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Dedicated to the expanding knowledge of Underwater Crime Scene Investigation

INTERMEDIATE LIFT BAG OPERATIONS
By Mark Phillips
With Bob Kinder and Chuck Elgin

NEWS
DIVING MEDICINE
EVENTS
CONTINUING EDUCATION
AND MORE!
Greetings,

Over the last five years, PSDiver Monthly has transformed from a simple newsletter into an Internet magazine. Our corporate support is still growing but it is obvious that the bad economy is having a negative effect on business in general. We have lost a few sponsors because of financial issues and hope things work out for them. We have gained one or two new sponsors but are having to watch our budget closely too.

What is gratifying for me is knowing that we have accomplished so much with and through PSDiver Monthly and have been able to do it without having a subscription fee. I hope you place as much value on this as I do.

I was asked once why I call them sponsors instead of advertisers. Before I started the magazine, I pitched an idea to a selected group of businesses at DEMA. The concept was unique and most of them agreed to support the endeavor. They were supporters and friends, not advertisers I had to sell my product to. I decided then that we would not have advertisers and would term those companies as sponsors. Maybe it is hokey to some but to me, the idea that the first group of businesses was willing to take a chance on an idea elevated them to something more personal than a simple advertiser.

As we have grown, the majority of those companies who started with us are still here. The owners or managers or the companies participate or at least belong to our discussion group and occasionally offer information, provide assistance or interact with the group and interject commentary that we would never get on our own. I am appreciative of their support and continued sponsorship.

This month PSDiver Monthly is offering something a bit different. This issue is longer than usual and is dominated by a single article and theme; Intermediate Lift Bag Operations. The CEs this month will be drawn from the issue.

The depth of information I am attempting to provide is more than a simple article can convey. The three part series on lift operations has become an extreme challenge. I have only just started the heavy lift operation article and wonder if I will be able to complete it before the next issue is scheduled to go out. If it does not come out in the next issue, perhaps the one after. The project as a whole has evolved into a beast that just keeps growing.

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Some of you know that I got hurt on a fire call last month and have inquired about my condition. There was nothing heroic or sexy about the injury. The doctors say I have a severely strained lower back. Apparently in the lower back there is a joint that is not a flexor joint, but can flex. And I managed to move it more than it wanted to move and it fought back with extreme prejudice.

Aside from not being able to walk without pain for a few weeks and back spasms from hell, I am fine. Time and rest have healed me up some and the Doc says I should be able to go back to work in a couple of weeks. This is not the kind of time off I recommend ...

Stay Safe,
Mark Phillips
Editor / Publisher
Intermediate Lift Bag Operations
100 to 500 Pound Lift Rating
By Mark Phillips
With Bob Kinder and Chuck Elgin

In our effort to separate lift operations into categories that make sense, we have identified three categories. The first we discussed in Issue 69 as Basic Lift Bag Operations. These were defined as lift operations using lift bags with capacity up to 100 pounds of lift. These are typically open bottom bags and can be considered for recreational use. Bags ranging between 10 and 100 pounds should not be terribly difficult to use and should require little training and a lot of practice. We will discuss Large Lift Operations at a later date.

Intermediate Lift Operations we will define as any lift operations requiring lift capacity between 100 and 500 pounds. This would include an operation that used multiple smaller bags that combined to reach those limits.

When the job or need requires more than 100 pounds of lift, and larger lift capacities are required, manpower and equipment needs increase. So does the risk.

Increased risk during lift operations using over 100 pounds of lift capacity can include:
- Uncontrolled ascent
- Entanglement
- Heavy rigging issues
- Uncertain or unseen ascent profiles
- Weak attachment points
- Zero or low visibility environments prevents full view.
- Bottom suction and sudden release.
- Inadequate training
- Improper rigging
- Inadequate or improvised equipment

Other considerations include:
- Weight calculations
- Reliable information
- Lift capacity available
- Air sources and delivery capability
- Special fittings and hoses.
- Lift points
- Depth, Currents, Tides and Visibility

Not all lift bags are the same. Before we look at commercial products, let’s consider improvised lifting devices. First a reminder - we need to know that lifting objects from subsurface is not a typical diving circumstance. If you dive for money or reward, even using recreational techniques and equipment, you are considered to be a professional diver and are subject to the requirements of the OSHA commercial diver regulations (29 CFR Part 1910, Subpart T).
We usually read or hear about improvised lifting devices from the recreational diving community. These devices can be ingenious and actually offer a relatively safe option for small object lifts. These can include a plastic trash bag lining a dive bag, or a trash bag inside a burlap sack, inverted 5 gallon buckets (40 pounds of lift capacity), 1 gallon plastic milk jugs, 5 gallon water jugs and even a pair of jeans with the legs tied off. If these are used for small objects that would fall into basic operations 40 pounds or less lift, they can probably be used with a guarded degree of safety.

