FIRE AND RESCUE DEPARTMENTS OF NORTHERN VIRGINIA FIREFIGHTING AND EMERGENCY OPERATIONS MANUAL

Inland Water Rescue and Emergencies

Second Edition

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- City of Alexandria
- Arlington County
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The following committee members assisted in the development of the second edition of the manual:

City of Alexandria: Battalion Chief Chris Kunkle; Captain Sam Reyes
City of Fairfax: Capt. Jeremy Speakes; Lt John Jeniec
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The following sources were used as reference for this operational manual:

- NFPA 1006: Standard for Technical Rescuer Professional Qualifications
- NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents
- Pennsylvania Fish and Boat Commission
- Rescue 3 International
- Life Saving Resources Inc.
- Slim Ray, *A Manual for the Rescue Professional*, CFS Press, 1997

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AAW Publication Services: Andrea A. Walter (editing and layout, all editions)

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PREFACE

Fire and rescue departments are called upon, with increasing frequency, to deal with water rescue emergencies. Water rescue emergencies can include many types of incidents, such as:

- Victims stranded (on rocks, in creeks, rivers),
- Victims falling through the ice at a local lake or retention pond, and
- Vehicles trapped on a flooded roadway.

In most cases, rescuers that end up in the water did not intend to make an entry. These incidents have the potential to tax the resources of multiple jurisdictions due to the specialized personnel and equipment needed and the amount of these call types occurring at the same time during weather-related events like hurricanes, tropical storms, and severe thunderstorms. Adherence to safety protocols and being able to properly size-up these types of incidents is paramount to successful rescues and personnel safety.

The purpose of this manual is to establish standards and operational guidelines for the Northern Virginia region and to ensure all jurisdictions share a common language during emergency operations and training in a water rescue environment.

This manual was developed as a reference guide for inland water and ice-related incidents. The intent is to provide guidelines and options from which rescuers can choose to effectively and safely manage inland water and ice rescue incidents. To achieve a positive outcome, all phases of the incident must be coordinated. This includes a strong command presence, appropriately trained personnel, adequate resources, and specialized equipment. Following the guidelines provided in this manual will assist personnel in the successful mitigation of the emergency incident.

This manual references the following National Fire Protection Agency (NFPA) standards:

- NFPA 1006 Standard for Technical Rescuer Professional Qualifications; and
- NFPA 1670 Standard on Operations and Training for Technical Search and Rescue Incidents.

The Northern Virginia region recognizes the levels of certification as outlined by NFPA 1670 and 1006. Appendix A further defines the capabilities and training levels that will be accepted by the NOVA region.

The following revisions were made in the manual for the second edition:

- Minor Language Changes
- Updated photos and diagrams
- Additional EMS Transport Unit
- Updates to Command Board
- Submerged Victim Guidelines and Reference for Static Water Incidents

Definitions

The key definitions used in this manual are as follows.

Boil Line: This feature is evident downstream of low head dam type hydraulic. The boil line marks the area where the current splits direction of flow. The lighter aerated water further up-stream is moving back towards the hydraulic while the darker water is moving downstream.

Confluence wave: Formed when two separate flows meet.

Current Flow: The flow of the water tends to travel in a straight line (vector) until it comes into contact with an object, shore, or bank. The current does not always follow the shoreline due to this straight movement.

Downstream: Direction the water is flowing.

Downstream V: Water being pushed through a narrowing gap causes the level to rise up forming a chute or a tongue. This indicates the deepest part of a channel and is where a rescuer should swim and/or bring a boat.

Figure 1: Example of a downstream V.

Downstream Safety: Personnel/crew assigned to operate downstream of incident. These units ensure the safety of both the rescuers and victims by providing egress from the immediately dangerous to life and health (IDLH) area. Crews should have appropriate personal protective equipment (PPE) and resources available to include radios and throw bags.

Eddy: A reversal of water flow from downstream to upstream, caused by negative pressure void formed by passing water. The water actually flows back upstream towards the object and is considered a SAFE area while boating or swimming.

Eddy Fence: Line of swirls caused by the reversal of the eddy and the downstream flow of the water. The friction between the two currents causes a spiraling effect in the water that can be

sufficient enough to drag a swimmer under water or flip a boat. This line is usually evident by sight.

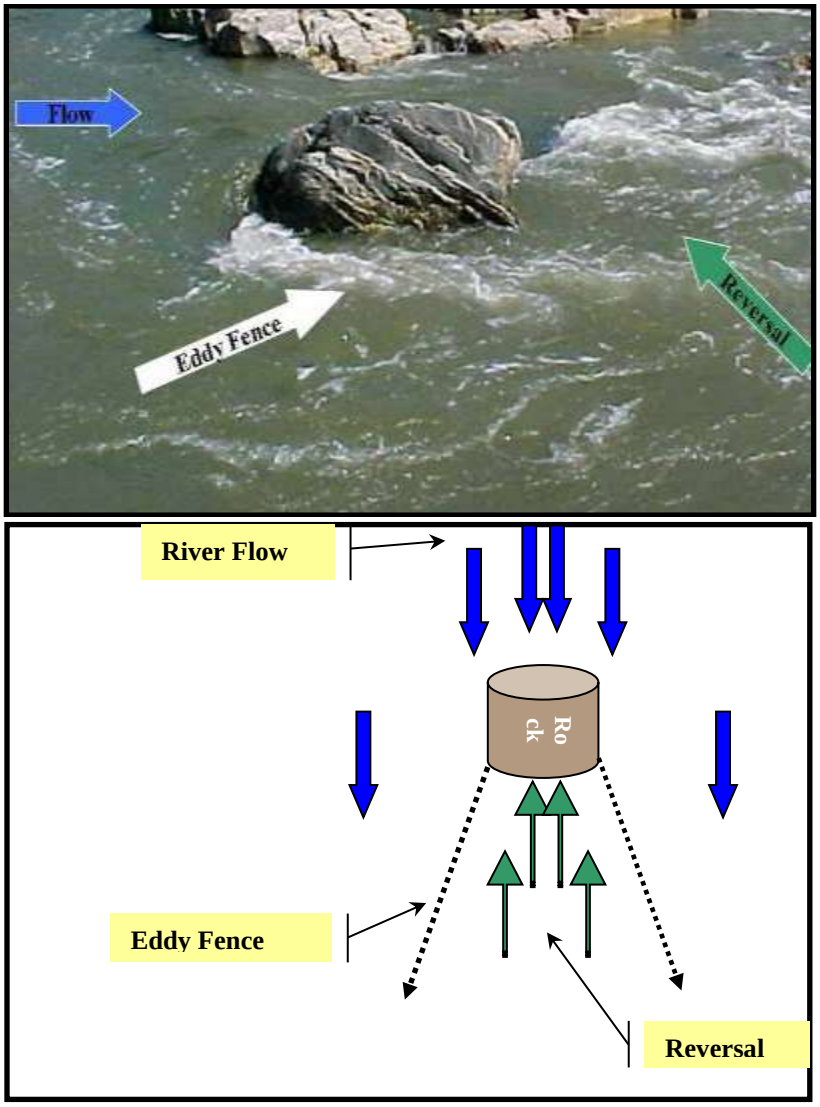


Figure 2: Eddy fence.

Ferry: The process by which a boat moves across the river without moving down stream

Ferry angle: Using the force of the water to assist the movement of a boat or a swimmers body to the target. Maintaining a 45º angle to the current a swimmer or boat can traverse the water with less difficulty.

Flood Channel: An artificial channel used to move floodwater away from an urban area. These channels are normally designed as a part of the storm water removal system. The current in this channel may be up to twice the speed as the main current.

Foot Entrapment: When a person's lower extremity becomes entrapped while operating in moving water. The force of the water pushes the person's body downstream of the entrapped body part not allowing removal without assistance. The person's airway becomes compromised and drowning will result unless immediate action is taken to secure airway and rescue the victim.

Frowning Hole: This feature is evident by the points on the outside of the hole facing towards you if looking at the hole from up-stream. If you mentally flip the whole up towards you it makes a frown. This hole will tend to hold a rescuer due to the nature of its shape. Since there is a reversal of flow as with all hydraulics, the rescuer will be kept in the bottom of the arc until swimming out and/or rescued.

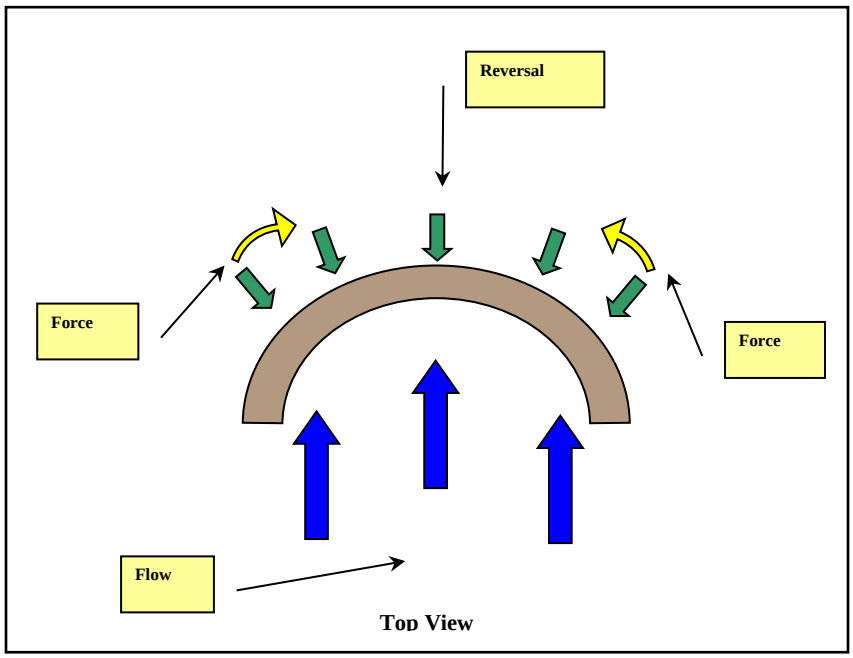


Figure 3: Frowning hole.

Helical Flow: As water passes along the sides of the shore it creates circular swirls resulting from friction. This helical pattern lends itself towards drawing water from the shoreline and pulling it in towards the main current flow in the center. **This is the reason that anyone within 10 feet of the water's edge must wear a personal flotation device (PFD)**.

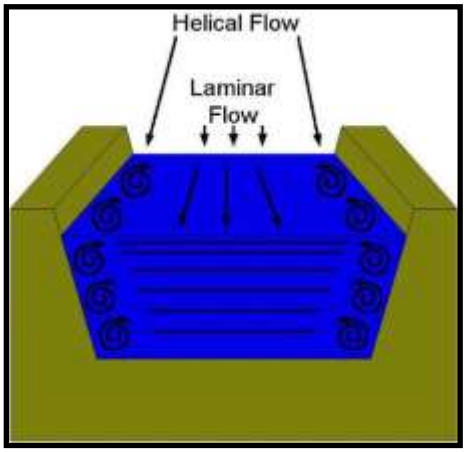


Figure 4: Helical and laminar flow.

