SAR Field Team Member, Instructors Guide

Search and Rescue Field Team Member

This course is intended to prepare each student to be a field team member in wilderness search and rescue. Students should be prepared to serve as a member of a task force or strike team given typical grid, hasty, canine, or mountain bike assignments in non-technical land search operations in wilderness, rural, suburban, or urban environments in searches for missing persons. This course is similar in scope to NASAR's FUNSAR course.

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Course Objectives

The objectives of this course are to:

1. Produce students who are able to safely and effectively operate in the field in land SAR operations in all weather (cognizant of proper clothing and footware, hazard recognition, hazard mitigation, survival, and terrain traversal), and to recognize hazardous conditions for which specialized resources (e.g. technical rescue teams) are required.

2. Produce students who are able to be clue aware searchers operating under ICS for an authority having jurisdiction.

3. Produce students who are able to, as a member of a task force or strike team, given a land search assignment, effectively navigate and carry out appropriate field tactics to complete the assignment.

The focus of this course is on core skills for ground searchers as members of human or canine tasks. It is designed to lay a foundation for future learning towards field team leadership, mantracking, search management, or technical rescue specialties. This course describes some aspects of search management, giving a field team member a perspective into some of the approaches and documentation that the overhead team uses to manage a search.

Materials and Supplies

Texts:

Cooper, D.C. ed. 2005. Fundamentals of Search and Rescue. National Association of Search and Rescue. Jones and Bartlett, Sudbury. 341pp.

Smith, R., et al., 2007. Basic Search and Rescue Skills; 2007; A Practitioners Guide to Search & Rescue (2nd ed). ERI Canada and ERI International, Calgary.

Supplemental Reading:

NASARC, 2011. Land Search And Rescue Addendum to the National Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual. 278pp.

FEMA, 2005. Typed Resource Definitions; Search and rescue resources. FEMA 508-8. 41pp.

Required Equipment for Each Student.

Compass (preferably baseplate and mirror with adjustable declination).
12" Ruler
Pen or pencil
Sharpie
Roll of flagging tape.
6 foot length of 7 to 9 mm nylon kernmantle rope.
Boots with ankle support.
Outdoor clothing appropriate to weather.
Tracking stick
Hair ties, or other means to mark tracking stick.

Optionally, a 24 hour pack as specified by the NASAR SARTECH II pack list.

Optionally, a GPS.

Required Equipment and Supplies for the Course.

Handouts (one per student, unless otherwise noted)
- Sign in sheet (1 per day).
- Course Syllabus (course_outline.odt).
- FEMA/NIMS Search and Rescue Resource Types (hardcopy of pp 39-41).
- NEWSAR Code of Ethics
- ICS 211 – Incident Check-in List
- ICS 219 (1-8,10) – T-cards/Resource Status Cards
- ICS 221 – Demobilization checkout
- CC-BY-SA paper: Conover, 2013. Legal Issues in SAR (SAR-Legal.pdf).
- USGS USNG Instruction sheet. USNGInstruct_No1v4_No2_r.pdf

USGS USNG example map. USNG_Training MapV1.pdf
CDC Drinking water treatment methods for backcountry and travel use cdc_12378_DS1.pdf
ICS-204
SAR Task Assignment Form (any appropriate form for region)

Maps

Paired topographic map and orthophotoquad, one for each pair of students (attached to unit 4 of the instructor's guide)

Topographic map, one for each pair of students (attached to unit 17 of the instructor's guide).

Topographic map, one per 2 students (may be any arbitrary maps).

Topographic maps of the area where the course is being held, one per 2 students.

Set of topographic maps of an area (with a UTM grid), one per student.

Compass, one per student.

Set of topographic maps of an area, one per student, each map with a different point marked on it (for triangulation exersise).

Set of topographic maps of an area (with a UTM grid), one per student, each map with a different point marked on it (for UTM exersise).

Set of trail or streetmaps of an area (without a grid), one per student, each map with a different point marked on it (for SDMRT exersise).

A ruler, one per student.

Optionally, GPS recievers, one per each pair of students.

Blanket or tarp and about 25 random things to play Kim’s game (unit 8).

A globe.

Means to accurately measure 100 meters.
Flagging tape
Survey marker flags, one of one color, one for each student in a second color.

Tracking

Rake
Tracking stick
Hair ties or other means to mark tracking stick.
Flags to mark track starting points
Headlamp, with means to afix to end of tracking stick.

Rope:

Two, different color, 6 to 10 foot lengths of nylon kernmantle rope 9 to 13 mm diameter, for demonstrating knots (should not be too stiff).

One 6 foot length of nylon kernmantle rope, 7 to 9 mm diameter, for demonstrating prussik knot (smaller than above).

Hardware:
Locking carabiner

Litter, rigid.

Webbing:
Six 10-12 foot lengths of 1" tubular webbing (Litter carry)
One 40 foot length of 1" tubular webbing (Litter tie down)
Two, different color, 4 to 6 foot lengths of 1" tubular webbing (demonstrate water knot)
One 15 foot length of 1" tubular webbing (demonstrate swiss seat)

Optionally, if unit 25 is being run as a tabletop exercise:
Maps and forms prepared to support a mock search.

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Disclaimer

This guide is not a complete manual for search and rescue response. The materials are not meant to replace field training by competent search and rescue leaders or to replace actual experience. NEWSAR and the authors and contributors do not endorse any specific equipment mentioned or shown in this program. The authors, contributors, and NEWSAR take no responsibility for the use of this guide or the information contained within. The authors, contributors, and NEWSAR take no responsibility and cannot be held liable for statements made by instructors who use this guide. It is the duty of every community, organization, volunteer group, and agency, to obtain the knowledge, skills, and proficiency to perform and maintain effective search and rescue management and operations. The information presented in this guide serves as a beginning outline and body of knowledge for proper search and rescue response programs at the community level.

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Revision History

2014 May 14: Initial draft of syllabus presented to NEWSAR board and given preliminary approval to proceed. "They thought it was a terrific idea and commended you on the work you put in to developing the syllabus." "The point was that your outline was very extensive and would serve the students very well if they completed training all the listed subjects. The Board also agreed that NEWSAR would not expect any fee from sponsoring this, but would produce certificates for graduates (my job) as part of its commitment to low-cost/no-cost SAR training. The fee structure would be up to you and your team to cover the cost of any materials."
2014 Sept 09: Initial draft of NEWSAR FTM Instructors Guide forwarded to NEWSAR board for review.
2014 Sept 14: Draft. Verbal approval from NEWSAR board members to proceed.
2014 Sept 15: Draft. Updates to crime scene preservation and survival units from NEWSAR annual training.
2014 Oct 1: Release 0.1. Objectives, Training Plan with outline in place for all units. Updates to rope section following comments from Lt. Leverone. Guide is in a form suitable for use, with the caveat that materials and supplies lists may be incomplete, and have not been reconciled between the individual units and the summary in Equipment Required for the Course.
2014 Nov 20: Release 0.2. Revisions following first delivery of the course.
2015 Sept: Release 0.3. Revisions following second delivery of the course, distributed at NEWSAR annual training, 2015.
2017 Oct 15: Release 0.4. Cleanup and consolidation of equipment list. Revisions from feedback at NEWSAR AT, Revisions following third delivery of the course. Added a map to the Canine/Equine SAR unit. Reorganized distribution of learning objectives and content in the Land Navigation Units. Merged Helicopter operations into Mountain Bike/ATV/Snowmobile (now unit 19) reducing from 26 units to 25. Moved Unit 4 maps into a separate file. Moved Task Assignment form unit from day 3 to day 2, numbering as Unit 17 and renumbering units 17-21. Adjusted time allocation of units.. Added Kim's game as a practical evolution in unit 8. Enhanced information on tick borne illnesses and poison ivy along with mitigation measures in unit 11 Hazards. Added FEMA Structure/Hazards Evaluation marking and Search Assessment Marking. Added some information on standards related to the subject matter of each unit. Added references to ASTM and NFPA standards. Revised GPS/communicating location units. Clarified use of flat/low angle/high angle.
2017 Oct 20: Release 0.4.1, Correcting typo for HIPAA in unit 7, adding more speaker's notes to unit 3. Corrected error in building of compiled speaker's notes pdf files, notes for units 6,15,and 22 were missing from the compiled speaker's notes files.

Course Units

The course is broken into 25 units in 4 modules (of about 6 hours each) and is designed to be taught in either 3 or 4 days. If taught in 4 days, plan for one module per day (units 1-7; 8-14; 15-20; and 21-

25). If taught in 3 days, units 1-9 can be covered on the first day, units 10-16 on the second, and 17-25 on the third. Time frames for each unit are suggestions.

Land navigation is considered sufficiently important that 4 units are dedicated to it. These are deliberately spread across the course with some repetition. Likewise, three units are dedicated observation skills and search tactics, again spread through the course with some repetition. This repetition of material is by design.

Module I: Search and Rescue

Unit 0: Introduction

Topics: Introducing the course. Course Logistics.
Time Frame: 15 minutes.
Method: Lecture, Around the room introductions.

Training Plan:
Introduce the course,

Outline:

Welcome
Introductions – instructor(s)

Fire exits, bathrooms.

Logistics for the course – handout course outline, schedule, text(s).

Introductions – round the room, name, affiliation, SAR background.

Course Description:
- Purpose of the course.
- The role in a search for which this course prepares you (Field Team Member).
- How it relates to other SAR courses, credentialing and certifications
  - (Third slide in the presentation 0_intro).

Describe requirements, equipment, etc.

Materials Needed:
- Sign in sheet.
- Course Syllabus.

Unit 1: SAR Systems, Search Crucials

Topics: Introducing Search and Rescue, describing the response systems for aeronautical and ground search and rescue, overview of land search operations. Introducing the Search Crucials, short phrases that describe key elements of Search and Rescue operations.
Related Standards: ASTM F2209-14 11.1.1, 11.1.2, 11.2, 11.3, 12.1.1, 12.1.2, 12.1.4
Methods: Lecture/Discussion
Time Frame: 40 minutes

Objectives:

Define the following terms: Search, Rescue, Lost, Missing.
Describe the international system for aeronautical SAR response.
Describe the function of ELTs, EPIRBs, and PLBs.
Describe the difference between a PLB and a non COPAS/SARSAT SEND.
Describe the response systems for inland SAR in missing person incidents.
Describe the phases of a missing person response.
Describe the role that this course is preparing you for in a search.
List the 7 search crucials.
Describe why Search is an Emergency.
Describe the role and importance of the Investigation function in a SAR response.
Describe the importance of clues and clue detection in a SAR response.
Explain why close grid search is not an immediate action in ground SAR.
Explain why containment is important in a SAR response.
Explain the importance of ICS and managing by objectives in a SAR response.
Explain the importance of the clue log, accountability, maps, and written objectives in a SAR response and which ICS functions serve to manage information in a search.

Training Plan: Present on SAR Systems and on the Search Crucials following the outline below. Facilitate discussion not just of the meanings of lost and missing, but more importantly, of each of the search crucials when working through the examples of lost and missing subjects.

Outline:

- Search and Rescue (definitions)
  - Locate + Access,Stabilize,Transport.
- International SAR systems
  - International agreements and global cooperation for Aeronautical and Maritime SAR.
  - Land SAR, mix of Federal/State/Local responsibilities.
- SAR Stages (as a lead in to a response to a radio distress beacon)
- COPAS-SARSAT
- ELTs, EPIRBs, PLBs
- non COPAS/SARSAT SEND devices
- Inland SAR

Key Federal players

State/County/Local: Introduce “authority having jusisdiction”

Olive Model – distinguishing catastrophic incident SAR (ESF-9)

Normal SAR incidents complex mix of jurisdictions – ICS very important.

Search Crucials (search is an emergency, search is a classic mystery, look for clues and the subject, know if the subject leaves the search area, grid search as a last resort, manage by objectives, search management is information management)

Lost and Missing (definitions)

Series of brief scenarios for discussion of lost and missing, each also bringing out elements of the search crucials.

(1) Bastard Search - Missing – Search is an Emergency

(2) Dementia – Missing – Classic Mystery, Clues and the Subject

Also ICS, manage by objectives, and information management

(3) Lost Hiker – Lost – Containment, Mystery, Clues and Subject.

(4) Hunter – Lost – Containment, Close Grid Search as last resort.

(5) Toddler – Lost – ICS, manage by objectives, counter example to Grid search.

