

# Water Rescue

## Lesson One

### Rescue Operations for the Water Rescuer

**DOMAIN:** COGNITIVE

**LEVEL OF LEARNING:** COMPREHENSION

#### **MATERIALS**

IFSTA Fire Service Search and Rescue Manual 7<sup>th</sup> edition; Swift Water Rescue by Slim Ray; Water Rescue Levels I and II by Delmar; NFPA 1006, Technical Rescuer Professional Qualifications; NFPA 1670, Operations and Training for Technical Rescue Incidents; NFPA 472, Professional Competence of Responders at Hazardous Materials Incidents; Emergency Rescue Technician, Incident Command Module & Safety Module; WATER RESCUE, Basic Skills for Emergency Responders, Mosby Lifeline Productions; Los Angeles County River and Flood Rescue Manual; overhead projector, LCD projector and computer, white board, dry-erase pens, VCR and monitor, Water Rescue Video: SWEPT AWAY by Alan Madison Productions.

**NOTE:** Due to the many diverse types of water-related environments that may be faced in North Carolina, these lesson plans will cover the following types of surface water rescue environments: Still water, Swift water, and Flood water. The authority having jurisdiction (AHJ) should have their personnel demonstrate the requisite knowledge for each type of water environment that may be anticipated within the geographical confines of their jurisdiction and the associated tactical and safety considerations as part of this competency. It should also be noted that any classification of personnel per NFPA 1670 standards shall be at the discretion of the AHJ.

**NOTE: It is strongly recommended that qualified water rescue instructors teach this subject. It is also recommended that due to the possibility of contamination of patients, rescue personnel and equipment, especially during flood-related incidents that all personnel involved in water-related incidents should be trained to the requirements of Chapter 3 of NFPA 472 Standard for Professional Competence of Responders to Hazardous Materials Incidents.**

**NOTE: These lesson plans are designed to introduce the Water Technical Rescuer candidate to the hazards associated with water rescue operations and the techniques required in order to function safely during rescue attempt in any of the aforementioned five Surface Water environments.**

### **NFPA 1006, 2008 edition JPRs**

- 11.1.1 Develop a site survey for an existing water hazard
- 11.1.2 Select water rescue personal protective equipment
- 11.1.3 Define search parameters for a water rescue incident
- 11.1.4 Develop an action plan for a shore-based rescue of a single, water-bound victim
- 11.1.5 Conduct a witness interview, given witnesses and checklists
- 11.2.4 Supervise, coordinate, and lead rescue teams during operations
- 12.1.3 Assess moving water conditions, characteristics, and features in terms of hazards to the rescuer and victims

### **Junior Member Statement:**

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

### **TERMINAL OBJECTIVE**

The Water Technical Rescuer candidate shall correctly describe in writing, the necessary elements of a Site Survey, Scene Size-Up, Incident Action Plan, Hazard Assessment Procedures and Command responsibilities associated with incidents involving the different Water rescue environments. In addition, The Water Technical Rescuer candidate, given the appropriate equipment, shall correctly demonstrate the proper basic rescuer PPE donning and doffing procedures.

**ENABLING OBJECTIVES**

1. The Water Technical Rescuer candidate shall correctly identify in writing, the necessary elements of a successful site survey as they relate to a Surface Water rescue / recovery incident.
2. The Water Technical Rescuer candidate shall correctly describe in writing, the factors that rescuers must know to effectively perform a scene size-up for a Surface Water rescue / recovery incident.
3. The Water Technical Rescuer candidate shall correctly describe in writing, the necessary elements for implementing an on scene operational plan or incident action plan (IAP) for a Surface Water rescue / recovery incident.
4. The Water Technical Rescuer candidate shall correctly describe in writing, the types of hazards and their consequences for rescuers that need to be included in a hazards assessment for a Surface Water rescue / recovery incident.
5. The Water Technical Rescuer candidate shall correctly describe in writing, the responsibilities of command, and the primary functions of command at a Surface Water rescue / recovery incident.
6. The Water Technical Rescuer candidate, given the appropriate equipment, shall correctly demonstrate the proper use of basic PPE and equipment needs for all Surface Water environment incidents.