Hydraulic: (smiling hole, frowning hole, low head) Water pouring over an underwater feature creating a void that will be backfilled by water traveling the opposite direction (upstream). This also creates a recirculation effect and the water becomes aerated by this churning. A boil line is usually evident downstream of the hydraulic and indicates the line where the water is flowing downstream yet again.

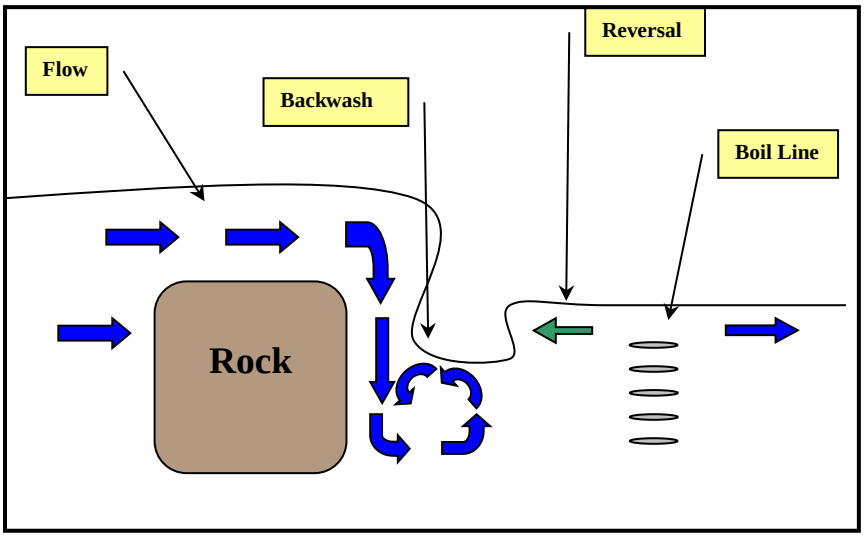


Figure 5: Hydraulic.

Hydraulic Effect: A movement of water caused by pressure.

Hypothermia: A lowering of the body's core temperature occurring when the body loses heat faster than it can produce. Hypothermia can cause impaired judgment, debilitation, and eventually, death.

Inside Bend: The opposite shore to the outside bend is where water tends to be moving slower. Objects and debris can accumulate in these areas. In high water, strong eddies may be present. (See Outside Bend for figure.)

Laminar Flow: Water moves in layers, one upon the other from the bottom. Each subsequent layer moves faster than the last. Therefore, the top layer of water is moving slower than that of the bottom. (See Helical Flow for figure.)

Low Head Dam: This feature is evident by the perpendicular line formed if looking at the hole from up-stream. This hole will tend to keep recycling the rescuer/victim in and out due to the nature of the shape. Since the reversal is perpendicular to the face of the object, the rescue/victim will be continually recycled through the hydraulic coming up in roughly the same location each time until rescued. **These are killing machines and should be avoided.**

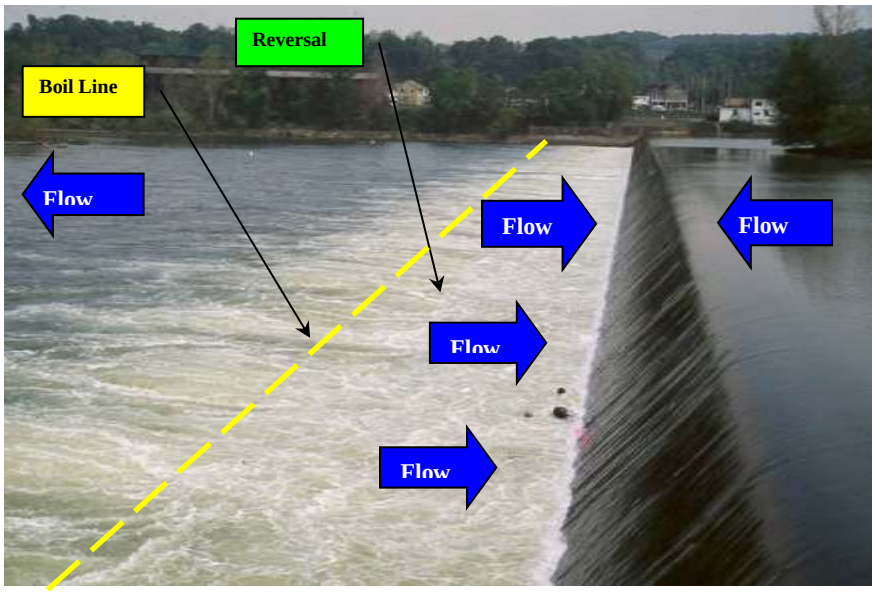


Figure 6: Low head dam.

Operational Zones: Operational zones for inland water incidents are as follows:

- Hot – in or over the water/ice is considered IDLH. Appropriate PPE is required. It is recommended that only Technician level personnel operate in the Hot Zone.
- Warm – within 10 feet of the water/ice, if conditions warrant the distance can be increased. This area is also dangerous and PFD's are required. Operations Level personnel and below can operate in the Warm Zone.
- Cold – greater than 10 feet from the water/ice. Any untrained personnel operate in the cold zone.

**Note - The distance and locations of the warm and cold zones may be increased as deemed necessary for the incident. Some of the considerations may include but are not limited to geography, weather, topography, or changing conditions.*

Outside bend: Where the current strikes a bank or shore of a water-way at a turn. The shore can to be undercut and/or eroded with water moving at a steady pace tends to force swimmer or boat into shore.

Pillow: Where water meets an object and pushes water above water line. Water will push off to either side with a probable eddy on the opposite side downstream.

Reaction Wave: Rising of water due to encountering object underwater. Not quite enough to form an upstream V or a hydraulic. These small bumps give us warning while operating a boat and/or swimming.

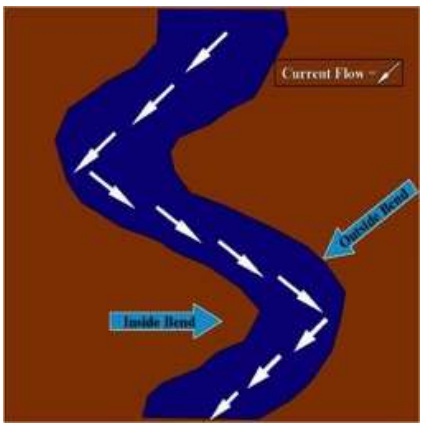


Figure 7: Inside and outside bend.

River Left: The left side or river bank, looking downstream.

River Right: The right side or river bank, looking downstream.

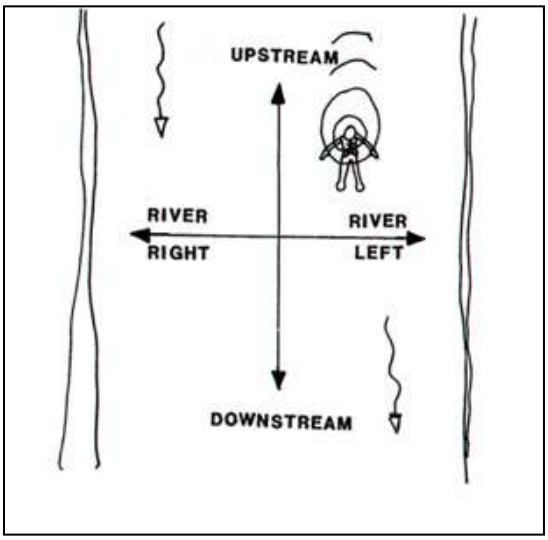


Figure 8: River left and river right.

Safe Swimming Position: A safe or defensive swift water swimming position, in which the swimmer is positioned on their back with feet at the surface pointing downstream. This reduces the risk of foot entrapment and allows the swimmer to defend them against smashing into objects.

Smiling Hole: This feature is evident by the points on the outside of the hole going away from you if looking at the hole from up-stream. If you mentally flip the whole up towards you it makes a smile. This hole will tend to spit a rescuer out due to the nature of its shape. Since there is a reversal of flow as with all hydraulics, the rescuer will be forced out the bottom of the hole to the right or left.

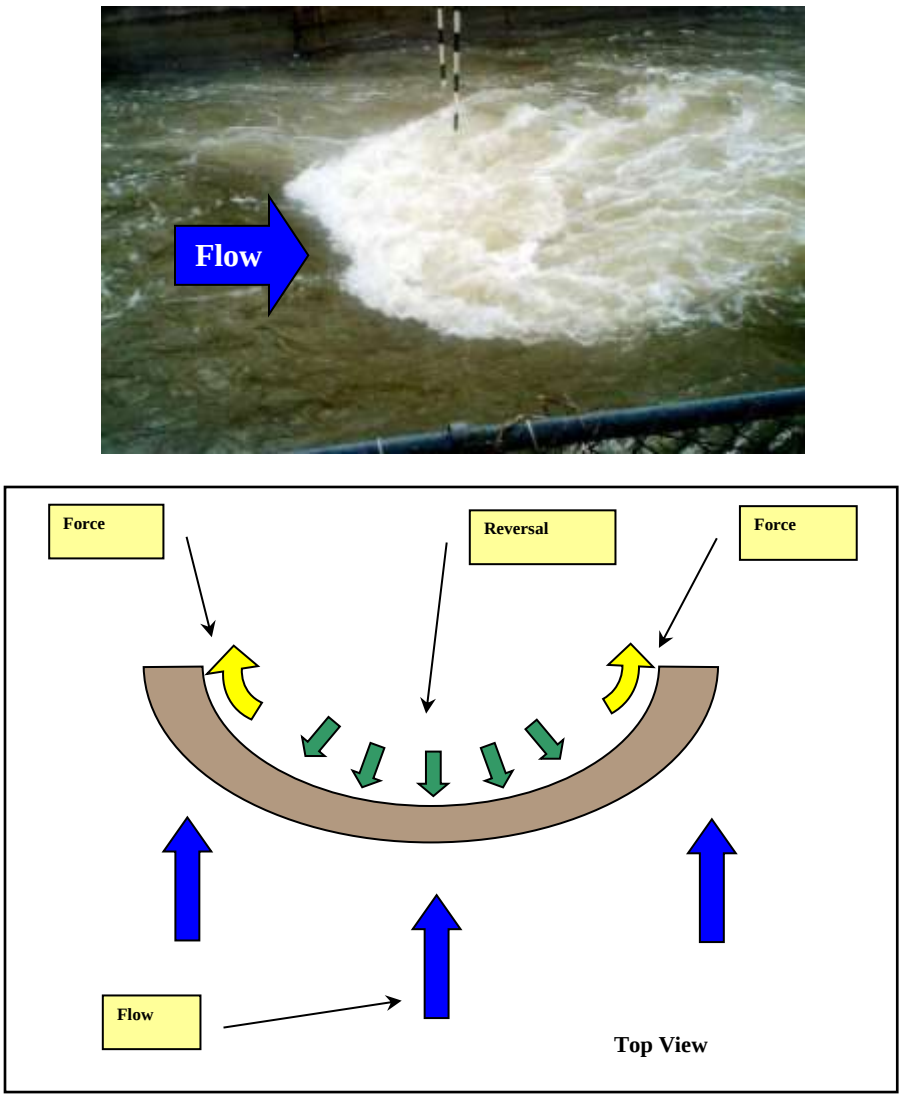


Figure 9: Smiling hole.

