to jump in.

Rule 4. DON'T tie yourself to a rope if you do go in the water. A safety tether may seem like a good idea when entering a flooded stream. It is not! Quite often a tethered rescuer gets swept off his feet, pushed underwater, and held there by the current. Remember, that force may be several hundred pounds-far too much for him to release the knot or to be hauled back upstream. Two firefighters died this way in 1995.

Rule 5. DO get appropriate training before an incident. "Water rescue" is a huge and diverse field, and rescuers sometimes make the mistake of thinking that because they are expert in one area, they are expert in them all. There is no substitute for hands-on, swiftwater-specific training with competent instructors. The emerging professional standard is that anyone in a public safety agency (fire, police, EMS) should have at least awareness-level swiftwater training (first responder is better) in order to protect themselves on site. Anyone whose duties may include actual swiftwater rescues should have at least technician-level training (e.g. Swiftwater Rescue Technician I), and incident commanders should have specialist (e.g. Swiftwater Rescue Technician II) training.

Flooding is probably the most common natural disaster. It knows no season nor region. Yet too often the need for training is ignored until after a high-profile incident. This article can do no more than identify some of the more obvious, avoidable mistakes that have killed rescuers in the past. To insure the safety of rescuers and the effective rescue of others, some form of swiftwater rescue training and awareness is essential.

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A New Flood Rescue Response Model

by Slim Ray

Many of the flood responses in the past few years have fallen into the "too little, too late," category. The scenario is distressingly familiar, especially for flash floods: as the flood hits, residents and local emergency workers struggle to survive and rescue others. Emergency managers struggle under a staggering call load, trying to separate the desperate from the trivial. They call outside resources, but by the time they arrive on scene, the flood is mostly over. This scenario has played itself out many times—in Ft. Collins, Kansas City, the floods of Hurricane Floyd in North Carolina, and elsewhere.

In the aftermath the response is generally justified with "we did all we could" and "there's just no way you can plan for something like this." Yet much of the problems emergency managers have encountered is due to using an antiquated and inadequate response model. In this article we will explore a newer, more responsive model. But first, let's look at some of the characteristics of floods.

Floods generally come in two flavors: river floods and flash floods. Many floods, such as the recent ones in North Carolina in the wake of Hurricane Floyd, have characteristics of both. In general, a river flood is just what the name implies: too much water in a river's watershed. It often affects a wide area, quite often an entire region, and has a slower onset and retreat than a flash flood. This leads to a different time problem than a flash flood, which comes and goes in a hurry. In river floods a major problem is exhaustion of the rescuers over an extended time period.

A flash flood, on the other hand, tends to be an intense but short-term event. The entire incident may last only four to six hours from start to finish, or it may be the start of a long-term river flood. One of the salient characteristics of a flash flood is that there are a very large number of life-threatening incidents in a very short time (more about that later). A flash flood may affect an entire region, or it may be localized to only a few city blocks. Time, always, is the rescuer's enemy, and the major management problem is that there are never enough rescue resources to go around.

All floods, generally speaking, have three phases, which often overlap:

Swiftwater Phase: this initial phase is where the most fatalities (and the most rescues) occur. Large numbers of people, including those in rescue agencies, are caught unaware, often in darkness. Many are swept away. Statistically the two largest groups are people killed are 1) those driving through moving water and 2) children playing near flooded creeks and flood channels. The sheer number of incidents overwhelms dispatch and available units.

Flood Phase: the situation stabilizes somewhat, but there is standing water everywhere and rivers may continue to rise, further restricting access. Those who are able have rescued themselves, at least gotten to positions of less immediate danger like the roofs of houses or the tops of cars. Because of the flooding, rescue units cannot access many locations. Large numbers of people may have to be evacuated from flooded areas and are displaced to shelters. In a river flood, this phase may be prolonged, sometimes for months.

Recovery Phase: the water begins to recede and people return to their homes. The dangers of this stage are more indirect—downed power lines, debris, disease, contaminated water and food, etc. There are major infrastructure problems—washed out roads; loss of power; lack of clean water. Rebuilding begins.