# Water Rescue

## Lesson One

### Rescue Operations for the Water Rescuer

#### MOTIVATION

Drowning is the second leading cause of accidental death in North America and most drownings occur in open bodies of water such as lakes and rivers. Drowning victims die of suffocation. Therefore the quicker the rescuer can reach the victim, the greater the chance for survival. **The number one concern to rescuers is the stabilization of the victim's airway, breathing and circulation.**

Typically most fire departments and rescue squads do not respond to a large number of water related accidents unless the response district includes areas with recreational bodies of water. Most rescuers are not trained to the needed level of proficiency. This can create an extreme safety hazard to patients and rescuers alike during an incident.

#### PRESENTATION

##### ENABLING OBJECTIVE #1

The Water Technical Rescuer candidate shall correctly identify in writing, the necessary elements of a site survey as they relate to a successful Surface Water rescue / recovery operation.

1. Define site-survey.
2. Discuss the importance of good pre-planning efforts such as Site-surveys and / or Incident Plans.
  - a) **Show permanent hazards for the area.**
  - b) **Show prior flood and high-water situations.**
  - c) **Determine proper PPE for the job to be performed.**

3. **Identify the need for a current set of area maps** such as commercial, orthophoto, hand-drawn, and tax office.
  - a) This allows the IC to better plan a tactical operation.
  - b) May be used to show prior rescue and recovery operations.
  - c) Use the Universal Transverse Mercator grid system for location planning.
4. **Identify** and contact **additional available resources** such as the Coast Guard, Wildlife Commission, Local qualified Fire and Rescue Departments, Local River and Boating Clubs.
  - a) **Current information on present hazards.**
  - b) **Information on any changes in the local area.**
5. **Identify and pinpoint access and egress routes for** rescue personnel to allow for a faster response and safer operation to include new roads and streets or changes in current roads and streets.
  - a) Citywide.
  - b) Countywide.
  - c) Railroad.
6. **Identify and pinpoint launch and retrieval sites** for rescue personnel to use.
  - a) Citywide.
  - b) Countywide.
  - c) Possible locations caused by flooding conditions.

Reference: IFSTA Fire Service Search and Rescue 7<sup>th</sup> Edition page 14.  
WATER RESCUE, Chapter 9.

## **PRESENTATION**

### **ENABLING OBJECTIVE #2**

The Water Technical Rescuer candidate shall correctly describe in writing, the factors that rescuers must know to effectively perform a **scene size-up** for a Surface Water rescue / recovery incident.

1. Define scene size-up.

2. Discuss the importance of interviewing potential witnesses for the following information.
  - a) Reason the victim was in the water.
  - b) Description of the victim and clothing worn.
  - c) What time the subject went under.
  - d) Location where victim(s) went into the water.
  - e) What was last meal, alcohol involved?
  
3. Discuss the importance of properly assessing the scene.
  - a) Establish the Point Last Seen (PLS).
  - b) Determine the search area and search effectively.
  - c) Hazards present.
  - d) Topographical Map usage.
  - e) Types and Mechanics of Drowning.
  - f) Reading the river is defined as the ability to recognize the river's structure by the actions of the surface water.

**NOTE: The search area can be determined by multiplying the speed of the current by the time since the last sighting of the victim.**

4. List and discuss the four components that a rescuer must apply to complete a successful Surface Water rescue / recovery operation.
  - a) Knowledge of the techniques available.
  - b) Skills necessary to perform the techniques.
  - c) Physical Fitness needed to apply the skill
  - d) Judgment in determining which techniques to apply and when.

Reference: IFSTA Fire Service Search and Rescue Manual  
7<sup>th</sup> edition pages 327-328 and pages 345-346.  
WATER RESCUE, Chapter 9.  
Swiftwater Rescue, page 204.

