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.

Table of Contents

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.

Scope with respect to standards

The scope of this course for preparation of search and rescue team members in Land Search and Rescue in the Wilderness and Non-Wilderness environment, but not for mountainous, alpine, or rope rescue as described in ASTM F1993-16. The scope broadly corresponds to NFPA 1670 (2017) Chapter 10, technician level, exclusive of rope rescue and operations on technical terrain and most of the search management aspects that are normally the content of a search management course (such as NEWSAR's Modern Search Management)..

ASTM F2209-14 Standard Guide for Training of Land Search Team Member. [Excluding 7.1.3, blood-borne pathogens, and other external courses (e.g. first aid, CPR)].
ASTM F2751-16 Standard Guide for Training of a Land Search and Rescue Team Member.
ASTM F2890-12 Standard Guide for Hazard Awareness for Search and Rescue Personnel.
ASTM F3071-14 Standard Guide for Basic Wilderness GPS/GNSS Use (GPS/GNSS-IW) Endorsement.
ASTM F3071-14 Standard Guide for Intermediate Wilderness GPS/GNSS Use (GPS/GNSS-IIW) Endorsement.
ASTM F1847-14 Standard Guide for Minimum Training of Search Dog Crews or Teams. [Limited to section 5. Handler Knowledge, Skills, and Abilities].
ASTM 2752-09 Standard Guide for Training for Level I Rope Rescue (R1) Rescuer Endorsement

ASTM F2209-14 sections 6.5 and 6.6 are covered in general terms, but should be filled in with the specifics of the authority having jurisdiction relevant to the delivery of this course material. There are a few deliberate deviations from the content of ASTM F2209-14 sections 7-12: Treatment of 7.9 is not included, this is left to a separate hazmat awareness course, likewise, treatement of 7.13 is not included, this is left to a separate OSHA universal precautions/bloodborne pathogens course. 11.2 search phases are mentioned, but they do not conform with the standard IAMSAR SAR Stages which are emphasized instead. 12.1.1.1 on search urgency is deliberately omitted, because search is an emergency, search urgency rankings are deceptive and should not be used in search management. 12.9.3, fails to distinguish between type III grid search and type IV evidence search, type IV evidence search is separated out here.

Some elements of NFPA 1006 (2017) chapter 10 relevant to ground searchers are covered to the Technician level, however NFPA 1006 chapter 10, on wilderness search and rescue, mixes skills that

more generally considered to be on a search management track, (e.g. 10.1.5; 10.2.2, preplan; 10.2.3, weather history and forecasts; 10.3.5 develop IAP; 10.3.6) and those on a technical/mountain rescue track (10.3.11, negotiate technical terrain) and those of a law enforcement forensic evidence technician (10.2.5) with those skills required by wilderness, rural, and urban ground searchers, which are covered here.

Materials and Supplies

Texts:

Cooper, D.C. ed. 2019. Fundamentals of Search and Rescue, second edition. National Association of Search and Rescue. Jones and Bartlett, Sudbury. 457pp.

Trantham, G, and Wells, D. 2018. NOLS Wilderness Navigation. Stackpole Books. Mechanicsburg. 200pp.

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.

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 [out of print as of 2017].

Required Equipment for Each Student.

Compass (preferably mirrored baseplate 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.

A 24 hour pack as specified by the authority having jurisdiction or the student’s home agency.

A GNSS (GPS) receiver..

Required Equipment and Supplies for the Course.

Handouts (one per student, unless otherwise noted) [See list in spreadsheet_components.ods. Handouts are in resources/handouts/ directory]. Items in bold are not included in the standard set of

course materials.

Sign in sheet (1 per day).

Course Syllabus (course_outline.odt).

Missing Person Questionnaire (missing_person_questionare.pdf);

Topographic Map (Unit4TempletonStateForestMap.pdf). One for each pair of students.

Paired TopoQuad and OrthoPhotoQuad (Unit5MapsTopoOrthoPhoto.pdf) one for each pair of students

Topographic Map Symbols (USGStopomapsymbols.pdf)

Map: Unit_5_Greylock_east_inkatlas-72747.pdf

FEMA/NIMS Search and Rescue Resource Types pp 39-41 (FEMA_ESF9_resources_extract.pdf)

Grid terminology slide (Unit6_sensors_and_tactics_grid_terminology_slide).

NEWSAR Code of Ethics (NEWSAR_Code_of_Ethics.pdf)

ICS-204

ICS-214

SAR Task Assignment Form (any appropriate form for region)

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. readingsLegal Issues in SAR (SAR-Legal.pdf).

Route Map (print color and b/w (Unit11_route_map.pdf)

Magnetic/True Conversion conversion chart (MagneticTrueConverstion.pdf)

**** Local map of the training area, WGS84 USNG grid ****

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

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).

NWS Heat Index chart

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

Generic Equipment list

Segment map, segment 2, Templeton (Unit18SegmentMapTempelton.pdf). One for each pair of students.

GNSS/GPS Receiver Checklist (GNSS_GPS_recieverChecklist.pdf)

Land SAR Addendum to National Supplement to IAMSAR: Ground SAR Tactics pp 131-140.

Canine Segments TopoQuad (Unit21_CanineSegmentMap.pdf);

Canine SAR Tactics from Land SAR Addendum to National Supplement to IAMSAR p141

**** Local map of the training area with NAD27 UTM grid ****

GAR risk assessment card (NPS) (GAR_risk_assessment.pdf)

SAR GAR risk assessment card (FEMA) (SAR_GAR_risk_assessment.pdf)

Cold Card ****obtain from WMS paper**,**

NPS Yosemite tie in (yosemite_litter_packaging.pdf)
FEMA Search and Victim Markings (search_victim_markings.pdf)

GNSS/GPS receivers, at least one per each pair of students, if not provided by the students individually.

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

Tracking
- Rake
- Tracking stick (for each instructor)
- 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 carabiners (3)
- Two Pulleys.

Litter, rigid.
Tarp, blankets (2), sleeping bag, space blanket.

Webbing:
- Six 10-12 foot lengths of 1" tubular webbing (Litter carry)
- One 40 foot length of 1" tubular webbing (Cold package Litter tie down)
- Two 18 foot lengths of 1" tubular webbing (Yosemite litter tie in).
- Four 12 foot lengths of 1" tubular webbing (Yosemite litter tie in).
- 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)

Licensing and Use

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.

NASAR is a trademark of the National Association of Search and Rescue. Reference to NASAR is made solely for reference, no endorsement is implied. These materials are not approved or endorsed by NASAR in any way.
ASTM is a trademark of ASTM International. Reference to ASTM is made solely for reference, no endorsement is implied. These materials are not approved or endorsed by ASTM in any way.
NFPA is a trademark of the National Fire Protection Association. Reference to NFPA is made solely for reference, no endorsement is implied. These materials are not approved or endorsed by NFPA in any way.

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.

2017 1.0.0-SNAPSHOT. Minor corrections in unit 2. Split the land navigation units (4,10,15,22) into two units each (to make no presentation longer than 60 minutes). Merged the task assignment form unit (17) into ICS. Added Equipment unit (17). Renumbered units, now a total of 29 units. Corrected some typos in ASTM standard numbers (F229 corrected to F2209). Crosschecked (in progress) objectives, outlines, and content of slides. Added a few more missing elements listed in the ASTM standards. Added Success Criteria sections (in progress). Expended text in objectives (in progress). Multiple corrections from review of 0.4. by Dr. Kevin Albert.

2019 April 1.0.0-SNAPSHOT. ASTM standard specifies that exterior operations in areas affected by disaster are within scope, and FEMA wide area search material assumes wilderness SAR responders as potential resources with early local availability, so added more material on disaster hazards and how to work as ground searchers within a wide area search response (unit 29, renumbered unit 29 as unit 30, total of 30 units with one supplemental).

2019 Dec 03 Removed tabletop exercise unit, added a ties and anchors unit, renumbered units 27-30. switched units 22 and 24 to put knots onto two days in usual delivery.

2020 Jan 22 Updates to unit 11 Land Navigation: North/Wayfinding, added practical evolutions. Units 1-16 all have slides, speakers notes, objectives and have slides cross checked against the objectives. Updated related standards list to include ASTM 2752-09. Updated texts, note FUNSAR page references are for first edition and need updating to second.

2020 Feb 14 Reorganization of the GNSS/GPS units. Added/completed more practical evolutions. Removed repetition, expanded and cleaned up the text of the ties, anchors,, litters units. Further crosschecks of instructors guide with presentations. Refined catastrophic incident search objectives nd added evolution on search and victim marking. Expanded practical evolutions for ties, anchors, litters, and rescue to fit scope of ASTM rope level 1 supplement. Cross check of presentations with instructor's guide

2020 March 2 Release 1.0.0.Updated all times to match spreadsheet_components, updated list of handouts and supplies. Filled in unfinished practical evolutions. Added success criteria for unit 14.

Course Units

The course is broken into 30 units in 4 modules and is designed to be taught over 4.5 days (or in 6 6 hour sessions plus one 4 hour session). If taught in 4.5 days, the schedule could involve: units 0-3, 4-11, 12-17, 18-22, and 23-30). Time frames for each unit are suggestions and are based on delivery of

versions 0.1 to 0.4, lecture times approximate 0.9 slides per minute.

Land navigation is considered sufficiently important that 8 units are dedicated to it. These are deliberately spread across the course with some repetition. Likewise, four units cover observation skills and search tactics, again spread through the course with some repetition. This repetition of material is by design. The course material can be reorganized, and each unit list as dependencies all of the units that are expected to have been already covered prior to that unit as an aid to reorganization.

The material in the course is distributed among topics as shown in the table below. See the file spreadsheet_components.ods for a more detailed overview of the course units.

	About SAR	Land Nav	Hazards	Searching	Rescue
Percent	20%	32%	15%	22%	11%
Hours	8:00	12:40	5:50	8:40	4:30

Module I: Search and Rescue

Unit 0: Introduction

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

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).
- Scope of this course relative to ASTM International standards.

Describe requirements, required equipment supplied by the students, etc.

Materials Needed:
- Sign in sheet (resources/admin/ClassList.pdf).
- Course Syllabus (resolurces/source_files/course_outline.odt).

Unit 1: SAR Systems, Search Crucials

Topics: About SAR. 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 and Discussion
Time Frame: 50 minutes.

Dependencies: None.

Objectives:
The learner will define the following terms: Search, Rescue, Lost, Missing.
The learner will describe the international system for aviation and maritime SAR response and its basis in international agreements.
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.

Success Criteria:
As a group, learners will accurately describe the sequence of events that follow the activation of a EPIRB, ELT, or PLB.
As a group, given a series of lost person scenarios, learners will accurately identify to what extent the people described in each scenario are lost and to what extent they are missing.
As a group, given a lost person scenario, learners will be able to accurately describe how each of the search crucials applies to that scenario.
As a group, given a lost person scenario and a map, learners will be able to identify multiple jurisdictions that may be concerned with the search effort.

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. Use this presentation to set the stage for the course with an openness to pertinent discussion and questions.

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
- Describe (but do not actually) activating a PLB, ask the students what sequence of events follows.
- 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. **Emphasize Discussion.**
  - (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: About SAR. 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 11.2; 12.1, 12.2, 12.3
[The scope of NFPA 1006 (2017) 10.1.5, 10.3.5 and 10.3.6 are covered at a very introductory level, those are search management skills and require separate search management separate training].

Methods: Lecture/Discussion.
Time Frame: 80 minutes (50 Minutes lecture/discussion, 30 minutes practical/discussion.

Dependencies: Unit 1: SAR Systems, Search Crucials

Objectives:
Define and describe the differences among the IPP, PLS, and LKP.
Describe the significance of IPP, PLS, and IPP for search operations.
Define and describe the differences between the Theoretical, Statistical, and Deductive search areas.
List the 5 sets of initial actions for a search described by Koester's Bicycle wheel model.
Describe how Koster's Bicycle wheel model provides reflex objectives for managing by objectives in the initial action stage of a search.
Distinguish between route searches and area searches.
Define POD, POA, and POS.
Describe how shifting POA drives resource allocation in a search.
Describe the significance of POD, POA, and POS for search operations..
Explain the phrase: Excessively High PODs Kill.
Distinguish between Active/Direct and Passive/Indirect tactics.
Describe the function and importance of a lost person questionnaire.