What rescue resources might we expect to use in a flood? The most obvious would be specialized water rescue teams. These, especially any used in the initial phases of the flood, must have swiftwater-specific training. Dive teams or those with only generic water rescue training only put themselves and the victims at risk in fast-moving water. However helpful these specialized teams are, however, there will never be enough of them to go around in flood event. To supplement them, we first need to look close to home.

There are many non-specialized rescuers in any flood zone. These include law enforcement personnel (police, sheriff, etc.), firefighters, rescue squads, and EMS personnel. However, these people need at least minimal training and equipment for simple rescues and to protect themselves. While all these groups will protest that they don't do water rescue, the simple truth is that during a flood, everyone will be doing it. Do not overlook other local resources, like municipal storm water personnel; power crews; and other city/county/state employees whose duties take them into the flood area.

Outside resources include mutual aid from surrounding jurisdictions (who may be having their own problems), and military assistance from the regular military and National Guard, and Coast Guard. Don't overlook qualified volunteers, especially kayakers and raft guides from river companies. These outfits often have a great deal experience in moving water and useful equipment, like rafts and PFDs, also.

Educate your dispatchers on the basics of flood and swiftwater rescue. They can't make decisions on what to send where unless they know how the system works. Any dispatch system needs a ramp-up capability; that is, the ability to expand its capacity from normal call volume to several hundred calls in a short time. In addition, it is critical for any dispatch system to be able to triage incidents; that is, to separate the trivial from the life-threatening. The newly-devised Natural Disaster Information Cards (see sidebar) are a great help in doing this.

Developed by meteorologist John Weaver at Cooperative Institute for Research in the Atmosphere (CIRA) at Ft. Collins as the result of the flood there in 1997, the Natural Disaster Information Cards are an invaluable tool for helping dispatchers and managers triage incidents and for helping citizens cope with emergencies. They can be downloaded free at <http://fcgov.com/oem/ndic.php> and modified to suit local needs.

Incident commanders and emergency managers also need a working knowledge of flood and swiftwater rescue, so they will know what works and what doesn't. Agencies need to have common maps and enough command interoperability to at least be able to talk to each other. A good way to do this is to schedule joint exercises. Most emergency managers, used to the routine of daily operations, have had little experience in managing a large incident.

Okay, most of these things so far are common sense, although unfortunately few agencies do them. But let's look at the response model, especially for a large incident. How do we manage a large flood incident to get rescuers where we need them? One thing we've already noticed is the lack of time, especially in flash floods, and the fact that most casualties happen in the first few critical hours.

The traditional response method is often called the "pull" system. In this model, response units remain at their home station until called. Once a disaster occurs, it is sized up and resources are identified to handle the problem. These are then requested through proper channels, alerted and dispatched. With volunteer units, the volunteers must first come to station, don their gear and draw their equipment, then proceed to the

incident location. In a large-scale disaster, outside resources are often not notified until local units realize that they can't cope with the situation, causing additional delays.

The advantage of the pull system is that it is a very efficient way to allocate resources. Rescuers are sent only to actual incidents, and then only as many as are needed. For routine situations this works just fine. The big disadvantage of the pull system, however, is that it is slow. The cycle of size-up, request, approval, selection, alert, and dispatch is called a decision loop, and it takes time. The more people and the more command levels in the loop, the longer it takes to get people on the road. In a flood this often means people get there too late, and when they do get there, they may not be able to reach flooded areas.

This problem also surfaced in the US Army in the early 1980s, especially for battlefield logistics. Military logisticians found that on the fast-moving air-land battlefield, the pull system was just too slow. By the time supplies had been requested up through the chain of command, authorized, loaded, and sent down to the units, the situation had changed radically and the original requests were no longer appropriate.

To deal with this the army came up with the "push" system. Under this system, unit logisticians would monitor the situation and make an estimate of what the units needed, then dispatch it without being asked. It was not as efficient as the pull system, because the requirements were not exactly known, and sometimes the logisticians guessed wrong. But it was much, much, faster and more responsive.

So what has this got to do with floods? Experience has proved two things—things happen in a hurry and large areas are quickly cut off by rising water. This has meant in practice that the people who are on the spot make the rescues, ready or not. There simply is not time to mobilize and deploy after the flood starts, and often impossible to get there.

