

“Distant Alerts” - Long Distance Scent Transport in Searches for Missing Persons

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Having been a first responder search and rescue professional for 30 years, I have had a great deal of experience searching for live and deceased missing persons in wilderness and rural areas. I've been fortunate to have located 20 missing persons with my K-9s over the years, many of them deceased. In cases where the person had been out in the woods in one spot for longer than a day, it was common for air scent search and rescue or cadaver dogs to indicate on the missing person's scent at some distance (one to two miles or more) from the person. Over the years, I have learned how to interpret these alerts or indications, what I am calling “distant alerts.”

SAR, Police K-9 and Cadaver Detection Dogs

Unfortunately, many volunteer SAR dog handlers don't respond to enough searches to understand or experience distant alerts, or they search various assignments and leave and never see how their alerts related to the location of the missing person. Dog handlers working air scent dogs need to be able to recognize a distant alert, interpret what the dog is doing and to locate the source of the scent that causes the alert.

Police K-9 teams rarely experience distant alerts because they normally search for subjects that don't remain in one place long enough to generate a distant alert. Like SAR dogs in training sessions, if a police dog alerts on air borne scent, the subject is always close by.

Cadaver detection teams that are working large areas in wooded or wilderness settings for an exposed body need to be aware of distant alerts and scent travel and pooling. Distant alerts and people smelling decomposition smells almost always occur in these types of searches if the body is not located within a day or two. Distant alerts cannot be duplicated in training by working small areas with relatively small amounts of material, no matter how long the practice material is out.

Scent Transport and Terminology

A number of authors have written about scent transport. Author Sandy Bryson gives a comprehensive treatment of the subject in her book, Search Dog Training, 1988. Boxwood Press, Pacific Grove, CA. 368 pp. Other search and rescue dog training books usually contain a chapter on scent transport and availability to air scenting dog teams.

When I use the term “air scenting dog teams,” I mean a dog that is looking for a missing person, dead or alive, primarily by smelling wind borne scent, rather than by following scent left on the ground by the passage of the person (tracking or trailing). “Air scenting dog teams” may be live find SAR dog teams, a police patrol dog team that has been taught an off lead “scout,” or a cadaver dog team. Generally, these dogs work off lead when working air scent, although they may sometimes work on lead. Handlers who are working a dog on lead for detection work will

find it harder to interpret a distant alert, but they should be aware of the possibility, as I have seen bloodhound teams become thoroughly confused on searches for victims who have been out for at least 12 hours. As the bloodhound is on track, it enters a scent pool generated by the victim that, because of distant scent transport, may or may not contain the victim. In these cases, usually the dog's circling in thick cover will defeat the team, but the handler should know that the dog is not "wrong," but reacting to the victim's scent even if the dog cannot locate the victim in its searching. In training, the majority of handlers never leave victims out more than a few hours, so teams never experience the intense scent pools that create distant alerts.

To explain the phenomenon better and follow SWGDOG terminology, an "alert" is the first set of natural behavior changes a detection dog gives when it detects the target scent. This may be increased olfaction, an increase in moving speed or excitement, a definite searching pattern, etc. An "indication" is the trained response the dog gives when it communicates this find to its handler. Dogs may be trained to bark at a live subject, SAR dogs may perform a find/refind, dogs trained to give a passive alert may down or sit as an indication. A distant alert may be just an alert – the dog getting excited, running around and showing behavior changes that show it has scent which does not end in an indication because the object of the search or other factors the dog needs to alert (like a discrete source) cannot be found. Most SAR dogs and police patrol dogs need the target of their search, i.e. a person, as a focus for their final indication, whether that is a bark indication, a bite or a find/refind indication. When these dogs enter the scent pool that creates a distant alert, the handler can readily read their excitement, but may not understand why the dog is getting excited because the dog doesn't give a final indication. In many cases, depending on what the dog is trained to do as an "end behavior," the dog may give an indication by barking, downing in scent, jumping on the handler, etc., even though it has not found a point source or focus for an alert.

The Conditions that Create Distant Alerts

Distant alerts only happen in settings where the victim has been out in one area for greater than 12 to 24 hours. Other searchers and persons travelling through the area do not produce long distance scent transport because they don't stay in one area long enough to generate the scent necessary to travel long distances and concentrate enough to activate the dog's alert behavior. Whole bodies decomposing on the surface in the woods invariably produce large amounts of scent, such that they can be smelled by humans even a mile or more away when their scent is transported and concentrated. Dogs will easily give distant alerts one to two miles away from missing persons or bodies, and possibly further. Cadaver or SAR dog teams looking for bodies should expect and capitalize on distant alert information. "Smells" by human searchers who are familiar with decomposing flesh should also be plotted on maps by search planners as clues to the location of the body, as many of these actually constitute a "human" distant alert if the body is not found nearby.

