AUSTIN FIRE DEPARTMENT
FLOOD WATER
BOAT OPERATOR COURSE

Created: January 2020

Austin Fire Department Boat Operator Course
This Boat Operator Course was prepared by the Austin Fire Department Boat Curriculum Workgroup. The Workgroup created the curriculum April 2019 to January 2020. Portions of this material are the product of previous work done by technical rescue specialists in the years leading up to the organization of this document. The remainder of the material was the work of the committee members with input from various sources including members of the swiftwater rescue team and outside technical specialists.

Purpose
This curriculum is not meant to cover all methods acceptable for Boat Operations. The purpose is to standardize those methods taught during this course. All the learning material in this document are intended to cover the Knowledge, Skills, and Abilities (KSA) needed by rescuers at the Boat Operator Awareness, Operations and Technician level.

Scope
The organization of the knowledge, skills and abilities (KSA's) within this curriculum are designed to follow the Job Performance Requirements (JPR) outlined by the National Fire Protection Association (NFPA) 1006 – Standard for Technical Rescuer Professional Qualifications 2017 edition. Standardized organization following NFPA 1006 is intended to allow the rescuer's training to be consistent with other emergency response organizations. Each JPR will be accomplished by using techniques specified in this curriculum.

Instructor Obligation
It is the responsibility of all instructors delivering any part of this curriculum to cover all of the learning material covered in the lesson plans. No instructor has the authority to delete, omit, or otherwise leave out any content within the curriculum. Anyone assigned the task of covering any part of this curriculum should build his/her class in such a manner that optimizes instructor style while at the same time maximizing the learning for the students.

2019/20 Austin Fire Department Boat Operator Workgroup Members

Keith Brown
Matt McElearney
Chris Layton
Travis Maher
Ryan Arencibia
Duane Carter
Cody Perry
Steve Herrera
Tyrus Baker
Aidan Bradley
Brad Loggins
Chris Moren
Greg Reddish

Surface Water Rescue Swimmer Course
(Awareness, Operations & Technician)

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Rules of Engagement

1. Horseplay is **STRICTLY FORBIDDEN**, especially during any evolution.

2. The use of tobacco products around any equipment is not permitted.

3. PPE will be worn during all evolutions.

4. Report all equipment that is damaged or lost.

5. No equipment is to be used in an evolution unless an Instructor is present.

6. The word **"STOP"** will be used to stop all activity during an evolution. Any student or instructor may use this word. It is to be used when any unsafe action, potential problem, or an unsafe condition is observed.

7. "**ONE WHISTLE BLAST**" will be used for stop and attention for a message to be communicated.

8. "**TWO WHISTLE BLASTS**" will be used for look upstream or move upstream.

9. "**THREE WHISTLE BLASTS**" will be used for look downstream or move downstream.

10. **"THREE WHISTLE BLASTS REPEATED"**: I need help (similar to evacuating a burning building)

11. The words **"FOR REAL"** will be used to designate any problem, which is not part of an evolution.

12. When a **"FOR REAL or THREE WHISTLE BLASTS REPEATED"** situation occurs, the Instructors will take charge and are in command.

Flood Water & Swiftwater Defined

Flood Water is defined as:

- AFD Floodwater is defined as a lake or water moving **NO FASTER** than 3-4 mph or 3 knots (a brisk walk) and presenting with little or no hydraulic features.

- Class I Rapids, Moving water with riffles and small waves. Few obstructions, all obvious and easily missed with little training. Risk to swimmers is slight; self-rescue is easy.

Swiftwater is defined as:

- AFD Swiftwater is defined as water moving **FASTER** than 3-4 mph or 3 knots and presenting with significant water features.

- Class II and higher level of rapids, strong current with many hydraulic features such as larger standing waves and frequent obstructions that require advanced training. Risk to swimmers is high; self-rescue is moderate/difficult.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
NFPA Standards

NFPA 1006 JPR(s):
21.1.3

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:16 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the rescuer should be able to:

- Identify the three NFPA standards that pertain to technical rescue equipment, rescuers and rescue agencies.

NFPA Standards and the Rescue Technician

- It is important for Boat Operators to understand standards and how they apply to their work. There are three National Fire Protection Association (NFPA) standards that pertain to technical rescue:
  - **NFPA 1006**- Standard for Technical Rescuer Professional Qualifications
    - NFPA 1006 is the professional qualification document that details what knowledge, skills, and abilities (KSA's) individual rescuers need to know. It identifies job performance requirements (JPRs) for a variety of technical rescue environments including: rope rescue, confined space, water rescue, etc. The standard uses a training model called "Core + 1". What that means is that there is "Core" JPR(s) (Chapter 5) that all technical rescue personnel should be able to accomplish. These requirements are essential to *all* of the

specialty areas of the technical rescue field. Once the core skill set is mastered; the trainee will be qualified for advanced instruction in any of the specialty areas (ex. rope rescue, water rescue, structural collapse, confined space, etc.) to Level I or II.

- **NFPA 1670**- Standard on Operations and Training for Technical Search and Rescue Incidents

    - NFPA 1670 is a standard set up to identify response capabilities of an organization. A person cannot be trained to NFPA 1670. It is an organizational standard not meant to apply to an individual's training. Emergency response organizations should use 1670 to identify what level of capability they will offer with a given type of rescue. This standard identifies three organizational response capabilities:

        - **Awareness Level** is the minimum capabilities of first in units and provides information on how these individuals should react at a technical rescue incident. It must be stressed that this is not an operational function level.
        - **Operations Level** rescuers are trained to identify hazards, use equipment, and apply limited techniques in low angle or high angle rescues.
        - **Technician Level** rescuers meet all of the requirements of the above plus apply more advanced techniques, coordinate, perform, and supervise technical rescues.

    NFPA 1670 also identifies the need for standard operating procedures, preplanning, the need to provide training to rescuers, etc.

- **NFPA 1983**- Standard on Life Safety Rope and Equipment for Emergency Services
    - NFPA 1983 is a manufacturer's standard specifying design and performance requirements for equipment typically used at technical rescue incident. It is important to understand that this standard specifically states it is not a user's standard dictating use requirements. This standard identifies testing procedures and minimum performance requirements required to be NFPA compliant. This does not mean rescuers are required only to use equipment that is NFPA compliant. A limited amount of equipment used in water rescue will be available with an NFPA certification.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Local & Federal Notifications

NFPA 1006 JPR(s):
21.1.1, 21.2.4

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:16 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the student shall be able to:

- Have the basic knowledge on notifying local and federal entities for the following:
  - Boating accidents
  - Boating navigational hazards
  - Hazardous materials and Sewage releases

Introduction:
There are various situations in which the Boat Operator will need to report certain conditions found.

- **Boating Accidents**
  - **Stop and Render Aid**

- The operator of any vessel involved in a boating accident must stop and render whatever assistance is necessary unless such action would endanger his/her own vessel, crew or passengers. The operator must give his/her name, address and vessel identification number in writing to any injured person and to the owner of any damaged property. Failure to do so in an accident that results in death or serious bodily injury is a Parks and Wildlife Code felony. Failure to do so in an accident that does not result in death or serious bodily injury is a Parks and Wildlife Class A misdemeanor.

➢ **Accidents and Casualties**

- Operators of any vessel must report accidents and casualties to a local law enforcement agency or to the Texas Parks and Wildlife Department within 30 days of the occurrence (48 hours if a fatality occurs) if the collision, accident or casualty resulted in:
  - Death (or missing person); or
  - Injury (requiring treatment beyond first aid) to any person; or
  - Property damage exceeding $2,000.

➢ According to Texas Parks & Wildlife Department a boating accident must be reported on or before the expiration of 30 days after the incident. The report should include a full description of the collision, accident, or casualty in accordance with regulations established by the department.

It is the responsibility of each boat operator who is involved in an accident to contact TPWD or your nearest law enforcement agency if the accident:

- Results in death; (within 48 hours) or
- Injuries to a person requiring medical treatment beyond first aid; or
- Causes damage to vessel(s) or property in excess of $2000.00

❖ **Waterway navigational hazards**

➢ Boating hazards identified should be reported to Texas Parks & Wildlife Department so they can be removed or marked.

➢ A buoy/marker with a diamond shape represents a danger to boaters, such as stumps, rocks, hazards, or shallow areas.

- **Hazardous Material and Sewage Release**

  - Notify Texas Commission on Environmental Quality (TCEQ) as soon as possible and no later than 24 hours after the occurrence. Austin Watershed Protection needs to be notified for spills or releases on waterways in the city limits of Austin.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Boat Types, Terminology & Identification

NFPA 1006 JPR(s):
21.2.1, 21.2.2, 21.2.5

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:16 Instructor to Student Ratio (Classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the student shall be able to:

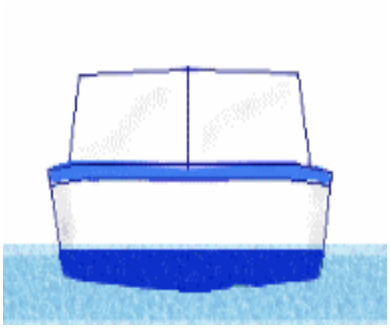
- Discuss different types of hulls/boats
- Identify parts of a boat
- Be familiar with common boat terminology
- Navigation identification

Introduction:
As a Boat Operator you should be familiar with different types of boats you may operate as well as types you may provide assistance.

Two Types of Boat Hulls

- **Displacement**

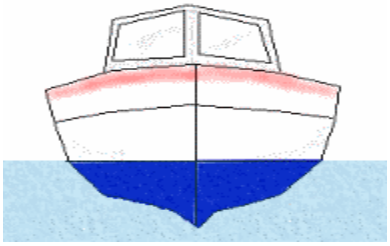
  - Flat bottom boat (displacement)



Flat bottom boats have a shallow draft. They can get up on plane easily but unless the water surface is perfectly calm they tend to give a rough ride because of the flat bottom pounding on each wave. They also tend to be less stable and require careful balancing of crew.

Examples of flat bottom boats are Jon boats, small utility boats, and some high-speed runabouts.

- Round bottom boat (displacement)

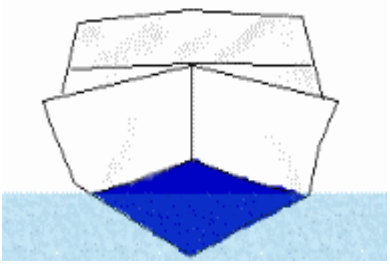


These move easily through the water, especially at slow speeds. They do, however, tend to roll unless they are outfitted with a deep keel or stabilizers.

Sailboats and Canoes have round bottoms.

- **Planing**

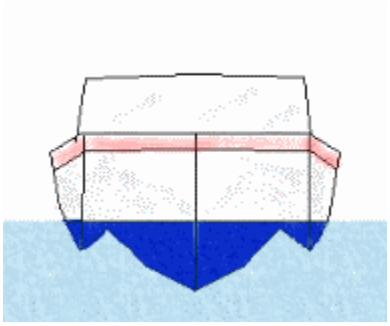
- Deep V bottom boat (planing)



The deep V bottom boat has a sharper entry into the water that provides for a smoother ride in rough water. They do, however, require more power to achieve the same speed.

Many runabouts use the deep V bottom design.

- Multi-hull boat or Cathedral (planing)



Pontoon boats, catamarans and some houseboats carry the multi-hull or cathedral design. The wide stance provides greater stability.

Each of the hulls may carry any of the bottom designs described above.

➢ **Austin Fire Department Spec Ops Boat**

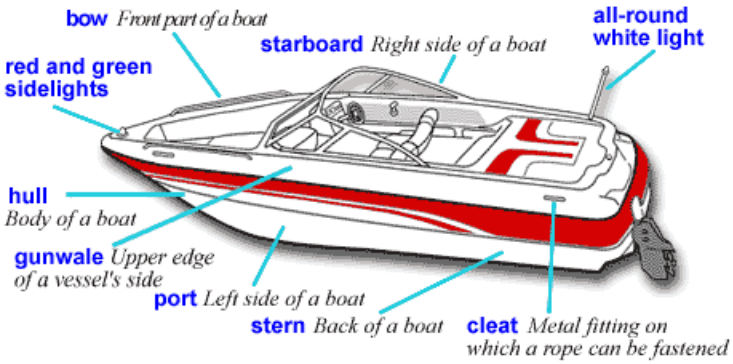
- Zodiac FC 420

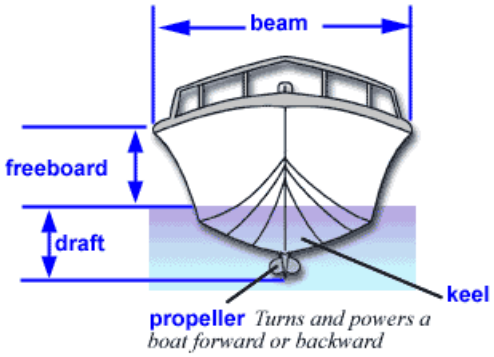
SIZE SPECIFICATIONS	FC420
Overall length	4.20 m / 13’9”
Weight (empty)	265 lbs.
CAPACITY	
Maximum payload	1918 lbs.
Number of persons	6
ENGINE	
Recommended power	40 HP
HULL SHAPE	FUTURA
FLOOR	Roll-up/Rigid

- **AFD's Outboard motor**
    - EVINRUDE E-TEC ENGINE BASIC SPECIFICATIONS

Engine:	Inline 2-Cylinder E-TEC D.I.
RPM range:	5500-6000 RPM
Weight:	232 lbs.
Shaft length:	15 in. (short shaft)
Oil tank capacity:	2 Quarts
Recommended Oil:	Evinrude/Johnson XD-100
Recommended Fuel:	87 Octane

- **Boat Terminiology**

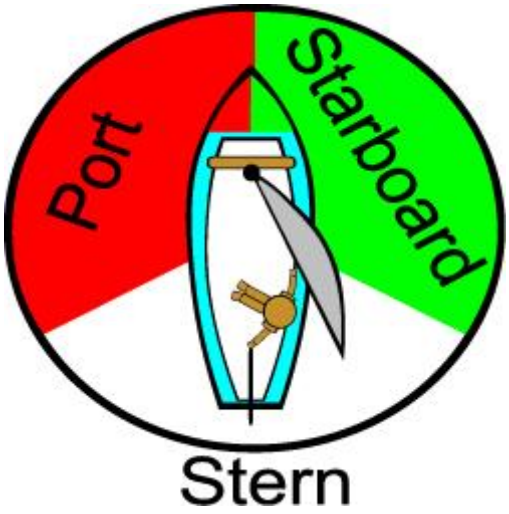




BOW

STERN

RED LIGHT



GREEN LIGHT

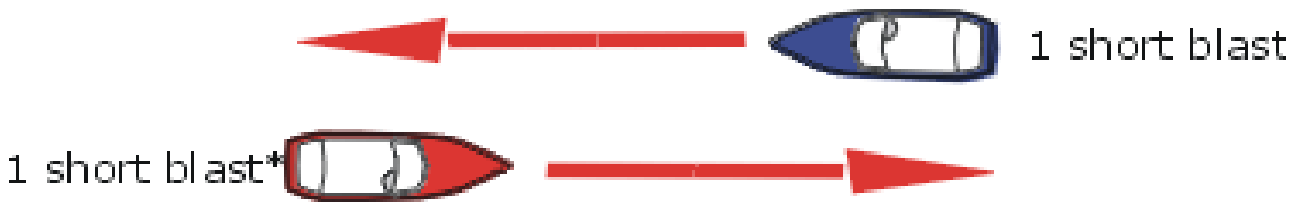
WHITE LIGHT

- Ways to remember terminology and colors:
  - The letter "P" (for Port) is always left of the letter "S" (for Starboard) in the alphabet.
  - "Port" and "Left" are both 4-letter words ending in T
  - The old saying “No red port left”

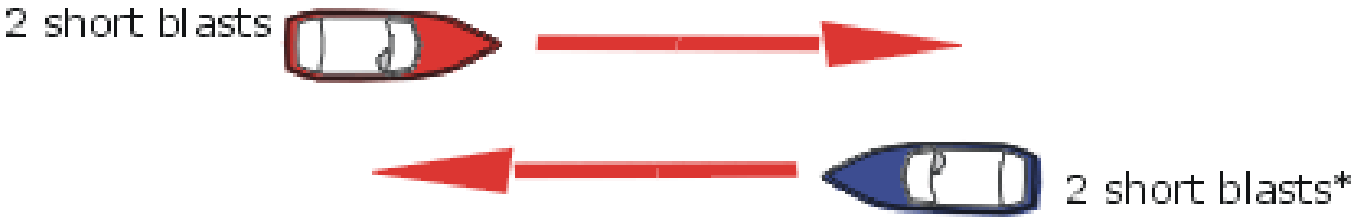
- **Crossing Situations**
  - When two power driven boats are approaching at right angles or nearly so, the risk of collision exists, the boat on the right will see green and is the stand-on vessel and must hold its course and speed. The other boat, the give-way vessel will see red and shall maneuver to keep clear of the stand-on vessel and shall pass it by its stern. If necessary, slow, stop or reverse until the stand-on vessel is clear.

