

West Virginia Wildwater Association Safety and Rescue Overview

Introduction

The information in this document is meant to be an overview. We highly recommend that you take a Basic Safety or Swiftwater Rescue class, CPR training and some level of First Aid training. You can also find a wealth of information in:

- Whitewater Rescue Manual, Charles Walbridge and Wayne A. Sundmacher Sr.
- River Rescue, 3rd ed., Les Bechtel and Slim Ray
- Swiftwater Rescue, Slim Ray
- Medicine for Mountaineers, J.A. Wilkerson, editor
- NOLS Wilderness First Aid, T. Schimelpfenig and L. Lindsey
- Outward Bound First Aid Manual, J. Isaacs and P. Goth
- Hypothermia, Frostbite and Other Cold Related Injuries, J.A. Wilkerson, C.C. Bangs and J.S. Hayward

International Scale of Whitewater Difficulty By American Whitewater

Class I Rapids

Fast 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.

Class II Rapids: Novice

Novice Straightforward rapids with wide, clear channels which are evident without scouting. Occasional maneuvering may be required, but rocks and medium-sized waves are easily missed by trained paddlers. Swimmers are seldom injured and group assistance, while helpful, is seldom needed. Rapids that are at the upper end of this difficulty range are designated "Class II+".

Class III: Intermediate

Rapids with moderate, irregular waves which may be difficult to avoid and which can swamp an open canoe. Complex maneuvers in fast current and good boat control in tight passages or around ledges are often required; large waves or strainers may be present but are easily avoided. Strong eddies and powerful current effects can be found, particularly on large-volume rivers. Scouting is advisable for inexperienced parties. Injuries while swimming are rare; self-rescue is usually easy but group assistance may be required to avoid long swims. Rapids that are at the lower or upper end of this difficulty range are designated "Class III-" or "Class III+" respectively.

Class IV: Advanced

Intense, powerful but predictable rapids requiring precise boat handling in turbulent water. Depending on the character of the river, it may feature large, unavoidable waves and holes or constricted passages demanding fast maneuvers under pressure. A fast, reliable eddy turn may be needed to initiate maneuvers, scout rapids, or rest. Rapids may require "must" moves above dangerous hazards. Scouting may be necessary the first time down. Risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. Group assistance for rescue is often essential but requires practiced skills. A strong eskimo roll is highly recommended. Rapids that are at the lower or upper end of this difficulty range are designated "Class IV-" or "Class IV+" respectively.

Class 5: Expert

Extremely long, obstructed, or very violent rapids which expose a paddler to added risk. Drops may contain** large, unavoidable waves and holes or steep, congested chutes with complex, demanding routes. Rapids may continue for long distances between pools, demanding a high level of fitness. What eddies exist may be small, turbulent, or difficult to reach. At the high end of the scale, several of these factors may be combined. Scouting is recommended but may be difficult. Swims are dangerous, and rescue is often difficult even for experts. A very reliable eskimo roll, proper equipment, extensive experience, and practiced rescue skills are essential. Because of the large range of difficulty that exists beyond Class IV, Class 5 is an open-ended,

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multiple-level scale designated by class 5.0, 5.1, 5.2, etc... each of these levels is an order of magnitude more difficult than the last. Example: increasing difficulty from Class 5.0 to Class 5.1 is a similar order of magnitude as increasing from Class IV to Class 5.0.

Class VI: Extreme and Exploratory Rapids

These runs have almost never been attempted and often exemplify the extremes of difficulty, unpredictability and danger. The consequences of errors are very severe and rescue may be impossible. For teams of experts only, at favorable water levels, after close personal inspection and taking all precautions. After a Class VI rapid has been run many times, its rating may be changed to an appropriate Class 5.x rating.

Paddler Rating Scale (as used in the WVWA calendar)

BEGINNER	May contain rapids not exceeding Class I in difficulty
NOVICE	May contain Class I and II rapids with an occasional easy Class III
INTERMEDIATE	May contain Class II and III rapids with an occasional easy Class IV
ADVANCED	May contain a full range of Class III-IV rapids
EXPERT	Trips at this level are not schedule by the WVWA

American Whitewater's Standard Rated Rapids

The current list of AW's standard rated rivers can be found at:

<http://www.americanwhitewater.org/content/Wiki/safety:class1benchmarkrapids?>

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The “Knows”

- Yourself and your group – strengths, weaknesses, physical and mental condition, gear carried, medical problems, ...
- The river – put in/take out; hazards; evacuation routes, ...
- The weather – what do you expect (and what if you are wrong?)
- The hazards – river features, critters, vehicles, people, the environment, bad judgment, gear failure, ...
- The important skills – paddling, rescue and first aid. The more you know, the more likely you'll be able to help. Convince your partners to learn new material.