However, improvising a lift device, especially on the fly, is never going to provide the same level of safety as a commercial device specifically manufactured for the job. Larger devices like 55 gallon drums, both the metal and blue plastic, can offer much larger lifting capacity. A 55 gallon drum has the ability to offer as much as 460 pounds of lift. This capacity makes it a dangerous option for use as a lifting device. That said, 55 gallon drums are used quite often for lifting. ...well prepared and have experience and the necessary logistical support that is necessary. The vast majority of PSD teams will not. 55 gallon drums or any other improvised lifting devices over 40 lbs of lift capacity are NOT recommended for PSD teams.

Lift bags come in a variety of shapes and can even be custom made to fit unusual needs. They are made of a non-gas-permeable material and are used to supply lift through displacement of water. The size, shape and design of the bag will determine its lift capacity and how or when a particular style might be used.

**Types of Lift Bags**

Lift bags come in different styles to fit different needs.

**Recreational Lift Bag.**

This is a multi-purpose bag that can be used as a lift bag, an up-line float, as a dry bag or as an inflatable dive flag/float. These bags are open bottom may or may not have a, top dump valve, will provide a web rigging point and afford 10 – 100 pounds of lift. These bags are usually small and compact enough to be rolled up and carried by the diver.

One cubic foot of sea water weighs about 64 pounds. A pint of water weighs about one pound. There are 8 pints in a gallon so a gallon of water weighs around 8 pounds. This means there are about 8 gallons of water in a cubic foot of water.
Light Commercial Lift Bag.
This bag is designed to be used easily by a single diver. These bags are ideal for use in light salvage, object recovery, construction and scientific applications. They are especially suited for remote locations or for deployment from small craft. These bags are open bottom, will have a top dump valve, will provide at least one web rigging point and afford 100 – 550 lbs pounds of lift. At the small end, these bags can be rolled up and carried by the diver. As they progress in size, they have to be treated as primary objects and treated as a dive designated tool.

Heavy Commercial / Professional Lift Bags.
With proper instruction and training, these are relatively easy to use. They operate just like the small basic operation bags, just on a grander scale. These types of bags are often used in heavy and light salvage and construction. Open bottom, top dump valve, trip line attachment point, heavy web rigging generally extending around the entire bag creating the lifting point, may have more than one web sling used to create the lifting point, 1000 – 80,000 lbs lift.

Enclosed Flotation Bags or Pillow Bags.
These bags adapt to a broad range of floatation requirements. They are typically used for vessel salvage, automobile recovery, and emergency floatation systems for ships, aircraft, submersibles and ROVs. Enclosed flotation bags require the use of a dedicated inflation hose or an independent air source. This can be something as simple as a scuba cylinder attached to the bag. These bags will generally have 2, 4 or more over pressure relief valves and a dump valve. They will typically use webbing loops sewn into the bag as attachment points. The webbing is sized based on the lift capacity of the bag and generally consists of 2 or more slings sewn into the lift bag to create a lift point. These types of bags are usually rated between 220 and 7000 lbs of lift.
Salvage Pontoons.
These bags are very similar to an Enclosed Flotation Bag except the web slings create 2 or more lifting points over a longer horizontal distance. They are useful for shallow water salvage, reducing the draft of a vessel, or raising an object closer to the surface. Commercially these are often used for cable and pipeline operations, or where long tows are planned. These bags are usually rated in the 1000 to 80,000 lbs range.

Boulder Bags.
These bags are used when there is need for large lift capacity in shallow water. These are a specialty style bag that offers a lot of alternative uses. They rage in capacity between 500 and 4000 lbs of lift and will obtain full lift in as little as 36 inches of water. The lift point is located in the middle of the bag, and is generally a D-ring or Clevis. “Boulder Bags derive their name from gold dredgers and nugget hunters who use them for lifting boulders in the shallow rivers of California's mother-lode country. They are designed to get a maximum amount of lift from a single lift-point in a minimum depth of water. For example, the 2000 pound Boulder Bag gets its total lift in less than 3 feet of water, whereas the 2000 pound Open Bottom Bag requires almost 8 feet of water. These bags are very durable and have been used as air jacks capable of exerting several thousand pounds of force over a large area.” http://www.carterbag.com/boulder.html

As you can see there are many types of lift bags designed for many different operational parameters. However, all of the lift bags we are likely to use are either going to be open bottom or enclosed. This actually simplifies a few things and requires us to learn only two methods of inflating the lift bags.

Most recreational divers will lift an object off the bottom by inflating their BC and floating or swimming it to the surface. If they have one available, they might use a lift bag and fill it until the object rises. Sometimes they might fill the bag until it is fully inflated and then try to lift it by swimming it to the surface with a fully inflated BCD. Be honest – you have probably done this yourself at least once in your career. “I found it and didn’t want to risk losing it ... so I just grabbed it and held on to it. But I
did remember to breathe out on the way up.” The fact that most divers live to tell the tale is not an endorsement for the technique. It is only the fact that they survived that we do not nominate them for the prestigious Darwin Awards.