- In the example above, the left vessel is the give-way vessel and should alter course and speed to pass behind the right vessel. If the skipper of the stand-on vessel does not observe the give-way vessel taking action to avoid collision, then he/she must take the required action to avoid a collision.

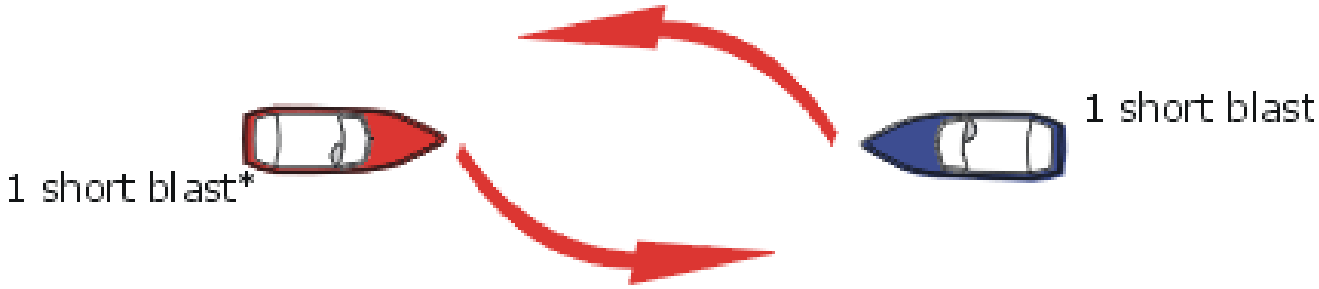
- **Passing Port to Port**



- **Passing Starboard to Starboard**



- **Meeting head to Head**



- **Navigation Identification**

Controlled Area
Type of control is indicated in the circle, such as slow, no wake, anchoring, etc.

Boat Exclusion Area

Explanation may be placed outside the crossed diamond shape, such as dam, rapids, swim area, etc.

Danger

The nature of danger may be indicated inside the diamond shape, such as rock, wreck, shoal, dam, etc.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Anchoring & Tying Off

NFPA 1006 JPR(s):
21.2.11, 21.3.6

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:16 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the student shall be able to:

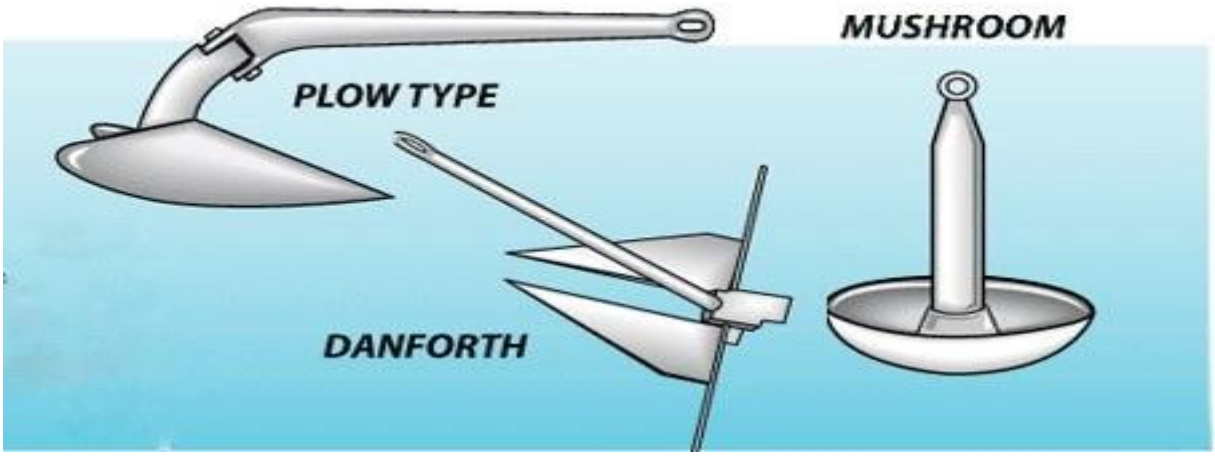
- Properly anchor stranded vessels
- Properly tie off boat to dock and other vessels

Introduction:
There are times when Boat Operators will be called to assist stranded vessels. As a Boat Operator it is important to understand the proper way to deploy and retrieve different types of anchors. Different methods for tying off to docks and other boats will also be discussed.

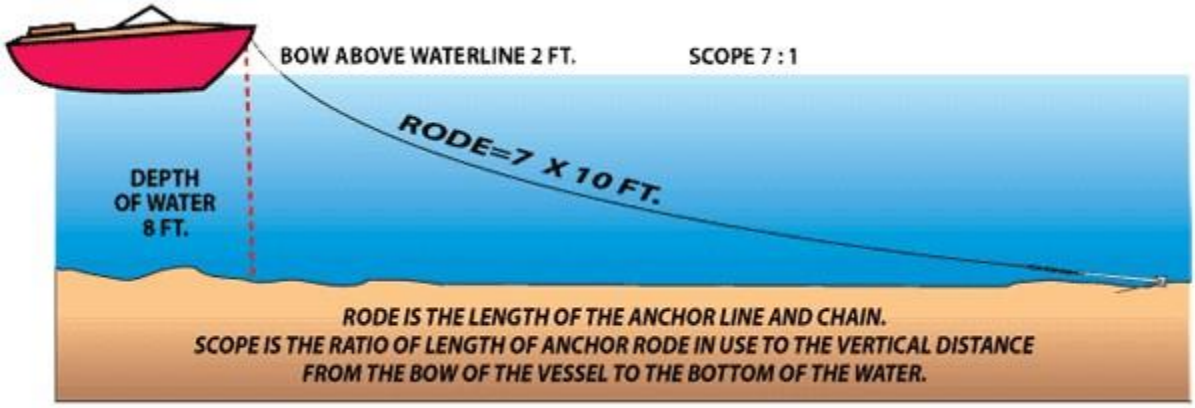
Anchoring

- As a Boat Operator it is important to understand the proper way to deploy and retrieve different types of anchors. The boat you are assisting may have mechanical problems, caught in bad weather or drifting toward a dam or other object.

- There is no single anchor design that is best in all conditions. The 3 types of anchors you will find aboard most boats are the Plow type, the Danforth/Fluke type and the Mushroom anchor.



- Mushroom anchors do not have the holding power of a Danforth/Fluke or Plow anchor and should only be used on small, lighter weight boats and PWC.
- Anchors also must have something to attach them to the boat. This is called the anchor rode and may consist of line, chain or a combination of both.
- The amount of rode that you have out depends generally on water depth and weather conditions. The deeper the water and the more severe the weather, the more rode you will put out. At a minimum you should have out 5-7 times the depth of the water plus the distance from the water to where the anchor will attach to the bow.



In the example above, if you estimate the water depth and it shows 8 feet and it is 2 feet from the top of the water to your bow cleat, you would multiply 7 by 10 feet to get the amount of rode to put out. Here, you would need to let out 70 ft.

Setting the Anchor

- Pick a spot with swinging room in all directions. Should the wind change, your boat will swing bow to the wind or current, whichever is stronger.
- Cleat off the anchor line at the point you want it to stop.
- Stop your boat and lower your anchor until it lies on the bottom. Slowly start to motor or drift back.
- When all the anchor line has been let out, if possible, back down on the anchor with engine in reverse to help set the anchor.
- While reversing on a set anchor, keep a hand on the anchor line. A dragging anchor will shake as it drags along the bottom. An anchor that is set will not shake the line.

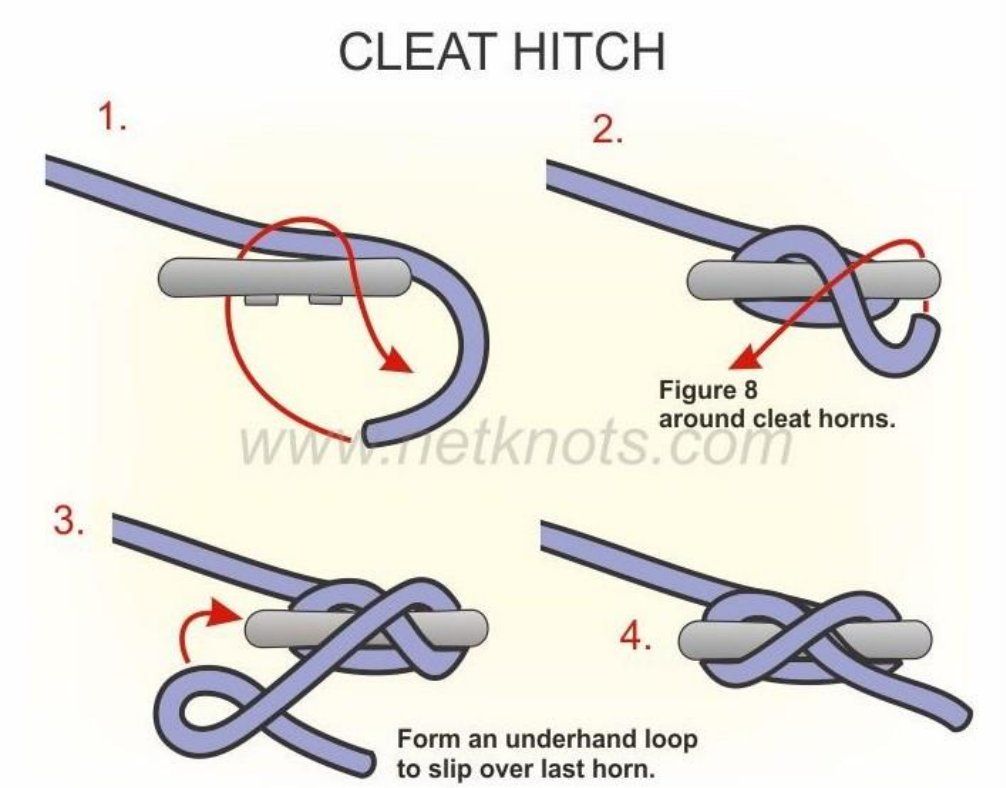
Retrieving the Anchor

- Retrieve the anchor by pulling or powering forward slowly until the anchor rode hangs vertically at the bow.
- Cleat the line as the boat moves slowly past the vertical. This will use the weight of the boat to free the anchor and prevent the rope from slipping through your hands or from being dragged over the bow of the boat.
- Once the anchor is free from the bottom, raise the anchor.
- **Never anchor from the stern alone, this could cause the boat to swamp or capsize.**

Cleat Hitch

- In order to secure the boat to a dock or secure a line to the boat, you can use the cleat hitch. Take the line to the ear of the cleat farthest from where the line comes from (the load). Take one wrap around the base of the cleat and then start a figure eight across the top of the opposite ear. Finish with a half hitch turned

under so that the line is coming away from the cleat in the opposite direction from which it came in from.



Tying off Zodiac boats in the water

- Zodiacs can be secured in the water utilizing the bow line and securing it to another object such as a tree or post. If the bow line will not reach, another rope may be utilized and secured to the D rings located on the exterior of the boat. Another acceptable method is to secure the boat to another boat that is tied off to an object.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Ground Support for Helicopter Activities

NFPA 1006 JPR(s):
21.1.5

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:16 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the student shall be able to:

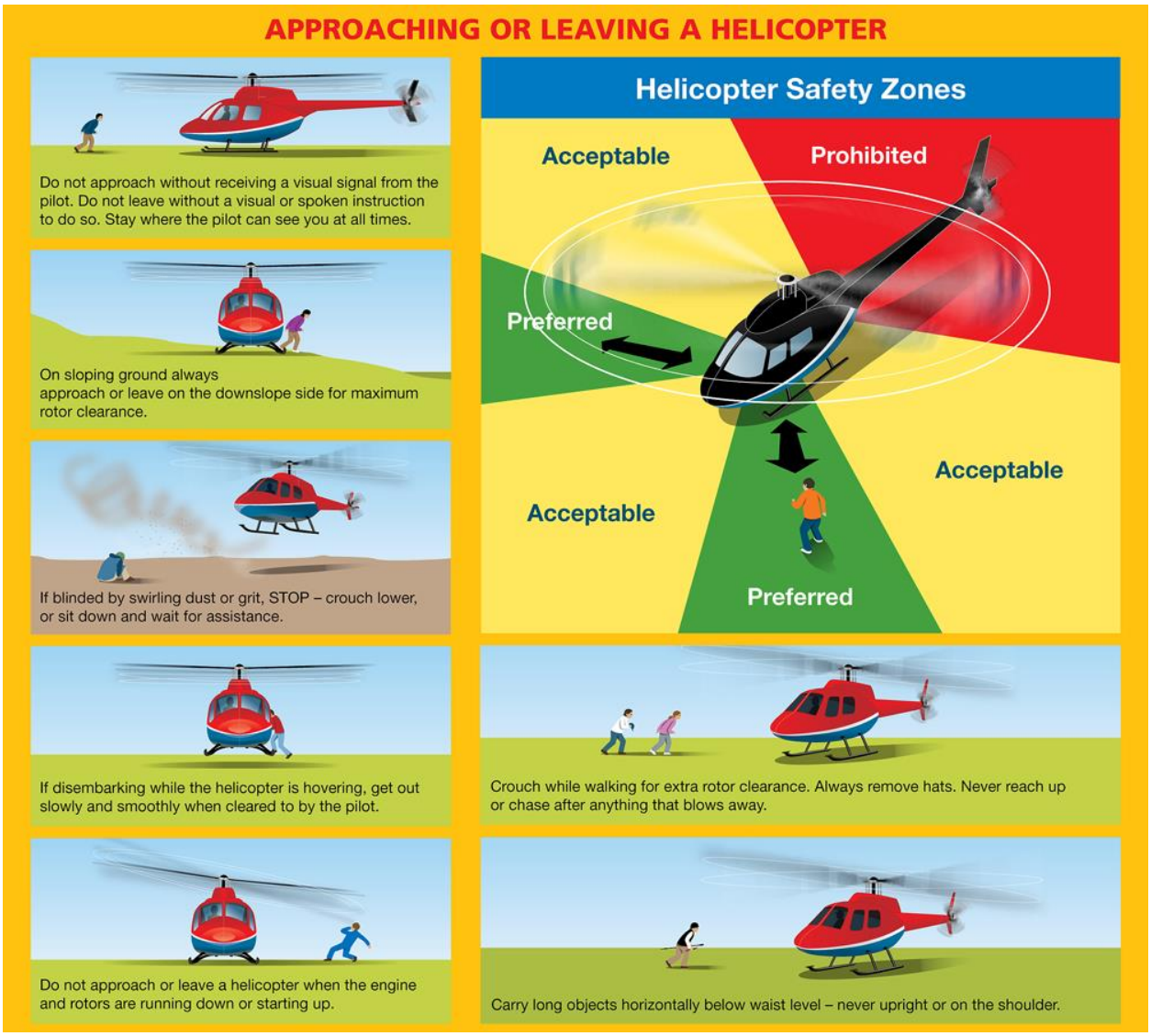
- Understand the rescue capabilities/limitations of helicopters during our rescue efforts
- Perform safety cross checks on helicopter rescue swimmers on extraction
- Apply safety procedures around helicopters
- Understand landing zone safety procedures and requirements

Introduction:
There are times when Boat Operators will directly or indirectly interact with helicopters during water rescue calls. Our goal is to work with the helicopter rescue swimmers in a way that is efficient and also safe for all. ATCEMS procedures provide for STAR FLIGHT response on a Medical Alarm to any area that would be outside a 20-minute response territory for ground ambulances. Other agencies outside of Travis County also use STAR FLIGHT.

General Safety Information:

- STAR FLIGHTS main rotor is approximately 11 feet off the ground and does not flex.
- STAR FLIGHTS tail rotor is 6 ½ off the ground and cannot be seen when turning.

- ALWAYS approach/depart a helicopter from the front, if possible. Never approach the helicopter unless you receive prior permission from the pilot or crew chief.
- ALWAYS approach/depart the helicopter from the downhill side to avoid the main rotors.
- NEVER approach/depart from the uphill side of an aircraft



Landing Zone information:

- 75’ X 75’ minimum landing area
- Level Terrain when possible
- Free of overhead hazards such as trees and electrical wires

- Clear of loose objects or debris
- During nighttime landings
    - Point head lights/scene lights at landing zone
    - Cyalume sticks work well to mark corners
    - Have drivers ready to turn off overhead lights on final approach

Water Rescue Operations:

- 1 option for in water rescue
    - STROP
        - Cinches around victim
        - Includes crotch strap
        - Hoists directly into the cabin

How we can assist

- Hook retrieval
- Safety Checks
  - Before they say “ready for extrication” we can check that the STROP hoist hook is closed and locked
  - STROP webbing is not twisted.
  - Once the rescuer is loaded and 5 feet off the ground they will put both arms out with thumbs up to verify proper attachment.