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. Conclude with practical evolution followed by discussion on missing person questionnaire.

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.

Routes and Segments

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.

Discuss objectives for initial actions in scenario.

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

POS: Probability of Success.

Shifting POA and resource allocation. Manage by objectives.

Tradeoffs of Efficient/Thorough search (and optimizing Overall POS).

Importance of consistent POD reporting.

Work through an example of shifting POAs, illustrating POS and the effect of inconsistent POD reporting.

Reference the NEWSAR POD/POD Factoring course.

Direct and Indirect Tactics

Lost person behavior questionnaire, importance and function.

Interviewing.

Practical Evolution (1) Missing Person Questionnaire.

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.

Handouts: A missing person questionnaire [one is included in resources/handouts/missing_person_questionaire.pdf, any could be used].

Practical Evolutions:

(1) Missing Person Questionnaire.

[*Learning objective of this evolution is is generally understanding the function of the missing person questionnaire, (not learning to interview)*].

Hand out missing person questionnaire forms (any format).

Form students into groups of 3.

Brief everyone with a location for a missing person incident (someone missing from this place at this time, initial planning and searching information has been obtained), that in their groups of three they have a family member or acquaintance to interview (and that only for the purposes of this training activity, they will be limited to 15 minutes).

Have one student in each group play the person being interviewed, instruct them to think a person they know well, and that that person is missing while engaging in a typical activity..

Have the other two students in each group conduct an interview, filling in the lost person questionnaire.

Allow the exercise to run for about 15 minutes, then stop to discuss.

Key discussion points: How far did you get in 15 minutes? What did you learn? How is this going to help with the search? Who needs to know this information?

Unit 3: Lost Person Behavior

Topics: About SAR. 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, Practical evolution.
Time Frame: 75 minutes (60 lecture/discussion, 15 practical)

Dependencies: Unit 1: SAR Systems, Search Crucials

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.
List the most important factor for survivability of a missing person.
Explain why search is an emergency.
Explain the phrase “search anywhere they could fit”.
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 critical elderly wanderer that pertain to search tactics.
Describe some characteristic behaviors of the despondent subject 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 why you check outbuildings, abandoned vehicles, and other structures in a search.
List some categories of lost person where direction of travel is a strong predictor of find location.
List some categories of lost person where direction of travel is a weak predictor of find location.
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. Finish up with practical evolution, emphasizing how dementia tends to result in missing subjects traveling in a straight line.

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 (structures, track offsets, responsiveness, etc.):

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.

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.

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.

Practical evolution (1) Walking like a critical elderly wanderer.

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.

Handouts: None

Practical Evolutions:

(1) Walking like a critical elderly wanderer.

Locate an outdoor location where people aren't going to walk into traffic or other hazards, ideally near a decision point where people can miss a turn by walking straight and can run into an obstacle.

Group everyone together.

Describe the critical elderly wanderer again: unsteady on feet, looking down, reduced perhiperal vision, reduced short term memory and ability to remember landmarks.

Simulating critical elderly wanderer: look down, hold hands to side of face (only looking at a small patch of ground right in front of you), start walking.

Have everyone face in about the same direction (in a line or in a crowd).

Direct everyone to do this (look down, hands as blinders at side of face, start walking, and stop

when the reach an obstacle.

Encourage everyone to start walking.

When people have run into things and stopped, have everyone stay where they are and look around.

Discuss (key points: tend to go in straight lines, tend to miss turns, tend to go until they get stuck).

Unit 4: Land Navigation – Topography, Slope

Topics: Land Navigation. Introduction to topographic maps. Visualizing topography from topographic lines on a map. Map scales. Measuring distance and area on a map. Measuring slopes on a map.
Related Standards: ASTM F2209-14 8.2.1, 8.2.2, 8.2.3, 8.2.7
NFPA 1006 (2017) 10.2.7; 10.3.7

Methods: Lecture, Demonstration, Practical Evolutions.
Time Frame: 65 minutes (45 lecture/demonstration, 20 practical)

Dependencies: None.

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.
Identify the symbol used for a depression on a topographic map.
Demonstrate how to measure the straight line distance between to points on a map.
Demonstrate a technique for measuring a distance along a winding route on a map.
Demonstrate how to calculate the grade for a slope on a topographic map.
Describe how to provide quick estimates of area in acres of segments marked on a map.
Identify the scale, contour interval, datum, vertical datum, and age on the border of a USGS map.

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

Outline:

- Topographic maps
- Contour lines – lines of equal elevation
  - Identifying steep and shallow slopes
- Identifying which way is up hill.
  - Depressions.
- Topographic map metadata
  - Scale
  - Contour interval,
  - Age
  - Map grids
  - Datum, vertical datum.
- Measuring Distances
  - Straight line distances.
  - Distances along curving travel routes
- **Practical Evolution (1) Calculate Distance.**
- Slope
  - Calculating slope
  - Measuring slope with a inclinometer in a compass.
- **Practical Evolution (2) Calculate Slope.**

Estimating areas

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

Handouts:
Topographic map
(resources/handouts/*Unit4TembletonStateForestMap.pdf*).

Required Supplies:
Topographic map, one for each pair of students.
[See Files source_files/Maps_reduced.odt for topographic map, also as resources/handouts/Unit4TembletonStateForestMap.pdf]

Practical Evolutions:

(1) Calculate Distance.

Materials: USGS 1:24,000 or 1:25,000 topographic map: *Unit4TembletonStateForestMap.pdf*

Measure the straight line distance between two landmarks.
(Measure the distance from the peak of Crow Hill to the Water Tank by the Fernald State School (~1350 meters)).

Measure the distance along a winding path (using the compass lanyard).
(Measure the length of Norcross Hill Road (~2km)).

(2) Calculate Slope.

Materials: USGS 1:24,000 or 1:25,000 topographic map: *Unit4TembletonStateForestMap.pdf*

Given a topographic map, find a steep slope:
Calculate the elevation change, calculate the grade.

Repeat with a shallow slope.
Calculate the elevation change, calculate the grade.

Unit 5: Land Navigation – Map Reading, Decision Points

Topics: Land Navigation. 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 (2017) 10.2.7; 10.3.7
Methods: Lecture, Demonstration, Practical Evolutions.
Time Frame: 90 minutes (60 lecture/demonstration, 30 practical)

Dependencies: Unit 4: Land Navigation – Topography, Slope

Objectives:
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, draw, valley,
Identify map symbols for a PLS, Clue, SARSAR Location
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. Finish with a discussion of what sort of features make good search segment boundaries, bringing together interpretation of the map with thinking about navigating and traveling on the terrain.

Outline:

- Topographic maps and air photos.
- USGS map symbols
  - USGS Orthophotoquad
- Open Street Map
- Terrain Features on topographic maps.
- Air photo interpretation (time of year, age, water, roads, trails, structures).
- Comparisons of air photos and topographic maps.
- SAR Map Symbols: IPP/PLS/LKP, Clue, ELT Location.
- **Practical Evolution (1) Find landmarks on USGS orthoimage and topographic map.**
- Where am I?
  - Map reading as hypothesis testing
  - "If I'm where I think I am, there will be a lake around the bend."
- Decision Points
- **Practical Evolution (2) Identify Map Decision Points on a trail system**

Reading terrain, terrain and travel.
Segment boundaries. **Discuss**. (Group exercise in reading and interpreting the map).

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

Handouts:

Topographic Map Symbols
(resources/handouts/USGS_topomapsymbols.pdf)
Paired orthophoto and topographic map
(resources/handouts/Unit5MapsTopoOrthoPhoto.pdf).
Topographic map with trails of portion of Mt Greylock, MA.
(resources/handouts/Unit_5_Greylock_east_inkatlas-72747.pdf)
Map created on Inkatlas.com.
Copyright OpenStreetMap contributors (openstreetmap.org), OpenTopoMap (CC-BY-SA).

Required Supplies:

These maps are listed under Handouts Above.
Paired topographic map and orthophotoquad, one for each pair of students.
[See Files source_files/Maps_reduced.odt for topographic and orthophoto pairs, also as resources/handouts/Unit5MapsTopoOrthoPhoto.pdf]
Topographic map, one for each pair of students.
[See: resources/handouts/Unit_5_Greylock_east_inkatlas-72747.pdf]
Map created on Inkatlas.com.
Copyright OpenStreetMap contributors (openstreetmap.org), OpenTopoMap (CC-BY-SA).
[See also: US Topo map: images/maps/ustopo_willamstown_MA_7382196.pdf]

Practical Evolutions:

(1) Find landmarks on USGS orthoimage and topographic map.

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, supplied as *Unit5MapsTopoOrthoPhoto.pdf*).

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.

Locate the following points on both map and air photo.
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

(2) Identify Map Decision Points on a trail system

Materials: Topographic map of an area that includes a trail system.
resources/handouts/greylock_east_inkatlas-72747.pdf

Provide the students with a PLS and a missing Hiker scenario.
Scenario: 25 year old male day hiker, went to hike the Bellows Pipe Trail on Mt Greylock.
PLS: Subject dropped off on the Bellows Pipe Trail trailhead on Thiel Road by Hoxie Brook at about 10 AM by a friend.
Weather: Cool overcast morning, then cold rain and mist for remainder of the day. Temperatures in the 50s.
Subject wearing clothing appropriate for the weather, had a day pack usually containing water, trail snacks, extra clothing. Experienced trail hiker, good health. No known medical issues. No recent significant psyco-social events in his life. Cell phone is non-responsive.
Subject's plan was to hike up the Bellows Pipe Trail to the Mt Greylock Summit, then return on the same route to get picked up at about 4PM. Subject did not return at the expected time (4PM) a couple of hours later the subject's friend followed the plan for the subject not returning on time and called for help.

(1) In small groups have the students identify Decision Points on the map.

(2) Discuss the identified decision points in the whole group.

(3) In small groups examine the consequences of terrain following from each decision point and identify high priority areas for search.

Unit 6: Search Sensors and Tactics

Topics: Searching. 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 8.6, 8.7.7
ASTM F2209-14 12.3.5.3, 12.4; 12.5; 12.7; 12.8.
NFPA 1006 (2017) 10.1.2; 10.2.3
See Also: SWDOG SC1: Terminology, ASTM F1848-14

Methods: Lecture/discussion.
Time Frame: 60 Minutes

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory

Objectives:
Describe the difference between clue finding resources and subject finding resources.
Describe why spontaneous volunteers need to be managed in a search.
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 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.
List at least six examples of the composition of single resources, strike teams, and task forces in a search.
Define: Type I search, Type II search, Type III search, and Type IV search.
Define: Search Lane, Base Line, Guide Line, Control Line, Guide Person.
Characterize Type I-IV searches in terms of efficiency, thoroughness, and destructiveness.
Explain the procedure for a field resource to call out a subject's name.
Describe the significance of Coverage in search operations.
List 8 factors that affect POD.
Describe 4 standard SAR Assignment team positions/functions
Describe some functions you may be responsible for as a member of a ground search strike team or task force.
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).
- External influences
- Inland SAR Resources
  - 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).

Resource Typing

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

Mantrackers/Sign Cutters

Direction of travel

Indirect and Direct Tactics

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

Ground searchers, Type I to IV search – efficiency/thoroughness/destructiveness.

Grid searching: Base Line, Guide Line, Guide Person, Search Lane, navigation and control techniques for grid searches.

POD Factors: Searcher speed, searcher spacing, terrain, vegetation, weather, time of day, searcher condition, subject condition. Direct to the NEWSAR POD course.

Coverage

Introduce the Northumbrian Rain Dance

Route Search, Area Search, Barrier search.

Composition of SAR assignment team: Roles: Leader, Communications, Navigation, Ground Searcher. Additional functions: Medical, LE.