Standing wave: Formed at the base of a downstream V due to channeling of the water into the chute/tongue. These waves are key to acknowledging the presence of a chute while in water swimming. Depending on amount and speed of water will determine size of waves.

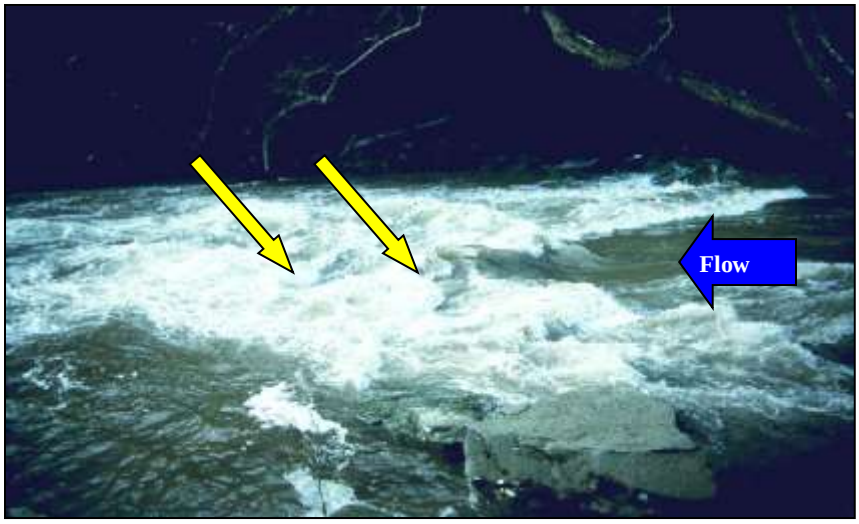


Figure 10: Standing wave.

Strainer: Object or structure that allows water to pass through but not rescuer. Examples (but not limited to): trees, fencing, cars/trucks, culvert/bridges with debris accumulated on upstream side, barbed wire, and guard rails.

Figure 11: Strainer.

Under Cut: Where water meets an object that is undercut or has a narrow hole through object. The water will either be at water level or slightly dipping below indicating the presence of the undercut. **These should be avoided!** These can hold a rescuer under water and/or force rescuer into hole creating a drowning hazard.

Upstream: Direction from which water is coming.

Upstream Spotter: Personnel assigned to watch for incoming hazards that can directly affect the incident. Units should be located a sufficient distance upstream of the incident to afford adequate reflex time.

Upstream V: Indicate an object under the water. The speed and the depth of the water flowing over the object will need to be taken into account to determine the location. The object could be directly under the V or further upstream. Caution should be used when either swimming and/or using boat-based rescues.

Figure 12: Upstream V.

Victim Recognition: Victims/patients will usually fall within specific categories in regards to ability to help themselves. This allows the rescuer to visually identify the potential level of rescue needed.

Category	**Description**
Normal	Everyday swimmer/person, no trouble following commands and assisting in own rescue
Panic	Can follow simple commands, can usually help themselves with proper direction
Counter Panic	Blank stare with associated inability to follow commands or assist rescuers. Indicative of a GO rescue where immediate assistance by trained personnel is needed
Instinctive Drowning Response (IDR)	Identified by victim face down in water able to get head up for a breath; this victim has < 60 second survival time

CHARACTERISTICS OF THE INLAND WATER ENVIRONMENT

Types of Water

The types of water where these emergencies occur determine the operations, strategy, and tactics to safely affect the rescue and eliminate the hazard. These decisions are based on the following water characteristics:

- **Swift Water** – fast-moving with identifiable hydraulics features. For the purpose of this manual, any body of water with a consistent direction of flow will be considered swift water, excluding waterways such as the lower tidal Potomac River.
- **Flood Water** – variation of a water flow and hazards where water is not normally present.
- **Flat/Static Water** – a body of water that may or may not be fed by alternate ground sources. Examples include: ponds, lakes, reservoirs, storm water retention ponds, and quarries.
- **Ice** – May occur in any of the above listed bodies of water when surface temperature falls below the freezing point.

Locations

Emergencies can occur in many different locations under both normal and extreme weather conditions. These may include natural, manmade, or a combination of both, and be accompanied by significant hazards related to the locations. The following is a list of locations where these emergencies could occur:

- Natural Locations
  - Low lying land or flood planes
  - Streams and rivers
  - Lakes, ponds and reservoirs
- Man-made Locations
  - Residential neighborhoods
  - Commercial properties
  - Lakes, ponds, and reservoirs
  - Storm water retention ponds
  - Roadways and bridges
  - Low head dams
  - Spillways and flood control channels
  - Abandoned rock quarry filled with water

Life Hazards and Challenges to Responders and Victims

Although the water environment is a significant hazard to responders and victims the following hazards and challenges have been provided to ensure personnel are aware of the considerations associated with these incidents.

Any hazard or challenge that can be determined prior to or is identified at a specific site should be preplanned and documented accordingly. (See Appendix F for Water Rescue Preplan examples.) Any water hazard will inherently change based on the current conditions. This includes weather and tides or any other variable that impacts water level or flow and the physical dynamics of the area.

Hazards and challenges associated with specific environments, such as swift water, flat water or ice, can be found in their respective sections.

Dynamic Hazards (objects moving in water):	– Vehicles – Trees – Propane tanks – Animals – Clothing
Static Hazards (stationary objects):	– Signs, poles and fire hydrants – Manholes – Picnic tables – Intake and culvert pipes – Vehicles – Guard rail, fencing and barbed wire – Structures – Utilities (power lines, gas service lines, etc.) – Sloped shoreline, undercut objects and other items that could entrap
Challenges:	– Weather and Season – Accessibility – Time of day, poor visibility and darkness – Personnel and equipment resources – Travel time – Number of victims – Animals – Potential crime scene

Environmental Hazards

Hyperthermia while working is a big concern due to the stressful nature of the events. Personnel working in dry-suits, PFDs, and helmets retain body heat and rapidly move towards dehydration. Adequate rotation of personnel must be provided along with ample hydration.

Hypothermia can also rapidly impact rescuers and victims. If personnel are not adequately protected there will be a premature end or delay in the rescue efforts.

In considering environmental hazards, rescuers should know how to calculate the aggregate temperature. The aggregate temperature is obtained by adding ambient temperature plus the water temperature. If the aggregate temperature is less than 140ºF, the potential for hypothermia is dramatically increased. High wind conditions and moving water may alter temperature variables and lead to rapid heat loss. Physical condition, drugs, alcohol, medications, and food intake can all increase risk.

Due to the potential for hypothermia, when the aggregate temperature is less than 140ºF, rescuers should consider additional PPE to include dry or ice rescue suits.

Hazardous Materials/Biological Hazards

Water may contain various chemical and biological waste products. This may be the result of saturated ground, the overwhelming of sewage and septic systems, or industrial run-off. Flood water should always be considered contaminated and dry suits shall be worn to protect personnel from contaminants. Gross decontamination should be performed after each entry. Completion of exposure reports are recommended for all entries into flood waters.

The following is a short list of common illnesses associated with exposure to flood waters:

- Gastrointestinal illnesses following ingestion of contaminated water or food.
- Infectious hepatitis or aseptic meningitis from viruses in sewage contaminated water.
- Leptospirosis following exposure to flood waters contaminated by animal urine.
- Intestinal bacteria such as E. Coli, Salmonella, Shigella, Hepatitis A Virus, and agents of typhoid, paratyphoid, and tetanus.

RECOMMENDED DISPATCH ALGORITHMS

Dispatch Requirements for Inland Water Rescue Incidents:

Based on jurisdictional resources, current environmental conditions, and availability, the following recommendations are listed for dispatch to inland water rescue incidents. Boats, as referred to in these recommendations, are inflatable, motorized, utility boats and are available to launch from a vehicle-accessible point to a body of water.

Water Rescue

- ✓ 2 Boats * (minimum staffing of three personnel per boat)
- ✓ 1 Rescue
- ✓ 1 Truck or Tower **
- ✓ 2 Engines
- ✓ 1 Battalion Chief
- ✓ 1 Safety Officer
- ✓ 2 EMS Transport Unit ***

Ice Rescue

- ✓ 2 Boats * (minimum staffing of three personnel per boat)
- ✓ 1 Rescue
- ✓ 1 Truck or Tower **
- ✓ 2 Engines
- ✓ 1 Battalion Chief
- ✓ 1 Safety Officer
- ✓ 2 EMS Transport Unit ***
- ✓ 1 Dive Team (consideration based upon incident specifics)

Water Rescue Task Force (can be used from Mutual Aid)

- ✓ 2 Boats * (minimum staffing of three personnel per boat)
- ✓ 1 Special Services unit (Swift Water Rescue Trained Personnel)
- ✓ 1 Battalion Chief
- ✓ 1 EMS Transport Unit ***

** It is recommended when boats are dispatched they respond to the incident with two swift water rescue technicians and one swift water boat operator. These swift water resources are intended to be used for their technical specialty on the incident as determined by the incident commander. It is not the intention of the manual to require the boats are launched with three swift water personnel. The number of responders placed in the water or on the boat should be determined by the boat operator and Incident Commander after evaluating the mission, resources available, and the equipment needed to safely make the rescue. Technical specialist (SME) on the scene should be consulted during this decision-making process.*

*** Indicates rear-mount vs. tiller vs. mid-mount considerations.*

**** The one EMS transport unit dispatched is designated for the care and welfare of the team members only and will not be included as a resource for service delivery. This is to protect our responders when dispatched out of the area for mutual aid.*

Phase Response Plan

There are three phases of readiness that should be recognized by the Northern Virginia regional fire and rescue departments. These are based on the weather forecast, current water table, and water levels on local bodies of water.

The following are basic recommendations for these three phases. Personnel notifications for the following phases are jurisdiction specific.