By adopting a "push" system, managers have a much better chance of getting people where they need to be. As flooding threatens, units are predeployed to known or suspected trouble spots as determined by weather predictions, historical data, pre-incident surveys, and agency preplans before flooding begins. Only in this way will they be where and when they are needed. It also works in reverse, allowing managers to get citizens out of areas sure to flood.

A good example of this is the system used in Los Angeles. When weather conditions are right for flooding, strike teams are dispatched to walk the flood channels, and swiftwater teams are positioned in likely trouble spots. This cuts out the time needed to identify the incident, dispatch, and travel to the incident. This way they can begin rescue immediately.

Obviously this is a much more difficult challenge than reacting to an existing incident. It requires considerable expertise on the part of managers and a close working relationship between weather forecasters and emergency services—much closer than is now generally the case.

Plans and Preparations

The Chinese military philosopher Sun Tzu said many years ago that most battles are decided before either army sets foot on the field. So it is with floods, and perhaps the most important arrow in the flood manager's quiver is his preplan. Unlike natural disasters like earthquakes and tornadoes, floods can often be predicted. Furthermore, floods are constrained by geography. It's possible, especially in these days of GIS software

packages, to map low areas and watersheds and to compare this with real-time meteorological data.

An agency's preplan needs to be a realistic, worse-case scenario of flooding in an entire region. What areas are at risk? In many cases your best data is historic, since some low areas flood every time there is a heavy rain. Where have rescues and drownings occurred in the past? Where will the water go? You will need maps of the entire watershed of any rivers and creeks, even if they go out of your jurisdiction. When planning deployments, try to anticipate which roads will be underwater, both so they can be blocked off and so that you won't try to deploy through them. Try to choose pre-deployment spots that won't go under water also. Good maps are a necessity. Federal agencies like U.S. Geologic Survey can be a great help here in showing you where the flood plains are. Don't neglect the smaller watersheds in your jurisdiction, since creeks will, with enough rain, become rivers. As mentioned before, common maps for all agencies are a necessity.

Survey your jurisdiction for obvious flood hazards:

Low bridges: These need to be blocked off. Seven people died in one incident in Kansas City when three cars were swept off a low bridge. Low bridges can also become blocked with flood debris and turn into dams, then send a surge of water downstream if they let go.

Dams: Low-head dams can become "drowning machines" during floods or high water. How would you rescue someone in one?

Flood channels: These present a difficult and dangerous rescue problem, with fast-moving water (up to 30 mph) and smooth banks.

Low water crossings: Very common in many western states, these need to be blocked off or at least monitored during high water.

Creeks and watersheds (watershed maps): Do you know where the water goes? That insignificant creek running through town may become a major river after a storm.

Storm water systems: People and even trucks have been sucked down storm drains.

Remember, though, that your flood problem is never "solved." Like any plan, it has to be periodically re-evaluated. Development, in the form of paving, roads, housing, malls, and other commercial development, can radically change flooding and drainage patterns. So can flood control measures. Often flood controls in one area just move problem somewhere else. Some flood protection measures, like low head dams and flood channels can greatly increase danger to rescuers.

There is one more vital piece of the puzzle—weather prediction. Just as a general must know as much as possible about his opponent, you must know about the weather. Only then will you as a manager be able to accurately allocate resources and make decisions.

New advances in weather forecasting, like Doppler radar and telemetric rain gauges, now make it possible to get real time information about exactly what is happening in the heavens and on the ground. You can now literally watch as storms pass over, filling watersheds and flooding creeks and rivers. For the first time, an incident commander can anticipate a storm's next move. But to do this, you need to develop a "weather intelligence" program. This means establishing a close relationship with weather forecasters, even to having them sitting at your elbow during the incident. In several incidents, large and small, the operation has come to grief because weather information did not get to where it was needed in a timely fashion.

CIRA meteorologist John Weaver calls this "tactical meteorology." By knowing what the storm is doing and when, incident commanders can greatly reduce the duplication of effort inherent in the push system. If you've done your homework on where flooding is likely to occur, and are able to make a tactical intelligence estimate on where the rain is coming down and where the storm is moving, you can predeploy resources before the roads flood out. You can also warn people in the path of the flood and evacuate them if necessary. One recent innovation is the development of the "reverse emergency calling" systems. These software packages allow EMS to automatically call households in a selected area (which they have determined is going to flood) and play a pre-recorded message warning residents of the danger and perhaps ordering an evacuation. It will never replace knocking on doors, but it does give residents critical advance warning time.