## PRESENTATION

### ENABLING OBJECTIVE #3

The Water Technical Rescuer candidate shall correctly describe in writing, the necessary elements for implementing an on scene operational plan or incident action plan (IAP) for a Surface Water rescue / recovery incident.

1. Define incident action plan (IAP).
2. Point out the importance of obtaining any information available from previous search and rescue and / or recovery operations and the final results.
  - a) Strategies and tactics used.
  - b) Comparison with proposed operational guidelines.
3. Identify equipment needs for the different Surface Water environments.
  - a) Safety equipment for rescuers.
  - b) Tactical equipment for operations.
  - c) Other related support and logistics needs.
4. Assess the condition of the patient.
  - a) Level of Consciousness (LOC).
  - b) Head above or below surface.
  - c) Victim wearing PFD.
  - d) Trapped or pinned.
5. Determine the potential hazards for the different situations that the rescuers may face.
  - a) Open water rescue.
  - b) Large lake or pond.
  - c) Low-head dam.
  - d) Flood water.
  - e) Swift water.
  - f) Ice.
  - g) Surf and / or Tidal.
6. List the potential on-scene-environmental conditions, and discuss their importance to the operation.
  - a) Current and past.
  - b) 12 hour forecast.
  - c) Time of day.
7. Is this operation a rescue, or a recovery, or a combination of both?
  - a) What is the number and types of victims.
8. Discuss a Risk Benefit Analysis and its importance to the operation.
  - a) Victim's time in water.
  - b) Level of training of on-scene rescuers.

9. Discuss the importance of conducting a probability of detection analysis to establish search parameters and personnel assignments.

Reference: IFSTA Fire Service Search and Rescue Manual  
7<sup>th</sup> edition pages 326-328.

WATER RESCUE, Chapter 9.

Swiftwater Rescue, page 204.

## PRESENTATION

### ENABLING OBJECTIVE # 4

The Water Technical Rescuer candidate shall correctly describe in writing, the types of hazards and their consequences for rescuers, that need to be included in a hazards assessment for a Surface Water rescue / recovery incident.

1. Define elements of hydrology and discuss the relative hazards associated with Surface Water rescue.
  - a) Currents are created by the laminar flow caused by gravity and the river bottom, thereby creating the speed that the different layers of water travel downstream.
  - b) The helical flow against the shoreline of the water can keep the victim from reaching the shore.
  - c) Downstream V.
  - d) Upstream V.
  - e) Smiling Hole.
  - f) Frowning Hole.
  - g) Hydraulics.
  - h) Pillow.
  - i) Eddy
  - j) Rip-currents (Fixed, Permanent, Flash and Traveling) formed by the movement of water through breaks in sandbars back to the ocean.
  - k) Surf Actions such as backwash, shore break and lateral currents.
  - l) Surface water wildlife.

**NOTE: A "man-made" hydraulic is more difficult to escape from than any known "natural" hydraulic.**

2. Identify what is commonly referred to as **loads**, and explain the various types of loads that water may contain.
  - a) Hazards are objects that are either floating or moving on the surface or beneath the surface of the water that may strike a victim or rescuer.
  - b) Obstructions are stationary objects within the body of water, either seen or unseen that may catch and hold a victim or patient.
  - c) Turbidity consists of silt, Surface Water organisms, or any other particulates that obscure vision beneath the surface and may also penetrate a victim's clothing and weigh them down.
  
3. Identify and discuss the **types of entrapments** found in bodies of water.
  - a) An **eddy** is a segment of water that flows back on itself or in a direction opposing the main flow of the current, possibly holding victims.
  - b) A **strainer/sweeper entrapment** is usually caused by debris within the water that allows water to flow through but traps solid objects like victims.
  - c) **Rock Jetty's, piers and pilings.**
  
4. Discuss the hazards associated with **low-head / low-water dams.**
  - a) A return or upstream flow of the current caused by the hydraulic action of the water flowing over a low-head dam, rock or ledge, is where victims inevitably get caught. This re-circulating current can pull the victim into the downwash, push them to the bottom, and pull them back to the surface repeatedly and indefinitely.
  - b) These dams are otherwise known as "drowning machines".
  