Phase 1 – FLOOD WATCH	In Phase 1, appropriate water rescue personnel are identified as water rescue team members but may be used to staff other response resources (first pull). This phase is the normal, operational, preparation level for any identified water rescue resource. This includes, but is not limited to, ensuring all personal protective gear related to water rescue is serviceable and ready for use on emergency scenes. Additional equipment caches should be immediately accessible.
Phase 2 – FLOOD WARNING	In Phase 2, conditions exist that could precipitate a water rescue event (ie…a flood warning has been issued for the jurisdiction). In this phase, where flooding is imminent, response resources should be immediately made available with dedicated personnel. This could be a focused area or the entire region and should be addressed accordingly. The evaluation and decision making to increase staffing levels or reassign and deploy resources in Phase 2 operations should be implemented by the jurisdiction's fire chief or designee.
Phase 3 – ACTION PHASE	In Phase 3, an area or jurisdiction is expecting or experiencing flood warnings, hurricanes, tropical storms, tornados, or any other weather event that has increased potential for significant precipitation accompanied by major flooding. During this phase all supported water rescue resources should be fully staffed and prepared to respond. It is also recommended during this phase, dispatch complements may need to be adjusted based on increased call volume and pending incidents. Preplanning should also include the potential for the jurisdictions resources to be depleted and outside assistance to be requested. This plan should consider regional resources would most likely be unavailable as they are most likely affected by the event as well. Other resources to be considered may include the US Park Police, state police agencies, state water rescue teams, Coast Guard, or other federal assets.

Additional personnel should be available as a rapidly deployable resource with minimal equipment, not including a boat. These resources should have, at a minimum, a four-wheel drive vehicle, all water rescue related PPE, and appropriate rope equipment for the water rescue environment. They can be used for specific incidents, area reconnaissance, rescue assistance which may or may not require a boat based rescue or they can be maintained as a roving unit based on system needs during times of high call volume.

Demobilization plans should be evaluated by the end of each 12-hour period or the end of each shift. Some factors that should be considered are number of flooded roadways, cresting of local streams and rivers and forecasted precipitation.

INITIAL INCIDENT COMMAND CONSIDERATIONS

This portion of the manual was designed to assist personnel from the first-arriving unit to the incident commander. Some of the considerations covered are safety concerns, management objectives, benchmarks, tactical options, and ICS organizational issues at emergency incidents. These same considerations can be used for non-emergency operations, such as training or recovery operations. It is recommended when adequate resources are available, a technical specialist be used at the command post. The Incident Commander should consider using the applicable branches, divisions, or groups during inland water rescue operation.

Note: the use of other agencies such as law enforcement, helicopter assets, dive teams, and/or Virginia Department of Transportation (VDOT) may necessitate the need for a unified command system.

Any time a rescuer is placed into the water to affect rescue, it is considered to be an IDLH environment and there is extreme risk to all involved. A risk/benefit analysis shall be conducted by the Incident Commander, in conjunction with a SME, prior to placing a rescuer in the water.

See Appendix D for the Water Rescue ICS board/worksheet

Effective incident command is critical on an inland water rescue incident. The actions of the first arriving units form the foundation on which the incident will be built. The first-arriving units should consider the following as priority actions which need to be completed as soon as practical:

- Communicate an on-scene report.
- Complete an effective size-up, trying to visualize as much of the incident as possible.
- Perform a risk benefit analysis to ensure subsequent actions and decisions are based on good judgment, experience, and training – not compassion.
- Communicate a situation report.
- Establish command and establish operational zones.
- Request additional resources as needed to complete the incident objectives.
- Provide direction for incoming resources to maximize efficiency for the incident objectives (i.e., aerial apparatus positioning, boat deployment, staging).
- Maintain personnel accountability.

Specific action plans are identified in the specific sections on swift water, flat water, and ice incidents.

ICS Positions to Consider during Inland Water Incidents

Safety Officer. The safety officer will be responsible for the overall safety of all personnel during an inland water rescue incident. He or she should work directly with the Incident Commander to ensure the incident is mitigated safely.

Technical Specialist. A technical specialist holds a technician-level certification for the incident type.

Marine Branch. The Marine Branch encompasses operations on the waterways associated with a particular incident. Responsibilities include briefing and assigning marine resources, determining the need for and requesting additional resources, providing information on the status of marine operations, and completing needed documentation.

EMS Branch. Personnel assigned to the EMS Branch will be responsible for providing treatment to victims removed from the water/ice, as well as to provide care for fire and rescue personnel as needed.

Upstream Division. The Upstream Division (awareness-level personnel can act in this position) consists of personnel responsible for watching for and advising of any obstacles and hazards floating downstream or other pertinent information that could impede the operation and may hinder the rescue.

Downstream Division. The Downstream Division (recommended to be swift water technician-level personnel) prepares for the rescue of victims and/or rescuers that may be swept downstream. All personnel in this division should have a throw rope bag in hand and be wearing appropriate protective equipment. There should be downstream personnel on both sides of the body of water.

River Right and River Left Division. These divisions consist of personnel who are responsible for rigging the rope rescue system and operating as a land-based rescue source for victims and rescuers swept downstream. Personnel assigned should be wearing appropriate protective equipment and have throw rope bags.

RIT Group. The Rapid Intervention Team (RIT) Group needs to be assigned during all incidents where personnel are operating in the Hot Zone. During normal operations, if a boat is deployed, there should always be another boat with at least the same capacity as the rescue group's boat. This boat should have a certified crew and be ready to go in the water to act as the Rapid Intervention Team. During high call volumes, when a phased response is necessary, a second boat may not be available. In these situations the RIT component, may consist of a technician-level crew without a boat. This team is responsible for the safety of the rescue team and victim.

INLAND WATER AND ICE INCIDENT OPERATIONS

The Northern Virginia region has numerous inland water/ice target hazards. These include lakes, ponds, retention ponds, creeks and flood canals such as the one on Four Mile Run. Because of the region's volatile weather conditions, inland water incidents may occur at a moment's notice and without warning. During the harsh winter months the region also lends itself to ice rescue incidents possible at any of the aforementioned target hazards.

The Northern Virginia region does not lend itself to the formation of safe ice for the purpose of recreation or other uses. Many variables contribute to ice formation, and with the inconsistencies experienced in the region with respect to wind, temperature, and water flow, personnel should treat all ice as unsafe to operate on.

On-Scene Report

The initial report on arrival to an inland water rescue incident should include the following information:

- Confirmation of incident location,
- Confirmation of incident dispatch information,
- Staging location for incoming resources,
- Establish and or transfer command, and
- Actions taken or needed to control access to the scene.

Size-Up

In order to safely mitigate the emergency, the initial incident commander shall perform a thorough size-up of the incident and gather all the information available to develop an incident action plan which include:

- Use a six-sided approach to visualizing the incident (above, below, four sides).
- Determine location, number, and condition of victims.
- Secure witnesses who may have valuable information on victim location.
- Review pre-plans of the location.
- Establish operational zones.
- Obtain and monitor current weather conditions.
- Mark the water/ice level and continual check to determine rise or fall.
- Determine if this is a rescue or a body recovery.
- Consider what will happen if responders do nothing and wait for water to recede.
- Request additional and specialized resources needed to accomplish the objectives.
- Request additional EMS units as needed for the number of victims.

Initial Response Operations

It is also important to implement these critical out-of-water actions during the development of the incident action plan:

- No personnel shall be in, on or over the water (Hot Zone) while wearing structural firefighting gear.
- Ensure all responders are in proper PPE and flotation devices.
- Conduct upstream and downstream recon to identify hazards.
- Maintain awareness of the hazards in and around the incident location.
- Position upstream spotter.
- Position downstream safeties.
- If a pet is located on the ice every effort should be made to attempt a rescue to prevent bystanders/family from entering IDLH. Historically, civilian rescue attempts happen after units leave the scene.

Risk/Benefit Analysis to Determine if Rescue or Recovery

The Incident Commander shall include a risk/benefit analysis before in-water operations are commenced. Responders need to act on training and facts and not out of compassion. The following are key considerations in performing a risk/benefit analysis before developing an incident action plan:

- Victim recognition – assess the patient's physical and mental status to determine if they can self-rescue or if they need to be rescued.
- Victim viability – determine when and where the victim was last seen, how long they have been submerged, and what is the water temperature.
- Hazards and environmental factors which can jeopardize rescuers.
- What factors will hinder or ease access to the victims?
- What is the training and experience of on-scene personnel?
- What are your available resources?
- Monitor weather conditions.
- Protect in place option (water level rising or falling).

Situation Report

The situation report should include the following information:

- Confirmation and condition and number of victims in, on or under the water, if possible.
- Information gathered from bystanders and victim status.
- Is the water/ice moving? How fast and in what direction?
- Possible access for resources.
- Establish operational zones.
- Consider Dive Team (SCUBA) due to reflex/response time.

Locating Victims

Victim location is a critical piece of information necessary for determining the strategy and tactics of most rescue situations. It is also needed to determine what resources are needed, where they may be staged or deployed, and the speed in which this will need to be completed. Accurate and precise location is very important and should be communicated to all personnel as quickly as possible so the Incident Action Plan (IAP) can begin to be developed.

During an ice rescue incident, determining victim location may be as easy as looking for broken ice. However, with moving water under the ice, this may only be the point of entry by the victim. Cold water shock response may prevent a victim from being able to assist with self-rescue by altering their mentation or physical capacity.

The following information shall be collected through observation or witness interviews:

- Last location and time any possible victims were seen.
- Number of victims.
- Name, age, race, and sex of victims or approximate size.
- Clothing and type of shoes worn (footprints).
- Ability to swim.
- State of health and medications.
- PFD or other floatation device.

A contact number or address can be useful to confirm or deny the possibility of the victim returning home if they self-rescued. If the vehicle license number can be determined local law enforcement can obtain address and contact information to attempt to make contact and confirm the location of possible victims.

Due to the change in the surface ice characteristics during an ice rescue operation (breaking ice and increasing the size of the hole in the ice), the initial victim location or point last seen should be identified from the shore. This will assist the dive team in rescue and recovery if the victim(s) submerges. Figure 13 shows one method that is both simple and accurate way to accomplish this with markers such as traffic cones.