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 (pp 39-41)
(resources/handouts/FEMA_ESF9_resources_extract.pdf)

Grid Terminology
(resources/handouts/Unit6_sensors_and_tactics_grid_terminology_slide.pdf)

Practical Evolutions: None

Unit 7: ICS – Managing Chaos

Topics: About SAR. Review of ICS with an emphasis on elements of ICS that are important for field searchers. 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.
Relevant Standards: ASTM F2751-16 8.7.6
ASTM F2209-14 6.7
NFPA 1006 (2017) 5.2.4 10.1.4;
Methods: Lecture/Discussion, Practical Exercise.
Time Frame: 60 Minutes (45 lecture/discussion, 15 practical.

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory

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.
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.
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.
List at least five things that should be communicated in a debriefing.

Training Plan: Present on ICS and the SAR Task Assignment Form following the outline below.

Facilitate discussion, particularly on information transfer in briefing and debriefing. Follow with a brief practical exercise with the SAR Task Assignment Form.

Outline:

- ICS as a common framework for managing emergency response.
- 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
- 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.
Contrasting the task assignment form with T-Cards
The task assignment form lifecyle.
Practical Evolution: (1) Complete a Task Assignment Form

Readings:
FUNSAR: Chapter 3.
Basic Search Skills: None.
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)
Map for practical evolution: (resources/Unit4_TempletonStateForestMap.pdf)
Blank paper.

Practical Evolutions

(1) Complete a Task Assignment Form

In pairs of small groups (of 4-6 people each), given a general description of an assignment have each group fill out a task assignment form for the other, then exchange and brief each other on a simulated assignment. Use the briefings of the assignments to evaluate the level of understanding of the material in search sensors and tactics

(1) Show the slide. Give an operational period briefing: 72 hours into a search for a missing 23 y/o male. Autism spectrum disorder. Went missing from residence on Norcross Hill Road about 80 hours ago. Probably wearing black parka and hat, blue jeans, boots. Attracted to large trucks. Previous operational periods focused search effort on Norcross Hill area. Yesterday, possible tracks found crossing Crow Hill Brook west of Crow Hill. Today increased search effort on area of Crow Hill, Templeton State Forest and down to route 2.

(2) Split into groups of 4-6 people. Each group is to pair with another group.

(3) Each group is to make a short list of the names and any specialties (medical, canine, communications, etc) of the members of the group. Give this list to the other group you are paired with.

(4) Prepare a task assignment form for an area search of Segment 1. The resources available to you are

the list just given to you by the other group. Complete the entire form, including assigning individuals to roles. Make up plausible values for elements such as transportation and communications. Mark the segment on the map.

(5) Select a member of your group to stand up and brief the other group on their assignment.

Materials: One copy of a task assignment form per group.
One copy of a map for the area (resources/Unit4_TempletonStateForestMap.pdf) per group.
Blank piece of paper, one per group.

Unit 8: Legal and Ethical Framework

Topics: About SAR. The legal and ethical framework for SAR operations.
Related Standards: ASTM F2209-14 6.6
ASTM F1847-14 5.5
Methods: Lecture/Discussion.
Time Frame: 40 minutes.

Dependencies: Unit 1: SAR Systems, Search Crucials

Objectives:
Describe the differences between legal, ethical, and moral obligations.
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 relevance of Good Samaritan laws for search.
Explain the importance of documentation to a search.
Explain the importance of accountability on a search.
State your agency's policies related to driving to 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:

- Legal, Ethical, Moral.
- 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.
- Emergency Response
- 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

Note: See Unit 14: Crime Scene Awareness for related practical evolutions: (1) Clue Flagging; (2) Secure a Crime Scene; (3) Secure an IPP.

Module II: Core Search Skills

Unit 9: Clue Detection

Topics: Searching**.** 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: 60 minutes (50 minutes lecture/discussion, 10 min practical)

Dependencies: Unit 1: SAR Systems, Search Crucials

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.
Describe the chain of events between light bouncing off a clue and your recognizing it as a clue.
Describe four techniques for building your visual skills for better observing clues.
Explain the search cube.
Describe how clue detection can be incorporated into regular canine SAR training evolutions.
Describe the effects of fatigue and dehydration on effectiveness in clue detection.
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, placing the practical evolution either in the middle, or at the end (depending on the logistics of moving the class back and forth, and the timing of breaks).

Outline:

Clue Detection
Search is a classic mystery/Kinds of clues
Clues can be seen, heard, felt, smelled, elicited through investigation.
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
Practical Evolution :(1) 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.

This works best if a second instructor can lay out the articles out of sight of the class while the class is working through the lecture/discussion.

Gather the class around the covered articles.

Give these instructions: 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).

Materials: A blanket or Tarp.
About 25 random articles.
Notepad and writing implement for each student

Unit 10: Tracking

Topics: Searching**.** Very brief introduction to tracking and sign awareness.
Related Standards: ASTM F2209-14 12.10, 12.11.1, 12.11.2
[scope of "man-tracking skills in NFPA 1006 (2017) 10.3.9 is covered at a very introductory level, extensive separate training is required to develop tracking skills]
Methods: Lecture/Discussion, Demonstration, Practical Evolutions
Time Frame: 110 minutes (50 lecture/discussion, 60 practical)

Scheduling Note: Move this unit in the schedule to place it either early or late in the day to obtain a low sun angle. Consider switching this unit to another day if weather is overcast. An option is to move this unit to the beginning of the next day, and follow the sequence: unit 9, unit 11, unit 12, (end of day), unit 10, unit 13...

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 9: Clue Detection

Objectives:
Define: Mantracking, Sign, Track/Print, sign cutter.
Distinguish between conclusively human and corroborant sign
Describe how to use light to make tracks easier to see.
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.
Light
Flattening, Regularity, Color Change, Disturbance.
Conclusively human and corroborant sign
Sign as passage in three dimensions.
Track Traps
Step by step method (as a learning method; as a tactic).
Supporting a tracking task
Learning More: NASAR Tracking, Field Team Sign cutter, Dirt Time.
Practical Evolutions:
(1) Sign and sun angle
(2) Use of the tracking stick.

(3) Tracking 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 (one per pair of students)
Headlamp, with means to affix to end of tracking stick.

Practical Evolutions:

(1) Sign and sun angle

Rake a small patch of sand (enough for 2 or 3 clear prints), 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 11: Land Navigation: North and Wayfinding

Topics: Land Navigation. 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: F2209-14 7.2, 8.2.4, 8.2.5, 8.2.8, 8.2.6,
NFPA 1006 (2017) 10.2.7; 10.3.7
Methods: Lecture/Discussion, Demonstration, Practical Evolutions
Time Frame: 65 Minutes (45 classroom, 20 practical)

Dependencies: Unit 4: Land Navigation – Topography, Slope
Unit 5: Land Navigation – Map Reading, Decision Points

Objecties:
Describe how people wayfind on land.
Explain how to wayfind by maintaining orientation, planning a route, monitoring the route, and recognizing the destination.
Explain the difference between route knowledge and survey knowledge.
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.
Describe how the position of the sun, moon, and stars changes over time.
Explain how the sun, moon, and stars can be used to determine north.
Identify the big dipper, little dipper, and Polaris in the night sky.
Describe three different ways to avoid getting lost.
Explain how a backstop is used in navigation.
Explain why it is important to give locations memorable identities.

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

Outline:

- Route knowledge and Survey Knowledge
- Wayfinding; Dead reckoning, perception, mental (limbic) map.
  - Maintain orientation
  - Plan a Route – pick a course towards your destination
  - Route Monitoring – keep evaluating that you are on course
  - Recognize your destination, or that you've gone past it.
- Maintaining orientation, observing the environment.
  - **Practical Evolution: (1) Directional Cues**
- True, magnetic, grid north
  - Declination
  - Agonic line
- Telling North
  - Sun, Moon, Stars

Wayfinding errors: Confirmation Bias, Bending the Map.
Spatial mental illusions.
Avoiding Getting Lost
- Identify backstops (recognize when you've gone past your destination)
- Maintaining a straight course/environmental cues for direction.
- Pay close attention to landmarks
- Pay close attention to your surroundings (terrain, vegetation, smells, etc)
- Remember the identity of locations you travel through (give places memorable identities).
- Look behind you regularly (particularly at trail junctions).
- Track times and directions
- Structure your path.

Practical Evolutions: (2) Wayfinding: Planning a route.(3) Wayfinding: Structuring a route.

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

Handouts:
Two: copies of Route Map one in color the other b/w (resources/Unit11_route_map.pdf)

Materials Needed: None.

Practical Evolutions:

(1) Directional Cues

Bring the class outside.
Ask: **How many directional clues can you perceive?**
Discuss.
Any of sun, moon, stars may be visible. Shadows, or the position of a light in the sky.
A bright planet may be visible.
There may be traffic sounds from a highway.
There may be evident landmarks.
There may be skyglow off clouds from streetlights.
There may be planes flying overhead.
There may be steady movement of clouds.
Ask: **Which way is North?**
Discuss.
Directional cues may be able to point to north, or may just be able to help keep you moving in one direction.

(2) Wayfinding: Planning a route.

Provide students with a color and a greyscale copy of a map with two points marked (Unit_11_route_map_Gardner.pdf).

Put students into pairs.

Have each pair examine the map, identify a travel route, identify landmarks, identify backstops, estimate travel times, and create a structured path from the start point to the end point.

Have each pair mark this route on their greyscale map.

Have some of the pairs present their route, landmarks, and backstops to the class.

(3) Wayfinding: Structuring a route.

Take a pair of students, give them a clue to place out at a nearby place.

Instruct those two students, out of sight of the others, to travel to the nearby place and place the clue there. On the way, they are to note and record (and give memorable identities to) landmarks, distances, backstops, and directions of travel.

Have the two students, out of sight of the others, go and place the clue and return.

Have the two students describe to the rest of the class the structured path to reach the clue. The class can take notes.

Let the rest of the class follow the described route to the clue.

Discuss.

Unit 12: Land Navigation: Map and Compass

Topics: Land Navigation. 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: F2209-14 8.2.4; 8.2.5; 8.2.8; 8.2.6; 8.3
NFPA 1006 (2017) 10.2.7; 10.3.7
Methods: Lecture/Discussion, Demonstration, Practical Evolutions
Time Frame: 115 Minutes (55 classroom, 60 practical)

Dependencies: Unit 4: Land Navigation – Topography, Slope
Unit 5: Land Navigation – Map Reading, Decision Points
Unit 11: Land Navigation: North and Wayfinding

Objectives:
Name the parts of a compass.
Accurately shoot a bearing with a compass on a distant point.
Describe how metal objects and sources of magnetic fields can affect a compass.
Explain how to convert bearings between true and magnetic north.
Describe the consequences of failing to account for declination when using a compass.
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.

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

- 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.
- Magnetic objects affect a compass.
  - Human: Vehicles, Radios, GNSS receivers, reinforced concrete, etc.

Natural: Iron ore, local magnetic variation.

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, estimated change in mils per year.

Estimating navigational error at 1km if not accounting for declination or change.

Sanity checking bearings.

Determining bearing from map.

Practical evolution: (1) Determine bearings on map.

Triangulation on a map.

Practical evolution: (2) Triangulation, measuring bearings on map.

Orienting map to north

Practical evolutions 3-7, outside.

Readings:

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

Handouts:

Converting between true and magnetic north.
(resources/handouts/MagneticTrueConversion.pdf)

USNG Training Map
(resources/handouts/USNG_Training MapV1.pdf)

**** Map of training area.**

Materials Needed:

Required equipment and supplies:

Consumable topographic maps of the area where the course is being held, at least one per 2 students, preferably at least three copies per two 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) 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.

(2) Triangulation, measuring bearings on map.

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.

(3) 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.

(4) 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.

(5) 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.

(6) Shoot bearing and plot on map.

Outside.

In pairs, using a topographic map (or orthophoto quad) of the area, identify the current location.

Identify a visible landmark which is also shown on the map.

Shoot a bearing on that landmark.