The missing person response

Walk through the stages: Preplanning; Notification; Initial Response; First operational period; Subsequent operational periods; Suspension; Critique.

Readings:
FUNSAR: Chapter 1
Basic SAR Skills: Chapter 12 pages C-3 to C-6
Land Search And Rescue Addendum: 1-3 to 1-14 and 1-35 to 1-44.

Practical Evolutions: None

Handouts: None

Unit 2: Search Theory

Topics: Basic introduction to modern ground search theory. The search area, initial reflex actions, and how searches are driven by probabilities.
Related Standards: ASTM F2209-14 12.3
Time Frame: 45 Minutes
Methods: Lecture/Discussion.

Objectives:

Define and describe the differences among the IPP, PLS, and LKP.
Define and describe the differences between the Theoretical, Statistical, and Deductive search areas.
List the 5 initial actions for a search described by Koester's Bicycle wheel.
Define POD and POA.
Describe how shifting POA drives resource allocation in a search.
Explain the phrase: Excessively High PODs Kill.

Training Plan:
Present on Search Theory following the outline below. Facilitate discussion, particularly of importance of reflex/initial actions, and on example of shifting probabilities. Details of the bayesian statistics aren't dealt with here, but general concept of reported PODs shifting POAs to prioritize resource allocation is a focus of this unit.

Outline:

To put boots on the ground, investigation needs to determine where to search.
PLS – Point Last Seen, LKP – Last Known Point, either can change
IPP – Either PLS or LKP, doesn't change.
From the IPP: Theoretical, Statistical, and Deductive Search areas.
Theoretical: based on travel rate times time.
Statistical: based on behavior category, thus investigation.
Categories of lost people have statistically predictable behaviors
Theoretical, Statistical 95% are very large areas – Know if the subject leaves the search area.
ICS Planning P – Reflex actions and full operational periods.
Initial/Reflex actions – Koester's Bicycle wheel (Protect the IPP, Containment, Mantrackers/Tracking dogs to the area around the IPP, Route searches on travel corridors, hasty tasks to areas of high risk/high probability). Manage by Objectives – the bicycle wheel model provides a list of objectives.
Half of all searches over in three hours or less, a few searches take days.
POA: Probability of Area, segmentation, consensus, initial probabilities.
POD: Probability of Detection
Shifting POA and resource allocation. Manage by objectives.
Tradeoffs of Efficient/Thorough search.

Importance of consistent POD reporting.
NEWSAR POD/POD Factoring course.

Readings:
FUNSAR: Pages 228-234.
Basic SAR Skills: Chapter 13 – Search Area/Confinement C-7 to C-11.
Land Search And Rescue Addendum: Section 5-3 Developing the search area 5-19 to 5-25.

Practical Evolutions: None

Handouts: None

Unit 3: Lost Person Behavior

Topics: Introducing how lost people behave. ISRID and statistical studies of lost person behavior. Categories of lost people. How search tactics can be affected by lost person behaviors.
Related Standards: ASTM F2209-14 12.1.5
Method: Lecture/Discussion
Time Frame: 60 minutes

Objectives:

Describe how a person reacts when they realize that they are lost.
Describe strategies that people employ to try to become un-lost.
Explain why lost people often cross roads and trails.
Explain why search is an emergency.
Describe some characteristic behaviors of the critical elderly wanderer that pertain to search tactics.
Describe some characteristic behaviors of the toddler that pertain to search tactics.
Describe some characteristic behaviors of a 10-12 year old child that pertain to search tactics.
Describe some characteristic behaviors of the hiker that pertain to search tactics.
Describe some characteristic behaviors of the autistic subject that pertain to search tactics.
List five warning signs that a missing child may be a stranger abduction.
Describe some characteristic behaviors in an abduction that pertain to search tactics.
Explain how to approach and communicate with a subject, particularly a subject with dementia or autisim spectrum disorder.

Training Plan: Present on lost person behavior following the outline below. Facilitate discussion, particularly around experiences of being lost.

Outline:

Response to being lost.
Panic reaction and subsequent stages.
Strategies for becoming un-lost.
Single greatest factor in survivability is time.
Brief history of lost person behavior research and ISRID.
Behavioral categories: Dementia, Autistic, Despondent, Hunter, Hiker, Child, Abduction.
Statistical behaviors: time mobile, where found, track offsets, frequency in structures etc.
Behaviors and search tactics (active/passive, where to search, decision points).
Examples with particular impact on field tactics:
Dementia/Alzheimer's – stop moving within hours, very unlikely to respond to searchers calling their name. May be stuck in dense brush. May have catastrophic reaction.
Child 1-3 – tend to be very close to the IPP, tend to shelter/hide in structures, brush, inside logs – look anywhere they can fit. Check anywhere they may fit within abandoned vehicles. Often drawn to animals or water. Can sleep through loud noises.
Child 10-12 – often in adventuring, exploring, fantasy play, shortcuts. Often make mistakes at

decision points. Signcut and evaluate field decision points. May be well outside home range. Check anywhere they may fit within abandoned vehicles.

Hiker – tend to be on or close to trails or linear features.

Autistic – attracted to lights, water, reflections, may be attracted to animals, transportation. May have catastrophic reaction if overstimulated. Often in structures. Very unlikely to respond to searchers.

Abduction – Red flags: Age 5-12, White Female, Missing from familiar place, unexplained disapearance, no history of running away. Requires rapid police response. Behavior of perpetrator leading to multiple crime scenes that may be found – PLS, initial contact site, assault site, murder site, dump site. Dump site, easy vehicle access, secluded, downhill, natural cover, often at water crossing.

Approach, particularly to autistic and dementia – simplify the environment – reduce noise, radios, etc. Approach from the front, make eye contact, ask simple direct questions.

Readings:

FUNSAR: Pages 233-234.

Basic SAR Skills: Chapter 14 pages C-13 to C-24

Land Search and Rescue Addendum: Appendix G (Lost person behavior category: Dementia), pp G-1 to G-10.

Practical Evolutions: None

Handouts: None

Unit 4: Land Navigation – Map Reading, Topography, Decision Points

Topics: Introduction to maps, topographic maps and air photos. Provide a vocabulary for describing terrain features, how to read those features on a topographic map, and examine how terrain affects travel. Describe decision points, field decision points and their importance in a search. Approach to finding where you are on a map.
Related Standards: ASTM F2209-14 8.2.1, 8.2.2, 8.2.3, 8.2.7
NFPA 1006 (2013) 16.1.4
Time Frame: 90 minutes (75 lecture/demonstration, 15 practical)
Methods: Lecture, Demonstration, Practical Evolutions.

Objectives:
Describe what contour lines on a map represent.
State which way is uphill when a contour line has a V shape where it crosses a stream.
Demonstrate how to calculate the grade for a slope on a topographic map.
Demonstrate a technique for measuring a distance along a winding route on a map.
Identify USGS topographic map symbols for: Occupied structure, unoccupied structure, church, school, swamp, woods, stream, quarry, railroad line, powerline, bridge,
Describe the information available on a USGS topographic map, a USGS orthophoto quadrangle, and on Open Street Map.
Describe how current information is likely to be on a USGS topographic map, a USGS orthophoto quadrangle, and on Open Street Map.
Define the following terms for terrain features: Peak, ridge, saddle, valley,
Define the term decision point.
Explain the importance of field decision points.

Training Plan: Present on map reading following the outline below, interspersing practical evolutions with the lecture.

Outline:

- Topographic maps
- Contour lines – lines of equal elevation
- Scale
- Slope
    - Calculating slope
    - Measuring slope with a inclinometer in a compass.
- Topographic maps and air photos.
- USGS map symbols
- USGS Orthophotoquad
- Topographic map metadata
    - Scale
    - Contour interval,
    - Age
    - Map grids

Datum, vertical datum.
Air photo interpretation (time of year, age, water, roads, trails, structures).
Open Street Map
Terrain Features, reading terrain
Terrain and travel
Segment boundaries
Decision Points
Where am I?
Map reading as hypothesis testing
"If I'm where I think I am, there will be a lake around the bend."

Readings:
FUNSAR: Chapter 10 (Navigation).
Basic SAR Skills: None
Land Search and Rescue Addendum: None

Handouts:
Topographic Map Symbols
Paired orthophoto and topographic map (included below).

Practical Evolutions:

(1) Calculate Distance.

Materials: USGS 1:24,000 or 1:25,000 topographic map.
Measure the straight line distance between two landmarks.
Measure the distance along a winding trail (using the compass lanyard).

(2) Calculate Slope.

Given a topographic map, find a steep slope, calculate the elevation change, calculate the grade. Repeat with a shallow slope. Use SE side of Pingry Hill, and from the stream just north of the interesection with Notting Road on RT 119 to the top of Smoke Hill.

(3) Find landmarks on USGS topographic quads and orthophoto quads.

Materials: USGS 1:24,000 or 1:25,000 topographic map, along with USGS 1:24,000 orthophoto quadrangle of the same area. (Alternately, 8 1/2" x 11" printouts of portions of both maps).

Split the students into small groups, provide group each with a copy of each of the two maps. Instruct the students to locate features on one map, then locate them (if they exist, on the other).

For the attached portions of the Ayer MA quadrangle, identify the following features on both maps (not all features exist on both maps): The Ayer 15 minute topographic quadrangle dates from 1988, while the Ayer 7 1/2 minute orthophotoquadrangle dates from 2012.

Sandy Pond

Pingry hill
The gravel pit on the east face of Longs Hill
The trailer park southeast of Longs Hill
Whitetail way
The swamp to the northeast of Duck Pond
The church on Prescott Road

(4) Identify Map Decision Points on a trail system

Materials: Topographic map of an area that includes a trail system.

Provide the students with a PLS and a missing Hiker scenario.

In small groups have the students Identify Decision Points.

Discuss the decision points in the group.

In small groups examine the consequences of terrain following from each decision point. Idientify high priority areas for search.

Required Supplies:

Paired topographic map and orthophotoquad, one for each pair of students.
[See File Maps.odt for topographic and orthophoto pairs]
Topographic map, one for each pair of students.

Unit 5: Search Sensors and Tactics

Topics: Description of the major types of resources that perform some sensor function in a search, and the tactics of how these sensors are applied.
Related Standards: ASTM F2751-16 8.7.7
ASTM F2209-14 12.5, 12.7, 12.8
NFPA 1006 (2013) 5.2.1
See Also: SWDOG SC1: Terminology, ASTM F1848-14
Methods: Lecture/discussion
Time Frame: 60 Minutes

Objectives:
Describe the difference between clue finding resources and subject finding resources.
Explain the difference between Direct (active) and Indirect (passive) search tactics.
List at least 5 types of search resources, with at least one capability and limitation of each.
Describe why spontaneous volunteers need to be managed in a search.
Define: Type I search, Type II search, Type III search, and Type IV search.
Characterize Type I-IV searches in terms of efficiency, thoroughness, and destructiveness.
Define: Search Lane, Base Line, Guide Line, Control Line, Guide Person.
Describe what air scent canines detect, and how they are used in a search.
Describe what tracking/trailing canines detect, and how they are used in a search.
Describe how air scent canines differ from tracking/trailing canines.
Explain why it may be advantageous to assemble a tracking canine, handler, and a sign cutter into a task force.
List some advantages and disadvantages of deploying motorized resources (ATVs, Snowmobiles) in a search.
Describe some functions you may be responsible for as a member of a ground search strike team or task force.
List at least six examples of the composition of single resources, strike teams, and task forces in a search.
Explain the procedure for a field resource to call out a subject's name.
Distinguish among a route search, area search, travel corridor search, and boundary search.

Training Plan: Present on search sensors and tactics following the outline below. (Note that many of these are expanded upon and practical evolutions provided in subsequent units. e.g. tactics in the unit Applying Search Tactics).
Outline:

Trained & Untrained searchers (Clue finders, Subject finders).
Inland SAR Resources
Resource Typing
External influences
Ground searchers, Type I to IV search.
Base Line, Guide Line, Guide Person, Search Lane, navigation and control techniques for grid

searches.

Note the Northumbrian Rain Dance and reference NEWSAR POD course.

Canines (Tracking/Trailing, Air Scent, HRD/Cadaver, Water)

Mantrackers/Sign Cutters

Indirect and Direct Tactics

Calling the subject's name (stop, shout/whistle, pause and listen).

Route Search, Area Search, Barrier search.