Don't forget the media. It can be friend or foe, but it is absolutely vital for public education. Insist on a two-way relationship. If they want you to keep them informed, they need to help you keep the public informed. Citizens should be told the basics of flood safety. Probably the most important thing they need to know is not to drive through flooded roads, since the majority of flood fatalities happen in cars. Some states have produced videos to discourage this, and maybe you can get the local TV station to do a spot. Don't wait until the flood hits and then try to figure out what to do. This has been tried and it doesn't work. Modern management techniques make it possible to get ahead of the flood, and that's where you must be for effective flood incident management. If you don't, you're sunk, literally. Once you get behind, you'll never catch up during those critical opening hours, where you are most likely to lose the most people, both civilians and your own.

To reiterate the differences between old and new models:

OLD MODEL:

Reactive

"Pull" system — resources sent only when requested

Incident command designed to deal with serial incidents, copes with multiple simultaneous incidents only with difficulty.

Long response time

Responds to incidents already in progress

Resource deployment hampered or prevented by flooded roads

Efficient use of resources

Managers trained "on the job" for routine operations only

NEW MODEL:

Proactive

"Push" system — attempts to anticipate needs rather than reacting to them

Extensive preplanning and use of weather intelligence data

Incident command able to deal with multiple simultaneous incidents, has "ramp-up" capability

Short response time

Reacts to predictions of flooding

Resources predeployed when possible

Less efficient use of resources, some duplication unavoidable

Emphasis on multi-agency, multi-jurisdictional operations

Managers trained for large-scale operations

Let's look at some actual examples.

In the floods in Fort Collins, Colorado (1997) and Kansas City (1998) the dispatch system quickly became clogged by the large number of incidents. Emergency managers ran out of local resources in short order. In both cases the response model at the time did not allow expansion of dispatch capability to cover the increased number of incidents, nor was outside help summoned until it was too late. In Kansas City there was no agency preplan or much interagency cooperation, leading to a failure to close access over a low bridge. Seven people in three cars were washed off the bridge and drowned.

The next year North Carolina found its response model was simply inadequate for dealing with a disaster the size of Hurricane Floyd. State policy is to relegate rescue responsibility to the counties, with state emergency managers acting only as resource coordinators. When rains from the hurricane swamped the eastern part of the state, county emergency management was quickly overwhelmed, but state policy prevented mobilizing resources until the counties actually asked for them, virtually guaranteeing that adequate rescue resources would not be available during the first critical night. By the time teams outside the area were actually dispatched, flooded roads prevented them from getting into many areas. Thirty-seven counties flooded, yet there was no overall state management of the overall crisis, at least in the initial stages. Each county struggled along as best it could, attempting to deal with incidents on a case by case basis. Had it not been for massive intervention by military rescue helicopters, it is likely that the death toll would have been much higher than the fifty-two who actually lost their lives.

Another common failure of the rescue agencies in both Kansas City and North Carolina was the lack of flood rescue training and equipment. National Guardsmen, transportation workers, and others were deployed to the flood zone without any training or PPE. According to a CDC report, ten percent of the fatalities in the Hurricane Floyd flooding were rescue workers.

It is time for us, the rescue community, to recognize that existing response models, both for floods and large-scale disasters, are simply not adequate. No longer should we pretend that they are meeting the needs either of citizens who look to us for rescue, or for keeping our own safe. Our task for the future is to plan, train, and make rescues in the safest and most expedient way possible.