Plot that bearing, from the current location, on the map.

Check if the landmark is along the bearing plotted on the map.

(7) Triangulate location with bearings on landmarks

Outside.

In pairs, shoot bearings on three different landmarks.

Transfer those bearings to a topographic map of the area.

Lines should cross at the current location.

Unit 13: Hazards and Mitigation

Topics: Hazards. 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; 5.2; 5.3; 5.4, 5.5 (see 1.4, awareness of trench considered out of scope herein).
NFPA 1006 (2017) 10.1.3;
Methods: Lecture/Discussion
Time Frame: 60 Minutes.

Dependencies: Unit 1: SAR Systems, Search Crucials

Objectives:
Describe the role of the safety officer and safety plan in an incident.
Explain the steps in the Cyclical Risk Management Process.
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.
List and explain the risks of technical environments that require special equipment and training for entry.
Describe the characteristics of non-technical terrain.
Explain the hazards presented by fatigue and how to mitigate them.
Describe how to mitigate the risk of driving while fatigued.
Describe hazards posed by water.
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 the FEMA Structure/Hazards Evaluation Markings

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

- Primacy of safety
- Safety officer, safety plan
- Cyclical Risk Management Process
- 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, wild and domestic animals.
- Other Environmental: Altitude, Snakes, stinging insects, Arid environments.
- Technical rescue environments (hazard awareness, obtain suitable resources)
  - Confined Space
    - IDLH environments (e.g. low oxygen atmospheres)
  - Technical Terrain
    - Fall hazards, falling objects, trip hazards, unnecessary personnel.
  - Water
    - Drowning, Hypothermia, Currents, Contaminated water,
    - Unsafe shorelines, electrocution, confined spaces
    - Low head dams, strainers.
  - Structural Collapse (abandoned buildings, disaster awareness)
    - Secondary collapse, Toxic atmospheres, hazardous materials.
    - Risks of fire, explosion, damaged utilities, electrocution
- Discuss at least one example of a potentially hazardous environment, using the Cyclical Risk Management Process as a framework.
- 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.
- Risk mitigation: PPE, stay out, obtain properly trained and equipped help.

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. Toxic human foods.

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:

Heat Index. (resources/handouts/NWS_heatindex_graph.pdf).

Practical Evolutions: None

Note: there is a Green/Amber/Red risk assessment in Unit 27: Rescue (practical (1) GAR Risk Assessment) that could be used here.

Unit 14: Crime Scene Awareness

Topics: About SAR. 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
[NFPA 1006 (2017) 10.2.5, limited to "document evidence"]
Methods: Lecture/Discussion, Practical
Time Frame: 90 Minutes (30 lecture/discussion, 60 practical evolution)..

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 6: Search Sensors and Tactics
Unit 8: Legal and Ethical Framework

Objectives:
List the objectives in crime scene preservation.
Define chain of custody.
Explain the principles of "Contamination, Containment, Restraint, Call"
Distinguish between physical and incorporeal evidence.
Explain how to turn incorporeal evidence into physical 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.

Success Criteria:

- Given an object placed out in the environment as a clue, note pads, writing implements, and flagging tape, learners will, working individually, with accuracy, record, report, and clearly mark the location of the clue without touching it.
- Given a set of objects and disturbance in the environment having the appearance a potential crime scene, learners working as a group will, with minimal disturbance of the scene, with accuracy, demonstrate minimal contamination, documentation of contamination, containment, restraint, documentation, and reporting the potential crime scene.
- Given an IPP, learners can describe how to appropriately secure the IPP with minimal disturbance of sign.
- Learners, as a group will describe the effects of disturbance produced by searchers on sign left by a subject.

Training Plan: Present on crime scene awareness following the outline below, then proceed to the increasingly more complex practical evolutions.

Outline:

Safety

Goals: 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 txo 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.

Chain of Custody

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).

Practical Evolution: (1) Clue Flagging

Practical Evolution: (2) Secure a Crime Scene

Practical Evolution: (3) Secure an IPP

Practical Evolution: (4) Clue Detection in a Type III Grid

Practical Evolution: (5) Follow sign from a clue or IPP.

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:

(1) Clue Flagging

Objectives: ASTM F2209-14 12.6.1 Demonstrate how to approach a potential clue, calling in information about the clue, recording the location of the clue and marking the clue's location for subsequent search. Demonstrate Clue handling: Don't touch, call it in, flag to be clearly visible.

Preparation: Lay out a small number obvious clues short distances along linear features (e.g. along the sides of a parking lot or just off a trail).

Form the class into groups of three or four students. Each group must have flagging tape and a sharpie. Have an instructor accompany each group. Appoint a leader for each group.

Instruct the class to call out hold the line if they see a potential clue, remind them not to touch and call in for instructions. Remind them for flagging to use three long streamers, marking one with the assignment number, date, time.

Start each group working a different part of the linear feature.

On discovery of a clue, a member of the group should call out hold the line, nobody should touch the clue, the leader should investigate and call in.

On call in, instruct the leader to flag the location, record the location, and continue.

Flagging should be three long streamers around the clue, one marked with assignment, date, and time.

(2) Secure a Crime Scene

Preparation: Lay out clues for an obvious crime scene, preferably in a location where a line of searchers can come upon it all at the same time. Break the class into teams of 6 to 8.

Line a group up as for a type III search, where the line of advance will bring at least one member of the line to see the crime scene.

Appoint a leader for the task, place them behind the group..

Instruct the group to call out hold the line if they see a potential clue.

Have the leader advance the group all as a unit as in a type III search.

When someone calls hold the line, have the leader come in close enough to see that it's a crime scene and then instruct everyone to flag their location and back out the way they came.

Assemble the class, bring around to the crime scene from another direction, and discuss: concerns at a crime scene, actions, things not to do, how the flagging of locations documents disturbance, etc. Don't do tracking off of this evolution.

(3) Secure an IPP

Objective: ASTM F2209-14 12.11.3, 12.6.1

Preparation: Park a vehicle in a location where the driver getting out can leave tracks, close up and walk away from the vehicle leaving sign.

Gather the group in a position where they can see the vehicle.

Instruct a couple students that this is the IPP and they should secure it.

Discuss actions taken and not taken.

Note: Reuse this location for (5) Follow sign from a clue or IPP.

(4) Clue Detection in a Type III Grid

Objectives: ASTM F2209-14 12.11.3, 12.6.1 Understand base line, control line, search lane. Understand maintaining constant distance from person on control lane side. Understanding clue flagging. Understanding crime scene preservation.

See: grid_problem_layout_diagrams.pdf

Seed an area about 50-100 meters deep with a few clues, including, furthest in, an obvious crime scene with a simulated weapon or other hazard. The area must have either an natural handrail/control line, or you must have flagged a control line prior to starting.

Leave evident sign traveling away from the crime scene in a direction likely to be undisturbed by the approach of the grid team.

Place a navigator on the base line at the start of the control line.

Line the members of the class up for a type III grid search on the base line, space relatively close together.

Instruct each member of the class to remain a constant distance from the person towards the control line end of the line.

In a large class, maintain the span of control.

The instructor serves as the leader.

Instruct the class to call out hold the line if they see a potential clue.

Give orders to look left, look right, look ahead, look up, look down, turn around look behind you, look up, look down, turn around, advance, stop... repeat.

On hearing hold the line, make sure the line stops, go to investigate the clue, on investigating, call in the clue and then have the student flag the clue. On the crime scene being found, talk the students through actions at a crime scene (flag their locations, back out on the route they came in, assemble but don't discuss the scene, etc).

Stop the exercise, bring the students out and discuss.

Note: Reuse the crime scene location for (5) Follow sign from a clue or IPP.

(5) Follow sign from a clue or IPP.

Objective: Learn to be careful in approaching and marking a clue or IPP. Practice mantracking.

Setup: Switch groups around from locations used in evolutions (3) Secure an IPP or (4) Clue Detection in a Type III Grid above. Provide briefing information from the task that first located the clue or secured the IPP.

Split the class into teams of three.

Start each team of three at either the IPP or a clue or the crime scene.

Instruct each team of three to acquire and follow sign from the starting point.

Let the teams work for an appropriate period of time.

Bring the groups back together and discuss, including how disturbance from searchers affected their efforts.

Unit 15: Backcountry operations: Clothing, Weather, Hygiene

Topics: Hazards. 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 (2017) 10.2.6; 10.2.12
Methods: Lecture, Discussion, Demonstrations.
Time Frame: 45 minutes

Dependencies: None.

Objectives
Explain the importance of physical fittness for the SAR mission.
Enumerate the mechanisms of heat loss.
Contrast the heat conduction properties of air, water, and the ground.
Explain how to control the mechanisms of heat loss to stay warm.
Explain how to control the mechanisms of heat loss to stay cool.
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.

Tailor the presentation to the outdoor and backcountry skills and experience of the students.

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
Air as an insulator, water as a heat conductor. Soil, rock, as heat conductors.

To stay warm: trap air next to your body.
To stay cool: let moisture evaporate from your skin, let wind carry air away from your skin.
Wind Chill.
Layering (demonstrate)
    Wicking, Warmth, Wind/Wet
Ventilation (demonstrate)
Boots
    Ankle support
    Good traction
    Break them in.
Heat Index
    Working with heat index > 90 degrees (hydrate, rest, monitor)
Hydration
    Avoid Caffeine
Giardia, water treatment.
Winter operations
Hygiene
    Clean socks
    Brushing teeth
    Toilet (minimum distance from water, wipes, handwashing, etc.)
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.
(handouts/cdc_12378_DS1.pdf)

Practical Evolutions: None

Unit 16: Basic Survival

Topics: Hazards**.** 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 (2017) 10.3.4; 10.3.10
Methods: Lecture, Discussion (optional practical evolutions).
Time Frame: 150 minutes (50 classroom, 100 practical, optional overnight practical evolution).

Dependencies: Unit 15: Backcountry operations: Clothing, Weather, Hygiene

Objectives
List, in order, 7 survival priorities.
Explain the Preventative SAR message communicated with the acronym "STOP".
Describe conditions of high risk for hypothermia.
Explain how Conduction, Convection/Bulk Transfer, Evaporation, and Radiation produce heat loss.
Describe desirable properties of a survival shelter.
Explain how the desirable properties of a survival shelter relate to blocking heat loss via Conduction, Convection/Bulk Transfer, Evaporation, and Radiation.
Describe methods of constructing an expedient shelter from typical materials in NE US woodlands and materials carried in the 24 hour pack.
Explain why you may want to have a fire in a survival situation.
Describe materials suitable for tinder, kindling, main fuel, and an ignition source in lighting a campfire.
Describe how to construct and light a campfire.
Explain how you use the elements of the fire tetrahedron to light a campfire.
Explain the value of an emergency blanket or a plastic bag in a survival situation.
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 create the ground to air signals for "Require Medical Assistance" and "Require Assistance".
Describe how to signal your location to ground searchers
State the meaning of three whistle blasts.
State how to respond to a set of three whistle blasts.
Describe how to select a water source and at least two methods for purifying water.
State the CDC recommendation for how long to boil water to make it potable.
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.
- PSAR Messages
  - Hug-a-Tree, Make yourself Big.
  - STOP (Stop, Think, Observe, Plan)
    - Plan: first aid, shelter, fire, signals, water.
- Hypothermia
  - Most dangerous conditions: 50 degrees and rainy.
  - Falls during river crossings, sweating into cotton.
  - Heat loss – conduction, convection, radiation.
- Shelter
  - 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).
- Making fire
  - Reasons for 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 (Require Medical Assistance, Require Assistance).
  - Ground to air body signals (Require Medical Assistance, all OK).
  - 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.
Review: Rule of 3s, STOP,
Food.

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

Handouts: None

Practical Evolutions:

ASTM FTM Demonstrate Ability

Build expedient shelter
Build sustainable fire

(1) Building and starting a campfire.

Note: Arrangements needed for permitting and permissions, and conditions must be suitable. May require rakes, water supply, etc.

This can work effectively with students starting small fires in disposable aluminum turkey pans.

