

Search and Rescue Theory

Objective: Nail down principles of SAR theory and strategy. Become a better searcher by knowing the basics of search strategy and the rationale behind your task.

What is search and rescue (SAR)? *Search and rescue are two totally different activities.*

SEARCH “to identify and locate persons who are or may become distressed or injured and who are unable to return to a place of safety on their own. Search operations may occur in urban, wilderness, or maritime environments.”

RESCUE “to access, stabilize, and evacuate distressed or injured persons by whatever means necessary to ensure their timely transfer to appropriate care or familiar environment.”
(*Virginia Emergency Operations Plan, Basic Plan, Annex L: SAR*)

The National Search and Rescue Plan

The National Search and Rescue Plan identifies federal responsibilities and serves as the basis for the National Search and Rescue Manual. Local and state governments are expected to assume the responsibilities for the initial SAR response within their geographic boundaries. According to the National SAR Plan, all maritime or navigable water SAR is the responsibility of the U.S. Coast Guard. All inland SAR is the responsibility of the U.S. Air Force (Air Force Rescue Coordination Center – AFRCC). (*Search and Rescue Fundamentals, pp. 7-8*)

Some Basic Questions:

- 1) Who will tell me where to go?
- 2) Why am I going there? Who am I looking for?
- 3) I didn't find the subject. What good did I do?
- 4) What do I do next?

Some Basic Answers:

- 1) Search Management (ICS)
- 2) Search Strategy
- 3) PODs and Clues
- 4) Recuperate and search again... after a task and after a search.

What is ICS? *They tell you where to go.*

The Incident Command System was originally developed by the National Forest Service to coordinate during wildlife suppression efforts. “ICS is the mechanism that exists to provide direction and control of a situation that is outside the normal governmental management sphere.”
(*NASAR Conference Papers 1985, pp. 28, 35*)

ICS can expand and contract in numbers of people and jobs involved depending on the search and available resources. In ASRC-run searches, Incident Commanders and Incident Staff make up most of ICS.

Basic ICS positions

Responsible Agent (RA)
Incident Commander (IC)
Operations (Ops)
Planning (Plans)

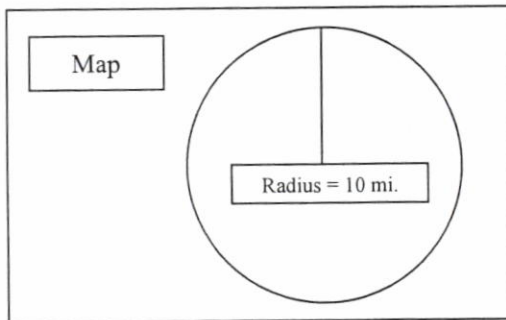
Crash Course in Search Strategy

You'll learn all about search strategy in search management classes later on. For now, focus on how to **establish a search area**.

You have a huge open space with trees, fields, ridges, drainages, rivers and streams. From this perspective, the subject could be anywhere. Sending teams out randomly would be a waste of your resources and would add hours on to how long the subject has been lost. So you need to reasonably determine the boundaries of the area where the subject might be.

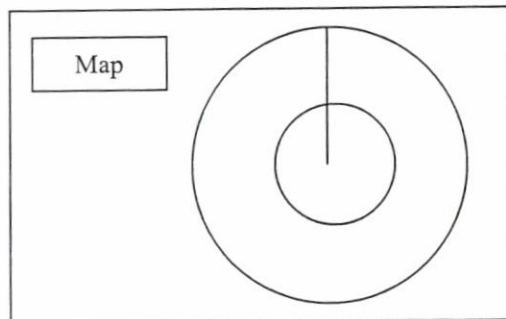
Determine search area by creating boundaries.

Highlight the new search area after each boundary change.



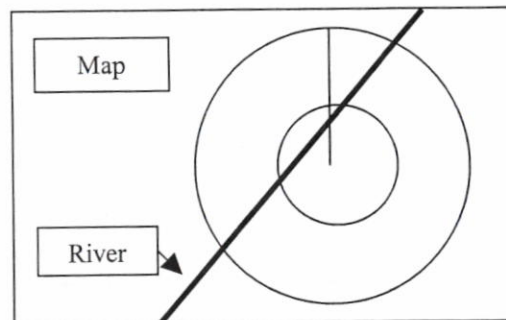
Theoretical Boundary

How far could the subject go in the elapsed time? This is a circle. The center of the circle is the PLS or LKP. The radius of the circle is the distance they can walk in an hour (mph) times hours missing. Let's say he has been gone 10 hours and can walk 1 mph. What's the Theoretical search area? Is this useful?



Statistical Boundary

How far do similar subjects go? We check out Subject Profiles and usually use a distance where we can find 90% of our subjects. This is a much smaller circle.