Direction of travel

Helicopters/Aircraft/Drones

Mountain Bike teams

ATV/Snowmobile

Fire Service Resources: Wildland firefighters (local terrain knowledge), people to go door to door with flyers, lights, rehabilitation (mist fans), communications, thermal imagers, technical rescue (high angle, confined space, water).

Readings:
FUNSAR: Chapter 11; Chapter 14.
Basic SAR Skills: Chapter 15: Search tactics and resources; Chapter 16: Search Principles and Techniques C-25 to C-54.
Land Search And Rescue Addendum: 2-4 to 2-10

Handouts:
FEMA/NIMS Search and Rescue Resource Types (hardcopy pp 39-41).

Practical Evolutions: None

Unit 6: ICS – Managing Chaos

Topics: Elements of ICS that are important for field searchers.
Relevant Standards: ASTM F2751-16 8.7.6
ASTM F2209-14 6.7
NFPA 1006 (2013) 5.2.4
Methods: Lecture/Discussion
Time Frame: 30 Minutes.

Objectives:
List the five main ICS functions.
Identify the ICS general staff and command staff.
State titles for supervisory roles in the command staff, general staff, division, branch/group, and unit.
Define staging area, command post, base.
State within how many minutes a resource in a staging area is expected to be able to deploy to an assignment.
Explain which activities are expected to occur at a command post, staging area, and base.
State the optimum, minimum, and maximum span of control under ICS.
Describe the span of control issues presented by having one trained searcher lead ten untrained personnel in a close grid search.
Differentiate among a single resource, a task force, and a strike team.
Describe the elements of the Incident Action Plan.
Explain how a blank sheet of paper, form ICS-202 Incident Objectives, and form ICS 201 Incident Briefing can help record the elements of the Incident Action Plan in an expanding incident.
Differentiate between the initial response and cycles of operational periods in the ICS planning P.
Explain the importance of reflex actions in the initial response to lost person incidents.
Describe how a sign in sheet, T-Cards, the SAR Task Assignment Form, and a demobilization plan can be used in maintaining accountability of resources.

Training Plan: Present on ICS following the outline below.
Outline:

- ICS Functions
  - Command, Operations, Planning, Logistics, Finance/Administration.
- Standard Titles
- ICS Facilities
- Chain of Command, Span of Control,
- Resources
  - IC approves all resource requests.
  - Single Resource, Task Force, Strike Team
- Manage by objectives.
  - Goals and objectives, SMART objectives.
  - Ensure the safety of all responders and the general public throughout the entire duration of the incident.
- Scaling
  - Some searches go on for days and involve hundreds of searchers.

- ICS is inherently designed to scale.
- Posts aren't automatic, IC delegates as needed.

Incident Action Plan

- Objectives, Organization, Assignments, Map (can use blank paper)
- ICS 202 Incident Objectives (SMART objectives)
- ICS 201 Incident Briefing Form (4 pages)

Planning P

- Search is an emergency, initial actions are critical and need to be rapid.
- Don't get stuck in the paperwork – get boots on the ground.

Accountability:

- Sign in, T-Cards, ICS 204-Assignment list, SAR Task Assignment Form
- Accountability board, Accountability Tags (tag in/tag out).
- Signout/Demoblilization Checkout

Readings:
FUNSAR: Chapter 3.
Basic Search Skills: None.
Land Search And Rescue Addendum: None.

Handouts: None

Practical Evolutions: None

Unit 7: Legal and Ethical Framework

Topics: The legal and ethical framework for SAR operations.
Related Standards: ASTM F2209-14 6.6.1, 6.6.3, 6.6.4, 6.6.5, 6.6.6, 6.6.7
Methods: Lecture/Discussion.
Time Frame: 30 minutes.

Objectives:

Describe why, in most jurisdictions in the world, the authority having jurisdiction for search and rescue incidents is a law enforcement authority.
Describe why information is disseminated in a search and rescue incident only on a need to know basis.
List three entities who might be listening to communications amongst searchers on a search, and describe how things they overhear may compromise the search or confidentiality.
Define the terms: Scope of practice, Standard of Care, Negligence, Engendered Reliance, Duty to Act, Consent, Abandonment, Trespass.
Describe under what conditions in a search it may be permissible to trespass.
Describe what actions to take when a landowner refuses permission to search their property.
Explain the importance of documentation to a search.
Explain the importance of accountability on a search.

Training Plan: Present on the legal and ethical framework for SAR following the outline below. Facilitate discussion, be prepared to handle "what if" situational questions.

Outline:

- NEWSAR code of ethics
- Authority having jurisdiction, deploy only for AHJ
- Need to Know Basis
- Confidentiality
    - Searches are potential crimes – dissemination of information may compromise investigation or conviction, perpetrator may be listening, perpetrator may be a searcher.
    - HIPAA – all patient information is strictly confidential.
    - Who might be listening (family, press, perpetrator...).
- Scope of practice, Standard of Care, Negligence
- Engendered Reliance, Duty to Act, Consent, Abandonment
- Entering private land: asking permission, handling refusal of permission, leave if asked.
- Trespass (no more right than anyone else).
    - Criminal – willful entering posted land.
    - Innocent – unaware of posting.
    - Trespass to save a life (very limited).
- Good Samaritan laws (medical, SAR).
- Documentation
    - Search documentation
    - Training records
- Safety, Hazards, risk mitigation.

Accountability (sign in, resource status, who is on what task, did everyone get home safe)
Train as you search. Same attitude for training as emergencies.

Readings
FUNSAR: Chapter 4
Basic Search Skills: Chapter 2, A-11 to A-15; Addendum 15, F-38 to F-88.
Land Search And Rescue Addendum: None.

Handouts:
NEWSAR Code of Ethics
ICS 211 – Incident Check-in List
ICS 219 (1-8,10) – T-cards/Resource Status Cards
ICS 221 – Demobilization checkout
CC-BY-SA paper: Conover, 2013. Legal Issues in SAR (SAR-Legal.pdf).

Practical Evolutions: None

Module II: Core Search Skills

Unit 8: Clue Detection

Topics: Importance of clues. How to develop clue awareness skills.
Related Standards: ASTM F2209-14 12.1.2, 12.1.3
NFPA 1006 (2013) 16.1.4
Methods: Lecture/Discussion
Time Frame: 50 minutes (45 minutes lecture/discussion, 5 min practical)

Objectives:

Explain the importance of clues in a search.
Give an example of a clue for each of three different senses.
Describe three behaviors a subject may exhibit that lead to the production of clues, and how investigation may aid the recognition of those clues.
Explain the search cube.
Describe four techniques for building your visual skills for better observing clues.
Describe how clue detection can be incorporated into regular canine SAR training evolutions.
Describe the actions to take on finding a clue.
Describe where in the ICS structure a clue log is maintained, and its importance for a search.

Training Plan: Present on clue awareness following outline below.
Outline:

- Clue Detection
- Search is a classic mystery/Kinds of clues
- Search for clues and the subject
    - Subject behaviors that produce clues
- Physiology of vision
    - Optic pre-processing and processing, implications for techniques for looking.
    - Chain from seeing to observing.
- Teach your brain to observe
    - Kim's Game
    - Clues in training evolutions
- Techniques for observing
    - Search Cube
    - If you are talking you aren't searching
    - Visual skills (look through things, moonlighting, near/middle/far distance, avoid scanning).
- The subject may be hidden
    - Children – look anywhere they may fit (particularly high risk – vehicles, abandoned appliances).
- Fatigue, Hydration
- Recording and marking clues.

The clue log

Readings:
FUNSAR: “Clue Consciousness” pp.225-228.
Basic Search Skills: Search Principles and Techniques: C-39 to C-54; Evidence Handling C-67 to C-74;
Air Observer Skills: F-23 to F-31.
Land Search And Rescue Addendum: None.

Handouts: None

Practical Evolutions:

(1) Kim’s game.

Preparation: Lay out about 25 random articles, cover with a blanket or tarp.

Gather the class around the covered articles.
Give then instructons: I’m going to remove this blanket, there are things underneath it. You will have one minute to look at the things under this blanket. After one minute, I’m going to cover them up again. At that point, each of you is to write down a list of as many things as you can remember.

Remove the blanket/tarp.
After one minute, cover the articles back up again.
Have everyone (individually) write down all the articles they remember.

Compare lists with the actual articles.
Discuss (particularly mental strategies for remembering lots of things).

Unit 9: Tracking

Topics: Very brief introduction to tracking and sign awareness.
Related Standards: ASTM F2209-14 12.10, 12.11.1, 12.11.2
NFPA 1006 (2013) 16.1.4, 16.1.8
Methods: Lecture/Discussion, Demonstration, Practical Evolutions
Time Frame: 60 minutes (including 20 practical)

Objectives:
Describe how to use light to make tracks easier to see.
Define: Mantracking, Sign, Track/Print, sign cutter.
Distinguish between conclusively human and corroborant sign
Define: Track trap.
Describe how to approach potential track traps while walking on a trail.
Demonstrate the step by step method of following a track.
Demonstrate how to mark track measurements on a tracking stick.
Demonstrate how to use a tracking stick to follow a track.
Describe how to support a sign cutter as a flanker in a mantracking assignment.

Training Plan: Present on tracking as in outline below, followed by practical evolutions outdoors in prepared area.
Outline:

Sign, Types of sign.
Conclusively human and corroborant sign
Light
Track Traps
Step by step method (as a learning method; as a tactic).
Drawing tracks
Supporting a tracking task
Learning More: NASAR Tracking, Field Team Sign cutter, Dirt Time.
Practical Evolutions: Walk around sign. Follow track step by step.

Readings:
FUNSAR: Chapter 13, Tracking.
Basic SAR Skills: Chapter 18, Tracking C-57 to C-62.
Land Search And Rescue Addendum: None.

Handouts: None

Materials Needed:
Site Requirements:

Outdoors, patch of sand or dirt.
Light, preferably sun at a low sun angle.

Site preparation:

Rake out a small patch of sand or dirt, enough for one print

Rake out a large patch of dirt, enough for a series of tracks of about 20 prints each, one track for each pair of students.

Required equipment

Rake
Tracking stick
Hair ties or other means to mark tracking stick.
Flags to mark track starting points
Headlamp, with means to afix to end of tracking stick.

Practical Evolutions:

(1) Sign and sun angle

Rake a patch of sand, walk through it.
Have the students stand with the light at their backs and the sign in front of them and observe the track.
Then have them walk around to the other side of the sign and observe how the sign becomes clearer looking into the light.
Discuss.
If light conditions are suitable, demonstrate creating shadows in the track with a headlamp held low past the track.

(2) Use of the tracking stick.

Rake a large patch of sand or dirt.
Lay out a series of parallel tracks, one for each pair of students.
Bring each pair to the start of a track.
Have each member of the pair measure the print length and width, and stride length, and mark their tracking stick accordingly.
Have each member of the pair demonstrate how to use the tracking stick to find the next print.

(3) Tracking step by step

Continue from (2).
Have the students work in pairs and follow the tracks step by step,

Unit 10: Land Navigation: Map, Compass

Topics: Working with a map and a compass. Reading and using the metadata on the border of a USGS topographic map. Describing location from a map and with GPS.
Related Standards: ASTM: F229-14 8.2.4, 8.2.5, 8.2.8, 8.2.6,
NFPA 1006 (2013) 16.1.4
Methods: Lecture/Discussion, Demonstration, Practical Evolutions
Time Frame: 120 Minutes (70 classroom, 50 practical)

Objectives:
Explain confirmation bias and approaches to navigation problems that reduce the risk of making navigational errors due to confirmation bias.
Describe the distinction among true north, magnetic north, and grid north.
Identify the big dipper, little dipper, and Polaris in the night sky.
Name the parts of a compass.
Accurately shoot a bearing with a compass on a distant point.
Provide a back azimuth for a given bearing.
Orient a map to north with a compass.
Orient a map to north using landmarks.
Accurately determine the bearing from one landmark to another on a topographic map.
Take a bearing on a landmark and transfer that bearing to a topographic map.
Given three bearings on landmarks, triangulate a location on a topographic map.
Determine the compass declination for an area from the metadata on the map border.
Identify the datum, vertical datum, contour interval, scale, and revision history of a USGS topographic map or orthophotoquad from the metadata on the map border.