Personal Preparedness

- Wear a good Personal Floatation Device (PFD) - ALWAYS.
- NEVER boat alone.
- Be a competent swimmer, comfortable in the water, with the ability to handle yourself underwater and in whitewater.
- Have a realistic picture of your paddling ability. Never attempt a river where your inability may jeopardize yourself or your fellow paddlers. Be conservative.
- Know & respect river classifications.
- Be suitably clothed & equipped.
- Secure any rope, which may possibly become entangled in your limbs. Be especially cautious of bailer lines.
- Be practiced in rescue, self-rescue, escape, and first aid.
- **If you suffer from a known medical condition, bring appropriate medication and advise others of your condition.**

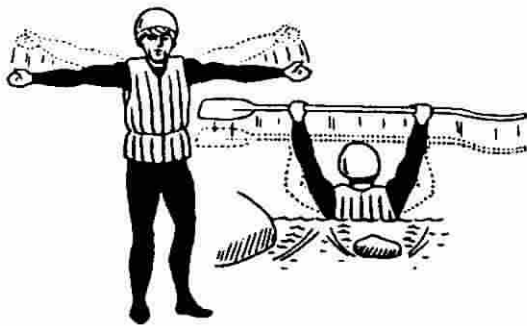
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River Signals

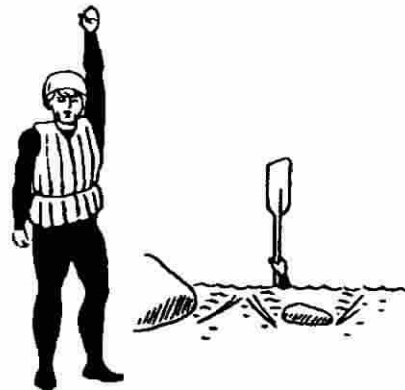
Whitewater can be quite noisy. With paddlers traveling at safe distances apart, it can be difficult for members of a group to communicate effectively with one another. A common “language” of sound and visuals, river signals, is frequently used.

First is the audible signal – three loud blasts or a whistle. It is used to get the attention of others. Everyone on the river should have a whistle readily accessible but should use it for emergencies only. **NOTE:** Do NOT fasten a whistle to the zipper pull on your PFD. The force of the water against the whistle can unzip your PFD!

Visual signals are also used on the river as noted below. They are performed with arms or paddles, as illustrated. They may be given alone, also illustrated, but may also be used in conjunction with the audible signal. When any of the signals is used, it should be passed on to others in the group immediately. The group should take action appropriately in response.



STOP: Potential hazard ahead. Wait for “all clear” signal before proceeding, or scout ahead. Form a horizontal bar with your paddle or outstretched arms. Move up and down to attract attention, using a pumping motion with paddle or flying motion with arms.



ALL CLEAR: Come ahead. (In the absence of other directions, proceed down the center.) Form a vertical bar with your paddle or one arm held high above your head. Paddle blade should be turned flat for maximum visibility.



HELP/EMERGENCY: Assist the signaler as quickly as possible. Give three long blasts on a police whistle while waving a paddle, helmet or life vest over your head in a circular motion. If a whistle is not available, use the visual signal alone.



WHERE TO GO: To signal a particular direction or a preferred course through a rapid around an obstruction. Aim the paddle or arm in a 45° angle to the side of the river with the preferred route. **NEVER POINT TOWARD THE OBSTACLE YOU WANT OTHERS TO AVOID!**

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Rescue Sequence

- First protect yourself and everyone else.
- Then rescue:
 - People
 - Big gear (boat – generally first – and paddle)
 - Little gear (bags, ropes, water bottles, etc.)
- Generally, try simple rescues first, then move to more complex techniques.
 - Simple rescues are faster; complex rescues take more time and more time means decreased
 - Survival chances. However, some simple rescues place the rescuer at much higher risk.
- General techniques available to the rescuer:
 - Talk – Reach – Throw – Row – Tow –Go – Helo (helicopter)
 - Consider the situation – stable/unstable, heads up/heads down?
 - What are the likely consequences of your actions, or your failure to act?