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Water Rescue Incident Action Plan

Incident Name _____ Date _____

Location _____ GPS /Long/lat _____

Incident type: ☐Persons in water ☐ Entrapment ☐Boat Accident ☐Missing persons ☐Other

Incident description: _____

Staging Area location: _____

Scene Size-Up Information

Number of Victims: _____ Injuries: _____ Able Self-Rescue /Assist self: _____

Victim Location or PLS: _____

Head-Up or Head down?: _____ Stable situation? _____

Bystanders Attempting Rescue?: _____ Safe? _____ Competent? _____

Hazards: _____

Assignments

Incident Command: _____ Safety Officer _____

Primary Rescue Team: _____ Rescue swimmer: _____

Downstream Back-up Team: _____

Up-stream Spotters: _____

Additional Resources/Mutual aid Requests

Specialized Water Rescue Teams: _____

EMS Units: 1 for victims & 1 for Rescuer Rehab/Stand-by: _____

Rescue Helicopter: _____

PPE/Equipment

Hot Zone - In water: Dry Suit, Rescue PFD, Helmet, gloves, whistle, headlamp, knife, & throw bag

Warm Zone - within 15 ft of water: PFD, Helmet, gloves, & throw-bag

Cold Zone - more than 15 ft from water: EMS gear or fire gear ok

Rescue Plan

- ☐ Talk: _____
- ☐ Reach: _____
- ☐ Throw: _____
- ☐ Row: _____
- ☐ Go: _____
- ☐ Helo: _____

Water Rescue Hazard Assessment

Site Name: _____

Assessment Conducted by: _____ Date: _____

Body of water _____

Type of Hazard: _____

Hazard Location _____

Manmade Hazards ☐ Low Head Dam ☐ Power generation Dam ☐ Raceway ☐ Bridge ☐ Other

Natural Hazards: ☐ Waterfall ☐ Rapids ☐ Strainer ☐ Hydraulic ☐ Undercut Rocks ☐ Other

Discription of Hazard _____

Site Accident History: _____

Site Use History _____

Whitewater Type: ☐ Class I ☐ Class II ☐ Class III ☐ Class IV ☐ Class V ☐ Class VI

River Width at site: _____ ¼ Mile Above site: _____ ¼ Mile Below site _____

River Depth At Site: _____ ¼ Mile Upstream: _____ ¼ Mile Downstream: _____

River Right Bank Description: _____

River Left Bank Description: _____

Hazards within ½ Mile Downstream _____

Nearest Road Access: _____

Nearest Boat Launch Assess Upstream: _____

Nearest Boat Launch Assess Downstream: _____

Property Owner River Right: _____ phone # _____

Property Owner River Left: _____ phone# _____

Conditions at assessment: Flow: _____ Gauge Depth _____ Water Temp: _____

Weather: _____

Water Rescue – Awareness Level Pre-Test

True or False:

1. At the scene of a swift-water rescue incident only trained personnel should don (PFD's) Personal Floatation Devices
2. Most successful swift-water rescues are made by specialized swift-water rescue teams not by first responders.
3. A low head dam can be one of the most hazardous features on a river
4. Rescuers should never wade in swift-water over knee deep.
5. The best way to keep personnel safe at a swift-water incident is to tie a safety rope to anyone entering the water.
6. A Helicopter is the safest way to rescue someone from a low head dam.
7. An inflatable boat should not be used in swift-water due to the possibility of air leaks from hitting rocks.
8. Public safety divers are all trained to dive in swift-water and ice rescue situations.
9. A flare gun is an essential safety item that should be carried on each swift-water rescue PFD or Ice Rescue suit.
10. Most water rescues are made with a throwbag containing only 70 feet of rope.

Water Rescue Scene Size-up Exercise

View the video segment showing footage of an actual Rescue scene. As you view the video segment, attempt to answer the following questions from the perspective of the leader of an incoming water rescue team.

1. What type of water rescue situation is presented: _____
2. Is this a heads up or head down situation: _____
3. How many possible victims are there: _____
4. Is the situation stable or unstable: _____
5. Are the rescue attempts being made Safe? _____ Effective? _____
6. Are rescuers operating under the incident command system: _____
7. Has downstream back-up established: _____
8. Has an upstream lookout been posted: _____
9. Is the PPE worn appropriate for the situation: _____
10. What immediate actions would you implement: _____



NYS Division of Homeland Security and Emergency Services

OFFICE OF FIRE PREVENTION & CONTROL

Organization:

Name:

FOLD

Please remember to:

- Enter into the discussion enthusiastically.
- Give freely of your experience.
- Keep confidences and assume others will, too.
- Confine your discussion to the topic.
- Listen alertly and take accurate notes.
- Provide constructive feedback.
- Appreciate the other person's point of view.
- Practice learned skills on the job.
- Be prompt and regular in attendance.