Training Plan: Present on the topics in the outline below, interspersing practical evolutions with the lecture.
Outline:

- Wayfinding errors: Confirmation Bias, Bending the Map.
- True, magnetic, grid north
  - Declination
  - Agonic line
- Telling North
  - Sun, Moon, Stars
- Parts of a compass
- Types of compass (baseplate, mirror, lensatic)
- Parts of a Lensatic Compass
- Degrees and Mills
  - 1 mill = 1 meter at 1 kilometer
  - 1 degree = 17.8 mills
  - One degree error = about 18 meters error at 1 km.
- Parts of a Mirrored Baseplate Compass.
- Shooting a bearing with a compass
  - Holding a compass (orienteering, folding mirror, lensatic).

Sighting and shooting a bearing
Setting declination on a compass.
Adjusting for magnetic declination
Ignore it (compass alone, near agonic line)
Correct for declination (Map to compass, west, add)
Set declination on compass (preferred, everyone works on true north bearings)
Mark magnetic north lines on map (use protractor or compass as protractor).
Identifying declination on map metadata, age of declination, estimaged change in mils per year.
Estimating navigational error at 1km if not accounting for declination or change.
Orienting map to north
Triangulation on a map.
Determining bearing from map.
Practical evolutions 1-4, outside.

Readings:
FUNSAR: Chapter 10, Navigation.
Basic SAR Skills: Chapter 7, Navigation B-35 to B-50.
Land Search And Rescue Addendum: None.

Handouts: None

Materials Needed:
Required equipment and supplies:
Topographic maps of the area where the course is being held, one per 2 students.

A globe.

Set of topographic maps of an area (USNG training map), one per student, each map with a different point marked on it (for triangulation exercise).

Practical Evolutions:

(1) Orient Map to North with a compass.

Outside.
Examine a topographic map of the area (or orthophoto quad), identify the declination.
Set that declination on a compass.
Place the map on the ground or a non-metal surface (not a car hood or a table with metal frame).
Place the compass on the map, pointing the direction of travel indicator to the north of the map, and the side of the compass parallel to the left or right margin of the map.
Turn the map and compass until the north end of the compass needle falls inside the north box.

(2) Orient Map to North by landmarks.

Outside.

Examine a topographic map of the area (or orthophoto quad), identify your location.

Identify three landmarks on the map that should be visible from your location.

Identify the three landmarks on the ground.

Place the map on any surface, and rotate it so that the three landmarks on the map are in the same relationship to your current location as they are on the ground.

(3) Shoot Bearing.

Outside.

As a group, stand together and shoot a bearing on a distant landmark. Have everyone compare their bearings. Assess and correct differences (declination, not holding compass level, reading wrong end of compass, etc).

Repeat on a second landmark.

(4) Triangulate location.

Outside.

If outside and visible, shoot bearings on three different landmarks, transfer those bearings to a topographic map of the area. Lines should cross at the current location.

(5) Determine Bearings on map.

Inside.

Distribute the USGS USNG example map. Have the students set the declination of their compasses to that location (in Louisiana).

On the USNG example map, have the students determine the bearing, relative to true north, from the light on Shingle Point to the water tank near Planters canal.

Have the students determine the back bearing (from the water tank to the light).

Repeat with the bearing from BR 3 where the road crosses Planters Canal to light 18 on the north bank of the Mississippi river.

If students are still having problems, repeat with additional clearly marked landmarks.

With a topographic map of an area local to the course, have the students set the declination of their compasses, and determine, on that map, the bearing from one clearly defined landmark to another.

(6) Triangulation

Split class into paired teams, with two people in each team.

Give one team of each pair a the USNG training map and a location.

Give the other team of each pair a map of the same area with a different point.

Place the pairs separated back to back, (or in radio communication with each other (e.g. using FRS radios with separate channels for each pair))

Each team measures bearings from three identifiable landmarks to their marked point.

Have one team transmit the landmarks and bearings for their marked point to the other team in the pair.

Have the second team in the pair mark the bearings on their map and mark the triangulated point.

Repeat for the other point.
Have the teams compare maps.

Unit 11: Hazards and Mitigation

Topics: Inculcate SAR responders with a safety mindset. Review typical hazards of NE US SAR training and operational environments for both responders and SAR canines. Describe mitigation measures that can be taken to reduce the risks posed by those hazards. Provide SAR responders with an awareness of Critical Incident Stress. Discuss the risks of driving while fatigued.
Related Standards: ASTM F2209-14 7.10, 7.11, 7.12, 12.5
ASTM F1847-14 5.8; ASTM F2890-12 4; NFPA 1006 (2013) 5.2.3
Methods: Lecture/Discussion
Time Frame: 40 Minutes.

Objectives:
Describe the role of the safety officer and safety plan in an incident.
State who may call attention to a safety issue, and why.
Describe specific safety hazards in the NE US, along with mitigation measures.
Describe typical safety hazards encountered in SAR, along with mitigation measures.
Describe the characteristics of non-technical terrain.
Explain the hazards presented by fatigue and how to mitigate them.
Define Critical Incident Stress and Post Traumatic Stress Disorder
List five factors that can contribute to CIS.
Describe mitigation measures for CIS.
List five hazards for SAR canines and how they can be mitigated.
Explain the risks of thermal stress in canines and how to mitigate those risks.
Describe how to mitigate the risk of driving while fatigued.
Describe the FEMA Structure/Hazards Evaluation Markings

Training Plan: Present lecture/discussion following the outline below.
Outline:

- Primacy of safety
- Safety officer, safety plan
- Control Zones:
  - By degree of hazard
  - Hot, Warm, Cold, Exclusion
  - Hot: appropriate PPE and assigned task.
  - Exclusion: Nobody (explosion hazards, crime scene).
- Accountability.
- Specific hazards and mitigation.
  - Everyday hazards: Ticks, poison ivy, branches at night, rough terrain, sun, dehydration.
    - Mitigation for poison ivy risks
    - Mitigation for tick borne illness risks
  - Common hazards: unstable/dead trees, animals, unstable slopes, falling debris.
  - Non-Technical, Technical (Low Angle/High Angle) terrain.
  - Weather: Heat, Cold, Lightning, Snow, Avalanches, rain, floodwater.
  - Human:
    - Armed subject (hunter, despondent), clandestine drug operation.

- Wells, mineshafts, abandoned buildings, hazardous materials.
- Other Environmental: Altitude, Snakes, stinging insects, Arid environments.
- Technical rescue environments
  - IDLH environments (e.g. low oxygen atmospheres)
- FEMA Structural/Hazards Evaluation Marking
- Lightning
  - If you can hear thunder, take shelter.
  - Avoid tall isolated trees.
  - In forest, take shelter in a low ravine (mindfull of flash floods).
  - In the open: Drop to your knees, bend forward, hands on knees, do not lay flat.
- Fatigue
- Rehabilitation
  - Re-hydration.
  - Food, Rest, recovery from stresses of incident.
  - Vital sign checks by EMS personnel.
- Critical Incident Stress
- SAR Canines: Poisons, other hazards,
  - Mitigation: Leave it, strong recall, Safe.
  - Canines and Heat .

Readings:

FUNSAR: Chapter 8 Safety in SAR Environments.

Basic SAR Skills: Chapter 6 Field Health and Hygiene; Chapter 8 Foot Travel; Chapter 9 Environmental Hazards in SAR; Chapter 10 Animal, Insect and Snake Hazards; Addendum 3, Critical Incident Stress.

Land Search And Rescue Addendum: None.

Handouts: None

Practical Evolutions: None

Unit 12: Crime Scene Awareness

Topics: How non-law enforcement SAR personnel should treat a potential crime scene.
Related Standards: ASTM F2209-14 6.6.3, 6.6.4, 12.6
Methods: Lecture/Discussion
Time Frame: 25 Minutes.

Objectives:

Define chain of custody.
Distinguish between physical and incorporeal evidence.
Discuss the relationship between medical care and preservation of evidence.
Describe the sequence of actions to take on discovering a potential crime scene.
Describe the sequence of actions to take on discovering a potential crime scene where the subject is present.
Describe measures for mitigating critical incident stress of responders at a crime scene.
Explain why only minimal information should be relayed, and that by cell phone, to LE on discovery of an apparent crime scene.
Describe how to interact with a member of the general public you encounter on a search.

Training Plan: Present on crime scene awareness following the outline below.
Outline:

- Safety
- Objectives: Minimal disturbance, documentation, maintain chain of custody.
- Principles:
  - Contamination, Containment, Restraint, Call
  - Defense needs to raise reasonable doubt
    - Uncertainty, untrained investigators, too many different observations/observers
- Actions to take on discovering a crime scene
  - Limit and record contamination (contamination)
  - Establish an exclusion zone and a cold zone (containment)
  - Call it in – preferably via phone rather than radio (call).
    - Emphasis on quiet notification.
    - Call to appropriate jurisdictional law enforcement authorities.
    - Pre-planned code may be appropriate (despite ICS) to communicate with IC.
    - Radio can be and is legally monitored.
    - Cell phones can be illegally monitored.
    - Minimum information necessary. Do not elaborate. Location and time of find.
    - Take, only if asked by LE, a picture and send to LE by cell phone.
      - Cell phone becomes discoverable evidence.
- Things not to do at a crime scene (restraint).
  - No picture taking.
  - No discussion of the crime scene with each other.
  - Absolutely no deploying canines as a “training opportunity”.
  - No social media activity.

Handover

Only relinquish the scene to a properly identified LE officer (uniform, badge)

Log the time, log your handover of the scene.

You retain a log with one entry – time you handed crime scene and everything else over to LE.

LE gets all materials, with a log with a last entry of your handover of the scene and documentation.

Relinquish all materials to the LE officer.

Remove yourself and all other SAR personnel to an identified location for debriefing by investigative LE.

Discuss nothing about the matter to anyone, including each other.

Investigative authorities need just the facts, as immediately observed, without your inferences.

Approaching a possibly deceased find.

Emergency medical care takes priority, preservation of evidence is an additional concern.

If medical care is not necessary (per local medical protocol, e.g. decapitation, extreme dependent lividity, rigor mortis), preservation of evidence becomes primary concern.

Critical incident stress mitigation

If you don't need to see it, don't go look.

Physical and incorporeal evidence, documentation of incorporeal evidence

Interactions with people encountered on the search:

Ask if they saw the missing person

Downplay the situation – e.g. comment about nice day

Observe their behavior – go with your gut instinct.

Get a name and a callback number.

Actions to take on finding a potential clue in the absence of LE interest or present involvement.

Record the location.

Mark the location with flagging tape

Take a photo with a disposable camera (which will be handed over to search management).

Readings:
FUNSAR: “Incident Site Procedures” p.41-42. “Handling Evidence” p.234-238.
Basic SAR Skills: Chapter 20 Evidence Handling C-67 to C-74.
Land Search And Rescue Addendum: None.

Handouts: None.

Practical Evolutions: None.

Unit 13: Backcountry operations: Clothing, Weather, Hygiene

Topics: Fundamentals of working outdoors in the back country. How to select clothing for SAR training and operations, how to dress for the weather, fitness for SAR, backcountry hygiene, reading the weather.
Related Standards: ASTM F2751-16 8.7.1, 8.7.2,8.7.3,8.7.4
ASTM F2209-14 7.1, 7.7, 9.1.1
NFPA 1006 (2013) 16.1.3
Methods: Lecture, Discussion, Demonstrations.
Time Frame: 30 minutes

Objectives
Explain the importance of physical fittness for the SAR mission.
Enumerate the mechanisms of heat loss.
Describe the properties of cotton, nylon, polyester, acrylic, wool, silk, and down as materials for clothing.
Explain the phrase "Cotton Kills"
Explain how to use clothing layers to maintain temperature in changing weather conditions and with changing activity levels.
Interpret Wind Chill and Heat Index values.
Describe desirable properties of footwear for SAR.
Explain the importance of maintaining hydration.
Explain the risks of drinking untreated water from backcountry sources.
Explain how to maintain hygene in the backcountry.
Describe the changes to wind and clouds that signal precipitation.

Training Plan: Present on clothing, backcountry living, and weather following the outline below. Include demonstrations including clothing types, layering, and ventilation. Effective demonstration may be to come in dressed in full three season layering and take off layers down to a base layer as you go through the layers.

If students have significant hiking or other outdoors experience, emphasize discussions of clothing, footwear, keeping clean, and obtaining water, rather than presenting on these topics.

