

77 FACTS ABOUT SEARCH DOGS

Answers for Search Managers and Dog Handlers

(or everything you wanted to know about SAR dogs but were afraid to ask)

by Hatch Graham¹

The Team

1. A search dog team consists of two people – dog and one handler.
2. A search dog team is no better than its weakest link – to meet expectations, the handler must be fit, search-wise, know his way around the country, be equipped and believe his dog – who is usually the stronger link.
3. A search dog team needs to know:
 - where to look and sniff
 - how to cover the area to scent and see
 - how to avoid other searchers.
4. A search dog team will often want to search the perimeter of its assigned sector first
 - to cut for tracks – scent or sign
 - to learn the boundaries of the assignment
 - to check weather (wind speed, direction, irregularities).
5. A search dog team will prefer to search into the wind:
 - Zigzagging into the wind on small areas
 - parallel sweeps across the wind on larger areas
 - often along ridges and downhill with normal daytime updrafts
 - often up canyons and uphill in morning and evening shadows when there are normally downdrafts.
6. A search dog team (at least the handler) will want a good map and orientation. More than most searchers, SAR dog teams are often on their own.
7. A search dog team will need communications with search base. Most teams have their own radios but agencies need to have the usual 155.160 frequency at Base unless they provide radios.
8. A search dog team is effective at night:
 - probability of detection is much greater at night
 - handler safety in terrain is the only reason to hold back at night on a high priority search.
9. Other than nighttime, early morning and late afternoon and evening are the best times for a search dog team. Midday convection currents in summer decrease the dog's effectiveness.

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Application

10. The search dog team can search by airscent or wind scent within 15 minutes after other searchers have cleared an area. For airscenting it doesn't matter how many have been there before or how long since the subject has been missing.
11. Many airscenting dogs are cross-trained to trail or track and can do so if the area is undisturbed and the track is not too old.
12. A scent article is useful:
 - must be uncontaminated by others than subject
 - if touched by others, dog should meet them so he knows they're not the subject
 - carry it double-sealed in two ziplock plastic bags so the inner bag is not contaminated
13. A search dog is useful for covering large areas fast, with the least amount of forces committed to the search.
14. A search dog can search shrubbery, crawl spaces, outbuildings in urban settings on house-to-house searches.
15. Some search dogs can work debris from floods, mudslides, tornadoes, explosions, plane crashes, earthquakes.
16. Some search dogs can work avalanches.
17. Some search dogs can search for evidence of crime.
18. Search dogs can locate drowned people in the bottom of lakes. Gases and oils escaping from bodies rise to the surface and a dog in a boat will give an accurate indication.

How It Works

19. Bodies, alive and dead, give off rafts of cells and gases and vapors constantly.
20. At least one-third of cells emitted from humans are lighter than air (.014mm=14microns or smaller) and stay suspended.
21. These airborne cells and odors act like smoke.
22. During calm days, with the sun overhead, smoke and scent rise up from convective currents. This the toughest time for dogs.
23. Wind will shear the convective column over along the ground and overcome the problem.
24. Cloudy days (low or midlevel clouds) reduce convection and dogs do better.
25. Mornings and evenings and winter, when shadows are longer (the sun isn't overhead), are better for dogs.