Divide students into pairs.

Given twigs for kindling, have each student start a fire sufficient to ignite the kindling using tinder and firestarting materials from their 24 hour pack.

Given a container, water, and larger fuel, have each student build and maintain their fire sufficiently to bring the water to a boil.

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

Note: Arrangements needed for permitting and permissions, and conditions must be

suitable.

Have each student, using only available natural materials and the equipment in their 24 hour pack construct a seasonably suitable expedient shelter.

Optionally, students sleep overnight in their shelters.

Unit 17: Equipment

Topics: Hazards. Overview of equipment and supplies carried and used by ground searchers.
Related Standards: ASTM F2209-14 7.6, ASTM F2751-16 8.2, 8.7.1, 8.7.2.
NFPA 1006 (2017) 10.2.6; 10.3.2

Methods: Discussion, Practical.
Time Frame: 70 minutes (15 minutes lecture/discussion, 55 minutes practical)

Dependencies: Unit 15: Backcountry operations: Clothing, Weather, Hygiene
Unit 16: Basic Survival

Objectives:

Describe appropriate types and quantities of food to carry on a search.
Explain how to manage food when camping overnight.
Explain mission specific packing for normal area of operations.
Describe the purpose and explain the use of all required equipment.

Training Plan:

Brief guided discussion on what to carry and why.
Practical: Pack check, either using an example pack, or going through student's gear to check for conformance with a relevant authority having jurisdiction's equipment list. Focus most of the time on the practical evolution and discussion evolving from it.

Outline

What to carry, why?
- Local conditions (weather, terrain)
- Mission requirements, including duration.
- Team capabilities and resource type.
- Survival.

Tradeoffs, weight and mission needs
Expectations from standards and AHJ
ASTM: Operations: self sufficient for 24 hours; perform duties in expected conditions, including darkness.
FEMA Resource Typing: :
- Type III (and II) Canine Search and Rescue Team
- or Type IV (and III and II) Wilderness Search and Rescue Team.
  - The ability to be self-supporting for 24 hours.
- Type I Canine Search and Rescue Team
- or Type I Wilderness Search and Rescue Team.:
  - The ability to be self-supporting for 72 hours.

Core Survival equipment:
- Importance of survival equipment on your person.
- Waterproof matches, knife, whistle, candle, emergency food,
- moleskin, water treatment, space blanket.

Food

For the mission.
Keeping food from critters.
Factors in equipment lists/choices (discuss, or incorporate into discussion in pack check):
Weather (including temperature),
Temperature and water needs (heat index Hot or greater, 1 qt per hour)
Terrain, altitude, travel time, navigation,
Flora and fauna, duration of incident, logistics (including communications),
Patient care needs
Incident management needs.
Practical evolution: Pack Check.

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

Handouts:
Pack list from a relevant Authority Having Jurisdiction and/or
A generic example pack list (resources/handouts/*EquipmentList.pdf*)

Practical Evolutions:

(1) Pack check

If students have 24 hour packs (conforming to some AHJ equipment list):
Have each student lay out the contents of their 24 hour pack on the tarp from that pack.
Go through the relevant agency pack list(s).
Have each student hold up each item as it is called.
Ask students the purpose of selected items, **discuss**.
Ask students what other purposes items can be put to.

If only some or none of the students yet have a 24 hour pack assembled
Divide students into small groups, one group per 24 hour pack.
Have each group lay out the contents of their 24 hour pack on the tarp from that pack.
Go through a relevant agency pack list.
Have a student in each group (rotate within group) hold up each item as it is called.
Ask students the purpose of selected items, **discuss**.
Ask students what other purposes items can be put to.

Module III: Searching

Unit 18: Land Navigation: Grid with compass and pace count

Topics: Land Navigation. How to navigate a grid (for canine, Type II, or Type III search of a segment) using a compass and pace counting.
Related Standards: ASTM F2209-14 8.4.1, 8.4.2
NFPA 1006 (2017) 10.2.7; 10.3.7
Methods: Lecture/Discussion and practical evolutions.
Time Frame: 110 minutes (30 classroom and 80 practical)
Optional 6 hour practical.

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 4: Land Navigation – Topography, Slope
Unit 5: Land Navigation – Map Reading, Decision Points
Unit 6: Search Sensors and Tactics
Unit 11: Land Navigation: North and Wayfinding

Objectives
Demonstrate how to determine your pace count.
Demonstrate how to travel a given distance on a given bearing.
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.
Demonstrate how to navigate around an obstacle on a bearing.

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

Outline:
- Determining bearings from map (review)
  - Practical (1) Measure Gridline Bearings and Distances on map (segment 1)
- Navigation on a bearing with compass
  - Practical (2) Measure Gridline Bearings and Distances on map (segment 2)
- Navigating around an obstacle
- Pace count
- Using Backstops and Handrails.
  - Practical: (3) Establish Pace Count for 100 meters.
  - Practical: (4) Navigation on bearings on an equilateral triangle with 100 meter sides, returning to the starting point.
  - Practical: (5) Navigation on bearings on an equilateral triangle with 100 meter sides with an obstacle on one leg, returning to the starting point.

Optional Practical (6 hours): (6) Navigate on assigned bearings to marked targets, report distance traveled (optional, plan for about 6 hours).

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

Handouts:

Templeton State Forest map, marked with segments (resources/handouts/Unit18SegmentMapTempleton.pdf).

Practical Evolutions:

(1) Measure Gridline Bearings and Distances on map (segment 1)

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 (segment 2)

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 (ignore any other flags).

(5) Navigation on bearings on an equilateral triangle with 100 meter sides with an obstacle on one leg, returning to the starting point.

Preparation:

Identify a lightly wooded area that is at least 100 meters by 100 meters.

Lay out a triangular course in this wooded 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.

Layout and bearings should not be the same as for practical evolution 4.

Provide backstops so that students know not to leave the area if they make a navigation error.

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.

Along one leg, set out flags, flagging tape, caution tape, or some other marker (or have the route include an obstacle).

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 (ignore any other flags).

If you encounter an obstacle (line of flags, flagging tape, etc) navigate around it, return to your line of travel, and complete the 100 meter leg.

(6) Navigate on assigned bearings to marked targets, report distance traveled (optional, plan for about 6 hours).

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 19: Land Navigation: Basic GNSS

Topics: Land Navigation. Introduction to using a GNSS receiver for land navigation.
Related Standards: ASTM F3071-14 5.1 (except 5.1.6); 6.1.1; 6.1.3; 6.2.3; 6.2.3; 6.2.4.
ASTM F3072-14 5.2.1; 5.2.2; 5.3.1 (except 5.3.1.2), 5.3.2; 5.3.3, 5.4, 5.6 (except 5.6.3).
NFPA 1006 (2017) 10.2.7; 10.3.7
Methods: Lecture/Discussion and practical evolutions.
Time Frame: 95 minutes (45 lecture/discussion, 50 practical)

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 4: Land Navigation – Topography, Slope
Unit 5: Land Navigation – Map Reading, Decision Points
Unit 6: Search Sensors and Tactics
Unit 11: Land Navigation: North and Wayfinding
Unit 18: Land Navigation: Grid with compass and pace count

Objectives
Describe how a GPS receiver uses satellite signals to determine its location.
Describe sources of error in using a GPS or other GNSS receiver.
List three potential problems with using GNSS receivers for navigation.
List at least 4 limitations of a GNSS receiver.
Demonstrate how to determine the bearing and distance from the current location to another location on the GNSS receiver's map display.
Distinguish among tracks, waypoints, and routes on a GNSS receiver.
Demonstrate how to record a waypoint with a GNSS receiver from the current position.
Demonstrate how to record a waypoint with a GNSS receiver from the map pointer (create and move waypoint).
Demonstrate how to retrieve a waypoint stored in a GNSS receiver.
Demonstrate how to determine the bearing and distance from the current location to a stored waypoint.
Demonstrate how to navigate to a waypoint using a GNSS receiver and a compass.
Demonstrate how to project a waypoint with a GNSS receiver.
Describe how GNSS receiver tracks can be used help document a search.
Describe how GNSS receiver waypoints can be used help document a search.
Describe how to calibrate an altimiter in a GNSS receiver.

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

Outline:
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.
Reading the GNSS map display
Reading the GNSS satellite display.
Reading elevation
Higher error in elevation than in position.
Altimeter and calibration
Determining bearing and distance to a location.
Navigating with the GNSS compass.
GNSS: Track, Waypoints, Route.
View a stored track.
GNSS – set waypoint,
From current location
Using averaging to improve waypoint accuracy.
From map pointer (drag waypoint with pointer)
GNSS – navigate to a waypoint.
GNSS – project waypoint.
GNSS – check your navigation with the map

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

Handouts:
GNSS/GPS receiver checklist (handouts/GNSS_GPS_recieverChecklist.pdf)

Practical Evolutions:

(1) Actions on turning a GNSS receiver on.

Have each student: Given a GNSS receiver:
Put new batteries in the GNSS receiver.
Turn the GNSS receiver on.
Check the battery charge.
Check to see if the receiver has a satellite lock.
Using the satellite display, move to a location where the receiver can get a lock on at least 4 satellites.
Store the current track.
Clear the current track.
Turn track log off. Turn track log on.
Mark a waypoint.
Calibrate the Compass.

(2) Determine bearing and distance from current location to point on display..

Have each student: Given an GNSS receiver and a location outside where landmarks are visible.
Turn on the GNSS reciever, verify that it has a location.
Move the pointer on the GNSS reciever display to a visible landmark.
Write down the bearing and distance from the current location to that landmark.
Using a compass, obtain a compass bearing on the landmark.
Compare the compass bearing with the bearing read from the GNSS reciever.

(3) Mark Waypoint, Edit and Project Waypoints.

Have each student: Given an GNSS receiver and a location outside
Store a waypoint at the current location.
Project a waypoint on a given bearing and distance.
Save a waypoint, and with the map and pointer, drag it to a nearby landmark.
Walk some distance towards the landmark, then navigate to the first projected waypoint.

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

With students working in parirs.
Given a GNSS reciever and a compass.
In an area where there is a trail that curves,
Have each pair of 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.

Unit 20: Applying Search Tactics

Topics: Searching. Tactics for conducting field searches.
Related Standards:
ASTM F2209-14 12.8, 12.9
ASTM F2751-16 8.7.7
NFPA 1006 (2017) 10.3.9 *(direct and indirect search techniques, search patterns)*
Method: Lecture and practical evolutions
Time Frame: 145 minutes (45 lecture/discussion, 100 practical)

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 4: Land Navigation – Topography, Slope
Unit 5: Land Navigation – Map Reading, Decision Points
Unit 6: Search Sensors and Tactics
Unit 11: Land Navigation: North and Wayfinding
Unit 18: Land Navigation: Grid with compass and pace count

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/sound 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.
Demonstrate how to perform a Type III search.
List five area search patterns
Describe how to establish an artifical backstop for a segment boundary with a bump line.
Describe how to perform a Type IV 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/sound 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.

Review Grid Search
- Base line, guide line/control line, search lane, span of control.

Northumbrian rain dance, AMDR
Practical Evolution: (1) Northumbrian rain dance. (here or at end)
Type II search
- Trained Searchers, Span of control, maintain tight control.
- Purposeful wandering
- Flag, Advance, Flag, Search Back, Search Forward, repeat.

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.

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.

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)
- Using a bump line as an artificial backstop.

Binary search
Type IV search
Practical Evolution: (2) Type II grid with purposeful wandering on bearing.
Practical Evolution: (3) Type II grid with cycles of advance and purposeful wandering.
Practical Evolution: (4) Type III grid off a base line.