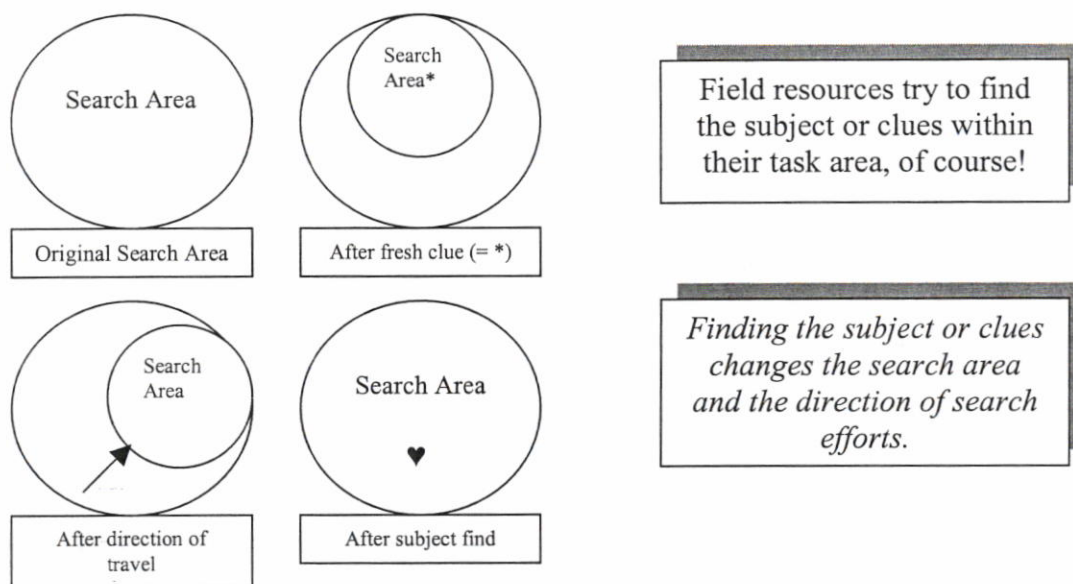
Subjective/Deductive Boundary

Are there places the subject cannot or will not go? Cross them off. Are there places he is likely to go? A direction he is likely to travel? Highlight them as your high probability areas.

Containment and Deploying Resources

Now that you've determined your search area, the first priority is to **contain the subject** within those boundaries. With containment tasks sent out, base staff **deploy field resources** to areas within the search boundaries where they believe teams will most likely find the subject.

How do field resources fit into search managers' grand scheme?



MAP PROBLEM

You are searching for an elderly man with possible dementia. He was last seen at his home in the middle of your map. He has been missing for 3 hours and your task is to establish a search area. (For the statistical boundary, the subject profile for this man indicates that he is likely to travel 1 mph uphill and 3 mph downhill).

Draw your 3 boundaries and one of each of the following tasks:

Containment, Survey, Reflex, Attraction, Hasty, and Sweep

Hint: Using multiple colors to delineate each of your boundaries and tasks makes your search area clearer!

Field resources also search an area to try to increase the **POD** of that area.

Even if field teams don't find the subject or any clues, they can contribute to increasing the POD of that area, giving search staff reason to send more teams through the area or direct resources to other areas.

Incident Staff consider at least the following when planning search strategy...

Probability of Area (POA)

The chances, or probability, that a subject or clues are in a certain area.

Probability of Detection (POD)

The chances that the subject or a clue will be found by the search action if it is in the search area. Both **Predictive** and **Retrospective**.

Probability of Success (POS)

The chances of being successful with a particular search, in a given area.

Success *seems easy* to represent: either you find the subject or clues or you don't. However, the **POS is something different**. Probability can be "estimated" ahead of time, and this estimate can be a planning tool.

Example:

Would your primary search efforts be directed to an area where there is little chance that the lost subject is there (a low **POA**)? Suppose the lost subject is in the area, but the terrain conditions and/or visibility is poor. Is the probability of finding the lost subject high or low (what is the **POD**)? If the probability is low due to terrain, what kind of search should you do? Suppose you are walking across a large mountain bald; how might this affect the search?

A Washington State study found that in moderate to dense brush and using a grid search, the space between searchers dramatically effected the POD. At 20 foot spacing, the POD was 90%. When the searchers were 60 feet apart, the POD went down to 70%. At 100 foot spacing, the POD was 50%. What conclusions can you draw from this?

Remember: POD is used to determine whether an area has been searched sufficiently given the scenario. Each search is different. Search managers have to take all of this into consideration when planning their search strategy.

Other Pointers

- Rarely is an area searched only once. Repeated sweeps of the same area using different patterns or resources is important.
- **POD** increases each time the area is searched.
- Many factors can decrease **POD**.

Be aware of:

Terrain
Critical spacing
Searcher fatigue

Did we answer our basic questions?

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