26. There is no convection at night, which is great for the dogs, usually.
27. On cold, dead calm nights, warmth of live bodies will cause some convective lift which can cause a problem on flat terrain. On hills, there will usually be downslope laminar flow of air to overcome this.
28. Scent plumes, like smoke, fall into several patterns depending on weather:
 - fumigating: nighttime inversions break with morning sun and bring scents down into valleys and low spots. A subject on a hillside may be detected by a dog down below easily at this time. Dogs should be in the field before sunup.
 - lofting: essentially the opposite of fumigating; it results after the sun sets, the ground is cooling but the air aloft is still warm. It is typical of valleys in the late afternoon and elsewhere in the early evening. On calm evenings when this occurs, handlers should be working their dogs along ridges and higher slopes.
29. ● fanning plumes occur at night in stable air. Scent will hold at the same elevational level. A dog may alert on a victim across a canyon at the same elevation but have no way to follow to him. Handlers should report alerts. A series of nighttime alerts at the same elevation is an important clue: check elsewhere at that elevation.
30. ● coning plumes are typical on cloud-covered days and are the best thing going for air scenting dogs. Other references to plumes are often mistakenly called “cones.”
31. ● looping plumes are typical of clear or high cloudy days, and midday, high convection situations. Scent will rise up, cool, loop back down, heat up again, rise back up, etc. The dog will alert, put his head up, then lose the scent. An experience handler will mark the map and possibly get a direction from a line of these alerts. Sometimes several dogs in the field will establish the line over half a mile or so in this way, pointing to the subject.
32. Wind carries scent to the dog but also disperses it. Convection disperses it, too; even more so. At 100 meters from the source at noon on a clear, windless day, a dog will receive about 21% of the scent he would receive on a clear night. A 12 mph wind will equalize the situation and he'll catch 10 to 25% of the scent.

Probability of Detection (Pod)

33. Pod varies for search dog teams according wind, convection, terrain and vegetation barriers.
34. The handler part of the team will run at 50% Pod just like a grid searcher at 100 ft.; except the dog handler will be covering only about one-third of the country (16.5%) since she's more likely gridding at 300 ft. (Only 100 ft. will be covered in every 300 ft. by the handler's eyes alone.)
35. The dog's Pod will run from 5% to 95% at 300 ft. based on weather conditions.
36. The dog/handler search team, then, in a sense, is double coverage and will vary from about 21 % to 96% Pod. NASAR has used a figure of 50% which isn't a bad average; but remember, it's an average of a wide range. Areas searched morning and evening are much higher than midday.

37. Dogs are trained to ride in anything the handlers can manage:
- chairlifts
 - helicopters
 - sling harness
 - pickups
 - akios (snow machine sleds)
 - aircraft
 - boats
38. From a practical standpoint they're limited in steep, rocky cliff country.
39. They navigate most brush better than most people.
40. They tire in deep, powder snow, but the heavier coated breeds will still search.
41. They require two pounds of dogfood (dry kibble) each day. The handler will bring some but on an extended search you should get a 50 pound bag of a premium brand for your teams.
42. Dogs will need at least as much water as the handlers. If there are streams, springs, etc., OK. But in dry country, they'll need water rations, too.
43. The dogs will stay with their handlers at night:
- in a tent
 - in the field
 - in a motel. Handlers will tent rather than leave their dogs, so clear with the motel. Holiday Inn, Motel 6, and many others normally accept trained dogs.

More on Tracking and Trailing

44. Two-thirds of scent given off by the subject is heavier than air. It falls to the ground or blows alongside to the ground. These heavier scent particles form a trail.
45. As the bacteria on the scent particles (skin cells) digest the protein they convert the cells to vapors. The trailing dogs will follow this scent.
46. The longer the bacteria work on the protein the more it is consumed until, at last, it's all gone.
47. Warm, moist weather causes the fastest rate of conversion -- more scent, shorter duration.
48. Very dry weather, hot or cold, gives less scent but sometimes longer duration.
49. A sun-baked particle of protein may have no bacterial action -- no scent.
50. After a rain or morning dew, it may be rejuvenated.
51. Where the subject's feet step on vegetation or scuff the dirt, new bacteria are turned up in the soil, and cells are crushed in the plants. The cells begin to ferment and the ground smells different. A tracking dog can work these vegetable and soil scents like a trailing dog does the human scent particles. Many dogs do both.

52. Some search dogs are cross-trained to air scent, trail, and track.
53. Most search dogs will alert to clues as well as people: packs, clothing, etc.