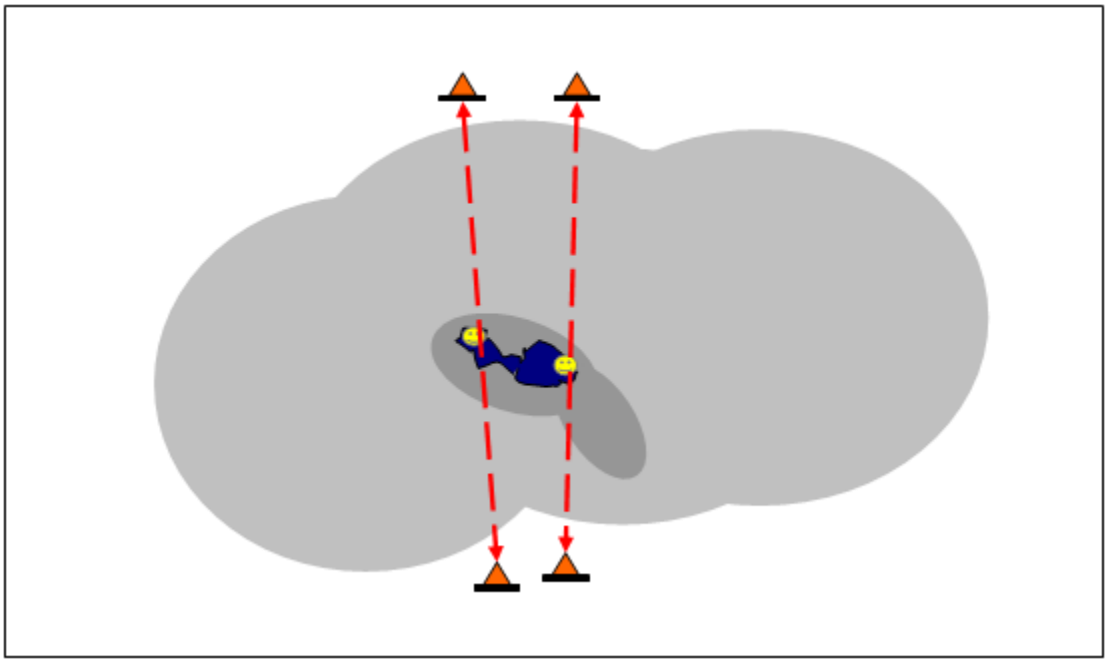


Figure 13: Initial victim location or point last seen should be identified from the shore.

Once visual or verbal contact is made with the victim(s), it shall be maintained until rescue is affected. Contact is required to ensure the victim(s) location and conditions area monitored and continue to obtain information from the victim(s) if possible. Personnel are dedicated to this function and will not be used in any other capacity unless immediately replaced.

Every effort should be made to maintain the victim in a stable position until properly equipped and trained personnel are on the scene. Uncoordinated rescue attempts may destabilize ice conditions, hamper rescue efforts, and directly affect victim survivability.

Initial Action Plan (IAP)

As the location and number of victims is determined, the Incident Commander shall develop the IAP. This plan will be built off of the initial response operations and information gathering of the first-arriving units.

An IAP should have several options for the incident operations. As conditions change, the dynamics of the incident cannot always be predicted. The ability to modify tactics is as important as the initial plan.

The Incident Command System should be implemented in the initial stages to ensure scalability of the incident.

Mandatory Safety Requirements

Anyone operating in the warm or hot zone is required to have appropriate training in the use of PFD and PPE as specified later in the document in Appendix B.

Any single long whistle blast requires all persons within the sound to stop operations and look in the direction of the whistle.

For additional reference material on communications and hand signals see Appendix C.

Any time a rescuer or victim is located in the water there shall be an upstream spotter and downstream safety with retrieval devices available. These personnel are dedicated to these positions and may not be used in any other capacity unless immediately replaced.

Figure 14: Fire apparatus shall not be driven in the hot zone.

Fire apparatus shall never be driven into or through the hot zone to include flooded roadways or bodies of water of any kind, Figure 14. Only appropriate water rescue equipment will be used to enter the water. Although aerial devices can be used over the hot zone, the vehicle itself will remain out of the water and in a location not threatened by rising water levels. Figure 15 shows the forces on vehicles as a result of entering high water.

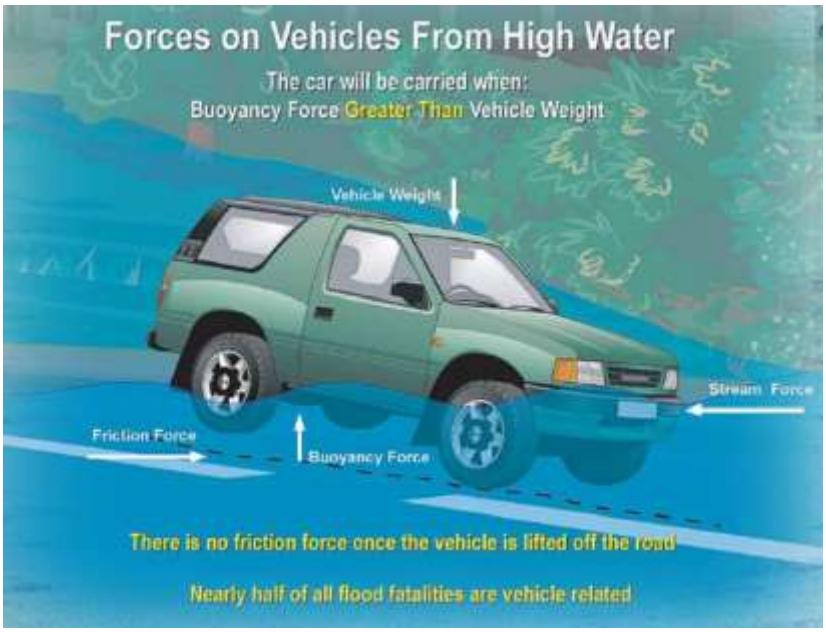


Figure 15: Forces on vehicles from high water.

Additional Staffing

Water and Ice rescue events are resource and labor intensive. The need for additional resources should be addressed as soon as possible. As a general rule, it could require 16 personnel to affect a single person rescue from moving water during daylight hours.

- Spotters and safety (three personnel)
- Incident safety (one person)
- Team leader (one person)
- Incident commander (one person)
- Subject Matter Expert (referred to as SME, proficient in the incident's discipline)
- Entry team (four personnel)
- RIT (four personnel)
- Shoreline support and rope technicians (four personnel)

There is an exception for **ICE RESCUE ONLY** as it relates to thermal protection to shoreline crews. This exception only applies if the incident commander, safety officer, and water/ice rescue unit officer agree there is little to no risk to personnel operating in the warm zone. It is understood that structural firefighting gear offers significant thermal protection in the cold environment and is readily available to most personnel. For this reason, it is considered acceptable to have personnel operating in the warm zone (10 feet from the water's edge as a rule) using structural firefighting PPE**.** ***This is only true in the flat or static bodies of water that have surface ice. These personnel should make every effort to minimize or eliminate the need to operate in the warm zone.***

Rope Operations

Rope operations in the water/ice environment have different challenges that are not normally encountered during other rope and high angle incidents. For this reason, coordination between the water rescue personnel and technical rescue personnel is essential.

Figure 16: Rope operations in swift water and ice rescue incidents.

Helicopter Operations

Some considerations of when a helicopter can be used are the following:

- Reconnaissance
- Scene Lighting
- Search (FLIR)
- EMS Transport
- Deployment of personnel and/or equipment
- Hoist operations

The helicopter crew has the final authority on whether or not to attempt the operation.

Figure 17: Helicopter rescue in a swift water incident.

Boat Deployments

Deploying boats can be an option to conduct both search and rescue operations or as an operating platform. These operations are considered medium to high-risk depending on the dynamics of the ice/water environment and an RIT complement is required.

When using a boat, consideration must be given to locations for launching. The size, weight, launching platform, and tactical positioning will dictate the feasibility of launch locations.

Figure 18: Boat use in swift water and ice rescue incidents.

Truck and Rescue Company Operations

Unless the first-arriving unit or jurisdictional procedure directs otherwise, staging should be considered. Trucks, towers, and rescues should be prepared to stage in a location that enables easy deployment of their ladder. This could be based on the body of water, geographical dynamics, and incident situation and location.

Truck, tiller, and tower capabilities should be considered in the dispatch complement. Access at many locations may limit the use of certain apparatus (mid-mount vs. rear-mount ladder trucks vs. tillers) and should be considered at the time of dispatch by responding personnel.

Figure 19: Use of aerial apparatus at a swift water rescue incident.

Positioning

Priority positioning should always be given to boats, boat support, trucks, and towers. Towers and rescues should position near to the scene or where the victim could potentially end up as coordinated by the incident commander. Special attention should be given to the approach to the scene to optimize the use of the aerial.

Technical Rescue

Any time personnel are located above or near the water/ice in an operational capacity they will be considered to be in the hot or warm zone. This includes operating on aerial ladders/platforms. The personnel should have the appropriate level of training and PPE.

Because of the technical nature of operating aerial devices at water rescue incidents the operator should be trained to the operations level or be immediately advised by an operations trained individual. The individual(s) operating within the hot zone on the ladder should be at minimum technician level because of the possibility or necessity of the rescuer entering the IDLH.

Submerged Victim Guideline and Reference for Static Water Incidents

Personnel should ensure surface water rescue / swift water rescue / boat resources have been dispatched and directed to most direct access point. Based upon the supplemental information a request should be made for a SCUBA dive team and any available helicopters. In the NOVA region, additional assets such as a cadaver canine and remotely operated underwater vehicles are available.

Upon arrival, personnel should make contact with reporting party and obtain:

- Determine point last seen (PLS): Specific point that someone saw them go under. Mark if possible from shore line, get compass bearing or GPS coordinates.
- Determine time last seen. Initiate timer based on time victim was last seen.
- Was the victim struggling or submerged?
- Did the victim submerge and come back up at any period (which would reset the time for victim down)
- Gather a physical description of the victim to include the clothing and if the victim was wearing a personal flotation device (PFD).

Direct dispatch center to initiate an incident timer for the rescue operation and Command monitor for situational awareness.

Police department should be requested and utilized to remove spectators / civilians from immediate area. Additionally, initial efforts should also include cordoning off area of operations and the unified command post.

In advance of the rescue operations, personnel should remove all civilian would be rescuers from water immediately. The rare exception is trained lifeguard personnel that be

an asset on this incident. Place spotter(s) on shore and personnel with throw bags equal to the PLS. Additionally, place spotters and personnel down current with throw bags, if

Command should obtain current and future weather report to determine the implications it may have on the rescue operation.

RESCUE OPERATIONS

Active search and rescue operations should be done for victims that have been submerged for up to 60 minutes. This can be extended for colder water temperatures. Consider online medical control consult prior to search termination.

Drop a marker buoy to indicate the point last seen and base search patterns off buoy, relay GPS location to command.

Command should develop a incident action plan to include determining search pattern (see below)

Initiate immediate search for submerged victim(s):

- Utilize a human / rescuer chain search for shallow waters (beaches, ponds, swimming pools)
- Utilize boat-based searches for deeper waters using probing tools such as long pike poles. Consider use of recreational boats in area with SONAR that could possibly provide assistance. Consider use of PD boats equipped with side-scan SONAR.
- Consider utilizing sub-surface searches after consult with IC if the PLS has a high probability of detection and an assessment is made of potential underwater hazards in the area:
    - Planning considerations for sub-surface searches: current weather, water temperature, wave action, currents, hydraulics, low head dams, obstructions, debris, contamination, turbidity, crew experience
    - Adjuncts: mask, snorkel, knife, fins, throw bags
    - Trained water rescue personnel may submerge to look for victims with or without PFD.
    - Trained water rescue personnel engaging in sub-surface searches may be tethered if entanglement hazards are not suspected.
    - Personnel doing sub-surface searches will be partnered with a spotter.
    - Sub-surface searches should be short duration (< 1 minute) and the maximum work period will be 10 minutes. Work period starts when personnel submerge under water and implementation of a incident timer should occur. Consider having relief personnel immediately available if possible for extended search operations.
    - Sub-surface searches should be limited to water depths up to 10 feet.