While police K-9 teams are usually in hot pursuit of a criminal or doing a track on a missing person within hours of their disappearance, they may end up searching wooded areas for a missing person that has been gone for days because of the diverse nature of police K-9 work. A late report of a missing person may also generate a K-9 search for a person who has

been in one place for a day or more. All K-9 teams need to be aware of distant alerts so they can add them to their knowledge store of “what might happen” during a search.

Dog Behavior Seen in a Distant Alert

Live find SAR dogs that hit an intense scent pool will alert by becoming excited and increase their pace as they search for the source of the scent. Since the source is not present in the area, the dog usually becomes frustrated and may try to indicate the presence of scent in various ways. They may also stop searching if they become frustrated. At this point, the dog may look to the handler for help, or do a variation of their alert or final indication.

Cadaver dogs that are trained in a passive indication may just give that indication, or they may show searching behaviors before they stop searching, depending on how committed their training has made them to find the source of the scent. Dogs that are more aggressive in their indications and searching for the source may end up barking, jumping up on rocks and trees and looking up or barking at the sky if the scent is being transported down in a vortex. Other variations would be jumping on the handler, or “self-rewarding” by playing with sticks and/or trying to grab or solicit rewards from the handler. I had one female GSD who would consistently start playing with sticks and grabbing limbs of trees when she got into an intense scent pool where she could not find the source. An inexperienced handler might attribute such behavior to a “false” alert or the dog fooling around with animal or other scents. However, if the dog is well trained, the handler needs to recognize these signs as the dog indicating on the missing subject’s scent, even if the dog cannot find the subject. The location of distant alerts provides valuable clues to the location of the missing subject.

Even if the dog does not give a recognizable indication, there are usually searching patterns and behaviors that a good handler will recognize as the dog detecting scent. For example, in a woods environment, it is common for cadaver trainers to put samples in holes or rock piles on the ground, so the dogs will often concentrate on and check holes when they detect scent. The repeated and persistent checking of holes and other structures that might be a hiding place that the dog has encountered in training is a clue that the dog is working scent even if it does not give a final indication. Air scent SAR dogs will often lift their noses up high and seem to “skim” along when working scent. They may charge ahead and work an area like a clearing in the woods, a hedgerow in a field with a nose high posture, and if the handler watches closely, the dog will investigate the extent of the scent, turning back when it runs out of scent, doubling back, moving in a different direction, etc. In a normal search problem, such actions allow the dog to follow the scent cone to the person, but in a scent pool or distant alert situation, the person is a long distance away and the scent pool does not lead to the person.

Where do Distant Alerts Take Place?

Where are handlers most likely to see distant alerts? Scent will collect at natural collection points. If handlers can think of air like water, scent will “pile up” like debris in a stream, or collect where the air flow “washes” up on a high point or barrier to scent movement. A detailed treatment of how air flows under various conditions can be found in Bryson’s book and other references on weather, air flow and turbulence. However, not being trained in

atmospheric conditions, I find them hard to understand and apply to search work. I rely more on my past experiences at actual searches and trying to visualize how the wind and air flow transport scent.

I've seen distant alerts occur along hedgerows in fields, roads in the woods that create a break in the tree canopy, low lying areas, openings in the forest, the downwind side of a wooded knoll in a field, bends and flat places in rushing streams and on the upwind side of a small knoll. Anything that might be a barrier to the prevailing air flow and create an eddy or a pocket could collect enough scent to produce a distant alert. Alerts can occur on the upwind side of a barrier in low wind conditions where the barrier acts like a dam, or on the back side of a barrier where the barrier creates an eddy effect in stronger air currents. Trees and other vegetation in open areas will create coves, dams and pockets that collect scent.

Interpreting Distant Alerts

The most common and easy to interpret distant alert situation occurs when the scent of the subject rises to the top of the tree canopy, is transported with the prevailing wind along the tops of the trees, hits a break in the trees and vortexes down in the opening, swirling around in the opening. An air scent dog hitting this area will alert and run around the opening, but turn back each time the dog goes out of the opening because the scent literally is dropping out of the sky and cannot be followed on the ground. A similar situation can happen on a windy day on the backside of a hill where the scent from the top or upwind side of the hill is swept down and hits the ground some distance from the downwind slope of the hill. These are situations where dogs may try to tell their handlers that the scent is blowing from the sky. To find the victim, work areas up wind of the alert. These alerts may occur over a mile away from the victim.