Recreational divers with more experience will use a lift bag large enough for the task. Usually they will only have one and will put air into the bag until it starts to rise and away goes the object to the surface, usually with the diver hanging on.

This is not the way we as Public Safety Divers should approach the job. Many times we are dealing with evidence, or objects of value. An uncontrolled ascent could be embarrassing, especially if on the way up you dropped a victim. Worse than that, an over pressure injury resulting from a rapid ascent could be a career ending event. So that we do not dwell on pressure changes, decompression sickness and all the physics of basic scuba, we will agree that **ANY lift operation should be conducted in a manner in which the object reaches the surface by means of a controlled lift.**

**Controlled Lifts**

Once your object is located the first step in the recovery process is to attach a line to it. The process used will vary from situation to situation but two techniques should dominate. In the PSD world, visibility is usually a luxury and not something we can count on having. This would imply that our diver is using the search rope as a tethered line and is being guided by a dive tender on the surface. Since scuba is still used by the majority of teams, we will focus on scuba and leave surface supplied diving techniques for a future article.

Once our scuba diver locates the missing object, it needs to be marked. We may have spent quite a bit of time searching for it, and we do not want to have to start over again. There are two safe and simple ways to do this. Keep in mind we are locating evidence almost every time we dive so documentation and preservation efforts need to be incorporated into this process.

The first method to mark an object’s location might be to use a simple fisherman’s float. These are self deploying and are easily carried by a diver in a BCD pocket. To deploy the marker float, the diver has to release the weight and free the float so it can rise to the surface. The float will mark the underwater location by referencing it on
the surface. There are two very important things that must be done with these. First, do not depend on the weight to keep the marker in place. Tie the end of the line with the weight attached to a fixed point on the object. Otherwise, a modest current could pull the weight free of the object rendering the marker useless. Secondly, if there is current, make an effort to stay perpendicular to the current. The light line used on these types of floats tends to tangle on a diver with great ease. Staying perpendicular to the current will keep the diver out of the path of the float line.

The second method we can use to mark an object’s location uses our search line. For this to work the diver must be attached to the search line with a clip or link that is easily detachable. A high quality quick release should be considered. The line must also have a hand loop tied a few feet from that end. The diver must also have what we call a Tag Line. This is a separate piece of rope or strap that has a clip on each end. Some divers refer to this as a Contingency Line or strap. To use the search line as a marker line, the diver will clip the Tag Line onto the hand loop that is tied into the search line. The other end is attached to a D Ring on the BCD with the other clip. Since the far end is being held by a Line Tender and the diver is now attached to the hand loop, the diver can unclip the search line from the BCD without losing contact with the search line. Now that the search line is unclipped, the free end can be wrapped, looped, tied or clipped to the object. Once secured, the diver will move the clip on the Tag Line above the hand loop and secure it to the search rope. All the diver has to do now is follow the rope back to the surface. If at any time the diver needed help or was in distress, the Standby or Rescue Diver has the ability to use a Tag Line and clip on the search line allowing that diver the ability to follow the search line directly to the first diver.

Once the initial search line is secured to the object and the diver exits the water, that line becomes the primary marker line for the object. If necessary other divers can use a Tag Line and clip to it and go directly to the object for follow-up rigging, documentation or investigation. Regardless, once that original line has been secured, it does not get removed until the object is secured on the surface.

While the object is being rigged for lifting, the marker rope must stay in place. It is probable that it will get in the way of rigging and must be moved. If the marker
line needs to be moved, care must be given to the process. The diver must alert the Line Tender that slack is needed and that the marker rope is being relocated. If the Line Tender is not made aware of the change, it is possible the line tender will attempt to pull slack out of the line and pull it off or away from the diver and object. During a recovery, whether it is a tow truck operation or a vertical lift, the marker rope will become an indicator gauge to what is happening below the surface.

**Lift Operations**

**Filling the Lift Bag**

Obviously we intend to use compressed air to fill our lift bags. When we discussed Basic Lift Operations we discussed small bags up to 100 pounds of lift capacity or improvised lifting devices up to 40 pounds of lift capacity. While we can all agree it is safer and more prudent to use a source of air other than our breathing air, we are realistic enough to accept that the majority of us will not. Because the volumes of air are comparatively small, we can hesitantly justify this. However, when we begin using systems that provide over 100 pounds of lift capacity, this “wink, wink, nudge, nudge” justification can absolutely NOT be applied.

We can fill lift bags or provide air for lifting in a variety of ways. Depending on the bag being open bottomed or enclosed our delivery systems will change. An open bottom bag requires air to be released and trapped inside. We can do this with a compressed air hose and regulator supplied from cylinders or a compressor at the surface. Air can also be deployed from a diver carried cylinder specifically intended for use with the lift bag. This can be as easy as a scuba regulator attached to a standard cylinder. All the diver needs to do is position the regulator in the open bottom and depress the purge valve on the second stage to release air.