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:

Land SAR Addendum to National Supplement to IAMSAR: Ground SAR Tactics pp 131-140. (resources/handouts/Land_SAR_Addendum_pp131_140GroundTactics.pdf)

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 21: Canine and Equine SAR

Topics: Searching. 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
NFPA 1006 (2017) 10.1.2
See Also: MASSARDF standards.
Methods: Lecture/Discussion and a practical evolution.
Time Frame: 120 Minutes (50 minutes lecture/discussion, 70 minutes practical)

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 4: Land Navigation – Topography, Slope
Unit 5: Land Navigation – Map Reading, Decision Points
Unit 6: Search Sensors and Tactics
Unit 11: Land Navigation: North and Wayfinding
Unit 18: Land Navigation: Grid with compass and pace count
Unit 20: Applying Search Tactics

Objectives:
Summarize the capabilities of each of wilderness air scent, tracking/trailing, and HRD 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.
Explain why it may be advantageous to assemble a tracking canine, handler, and a sign cutter together in an assignment.
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. Conclude with a navigation exersise simulating grid navigation for a canine task.

Outline:
Types of canine resources (tracking/trailing, air scent, HRD/cadaver, water)
Wilderness Air Scent

Weather/Scent/Canine tactics
Wilderness Air Scent canine POD.
Working with a canine task.
Observing canines (untrained alert and trained indication behaviors, bearing into wind on alert
Air scent route search and area search.
Gridding a segment – navigation for an air scent canine task.
Practical Evolution (1) Calculate bearings to grid a segment (for a wilderness air scent canine task).
Coordinating with upwind segment.
Tracking/Trailing
Combined Tracking and Mantracking resources
Scent Articles
Equine SAR
Elevated search platform – increased detection range.
Horses (prey animals) alert.
Can search trails, travel corridors, or segments.
Practical Evolution: (2) Navigate three legs of the grid for a canine segment, including diverging to investigate.

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

Handouts:
Topographic map with marked segments and wind, (handouts/Unit21CanineSegmentMap.pdf, source file source_files/Maps.odt, page 3)
Canine SAR Tactics from Land SAR Addendum to National Supplement to IAMSAR p141 (handouts/Land_SAR_Addendum_p141CanineTactics.pdf)

Practical Evolutions:

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

Map (handouts/Unit21CanineSegmentMap.pdf) 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.

(2) Navigate three legs of the grid for a canine segment, including diverging to investigate.

The Problem: Navigating a wilderness air scent canine grid for a 40 acre problem.
Simple case: Rectangular area about 300x500m, assume a constant wind along long axis of area, straight trail or road for baseline.
Complication: Handler may follow the dog off the grid, but want to return to the grid.

Baseline, walk 200m along baseline, flag every 100 m.
Naviaate 300m into segment along bearing.
Navigate 100m backbearing of baseline
Navigate about 150 meters back to baseline
Simulate: dog gets interest, flag, record location, and wind direction.
Simulate following dog about 100 meters off base line into wind. Return to marked point.
Continue on original bearing to baseline.
Assess distance from 100m mark. Desired target is returning to within 35 meters (5% error) of the marked point at the end of the second 300m grid line. For uneven terrain, navigating around obstacles, dense brush, or other deviations from relatively flat open woodlands, within 50m (7% error) of the marked point is a more realistic target.

See file: grid_problem_layout_diagrams.pdf

Unit 22: Ties and Rope

Topics: Rescue. How to tie a set of knots relevant for low angle carry out. Awareness of the risks of the high angle environment. Basics of rope, webbing, and carabeners for assist in flat terrain carry out. Ties for patient packaging in a litter for flat terrain carry out.

Out of scope: doing anything "On Rope", rigging, or haul systems; treatment is for flat terrain carryout with technical environment awareness level only.

Related Standards: ASTM F2751-16 8.8.2.3
NFPA 1006 (2017) 10.2.10
Methods: Lecture (brief), Demonstrations, Practical Evolutions.
Time Frame: 75 minutes. (15 minutes lecture, 60 minutes practical)

Dependencies: Unit 13: Hazards and Mitigation

Objectives:

Learners will be able to independently differentiate static rope from dynamic rope, by accurately determining which instances each type should be used in and the stretch characteristics of each type under load.

Learners will be able to accurately explain what distinguishes kernmantle rope from other types of rope.

Learners will be able to accurately explain how stepping on a kernmantle rope can cause damage to the fibers in the core of the rope.

Learners will be able to accurately explain what distinguishes kernmantle rope from webbing.

Learners will be able to identify the parts of a locking carabiner by accurately choosing the correct parts.

Learners will be able to orally summarize the proper care of rope before, during, and after its use, including: inspection after use, not stepping on rope, ropes and battery acid, and use of sharp objects near a loaded rope.

Learners will be able to compare images of bight, loop, and round turns and will accurately identify each.

Learners will be able to define the terms Standing end and running end by accurately recording the definition of each.

Learners will be able to compare definitions of tie, knot, bend, and hitch and will accurately match each term to its definition.

Given ropes and webbing materials, learners will successfully tie each of the following ties, and orally identify each on questioning with accuracy:

Figure 8.

Figure 8 on a bight, with barrel knot safety.

Figure 8 bend.

Figure 8 follow through (tie in), with barrel knot safety.

Half Hitch

Water knot (in webbing)
Clove Hitch (with webbing)
Girth Hitch (with webbing)

Success Criteria:

Given descriptions of the stretch under load and potential uses for static rope and dynamcic rope, correctly associate these descriptions with the terms dynamic rope and static rope.

Given descriptions of static rope, dynamcic rope, webbing, laid rope and kernmantle rope, learners will individually correctly associate the descriptions with the terms dynamic rope, static rope, and webbing.

Given several descriptions of why stepping on a rope might be bad for the rope, learners will be able to individually correctly identify sand grains being ground into the sheath of kernmantle rope, penetrating the sheath and invisibly cutting load bearing fibers in the core as an important reason why never to step on a rope.

Given diagrams of various configurations of rope, learners will individually correctly match diagrams to the terms bight, loop, and round turn.

Given diagrams of various configurations of rope, learners will individually correctly match diagrams to the terms knot, bend, and hitch.

Learners will individually correctly match the terms tie, knot, bend, and hitch to definitions of those terms.

Given a diagram of a locking carabiner, learners will individually correctly identify all of the parts of a locking carabiner..

Success Criteria, Practical:

Learners will be able to individually orally describe the proper care for a rope including at least the following points: inspection after use, never step on a rope, keep rope away from battery acids, do not touch a loaded rope with a sharp object.

Given a length of rope, learners will individually demonstrate how to correctly tie a Figure 8 knot and orally state that it is a knot when asked what kind of tie it is.

Given a length of rope, learners will individually demonstrate how to correctly tie a Figure 8 on a bight with a barrel knot safety.

Given two lengths of rope, learners will individually demonstrate how to correctly tie a Figure 8 bend and oraly state that it is a bend when asked what kind of tie it is..

Given a length of rope and a tie in point, learners will individually demonstrate how to correctly tie a Figure 8 follow through with a barrel knot safety.

Given a length of webbing and something to tie onto, learners will individually demonstrate how to correctly tie a Half Hitch and orally state that it is a hitch when asked what kind of tie it is..

Given a length of webbing, learners will individually demonstrate how to correctly tie the two ends of the webbing together in a water knot and orally state that it is a bend when asked what kind of tie it is..

Given a length of webbing, and something to tie onto, learners will individually demonstrate how to correctly tie a clove hitch and orally state that it is a hitch when asked what kind of tie it is..

Given a length of webbing, and something to tie onto learners will individually demonstrate how to correctly tie a girth hitch and orally state that it is a hitch when asked what kind of tie it is.

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 in this unit.

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
  - Keep away from battery acids.
  - Inspect after each use, maintain a rope log.
  - Loaded ropes cut easily by sharp objects/edges.
- Hardware
- Parts of a carabiner.
- Terminology: Byte, loop, Running/Standing End, tie, knot, bend, hitch
- Knots:
  - Figure 8.
  - Figure 8 on a bight.
  - Figure 8 on a bight, with barrel knot safety.
  - Figure 8 bend.
  - Figure 8 follow through (tie in), with barrel knot safety.
  - Half Hitch (with webbing)
  - Water knot (with webbing)
  - Clove Hitch (with webbing)
  - Girth Hitch (with webbing)

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).

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.

(7) Water knot (ring bend)

Tie a water knot in webbing.

(8) Clove hitch

Tie a clove hitch around a rigid object with webbing.
A clove hitch can also be formed and slipped over an object.

(9) Girth hitch

Tie a girth hitch around a rigid object with webbing.

Unit 23: Communications & Accountability

Topics: About SAR. 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 (2017) 10.1.4
Methods: Lecture/Discussion, Demonstration.
Time Frame: 40 minutes.

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 7: ICS – Managing Chaos
Unit 13: Hazards and Mitigation

Objectives

Learners will be able to identify three unlicensed radio services that can support land SAR operations.
Learners will be able to identify at least three licensed radio services that can support land SAR operations with appropriate licensing.
Learners will be able to explain the function of a squelch control on a radio.
Learners will be able to explain the function of the PTT control on a radio.
Learners will be able to describe the difference between a simplex transmission and a transmission over a repeater.
Learners will be able to identify a limitation of a simplex transmission compared to transmission over a repeater.
Learners will be able to describe the steps in transmitting a message by radio.
Learners will be able to describe the two conventions for calling to establish contact by radio.
Learners will be able to explain the importance of both acknowledging and echoing back a transmission.
Learners will be able to describe how to communicate clearly and professionally by radio.
Learners will be able to explain why you should test your radio before leaving staging for an assignment.
Learners will be able to describe three common problems with a radio and how to troubleshoot them.
Learners will be able to describe the function of a net control station in a radio net.
Learners will be able to explain what sort of information should not be transmitted by radio and why.
Learners will be able to describe three forms of unlawful radio transmissions.
Learners will be able to explain how to deliver a personnel accountability report by radio.
Learners will be able to explain what accountability systems seek to accomplish.
Learners will be able to explain the importance of signing in on every incident.
Learners will be able to list at least 4 tools for managing accountability on a search.

Success Criteria

Given a list of radio services, learners will accurately identify from that list three radio services which do not require licensing for operation and can support land SAR operations.

Given a list of radio services, learners will accurately identify from that list three radio services which do require appropriate licensing for operation and can support land SAR operations.

Learners will be able to correctly recognize that because shore to shore communications are not allowed in that service, the Marine radio service cannot be legally used to support land SAR communications.

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.
Describe the two conventions for calling to establish contact by radio.
Explain the importance of both acknowledging and echoing back a transmission.
Describe how to communicate clearly and professionally by radio.
Explain why you should test your radio before leaving staging for an assignment.
Describe three common problems with a radio and how to troubleshoot them.
Describe the function of a net control station in a radio net.
Explain what sort of information should not be transmitted by radio and why.
Describe three forms of unlawful radio transmissions.
Explain how to deliver a personnel accountability report by radio.
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.
  - Unlicensed: 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.

Troubleshooting: Low battery, Poor signal path, Loose externa microphone connection.
Professional communication.

Establish contact then transmit message.
Use plain english, no codes. Use longer words for clarity.
What to say.
What not to say.
Writing numbers while transmitting them.

Unlawful transmissions (including false distress signals, profanity, malicious interference).
Radio nets

Net control station.
PAR/status checks.

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 24: Mechanized Platforms: Mountain Bikes, ATVs, Snowmobiles and Helicopter Operations

Topics: About SAR. 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 (2017) 10.1.2; 10.2.8
[Organizational: NFPA 1670 (2017) 15.2.2]
Methods: Lecture/Discussion.
Time Frame: 50 minutes.

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 6: Search Sensors and Tactics
Unit 13: Hazards and Mitigation

Objectives:
List at least 6 characteristics of safe operations.
Describe 4 risks associated with helicopter landing zones.
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.
Draw the map symbols for a Helibase and a Helispot.
Describe how to systematically look at the ground for subject or clues when serving as an air observer.
List the things to be covered by the crew for a passenger in a helicopter Safety Briefing
Discuss the relative advantages and disadvantages of mountain bikes, ATVs, and snowmobiles 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.

Training Plan: Present on helicopter, 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:

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
  - ICS map symbols.
  - 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
  - Safety Briefing
  - 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.