The Dog

54. A search dog has 44 times more olfactory sensory cells than a human. He's a super sniffer.
55. A dog's olfactory lobes take up nearly one-eighth of his brain. He's scent smart.
56. A dog can perceive certain smells in a range of one part in ten quadrillion (10^{-15}) or 100 thousand to 100 million times greater than man. That's seems incredible but true.
57. A double-coated dog's coat is good insulation. It keeps him warm in winter, cool in summer.
58. A dog's cooling mechanism is evaporation through tongue and pads.
59. A dog is susceptible to hyperthermia in hot, humid climates. Swimming or dunking helps.

The Weather and Scent Transport and Diffusion

60. You can judge the potential convection by measuring your shadow and looking at the sky:
 - nighttime or overcast with low clouds = no convection
 - daytime and partly low cloudy = low to moderate convection
 - daytime, clear or mid to high clouds, 6 ft. shadow over 8.5 ft. = moderate
 - daytime, clear or mid to high clouds, 6 ft. shadow 3.5 to 8.5 ft. = high
 - daytime, clear or mid to high clouds, 6 ft. shadow under 3.5 ft. = very high
61. Winds help overcome convection; you'll need a moderate breeze of 13-18 mph to overcome very high convection. You'll know, if the wind is raising dust and small branches move, that you've got 13 mph or more. But dustdevils or whirlwinds don't help.
62. Large roll eddies on the lee of ridges and canyon rims cause upslope winds blowing opposite the prevailing wind.
63. Eddies form at bends in canyons and mouths of tributaries bringing scent from different directions.
64. Ridgetop saddles and mountain passes increase windflow. They're a good place to pick up air scents.
65. At edges of meadows, behind hedgerows, at any break in vegetation, expect eddies. Check all of the edges; the scent may not be carried away on the breeze.
66. Openings in a forest will heat up and bring a draft into the opening from all directions. Check the middle of openings to take advantage of it.
67. A tree or telephone pole in a field can act like a chimney, too. Check around it.
68. Don't expect as much wind in a dense forest as in the open. A 20 mph fresh breeze will be

slowed down to 4 mph. A 4 mph breeze will only be slowed to 2.5 mph, though.

69. When the sun is on the slopes of a hill, there will normally be an updraft flow of air. During the day, major canyons will have an upstream breeze. This will carry the updrafts on the slopes diagonally upslope and upstream.
70. The updrafts increase in velocity as they rise. The ridges are receiving scents from off the whole slope.
71. As the sideslopes go into shadow, downdrafts begin. It's good to search from the bottom up at this time.
72. Downdrafts are laminar -- in thin layers -- and flow down like water. Debris piles and brush can act as a dam. Hollows and low shady spots may have scent pooling in them. The mouths of side drainages are good places to check in the shade and at night.
73. Thunderstorm downdrafts push air out in all directions from directly under the cell at the mature stage. A dog can alert from a great distance, so note the location of the thunderhead and the wind direction if your dog alerts.
74. Before reaching mature stage which has rain, the thunderhead will have a strong convective updraft and will be sucking air toward it. It's important to keep track of what's happening and note the time of your alerts since the wind may be going one way one minute and the other way the next.
75. Smoke candles help You judge what's happening. They're a good tool to use in practice sessions occasionally. One source is Ben Meadows Co., P.O. Box 80549, Atlanta, GA 30366, or P.O. Box 2781, Eugene, OR 97402 (Item 171352).
76. There are at least 90 search dog units in the country. They vary in their versatility and expertise.
 - Don't call a Virginia unit for avalanches.
 - Most Bloodhounds don't area search (there are exceptions). A number of airscenting teams don't track or trail, but many do.
 - Find out about your local resources.
 - You can obtain teams through Air Force Rescue Coordination Center, Scott AFB (1-800-851-3051). Be sure to give an idea of the situation, terrain, weather, etc., and how many teams you need.
77. Search dog teams can reduce your manpower needs:
 - One dog/handler team can clear about one-half square mile per day on average, some times more.
 - If your primary search area is everything in a three-mile radius from the PLS, **one** dog team will take a couple of months; better ask for 20 teams and hope the country isn't worse than average.
 - Or, call in 250 grid searchers. The coverage is about the same.

Think dogs! We're here to help.