Even in relatively level areas, small hills and changes in terrain can complicate scent transport, especially when the wind is still over night. Overnight collections of scent on calm nights can produce multiple unproductive alerts by dog teams in a relatively small area, indicating that the victim is probably within a half mile or so of the alerts, often on a small hill or different elevation, or in an opening where the scent chimneys up during the day and settles at night in surrounding collection points, like the edges of openings or in roadways that are bordered by woods. Scent that originates at one level or altitude does not always sink nearby, and may travel along layers of air to be picked up a distance away at the same or higher altitudes, but not at lower levels near the victim. An examination of the prevailing wind or knowledge of how daytime heating and cooling may be transporting the scent can help to locate the subject.

In mountainous terrain, scent may be transported long distances by daytime thermal heating that makes air flow up hill. Often dogs will alert at the top of a ridge, cliff or mountain where the tree canopy ends. In this case, the scent is obviously being transported from down below, but prevailing and overnight winds have to be taken into consideration.

Waterways greatly affect nearby air temperature, and usually the air that flows with a stream does not mix with adjoining air masses, but follows the water flow. I remember one search for a suicidal subject where his vehicle was located a month after he was last seen. For

the first day of search effort, a few Maine Game Wardens and volunteer dog teams from Maine Search and Rescue Dogs worked areas along the river where his vehicle was parked. Towards the end of the day, the dog team on the west side of the river reported alerts on small hills about a half mile from the river but could not come up with the victim. At the time, the wind was from the east and the weather cold and foggy. The subject's vehicle was parked on the east side of the river, making it most likely that the victim was on the east side, if he was on land. Because of the terrain, teams on the east side did not search down far enough to be opposite the alerts on the west side. At the same time the team on the west side had alerts, a team working the water in a canoe reported no alerts, even though the team passed very close to the victim while on the water in the canoe. The initial search ended with that day. A few days later, game wardens checking the area reported smelling something decomposing when they walked a high bank on a curve in the river that was north of the subject's vehicle. That day, it was sunny and the wind was from the south, blowing directly up a mile long straight portion of the river to where the river curved around the hill where the smell was detected. Obviously the curve in the river was blocking scent transport and creating a pool of strong scent that even people could smell. Armed with that information, I took my dog and another searcher and worked down the east bank of the river until we found the subject's body almost a mile downstream, directly across from where the dog team had alerts on the west side of the river. In this case, drawing lines upwind according to the prevailing wind at the time of the alerts (human and dog) created a crossing point that located the victim.

On another search for a despondent subject, the day after he went missing, several dog teams reported distant alerts in low clearings in the woods, or in one case, on a wooded knoll that was downwind from an agricultural field. The wind had been light but steady from the northwest, and all the alerts lined up from northwest to southeast when plotted on a map the night after the first day of searching. Looking to the northwest of the alerts, there was an agricultural field that had been recently been plowed that was bordered by a paved road and northwest of the road there was a thick softwood swamp that bordered a stream. The subject was found alive at dawn the next morning in the softwood swamp. At that search, just following a line upwind from the alerts according to the prevailing wind direction gave information on where the victim was. The distant alerts were a mile to a half mile from his location.

Hills and mountains complicate scent transport because they block prevailing winds, causing vortexes and mixing. Daytime thermal heating moves air up hillsides and nighttime cooling moves air downhill. The savvy SAR dog handler uses these air movements to their advantage, searching hillsides from the top during the day and from the bottom during cooling periods. The difficulty with distant alerts in these situations is figuring out where the scent is coming from and how it is getting there. Recently I located a body in a search where my cadaver dogs were giving indications on the banks of a stream a mile from the body. The body was on a heavily forested north slope that sloped down to the stream about 100 feet away. Besides what scent material may have been washing from the body into the stream, it was obvious that the cadaver scent was being transported mainly downstream by air flowing above the water in the stream bed, which greatly confused the interpretation of the alerts because the stream and scent flowed east, opposite the prevailing north west wind. SAR dogs gave alerts in several places in the valley during the month long search, with the strongest alerts on sunny