Self Rescue

1. Get on the upstream side or end of your boat IMMEDIATELY! WASTE NO TIME! Even slow current can make a battering ram of a boat. Being caught between a boat and an obstruction is extremely dangerous. Serious injury may result.
2. When swimming in whitewater, float on your back with your feet on the surface and downstream of your head (the defensive swimming position). When dropping over falls or through narrow areas, ball up in the tuck position to prevent entrapment of arms or legs, then resume the defensive swimming position.
3. **Do Not** attempt to stand up, even in slow moving water, before it is more than knee-deep. Knee-deep, slow moving (2 to 3 feet per second) should be okay. Foot traps exist in all streams and moving water can drown you very quickly if your foot is trapped between a couple of rocks or the fork of an underwater limb or if a pant leg catches on an underwater snag. Whenever possible, work your way into an eddy before standing.
4. Look for a safe landing place on shore and attempt to tow your boat to shore by swimming with a side stroke and scissors kick, watching downstream at all times. LEAVE THE BOAT AND GO FOR SHORE ONLY IF YOU CANNOT MAKE IT SAFELY WITH THE BOAT. If caught in a downstream hazard, very cold water will sap your strength very, very quickly.
5. When you get near shore, watch for strainers and other shore obstructions. You may have to wait for a clear shore to land. Do not attempt to land on the outside of a curve or where trees and limbs are brushing the water, unless even greater danger lies immediately downstream.
6. Hang on to your paddle unless personal safety requires you to abandon it.
7. Remain calm and help as much as possible with your rescue.
8. **FOLLOW THE INSTRUCTIONS OF RESCUERS.** They are usually in a better position to evaluate hazards and determine appropriate action than you are.

Rescuing Others

1. Rescue people first, equipment later.
2. In the recovery of equipment, avoid taking unnecessary risks which might further endanger yourself or others. Always try to carry a spare paddle.
3. Carefully observe victims of long or difficult swims for signs of hidden injury, shock, or hypothermia.

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Hypothermia

Hypothermia is the cooling of the body to such a point that it can no longer maintain a constant temperature. Paddlers are mainly concerned with immersion hypothermia, which is caused by cold water flowing around the body, but wind-chill hypothermia can also be a factor.

The best way to deal with hypothermia is to prevent it.

1. Wear proper clothing: drysuit, wetsuit, wool, polypro, pile or a combination, plus a wind breaker layer, like spray jacket/pants, and protection for the head, such as a helmet and/or wool cap or polypro balaclava.
2. Know your ability and paddle one class lower than your ability when the air and/or water temperatures are cold. Paddle only short runs with easy access. Roads alongside help.
3. Avoid flooded rivers.
4. Bring spare clothes, plenty of liquids (no alcohol), extra sugar foods, personal medications, waterproof matches and chemical fire starter, if applicable. Tie them into the boat in a waterproof container or bag.
5. Eat well before trips, get plenty of sleep and pack high-sugar foods in with a nutritious lunch.
6. Drink plenty of liquids while exercising.
7. Maintain a high level of activity, but do not over-tire yourself.
8. If you find yourself in the water, get out of the water ASAP. If you cannot get your entire body out of the water, try to get as much of your head and torso above water as possible. (Water wicks body heat away 25 times faster than air.) Avoid unnecessary movement as that increases heat loss under water.
9. When in doubt, stay home.

Hypothermia Treatment

Know the warning signs of hypothermia – shivering, clouded mental faculties, muscular rigidity, even unconsciousness with diminished respiration. Then take action to keep matters from getting worse as soon as you recognize the symptoms. Hypothermia affects judgment and coordination and is insidious in its effects. A good example is the paddler who swims once and gets cold, then starts missing his roll and swims again and again, becoming colder and more exhausted each time until he finally becomes hypothermic. Keep an eye on people after they swim. If it happens again right away, and they are shivering, it is time to suggest a warm-up.

The first thing to do is to get the person out of the water and on shore. Do not go to an island unless that is your only option, as it is more difficult to evacuate someone from there.