Nevers in the helicopter world:

- NEVER approach helicopter without prior approval.
- NEVER go near the tail rotor.
- NEVER approach from the uphill side.
- Starflight will NEVER deploy or retrieve directly from a vessel.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Rescue Philosophy

NFPA 1006 JPR(s):
21.1.6

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Identify the primary priority of Watercraft Rescue Training.
- Explain what legal issues may arise from performing a rescue.
- Give a basic description of search operations
- Explain the Low to High Risk methodology of watercraft rescues.
- Implement the components leading to the development of successful judgment and those leading to a successful rescue

Introduction:

Watercraft rescue, especially in moving water, is inherently dangerous. Even without any medical concerns or injuries the victim may present, just making access is an undertaking that can involve a large number of personnel and requires in-depth knowledge of the subject matter. Understanding the priorities in Watercraft rescue and the responsibility for oneself, one's team and the victim is only the beginning of the very involved process in becoming proficient in this discipline

Identify the primary priority of Watercraft Rescue Training

- Self-rescue #1 priority
  - Crux of the class
  - Most important information in class
  - Hydrology
  - Reading the river
  - Personal experience in water

- Safety of team members is the #2 priority
- Don't attempt rescue unless assured of the first two
- Is it okay not to attempt a rescue?

Explain what legal issues may arise from performing a rescue.

- Maintain a training record
  - Legal Protection

- Assuming a mantle of professionalism
  - Difference between volunteer and professional
  - Duty vs. moral obligation

- Negligence / Malpractice
  - Duty to act
  - Breach of duty
  - Injury must have occurred
  - Proximate cause
  - Standard of Care
  - Reasonable prudent person

- Don't lose them again
  - Losing victim contact (abandonment)
  - Maintain physical contact

- Search and Rescue (SAR)
  - LAST
    - Locate
    - Access
    - Stabilize
    - Transport

- SAR Fundamentals
  - Witness (reporting party) interview
  - Point Last Seen (PLS)
  - Containment
  - Probability of Detection (POD), Probability of Area (POA)
  - Hasty search

Explain the Low to High Risk methodology of swiftwater rescues

- Low to High Risk rescue options
  - Talk, Reach, Throw, Row, Go-tow, Helo
  - Play to the group's strengths

Colored Cells are the Risk Categories	Low Risk	Medium Risk	High Risk

Frequency of Scenario	Severity of Consequences		
	Low Severity	Medium Severity	High Severity
High Frequency	Medium	High	High
Medium Frequency	Low	Medium	High
Low Frequency	Low	Low	Medium

Implement the components leading to the development of successful judgment and those leading to a successful rescue

- Elements of a successful rescue
  - Training, practice, experience, judgment
  - Successful rescuers need all four
  - Instructors only provide the first

- Practice-Practice-Practice and MORE Practice is essential
  - Information half-life is 6 months
  - Practice breeds experience
  - Take classes in different locations
  - Make practice realistic

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Course Topic:
Communication

NFPA 1006 JPR(s):
21.1.3, 21.2.3

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:16 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
- At the end of this lesson, the rescuer should be able to:
- List different communication mediums in the swiftwater rescue environment.
- Explain the hand and audible signals commonly used in swiftwater rescues.
- List ways that rescuers can be located and tracked after dark

Introduction:
A Watercraft rescue incident scene can have multiple communication barriers. These barriers can range from environmental (background noise from apparatus, people, weather, moving water) to visibility (darkness, distance) and natural (geographic features, heavily wooded areas). Rescuers and rescue teams should have alternate forms of communication with each other in order to successfully complete tasks.

Types of communication

- Radios
  - Portables (handheld)
  - Mobiles (vehicle / Base)
  - Cellular telephones
  - Protection- Dry bags

- Signals/Tracking
  - Audible
  - Voice
  - Whistle
  - Air horn

- Visual
  - Hand & arm
  - Lights
  - Chemical light sticks 2 colors—1 for rescuers (green), 1 for victim (red)
  - Strobe

Commonly used signals

- Hand Signals
  - One arm in the air: I need a rope
  - Two arms in the air: I need help
  - Hand placed on top of head: I am Okay
  - Arms held in a circle above head: I need medical attention

- Audio Signals/Horn blasts
  - One blast: Attention or Stop
  - Two blasts: Attention/Look UP stream
  - Three blasts: Attention/Look DOWN stream
  - Three blasts repeated: I need help (similar to evacuating a burning building)

Ways rescuers can be located/tracked after dark

- Visual
- Lights and Reflective tape
- Chemical light sticks
- Strobes
- Marking tape
- Audible
- Whistles

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Personal Protective Equipment

NFPA 1006 JPR(s):
21.1.6, 21.1.7

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Select proper PPE for operating on a zodiac boat
- Explain how to properly don PPE for the flood/swiftwater environment

Introduction:
Choosing and wearing the correct PPE while operating a boat is important for safety and performance.

Select proper PPE for the swiftwater environment

- Personal Flotation Device (PFD)
  - Coast Guard Type V
  - Live Bait Tether
  - 22 pounds of Flotation
  - Wear it like you expect to be in the water

- Helmet
  - Use only those approved for whitewater
  - No “fixed” or wide brim
  - Drains water well (no “bucketing” as per NFPA)

- Thermal protection
  - Wetsuits
    - Used ONLY in floodwater/rescue swimmer situations
    - Good thermal / Trauma protection
    - Restrictive
    - Allows water to contact the skin directly (haz-mat issues)
    - Requires proper size for optimal thermal protection

  - Drysuit
    - MUST be worn in swiftwater conditions due to hazmat issues
    - Excellent thermal protection if insulation worn underneath
    - Works in a variety of water temperatures
    - Impervious to weather, rain, wind, etc.
    - Protects skin from direct contact with water
    - Doesn't have the trauma protection of wetsuit

- Footwear
    - Trauma protection
    - Thermal protection

- Gloves
    - Trauma protection
    - Limited thermal protection

- Knife
    - Should be sharp on both sides
    - Secure sheath system

- Whistle
    - Necessary for communication
    - Pea less

- Fins
    - More efficient swimmer

- Lights
    - Should have two sources of light
    - Headlamp, waterproof flashlight is best combination
    - Chemical lights

- Evinrude kill switch
    - Each boat team member should have an extra clipped on their PFD

- Radio holster
    - Each member should have radio in holster and attached to their PFD or Boat

- Prusik Loop and AMD carabiner

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Decontamination

NFPA 1006 JPR(s):
21.1.2

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Identify contamination hazards found in flood water
- Describe the decontamination procedures when exposed to flood water
- Identify symptoms of exposure to flood water contaminates

Introduction:

Direct exposure to the water environment increases the risk of contracting bacterial, viral and protozoal diseases. The water environment may be contaminated with both sewage and decaying animal or human remains. The signs and symptoms experienced by the victims of waterborne microorganisms are similar, even though they are caused by different pathogens. These symptoms include nausea, vomiting, diarrhea, abdominal cramps, muscle aches and fever.

Floodwaters also may be contaminated by agricultural or industrial chemicals or by hazardous agents present at flooded hazardous waste sites. Although different chemicals cause different health effects, the signs and symptoms most frequently associated with chemical poisoning are headaches, skin rashes, dizziness, nausea, excitability, weakness and fatigue.

If a boat operator experiences any of the signs or symptoms listed above, appropriate first-aid treatment and medical advice should be sought. Wounds that are associated with a flood should be evaluated for risk; a physician may recommend a tetanus immunization.

Procedures:

Disinfection/decontamination of contaminated skin, clothing, rescue equipment and surfaces is critical in disease prevention. A gross decontamination of the skin and PPE using high flow/low pressure clean water immediately upon exiting the water is recommended. Then a 1% household bleach solution when Special Operations Decontamination kits arrive on scene. Dry suits may be washed in a non-agitating washing machine. Follow manufacture's recommendations.

Decon Kit Contents:

1" Hose NPSH

Task Force Tip Twister Nozzle

2.5NH x 1.5NH Adapter

1.5NH x 1NPSH Adapter

Pump sprayer


HUSKY
HDX
DAWN

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Hydrology

NFPA 1006 JPR(s):
21.1.2

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the student shall be able to:

- Have a basic knowledge of hydrology as it is encountered during a moving water event:
  - Accurately describe the force of moving water in terms of pressure against fixed objects and people
  - Accurately compute current velocity with appropriate information
  - Define Laminar Flow
  - Define Helical Flow
  - Describe Top Load
  - Describe Suspended Load
  - Describe Bottom Load
  - Describe physical features of hydrology.

Introduction:
In a moving water environment, it is important to understand the dynamics in this environment as well as the hydrology. This knowledge not only assists with victim location and rescue but also self-preservation if necessary.

Class 1 (Easy): Fast-moving current with small waves and few obstructions that are easily avoided. Low-risk. Easy self-rescue.

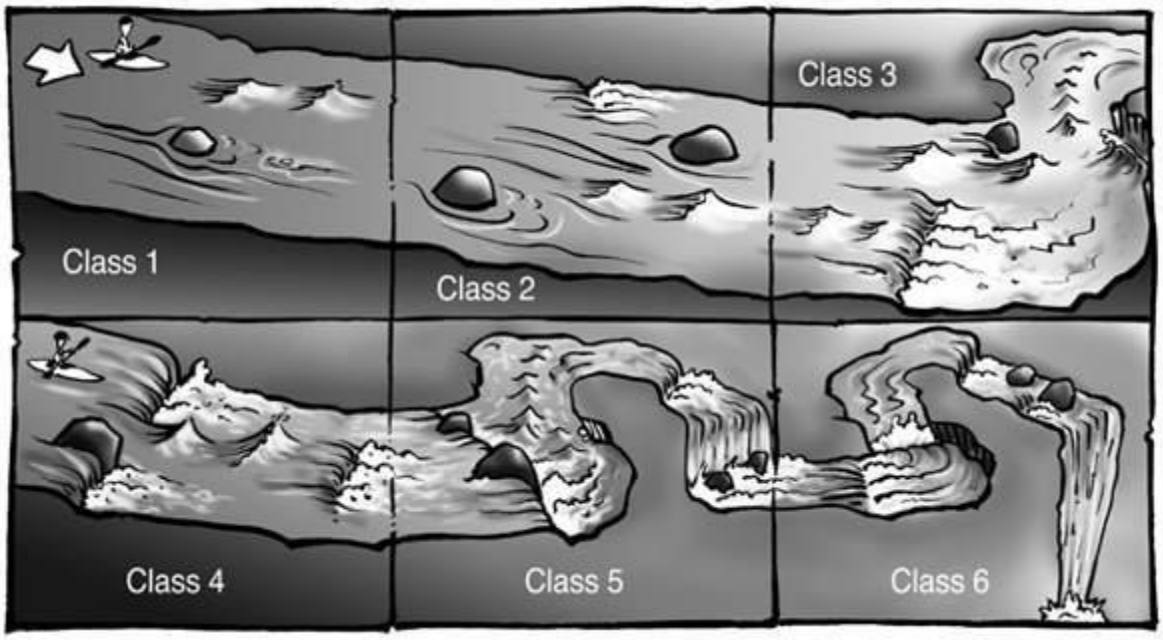
Class 2 (Novice): Straightforward rapids with wide-open channels that are evident without scouting. Occasional maneuvering is required. Trained paddlers will easily avoid any rocks or medium-sized waves. Swimmers are seldom injured.

Class 3 (Intermediate): Rapids with moderate, irregular waves, strong eddies and currents. Complex maneuvers and good boat control are required. Major hazards are easily avoided. Scouting is recommended for inexperienced paddlers. Self-rescue is usually easy and injuries to swimmers are rare.

Class 4 (Advanced): Powerful, turbulent, and predictable rapids with large, unavoidable waves and holes or constricted passages. Fast and reliable eddy turns and precise boat handling are needed to navigate safely through. Scouting is necessary, and rapids may require "must-make" moves above dangerous hazards. Strong Eskimo roll highly recommended, as there is a moderate to high risk of injury to swimmers. Self-rescue is difficult, so skilled group assistance often needed.

Class 5 (Expert): Extremely long, obstructed, or violent rapids with exposure to substantial risk. Expect large, unavoidable waves and holes, or steep, congested chutes. Eddies may be small, turbulent, difficult to reach, or non-existent. Reliable Eskimo roll, proper equipment, extensive experience, high level of fitness and practiced rescue skills essential for survival. Scouting highly recommended, but may be difficult. Swims are very dangerous and rescues are difficult.

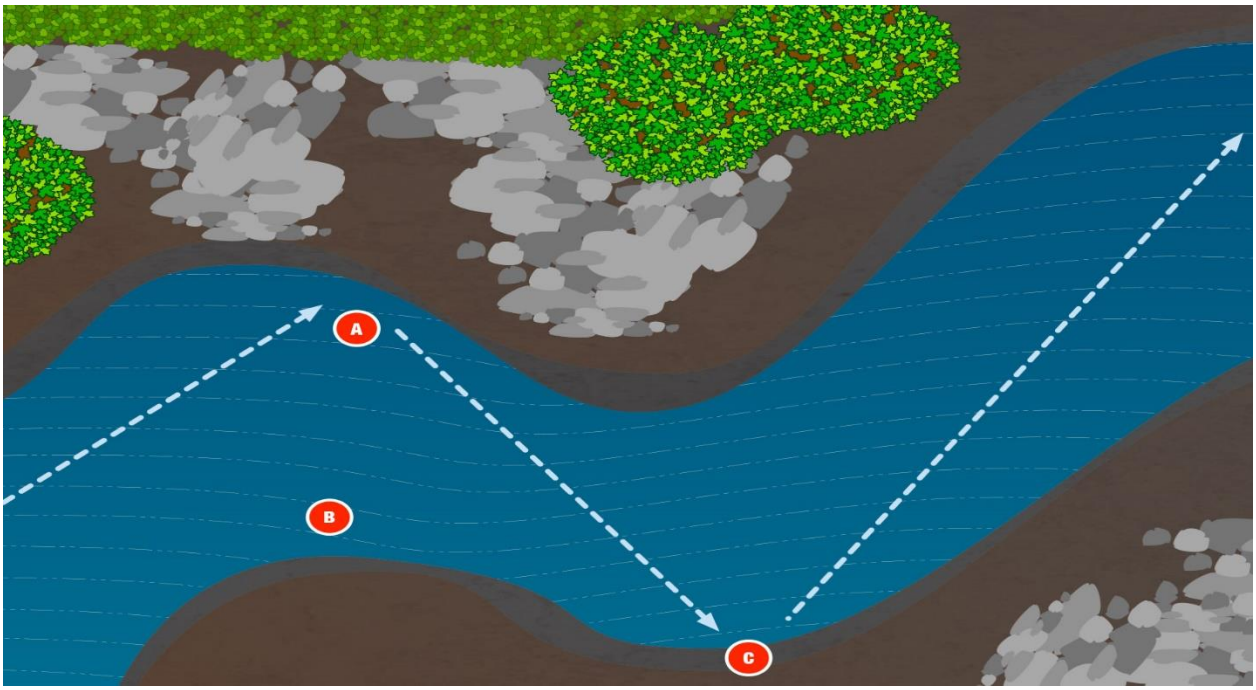
Class 6 (Extreme): These runs exemplify the boundaries of difficulty, unpredictability and danger, and have almost never been attempted, if ever. The consequences of errors are very severe and rescue may be impossible. Only expert teams with ideal conditions and extensive safety systems should ever consider these rapids.



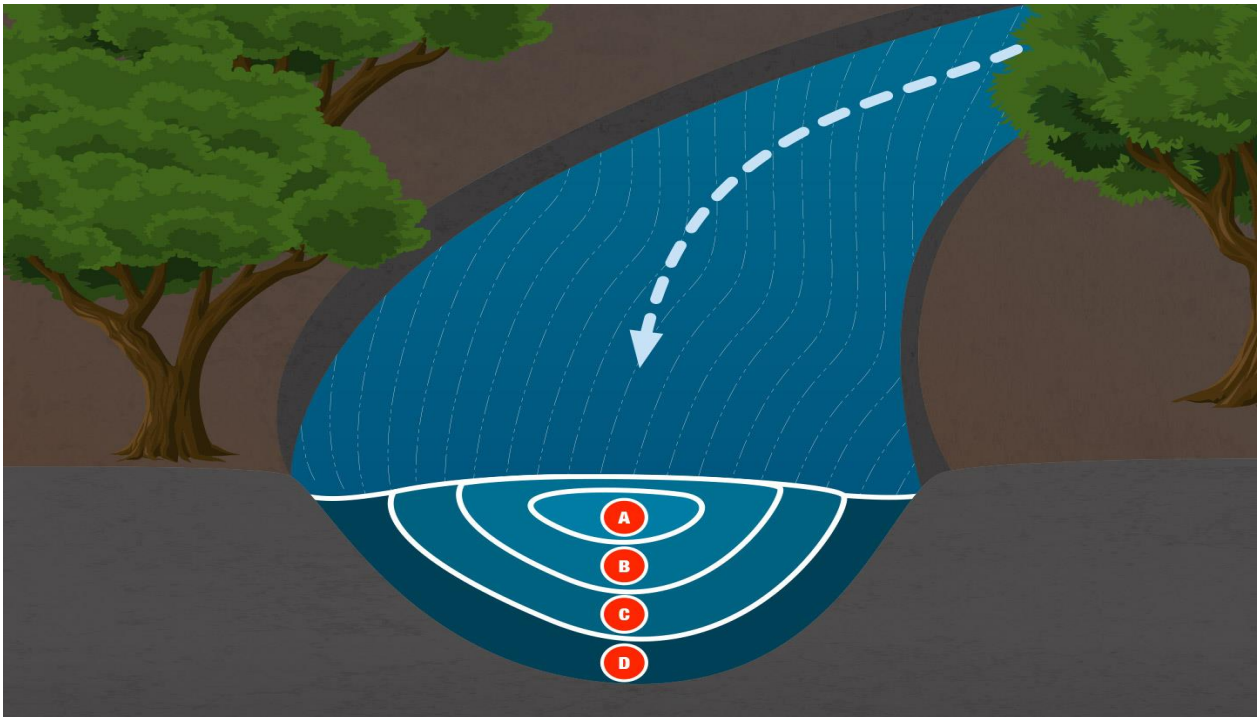
- Power of moving water
  - Speed Doubles / Force Quadruples
  - Weight of water - 8.33 lbs./gal / 62.2 lbs./ft3
  - Estimating current velocity - The speed, or velocity, of water is measured in feet per second. The velocity of swift water can be determined by measuring the time it takes for an object to float a specified distance down the river, and then dividing that time into the distance. For example, if it takes this object 20 seconds to travel 100 feet, the velocity would be 5 ft./sec, which is equal to 3.4mph.
  - Water pressure on fixed objects
  - Water volume/flow - Velocity is important for the technical rescue team to determine the volume of water flowing. To do that, multiply the width by the depth by the velocity in ft./sec. For example, if a wash is 100 feet wide and 4 feet deep flowing at 5 ft./sec, then 100 × 4 × 5 = 2,000 cubic feet of water per second. One cfs is equal to about 450gpm.