Command should monitor the tactical radio channel and ensure all personnel on water have communications.

Have a dedicated safety officer on shore to monitor water operations, if possible. A fully staffed RIT and RIT boat should be available and ready for deployment if a rescue operation does occur.

RECOVERY MODE

The recovery mode occurs when the active rescue and search operating in water transitions into boat based only operations. The use of an aerial search with a PD helicopter can be beneficial.

Command should confer with PD (unified command) and determine if a search is to be continued or the incident can transition to a PD-only incident. If the decision is to continue with the search, Command should determine with the PD how the body recovery will be conducted (leave in place or remove from the water).

Ensure all personnel involved in water rescue complete gross decontamination and rehab. Witnessed drownings can take an emotional toll on rescuers, both civilian and unformed. Command should assess the emotional state of those involved and request appropriate resources to assist with critical incident debriefing.

STANDARD SEARCH PATTERNS

Sweep Search Pattern

Flat water or land search. Rescuers line up at designated start point on search grid/map and proceed along a straight line with fixed distance in between each person. Once the end of the search area is reached, the lead will direct one of the ends to stand fast and others will line up to search grid in the other direction. The lead will stay back to keep everyone in sight and maintain orientation with map. Distance between rescuers will be dictated by terrain, weather, and other incident conditions. Search continues until assigned grid is completed, victim found or another assignment is ready.

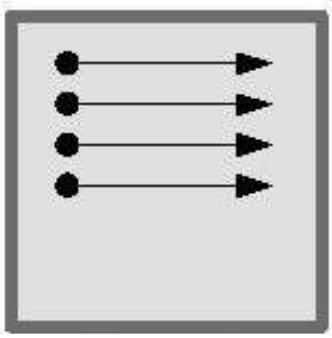


Figure 20: Sweep Search Pattern

Double Back Search Pattern

Flat water or land search technique. A rescuer(s) walks out a fixed distance, executes a 90° turn then walk a fixed distance to form the top of a mini-grid. Then through a series of switchbacks, they search the area slowly working their way back to origin/starting point. Overlap on each pass will be determined on visibility. This can be used on and/shore/water with multiple searches at same time. It is important that the lead keeps track of teams and start points to ensure no area missed and overlap occurs.

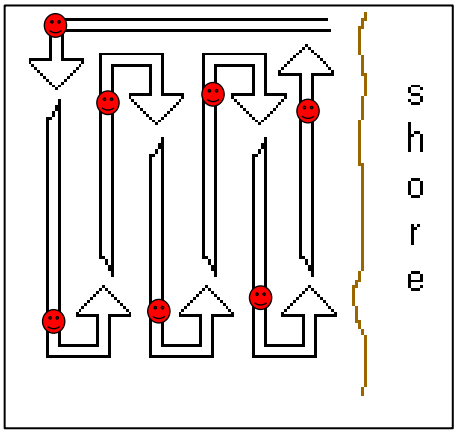


Figure 21: Double Back Search Pattern

Spiral Search Pattern

Flat water or land search. Rescuers use a fixed point as a reference to initiate a search area. Several spirals can go on at same time if needed though areas should overlap to minimized dead space in patterns due to circular nature. After a rotation the rescuer will let a length of rope out and continue in a circular pattern search along the way. This technique is well suited for shallow water searches having the center person letting out rope while the other person uses a poling tool, feet or hands to search depending on water clarity and depth. This spiral technique can be used with boats in shallow water with poling tools and the boat rotating around a center point gradually expanding the circle. On land this technique is used to locate small objects or search limited visibility areas.

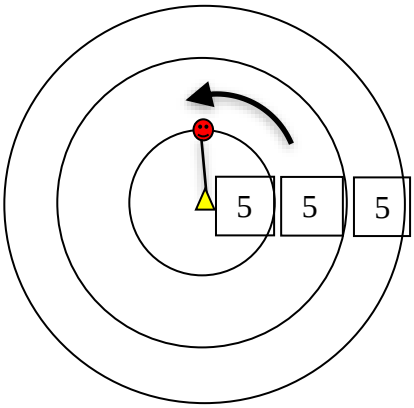


Figure 22: Spiral Search Pattern

APPENDIX A – RESPONDER TRAINING LEVELS AND REQUIREMENTS

Water and Ice Awareness Level

- All personnel in the NOVA Regional Fire Departments shall have water and ice rescue awareness level training in order to operate at the first responder level.

- For the NOVA region fire departments, awareness level training will include requirements outlined in NFPA 1670 to include lecture and practical applications in the following areas:

    - Hazard recognition.
    - Personal protection.
    - Activation of the emergency response system.
    - Gather data.
    - Throw bags and other shore-based rescue techniques.

- Recertification: At the discretion of the Authority Having Jurisdiction (AHJ).

Swift Water Operations Level

- This second tier provides training for in water rescues under the direct supervision of a water rescue technician. All personnel trained to operations level should have been evaluated and proficient in self-rescue skills.

- For the NOVA region fire departments, the operations-level training will include requirements outlined in NFPA 1670 to include lecture and practical applications in the following areas:

    - Swimming pool skills.
    - Basic swift water training in moving water environment.
    - Swim Test: participant must comply with course provider curriculum.

- Recertification: At the discretion of the Authority Having Jurisdiction (AHJ).

Swift Water Technician Level

- This third tier provides training for self-rescue and advanced water rescue techniques such as: direct & indirect in water contact rescues, emergency procedures, advanced rope systems, boat-based rescues, helicopter rescues, and night operations.

- For the NOVA region fire departments, the technician-level training will include a pre-requisite of Technical Rope Rescue and the requirements outlined in NFPA 1670 to include lecture and practical applications in the following areas:

    - Swimming pool skills.
    - Basic/advanced swift water training in moving water environment.

- Swim Test: participant must comply with course provider curriculum.

- Recertification: Personnel will be required to attend a minimum of 16 hours of training with a minimum of 8 of these hours to be practical application of skills in a water environment annually. The swim test will be required at least every two years to maintain certification. Testing and skill evaluation will occur at annual drills. Students must be able to swim 300m unassisted in under 12 minutes to attain technician certification.

    - Minimum of two evaluators must be present with one being an instructor.
    - Use of goggles is permitted.
    - Personnel may use any stroke and may pause at ends of pool.
    - Personnel shall not touch bottom of pool.

Ice Rescue Technician Level

- Ice rescue personnel are trained for self-rescue and in advanced rescue techniques to include: direct and indirect on- and in-ice contact rescues, emergency procedures, and haul systems.

- For the NOVA region fire departments, ice rescue technician level training will include lecture and basic/advanced ice rescue techniques on ice.

- Recertification: At the discretion of the Authority Having Jurisdiction (AHJ).

Boat Operator

- Swift water boat operators are trained for basic and advanced boat handling techniques, trailers, launching and recovery, emergency procedure, boat and motor maintenance, direct and indirect boat-based contact rescues, advanced rope based systems, and night operations. Swift water boat operators must also complete and maintain the requirements of a swift water technician.

- For the NOVA region fire departments, swift water boat operator training will include lecture and basic/advanced boat handling.

- Recertification**:** Maintenance of technician-level certification. Personnel will be required to attend a minimum of eight hours of training annually, all of which will be practical application of skills in a water environment.

Helicopter Hoist Training

- Personnel assigned to water rescue stations should attend a helicopter hoist class conducted by the US Park Police Helicopter Units or other qualified agencies. Units on scene should consult with certified helicopter personnel if a helicopter-based rescue is deemed necessary.

- Helicopter hoist-trained personnel shall be trained in all aspects of swift water rescue as well as: helicopter-based rescue to include hoisting and net-based rescues, stokes basket operations, pick-offs, and lifts.

APPENDIX B – EQUIPMENT RECOMMENDATIONS

Minimum Swift Water Boat Recommendations

The following recommendations are the equipment that should arrive on scene with the boat, but not necessarily in the craft when used.

Inflatable Rescue Boat (IRB)	
Air, manual inflation pump	1 per boat
Fuel container (bladder or can)	1 per boat
IRB, motorized	12' minimum, 16' maximum
Motor with prop guard	25 Horse power minimum
Repair Kit	1 per boat
Lanyard, wrist, kill switch	Required Minimum 2 per motor
Motor flush kit	1 per motor
Paddles (Guide T handle)	4 per boat
Prop/Shroud, spare (pump jet)	1 per motor
Other related equipment	Jurisdictional preference

Not all boats are appropriate for swift water environments. There should be a designation at dispatch to recommend only swift water rescue resources for these events if the information received leads to a swift water rescue call type.

An appropriate and dedicated vehicle should be used to trailer boats. This vehicle needs to be capable of navigating undeveloped areas where normal water access is not available. Smaller vehicles with four wheel drive and short wheel bases are highly recommended. Large fire apparatus such as pumpers and ambulances are not appropriate to trailer or launch vehicles in the flood and/or swift water rescue environment.

Minimum PPE Requirements

Below are recommendations for a regional PPE standard for inland water emergencies.

Victims:

- Type III/V Coast Guard approved PFD
- Appropriate water rescue helmet with attached solid light or light stick if appropriate (strobe lights are inappropriate for moving water operations).

Awareness Level:

- Type III/V Coast Guard approved PFD
- Appropriate water rescue helmet (red color)
- Water rescue throw bag
- Whistle

Operations and Technician Level:

- Type V with quick release strap; Coast Guard/Mil Spec approved PFD
- Appropriate water rescue helmet
    - Technician – yellow
    - Operations – yellow w/red reflective stripe down center
    - Hoist qualified – yellow w/blue reflective stripe on top
- Dry suit with thermal protection
- Appropriate footwear
- Appropriate gloves
- Whistle
- Knife
- Personal throw bag
- Light source (helmet light recommended)
- Low light/night time marking device (yellow on helmet)

Supplemental Gear (Jurisdictional Preference):

- Fins
- Vest tethers (cow tail)
- Personal rope hardware
- Center punch, rescue hammer
- Handsaw

Minimum Personal Protective Equipment Standards

Personal Floatation Devices (PFDs): Operational units should have a PFD assigned for every riding position. All PFDs must be accounted for daily and inspected once a month for wear and functionality (i.e., tears, missing/broken buckles, excessive fading). All victim/awareness level PFDs will carry a Coast Guard rating and operations/technicians will carry a Coast Guard/Mil Spec rating. All labeling should be visible and readable on the interior of the jacket.