In the early stages the patient can walk, and that's exactly what he should do. Walking will re-warm him and get him away from the probable cause of his hypothermia – cold water. Consider walking out from the site, but don't let the patient do it alone. Hypothermia is notorious for clouding a person's judgment, and people have become lost on simple trails because of it. At least one and preferably two people should accompany the patient.

When walking, do not ignore wind chill, rain and other factors. There have been several fatalities when paddlers have tried to walk out in very poor conditions and never made it. If you are carrying basic survival gear (including matches or a lighter), it may be better, especially if you can find a protected spot, to try to re-warm the patient on the spot while someone goes for help. Build a fire and if possible get the patient into dry clothes or a sleeping bag. If these aren't available, use extra clothing from other members. Give the patient a warm, nonalcoholic drink. Alcohol only makes the situation worse.

This treatment will not work in the second stage of hypothermia (body core temperature: 90-95 degrees F.). The point at which hypothermia becomes critical is when the body cannot re-warm itself without outside help, even in a dry sleeping bag. One solution at this point is to use body heat from other members of the group in a "human sandwich". Skin-to-skin contact is necessary if this is to work. Another solution is to heat moist life jackets in front of a fire and wrap them around the patient's torso, exchanging them for freshly warmed ones when cool. **DO NOT RUB THE VICTIM'S ARMS AND LEGS IN AN ATTEMPT TO WARM UP THE SKIN.** Such stimulation only hastens the flow of cold blood to the heart and throughout the body and can cause more severe damage, even heart attack.

The more advanced the hypothermia, the less effective re-warming technique will be. In the advanced or third stage (body core temperature: 90 degrees F. or less) there is a danger of cardiac arrest if the patient is

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suddenly re-warmed (as by being put into a heated car or cabin), since this causes the stagnant chemically unbalance blood from the limbs to start recirculating again. This stage of hypothermia is on the whole easily recognized: the patient is unconscious. Field re-warming is impractical and the patient must be evacuated to a hospital. The limbs should be left uncovered but the torso kept warm. As with CPR, though, don't give up. People have been revived with a core temperature of 64 degrees F. and no heartbeat. An unconscious victim should be treated for shock.

Prevention works best. Take a Red Cross First Aid course and/or a club-sponsored Safety Clinic for more information and education.

Shoulder Dislocation

Whitewater paddling can cause a variety of injuries: broken limbs and noses, sprains, cuts and others. A common injury, particularly among kayakers, is a dislocated shoulder. A shoulder dislocates when the ball of the upper arm pops out of the socket of the shoulder. It is usually very painful and under normal circumstances should only be "reduced" (put back in place) by a doctor.

Shoulder dislocations are frequently caused by poor paddling technique. A typical case is when a paddler extends his arm away from his body, rotates it rearward on a brace, turns his head in the opposite direction and receives a jarring blow. All paddlers should take the time to learn proper paddling technique and methods of avoiding shoulder dislocations.

First aid field treatment is to put a sling on the arm and then tie a swath bandage around the body to keep the arm immobilized. The patient should be evacuated, and although he can usually walk, he should not be sent out alone: pain from a shoulder dislocation can induce shock.

Paddlers venturing into remote areas may want to discuss methods of reducing a shoulder dislocation with their doctor. This is especially true of those who have suffered a dislocation in the past, since they are more likely to have it happen again. The longer the shoulder remains "out", the harder it is to put back in.

Rescue Gear

Rope – every paddler needs at least one throw rope. The smallest available bags contain 50 feet of ¼ inch diameter polypropylene rope, and are simply too small to be of much use in a rescue situation. Although ¼ inch spectra lines are stronger, they are tough on your hands and they cannot be used for haul systems because of their small diameter. 5/16 inch diameter ropes are more comfortable on your hands and can handle larger loads, although they are only useful for people rescues (not boats). They make a good backup line.