- Swift water terminology
  - Upstream – Direction from where the water is flowing
  - Downstream – Direction water is flowing to.
  - River Left – Left side of water way when facing downstream
  - River Right – right side of waterway when facing downstream

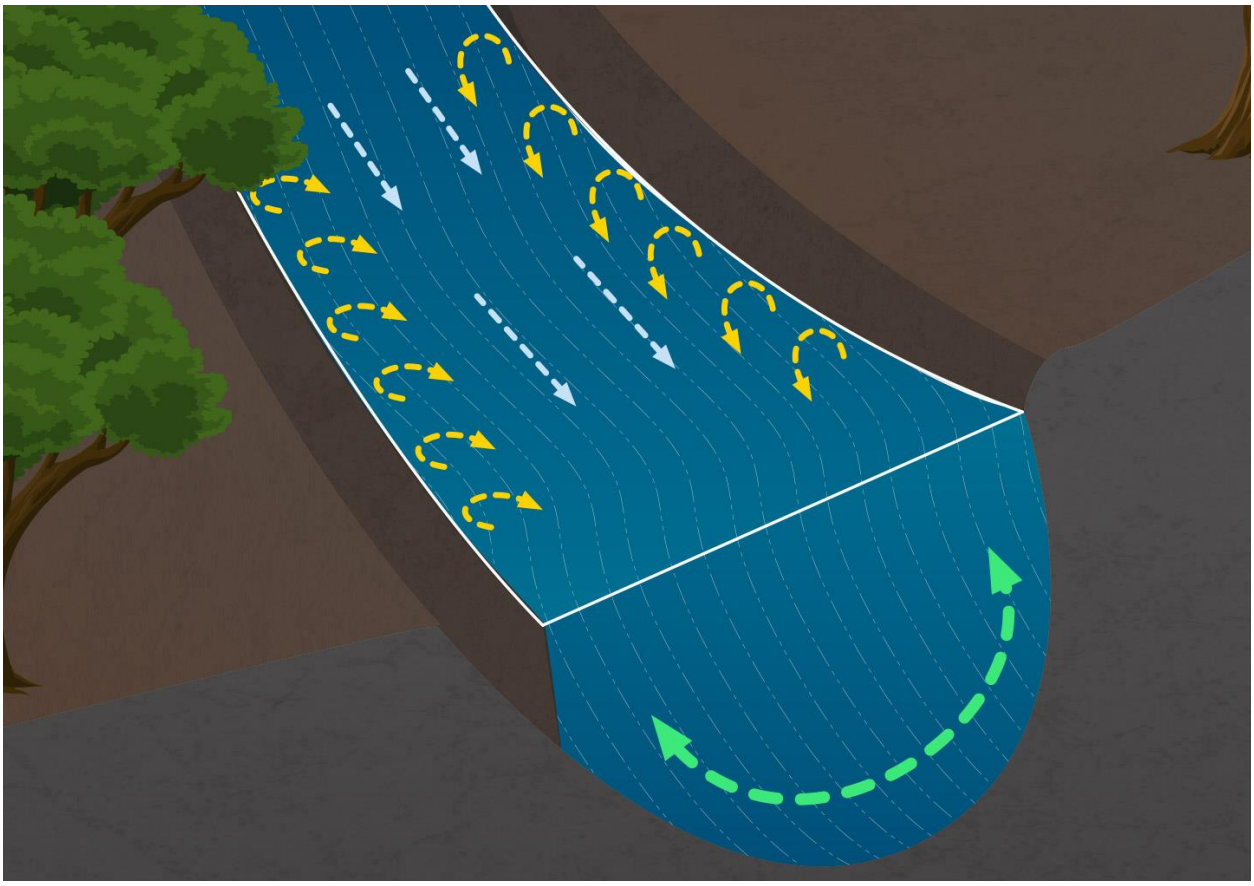
- Current Vector - the direction the current is flowing that does not necessarily follow the direction of the banks.



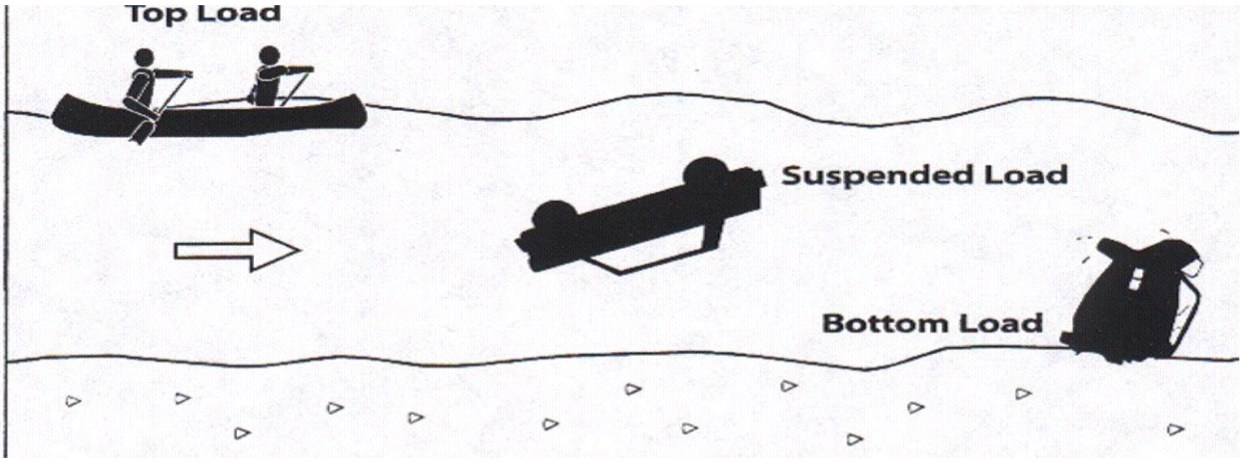
- Laminar flow - Layered flow of water that is slower on the bottom and faster toward the top.



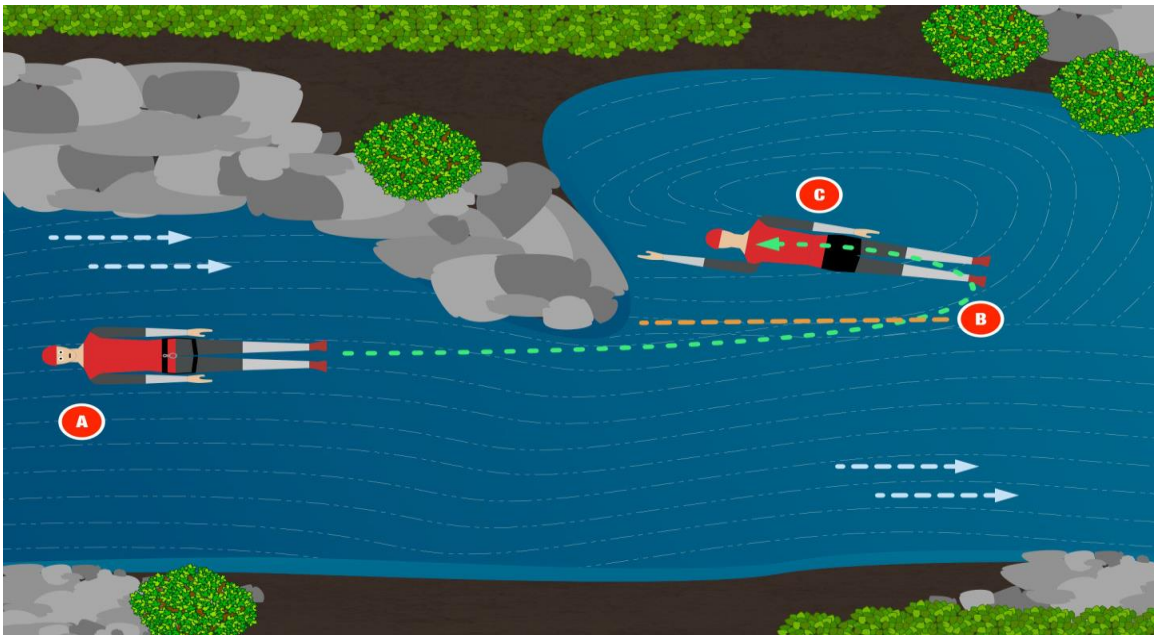
- Helical flow - Circular action of water at the banks caused by friction that forces water midstream.



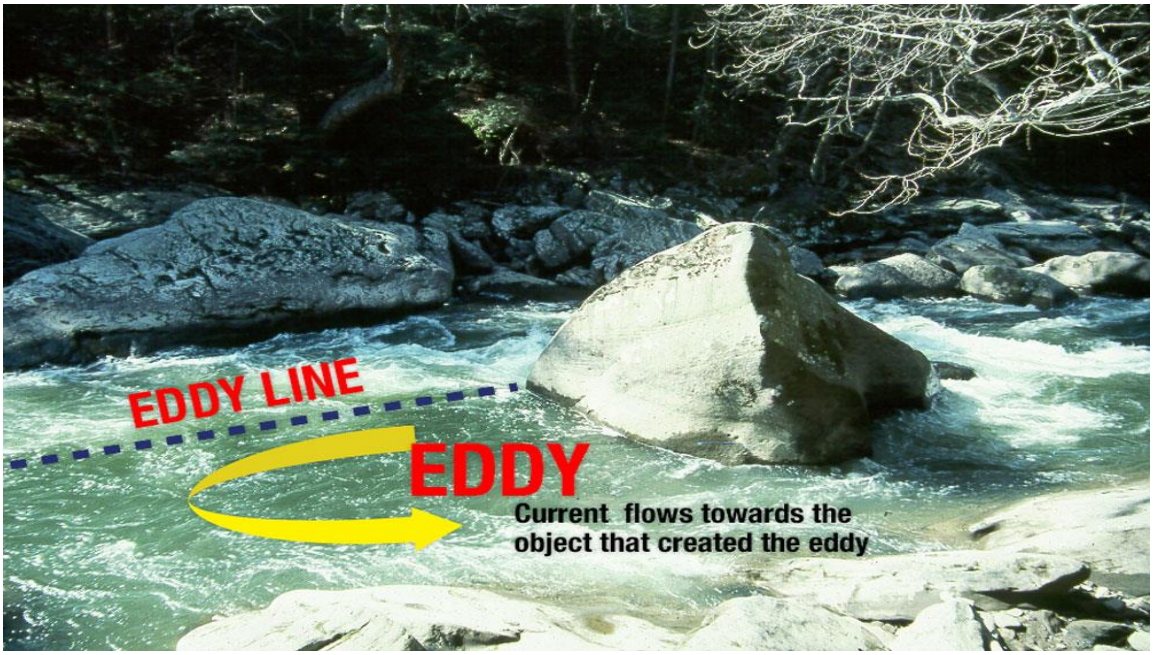
- Top Load - Object that is positively buoyant and floats on surface.
- Bottom Load - Object on the bottom stuck in the mud or too heavy to be moved by the current. It can cause foot entrapments.
- Suspended Load - Neutrally buoyant object that moves with the current but is too heavy to float. It can be dangerous and hard to see.



- Hydrologic features
  - Eddy - Horizontal reversal of water caused by water flowing around an object. An eddy will be on the downstream side and is a safe place for rescuers to exit the water.



  - Eddy Line/Fence - Distinct line where current flows in opposite direction. A rescuer needs to get over the eddy fence to enter the eddy.



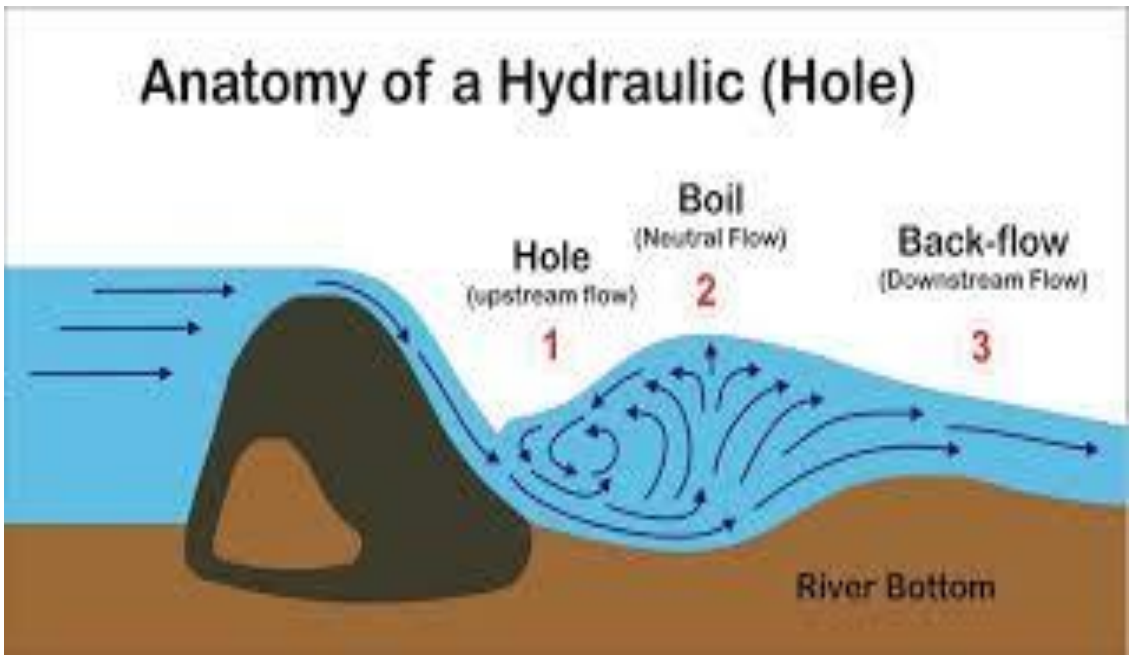
  - Eddy Hopping – Using the downstream side of multiple eddies to move across a body of water by rapidly jumping/swimming from one eddy to the next

- Downstream V - Convergence of water flowing to the path of least resistance creates a V pointing downstream, as in a bottleneck. The main channel, which isn't always midstream, can be identified by the largest series of Vs.

- Upstream V - Water going around an object above or slightly below the water's surface creates a V pointing upstream. The objects below can be hazardous.

- Horizon Line - A line across the river where your downstream view diminishes; evidence of a significant drop.

- Hydraulic/Hole/Stopper/Keeper - Life-threatening vertical reversal of water caused by water flowing over an object, such as a low head dam. Water is forced down and then circulates back up. Some water continues downstream while some recalculates. The churning whitewater of a hydraulic consist of between 40-60% air. Rescuers should exit water immediately.
  - Smiling Hole
  - Frowning Hole



- Standing Wave/Wave Train - rhythmic series of waves caused by the convergence of main channel currents as the result of rising river water, underwater obstacles or ledges, or an increasing river speed.