Enclosed bags require a bit more finesse.

Enclosed bags will have an air inlet valve located somewhere on the body of the bag. This valve may allow you to attach a low pressure hose with a quick-disconnect fitting. The air source will be either an air hose that is supplying air from a different location or an attached or hung scuba cylinder. If the air is coming from an attached or hung scuba cylinder, it should be rigged with a first stage and a single low pressure hose with an end fitting that fits the fill valve on the lift bag. The first stage may have a thumbnail pressure gauge. The fittings on all should be either stainless steel or brass. When using a manifold or cylinder to inflate an enclosed lift bag, the fill valve should always be full open. The cylinder valve or the manifold is the control point. The fill valves on the bags are ball valves, and may get knocked closed during the lift.

If a scuba cylinder is being attached, depending on the manufacturer, the lift bag may have a built in holder for the
cylinder or a designated attachment point specifically sewn into the material to locate and support the cylinder. If it is being hung, it will be secured to one of the attachment points on the bottom of the bag. The fill hose must be long enough to reach the inlet valve. Air will be released into the bag by turning the cylinder valve on. This method is effective but the least desirable. In zero visibility it is impossible to know how much air has been released or how much effect what has been released is having on the object. If two enclosed bags are being used to stabilize the lift, even with communication gear, divers will not be able to coordinate an even lift. The safest way to use this style of inflation is to turn the valves on a quarter turn, move away from the object and surface. If you are successful, the object will make it to the surface with the overflow valves on the lift bags screaming. All you will need to do is turn the cylinders off and secure the object at the surface. At no time should divers be below the object!

When this type of inflation method fails, the lift bags may become unbalanced because of different fill rates. One will fill faster and the uneven rise might cause the other bag to tangle in something or break off the attachment point being used. Depending on how it is secured, the higher bag might slip off entirely. Regardless, you will not want a diver anywhere near the object while it is being lifted.

If using a single large lift bag, a rapid inflation could cause the object to pull apart, the attachment point to fail, or the suction on the bottom could cause the bag to fill completely and not be quite enough. In this instance the bag will be at full capacity with an open air cylinder still feeding it. A diver approaching this scene would be as dangerous as looking to see if a dynamite fuse is still burning or not.

A safer and more efficient way to fill enclosed lift bags is to use a remote fill system. This can be something as simple as a long low pressure hose attached to a scuba cylinder that is in a boat or on shore. Once the lift bag is attached and the fill hose secured, the lift operator can turn on the cylinder. The divers should still move away and surface before the lift operation starts. Once air begins to flow to the lift bag, the operator can better judge the flow by how far the valve is turned, by timing the air flow or by listening to the air flow. Because the operator and the supply valve are above water, the operator can turn it off without being in a danger zone. As simple as this seems, consider what is happening. Air is slowly filling the lift bag. As it begins to fill, it will start to rise. On the surface, small bubbles may be noticed. The operator can turn the valve off and wait.

If enough air has entered the lift bag, the bag may be causing an upward force at the attachment point that is forcing the object to slowly move in the direction of force. The operator turns off the cylinder valve and waits. If nothing happens, there is no danger to adding more air, the operator simply turns a
valve and watches the surface a little longer. After a brief injection of air, the operator will turn off the valve again and wait. Now the bag has more air in it and is creating even more upward force. If it starts to lift, the water on the surface may start looking different. As the bag expands and rises, it will be pulling the mass of the object with it. All of the water above the bag and object has to move out of the way – it is being displaced. The surface of the water will look like water is rising and moving away in a circular motion and may even seem like it rises slightly. As the bag approaches the surface the overpressure valves may be triggered and massive amounts of bubbles and released air will boil the surface.

Once the enclosed bag reaches the surface, it will rise out of the water until the weight of the object and the lift capacity of that part of the bag that is still in the water equalize. An oversized bag will rise higher out of the water than a bag that was just barely large enough to work.

Multiple enclosed bags can be filled using a surface manifold system and multiple hoses. The source air supply could be anything from scuba cylinders to a portable air compressor. Once the air supply valves are moved to the surface and are able to be managed and regulated by a surface operator, the fill stage of a lift operation becomes safer and more controlled.

**Rigging the Lift**

Any rigging used for lift bag operations must be rated for at least 5 times the load. Manufactured and certified slings are preferred to 1 or 2 inch rescue webbing or improvised, makeshift slings. Chain is highly usable and easy to adjust for length. When used for lifting or combined with rope or cable, the chain size should never be less than 3/8 inch and must be proof rated. The components that will be required will include a lift bag, equipment providing ability to get air into the bag, a rope going from the bag to the object, a separate rope, chain or attachment device that will be used to secure or create an attachment point and connecting hardware.