For rescue purposes, a 70 foot 3/8 inch diameter line is best. Polypropylene lines stretch more (as much as 30% stretch before breaking) and have a fairly low breaking point (1900 to 2400 pounds). They work well for swimmer rescues but, because they stretch so much, polypropylene lines are not ideal for haul systems. Spectra lines have almost no stretch (less than 5%) and, because of their higher breaking strength (4000+ pounds) are useful for situations when you need to haul boats out of a pin. Polypropylene throw bags cost \$20 to \$45; spectra bags cost \$70 to \$90. Consider buying an additional 100 foot or longer spectra line for use in areas where there is a high potential for pinning (e.g., remote creeks)

Knife – if you have a rope, you need some way to cut it. Fixed or folding blade, double or single edge, pointed to blunt all work well, although personal opinions vary widely. Folding knives must have a blade locking mechanism. Rubberized grips may make the knife easier to hold. Remember that knives are both tools and weapons – be careful to avoid hurting yourself and those around you. Alternatives to knives include trauma shears and seat belt cutters (\$5-\$6 for either). Knife manufacturers include Gerber, Buck, Spyderco and Schrade; cost is \$15 to \$200+ (for custom knives), typical costs are \$30 to \$50.

Whistle – essential for signaling. Pea-less whistles are better for use around water (\$2-\$6).

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First Aid Kit – take a first aid class and learn how to use the kit. Every paddler should know how to do CPR and provide basic first aid. Remember, 911 doesn't cut it on the river. See the section later in this document for a list of suggested first aid supplies. Cost is \$5 up to whatever you want to spend (easily over \$500); a well-stocked kit appropriate for boaters should be \$30 to \$100.

Webbing, Prussicks, Carabiners – all are essential components of simple technical rescue systems. Each rescuer should have at least one length of 15+ foot long, one inch diameter tubular nylon webbing, two 6+ foot 5 or 6 mm prussic cords and 2 or 3 locking carabiners. Total cost for the package is \$20 to \$30. If everyone carries these basic materials, fairly advanced rescue systems can be created by pooling the group's gear.

Saw – small folding saws are useful for strainers, rapid boat removal/destruction and cutting firewood. You'll rarely use one but, when you need it, nothing else will do. Look in camping supply areas at WalMart or Kmart, in camping stores, or in a hardware store. Cost is \$10 - \$25.

Depending on your personal experience, you may wish to add items to the above list. If you do so, remember that other people may not know how to use the equipment in a safe fashion.

Knots

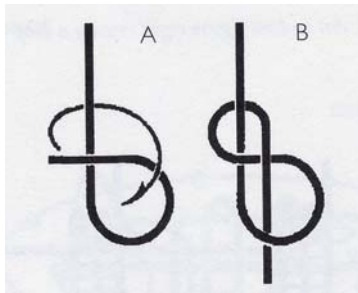


Figure 8 Stopper Knot

Used to hold something in place on a rope, such as the foam block in the bottom of a throw bag.

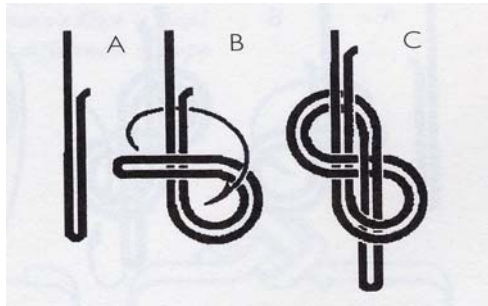
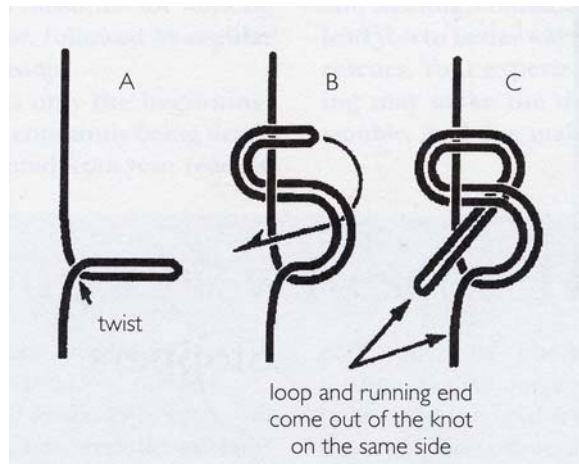