Outline:

- Physical Fitness
- Heat Loss: Convection, Conduction, Evaporation, Radiation
- Layering (demonstrate)
- Ventilation (demonstrate)
- Boots
    - Ankle support
    - Good traction
    - Break them in.
- Wind Chill
- Heat Index

- Working with heat index > 90 degrees (hydrate, rest, monitor)
- Hydration
  - Avoid Caffeine
- Giardia, water treatment.
- Winter operations
- Equipment
  - Medications (prescriptions you may need (epi-pen)), over the counter medications.
  - Sunblock, Insect Repellent, Hat
- Hygiene
  - Clean socks
  - Brushing teeth
  - Toilet (minimum distance from water, wipes, handwashing, etc.)
- Improvisation
- Reading weather
  - Cloud progression: Cold Front
  - Cloud progression: Warm Front
  - Low pressure areas, fronts and wind shifts.

Readings:

FUNSAR: Chapter 6, Physiology and Fitness; Chapter 7 SAR Clothing.

Basic SAR Skills: Chapter 3, Fitness for SAR; Chapter 4, Clothing; Addendum 8: Cold Weather Nutrition.

Land Search And Rescue Addendum: None.

Handouts:

CDC Drinking water treatment methods for backcountry and travel.

Practical Evolutions: None

Unit 14: Basic Survival

Topics: Priorities for survival. Skills for survival. Fire starting. Shelter construction. Shelter construction in the snow.
Related Standards: ASTM F2209-14 7.3, 7.4, 7.5, 7.8, 9.1.2
NFPA 1006 (2013) 16.1.5, 16.1.6
Methods: Lecture, Discussion (optional practical evolutions).
Time Frame: 40 minutes (with 2 hours for optional evening practical evolutions).

Objectives

List, in order, 7 survival priorities.
Describe conditions of high risk for hypothermia.
Describe desirable properties of a survival shelter.
Describe methods of constructing an expedient shelter from typical materials in NE US woodlands and materials carried in the 24 hour pack.
Describe how to construct and light a campfire.
Explain the value of an emergency blanket or a plastic bag in a survival situtation.
Describe how to make yourself most visible to an aircraft.
Describe how to a signal an aircraft that you are in distress
Describe how to signal your location to ground searchers
Describe how to select a water source and at least two methods for purifying water.
Explain how to create a transpiration bag.
Describe how to construct two forms of simple snow shelters.

Training Plan: Present on survival following the outline below. Focus on positive mental attitude, shelter, rest, signals, touch on water. Optionally, in an overnight setting, practical evolutions on fire starting and expedient shelters.

If students have significant hiking or other outdoors experience,, emphasize discussion.

Note: If students have limited backcountry experience in the northeast spend time making sure that students are able to identify materials alluded to, such as birch bark.

Outline

- Survival Priorities
  - Positive mental attitude, air, shelter, rest, signals, water, food
  - Rule of threes: 3 min air, 3 hours shelter, 3 days water, 3 weeks food
  - Focus on attitude, shelter, rest, signals.
- Positive mental attitude.
  - Forget the promise that you'd be home for dinner tonight.
  - Focus on survival priorities.
  - Understand how you deal with isolation.
  - Expect initial panic on realizing you are lost.
- Hypothermia

Most dangerous conditions: 50 degrees and rainy.
Falls during river crossings, sweating into cotton.
Heat loss – conduction, convection, radiation.
One below worth two above – heat loss by conduction to ground.
Trap warm air, make a wind break.
Main heat loss areas (insulate head and core).

Shelter

Making fire

Fire tetrahedron
Lighter; magnesium, knife and sparker; matches: hurricane, strike anywhere, book.
Tinder, Vaseline soaked cotton, fuzz stick.
Kindling, ventilation, layers.
Main fuel (long logs, push in as they burn).
Above and below the fire.

Signal methods

Lay flat, arms and legs spread to make yourself visible to aircraft
Ground signals for aircraft
Sounds (whistles, gunshots) – three to signal distress, two to respond.
Making a smokey fire
Amateur radio wilderness protocol
Making your shelter visible to ground searchers: Trash, flag lines, disturbance lines

Giardia, water treatment.

If you drink untreated water in the NorthEast you will probably get Giardia.

Improvisation

Focus on function (jacket needs to trap layer of warm air, not have buttons and pockets).
Think lazy – how to accomplish the minimum with minimal effort
What is it supposed to do? How does it function? What materials can do that?
What is the minimum that will accomplish that?
Work to improve the situation.

Obtaining water

Boiling
Iodine (and other treatments that have long shelf lives).

Winter survival

Snow shelters
Snow cave, snow cave in piled snow. Minimal effort

Core Survival equipment:

Waterproof matches, knife, whistle, candle, emergency food, moleskin, water treatment, space blanket.

Readings:

FUNSAR: Chapter 6, Survival and Improvisation;
Basic SAR Skills: Addendum 9 Hypothermia.
Land Search And Rescue Addendum: None.

Handouts: None

Practical Evolutions:

Optional: If permitting and permissions are available, and conditions are suitable.

(1) (Optional) Building and starting a campfire.

(2) (Optional) Constructing and overnighting in an expedient shelter.

Module III: Searching

Unit 15: Land Navigation: Grid with compass and pace count, GPS

Topics: How to navigate a grid (for canine, Type II, or Type III search of a segment) using a compass and pace counting. Introduction to using a GNSS receiver for land navigation.
Related Standards: ASTM F2209-14 8.4.1, 8.4.2
ASTM F3071-14 5.1.5
ASTM F3072-14 5.2.1, 5.3.1, 5.4, 5.5, 5.6
NFPA 1006 (2013) 16.1.4
Methods: Lecture/Discussion and practical evolutions.
Time Frame: 90 minutes (including 35 practical)

Objectives

Demonstrate how to determine your pace count.
Demonstrate how to determine the bearings for gridding a marked 60 acre area on a map.
Demonstrate how to accurately navigate on three given bearings with 100 meter legs, returning to within 10 meters of the starting point.
Describe how a GPS receiver uses satellite signals to determine its location.
Describe sources of error in using a GPS or other GNSS receiver.
Distinguish among tracks, waypoints, and routes on a GNSS receiver.
Describe how to record a waypoint with a GNSS receiver.
Describe how to navigate to a waypoint using a GNSS receiver and a compass.
Describe how to project a waypoint on a GNSS receiver.
Distinguish among tracks, waypoints, and routes in a GNSS receiver.
Describe how GNSS receiver tracks can help document a search.

Training Plan: Present on land navigation following the outline below, followed by practical evolutions.

Outline:

- Pace count
- Determining bearings from map
- Navigation on a bearing with compass
- GNSS receivers (including GPS receivers)
- How GPS works.
- Potential issues and sources of error with GNSS receivers.
    - Canopy
    - Solar storms
    - Battery failure
    - Human error
- GNSS compass and calibration.
- GNSS: Track, Waypoints, Route.

GNSS – set waypoint,
Using averaging to improve waypoint accuracy..
GNSS – navigate to a waypoint.
GNSS – project waypoint.
GNSS – check your navigation with the map
Practical Evolutions: Pace Count. Triangle. Navigate on bearings to targets, report distance.

Readings:
FUNSAR:
Basic SAR Skills:
Land Search And Rescue Addendum:

Handouts:
Templeton State Forest map, marked with segments.

Practical Evolutions:

(1) Measure Gridline Bearings and Distances on map

On Templeton State Forest Map
For segment 1: Measure distance of base line along N segment boundary.
Measure bearing along guide line and calculate backbearing.

(2) Measure Gridline Bearings and Distances on map

For segment 2: Measure distances and bearings to grid this area.
Distance from a landmark to a starting point on the base line.
Distance along base line. Distance from base line to N segment boundary.
Bearing N from base line, backbearing from N boundary back to base line.
Bearing along base line/N segment boundary.
Identify landmarks near NW and NE segment corners.

(3) Establish Pace Count for 100 meters.

Measure out and mark a 100 meter straight line course in available terrain.
Have the students pick a foot, right or left, and remind them to count each time that foot hits the ground to obtain the pace count.
Remind the students to try to maintain a uniform pace length on the flat, up, and down.
Have each student walk the course at a normal searching speed, counting their paces, and recording the number of paces they cover in 100 meters.
Have each student walk the course back from end point to starting point, counting their paces, and recording the number of paces they cover in 100 meters.
Have each student average the two pace counts.
Remind the students to repeat this exercise in different terrains in different conditions.

(4) Navigation on bearings on an equilateral triangle with 100 meter sides, returning to the starting point.

Preparation:

Identify an open area that is at least 100 meters by 100 meters.

Lay out a triangular course in this open area with an equilateral triangle, each side of which is 100 meters long, each corner of which forms a 60 degree angle. For ease of calculation, make one leg of the triangle either north-south or east-west.

Pick a corner as a starting point. Plant a flag (of a different color of the flags to be given to the students) at this corner. Leave the other corners unmarked.

Decide if the students will use true or magnetic bearings.

Record the bearings to travel the sides of the triangle. For example, starting at the north corner of this triangle▲, the bearings would be 150 degrees, 270 degrees, and 30 degrees.

Running:

Take a flag (don't hold the metal stake near your compass).

Go to the marked starting point, and travel 100 meters on a bearing of (150 degrees true).

Turn to a bearing of (270 degrees true) and travel 100 meters.

Turn to a bearing of (30 degrees true) and travel 100 meters.

Plant your flag.

(5) (Optional) Record waypoint, navigate back to waypoint with a compass.

If GPS receivers are available

In an area where there is a trail that curves, have the students flag a point just off the trail and record a waypoint there, then walk down the trail to a point about 300 meters away (as the crow flies) from the waypoint (where the trail is not a direct route back to the waypoint), then read distance and bearing to go to the waypoint from the GPS and use the compass and pace count to return to the waypoint.

(6) (Optional) Navigate on assigned bearings to marked targets, report distance traveled.

If sufficient time is available (it will take about half a day), have the students set up and run the navigation element of the NASAR SARTECH II exam.

Preparation:

Required Equipment and supplies

Means to accurately measure 100 meters.

Flagging tape

Survey marker flags, one of one color, one for each student in a second color.

Unit 16: Applying Search Tactics

Topics: Tactics for conducting field searches.
Related Standards:
ASTM F2209-14 12.8, 12.9
ASTM F2751-16 8.7.7
NFPA 1006 (2013) 16.1.9
Method: Lecture and practical evolutions
Time Frame: 105 minutes (including 70 practical)

Objectives:

Describe the characteristics of an attractor.
Explain why an attractor should not move.
List at least 5 containment tactics.
Describe how to perform an audio sweep.
Describe the efficiency, thoroughness, and destructiveness of Type I to IV searches.
Describe the relationship of thoroughness and destructiveness in Type I to IV searches.
Demonstrate how to conduct a Type I search along a trail with a 3 person team.
Demonstrate use of the FEMA USAR Search Assessment Marking system.
Demonstrate how to perform the Northumbrian rain dance to establish AMDR.
Describe three ways to manage navigation in a Type II search.
Demonstrate two ways of performing a Type II search with a 6 person team.
List five area search patterns
Demonstrate how to perform a Type III search.

Training Plan: Lecture/discussion amplifying the application of search tactics using the outline below, followed by practical evolutions out doors.
Outline

- Passive and Active Tactics
- Attraction
  - Lookouts/Road blocks with lights/siren (attractor shouldn't move).
  - High points, scenic views, fire towers, FD aerial platform.
- Containment
  - Road/Trail blocks, Camp-ins
  - Road patrols
  - Track Traps
  - Perimeter Sign Cutting
  - Lookouts (binoculars, thermal imaging)
- Stop/Call/Listen (audio sweep).
- Review Type I – IV search
  - Tradeoffs in efficiency, thoroughness, destructiveness, resource requirements.
- Type I - Hasty search
  - Linear feature search (trail, drainage)
    - Trail: one person on edge of trail sign cutting, one flanker off trail on either side.

- Canine route search
- Point of interest (high probability, high risk) search (particularly structures and vehicles)

Lost person categories and places to look
- Structures

The FEMA Search Assessment Marking System.
- Marking on entry, marking on exit. Marking for incomplete search or No Entry.

Binary search

Type II search
- Trained Searchers, Span of control, maintain tight control.
- Purposeful wandering
- Flag, Advance, Flag, Search Back, Search Forward, repeat.