- Strainer - any object that allows water but not solid objects to pass through it

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
ICS

NFPA 1006 JPR(s):
Not applicable

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

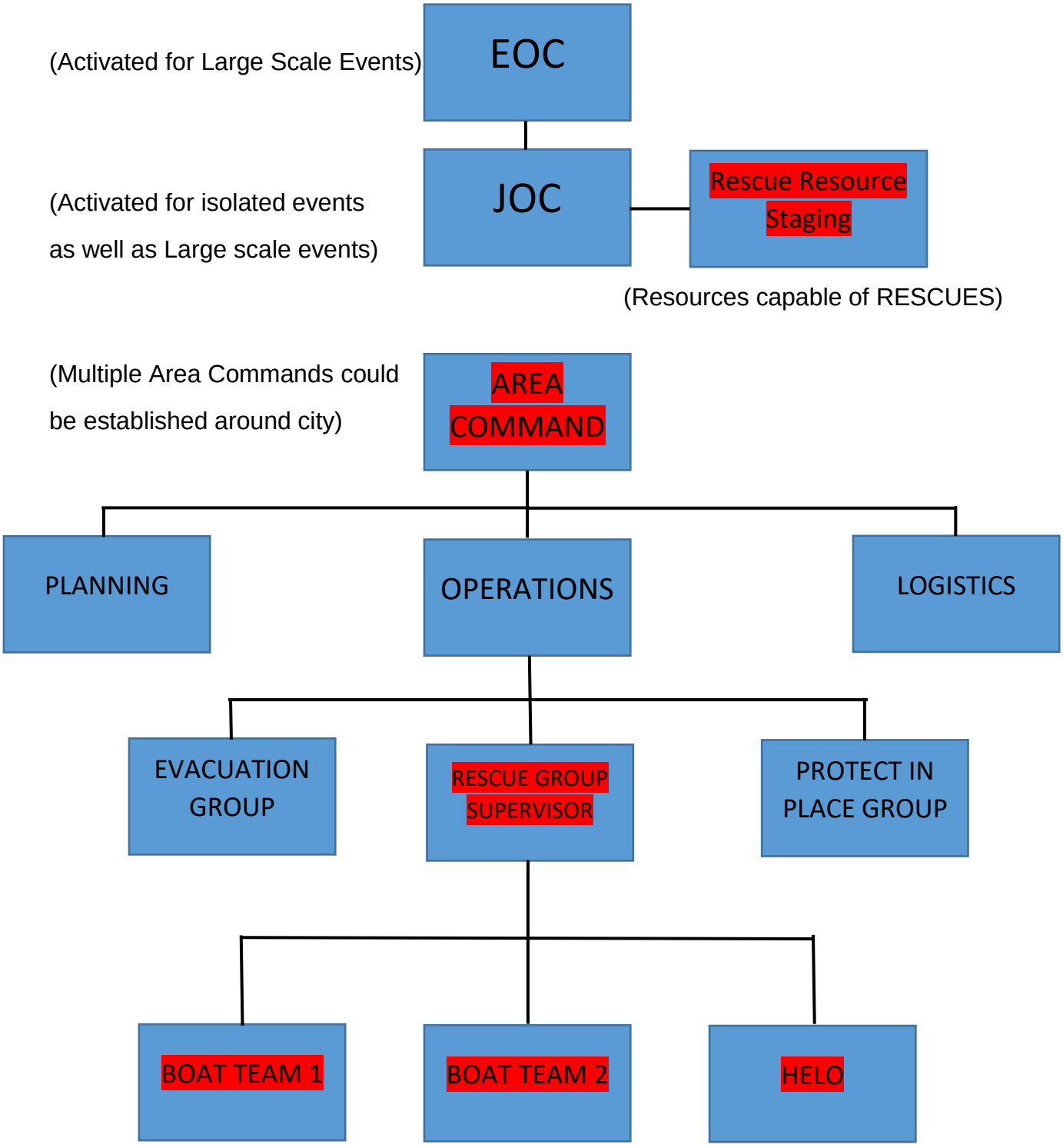
- Describe the intent of the Incident Command System

Introduction:
The swiftwater rescue incident can quickly overwhelm resources and further complicate the situation. Use of the incident command system is necessary to keep the incident managed and affect the rescue in a safe and efficient manner. The typical swiftwater rescue in the Central Texas area will only involve an incident commander, safety, and an operations section. The remaining 3 sections may be employed on a large scale, area wide incident with multiple agencies and jurisdictions involved.

Describe the intent of the Incident Command System
The incident command system was developed in an effort to effectively manage on-scene and responding resources. On large scale incidents effective span of control was quickly overrun and mass free-lancing quickly followed. Personnel accountability and effective tactical deployments were impossible to track. The incident command system was designed to keep control of the incident through unity of command and limited span of control. The system has been adapted to cover any incident of any size. In the

swiftwater rescue realm, ICS plays an important role due to the dynamic nature of the incident. Usually there will be multiple agencies, bystanders, reporters, and victims on-scene.

(Activated for Large Scale Events)



(Activated for isolated events as well as Large scale events)

(Resources capable of RESCUES)

(Multiple Area Commands could be established around city)

(Assets in **RED** will be assigned to area command by the JOC until rescues are complete. They then become available again in Rescue Resource Staging)

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Pre-Planning, Site Survey, Scene Size-up

NFPA 1006 JPR(s):
21.1.2, 21.2.4, 21.2.18

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the student shall be able to:

- Describe how to properly conduct a pre-plan of potential static/swiftwater hazard areas in their district or jurisdiction
- How to conduct a site survey of lakes, creeks, and low water crossings that are prone to static/swiftwater boat rescues
- How to conduct an accurate scene size-up during a static/swiftwater boat rescue including:
    - Establish of the ICS
    - Placement of upstream spotter(s)
    - Placement of downstream safeties
    - Request additional resources

Introduction:

During static/swiftwater boat rescues it is always a good idea to know in advance where certain features and hazards are going to be found during flood events. This is known as the pre- plan. Another more focused aspect of the pre-plan is the site survey in which a department will look closely at problem areas and plan on how to deal with potential rescues in these areas prior to the event. During an actual event the first arriving unit on scene must conduct an accurate scene size-up and use the information gained to effectively plan and manage their rescue.

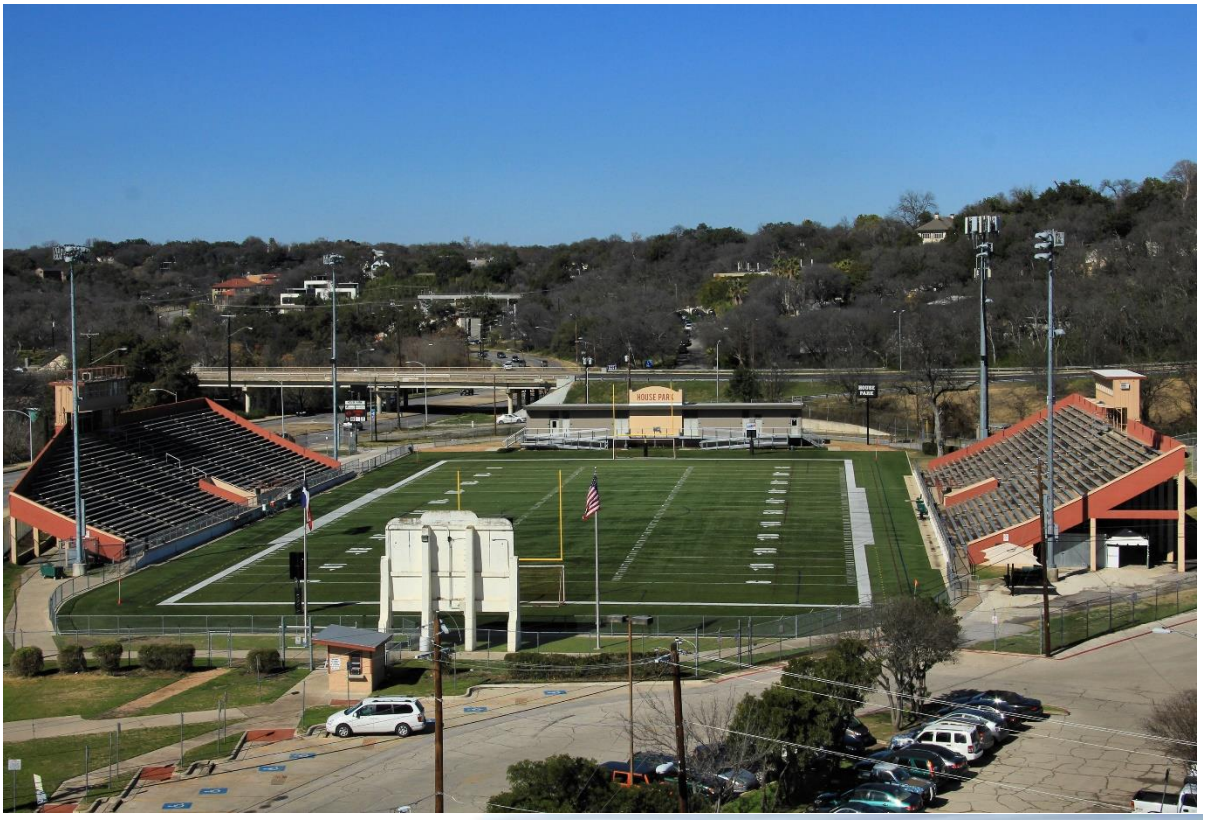
Pre-planning:

- Know the waterways in your area
    - Lakes
    - Creeks
    - Year-round flow
    - Flooding only
- Where are the bridges?

- Where are the low water crossings?

- Where are the low head dams?
- Mark locations with GPS coordinates
- Know GPS Coordinates in advance
- Mark potential problem areas on map
- Know alternate routes
- Meet with other local agencies/aircrews and exchange information
- Make sure your department has equipment ready and in working order

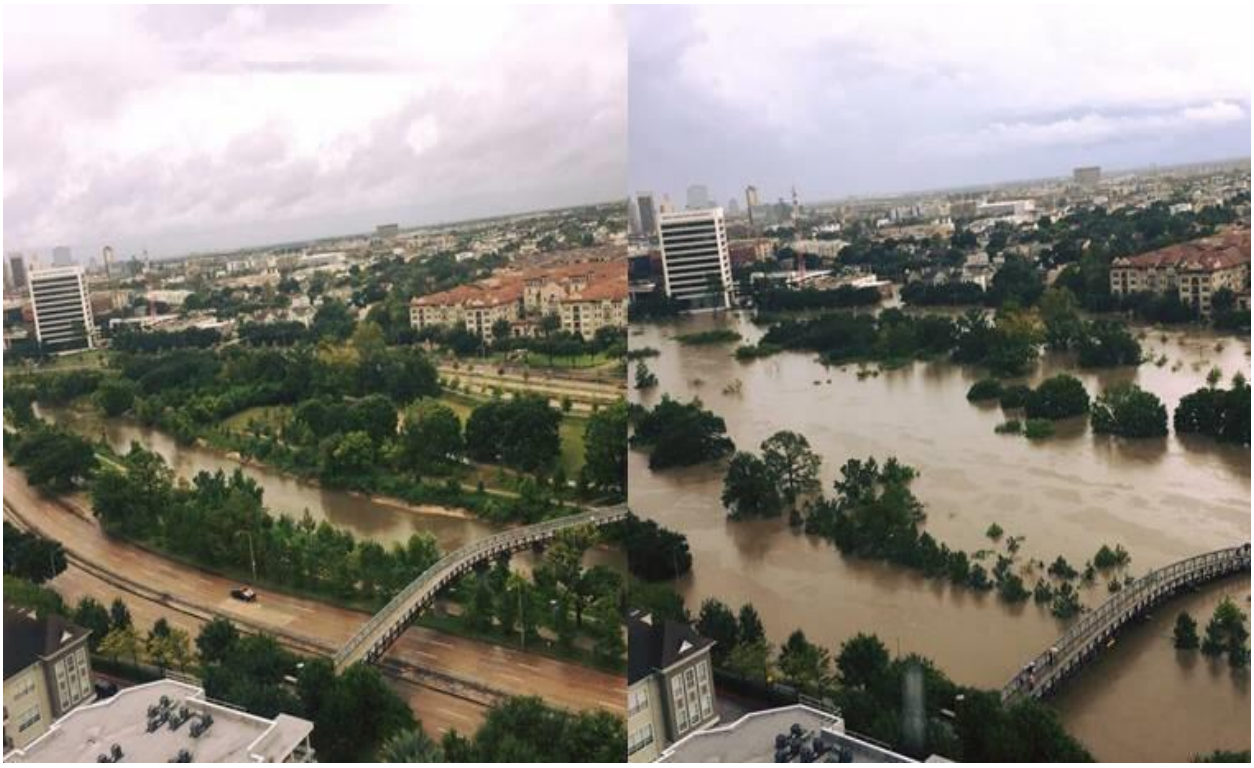
House Park, Austin, TX

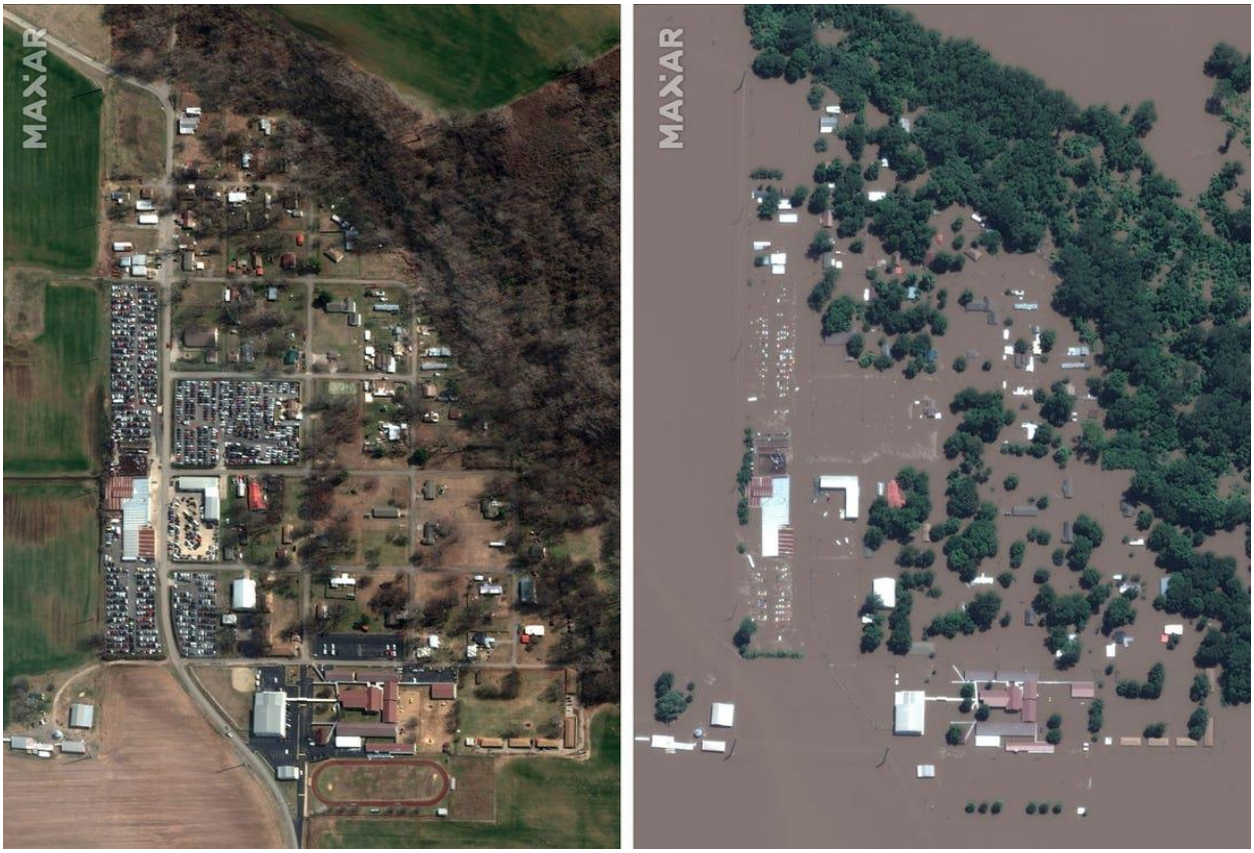


Onion Creek, Austin, TX

Graveyard Point, Lake Travis, TX

Houston, TX





Site Survey:

- Look at potential problem areas in your area more closely:
    - Lakes & creeks
    - Low water crossings
    - Low water bridges
    - Low head dams
- Anywhere that has a flood gauge…it's there for a reason!!
- Try to look at locations in both normal and flood conditions
- In dry or low water conditions identify potential hazards
    - Rocks
    - Strainers
    - Hydraulics
    - Fences
- Identify a "point of no return" beyond which a rescue may no longer be possible
- In flood conditions especially at low water crossings and low water bridges get an idea of water depth and speed
    - This will help you in planning a rescue in regards to a shallow water crossing
    - You can know in advance of potential water speeds in the event of a lost victim and place downstream spotters accordingly

- Keep written records
    - Update annually
    - Distribute to other agencies and organizations as needed
    - Coordinate with local GIS department for development of detailed maps with topo and USNG

Scene Size-up:

- Establish Incident Command and location of CP
- Determine number of victims
    - Are they visible?
    - Are they downstream?
- Place upstream spotter based on by water flow/speed, terrain, communications, and line-of-sight
- Place downstream safeties as needed
- Determine rescue scenario
- Risk vs. Benefit (talk, reach, throw, row, go-tow, helo)
- Available resources
- Request additional resources early
- Mutual Aid
- Aircraft

BOAT OPERATOR

Pre-Planning

1. Personnel:
    - -Fitness; injuries, stamina etc.
    - -Qualifications; what are they certified to operate
    - -Experience; what have they done, what are they comfortable operating in
    - -PPE; do they have everything they need on hand and working
    -
2. Equipment:
    - -Boat checks; weekly, operations
    - -Trailer check
    - -Victim PPE; PFDs, blankets, medical basics
    - -Pet transport; kennels, blankets, ropes
    - -Forcible entry tools; glass breaker, axe, pike pole
    -
3. Known hazard:
    - -Low water crossings
    - -Strainers
    - -low bridges
4. Boat entry points:

    -Normal, High and Low water

    -Swift and flood water

5. Routes:

    -Roads likely to flood

    -Alternate routes to known problem areas

    -Possible HPV or Helo support

6. Post rescue:

    -De-con options for rescuers and patients

    -Animal resources; Vets, heavy equipment, trailers

    -Equipment de-con and boat service

BOAT OPERATOR

Scene Size-Up

1. Flood Water:
   - -Day or Night
   - -Weather conditions; rain, lightning, fog
   - -Water conditions; Rising, falling, speed change, floating hazards
   - - GPS information
   - -Number and location of victims
   - -Trapped; Car or house, requires tools to access
   - -Possible underwater hazards; fences, signs, bridges
   - -Entry and exit points
   -
2. Swift Water:
   - -Day or night
   - -Weather conditions; rain, lightning, fog
   - -Water conditions; Rising, falling, speed, debris, upstream and downstream hazards
   - -GPS information
   - -Possible underwater hazards; fences, signs, bridges
   - -Communications; verbal, radio, cell phone
   - -Entry and exit for moving water; angled or protected launch, Pt drop off
   - -Better access points from a different location
   -
3. Risk/Benefit:
   - -Enough skilled personnel
   - -Enough equipment and PPE
   - -Pt danger; water rising or falling, medical conditions, exposure
   - -Helo operation?