Hardware should be used to attach the lift rope to the bag and to the object. This will allow the individual units to be separated if necessary. While it will happen on occasion, caution and thought must be given to wrapping the lift line around an object and securing the line to itself. Doing this will eliminate some options if things do not go as planned.

**Ropes**

Ropes should be suitable for the job, should not stretch and should have a working load rating suitable for the job. Keep in mind that the object to be lifted is displacing water. This means that it will not have the same lift requirements as it would on the surface or dry land. The displacement of the
water will buoy up the object to some extent. Air pockets or trapped air within the object will also lighten the object so long as it remains under the surface.

Rope choice is important. We commonly see hardware store ropes used for lifting. While less expensive and easily obtainable, we need to be aware of their strengths. Every rope has a breaking strength. Simply put, if we place a heavy enough strain on a rope then it will eventually break. The Safe Working Load of a rope is generally considered to be one-fifth of the rope's breaking strength. So when purchasing ropes for lifting purposes, be attentive to the descriptions and specifications of the product.

Ropes used for lift bag operations should be no less than ½ inch in diameter. According to The American Boat and Yacht Council charts of safe working loads for 3-strand twisted line and single braid line ½ inch nylon has a working load of only 704 pounds. A similar ½ inch Polypropylene has a working load of 714 pounds. By increasing the diameter of these ropes by only a ¼ of an inch, we more than double the working load. A ¾ twisted line and single braided line nylon rope has a working load of 1562 pounds and ¾ Polypropylene rope, 1445 pounds.

If we change the ropes to double braided line, we will find that ½ inch rope offers a workload of 1630 pounds and ¾ inch rope offers 3600 pounds of workload.

Lighter lines should never be used for lift bag operations. However, lines with a diameter less than ¼ inches can be used for positioning slings and locking them together. This will prevent them from sliding off and will join multiple slings together.

Cordage, string or twine usually has no reason to be used. These smaller lines tend to drift and cause entanglements. It is likely and reasonable to assume they could be used prior to rigging for a lift. This might be to tie bags over the hands or feet of a trapped victim or to secure a door to a frame.

Cables and Chains
Generally steel or alloy cables are not suited for intermediate lift bag operations as the primary lift medium. However wire rope makes excellent, short bridles that can be used in rigging as well as chokers.

Metal cables kink and add weight to the lift. Cables or wire rope can splinter. The splintering can puncture through a gloved hand, cut through a wet or dry suit or cause damage to the object. At worst, it could cut into the object and in some cases, like an old fiberglass hull, the damage and lifting force...
applied by a cable could be severe enough to cut it in half.

Chains might be used but only as a wrap to provide an attachment point or to secure the object. Chains will have to be carried by a diver and can be awkward to handle. The diver will have to deal with the added weight of the chain, creating a possible safety issue. Chains will add weight to the lift.

If used for an intermediate lift, chains should be long enough to easily adjust for length. The links should never be less than 3/8 inch diameter. The chain links must be welded. Chains being used for underwater operations should always be proof rated. When applying chains, the hooks will generally bite onto a chain link in order to tighten them and secure them. Often this attachment requires some tension on it in order to keep it in place. To keep chain hooks from coming off, the diver can use a nylon wire tie to secure the hook to the link. This is difficult to do with a gloved hand in zero visibility and is a skill that should be incorporated into training.

Knots
Every rope has a breaking strength and the safe working load of a rope is generally considered to be one-fifth of the rope’s breaking strength. Knots almost always lower the strength of a rope. Depending on the knot, the strength of the rope can be compromised by as much as 50 percent or more.

Dave Richards, the Technical Director at the Cordage Institute in Sugarland, Texas, has an excellent article and test results that show the differences the type of knot can have on the strength of a rope. His article and findings can be found by clicking here: Knot Break Strength vs. Rope Break Strength. A good website for learning how to tie a variety of hitches is: The Most Useful Rope Knots for the Average Person to Know.

Using an improper knot for a lift operation may produce excess stress on the rope and could cause the rope to fail at the knot. Attaching ropes to an object should be done using an approved, predetermined and practiced knot.

Knots of all types and kinds could be used. Picking the best knot for the job at the time it is needed is not always an option. When rigging for a lift, consideration must be given to which knot, knots, hitch or hitches will be used. Not every object will be the same and a variety of knots and hitches should be learned and used as needed. Knots and hitches selected should not greatly compromise the rope,

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<td>1. Square knot</td>
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<td>8. Becket bend or sheet bend</td>
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slip, be too difficult or complicated or be so difficult to untie that the rope has to be cut. Typical fire service knots are excellent choices. These include the square knot, bowline, half hitch and figure 8. These knots or a combination of them will usually provide the service necessary for most jobs. They are effective and simple enough to tie with a glove hand in zero visibility. Proper training will make the operation much more effective. The best knots are the ones you can tie by feel in any position.