- Awareness/Victim Level
    - Type III/V PFD: minimum floatation 15lb-22lb
    - Location: All Awareness-level apparatus
- Operations/Technician Level / Swift Water Boat Operations
    - Type V PFD w/blow-out: minimum floatation 22lbs
    - Location: All Water Rescue stations
- Special Considerations: Proper training and fit are required for use of this type of vest. Proper lacing of buckle and side adjustment are imperative for relatively safe operations. Only Technician/Operations level personnel are to use Type V PFDs w/ blow-out straps due to the possibility of entrapment that could lead to injury or death.

Helmets: Units trained at or above the operations level will have water rescue head protection available. Structural firefighting gear is not appropriate and is unsafe for the water environment. The NOVA region helmet color scheme is as follows:

Level	Color
Awareness Level/Victim	Red
Operations Level	Yellow with Red Stripe
Technician Level	Yellow with Technician Marking
Boat Operator	Yellow with Technician Marking
Helicopter Certified	Yellow with Blue Reflective Tape on Top

Ice Rescue Suit: Ice suits (e.g., Mustang Ice Commander) specifically designed for cold static water entry afford the rescuer long-term operability in an extreme cold environment and are the tool of choice for ice rescue. Operations involving ice require the use of appropriate PPE to limit personnel exposure as well as provide thermal protection during operations in ice.

Footwear: Appropriate footwear should be used for any unit operating near the water's edge or performing in-water operations. **Turn out boots and/or station shoes can greatly diminish survivability in moving water.**

Supplemental Equipment:

- Throw Bags

- Fins
- Ring Buoy/Cinch Rings
- Waterproof Radio Bags
- Lighting
    - Waterproof headlamp
    - Low level light helmet identifier
    - Corresponding light stick
        - White – Boat marking stern
        - Green – Boat marking Starboard
        - Red – Boat marking Port
        - Yellow – Rescuer marking Tech/Ops
        - Blue – Victim marking

APPENDIX C – COMMUNICATIONS

Whistle Commands

Whistle commands are as follows:

One blast: Stop, look at person.

Two blasts: Look upstream.

Three blasts: Look downstream.

Multiple blasts: Trouble.

Hand Signals

The following table shows the hand signals for various communications in inland water rescues and emergencies.

OK	
Stop	

Victim Recovered	
Tighten	
Slack	

APPENDIX D – INCIDENT COMMAND SHEET

☐ Rescue **Swift Water Incident Command Board** ☐ Recovery

Dispatch		Incident Location:	PLS/ LKP	Patient(s) Info:
ENG				
TRK		River Right Access:	Cmd Name:	Radio Channels: Tac: / Air:
RSC		River Left Access:	Cmd Loc:	Cmd: / EMS:

		Group/Division		Group/Division		Group/Division		Group/Division		Group/Division		RIT	Staging
BOAT													Loc:
BOAT													
EMS		Supervisor	Chnl	Supervisor	Chnl	Leader	Chnl	Leader	Chnl	Leader	Chnl		
BC		Unit	Assignment	Unit	Assignment	Unit	Assignment	Unit	Assignment	Unit	Assignment		OIC:
MEDIC													
AMB													
SAFO												Medical Unit (Decon?)	
HELO													
Add'l Resources													
BOAT													
BOAT													
BRUSH													
4x4													
AIR UNIT													

							Put-in Loc	Take-out Loc
Canteen		☐ Pt Located	☐ Pt Extricated	☐ First Put-in	☐	☐		
2nd BC		☐ Pt Accessed (GPS?)	☐ Pt w/EMS	☐ Last Take-out	☐	☐		
2nd EMS		☐ Pt Stabilized	☐ Area Secured	☐ Off Water	☐	☐		

Request				Task		Par	OS Time:	Monitor	
☐ Police	☐ Wrecker	☐ Light-Air	☐ Bus	☐ Upstream	☐ Hazard ID	☐ 10 Min	☐ 60 Min	☐ Water Lvl	☐ Weather
☐ Power Co	☐ Helicopter	☐ Canteen	☐ FieldCom	☐ Downstream	☐ Patient PFD	☐ 20 Min	☐ 80 Min	☐ 10' PPE rule	☐ Debris
☐ Park/DNR	☐ VDOT	☐ HazMat	☐ PIO	☐ Water Sample	☐ Prevent	☐ 40 Min	☐ 100 Min	☐ Air/H20Temp	☐ Pt LOC

Sketch:
GPS points,
Hazards,
DS access

Notes:
Water info,
Hazard info,
Site info
inc. history)

RETHROG, 15 absolutes, Swiftwater team components/resource guide, example diagrams. etc, on rear,

APPENDIX E – INLAND WATER INCIDENT COMMAND CHECKLIST

Phase I: Size up

- ❑ Primary Assessment
    - o Secure witness
    - o Determine location, number, and condition of victims
    - o Identify immediate hazards
        - ❑ Water level rising or falling?
        - ❑ Obtain current weather report
        - ❑ Surface loads (debris), hydraulics, hypothermia
- ❑ Secondary Assessment
    - o Assess need for additional personnel and equipment
    - o Assess need for additional equipment (boat)
- ❑ Rescue or recovery mode?

Phase II: Pre-rescue Operations

- ❑ Make general area safe (i.e., traffic and crowd control)
- ❑ Make rescue area safe
    - o Assign safety officer
    - o Assure team response to opposite bank
    - o Personal protective equipment within 10 ft. of water
    - o Assign downstream bag throwers
    - o Assign upstream spotters
- ❑ Form incident action plan
    - o Reach, throw, row, go, helicopter
- ❑ Establish backup plans
- ❑ Victim or Patient PFD and Helmet

- Pre-rescue briefing

Phase III: Rescue Operations

- Implement primary action plan
    - Make contact with subject
    - Apply protective equipment
    - Remove subject to safe area
- Transfer to appropriate EMS

Phase IV: Termination

- PAR – Personnel Accountability Report
- Consider decontaminating rescuers and PPE

APPENDIX F – PRE-PLAN EXAMPLE

Woodburn Road Flood Pre-plan, Box 2320

Purpose:

Create a standard equipment dispatch and action plan for response to incidents involving emergencies as a result of high water on Woodburn Road.

History:

- Heavy rains produce flooding of Woodburn Road for a significant distance.
- Citizens regularly disregard signage indicating not to cross flooded roadway.
- Woodburn Road is a major thoroughfare between Gallows Road and Little River Turnpike.

Location and Area:

Between the 3500 and 3600 block of Woodburn Road, a low lying area is regularly flooded.

There is a concrete bridge on Woodburn Road under which Accotink Creek flows during normal water periods.

Eakin Park (wooded) encompasses the area to the Northwest of Woodburn Road in this area while a privately owned field and park is on the Southeast side of Woodburn Road. Woodburn Road is a two lane road through this area. A walking trail parallels the stream on river left throughout this area however, it floods with minimal rain and is of no use for this type of response.

Characteristics:

The stream floodplain is defined and maintained as a riparian zone throughout the entire area, which includes a variety of brush, woody debris, trees, a five foot tall fence beside a walking path (along stream on downstream, river left, side from Woodburn Rd.) and guardrails at the bridge over Accotink Creek along Woodburn Road.

This is a wide floodplain with minimal open areas (i.e. fields or yards) throughout entire drainage. There is a three acre field immediately below Woodburn Road, river left. The width of the floodplain during relatively frequent flooding periods (1’ – 2’ on Flood Markers) is greater than 100 yards (300 feet). This location floods numerous times each year.

Rescuer Hazards:

- Positioning of downstream safeties will be difficult due to width of stream when flooded and the majority of the affected area is densely wooded.
- Utility of upstream spotters will be minimal due to the width of the floodplain and density of the riparian zone.
- There is a fence and low hanging power lines (12 feet off ground) 40 feet downstream from Woodburn Road throughout entire floodplain.
- On downstream side of Woodburn Rd. exists a ditch (up to 4' deep). A car could easily be swept from roadway into ditch and covered with water at the 2' mark on flood level signs.
- Guardrail is installed on each end of bridge on both upstream and downstream sides.
- A five foot tall fence is installed along the walking path downstream from Woodburn Road (River Left). (This fence appears to be conveyor belt material cut down to 2" – 3" wide and nailed to fence posts.)

Equipment Considerations:

- Two trucks: one from each side (T430 is first due need to request TL403),
- Two engines: one on each side
- R418
- One EMS unit on each side

(The addition of an engine and truck deviates from the standard RSWIFT response.)

- **Best access for boats is from north side; this will be SW418 and SW433.
- Determine utility of mid mount tower ladders at this location.

Positioning/ Approach/ Staging:

- <u>On the North Side:</u> Stop traffic at Beverly Road and stage fire apparatus at intersection of Woodburn Road/ Guinevere Road since this is the best place to turn apparatus around while allowing access to scene on Woodburn Road. (Pickup truck/ Brush Truck/ Jeep drawn boats may be able to utilize driveways closer to bottom of hill to turn around and unload boats.)

- <u>On the South Side:</u> Stop traffic and stage Apparatus at Frost Road.

On both sides it will quickly become a hindrance to our efforts if civilian traffic is not quickly controlled. Traffic control should be established by PD in the form of completely closing **<u>Woodburn Road at Beverly Road on the North Side</u>** and **<u>Woodburn Road at Frost Road on the South Side</u>.**

WOODBURN ROAD FLOODING IAP

Box: 2320 3500 – 3600 Woodburn Road

Standard Equipment Compliment:

2 Boats * (minimum staffing 3 personnel per boat)
1 Rescue *
1 Truck/Tower *
2 Engines
1 Battalion Chief
1 Safety Officer
1 EMS Transport Unit

***Special Request Equipment Compliment:**

Upon Dispatch:

- Request additional Truck Company

Geographic Divisions:

- Equipment arriving on scene from **Gallows Road** will be in the **Gallows Road Division**.
- Equipment arriving on scene from **Little River Turnpike** will be in the **Little River Division**.

Initial Assignments:

- 1 Engine, 1 Truck, 1 EMS Unit respond to Little River Division.
- All other equipment responds to Gallows Road Division.

Incident Command Post:

- Located in the driveway of 3537 Woodburn Road, which is in the Gallows Road Division.

Responsibilities:

- First arriving unit on each side will approach scene and perform an initial size up of situation. Command will be established by unit on Gallows Road Division in event of delay of BC.