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Search Techniques

NFPA 1006 JPR(s):

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

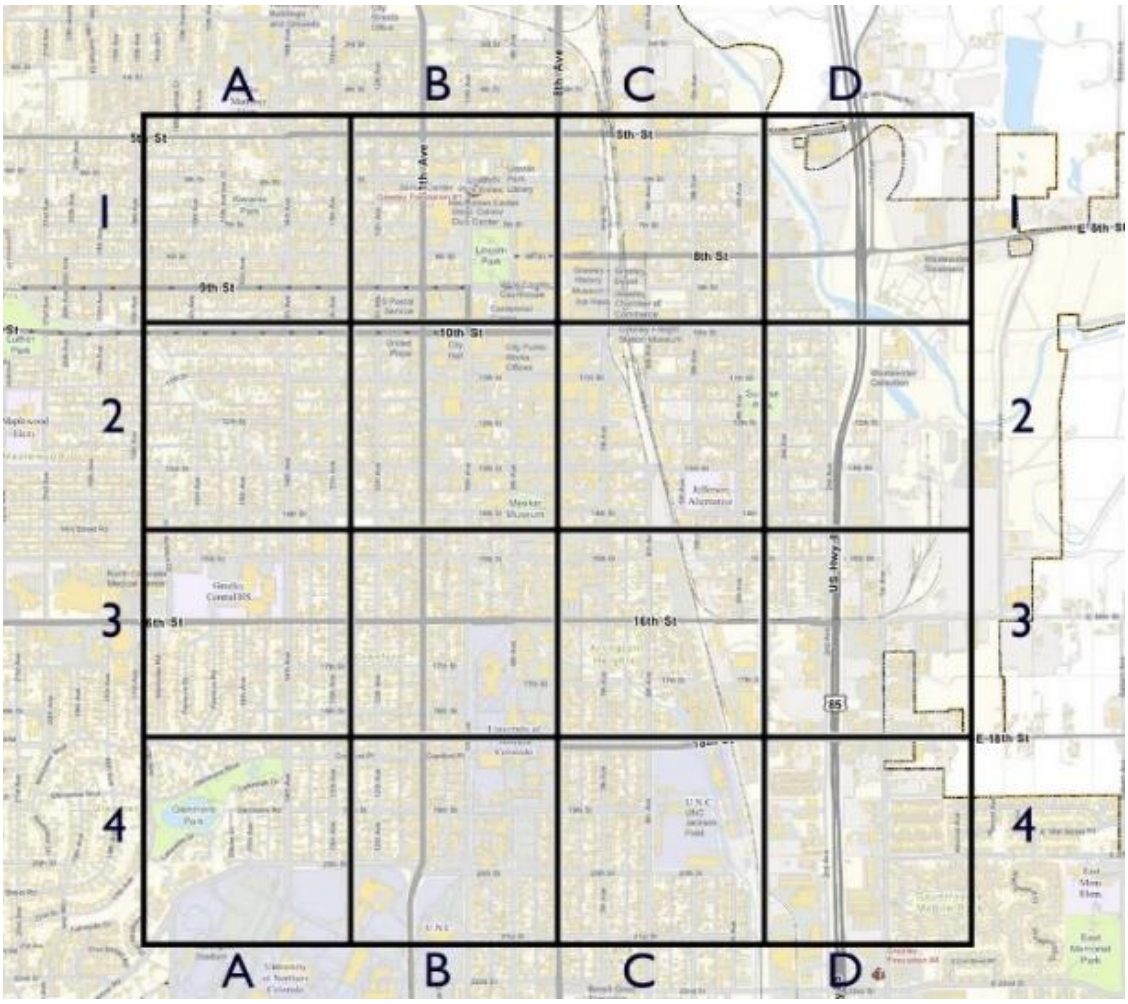
Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:
- ❖ Search a geographic area by grid
- ❖ Locate victims and structures by latitude/longitude coordinates
- ❖ Locate victims in a structure
- ❖ Be able to mark structures as searched and number of victims rescued
- ❖ Locate victims missing in swift water

Introduction:
Whether a last known location or a neighborhood, many times we will be called to perform a search of a given area. We will discuss a map grid search, using Latitude & Longitude searches with GPS/cell phones as well as review the USAR marking system for searching structures. The advantages and disadvantages of each type will also be discussed.

- ➢ Search a geographic area by map grid
  - Map of area needing to be searched divided into grid
    - X-Axis Letters (A,B,C,D)
    - Y-Axis Numbers (1,2,3,4)
    - Divisions are alphabetical
    - Segments are numerical
    - A1 = Division A; Segment 1



- Locate victims and structures by latitude/longitude coordinates
  - Cell phone based vs GPS units
    - Cell phone based search:
      - Advantages:
        - ♦ Ease of access and use
        - ♦ Many mapping software applications to choose from
        - ♦ Sending info between teams and command
      - Disadvantages:
        - ♦ Areas of no cell reception
        - ♦ Battery life
        - ♦ Data plan
        - ♦ Software crash
    - GPS Units
      - Advantages:
        - ♦ Long battery life, with standard sized replaceable batteries
        - ♦ Durability

- ♦ Multiple map choices
- ♦ Multiple coordinate types

- Disadvantages:
  - ♦ Familiarity with specific device
  - ♦ Whole team using correct maps
  - ♦ Connectivity issues

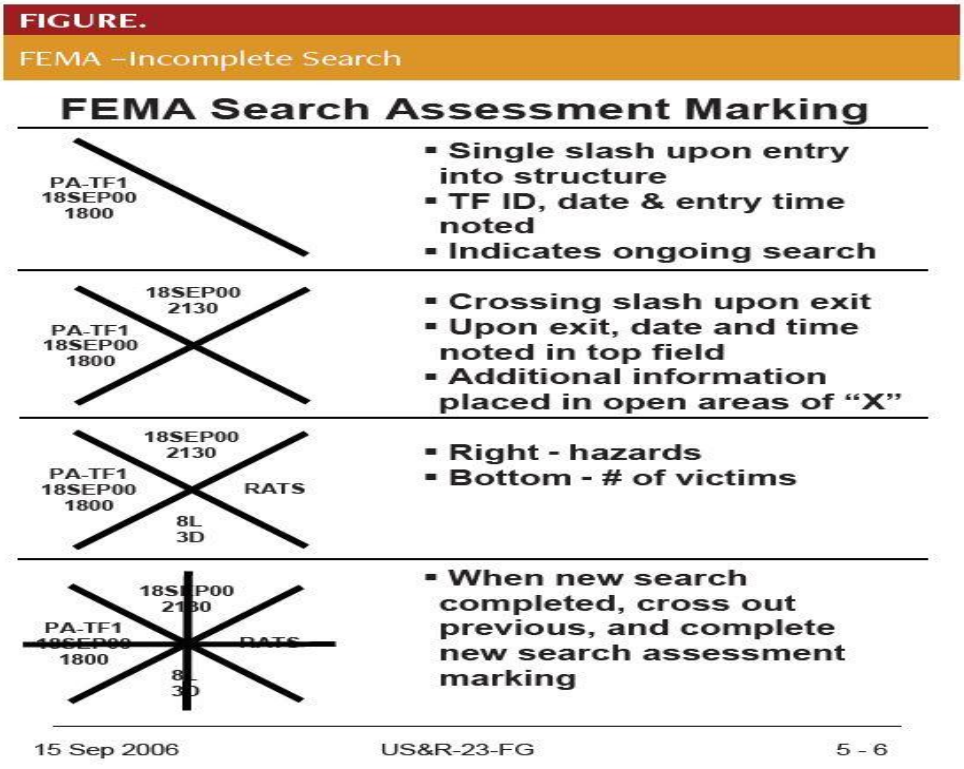
➢ Locate victims in a structure

- Search tasks
  - Hasty search – Search around structures and on the roof
  - Primary search – Gain access, call out for any occupants, perform a quick search
  - Secondary search – Search all spaces throughout structure (i.e. rooms, attic, garage, etc.)
- Equipment needed
  - Forcible entry tools
  - Flashlight
  - Door marker/international orange spray paint/chalk
- Attics
  - Often a place of refuge when water is up to roof/last floor of living space
    - Sound attic and listen for victims
    - Check attic

- USAR Marking System

FIGURE.

FEMA –Incomplete Search



- Locating missing victims in swift water may be broken into two parts: a Passive Phase and Active Phase.

  - **Passive Phase (not immediately actively searching)**:
    - gathering information on missing subject. It may be interviewing witnesses and identifying a point last scene and description of missing victims. Once basic information about victim has been obtained, hasty teams can start searching water ways and banks attempting to locate the victim. The top of the search perimeter is usually the point last scene and bottom of the search perimeter could be determined by multiplying the speed of the currently the time since the last sighting (3 mph current X 30 min. since last sighting 1.5 miles deep). If it has been only a short time since the victim was last seen rescuers may want to drop a marker into the water to to approximate the victim's drift. If the victim is ambulatory and may be able to get out of the water banks of the waterway need to be searched. As part of the search, rescuers should study a map of the area and determine waterway probably of detection areas such upstream sides of boulders and strainers, low head dam areas, and islands. A live person will usually try and get to shore or midstream obstacle as soon as possible. Drowning victims on the other head will assume a slight negative buoyancy ans ink to bottom and since there are eddies on the waterway there will be a high probability of detection downstream of the point last scene.

  - **Active Phase (formalized part of search)**:
    - A command post may be established and there may be more detailed coordination with other agencies. Searches may be are more detailed in areas where probability of detection has been calculated to be high. The search plan may be more formalized during this phase of the search as well.
    - Start search up stream of reported location

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Body Positioning & Crew Operational Duties

NFPA 1006 JPR(s):
21.2.3, 21.2.8

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Identify the duties and responsibilities of the Boat Operator (BO)
- Identify the duties and responsibilities of the Agile Bowman (AB)
- Identify the riding positions of the Boat Operator and Bowman

Introduction:

The operation of a water rescue craft requires teamwork and the ability to effectively communicate with each other. The BO and AB must work in unison to operate the boat efficiently and effectively. It is important the BO and AB know each other's roles and responsibilities. The AB must always be prepared to operate the boat in the event that the BO goes overboard.

Boat Operator:

The BO sits below the left or right side gunnel tube, just forward of the tiller arm, with at least 1 foot pressed against the opposite tube. This will effectively “wedge” the BO in the boat so that they remain stable during boat maneuvers. It is important to position yourself in a way that gives the tiller arm a full range of motion. The chest is aligned with the long axis of the boat, with one hand on the tiller and the other hand holding on the gunwale rope (referred to as a lifeline on Zodiacs). The “dead man” lanyard can either be attached or not attached to the BO based on BO preference. If the lanyard is attached, it should be placed in position so that it does not disconnect during maneuvers.

The BO is the “Captain”, with strategic and tactical authority of the boat, its occupants, and for navigation. They must maintain a 360 degree awareness, as well as a plan for their maneuvers, directing weight shifts, and establishing a communication system for communication.

General Responsibilities:

- Pre-trip operational check
- Strategic and tactical authority
- Safe operation of the boat
- Route selection and navigation
- Maintain 360 awareness at all times
- Crew and victim positioning

Agile Bowman:

The AB rides near the bow of the boat in a crouched kneeling position, holding on to the lifelines. Generally positioned centered in the front 1/3 of the boat. The AB should try to remain low in the boat and not obstruct the view of the BO. The AB should strive to keep their position in the center of the boat, in most cases. It is important to remain agile and facilitate weight shifts during boat maneuvers.
The AB identifies upcoming hazards, uses hand and arm signals to relay to the operator any hazards and directs to the clear route. The AB is also responsible for pulling in victims, deploying throw lines, and making potential swimming rescues. It is also common that the AB probes water depth with a paddle when the BO is uncertain of the depth. The AB is also to be trained to periodically look aft, down the right side of the boat, to make sure the outboard motor is still producing an effective stream.

One of the most critical roles for the AB is to shift their weight during maneuvers:

- Throwing weight forward over the bow of the boat to get on plane
- Positioning fore or aft to keep boat on plane
- Moving back when “plowing”
- Moving back and shifting weight left or right during J-turns or Peel turns
- High siding the boat to combat flips, pins, and wraps (crew shifts their weight away from the current pushing against the side of the boat)
- The AB may also have a “dead man” lanyard attached to his PPE or know where a back-up one is located in case the BO is thrown from the boat and the motor needs to be re-started.

General Responsibilities:

- Pre-trip operational check
- Rescue duties
- Hazard identification and communication
- Securing bowline
- Remaining agile, weight shifts in unison with BO maneuvers
- Probe water depth
- Maintain 360 degree awareness

Cross-training is important, and the rescue philosophy urges not allowing anyone in the boat during high risk swiftwater operations that is not prepared to self-rescue in an emergency.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Boarding & Exiting Watercraft

NFPA 1006 JPR(s):
21.1.8

Time:
20 minutes

Scheduling Suggestions:
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:

At the end of this lesson, the rescuer should be able to:

- Understand the elements that effect the stability of a watercraft, including mass, center of gravity, weight distribution, impact loads, current & wind and water conditions.
- Demonstrate the ability to board a watercraft in a manner that prevents injury and minimizes the impact or stability of a watercraft.

Introduction:

It is important to recognize the type of boat you are boarding and the impact that it will have. Boarding the boat also is a point where accidents can happen. This lesson will address the safety hazards and explain the correct procedures for boarding and then exiting the watercraft.

Boarding a watercraft:

- Shore-Based Entry
  - Size-up area around the boat and anticipate water reactions to impact loads, current, wind & water conditions
  - Enter the boat from the bow

- Be cognizant of the reaction your boarding action will put on moving the bow
- When performing a shore-based entry keep your center of gravity low and hold onto the boat handles while placing one foot onto the floor of the boat while straddling the Gunnel tube.
- Expect surface to be slippery
- Anticipate the boat lowering into the water and pushing away from the direction of entry when your weight enters the boat.
- It is not good practice to stand upright and walk on the Gunnel tubes
- The Hypalon material the Zodiac boats are constructed of can be slippery when wet or when you have wet water boots
- Once safely in the boat immediately get in the proper bowman position.

- Wading-Based Entry
  - Size-up area around the boat and anticipate watercraft reactions to impact loads, current, wind & water conditions
  - The preferable approach would be on the port side in plain view of the boat operator. Or whatever side the boat operator presents to you.
  - Grasp the hand ropes and pull yourself up while simultaneously throwing one leg over the Gunnel tube.
  - Once safely in the boat immediately get in the proper bowman position.

Exiting a watercraft:

- Whether exiting in shallow water or onto shore have the bow line in hand and ready yourself for exit.
- Exiting needs to be a coordinated plan. Only exit when the Boat Operator indicates it is time.
- Once off the boat help control boat orientation for the boat operator.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Boat Maneuvers

NFPA 1006 JPR(s):
21.2.3, 21.2.8, 21.3.5

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Explain and demonstrate a Hover
- Explain and demonstrate a Ferry
- Explain and demonstrate a Peel Turn
- Explain and demonstrate a J-Turn

Introduction:

BO and AB's need to "feel" the boat, learning the time it takes to throttle up and stop, and most importantly how weight shifts affect performance. As always, it is critical to maintain 360 degree awareness for safety. In order to avoid tunnel vision, practice scanning constantly.

The most critical piece of communication between the BO and AB is the issuing of commands by the BO for a boat maneuver. The BO will state what they intend to do (J-turn, Peel turn, etc.), then give a direction, followed by and execution command (such as "now"). If the BO does not give a warning or communicate what they are doing, the crew members could be thrown out of the boat or perform an unintended movement.