Hardware
The hardware used in any lifting operation can vary greatly. Whatever the lift is, the only way to safely incorporate hardware is to use hardware that meets or exceeds NFPA 1983 or ANSI/OSHA strength requirements for lifting people. For small or light lifts, some smaller types of stainless steel or aluminum clips could be used. But these must have a weight rating. Some aluminum clips will have a stamped rating on them of 150 to 300 pounds. These should NEVER be used to lift a person and should NOT be used when lifting an object with a surface weight of more than 30 to 60 pounds. This practice will keep the hardware within a 1/5th rated strength rule. For larger lifts, a proper, rated piece of hardware should be used.

When choosing hardware, consider if it would be safe to use to hold the weight of a person if that person was you, and you were hanging off a 100 foot high bridge. If you do not want to use it there, it probably is not the best choice to use when performing an intermediate or larger lift operation.

Common hardware used will include shackles, carabiners, and locking connectors. These types of devices will usually incorporate a way to secure the opening of the device. These can be a spring gate, a clevis fastener or locking gate.

When used, the rating for any hardware should exceed the requirements for the load. When working with quality hardware it may be difficult to stick with a 1/5th rule but knowing why that rule exists should encourage the use of hardware rated higher than needed. Hardware strength ratings should always match or exceed the strength ratings of the rope you are using.

Mouse shackles whenever there is danger of the shackle pin working loose or coming out due to vibration. To mouse a shackle properly, take several turns with 12...
or 14 gage wire through the eye of the pin and around the bow of the shackle. This step may not be practical while performing a multi stage lift but should be added as a finishing step before towing an object or lifting it out of the water.

However, pins that have the ability to become completely separated from the shackle can have a security line or wire tied on them to prevent them from being dropped in the mud. Keeping up with separate pieces of hardware, ropes and slings can be difficult and a small pin can easily be dropped and lost.

**Attachment Points**

Considering that this discussion is limiting our lift to an intermediate capacity between 100 and 500 pounds we must make note that the objects we describe may exceed these limits and that the examples are used to illustrate specific techniques or information that can be applied to an intermediate lift. Attachment points will be those points where the greatest upward stress will occur. Using the lift bag line to connect directly to the object may be effective but application of appropriate hardware to the attachment point and the lift rope to the hardware will usually be better. This will prevent the rope from chafing or being cut and could afford more options to the divers and lift operation in general.

Some objects, particularly motorized equipment, will often have lifting points on the frame or motor that are been placed there specifically for lifting purposes. These points will be reinforced or designed to be used to lift and support the weight of the object.

There may be more manufacturer lifting point and if necessary, a multi leg bridle or harness can be constructed that will allow a single line lift. If the object is too large for that it may be necessary to use two bags. Convenience may dictate where you attach a line or lines if it is necessary to use multiple bags.

**Slings, Chokers and Harnesses**

According to [OSHA 1910.184](https://www.osha.gov/pls/dpgen/accesstoc?pg=plshelp&pgaction=pg&section=1910.184), a sling is an assembly which connects the load to the material handling equipment. A sling is one of various designs of webbing (usually Nylon) or steel (chain or cable) straps either with eyes on each end or an endless loop.
Slings are used in rigging for lifting heavy loads. A choker sling is intended for use with one end run through the other end in a way that allows it to tighten on the load to positively secure it during a vertical lift.

Chokers are usually made from wire rope or cable. They would not normally be used in a standard sling configuration. They will have either a wire loop on either end that is unprotected or will have a chafing protector inserted into the loop. The choker will have one end loop capable of passing through the opposing end loop. The application of a choker is as easy as wrapping the choker around the object and passing one loop through the other. The free end attaches to the lift hardware and the other end is able to self tighten on the object.

Using the sling as a choker will reduce its rated capacity. When using a choker at an angle of less than 120 degrees (see drawing) the choker rated capacity must be reduced.

**Webbing**

Webbing is a strong fabric woven as a flat strip or tube. It comes in varying widths and fibers and is often used in place of rope. Modern webbing is often made from high-strength material, such as, Nylon, Polyester, and even Kevlar. Webbing can also be made with lower rated strengths. These materials should not be used for lift bag operations and include webbing made from cotton, Polypropylene, or flax.

Nylon webbing is most commonly used for lifting. It offers lightweight construction compared to cable or chain and is capable of managing heavy weight loads. A sling made of webbing can be used in a number of ways. It can be used for a vertical lift. It can be used as a choker sling and it can be used as a basket sling.

A 3 inch industrial grade tow strap made from quality nylon fabric can have a strength rating of as much as 44,000 pounds.

When using these types of slings, there are a few things to be aware of. They can wear, cut and abrade easier than chain or cable. They may also stretch under load.
Rated capacities for nylon slings used in general purpose lifts are calculated like rope; that is to a factor of 5. The maximum load capacity is 1/5 of the nominal breaking strength of the sling. Never exceed the rated capacity of a sling. Depending on the angle of lift, that capacity will diminish as well.