Immediate Staging: (for all but first arriving unit on each side):

- **Gallows Road Division:** Woodburn Road/ Guinevere Road
- **Little River Division:** Woodburn Road/ Frost Road

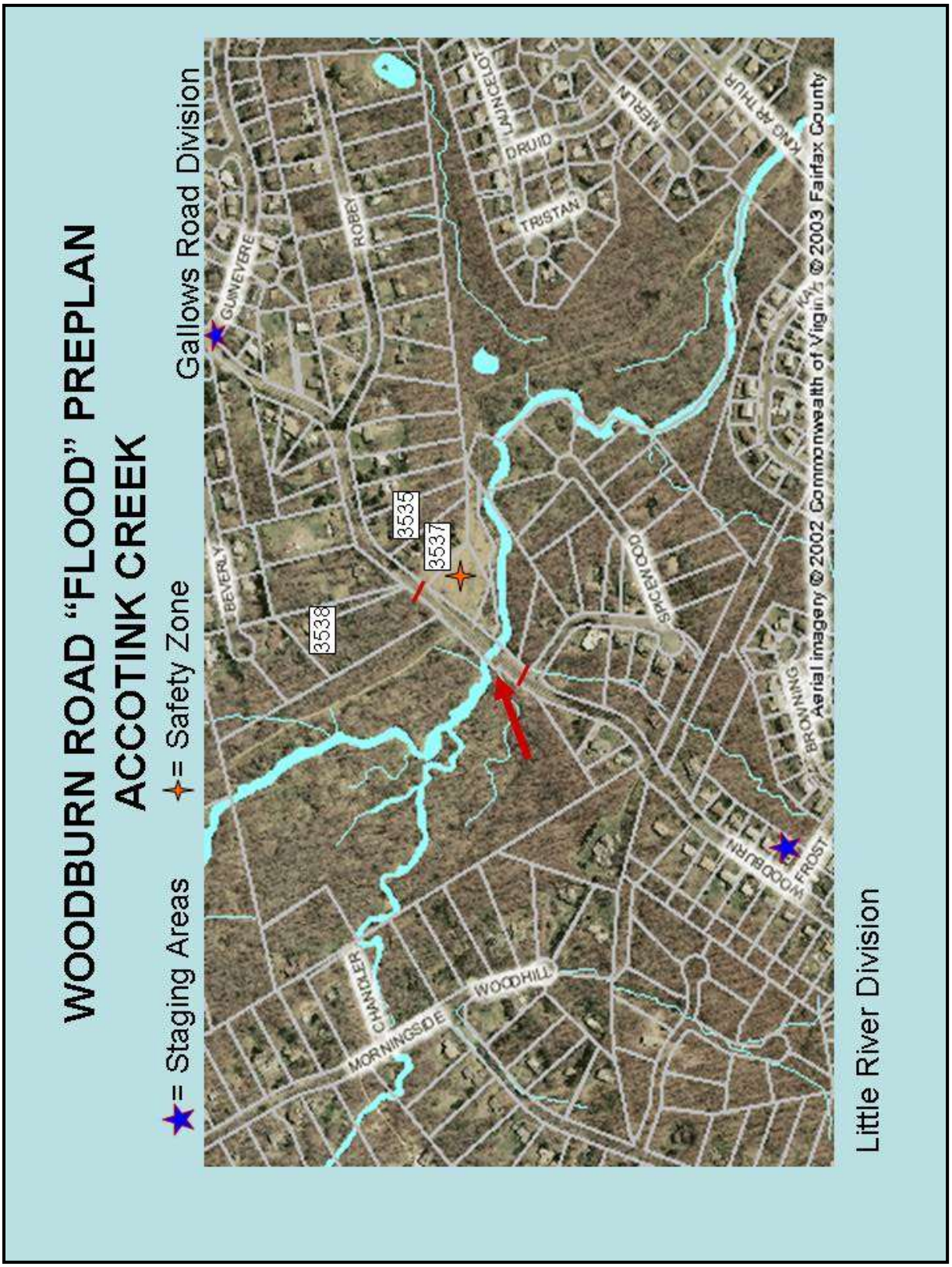
Unit Assignment:

- ALL Boat access will be from the Gallows Road Division.
- Rescue Priority will be responsibility of the boat crew(s).
- Truck Companies will be responsible for support of incident with staffing, equipment, aerial observation and lighting.

Safety Considerations:

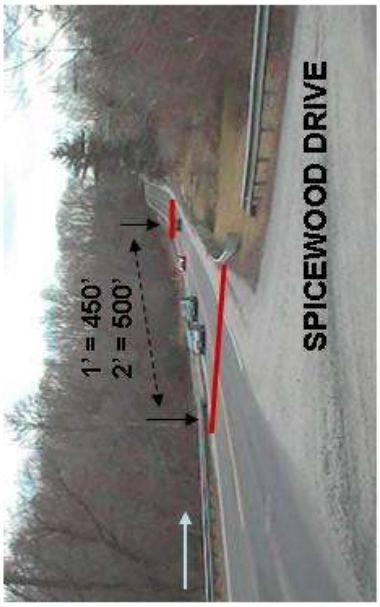
All personnel on scene will wear appropriate PFD prior to and during any actions near the water. No personnel will wear structural firefighting gear of any type including helmet and bunker gear (NO Structural Gear). This is in accordance with the FCFD SOP for Swift Water Emergencies.

- A safety zone will be established in the field (downstream river left) below Woodburn Road on Gallows Road side.
- This safety zone will need to be staffed by personnel with proper water rescue equipment i.e. line gun, rope bags, PFD's, etc.

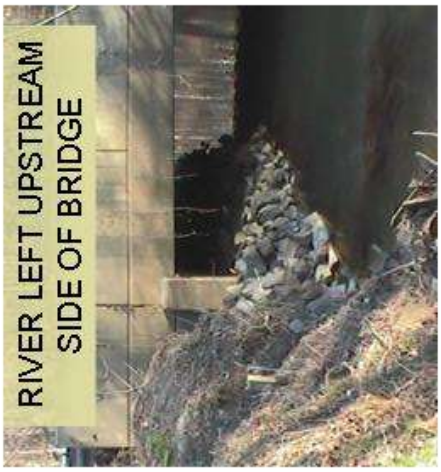

WOODBURN ROAD "FLOOD" PREPLAN
ACCOTINK CREEK
= Staging Areas
= Safety Zone
Gallows Road Division
Little River Division
GUNEVERE
BEVERLY
ROBEY
LANCELOT
DRUID
TRISTAN
MERLIN
KING ARTHUR
3535
3537
3538
SACKWOOD
BROWNING
WOODBURN
FROST
CHANDLER
MORNINGSIDE
WOODHILL
Aerial imagery © 2002 Commonwealth of Virginia © 2003 Fairfax County

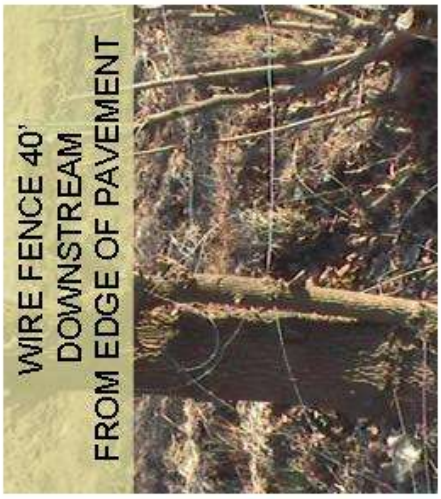
1' LEVEL ON WATER LEVEL SIGN = 450' OF ROAD COVERED BY WATER

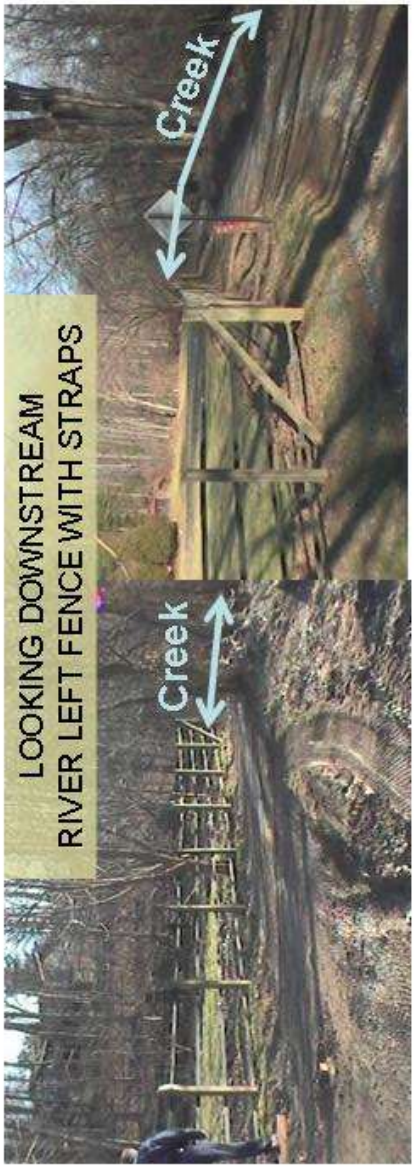
2' LEVEL = 500' OF ROAD COVERED BY WATER



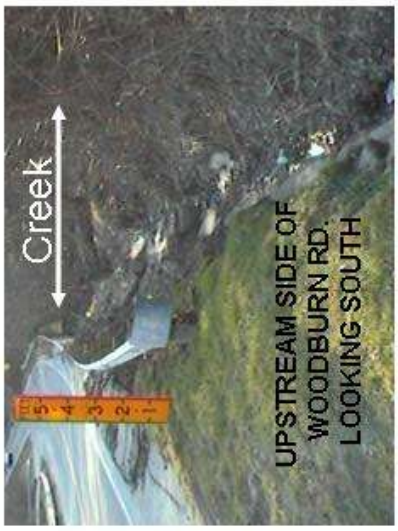
HAZARDS


RIVER LEFT UPSTREAM
SIDE OF BRIDGE


WIRE FENCE 40'
DOWNSTREAM
FROM EDGE OF PAVEMENT

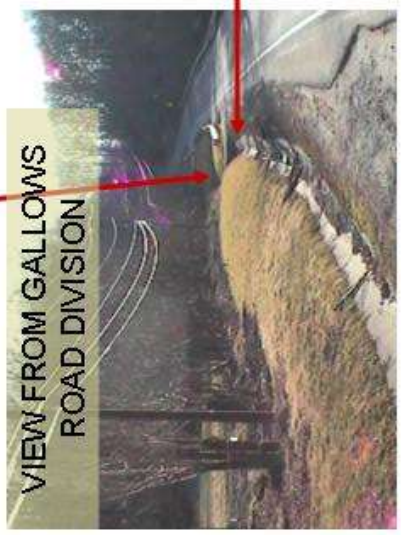

LOOKING DOWNSTREAM
RIVER LEFT FENCE WITH STRAPS
Creek
Creek

THE AREA


Creek
UPSTREAM SIDE OF WOODBURN RD. LOOKING SOUTH


2' – 4' DEEP DITCH ON DOWNSTREAM SIDE OF WOODBURN RD. (LOOKING TOWARD LITTLE RIVER DIV.)


Creek


VIEW FROM GALLOWS ROAD DIVISION