Northumbrian rain dance, AMDR

Sound sweep (responsive subject)

Managing area search
- Base line, backstop, guide line, navigator (guide person)
- Everyone hangs off of navigator. Furthest from guide person flags next guide line.
- Span of control.

Area Search Patterns:
- Area Search (II or III)
- Route (Area) Search (I or II)
- Parallel Route Search (II)
- Expanding Circle Search (II)
- Contour search (II or III)

Type III search (grid search as a last resort)
- Can use mix of trained and untrained searchers. Can use spontaneous volunteers.
- Avoid large lines (use staggered start and flag lines).
- Span of control. Maintain tight control.

Type IV search

Readings:
FUNSAR:
Basic SAR Skills:
Land Search And Rescue Addendum: Section 4-4 SAR Resource Strategies and Tactics pp. 4-15 to 4-35.

Handouts:

Practical Evolutions:

(1) Northumbrian rain dance.

Place a backpack or similar human sized object out in the terrain.
Have the students, in pairs or groups of 3 pace away from the backpack until they can no longer see it, record the distance, move further away, rotate around the object, move until they can first make out the object, then pace the distance to it, and average all of their distances – this gives the AMDR.

(2) Type II grid with purposeful wandering on bearing.

Set up a series of 100 meter long search lanes off of a base line. Lay out a set of playing cards or clues, recording which clues are in which lanes, distributing up to 10 clues per lane. Record the bearing of the search lanes off of the base line.
Line the students up on the base line. Provide the bearing.
Each student sets their compass to navigate on the bearing (correctly handling declination).
Instruct the students to call "hold the line" for the first clue they encounter (then the line halts and you come to see the clue before you command "advance" again).
Direct the students to advance 100 meters along the bearing – sighting on a target in their lane, putting down their compasses, and advancing towards their target while purposefully wandering in their lane and recording the clues they encounter.
On a command, the students advance slowly along their search lanes, purposefully wandering as they advance.
On reaching 100 meters, compare each student's list of clues with the list of clues for their lane.

(3) Type II grid with cycles of advance and purposeful wandering.

Set up a series of 100 meter long search lanes off of a base line. Lay out a set of playing cards or clues, recording which clues are in which lanes, distributing up to 10 clues per lane. Record the bearing of the search lanes off of the base line.
Line the students up on the base line. Provide the bearing.
Each student sets their compass to navigate on the bearing (correctly handling declination).
Each student flags their starting location.
Instruct the students to call "hold the line" for the first clue they encounter (then the line halts and you come to see the clue before you command "advance" again).
Direct the students to advance 25 meters along the bearing – sighting on a target in their lane and advancing directly and rapidly to that point (recording any clues they observe).
Each student flags their 25 meter location.
Direct the students to purposefully wander slowly back to their starting point, recording any clues they observe, and then purposefully wander back to their 25 meter flag.
When all students are back on the flag line, direct them to advance.
Repeat until the grid line is out 100 meters.
On reaching 100 meters, compare each student's list of clues with the list of clues for their lane.

(4) Type III grid off a base line.

Set out a small number of clues off of a base line.
Line no more than seven students along the base line spaced closely enough to be likely to observe the clues.
Have one student serve as team leader. If more than 5 students, place the leader behind the line, if up to 5 students, place the leader on the line. Instruct the leader on the commands and to check out then flag clues on hearing hold the line.
Set a student at one end of the line as a navigator (either with compass or along a control line).
Direct all the students to stay an equal distance from the student on their side closest to the navigator.

Direct the students to call “hold the line” if they observe a clue.
Remind the students of the commands – stop, look left, look right, look up, look down, look infront of you, turn around and look behind you... turn around, advance.
Have the team leader direct the line to advance,
Continue until at least one clue has been found and the finder called “hold the line”

Unit 17: Putting it all together: The SAR Task Assignment Form

Topics: How the SAR Task Assignment Form links the objectives of a search, the activities of the planning section, the activities of field deployed resources, and supports the flow of information during a search. Explaining how the briefing and debriefing are key to both informing the clue aware searcher and the planning section.
Methods: Lecture/Discussion
Time Frame: 30 Minutes (including 15 practical).

Objectives:

Describe the stages in the task assignment form lifecycle.
Describe how the SAR Task Assignment Form facilitates information flow between the planning and operation sections in a search.
List at least five things that should be communicated in a debriefing.
Contrast the functions of the ICS-204 (Assignment List) with those of the SAR Task Assignment Form.
Describe the information that should be presented to a task in its briefing.
Describe who should be present in a briefing of a resource for an assignment.
Describe who should be present when a resource is being debriefed from an assignment.

Training Plan: Present on the SAR Task Assignment Form following the outline below. Facilitate discussion, particularly on information transfer in briefing and debriefing.

Outline:

Search management is information management.

Information flow – objectives to planning section to operations section, and back to planning section.

Key elements of information to be communicated: Searching Information, Clues, Where was searched, How well it was searched, Hazards found, field decision points. Where wasn't searched.

Discussion point – what are the consequences of this information not being communicated back to the planning section?

Operational Period Briefing (highly choreographed, minimize questions).

Briefing and Debriefing for specific assignments.

- Who should be present (leader, specialized resources – canine handler, sign cutter).
- What information should be communicated.
- Search operates under “Need To Know”, you will not learn everything.

The task assignment form.

- Information to be communicated in a briefing for an assignment.
- Information to be communicated in a debriefing from an assignment.

Contrasting the task assignment form with ICS-204, Assignment List.

Contrasing the task assignment form with T-Cards

The task assignment form lifecyle.

Practical Evolutions

(1) Complete a Task Assignment Form

In pairs of small groups, given a general description of an assignment have each group fill out a task assignment form for the other, then exchange, brief, review, and debrief on a simulated assignment.

Readings:
FUNSAR: None.
Basic SAR Skills:
Land Search And Rescue Addendum: Briefing and Debriefing SAR Teams, pp. 4-55 to 4-57;

Handouts:

ICS-204

SAR Task Assignment Form (any appropriate form for region)

Unit 18: Canine and Equine SAR

Topics: Description of the capabilities of Canine and Equine SAR resources, and how to work with those resources.
Related Standards: ASTM F2209-14 8.2.8, 12.5, 12.15
ASTM F1847-14 5.11, 5.12
See Also:
Methods: Lecture/Discussion and a practical evolution.
Time Frame: 50 Minutes (40 minutes classroom, 10 minutes practical)

Objectives:
Describe the capabilities of each of the four main canine SAR disciplines.
Describe what to do and what not to do while working with a canine task.
Describe the relationship of air stability to the ability of air scent canines to detect a human.
Describe the times of day and weather conditions when canine resources are most and least effective.
Explain how a canine handler can adjust tactics for working a segment in poor conditions.
Explain the difference between untrained alert behaviors and a trained indication in a canine.
Explain why you should record the bearing into the wind when observing untrained alert behaviors in an air scent canine.
Explain the tactical advantages of combining canine tracking/trailing and human sign cutting resources into a task force.
Explain the tactical advantages of combining air scent canine resources with clue aware human searchers.
Describe the capabilities of an equine SAR unit.

Training Plan: Present on canine and equine SAR resources following the outline below, interspersing the practical evolution with the discussion of gridding with a canine task.

Outline:

- Types of canine resources (tracking/trailing, air scent, HRD/cadaver, water)
- Weather/Scent/Canine tactics
- Working with a canine task
- Gridding a segment – navigation for an air scent canine task.
- Observing canines (untrained alert and trained indication behaviors, bearing into wind on alert)
- Combined Tracking and Mantracking resources
- Equine SAR
    - Elevated search platform – increased detection range.
    - Horses (prey animals) alert.
    - Can search trails, travel corridors, or segments.

Readings:
FUNSAR:
Basic SAR Skills:
Land Search And Rescue Addendum:

Handouts:

Topographic map with marked segments and wind, (attached below).

Practical Evolutions:

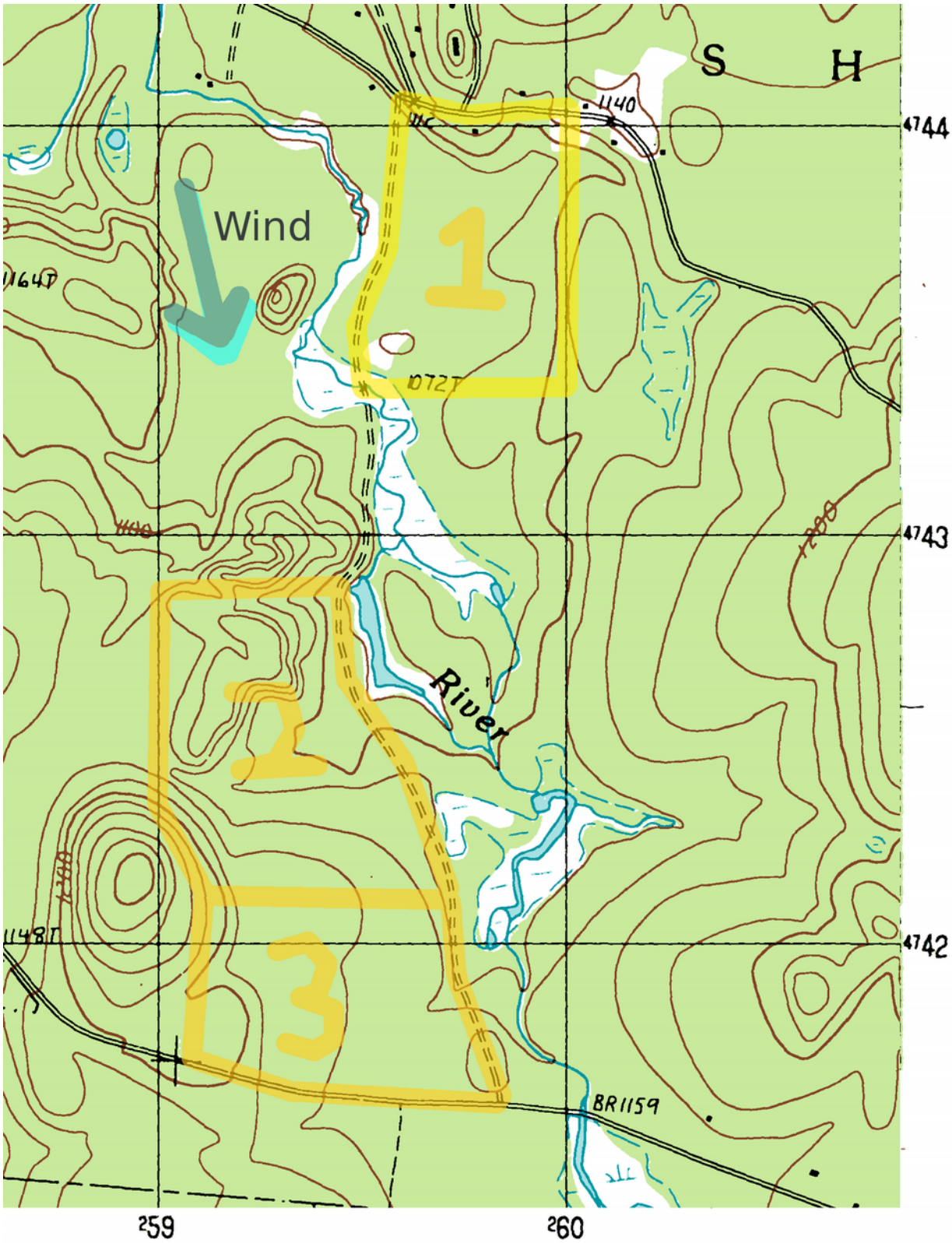
(1) Calculate bearings to grid a segment (for a wilderness air scent canine task).

Attached map (below) has three segments and a wind direction drawn on it (Segments 1 and 3 have two road/trail boundaries, Segment 1 has one road/trail boundary).. You can describe the conditions as morning, overcast, light steady wind from the north-north west.

Students do not need to work out the grid spacing (they can if they've taken canine POD/POD factoring) they would want to use, for the purposes of this exercise, use 100 meter grid spacing..

Given a map marked with the boundaries for a segment and a wind direction.
Determine the bearing for the direction of travel along the downwind boundary.
Determine the bearing for the direction of travel into the wind.
Determine the backbearing for the direction of travel along the downwind boundary.
Mark the map, or a sketch on a separate piece of paper, with the bearings and gridlines for a 100 meter grid spacing.