**WARNING!**

**Inspect** all slings before each use. Never use slings that have been damaged or overloaded.

- Always protect nylon slings with pads and/or wooden blocks around edges of a load.
- Web Slings will stretch when loaded.
- Do not attempt to pull jammed or snagged loads free with a web sling or any sling.
- Recoil can cause serious injury or death.
- Remember, your fingers CAN come off!

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Deciding Lift capacity

When the object is identifiable and there is time, a quick Internet search for manufacturers’ specifications will usually result in a dry weight for the object. While boats used to have a displacement rating, they now use dry weight. Dry weight is
usually the base weight of an object and will not include alterations, additions or stowed equipment and gear. Curb weight is usually used for land based motorized vehicles and will not include the weight of any add-ons, alterations or stored items. The general rule of thumb is to add 10 percent of the dry or curb weight to the base weight.

When working to determine the required lift capacity, it will help to know what you are lifting. If you do not have the ability or time to research and discover the weight of the object, you may have to use a best guess. Having a list of some known weights for a variety of common objects will help. For example, a 15’ flat bottom aluminum boat has a dry weight of about 200 pounds. The dry weight of a Yamaha F60 Jet outboard Motor is 268 lbs. If someone managed to join these two, the gross dry weight is only 468 pounds.

Take the time to do some research and develop a chart for objects you could be called on to recover. Laminate the chart and keep it with your lift bag inventory.

Some other examples of dry weights for objects you could encounter:

- Craftsman YT 3000 21 hp 46” Yard Tractor weighs 513 pounds
- Yamaha YZ125 dirt bike weighs around 200 pounds
- Harley Davidson FXSTD weighs around 675 pounds
- 2009 Yamaha V-Star 650 Classic 550 pounds
- 1998 Ford Taurus around 3,307 pounds
- Suzuki DF250 V-6 four-stroke outboard 585 pounds
- Polaris 800 PRO-RMK 155 Snowmobile around 431 pounds
- Ez-Go Shuttle 2 electric golf cart weighs around 1200 pounds
- Ez-go Shuttle 2 gas powered golf cart weighs 850 pounds

Displacement weight and dry weight are not the same things. Remember, displacement weight is calculated by weighing the volume of water that sloshes out of a tank when the object is submerged into it. Dry or curb weight is how much the object weighs on land.

It would be easy to look at an object, guess a weight based on a chart and just use a really big bag to eliminate any possibility of being under what is necessary for the lift. But keep in mind what could happen if you did overkill and used oversized bags.
You risk attachment point failure. You risk rope or hardware failure and you risk a runaway lift. When we considered the weight of the object and the rating of the line and hardware we were using, we were only considering a controlled lift using a near perfect amount of air. If we oversize or have an uncontrolled lift we have to take into consideration the amount of added forced the weight of the water has on the object as it rises. This is termed “Drag Force” and can be calculated using a complicated mathematical formula. To understand drag force, all you need to do is move your hand slowly though the water and compare how easily that is to moving your hand rapidly through the water. In a rapid lift, the larger the surface area the object has, the more drag force it will create. This added force is not part of your basic calculations and could be enough to cause failure in your equipment.

Overkill on the lift bags or air released into a bag is not acceptable. It is a waste of equipment and air and could place personnel at risk. However, overkill on the rigging is encouraged.

**Improvising lifting points**

Not every object will afford itself an easy or convenient lifting point. It is likely you will have to improvise one. This can be as simple as using a loop of chain around the object and attaching a sling to the chain. Rope or webbing can be used the same way. Any material used to improvise an attachment point for a lifting operation should be rated no less than the line being used for the lift.

Loggers will often hammer an eyebolt into a log and screw in as far as it will go. While not necessarily a recommended method for improvising a lift point for our use, it is worthy of being one of our “tools in the toolbox”.

**Lifting**

**Overcoming Bottom Suction**

Prior to lifting, an inspection should be made either visually or by touch of where the object contacts the bottom. If the bottom is soft, an object made of heavy dense materials can press down into the bottom sediment. If the bottom composition is mud, clay, viscous sand, silt or any combination, the shape and contour of the contact can be total. The suction force or vacuum force this will create can generate as much as 100 pounds of vacuum per square foot of contact. The flatter the contact with the bottom, the greater will be the suction. This contact force must be recognized and overcome before the object can be lifted.

If you force the issue and apply great amounts of lift, you stand to have line or hardware failures, uncontrolled lifts or cause severe damage to the object.

There are a variety of ways to overcome the suction force. The key is knowing that it exists and that to break it free, a layer of water must be allowed to fill a void created between the surface of the object and the bottom.
Methods to consider:
At the smallest or narrowest contact point, attach a lift bag rated for the object. Rig it so that it is just under the surface of the water. Fill it. The goal is to provide hard and constant pressure to the smallest area of surface contact. This should allow the object to pivot slightly and if you are lucky, it will be enough to move the object a couple of feet off the bottom, breaking the suction.