5. Discuss the **dangers and preventative measures to be taken when dealing with polluted water.**
  - a) Causes contamination for victim, rescuer and equipment. Certification at the Haz-Mat First responder level is necessary for the training to perform proficient decontamination of victims, equipment and rescuers.

- b) To avoid contamination, rescuers must always wear the proper PPE, complete with appropriate respiratory breathing apparatus, etc.
6. Identify and discuss the dangers and advantages of cold-water rescues.
- a) Hypothermia, the gradual cooling of the body's core temperature, is as great a danger for the rescuers as for the victims themselves.
  - b) Cold-water immersion extends the chances of victim survival because of the Mammalian Diving Reflex (MDR) in which the body automatically concentrates bloodflow to the brain, lungs, and heart.
  - c) Exposure becomes the primary concern because rapid immersion in cold water without proper environmental protection will cause the victim's body temperature to drop 25 times faster than in air.
  - d) When wind is added into the equation, body temperature can drop up to 250 times faster.
  - e) Rescue personnel should always don appropriate PPE when attempting a cold water rescue to preclude the effects of exposure.
7. Identify and discuss the classifications and characteristics of the victim types that rescuers can encounter.
- a) Non-swimmer.
  - b) Weak or tired swimmer.
  - c) Injured / hypothermic swimmer.
  - d) Unconscious swimmer.

**NOTE: Identifying the victim type before rescue efforts are underway is important because the physical and emotional condition of the victim can seriously jeopardize the safety of the rescuer.**

Reference: IFSTA Fire Service Search and Rescue Manual  
7<sup>th</sup> edition pages 329-332.  
WATER RESCUE, Chapter 3, pages 41-59.  
Swift Water Rescue by Slim Ray pages 231-233.  
Delmar Water Rescue Levels I and II, pages 137-140 and 302-309.

# PRESENTATION

## ENABLING OBJECTIVE #5

The Water Technical Rescuer candidate shall correctly describe in writing, the responsibilities of command, and the primary functions of command at a Surface Water rescue / recovery incident.

1. Discuss the importance of proper incident organization.
  - a) Maintain scene control.
  - b) Develop primary strategy.
  - c) Develop secondary strategy.
  
2. List the important points that an IC must observe at any Surface Water incident.
  - a) Monitor overall operation.
  - b) Reassess operations periodically.
  - c) Check to see if anything missed during initial size-up.
  - d) Has the situation changed?
  - e) Are additional resources needed?
  - f) Reassess rescue personnel's mental and physical status periodically.
  
3. Discuss some of the command responsibilities necessary when directing a Surface Water rescue / recovery incident.
  - a) Assign tactical tasks to competent personnel.
  - b) Establish and maintain communications.
  - c) Ensure safety for all personnel involved.
  
4. List the three Ks of command and their meaning.
  - a) Keep all personnel on the scene safe.
  - b) Keep trying to implement your entire plan.
  - c) Keep thinking and assimilating any new information.
  
5. Describe and discuss the functions of command.
  - a) Establish Command.
  - b) Determine the magnitude and projected duration of the incident. Recovery may continue for days. Combination of rescue and recovery may deplete resources.

6. Describe and discuss the **assessment of priorities** at an Surface Water rescue / recovery incident.
  - a) **Patient access and stabilization.** This may include stabilization of watercraft or vehicle.
  - b) **Patient extrication.**
7. Describe and discuss how to ensure **positive scene control.**
  - a) **Controlling spectators.**
  - b) **Security for evidence gathering and personnel.**
  - c) **Identifying witnesses.**
  - d) **Establish a secured area for family members.**
  - e) **Isolation from spectators and control for rescue operations.**
  - f) **Establish an information/media center and appoint a PIO.**
  - g) This is an absolute must for any operation.
8. Discuss the **command structure** for small-scale operations.
  - a) Command **may elect to control both strategy and tactics.**
  - b) **Experience of the command officer is the determining factor.**
9. Discuss the command structure for **large-scale operations.**
  - a) **Command should be sub-divided. It helps to maintain the continuity of the command structure for the incident.**
  - b) **It insures good communication among the responding organizations.**
  - c) **The amount of sub-division is determined by a needs-assessment during the initial size-up phase.**
10. Discuss the determination of the method of rescue.
  - a) **How much time will it take to set up a rescue / recovery system. The patient's condition is the determining factor.**
  - b) **Remember - Keep It Simple Sweetheart (KISS).**
11. **Consider the risk to your rescue personnel.** The **prime concern is rescuer safety.**
  - a) **Consider Probability of Success (POS). Will chosen strategy and tactics solve the problem?**