This map can also raise topics for discussion – what probems might be encountered in gridding these segments where to draw boundaries for additional segments, alternative boundaries for these segments, how large are these segments and how long would they take to search, interactions between tasks in adjacent segments, etc.


Wind
1
3
River
S H
1140
1072T
1164T
1148T
BR1159
4744
4743
4742
259
260
UTM GRID DECLINATION.....2°00' WEST
1998 MAGNETIC NORTH DECLINATION.....15°30' WEST
VERTICAL DATUM.....NATIONAL GEODETIC VERTICAL DATUM OF 1929

Unit 19: Mechanized Platforms: Mountain Bikes, ATVs, Snowmobiles and Helicopter Operations

Topics: Use of mountain bikes, ATVs, and Snowmobiles in SAR.
Awareness of potential interactions with helicopters in SAR operations.
Related Standards: ASTM F2751-16 8.1.4
NFPA 1006 (2013) 16.1.8
Methods: Lecture/Discussion.
Time Frame: 30 minutes.

Objectives:

Describe two advantages of mountain bikes over ATVs for SAR.
Describe appropriate PPE for riding a mountain bike.
Explain the meaning of "Rider Active" for control of an ATV
Describe how ATVs and Snowmobiles can be used to support rescue operations in SAR.
Describe appropriate PPE for riding an ATV.
Describe appropriate PPE for riding a snowmobile.
Explain why you need to take specific safety courses before operating an ATV or Snowmobile.

Describe PPE to wear at a helicopter landing zone.
Describe the risks associated with helicopter tail rotors.
Describe the risks associated with helicopter main rotors.
Explain why you should only approach a helicopter under the direction of a crew member of the helicopter.
Explain why you should never approach the rear of a helicopter without an escort by a crew member of the helicopter.
Explain why it is dangerous to approach or leave a helicopter on an uphill side.
List at least three preparations to make at a helispot.
Describe how to systematically look at the ground for subject or clues when serving as an air observer.

Training Plan: Present on mountain bike, ATV, and snowmobile resources following the outline below,

Note: Students are not being taught to operate these modes of transport, they are being presented with an awareness level of the safety issues, the need for further training, and some context on how these modes of transport can be used to support SAR operations.

Outline:
Mountain Bike
- Rapid coverage of trails.
- Less clue destruction (physical and audible) than ATVs.
- PPE

ATV
- Parts of an ATV

Definition and regulation varies by state.
Specific training needed to operate, rider active – rider's position on vehicle affects operation.
In Search:
Stop to listen.
Stop to check for sign.
Safety
PPE

Snowmobile

As for ATV
Regulation varies state by state.
May be able to travel cross country.
Safety
Specific training needed to operate,
Vegetation, wetlands, streams, fence lines as hazards.
PPE

Helicopter Operations
Helicopter safety, PPE
Hazards: Tail Rotors, Main Rotors, downdrafts, slopes, static, rotor wash.
PPE: Helmet, safety goggles, gloves, vests.
Remain at least 150 feet away.
Only approach under direction of crew.
Only approach rear with escort from crew member.
Landing zone/Helispot
Preferably pre-planned landing zone, with ground support from local fire department.
Site clear of overhead wires, towers, obstructions. Site clear of all obstacles taller than 12 inches. Site with less than 7 degree grade.
Check and clear the area of FOD – Foreign Object Debris.
At night, illuminate helispot with lights shining onto the ground (not strobes).
No Flares, No Smoking, No ignition sources.
Flight safety
Seatbelts fastened at all times.
Secure all loads (packs, ropes, loose equipment) under the direction of the crew.
Secure canines under the direction of the crew (rappelling harness, muzzle).
Air observer
How to systematically look at the ground (look at individual spots along lines, not scanning).
Look at point equivalent to size of fist held at arms length.
Move eyes to next point, one fist at arms length away along scan line.
Repeat along a diagonal line from the aircraft out to edge of sweep width.
Time to complete one diagonal line is time it takes aircraft to advance one fist width.
Air observing is highly fatiguing – limit to 2 to 3 hours.
On spotting something, point at it.
Note the position of the sighting with respect to landmarks.
Notify pilot.
Use clock positions to describe location of sighting.

Communicating location (NSARC matrix)

Aeronautical SAR responders: Lat/Long as primary, USNG as secondary.
Land SAR to Aeronautical SAR: USNG as primary, Lat/Long as secondary.
Aeronautical SAR to Incident Command: Lat/Long as primary, USNG as secondary.

Readings:
FUNSAR:
Basic Search Skills: Helicopter Operations F-17 to F-22
Land Search And Rescue Addendum:

Handouts: None

Practical Evolutions: None

Unit 20: Communications & Accountability

Topics: Radio communications. Accountability systems. Managing accountability.
Related Standards: ASTM F2751-16 8.1.5, 8.7.6
ASTM F2209-14 10.1, 10.2, 10.3
NFPA 1006 (2013) 16.1.9
Methods: Lecture/Discussion, Demonstration.
Time Frame: 30 minutes.

Objectives

List three unlicenced radio services that can support SAR operations.
List at least three licenced radio services that can support SAR operations with appropriate licensing.
Explain the function of a squelch control on a radio.
Explain the function of the PTT control on a radio.
Describe the difference between a simplex transmission and a transmission over a repeater.
Describe the steps in transmitting a message by radio.
Explain why you should test your radio before leaving staging for an assignment.
Describe the function of a net control station in a radio net.
Explain what accountability systems seek to accomplish.
Explain the importance of signing in on every incident.
List at least 4 tools for managing accountability on a search.

Training Plan: Present on communications and accountability following the outline below, include demonstration of how to transmit with a hand held radio.

Outline

- Radio services
  - Licensed: Amateur Radio, Public Safety, GMRS, Land Mobile.
  - Unlicenced: FRS, MURS, CB.
- Parts/controls of a radio
  - Antenna
  - PTT button
  - Battery
  - Volume control
  - Squelch control
- Simplex and repeaters
  - Simplex: Effectively line of sight.
- PL/CTSS tones
- Using a radio
  - Plan what you are going to say.
  - Listen to make sure channel is clear.
  - Press PPT button.
  - Pause.
  - State your message.

- Release the PPT button.
- Establish contact then transmit message.
- Use plain english, no codes.

Radio nets
- Net control station.

Troubleshooting

Accountability systems:
- Location of all personnel at all times.
- Identity and location of all responders to the incident.
- Use at every incident (including every training).
- Location and assignment (or other status) of all responders at all times.

Managing accountability:
- Who has been mobilized for the incident. (sign in)
- Who is out on which task. (SAR task assignment form)
- What is the status of each task. (T cards)
- Communications to support accountability: (test, on task, regular checkins, off task).
  - Regular status checks – may include location.
- Demobilization: Did everyone get home safe. (demoblization plan and implementation)

Readings:
FUNSAR: “Integrated Communications” p.32; “Communications Equipment” pp.189-191.
Basic SAR Skills: F-4 Communications, pp F-9 to F-14.
Land Search And Rescue Addendum:

Handouts: None

Practical Evolutions: None

Module IV: Rescue

Unit 21: Ties and Rope

Topics: How to tie a set of core life-safety knots. Awareness of the risks of the high angle environment. Basics of rope, webbing, and carabeners for technical rescue.
Out of scope: doing anything "On Rope", rigging, or haul systems; treatment is awareness level only.
Related Standards: ASTM F2751-16 8.8.2.3
NFPA 1006 (2013) 5.5.1; 16.1.11
Methods: Lecture (brief), Demonstrations, Practical Evolutions.
Time Frame: 90 minutes. (10 minutes lecture, 80 minutes practical)

Objectives:
Describe and differentiate amongst static rope, dynamic rope, and webbing.
Explain the meaning of the term kernmantle.
Identify the parts of a locking carabiner.
Describe proper care of rope.
Define: Bight, loop, round turn.
Define: Standing end, running end.
Define: Tie, Knot, Bend, hitch
Tie each of the following knots:
- Figure 8.
- Figure 8 on a bight, with barrel knot safety.
- Figure 8 bend, with barrel knot safeties.
- Figure 8 follow through (tie in), with barrel knot safety.
- Double overhand bend.
- Prussik hitch
- Water knot

Tie a swiss seat (tying off with a square knot and overhand knot safteys)

Training Plan: Present briefly on the topics in the outline below, then work through practical evolutions, demonstrating and having the students tie each of the knots. Slides are available to illustrate each knot.

Note: Students are not being taught how do anything with these knots, they are being given a foundation for future training..

Outline:
- High angle environment awareness.
- Need for separate technical rescue training.
- Software, Static line, Dynamic line, webbing.
- Care for software
  - Never step on a rope
  - How to inspect a rope for defects

Hardware
Terminology: Byte, loop, Running/Standing End, tie, knot, bend, hitch
Knots: Figure 8 family, Water knot, Barrel knot, Double overhand bend, Prussik.
Figure 8.
Figure 8 on a bight.
Figure 8 on a bight, with barrel knot safety.
Figure 8 bend, with barrel knot safeties.
Figure 8 follow through (tie in), with barrel knot safety.
Double overhand bend.
Prussik hitch
Water knot
Expedient Harness – swiss seat.
High strength anchor

Readings:
FUNSAR: Chapter 16.
Basic SAR Skills:
Land Search And Rescue Addendum: None.

Handouts:
Diagram of rope terminology

Additional Instructor's Resources:
Vines, T. and Hudson S. 2004. High Angle Rescue Techniques. 3rd ed. Elsevier Mosby, St Louis. 407pp. Chapter 11.

Smith & Pagett, 1996. On Rope. Chapter 3, Ties: Knots, Hitches, and Bends.

Materials Needed:
Equipment: Students
Rope:
One, 6 foot length of nylon kernmantle rope 6 to 9 mm diameter.
Webbing:
One 15 foot length of 1" tubular webbing.
Hardware:
One locking carabiner.
Equipment: Instructor:
Rope:
Two, different color, 6 to 10 foot lengths of nylon kernmantle rope 9 to 13 mm diameter, for demonstrating knots (should not be too stiff).
One 6 foot length of nylon kernmantle rope, 7 to 9 mm diameter, for demonstrating prussik knot (smaller than the above).
Webbing:
Two, different color, 4 to 6 foot lengths of 1" tubular webbing, for demonstrating water knot.
One 15 foot length of 1" tubular webbing, to demonstrate swiss seat.

Hardware:
One locking carabiner.

Practical Evolutions:

(1) Figure eight

Tie a Figure 8 (as a stopper knot).

(2) Figure eight on a bight.

Tie a Figure Eight on a bight.

(3) Barrel knot safety

Tie a barrel knot as a safety knot.

(4) Figure eight bend

Tie a figure eight bend, joining the ends of two piceces of rope.
First, tie a figure 8 near the running end of one piece of rope.
Second, thread the other rope through the figure eight, making a figure eight bend.
Third, tie barrel knots on either side of the figure eight bend as a safety.

(5) Figure eight follow through

Tie a figure eight follow through.
First tie a figure eight near the running end of a rope.
Second, thread the running end of the rope through your harness anchor point.
Third, thread the running end of the rope backwards through the figure eight.
Fourth, tie a barrel knot safety.

(6) Double overhand bend (grapevine knot)

Tie two ends of a rope together with a double overhand bend.

(7) Two wrap Prussik hitch

With the loop of rope formed with the double overhand bend, tie a two wrap prussik hitch on a larger rope.
Observe how this friction hitch holds under load, and slides without a load.

(8) Make a high strength anchor

Tie a figure eight on a bight. Tie a barrel knot safety.
Tie a figure eight on the other end of the rope.
Wrap the end of the rope with the figure eight on the bight twice around an anchor point such as a large tree.
Clip a carabiner through the bight and through the standing end of the rope.
Verify that the rope is not redirected by the carabiner when under load.

(9) Water knot (ring bend)

Tie a water knot in webbing.

(10) Swiss seat (expedient harness)

Make a swiss seat expedient harness out of a 15 foot length of 1” tubular webbing.

Find the center of the 15' length of webbing, slip this behind your belt buckle.

Reach between your legs from behind, grab the webbing, draw it around behind you, and thread both ends through the loop of webbing hanging from your belt buckle.

Run both ends of the webbing around your waist twice.

Tie the ends of the webbing together with a square knot.

Tie an overhand knot safety on either side of the square knot.

(10) Clove hitch

Tie a clove hitch around a rigid object.