and windy days when vortexes created by the three 4,000 foot mountains ringing the valley mixed all the air up. The distant alerts in these cases were on high, open overlooks above the valley where thermals brought scent up above the tree tops and in openings along roads that were at a distance downwind of the body. Later, my dogs alerted in bends of slower portions of the stream where scent and drift would naturally collect, the strongest alert being a mile opposite of the normal prevailing wind direction. It was clear to me that the scent from the body was being transported down the relatively straight stream valley to where the stream took an abrupt right angle turn. The straight portions of the stream were in a deep valley and sheltered on the south and west by mountains (which also blocked any significant heating by the sun), but when the stream took the abrupt corner, the scent was subject to being picked up by a vortex created by a mountain to the west, as well as heating by the sun and a thermal lift on an east facing slope. The stream was like a water hose that directed the water (scent) to a sprinkler (the stream bend) that was then blown by the wind in all different directions in the valley, producing the numerous dog alerts. To emphasize how much the stream valley contained the scent, numerous dog teams worked a road that was within sight of but elevated above the stream without having any significant alerts, passing by within a quarter mile or less of the body. The initial search effort had ground searchers working the streams, not dog teams, so the dog teams didn't get down to the stream level in the initial search. In this case, drawing lines between the alerts and taking a best guess on how thermal heating was affecting the scent rising to the mountain over looks produced a pretty good approximation of the body's location. The fact that all the alerts occurred in the same valley was also significant.

Scent may travel over ridges and hills to collect in the next lowland, but it will not jump large mountains unless the body or person is near the top of the mountain. Therefore, if dogs give distant alerts in a valley or on the side of a mountain, the person or body is most likely in that valley rather than the other side of the mountain. We had a particularly troublesome search where we had numerous indications by dogs and smells by humans during the duration of the two week search in late summer, but the lost man's body was not located that year. The next spring, a friend of his found the body in a woods opening a mile away from the focus of the search on the opposite side of a ridge that bordered the southern side of the search area. In this case, the scent was being transported over the ridge by thermal heating and southerly winds, then settling in the next valley over where most of the searching took place. The ridge was less than 150 feet in height.

Dead animals in search areas complicate and confuse the human interpretation of "smells" in an area. Most often, smells that are not accompanied by the finding of a body are discounted as animal by humans, but the searchers probably smell a decomposing human body at a distance. Searchers usually recognize decomposition, but most cannot tell animal decomposition smells from human decomposition smells. My experience with well trained SAR and cadaver dogs is that they may locate dead animals, but they don't get excited and give alert behaviors or indicate on them at a distance. With animals, most of their motivation is curiosity or general interest rather than a response that has been enhanced by training. If a trained dog alerts or gives an indication a distance from the body, the alert is on human scent. Conversely, I have seen times when humans smelled decomposition in areas where the dogs did not alert. Whether this is due to a change in air currents before the dogs arrive or to humans and dogs

smelling different things, it was hard to tell, but usually both the dog and humans will smell and “alert” in the same place if the decomposition smell is human.

Actions to Take with a Distant Alert

Any SAR dog handler who suspects their dog may have scent in a distant alert situation should immediately record the location of the alert and the prevailing wind direction. The prevailing wind direction would be the wind direction that might be producing the scent eddy, not the ground level local direction. Look to the tops of the trees or wind direction in open areas to know what the prevailing wind is. The location of the distant alert and the prevailing wind direction should be communicated to search command as soon as practical. If those running the search planning don't understand what the handler means by an alert or distant alert, the handler will have to try to explain. If the planners are not familiar with SAR or cadaver dogs, they probably won't understand why the dog could alert and not find the person.

Often several dog teams will report distant alerts in the same general area. The search command should take note of what the prevailing wind direction is at the time, and what it was for the last 24 hours, because the scent that produced the alerts would have been deposited in the previous 12 to 24 hours, often over night. If search command is not keeping track of prevailing winds, data from local airports or weather stations can be used, or search dog handlers should just keep notes on wind direction as a matter of course as they respond to searches.

Trust the Dog

Dog handlers have to trust their dogs. Dogs respond to the conditions and according to their training, and they have no reason to fabricate information. They only present what is there. If well trained air scent dogs give a distant alert at a location, the dogs have most likely smelled the missing person's scent. Handlers may have to spend some time explaining what a distant alert means to search planners and command so that the information is used properly. If the dog handler is working on their own or with a small group of handlers, then they will have to plot the alerts on the map and try to figure out where the scent is coming from based on the terrain, prevailing wind and tree cover.