- b) On-Scene Resources. Are sufficient resources and personnel currently available to make strategies and tactics work as planned?
- c) Off-Scene Resources. Time required for additional resources if needed.

Reference: IFSTA Fire Service Search and Rescue Manual  
7<sup>th</sup> edition pages 32-42  
WATER RESCUE, Chapter 9, pages 179 to 197.

## PRESENTATION

### ENABLING OBJECTIVE #6

The Water Technical Rescuer candidate, given the appropriate equipment, shall correctly demonstrate the proper use of basic PPE and equipment needs for all Surface Water environment incidents.

1. List the five types of PFDs used for Surface Water environment incidents and their uses.
  - a) Type I: Off-Shore use, extended rescue, rolls victims to face-up position, There are two sizes.
  - b) Type II: Near-Shore use, possible quick rescue, three sizes.
  - c) Type III: Calm inland waters, conscious victims, most comfortable to work in.
  - d) Type IV: Throwable device, cans, ring buoys, cushions.
  - e) Type V: Special Use (Rescue), "Mustang suits", Cold Water Survival Suits.
2. List the basic rescuer PPE required for Surface Water rescue incidents.
  - a) Type III or V Personal Flotation Devices (PFDs) with large squares of reflective material such as florescent tape for increased visibility are recommended and provide a certain degree of upper body warmth to the rescuer. The addition of release type belts and rings are recommended for use in any swimmer belayed type operations.
  - b) Flashlight (Chem-stick, strobe).
  - c) Whistle (waterproof).
  - d) Sheathed Knife (secured to PFD).
  - e) Carabiners (2, non-locking).
  - f) 5mm. X 4 feet long prussic cords (2).

- g) Layered clothing.
- h) Vented lightweight helmet with interior padding.
- i) Wet Suit.
- j) Dry Suit.
- k) Throw Bag.
- l) Ring Buoy, Cans or Life Rings.
- m) Boogie Board, Surf Board or Kick Board
- n) Waterproofed boots or river boots with wool or polypropylene socks.

**NOTE: PFDs and throw bags are essential pieces of equipment on all vehicles responding to Surface Water incidents.**

3. List other rescue aids used for Surface Water rescue incidents.
- a) Fire Hose Float.
  - b) "Boogie Board".
  - c) Pike Poles.
  - d) Ladders.
  - e) Brooms.
  - f) Communications.

**NOTE: Fire boots and bunker gear are not good choices for Surface Water rescue responses.**

Reference: IFSTA Fire Service Search and Rescue Manual  
7<sup>th</sup> edition pages 326-327

WATER RESCUE, Chap. 6, pages 116-130.

BOAT NORTH CAROLINA, Chapter 4, page 29.

Delmar Water Rescue Levels I and II, pages 14-19.

Swift Water Rescue by Slim Ray, pages 35-43.

## SUMMARY

This lesson plan is designed to introduce the Water Technical Rescuer to the various components of a successful search / recovery operation. The continual review and updating of these components during an event is imperative to the success of your operation. The main focus is on ensuring the safety of all on-scene rescuers and impressing upon them that a recovery operation is not an emergency. High-risk maneuvers cannot be tolerated during recovery type operations. Emphasize the need for a continuous training program in order to function safely at any Surface Water related emergency.