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

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

Handouts: None

Practical Evolutions: None

Unit 25: Land Navigation: Communicating Location: Coordinate Systems

Topics: Land Navigation. 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.
Related Standards: ASTM F2209-14 8.5, 8.6, 8.7, 10.4.
ASTM F3071-14 6.2.1
ASTM F3072-14 5.3.2
NFPA 1006 (2017) 10.2.7; 10.3.7
Methods: Lecture/Discussion and Practical Evolutions.
Time Frame: 120 Minutes.(75 lecture/discussion, 45 practical)

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 4: Land Navigation – Topography, Slope
Unit 5: Land Navigation – Map Reading, Decision Points
Unit 6: Search Sensors and Tactics
Unit 11: Land Navigation: North and Wayfinding
Unit 18: Land Navigation: Grid with compass and pace count
Unit 23: Communications & Accountability

Objectives:

Learners will be able to describe that a map coordinate system (e.g. lat/long or UTM) identifies, to some degree of precision, a location on the surface of the Earth..

Learners will be able to recognize, with accuracy, the coordinate system when coordinates are represented in the PLSS, geographic (latitude/longitude), UTM/UPS, and US National Grid coordinate systems.

Describe how locations on the surface of the Earth are represented in the geographic coordinate system (latitude/longitude).

Describe how locations on the surface of the earth are represented in UTM coordinates.

Explain how Grid Zone Designator, Easting, and Northing are used in UTM coordinates to designate a location on the surface of the Earth.

Differentiate between grid north and true north.

Given a print on demand map with a UTM grid of an area which spans a UTM zone boundary, identify the zone boundary on the map.

Given a marked point on a recent topographic map that has a UTM grid, state the UTM coordinate of that point.

Given a marked point on a map with a UTM grid and USNG Grid Zone and Square ID metadata, accurately state the USNG coordinate of that point to 10 meter resolution.

Given a USNG coordinate, with accuracy, identify the Easting portion of the coordinate and the Northing portion of the coordinate.

Given a USNG coordinate that represents a 10 meter square area, with accuracy identify that this coordinate has 10 meter resolution.

Learners will, in pairs of groups, accurately obtain the USNG location of a landmark on a map in one group, verbally communicate that coordinate to the other group who will accurately

plot it on the map, and correctly identify the landmark.

Demonstrate how to communicate the location of a point on a map using USNG coordinates for local communication.

Describe, in general terms, how to convert a coordinate from one system to another using a GNSS receiver.

Given a marked point on a recent topographic map that has a UTM grid, state the USNG coordinate of that point for global communication.

Explain how and why to sanity check a USNG local coordinate.

Identify the NSARC primary and secondary coordinate systems for communicating location by Land SAR Responders.

Learners will be able to 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.

Success Criteria:

Given a list of coordinates for locations on the Earth's surface which are represented as PLSS, latitude/longitude, UTM/UPS, and USNG coordinates, learners will (in a group or individually) accurately associate each coordinate with the correct coordinate system.

Individually, with accuracy appropriate to the scale of the map, learners will plot a given USNG coordinate on a provided map marked with a UTM or USNG grid.

Learners will be able to individually identify, with accuracy, the zone, band, 100,000m grid square designator, Easting, and Northing of a USNG coordinate.

Learners will be able to individually identify, with accuracy, given USNG coordinate specified to a precision of 100m, 10m, or 1m, what the precision of that coordinate is.

In groups, given pairs of identical maps, orally communicate from one group to another, with accuracy and to a precision appropriate to the scale of the map, a location on a map using USNG coordinates..

Given several ordered lists of coordinate systems, correctly identify the NSARC primary and secondary coordinate systems for land SAR responders as USNG and Latitude/Longitude.

(Optionally) In groups, given pairs of identical maps, orally communicate from one group to another, with accuracy appropriate to the scale of the map, a location on a map using the San Diego Mountain Rescue Team measuring system.

Given the display of a USNG coordinate on the display of a GNSS/GPS receiver, students will individually, with accuracy, identify the easting and the northing, and communicate the local USNG coordinate to a precision of 10 meters.

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 Survey System)

PLSS townships in Maine
Latitude/Longitude
Latitude, Longitude
Different representations (degrees minutes seconds, decimal degrees)
Decimal Degrees, 4 decimal places in latitude is about 11 meters.
Degrees, minutes, seconds, one second is about 30 meters.
UTM/UPS
Transverse Mercator Projection
Universal – made of 60, 6 degree wide zones, each a separate transverse projection.
Composed of: Zones, Bands, grid zone designator, easting, northing
Easting distance east from basee line of zone in meters.
Northing
True north and grid north, grid north lines at a zone boundary.
UPS at the poles.
MGRS
USNG
Keep positions as simple as possible.
Variable length for communication scope and precision
Local, Regional, and Global forms.
1km, 100m, 10m, 1 meter resolutions (and number of digits)
Grid informaiton on US Topo maps.
UTM/USNG markings on the borders of USGS topographic maps and US Topo.
Using USNG with 10 meter and 1 meter precison.
Practical evolution (1) Determine USNG coordinates of a point on a map.
Repeats of local coordinates (just easting and northing communicated).
Repeats of regional coordinates (100,000m grid square plus easting and northing).
Importance of including 100,000m grid square when near the edge of a grid square.
Sanity checking
Expected distance from current location to a location communicated with just local coordinates.
How to read coordinates over the radio.
Practical Evolutions:
(2) Communicate USNG coordinates of points on map via radio.
(3) Communicate Lat/Long coordinates of points on map via radio.
(4) Communicate UTM coordinates of points on map via radio.
(5) Communicate location of points on a map via radio using map features.
Using a grid reader/roamer
Advantages and disadvantages of coordinate systems.
Which coordinate system to use? 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.
SDMRT measure on map system.
Optional practical evolution:
(6 (optional)) Communicate SDMRT coordinates of points on a map via radio.

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.
(resources/handouts/USNGInstruct_No1v4_No2_r.pdf)
USGS USNG example map, one per student.
(resources/handouts/USNG_Training MapV1.pdf)

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 USNG 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 USNG 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) Communicate Lat/Long 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 latitude/longitude tics) 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 latitude and longitude 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.

(4) 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.

(5) Communicate location of points on a map via radio using map features.

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, but with a scale) 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 describe the location of the marked point using map features, including bearings and distances, and transmit this description 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.

(6 (optional)) 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 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 topographic maps of an area (with latitude/longiude tic marks), one per student, each map with a different point marked on it (for Lat/Long exercise).

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

Unit 26: Land Navigation: Using GNSS Receivers

Topics: Land Navigation. Geodetic Datum. Using a GPS.

Related Standards: ASTM F2209-14 8.5, 8.6, 8.7, 10.4.
ASTM F3071-14 5.1.6; 6.1.2; 6.2.5.
ASTM F3072-14 5.2.3; 5.3.1.2; 5.3.2; 5.5; 5.6.5; 5.4.4.
NFPA 1006 (2017) 10.2.7; 10.3.7
Methods: Lecture/Discussion and Practical Evolutions.
Time Frame: 100 Minutes.(45 classroom, 55 practical)

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 2: Search Theory
Unit 4: Land Navigation – Topography, Slope
Unit 5: Land Navigation – Map Reading, Decision Points
Unit 6: Search Sensors and Tactics
Unit 11: Land Navigation: North and Wayfinding
Unit 18: Land Navigation: Grid with compass and pace count
Unit 23: Communications & Accountability

Objectives:
Describe the importance of knowing the geodetic datum (e.g. WGS84) for a map or a coordinate.
Describe what the vertical datum tells you.
Identify the offset marks between NAD27 and WGS84 on a USGS topographic map that contains such marks.
Explain why a precise coordinate (latitude/longitude or UTM) is not sufficient information to communicate a location on a map over the radio.
Learners will be able to identify to the correct order of magnitude the difference in location in the NE US for a coordinate where the datum is treated as WGS84 when it is actually NAD27.
Learners will, given a GNSS receiver, demonstrate how to create a waypont in a GNSS receiver when given the location using USNG coordinates.
Demonstrate how to enter a location as latitude/longitude into a GNSS receiver and convert it into USNG coordinates.
Demonstrate how to set a GNSS receiver to: Lat/Long, NAD27, English distances, Magnetic north, and then to USNG, WGS84, Metric distances, True North.
Demonstrate how to plot the location of a waypoint from a GNSS receiver on a map, checking the map metadata for coordinate system and datum.
Demonstrate how to create and edit a route with a GNSS receiver.
Demonstrate how to retrieve and navigate a route using a GNSS receiver.
Learners will be able to list at least 4 limitations of a GNSS receiver.
Describe how to load a map from a computer into a GNSS receiver.
Demonstrate how to determine the bearing and distance from one stored waypoint to another stored waypoint.
Describe how to backtrack on a stored track in a GNSS receiver.

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

Outline:.

GNSS settings
GNSS settings: WAAS, power consumption
Geodetic Datum
Identifying Datum in map metadata.
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.
GNSS – setting datum and coordinate system.
Plotting a location from a GPS on a map (change settings to match map)
Practical evolutions: (1) Set datum and coordinate system on a GPS.(2) Mark current location on a topographic map
Using a GNSS/GPS receiver to convert between coordinate systems and between datums.
Review GNSS receiver habits for clean tracks.
Downloading tracks and waypoints from a GNSS receiver.
GNSS receiver navigation: difference between navigating to a waypoint and following a bearing.
Practical Evolution: (3) Determine the distance and bearing between two waypoints.
Proximity alarms for waypoints.
Determining distance and bearing between two stored waypoints.
Creating a route.
Retrieving and navigating a route.
Navigating a grid using a route.
Backtracking.
Limitations, sources of navigation error.
Loading a map into a GNSS receiver.
Editing a track with an external application (SARTopo example).
Contributing map data to Open Street Map
Directing a task from one location to another. Practical evolution: (4) Plot the location of a task, direct them to another location.

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

Required Equipment/Supplies:

GPS receivers, at least one per each pair of students.

Print on demand topographic map for area where course is being delivered, one copy per student, with a UTM grid. ***Note: Not included in standard course materials.***

Practical Evolutions:

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

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.
Have the students set the GPS receiver to use USNG and WGS84, and record the location.

(2) Mark current location on a topographic map

Given a GNSS/GPS receiver and a toopographic map of the local area with a grid.
Use a local map with a UTM grid an the NAD27 datum.
Instruct the students identify the coordinate system and datum of the map.
Instruct the students set the GNSS receiver to the same coordinate system and datum.
Instruct the students to confirm that their GNSS receiver has a good position.
Have the students mark their current location on the map.

(3) Determine the distance and bearing between two waypoints.

Given GNSS/GPS receivers each with a pair of waypoints entered.
Have each student locate a given waypoint in a GNSS/GPS receiver.
Have each student determine the distance and bearing from that waypoint to a second given waypoint.

(4) Plot the location of a task, direct them to another location.

Divide students into teams, a radio with each team.
Have all of the teams except one move to locations out of sight.
Keep one team at a central location.
Have each team transmit its location to the central team.
The central team records and plots the location of each team..
The central team instructs each team to flag its current location.
The central team calculates the distance and bearing from the location of each team to the location of another team (or of a predetermined waypoint).

The central team communicates to each team the distance and bearing to travel on.
Check the location that each team ends up at, identify and correct navigation issues.

Unit 27: Rescue

Topics: Rescue. Conducting Rescue Operations. Awareness and recognition of technical rescue environments. Primacy of safety in rescue operations.
Related Standards: ASTM F2209-14 11.1.3, 11.1.4
ASTM F2751-16 8.4, 8.7.5
NFPA 1006 (2017) 10.2.10
Methods: Lecture/Discussion
Time Frame: 35 Minutes (30 lecture/discussion, 5 practical)

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 13: Hazards and Mitigation
Error: Reference source not found

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.
Demonstrate how to perform a Green-Amber-Red risk assessment.
Discuss the elements of the FAILURE acronym.
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.
Describe at least 3 elements of ICS that support safety.

Training Plan: Present on rescue following the outline below. Practical on GAR risk assessment.

