How Do You Know Where to Start Looking?

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Whether you search with grappling hooks or divers, whether you search in fresh or salt water, or whether you operate in a rescue or recovery mode, there is one thing you need: a starting point to begin your search. Witness information often gives searchers a point at which a victim submerged – but is that point the place where a team should begin looking? Not necessarily: underestimation of distances over water, the rate at which a body falls through the water column, and current will all affect where a body lands on the bottom. That place is where the search should focus, not the point of submergence. This process, developed by Walt "Butch" Hendrick, is based on 35 years of recovery experience and experiments with euthanized animals donated by the American Society for the Prevention of Cruelty to Animals.

Witness Underestimation

The majority of all drownings are witnessed, and those witnesses can often be asked to help pinpoint the location where the victim submerged. However, we have found that in telling you how far out the person was from shore, the average witness will underestimate distances over water by about 25 percent.

Underestimation of distances can be addressed in two ways, and they work best when used together. The first method uses simple math: add 25 percent to the witness' estimate. For example, if she says the victim drowned 40 feet from shore, add 40 feet + (25% of 40) for a total of 50 feet. According to the math, the actual point of submersion should be 50 feet from shore.

The next method to be used is to go ahead and send the first diver out until the witness says that he is at the point where the victim descended. Doing so will not only help you determine if your diver is in the correct location, it will also allow you to determine how close the witness' estimation of distance was. After all, since your diver is using a marked, measured tether line, you always know how far out he is. If a diver cannot be sent out, toss an object into the water, and have the witness estimate where the victim submerged in relation to where the object hits the water.

Body Drop Rates

When a human body falls through the water column, it does not sink like a handful of keys. In fact, a body will fall at a rate of one-and-a-half feet per second on average in saltwater, and two to two-and-a-half feet per second in freshwater. Of course, that rate is not concrete: because of individual variation in muscle-to-fat ratios, body composition, and clothing, different bodies will sink at different rates.

Because of the variation, the best rule of thumb is to estimate that bodies will fall at a rate of two feet per minute in any environment. Hence, in a body of water 40 feet deep, a body should take about 20 seconds to reach the bottom.

It is important to note here that, except in extremely shallow or extremely fast currents (over 15 knots), once a body lands on the bottom, it **will not move** – even in a current – until it decays enough to produce enough gas to gain buoyancy. Once the body has enough buoyancy, it may only float partially; that is, the body will not simply pop to the surface, but will drift and scrape along the bottom and through the water column for some time before it finally surfaces. It is that postmortem wandering that accounts for the fact that "floaters" often appear far from their original point of descent.

Current

During the time it takes for a body to fall to the bottom, it will be pushed along by current like a parachutist in a breeze. The next piece of information needed, then is the speed of the current.

Current is always measured in knots[1], with one knot equal to a speed of 100 feet per minute. To find the speed at which a current is moving there are two options. The first is to toss in a tennis ball tied to fishing line knotted at five-foot intervals, and time how long it takes for the ball to travel 50 feet. After doubling that time to find how long it would take to travel 100 feet, you

[1] The Navy, Coast Guard, civilian shipping, commercial diving industry, and even airplane pilots measure speed in knots.

can calculate the speed in knots the ball was travelling.

The second option is to throw in an orange (a tennis ball can be used, but is not biodegradable), and see how far it travels in 30 seconds. Measure that distance, double it (you only timed for 30 seconds of travel), and you know how many hundreds of feet per minute the orange was travelling. Finally, simply divide by 100 to find the speed in knots.

Putting it together

Now that you know the amount of time the body took to reach the bottom and the speed of the current that was pushing the body as it fell, you can determine the approximate location the body landed. Using the example above, we know that a body falling through 40 feet of water takes 20 seconds to hit the bottom. If that body was being pushed by a two-knot current, how far would it travel during that time? Twenty seconds is one-third of a minute, and the body was travelling at 200 feet per minute. So, 1/3 min × 200 ft/min = 67 feet. Therefore, the body traveled 67 feet downstream of the current from the point it submerged. (See Figure 1.)

In some cases, currents will change as depth increases. However, these calculations can still give a good approximation of a starting point, and can be modified as information about current through the depth is relayed by divers.

Applying It

Lifeguard Systems recently got a call from a woman on a team that was searching for a young man who fell off of a river bridge. The fall was witnessed and was from a bridge, so the team had a good location for the submersion site. However, the woman who called was concerned that her team was simply looking too far down river. She told us that the river channel was fourteen to sixteen feet deep, and that the best estimate of water speed was two feet per second. So, where should her team have been looking?

Assuming the maximum depth of sixteen feet, a body falling at a rate of two feet per second would have taken only eight seconds to reach the bottom, or 8 ÷ 60 = 0.13 minutes, which, for the sake of speed, can be considered as one-tenth of a minute. The water speed was two feet per second, which equals a speed of 1.2 knots, or 120 feet per minute. The body therefore traveled at 120 feet per minute for one-tenth (0.1) minutes: 120 ft/min × 0.1 minutes = 12 feet. Therefore, in that current, the man's body only traveled about 12 feet from the point where he submerged.

In this particular case, the team did not move their search efforts to the calculated place. The body was not found until three days later, after it had bloated and moved a few miles down river, where it became hung up on a partially-submerged island.

We mentioned earlier that body drop rates are merely an approximation, so it is important to note that calculating a body's location is not precise. For that reason, when searching for a body, be sure that your search extends both up and downstream of the area where you have calculated the body's location to be.

No matter the method or pattern of search, these methods will help you determine where to begin. They can be used both quickly and effectively, and will help improve your team's chances of making a rescue or reduce the amount of time needed to make a recovery.

Safe diving always,
Team Lifeguard Systems

Look for future articles that will address how much tether line is needed to ensure that a diver descending from the surface ends up in the correct location on the bottom.

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