- **Stop, Plow, Plane:**

The BO will throttle up, the AB will move towards the bow, helping getting the boat up on plane quickly. When the boat gets on plane, the AB should move back towards the normal riding position.

When the BO calls “stopping, now”, the AB moves as far back as possible and the BO will down throttle. The weight shift to the stern will cause the boat to “plow” to a halt, the stern partially submerging and dragging the boat to a stop, usually within its own length.

Plowing becomes critical when executing J-turns

- **Ferry:**

The boat is set at an angle (ferry angle) to the current and held from going downstream by just enough throttle to maintain position. This technique allows the boat to move side to side in the current and make adjustments when route finding, scouting, or intercepting a target.

- **Hover:**

The boat is placed in the current facing up stream. Using two points of reference, one upstream and one to the left or right, apply just enough throttle to hold your position using the points of reference. The AB can dramatically affect the stability of the boat and the amount of throttle needed by their positioning. When the AB is up at the bow, the boat will plane out more, requiring less throttle. When the AB is towards the back, the boat will plow, requiring more throttle. Water conditions and BO will dictate which position is more desirable.

- **Peel Turn:**

From a hover, the BO will give the command “peel turn left or right, now”. The BO will down throttle slightly, allowing the boat to settle, then “pin” the motor all the way left or right and throttle back up to approximately ¾ power. The BO will stay in the turn until the boat has completed the 180 degree turn, then down throttle to gain control and make adjustments. The process described should be performed instantaneously. The AB position is crucial in performing tight turns. The AB should be slightly back of the normal riding position and shift their weight in the direction of the turn. This will place the boat in a plow orientation, allowing the 180 degree turn to be completed within a boats length.

- **J-Turn:**

Under power, facing upstream or downstream, the BO will give the command “peel turn left or right, now”. The BO will down throttle slightly, allowing the boat to settle, then “pin” the motor all the way left or right and throttle back up to approximately ¾ power. The BO will stay in the turn until the boat has completed the 180 degree turn, then down throttle to place the boat in a plow orientation to scout or intercept a target. The process described should be performed instantaneously. The AB position is crucial in performing tight turns. The AB should be slightly back of the normal riding position and

shift their weight in the direction of the turn. This will place the boat in a plow orientation, allowing the 180 degree turn to be completed within a boats length.

- **Maneuvers Around Objects**

All maneuvers around objects should be conducted in a controlled manner with the BO in complete control of the boat. The BO must account for the flow of the water and the effect water features will have on the boat (i.e. eddy fences, eddies). J-Turns and Peel turns should be executed in a tight and controlled manner utilizing only enough power to complete the maneuver. The flow of water and boat orientation (upstream or downstream) will determine the amount power required to complete the maneuver, usually 50-75%. Overpowering the boat will result in cavitation. As stated before, J-Turns and Peel turns should be completed within a boats length.

- **Route Finding**

Boat crews should strive to scout and analyze the river or rapid ahead before running it. The most effective way to do this is to find a spot where you can see the whole rapid. Start from the bottom, where you would like to end up and work upstream. There are usually several ways to run through each section of the rapid. The goal is to connect each section into a smooth, fluid run. Look for a route that will avoid hazards and set you up near where you would like to go. BO's should anticipate moves and the effects on the boat as they navigate, striving to always leave themselves an "out".

- **Downstream Travel**

BO's should avoid an uncontrollable speed when going downstream. The BO should be able to stop and scout ahead. To prevent this, we break the rapid into smaller more manageable segments by eddy hopping. These eddies can be areas where we can re-group, assess the situation ahead, come up with a plan, and then execute.

For effective control when going downstream, the boat needs to be moving faster or slower than the current, otherwise the current will take the boat. BO's can reduce speed by utilizing eddies or slack water or "backing down" with the bow facing upstream.

- **Upstream Travel**

Boats have the ability to hover against the current and scout while route finding. The AB can assist with this process by checking the depth and looking for the best path. In general, you will want to stay close enough to the shore to stay out of the main current, but far enough out to avoid shallow water and other underwater obstacles. The flat water just off the side of the main current between the wave train and the eddy can give you a clear shot and provide a smoother ride.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Crew Overboard Recovery

NFPA 1006 JPR(s):
21.2.12, 21.2.13, 21.3.7, 31.3.8, 21.2.6

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the boat operator should be able to:

- Identify the steps for positioning the boat
- Describe how to perform the recovery procedure

Introduction:

There are situations when the boat operator will be called upon to assist in recovering crew members back into the boat. One is when the bowman has exited the boat for rescue of a survivor. The other is when a crew member has fallen or been thrown from the boat during extreme swiftwater conditions or advanced boat maneuvers.

Boat positioning:

Best practice when retrieving a crew member is to navigate downstream past your crew member in the water and perform a j-turn to orient your boat upstream. Line your boat up with the crewmember on the same side as the boat operator. Hover until the crewmember begins to approach the boat. At this point, the boat operator should come off the throttle and match the crewmembers speed. The Boat Operator will then immediately go to neutral and tiller away. Water speed and conditions will determine the timing of when to start this procedure.

Recovery procedure:

The crew member should be oriented at the mid to front half point of the boat on the boat operators side. With the crew member facing the boat, grab their shoulder straps and in a coordinated movement pull the crew member up and in as they pull themselves into the boat. Only pull the crew member up onto the gunnel where they can quickly get situated in the boat. Pulling them all the way into the boat creates extra time for both members to recover and get back into position.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Victim Pick-Up

NFPA 1006 JPR(s):
21.2.14, 21.3.9

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Identify the hazards to performing a Victim pick-up
- Explain the steps for performing a Victim pick-up
- Understand the safety considerations during victim retrieval
- Explain the importance of body position and balance

Introduction:
One of the more technical and dangerous skills the boat operator and bowman are expected to perform is a victim pick-up from the water. When we have a victim in the water the bowman and boat operator must skillfully work together to successfully retrieve them. This skill takes experience and careful operating to accomplish correctly.

Boat Procedures:
Best practice when retrieving a victim is to navigate downstream past your victim in the water and perform a j-turn to orient your boat upstream. Line your boat up with the victim on the opposite side of the boat operator. Hover until the victim begins to approach the boat. At this point, the boat operator should come off the throttle and match the victims speed. Water speed and conditions will determine the timing of when to start this procedure.

Victim Recovery:
The bowman then grabs the victim and positions them halfway down the side of the boat. While the boat operator waits for the bowman to get the victim positioned correctly he/she should be reading the water conditions and looking for hazards which will impede the forthcoming operation. With clear and coordinated communication they will then perform recovery of victim. This occurs with the boat operator deliberately dropping the gunnel on the side you are recovering by tillering away from the victim under power in tight circles until the bowman has successfully pulled the victim into the boat. After everyone is in the boat, the boat operator will orient the boat upstream and give the bowman a chance to position the victim and assume his/her role.

Victim Pick Up During a J-Turn:

Picking up a swimming victim out of the water from a moving boat, or picking up a moving victim while holding a hover requires a combination of victim recovery skills and J Turns to be effected quickly and safely. Once the victim is located, the BO should position the boat downstream of the victim providing enough distance to gauge the route and speed of the victim. Once downstream the boat will be placed in a hover and the AB will provide directions to BO on path of the victim so that the BO can make adjustments. The BO will position the boat so that the victim can be caught on the opposite side the BO is operating from. As the victim approaches the BO should attempt to match the speed of the victim by reducing power or coming off the throttle completely. The AB will grab the victim and position themselves in the front 1/3 of the boat. When AB says “ready” the BO will throttle up and execute a J Turn towards the victim. This will cause the boat to dip on the side of the victim and allow the AB to pull the victim into the boat. The BO should stay in the turn until the victim is completely in the boat and the boat is facing upstream, this usually requires a 360 degree turn or greater (720 degree, etc.).

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Extrication from Midstream Objects

NFPA 1006 JPR(s):
21.3.2

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Recognize the size-up considerations
- Describe different ways to approach a victim on a mid-stream object or tree
- Understand the Boat Operator and Bowman roles and responsibilities during the rescue

Introduction:

It is not uncommon for victims to be found in trees or other mid-stream objects. Whether due to rising waters or being swept downstream. We will discuss the proper ways to size-up and approach a mid-stream rescue as well as the roles and responsibilities of the Boat Operator and Bowman.

Size-up:

- It is important to size up the scene to formulate the most effective and safest operation possible. Looking for hazards such as significant hydrology such as eddies and strainers. Other size up considerations include barb wire fences, shallow rocks and debris. Also determine if the mid-stream object is fixed or could move. The rescue plan should be discussed before implementing. This should include the planned approach and departure.

Types of Approach

- The preferred method is to approach from downstream. This allows you to keep good control of your boat while seeing hazards coming from upstream. Depending on the situation and conditions the best plan of action may be to navigate into the eddy downstream of the object. If an eddy is not present, then the plan would be to hover downstream of or alongside the mid-stream object/tree.

Roles and Responsibilities

- Boat Operator
    - His/her main task to navigate the boat into the correct position so the Bowman can perform the rescue. He/she must also maintain that position for the duration of the rescue.
- Bowman
    - The Bowman must communicate hazards to the Boat Operator during the approach. All body position changes should be communicated to the Boat Operator. Shifting weight, exiting/entering the boat will have a noticeable effect on the boat. After retrieving the victim the Bowman must place him/her in the most advantageous position possible.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Zodiac Boat Emergency Operations

NFPA 1006 JPR(s):

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Understand the elements that could halt or hamper operations while on the water.
- Understand importance of the pre-launch inspection prior to getting on the water.

Introduction:

While operating in the flood and swiftwater environment we should be prepared for a variety of potential emergencies.

Zodiac Boat Emergencies:

- **Hole in a chamber (slowly deflates)**
  - Check valve orientation (navigate)
  - May be possible to seal with flex seal tape
  - Share air from other chambers
  - Pull to shore and patch with kit

- **Ruptured chamber (Rapidly deflates)**
  - Check valve orientation
  - Apply Clamseal and then share air from other chambers or use flex seal tape if possible
  - Rearrange weight in zodiac opposite ruptured chamber
  - Pull to safety (Zodiac OOS)

- **Ruptured speed tube**
  - Turns will not be as sharp.
  - Verify squeeze clamps are closed

- **Keel chamber underinflated or ruptured**
  - Minor - porpoising (roller coaster motion)
  - Major – potential bending of floor up to and beyond 90 degrees
  - check and make sure cap is tight
  - Chamber does not share air with other chambers

- Zodiac will flex in the floor
- If not ruptured, may be possible to use foot pump to re-inflate.

- **Rip on bottom fabric**
  - No possible fix while on the water
  - Zodiac will be sluggish with poor handling
  - Rip/tear will likely grow larger in fast moving water

Boat motor: 40HP ETEC

- **Water not coming from water pump indicator**
  - Kill motor
  - Investigate intakes
    - Check and clear water intake screens
    - Check for debris in water pump indicator discharge or that hose is attached

- **Not able to shift to reverse**
  - Kill and tilt motor
  - Remove cowling, inspect shift linkage
  - Check for damage/deformity on front of the motors lower end, opposite prop.

Prop Issues

- **Prop tangled (**High RPM with no response**)**
  - Kill and tilt motor.
  - Untangle object or debris from prop

- **Prop blades chewed up** (high RPM to achieve control)
  - Navigate to shore
  - Kill and tilt motor
  - Change piranha blades on prop.

- **Prop nut backed off** (high RPM with no response)
  - Kill and tilt motor.
  - paddle to safety
  - replace prop/nut/cotter pin

- **Motor Stall**
  - Fuel line
  - Kill switch in place
  - Vapor lock
  - Overheat

- **Poor performance**
  - Prop strike
  - Prop entanglement
  - Limp mode
    - Low oil
    - Overheat
    - Fuel constriction
  - Boat under inflated
    - Gunnel tube
    - Speed tube

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Towing a stranded vessel

NFPA 1006 JPR(s):
21.2.15, 21.3.10

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the student shall be able to:

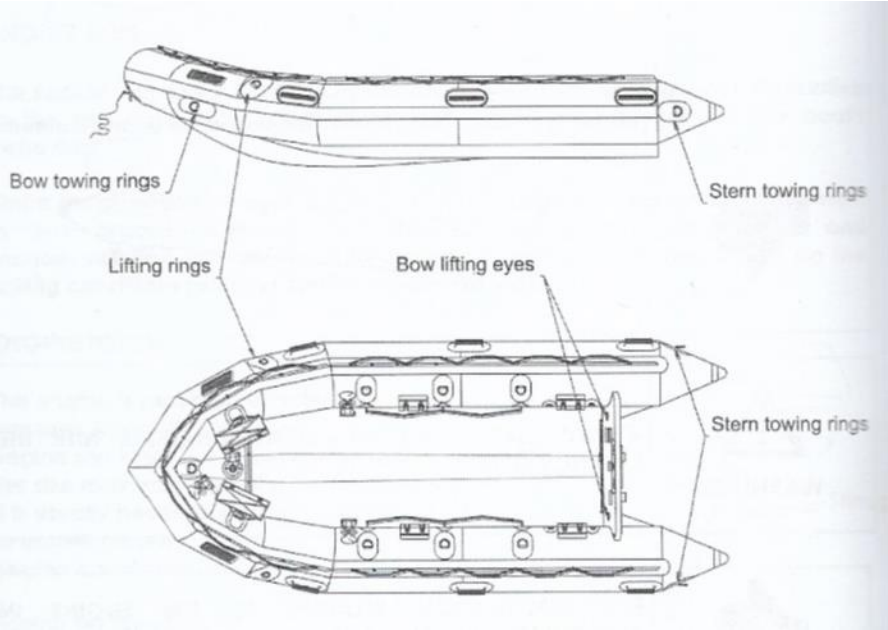
- Discuss two techniques to tow a stranded watercraft
- Discuss safety consideraations while towing stranded watercraft
- Perform as boat operator towing a stranded watercraft

Austin Fire department Special Operation personnel may encounter various types of watercraft needing towing. We will discuss two types of towing techniques using the FC 420. First before we go into the specifcs of setting up the towing bridle and executing a tow. Lets' consider some key safety considerations when towing a stranded watercraft and they are as follows:

- Towing should be carried out at low speeds
- Inspect anchor points and avoid using anchor points with visible signs of deterioation
- Have capability to release mooring line under load (release the knot under load or cut)
- Keep tow rope free from prop

- May be benefical to lift prop on boat being towed (to decrease drag and prop getting caught on debris) and use paddles to steer boat

FC420 tow ring locations (bow and stern)



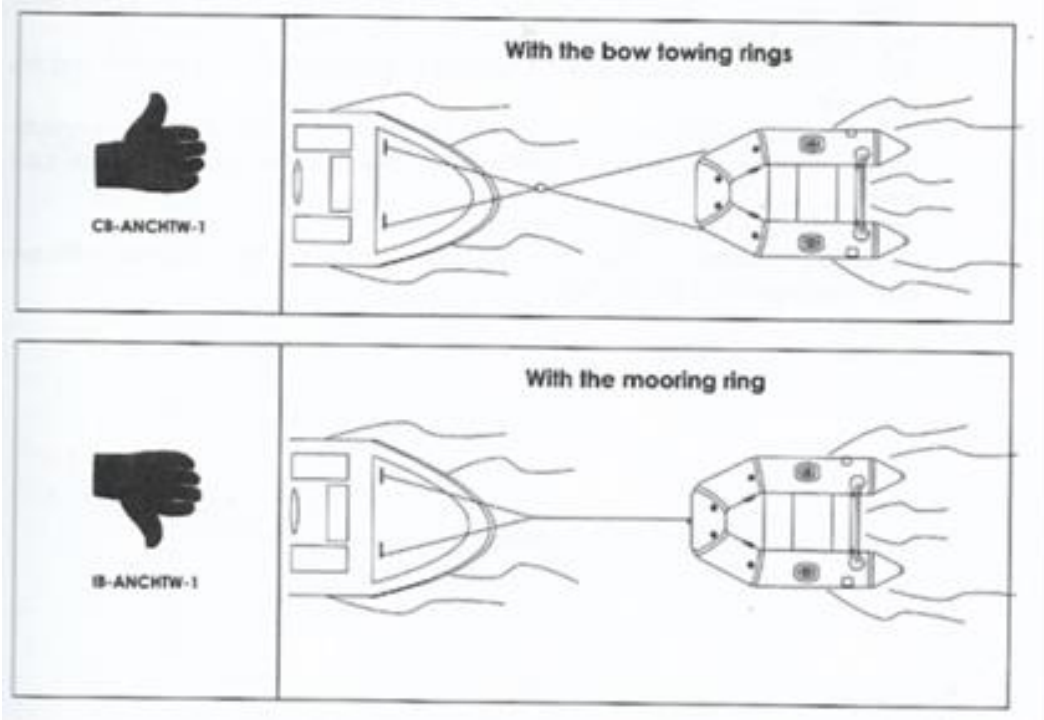
Technique #1 "Tow Astern"

Steps:

1. Tie two large double loop figure 8's (bowlines can be used in place of double loop 8') on each end of throw bag rope (utility rope may be used in place of throw bag rope)
2. Attach one loop to each tube with carabiner. Make sure knot is clear of prop (a float can be attached to keep rope clear of the prop).