Outline:
- LAST – Locate, Access, Stabilize, Transport
  - Access/Stabilize/Transport classical rescue phase.
  - Locate may also need technical rescue resources.
  - Stabilization: Physical, Medical, Emotional
  - Golden hour
  - Triage
- Technical rescue environment (high angle, cave, mine, water, mountain rescue) awareness
  - (Review from Hazards).
  - Emphasize recognition of hazards.
- Risk management process:
  - Situational awareness, Hazard Assessment, Hazard Control, Decision Point, Evaluation.
- Control Zones:
  - Hot, Warm, Cold
  - Example Control Zones for high angle rescue.
- FAILURE, reasons why technical rescue operations fail
  - F – Failure to understand the environment

A – Additional medical implications not considered
I – Inadequate rescue skills
L – Lack of teamwork and experience
U – Underestimating the logistical requirements
R – Rescue versus recovery mode not considered
E – Equipment not mastered

Calling in appropriate resources for safe rescue
Communication
Direct Communication for Safety
Whistle signals.
SUDOT, OATH
ICS:
Safety officer
Span of control, possible organization (Rescue Group with Supervisor)
Stabilization
Physical, Mental, and Emotional stabilization.
Catastrophic reactions
Approach to scene, scene safety.
Failure: Additional Medical Concerns.

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:
GAR risk assessment card (NPS); (resources/handouts/SAR GAR risk assessment card (FEMA)
GAR_risk_assessment.pdf (FEMA); (resources/handouts/SAR_GAR_risk_assessment.pdf)

Practical Evolutions:

(1) GAR Risk Assessment

Given an image of a hazard, hand out GAR assessment forms.
Instruct students to individually complete the GAR form.
Have a student compile the GAR scores.
Hold a discussion of the scores, can risks be mitigated, go/no go.
Emphasize the importance of the discussion and talking out loud about the risks.

Unit 28: Ties and anchors for Low Angle

Topics: Rescue. Assist and support basic rope rescue functions, under supervision of qualified rope rescue personnel.
Related Standards: ASTM 2752-09 6
ASTM F2752-09 8.8.2.3
NFPA 1006 (2017) 5.2.4.
Methods: Lecture, Demonstrations, Practical Evolutions. Emphasize demonstrations and practical evolutions over lecture.
Time Frame: 65 minutes. (20 minutes lecture, 45 minutes practical)

Objectives:

The learner will demonstrate the following knots:

- Figure 8 on a bight, with barrel knot safety..
- Figure 8 follow through (tie in), with barrel knot safety.
- Alpine Butterfly
- Double overhand bend.
- Prussik hitch
- Water knot (in webbing)
- Square Knot (in webbing)
- Tie a swiss seat (tying off with a square knot and overhand knot safeties).

Describe the purpose of the belay in a rope rescue system.
Explain how loads, forces, and friction affect rope rescue.
Explain the fall line.
Discuss factors affecting rope rescue efficiency.
List and describe the role of typical rope rescue team functional positions.
Anchors

- Describe Selection of materials
- Describe Alignment, limitations.
- Describe Angles and forces
- Describe Single point anchor
- Describe Multi-point anchors

The learner will, given rope, carabiner, a suitable object for an anchor, and edge protection demonstrate how to rig a single point anchor using a high strength anchor.
Haul and lower

- Describe Basic mechanical advantage.
- Describe how pulleys provide change of direction and mechanical advantage.
- Identify pulley as change of direction, and pulley that provides mechanical advantage
- Simple 2:2 pulley on litter for low angle assist
- Simple 2:2 pulley on litter for low angle assist with change of direction and progress capture device.

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.

Outline:

Use presentation primarily as means of organizing flow of demonstrations and practical evolutions.

Operate under the supervision of trained technical rescue personnel.

Main line and belay, belay in a rope rescue system.

Angles, Loads, forces, and friction in rope rescue.

Demonstration: forces with person at each end of line with one in middle, various angles.

Explain the fall line.

Discuss factors affecting rope rescue efficiency.

Knots:

Practicals.

Review: Figure 8 bend, with barrel knot safeties.

Review: Figure 8 follow through (tie in), with barrel knot safety.

Double overhand bend.

Prussik hitch

Discuss friction. Demonstrate ability to lock and slide.

Alpine Butterfly

Water knot

Square Knot (in webbing)

Expedient Harness – swiss seat.

Anchors

Selection of materials

Anchor alignment, the fall line, anchor limitations.

Demonstration: Anchor low on trees: place stake in ground, rope to top, force to topple, compare with same stake rope to base. Have students pull.

Single point anchors.

Multi-point anchors.

Demonstrate Redundant, Equalizing, Limited Extension with non-equalizing double figure 8, two equal fixed loops, contrast with equalizing double figure 8 with large and small loops.

High strength anchor.

Practical: (7) Make a high strength anchor

Anchor straps

Team functions:

Belayer

Lowering/Haul system operator(s).

Edge Manager

Safety

Rescuer/Litter Attendant(s)

Haul systems

Mechanical advantage.
Simple 2:2 pulley on litter for low angle assist
Add change of direction and progress capture device.
Practical evolutions: (10) 2:1 haul system(11) 2:1 haul system with change of direction

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

Handouts: none.

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).
50 foot plus length of 9-13 mm nylon kernmantle rope for demonstrating angles and a haul system.
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:
Two pulleys.
Two locking carabiners.
Prussic cord.
One litter (or other low-angle load).
Edge protection suitable for available low angle anchor point.
Stake, Driveway edge marker, or other long thin stick.

Practical Evolutions:

(1) Figure eight on a bight.

Tie a Figure Eight on a bight.

(2) Barrel knot safety

Tie a barrel knot as a safety knot.

(3) 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.

(4) Alpine Butterfly

Tie an alpine butterfly in rope..

(5) Double overhand bend (grapevine knot)

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

(6) 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.

(7) 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.

(8) Water knot (ring bend)

Tie a water knot in webbing.

(7) Square Knot

Tie a square knot in webbing.

(9) 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) 2:1 haul system

On non-technical terrain.

Organize into roles leader, haul team, etc. If class size is large enough, use litter and litter bearers as load, otherwise place a student to simulate the load.

Instruct students to construct a high strength anchor.

Instruct students to attach a pulley to a litter (or other load).

Instruct students to run the haul line from the high strength anchor, through the pulley, back to the anchor and place a haul team at or beyond the anchor.

(11) 2:1 haul system with change of direction

As above, add a change of direction pulley at the anchor point.

Add a soft progress capture device at the change of direction pulley.

This could add an additional anchor line, or use a mid-line knot in the anchor line.

Discuss knot efficiency and the high strength anchor.

Discuss how this system is similar to and different from the above 2:1.

Unit 29: Packaging and Flat Ground Litter operations.

Topics: Rescue. 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 8.1.2, 8.1.3, 8.5, 8.8.2.2, 8.8.2.3, 8.8.2.4, 8.8.2.5, 8.10.1, 8.10.2, 8.10.3, 8.10.4, 8.10.6
NFPA 1006 (2017) 10.2.10
Methods: Lecture/Discussion/Demonstration and practical evolutions.
Time Frame: 95 Minutes.(35 minutes lecture/discussion/demonstration and 40 practical)

Dependencies: Unit 1: SAR Systems, Search Crucials
Unit 13: Hazards and Mitigation
Unit 22: Ties and Rope
Unit 28: Ties and anchors for Low Angle
Unit 27: Rescue

Objectives:
Explain the differences in design and functional capabilities between rigid and flexible litters.
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.
Describe the personnel needs and functional roles needed to be filled by team members for a litter carry on non-technical terrain.
Demonstrate a litter carry over flat ground.
Describe the concerns that need to be address in packaging a patient in a litter for a carry out on non-technical terrain.
Explain how to rotate litter bearers and pass a litter over obstacles.

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 (under direction of medically qualified personnel).
- Litter operations
  - Low angle and high angle terrain
  - Safety
  - Team elements:
    - Navigation, carry, relief, rigging, leader.
    - Medical care: Designated EMS care provider
  - Who gives lift/lower/stop commands
  - Lift with the knees, not the back.
  - Brief the team on the evacuation plan.
- Litter tie-in
  - Long lace

- Multiple short laces
- Circumferential cross-ties prevent movement
- Thourough and appropriate tie-in.

Litter Packaging
- Advise the patient of the evacuation plan
- Maintaining patient temperature
- Protecting the patient's face
- Protecting the patient’s head
- Padding
- Access to injuries and patient care equipment.

Attachment of rope for rope assist
- Figure 8 follow through wraping litter rail.
- Figure 8 bend on a loop wrapping litter rail.

Litter Carry
- At the front, call out footing hazards
- Anyone can call stop.
- Frequent breaks – maintain hydration, maintain energy.

Passing over obstacles: hand pass, hand pass and leapfrog, lap pass.

Rotating litter bearers
- Rotate between sides
- Rotate between carrying and accompanying personnel.

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

Handouts:

Cold Card
- ****obtain from WMS paper****

NPS Yosemite tie in
- (resources/handouts/yosemite_litter_packaging.pdf)

Practical Evolutions:

(1) Litter packaging - burrito.

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) Litter packaging – Yosemite tie in.

Place the patient in the litter
Provide eye protection for the patient.
Tie the patient into the litter. figure 8 to capture shoulders, figure 8 to capture thighs.
Add cross straps, on lower rail.

(3) 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 30: Catastrophic Incident Search

Topics: .
Related Standards: ASTM F2209-14 1.2, 1.3 6.7 7.12.7 9.1 11.3 12.6.2.1 12.6.2.2
NFPA 1006 (2017) 6.1
Methods: Lecture, Discussion, practical.
Time Frame: 50 Minutes (35 lecture/discussion, 15 practical).

Dependencies: Units 1 – 13, 15-21, 23,25.

Objectives:
Describe how search and rescue field team members trained for the missing person incident may be used as resources to support wide area search in a catastrophic incident. Provide knowledge of terminology and tactics used in wide area search, and of victim and search markings. Emphasis on preparing SAR field team members to assist with hasty and primary search in a wide area search. Does not cover management or planning of catastrophic incident response. Does not cover search in partially or fully collapsed structures.

Training Plan: Review safety hazards present in a catastrophic incident where normal infrastructure is damaged or destroyed, describe wide area search and how it differs from normal missing person response. Describe search tactics and terminology used in wide area search. Cover marking systems, emphasis on victim marking.

Outline:

- Catastrophic incident SAR
  - Review the Olive Model.
- Wide Area Search, definition and contrast with normal SAR operations.
- Hazards in wide area search
- Hazard mitigation
  - LCES: Lookouts, Communications, Escape Routes, Safety Zones
- Accountability
- Overview of WAS Response
  - ICS (chaos, organization, systematic setting objectives with limited resources)
  - Initial Response:
    - Intelligence (information for setting operational objectives)
    - Reconnaissance: Intelligence gathering only.
    - Master Map
    - Manage by Objectives.
  - Hasty Search (Locate) (+Direct mobile survivors to collection point)
  - Special Response Teams (targeted known victim conentrations/special needs)
  - Primary Search, Secondary Search (Locate)
  - Rescue Operations (Access, Stabilize, Transport)
- Compare and Contrast meanings of Hasty Search
- Search Techniques.
  - Physical, Canine, Technical

Physical: Visual and Hailing
Hailing Search
Search Squads/Strike Teams
Accountability: Expect Hourly PAR and Location checks
Markings
Victim Markings
Search Markings, interior search marikins
Reading Structure Markings
Seek more training:: WAS course

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

Handouts:
FEMA Search and Victim Markings
(resources/handouts/search_victim_markings.pdf)

Practical Evolutions

(1) Read and Write Search and Victim Markings.

18 slides are available at the end of the presentation: (a) of search and victim markings and (b) of text describing markings.

Fit the use of working in groups or competition as appropriate for the class.

(a) Present examples of search and victim markings to the class.
Have students explain all elements of each marking.

(b) Have each student take out a piece of blank paper and a writing implement.
Present scenarios of search and of victim detection.
Have each student draw a marking.