A clove hitch can also be formed and slipped over an object.

(11) Girth hitch

Tie a girth hitch around a rigid object.

Unit 22: Land Navigation: Communicating location

Topics: Coordinate Systems. How to communicate a location obtained from a GPS or a map. Awareness of the Public Lands Survey System. How to locate a point by triangulation. Using a GPS.
Related Standards: ASTM F2209-14 8.5, 8.6, 8.7, 10.4.
ASTM F3071-14 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.6, 6.1
ASTM F3072-14 5.3.2
NFPA 1006 (2013) 16.1.4
Methods: Lecture/Discussion and Practical Evolutions.
Time Frame: 140 Minutes.(75 classroom, 65 practical)

Objectives:
Describe what a map coordinate system (e.g. lat/long or UTM) tells you.
Describe how points on the surface of the earth are represented in the geographic coordinate system (latitude/longitude).
Given a marked point on a recent topographic map that has a UTM grid, state the UTM coordinate of that point.
Identify the offset marks between NAD27 and WGS84 on a USGS topographic map that contains such marks.
List three potential problems with using GPS receivers for navigation.
State how much difference in location there might in the NE US for a coordinate if the datum was the NAD27 datum or if it was the WGS84 datum.
Given a marked point on a recent topographic map that has a UTM grid, state the USNG coordinate of that point for global communication.
Demonstrate how to communicate the location of a point on a map using USNG coordinates for local communication.
Demonstrate how to create a waypont in a GNSS receiver when given the location using USNG coordinates.
Demonstrate how to communicate the location of a point on a map using a pair of identical maps and the San Diego Mountain Rescue Team measuring system.
Demonstrate how to communicate a location using triangulation to three known points.
Identify the NSARC primary and secondary coordinate systems for communicating location by Land SAR Responders.
Describe what the geodetic datum (e.g. WGS84) tells you.
Describe the vertical datum tells you.
Explain why a precise coordinate (latitude/longitude or UTM) is not sufficient information to communicate a location on a map over the radio.
Demonstrate how to set a GNSS receiver to: Lat/Long, NAD27, English distances, Magnetic north, and then to USNG, WGS84, Metric distances, True North.

Training Plan: Present on land navigation following the outline below, interpolating practical evolutions into appropriate points in the presentation.

Outline:

Coordinate Systems

PLSS (Public Lands Seurvey System)
    PLSS townships in Maine
Latitude/Longitude
    Different representations (degrees minutes seconds, decimal degrees)
UTM/UPS
MGRS
USNG
    Variable length for communication scope and precision
Using a grid reader/roamer
Using a GPS to convert between coordinate systems.
Geodetic Datum
Distinction between local optimized datum and global datum.
Differences between NAD27 and NAD84 and WGS84
Grids on topographic maps.
    Dual grids on print on demand maps using scanned topographic maps.
Identifying Datum in map metadata.
GNSS – setting datum and coordinate system.
GNSS – WAAS, power consumption
SDMRT measure on map system.
NSARC Geo-referencing Matrix:
    Land SAR Responder: USNG primary; Lat/Long secondary.
    Land SAR Coordination with Incident Command: USNG primary; Lat/Long secondary.
    Land SAR Responder with Aeronautical SAR: USNG primary; Lat/Long secondary.

Readings:
FUNSAR: pp 144-149; pp 166-173.
Basic SAR Skills:
Land Search And Rescue Addendum: Section 4-7: Georeferencing pp. 4-43 to 4-51.

Handouts:
    USGS USNG Instruction sheet, one per student.
    USGS USNG example map, one per student.

Practical Evolutions:

(1) Determine USNG coordinates of a point on a map.

Inside.

On the USNG example map, have the students identify the USNG coordinate of the water tank near Planters canal.

Repeat with the + that marks Mile 78 on the Mississippi river.

If students are still having problems, repeat with additional clearly marked landmarks.

(2) Communicate UTM coordinates of points on map via radio.

Split class into paired teams, with either one or two people in each team.

Give one team of each pair a map (with a UTM grid) with one marked point.

Give the other team of each pair a map of the same area with a different marked point.

Place the pairs separated in radio communication with each other (e.g. using FRS radios with separate channels for each pair) (alternately back to back where they can hear but not see each other)

Have each team work out the UTM coordinate of their marked point.

Have one team transmit the coordinate of their marked point to the other team in the pair.

Have the second team in the pair mark the transmitted point on their map.

Repeat for the other point.

Have the teams compare maps.

(3) Set datum and coordinate system on a GPS.

(Optionally, If students have GPS recievers)

Split the students into groups of 2 (or more, depending on the number of available GPS units).

Have the students set the GPS receiver to use latitude/longitude and NAD27, and record the location.

Have the students set the GPS receiver to use latitude/longitude and WGS84, and record the location.

Have the students set the GPS receiver to use UTM/UPS and NAD27, and record the location.

Have the students set the GPS receiver to use UTM/UPS and WGS84, and record the location.

(4) Communicate SDMRT coordinates of points on a map via radio.

Split class into paired teams, with either one or two people in each team.

Give one team of each pair a map (e.g. a trail map, without a grid) with one marked point.

Give the other team of each pair an identical map with a different marked point.

Place the pairs separated in radio communication with each other (e.g. using FRS radios with separate channels for each pair) (alternately back to back where they can hear but not see each other)

Have the team with the marked map measure the location of the marked point.

Have the team with the marked map transmit the SDMRT coordinate to the other team in the pair.

Have the second team in the pair mark the transmitted point on their map.

Repeat for the other point.

Have the teams compare maps.

Required Equipment/Supplies:

Set of topographic maps of an area (with a UTM grid), one per student (USNG training map).

Compass, one per student.

Set of topographic maps of an area (with a UTM grid), one per student, each map with a different point marked on it (for UTM exercise).

Set of trail or streetmaps of an area (without a grid), one per student, each map with a different point marked on it (for SDMRT exercise).

A ruler, one per student.

Optionally, GPS receivers, one per each pair of students.

Unit 23: Rescue

Topics: Awareness and recognition of technical rescue environments. Primacy of safety in rescue operations.
Related Standards: ASTM F2209-14 11.1.3, 11.1.4
NFPA 1006 (2013) 16.1.11
Methods: Lecture/Discussion
Time Frame: 25 Minutes

Objectives

List the steps in LAST
Describe which steps in LAST might require technical rescue resources.
Describe five environmental conditions that should only be entered by specifically trained rescue personnel.
Describe the steps in a risk management process for rescue.
Describe the control zones that should be established at the top of a high angle slope.
Explain how to state a direct message to convey a safety concern.

Training Plan: Present on rescue following the outline below.

Outline:

- LAST – Locate, Access, Stabilize, Transport
  - Access/Stabilize/Transport classical rescue phase.
  - Locate may also need technical rescue resources.
- Technical rescue environment (high angle, cave, mine, water, mountain rescue) awareness
  - (Review from Hazards).
- Calling in appropriate resources for safe rescue
- Risk management process:
  - Situational awareness, Hazard Assessment, Hazard Control, Decision Point, Evaluation.
- Control Zones:
  - Hot, Warm, Cold
  - Example Control Zones for high angle rescue.
- Communication
- Direct Communication for Safety
- ICS:
  - Safety officer
  - Span of control, possible organization (Rescue Group with Supervisor)
- Stabilization
- [Transportation – next unit]

Readings:
FUNSAR: “Litters”, pp 270-273.
Basic SAR Skills:

Land Search And Rescue Addendum: None.

Additional Instructor's Resource:
Vines, T. and Hudson S. 2004. High Angle Rescue Techniques. 3rd ed. Elsevier Mosby, St Louis. 407pp. Chapter 11, Chapter 15, Chapter 16.

Handouts: None.

Practical Evolutions: None.

Unit 24: Packaging and Flat Ground Litter operations.

Topics: Packaging of a patient in a litter for non-technical extrication. Awareness of environments requiring technical rescue for litter operations. Out of Scope: Low angle litter operations. Haul systems.
Related Standards: ASTM F2751-16 8.1.3, 8.5, 8.8.2.2, 8.8.2.3, 8.10.1, 8.10.2, 8.10.3
NFPA 1006 (2013) 16.1.11
Methods: Lecture/Discussion and practical evolutions.
Time Frame: 60 Minutes.(including 40 practical)

Objectives:

Describe the safety concerns involved in a one mile carry out of a patient in a litter.
Demonstrate packaging of a patient in a litter.
Demonstrate a litter carry over flat ground.

Outline:

- Transport
- Litters and litter designs, litter wheels.
  - Basket/Stokes Litter: Metal, Plastic
  - Flexible/Sked litter (not suitable for low angle/broken ground with a haul line)
- Using a backboard in a Litter
- Litter operations
  - Low angle and high angle terrain
  - Safety
  - Team elements: Navigation, carry, relief, rigging.
  - Who gives lift/lower/stop commands
  - Lift with the knees, not the back.
- Litter Packaging
  - Maintaining patient temperature
  - Protecting the patient's face
- Litter Carry

Readings:
FUNSAR:
Basic SAR Skills:
Land Search And Rescue Addendum: None

Handouts: None

Practical Evolutions:

(1) Litter packaging.

Prepare the litter
- Lay out tarp, blankets, thermal blanket, sheet.
- Girth hitch the center of the 40' webbing to the lower rail at the foot of the litter
- Tie each carry strap in a loop with a water knot
- Girth hitch carry straps to lower rail along sides of litter

Place the patient in the litter
Wrap the patient – sheet, thermal blanket, blankets, tarp.
Provide eye protection for the patient.
Tie the patient into the litter, wrapping 40 webbing up diagonally from feet to chest.

(2) Flat ground litter carry

6 person team knees beside litter, 3 per side, placing carry straps over shoulders.
On command from right head, lift (lifting with the knees, not the back).
On command from right head, advance.
Have each team of 6 carry the litter about 100 meters on level ground.
On command from right head, stop.
On command from right head, lower.
Do not make the litter vertical or invert the litter.

Required equipment:
- Stokes or similar litter basket.
- Packaging: e.g. Sheet, emergency thermal blanket, two blankets or a sleeping bag, tarp (6'x8')
- Safety glasses, goggles, or other eye protection.
- Patient tie down materials: e.g. 40 feet of 1” tubular webbing.
- Carry straps: 6 8-10 foot lengths of 1” tubular webbing.

Unit 25: The SAR incident

Topics: Review by walking through the stages of a SAR incident.
Related Standards: ASTM F2209-14 6.5, 11.2
Methods: Guided Discussion.
Time Frame: 75 Minutes.

Objectives:
Describe the sequence of events that might be expected to occur over the course of a SAR incident.

Training Plan: Review of the course material as a discussion or in the form of a mock search tabletop exersise.
.
Discuss the elements of a hypothetical search, from pre-planning to record keeping, reviewing the course topics as a whole, following the outline below. Optionally, make the hypothetical search a concrete example, merging the discussion with a tabletop exercise. Some potential discussion questions in italics in the outline below.

Outline:

- Preplanning
  - *What do we know about people who go missing in this area?*
  - *What preplans do we have?*
- Preparation, Training, Training Records, Credentialing, Certification
  - *What training records do you have?*
  - *How could you document your training and credentials in court?*
- Callout
  - *How are you called out?*
- Sign in
- ICS Facilities: Staging Area (ready to depart for assignment in 3 min), Base, Command Post
- Briefing
  - *What do you want to hear in a briefing?*
- Assignment
  - *What tactics might you be asked to carry out?*
  - *What equipment do you need to apply those tactics?*
  - *What information gets transmitted over the radio?*
  - *There is a net supporting the search with call for status checks every half hour, what sort of information may be requested in that status check?*
  - *How can radio transmissions of bearing or location information get confused?*
  - *What happens if you have to shelter overnight?*
  - *What happens if you make a find?*
- Debriefing
  - *What information needs to be communicated back in a debriefing?*
- Search Base, Rest, Fatigue, Critical incident stress management.
- Demobilization, Checkout, return home accountability.

Mission Critique
Record keeping

Readings:
FUNSAR: “Anatomy of A SAR Incident” pp. 252-259.
Basic SAR Skills: None.
Land Search And Rescue Addendum: SAR Case Documentation pp. 4-53 to 4-54.

Handouts: Optionally, support the discussion with maps, and forms prepared to support the hypothetical search.

Practical Evolutions: The entire unit can be run as a tabletop exercise..