3. Stretch rope behind towing boat

4. Attach end of rope with double loop figure 8 to bow of boat (forming a “V” bridle).



Technique #2 “Alongside tow” (useful for congested waterways):

1. You can attach stranded vessel with prusik, throw bag rope or other material (having a way to quickly release the stranded vessel would be optimal) or personel can hang on to straned vessel while being towed to safety.


NRS

2. Tow boat will start slowly and stranded vessel will be infront of tow boat.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Boat Flip and Recovery

NFPA 1006 JPR(s):
21.3.4

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:16 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson, the rescuer should be able to:

- Self-rescue after flipping a boat during maneuvers.
- Maneuver the boat to a safe area to perform boat flip
- Learn mechanics of a boat flip
- What to expect after recovering a boat

Introduction:

With proper boat skills and training flipping a boat in the water will be a rare occurrence. The student will learn how to reposition a boat back into safe location and flip the boat back upright.

Self-rescue after flipping a boat

- Rescuer and victim life safety are the priority
  - If in a dangerous water environment it may be beneficial to ditch the boat all together. The rescuer should attempt to use ferry angles and swim to an eddy near the shore. If victims are on the boat the rescuer should attempt to make contact with victim and take them to shore.

- Maneuver the boat to a safe area to perform boat flip
  - The two methods of retrieving a boat to a safe area:
    - Paddling on top of boat.
    - Using the safety boat to tow the flipped boat into a safe area
  - Paddling a boat
    - If no downstream hazards exist a boat can be paddled from the bottom side by rescuers to a safe location.
  - Safety boat ferry
    - The safety boat can and should be used when possible
      - Use the same principles as towing a stranded boat to shore.

Mechanics of flipping a boat

- Flipping a Zodiac boat with motor is much heavier than flipping a NRS raft.
- In most cases it will take 2 rescuers to flip the Zodiac, if you have a 3rd rescuer they can be the gunnel rider.
- If windy use the wind to your advantage by facing the side you are lifting into the wind.
- Ensure motor has been killed
- If not in a safe location the rescuers may need to maneuver the boat to a safe location either by riding or paddling the inverted boat.
- Blow out 27 foot daisy chained flip lines.
- Climb on top of the boat.
- Both rescuers must stand up straight and lean back as far as possible to flip the boat back to upright.
- Rescuers may need to assist one another to get back aboard.

Post boat flip

- When a boat has flipped and the motor has taken in water, the motor will often be inoperable.
- The boat may need to be towed back to a location for retrieval.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Boat Paddling

NFPA 1006 JPR(s):

Time:
20 minutes

Scheduling Suggestions:
PowerPoint should be taught on the first day
On water instruction should be given the second day

Materials/Equipment needed:
Lesson Plan (Power Point, video, white board etc.)
Zodiac Boat, 2 crew members, victim

Instructor requirements:
1:12 Instructor to Student Ratio (classroom)
1:4 Instructor to Student Ratio (On water instruction)

Objectives:
At the end of this lesson the student shall be able to:

- Identify the needs for paddling operations while underway in a zodiac boat.
- Identify the positions, commands, and techniques for paddling operations in the event of Stillwater/flood water evacuations and motor failure.

Introduction

The need may arise during boat operations to use paddles for maneuvering in Stillwater/flood water. In the event of a catastrophic engine failure or loss of power paddles will need to be deployed to gain control of the boat and maneuver to an eddy or bank to begin troubleshooting or repair of the motor. Additionally, in the event of an overturned boat, crew members must be able to deploy their paddles from the stowage flaps located along the interior of the gunnels, recover their crew members to the top of the boat and begin maneuvering their boat to safety.

It is important to note that our paddles do not float and losing a paddle will result in the inability to propel and maneuver the boat in the desired direction.

Fundamentals of Paddling a Boat

Given a situation, we can classify the paddling operation into a two categories; ***Offensive and Defensive.***

For this curriculum we will be focusing on Defensive paddling only as it is the most likely scenario we as Boat Operators will encounter during operations.

Offensive Paddling Operations are used during normal operations of an Inflatable NRS Raft to propel and maneuver through Stillwater/flood water.

Defensive Paddling Operations would be those situations where we have had a catastrophic engine failure/loss of power or a situation where the boat has been overturned while operating in swift or quickly moving current. In this scenario, if the boat has the potential to be righted via the flip lines, then crew members will climb back in the boat, obtain the paddles and begin paddling facing downstream to an area of slower moving water like an Eddy or to the bank. If the above is not possible due to the current's speed or conditions are unfavorable, one member should be designated as the paddle retriever while the other crewmember climbs on top of the boats hull.

Should the operation deteriorate to a paddling operation while operating a zodiac boat, the boat motor should be pulled up and out of the water and stowed in the upright locked position prior to the tiller-man beginning paddling operations. This is due to the motor's skeg acting as a rudder and being caught by the water current. The bowman should begin paddling the boat to maneuver downstream in the desired direction of travel and to navigate around any debris or obstacles in the path of travel.

Positioning, Commands, and Technique

Positioning

Bowman: Agile Bowman paddling at the Bow
Tillerman: Tillerman or Coxswain paddling from the Stern of the boat

Commands

Simple commands are often the most effective, during both offensive and defensive paddling operations. Common examples used are as follows;

Stroke: Call for crew to perform a stroke.

All Stop or Right/Left Side Stop: Command for all members or specific side members to discontinue paddling.

All Forward or Right/Left Forward: Command used to initiate strokes in a given direction to maneuver Boat to a desired location.

All Back or Right/Left Back: Command given to paddle backwards to create drag in the water in order to bring the vessel to a stop in the water or to quickly change heading.

Paddling Technique

It is important to remember that while paddling any watercraft the directional propulsion is opposite of where they may be paddling. For instance, to paddle to the right, a command of "Left side paddle" would be called and vice versa.

Bite the water

With one hand firmly grasping the paddle about half way down the handle and another hand on top holding the T-handle, insert the paddle straight up & down until the top portion of the paddle is submerged and pull back.

Oversteering

Oversteering while paddling occurs very easily, therefore it is important to paddle as closely in unison as possible and to anticipate the moment the Bow of the raft or boat will be aligned with the desired heading to avoid "zig-zagging" through the water. This helps improve speed and efficiency in the water.

Minor adjustments

To aide in the maneuvering the boat, the Tillerman crewmember can dip his/her paddle in the water from their position in order to steer and make minor adjustments in the water to correct the heading of the boat. If this decision is made to do so, it is recommended to make the correction without making a command to the rest of the crew, as it may lead to confusion between commands and result in oversteering.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Pre & Post trip checks
Launching and Retrieving

NFPA 1006 JPR(s):
21.3.1, 21.3.12

Time:
15 Minutes

Scheduling Suggestions:
Classroom setting, should be taught on the first day
Trailer backing should be taught between rotations on the second day

Materials/Equipment Needed:
Lesson Plan (Power Point, video, white board etc.)
Tow platform and trailer on the second day

Instructor Requirements:
1:15 Instructor to Student Ratio

Objectives:
At the end of this lesson the student shall be able to:

- Understand the procedure for Pre-trip watercraft checks
- Launch site selection and methods of launching a boat in moving water
- Trailer Backing
- Understand the procedure for Post-trip watercraft checks

Introduction:
There are vital pre & post checks that need to be completed to ensure proper operation of your watercraft. Here we will cover those procedures.

Pre-Launch Checks:

- Air
  - Quickly verify the boat is properly inflated. Performance of the boat decreases significantly when underinflated.
  - Ensure speed tubes are closed
  - Ensure the control valves are set to Navigation
- Fuel and motor
  - Verify the fuel line is connected to the motor and the tank has fuel.
  - Remove the transom saver**.**
- Disconnect the tie downs on the stern.
- Disconnect the bridle at the bow.
- Once in deep enough water drop the motor into the water and start it.

Launch site selection and methods:

- The best site to launch a boat is in an eddy or an area away from the main current.
  - Often streets leading up to the main current will be flood water where a boat can safely be launched.
- Carrying the boat to an area for launch
  - If a site unable to be backed into the boat may be carried to the water.
  - Minimum of 6 rescuers required.
  - Labor intensive.
- Launching a boat in moving current.
  - Tie off boat at the rear ring on the upstream side with throw bag.
    - This method is used to prevent the boat from pointing upstream and causing the motor to swing around into shallower water.
    - The guides on the trailer will keep the nose pointed the correct direction until the boat operator is ready to get the boat underway.

Trailer Backing:

- Have a strategy in mind
  - If possible study the road and route you're taking. Often you will not be using a boat ramp to launch the Zodiac. Launch sites may include a road with rising flood water or an over flowing river bank in a field. When launching a boat in this type of situation use a spotter check the road/ ground conditions for debris, depth, and drop off. The emergency will likely dictate where you launch.
- Slow and steady
  - Slow down, set yourself up, and execute. Going slow and steady when backing up will not only ensure you avoid going the wrong direction, but also reduces the chances of damaging the Zodiac or trailer if you back into something. Pulling forward will help straighten the trailer and get it in line with the tow platform.
- Let go of conventional steering rules
  - One of the tricky things about backing a trailer is that when you turn the steering wheel to the right (Clock-wise), the trailer goes to the left. When turn the steering wheel to the left (Counter clock-wise), the trailer goes to the right.

Remember to take things slow, set yourself up, and make small adjustments. This will help to prevent oversteer and jack-knifing the trailer.
    - One trick that might help: keep a hand placed at the 6:00 position on the steering wheel and operate the steering wheel with this hand. By doing this, when you move the steering wheel to the right (Counter clock-wise) the trailer will go to the right. If you move the steering wheel to the left (Clock-wise) the trailer will go to the left.

- Practice
    - Drive and practice backing the boat trailer in open parking lots, driveways, and at boat ramps. As you get better, make it harder by making the spots tighter and longer stretches.

- Finally, remember to move the tow platform and trailer to an area that is safe from rising water.

Post trip check:

- Boat retrieval
    - Position trailer on ramp.
    - Prepare winch cable.
    - Walk or drive the boat to the back of the trailer, use guide lines if necessary to position boat and keep it straight.
    - Attach manual winch cable and bridle.
    - Shutdown and lift engine.
    - Winch boat onto trailer ensuring it goes on straight.
    - Once on fully drive tow platform and trailer to safe area out of the water.
- Secure boat
    - Attach stern tie downs to boat.
    - Transom saver.
    - Unload any loose unsecured items.
- Post trip inspection
    - Look for any damage that may have occurred during the operation
        - Check for any tears or punctures.
        - Check the propeller for damage.
    - Check fuel level and oil level.

Protect Texas Lakes and Waterways from invasive Plants and Animals:

- **Invasive Species**
    - Be aware of invasive species
        - Wash boat after use and particularly when moving between waterways to limit the potential to spread species
    - Non-native aquatic plants such as Hydrilla, salvinia and alligator weed can cause significant environmental harm. To curb the spread of these invasive

species, you are required by law to remove harmful plants and animals from your boat and trailer.

- Before launching and before leaving the boat ramp, you must:
  - Remove aquatic plants and animals from your boat, motor and trailer.
  - Drain your boat, motor and equipment
  - Rinse your boat, propeller, trailer and equipment.

Boat Operator Course
(Flood: Awareness & Operations)
(Swiftwater: Technician)

Class Title:
Maintenance & Inspections

NFPA 1006 JPR(s):

Time:
15 Minutes

Scheduling Suggestions:
Classroom setting, should be taught on the first day
Trailer backing should be taught between rotations on the second day

Materials/Equipment Needed:
Lesson Plan (Power Point, video, white board etc.)
Tow platform and trailer on the second day

Instructor Requirements:
1:15 Instructor to Student Ratio

Objectives:

- List daily & weekly inspections performed

Daily Inspection

BOAT & TRAILER

- Properly inflated
- All caps are on tight
- Items in boat are properly secured
- Motor mounts secured tightly
- Secured to trailer
- Fuel in tank
- Fuel line is disconnected
- Visually inspect trailer for tire inflation

Weekly Inspection

TRAILER

Trailer should be checked weekly and after each use to make sure it is ready for the next incident.

- Tongue
  - Correct ball size
    - 2 15/16
  - Safety chains
    - Present and in good condition
  - Safety pin
    - Present
  - Wiring harness
    - Intact and serviceable
  - Trailer Jack
    - In good condition to support trailer and stows properly
  - Spare tire
    - Properly inflated
    - Good tread
- Trailer Box
  - Check to make sure inventory is complete

- Axle
  - Bearings
    - Check for looseness
      1. If loose:
         a. Check to see if the nut is tight
         b. Check to see if it needs grease
         c. Or the bearing may be damaged
    - Check for heat
      1. At each stop while in use touch the hub and feel for excessive heat
      2. If you feel heat, check the hub to see if it needs grease

    - Check that the Bearing cap present

  - Tires (including spare)
    - Properly inflated
    - Good tread
  - Tail lights
    - Lenses are not broken
    - All lights are functional

MOTOR (Evinrude ETEC 40hp)

The weekly and after use inspection should be the same.

Fuel line will remain disconnected to prevent fuel from being forced through the motor

- Make sure fuel tank is full, tethered and in good condition
- Fuel line is connected securely to the fuel tank
- Attach flushing ears to lower unit
    - Observe stream from motor
        - 2019 motors should have strong stream
            1. High pressure, low volume
        - Motors prior to 2019 should have stream strong enough to clear lower fins
            1. Low pressure, high volume
    - Shift motor to forward then reverse
        - Listen for unusual noises
        - No need to over rev the motor,
        - Make sure motor idles smooth
        - Make sure motor runs smooth while in gear

- Motor has proper amount of oil
    - Do not over fill
    - DO NOT OVER TIGHTEN THE CAP!
    - Do not force latches on the cowling closed

- Prop is in serviceable condition
    - Piranha blades to second ridge is good

- 3 Kill switches are present
    - Boat Operator
    - Bowman
    - Tiller handle

- Make sure motor is secured to the transom
    - Bolts are tight
    - Motor transom clamps are hand tight

- Motor is secured with a Transom Saver
    - Strap and bungee cord
    - Transom saver is secured to trailer and in good functional condition

BOAT (Zodiac FC420)

The boat should be checked weekly and after each use to make sure it is ready for the next incident.

If foreign material is found inside boat it should be disassembled, cleaned, inspected and reassembled before putting it back into service.

Weekly inspection

- Connected to trailer winch
  - No excessive pressure

- Properly Inflated
  - Boat Gunnels & Speed Tubes
    - Do not bend end of tubes to determine pressure as this damages the inside seams
    - Turn valves to inflate to allow the Gunnels to equalize
    - Open clamps to speed tubes
    - Attach the pressure gauge to one valve
    - Add air with air bottle until gauge is in the GREEN/4 PSI
    - Turn valves back to Navigate when completed
    - Tighten clamps to speed tubes

  - Keel Tube
    - Does NOT have pressure relief valves!!!
    - Inflate to GREEN/4 PSI with foot pump and check with pressure gauge
    - Make sure cap is TIGHT

  - Verify ALL Caps on tight

- Check the boat for complete inventory

Trailer Box Inventory			
3/8" socket set (3/8" to 1")	1	**Equipment Bag**	
XD50 oil (1 gallon)	1		
WD40 (can)	1		
4 way tire iron	1	Fuel line (extra)	1
Grease gun with grease	1	Duct tape roll	1
Piranha prop kit (hub, prop wrench, 6 prop blades)	1	Funnel (medium size)	1
Bottle Jack	1	Motor flush ears	1
Wheel hub kit (hub, washers, lug nuts, cotter pin, dust cap)	1	Boat pressure gauge	1
60 minute air bottle	1	Flex seal tape	1
Tool bag		Gas rated teflon tape	1
Allen wrench 1/4" T handle	1	Extra tie down straps	2
Needle nose pliers	1	Pull cord with handle	1
Vise grips (medium size)	1	Zip ties (package)	1
12" crescent wrench	1	Chem Sticks-Green	4
12" Tool bag (in trailer box)	1	Trailer hitch lock with padlock	1
Channel locks	2	**Small Organizer Box**	
Phillips head screw driver #2	1		
Flathead screwdriver	1		
Open end wrench 9 piece set (1/4" to 7/8")	1	Prop nut kit (nut, spacer, cotter pin)	1
Punch and chisel set	1	Tongue Pin (trailer)	1
Hammer, ball-peen	1	1.98" dust cap	2
Diagonal wire cutter	1	7 to 4 way trailer adapter	1
Rubber mallet	1	transom saver pin	1

Check boat Pelican Case for complete inventory

- Boat transom is positioned on trailer properly
    - Sitting on the runners

Disassembling the Zodiac Boat

- Remove motor
- Deflate boat
- Remove floor
    - Remove stringers
    - Remove the four floor panels
    - Wash all floor components
- Inflate boat
- Stand boat up bow first

- Wash and rinse boat
    - Make sure to remove sand, rock and debris
- Inspect the bottom of floor for holes
- Inspect metal trim where floor attaches to transom at the bottom
    - Should not be loose
- Verify keel tube is properly secured
- Deflate boat
- Install floor
    - Replace the four floor panels
    - Replace stringers
- Inflate boat
- Reinstall motor