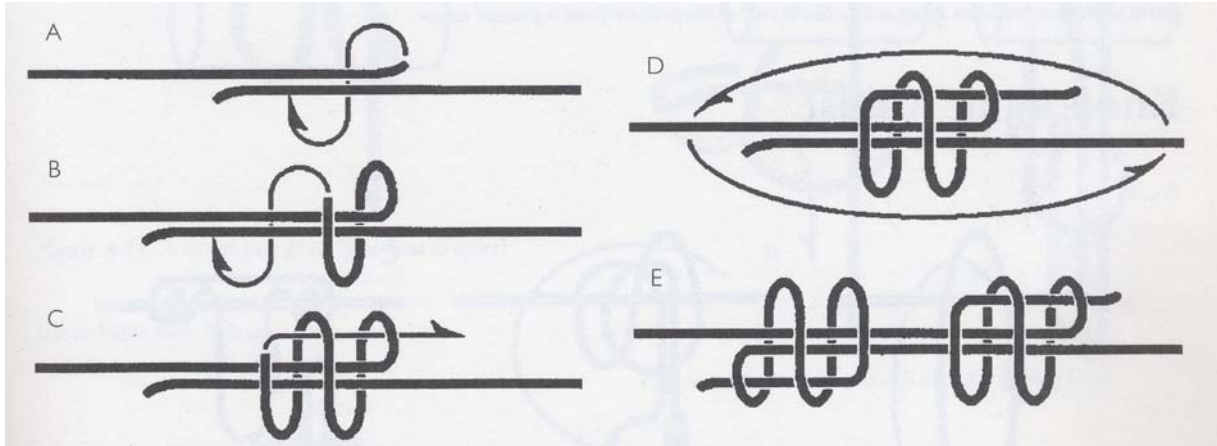
Figure 8 on a Bight

Creates a strong, reliable loop in the end of a rope. It is now used in place of a bowline knot because it is easier to tie, easier to untie after being loaded, and much stronger.

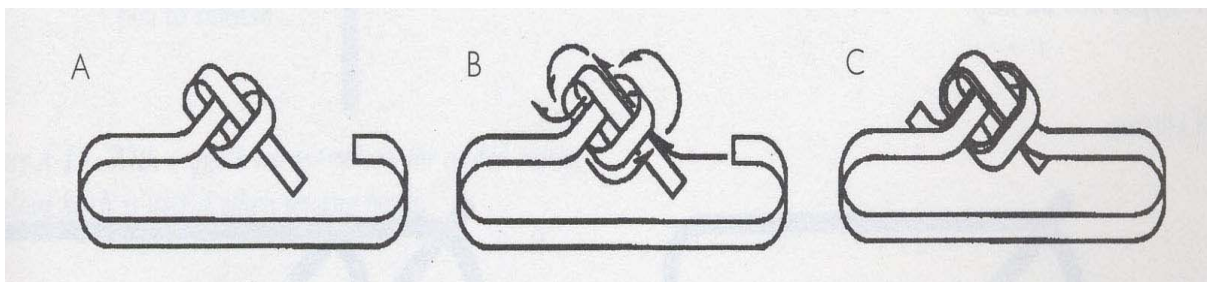


In-line Figure 8 Knot - Creates a loop at mid-line made to be pulled in the line with the rope.

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Double Fisherman's Knot – used to join two ends of rope together securely. After loading, this knot is difficult – if not impossible – to untie.



Water Knot – used to join two ends of webbing. This knot is actually a trace knot, built upon a simple overhand knot.

For more detailed instructions on tying these and other knots, go to: <http://www.animatedknots.com/>

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Personal First Aid Kit – for Day Trips

Contents will vary according to individual preferences and training. The following is a representative example:

Medicines:

- Aspirin or substitute
- Tylenol
- Antihistamine (Benadryl)
- Ibuprofen
- Antacid
- Antiseptic (Betadine)
- Tincture of Benzoin
- Triple antibiotic ointment
- Eye drops
- Sun block and lip balm
- Personal medicines (e.g., bee sting kit, asthma medication, etc.)

Dressings:

- Band-aids (12 1" size)
- 2x2 and 4x4 sterile dressings
- Butterfly strips
- Moleskin (1 or more sheets)
- Adhesive tape (1 roll, 1" waterproof)
- Gauze roll (1 2" size)
- Elastic bandage (Ace – 1 3" size)
- Triangular bandage (1 large)
- Steri strips (topical sutures)
- Spenco Second Skin

Other

- Disposable gloves
- Face Shield (for rescue breathing)
- Safety pins (3 large)
- Tweezers
- Scissors (or EMT shears)
- Penlight
- Duct tape
- Aquaseal
- Emergency blanket
- Butane lighter or waterproof matches
- Pencil and paper
- Emergency contact information
- Cash for phone calls, gas, etc.