If the size and shape of the object will allow, a common alternative is to use a long web strap or rope to “cut” the object free. To do this, two divers will need to descend to the bottom with one being on either side and at the same end of the object. Each will hold an end of the webbing. On cue, each diver will work the webbing into the bottom, following the surface contour of the object. They will continue to work the webbing or rope in a sawing motion. Depending on the size of the object, a lift bag may be placed on the same end of the object where the divers start. This bag will be used as earlier described but will either be filled at the surface or filled to half capacity with the bag just under the surface. The bag is intended to offer upward force but not so much that it would create a sudden release of the object. While we should expect a sudden release, we do not want the object to travel upwards more than a foot or so while our divers are working beside it.

Other options, especially for larger or buried objects would include the use of fire hose and nozzles, a portable high pressure water outfitted with garden hose(s) and nozzle(s) or even portable floatation pumps fitted with appropriate hoses and nozzles.

These methods should NOT be used in combination with a full lift operation. No diver should EVER be under the object.

Once the object breaks free from the suction, you will see the slightly submerged bag move to the surface, and feel the tag line go slack. A bag on the surface will float higher out of the water.

At this point you may decide to confirm the rigging or now have the ability to properly rig the object for lifting. The foot or two that had been created will give the divers the ability to properly rig the object.

Once the rigging is secure, an additional lift bag can be inflated to lift the object higher in the water column. It is NOT necessary or recommended to attempt to lift an object requiring an intermediate lift operation or larger to the surface in one lift.
Staged Lifting

When an object requires lift capacities in excess of 100 pounds and is deeper than 10 to 15 feet, lifting should be done in increments. If you do the calculations, you will find that the greatest ratio of expansion occurs in the last 12 feet of the water column. For us, this means a little air will turn into a lot of air very quickly. Objects that are deeper can be lifted in stages.

To do this, consider what was described when releasing an object from bottom suction. A bag was placed slightly below the surface and inflated. This slight rise gave the divers the ability to fully rig the object for a controlled lift. We use a small bass boat as our example and start here.

Now that the suction has been released, the boat is oriented at an angle with the bow pointing up. The bottom of the stern is still touching the bottom but two divers are able to position web straps under the hull and on either side. The strap closest to the stern will be set far enough back to help compensate for the angle of the boat. We are attempting a Basket Lift. (While we could just attach the line to the motor mounts, transom cleats or bow hook and use a Vertical Lift, this attempt will be to bring the boat to the surface in normal position.) Each diver will take the end of the strap on their side and ascend slightly to a point above the boat. A shackle will join the two ends. The divers will do the same with the other strap. A larger shackle or lifting ring can be used to combine all the ends to one point if necessary.

A second lift rope will be secured to both sets of straps and a fully deflated, possibly weighted bag of suitable size will be carried underwater to a predetermined depth. For our example, we will assume the bottom depth is 40 feet and our first stage bag will be secured to the lift rope 15 feet below the surface. Once secured, the diver will fill the bag with just enough air to make it slightly buoyant. This is not the time for lifting. Once tension is on the lift rope, the rigging divers will double check their slings AND use another

To deflate a large enclosed bag, fold it onto itself while it is still in the water. Keep the overflow valve open and at the highest point while doing this. As air begins to escape control the bag and roll or fold it until all the air has escaped. You will know this has happened when you are able to sink it easily. Some air may still be trapped and a five pound weight or two will usually help the descent. If ten pounds of weight is not enough – do not add more. Work out more of the trapped air.

Remember – air will compress as you descent and added weight could make things more difficult.

When using a manifold or surface supply system to fill lift bags, when you feel additional slack in the tag line it indicates the object is starting to move to the surface. STOP ADDING AIR TO THE BOTTOM BAG - BOYLE’S LAW WILL DO THE REST.
line, piece of lift rope or strapping to secure the slings to each other. This should prevent them from sliding apart or off the boat. The rigging divers will surface or ascend to the bag and signal or turn the fill valve on a quarter turn. As soon as they do, they will move away and surface.

If all works as planned, when the air bag breaks surface a swimmer or diver can turn off the fill valve and the boat will be suspended 25 feet below the surface. At this point, you could tow the bag and boat to shallower water if more work needed to be performed.

The first bag will now be floating free and can be disconnected from the boat. Once deflated, it can be reset for the next lift.

Our rigging divers will take the lift rope from the first lift and secure it to the shackle on the harness. There will be a rope on it already and it may take a little finesse to thread the line or hook onto the shackle. Once secured, the process will repeat itself and at the end of this second staged lift, the boat will be suspended just 10 feet below the surface. If we continue this process, the best we can achieve is to lift the boat so that it is suspended below the lift bag. No matter how tall the bag is and how much lift it is providing, the boat can not reach the surface.

This is where a third bag will come in handy. A third bag of equal size to those being used can be added to the operation. This and the other now deflated bag can both be secured to the sides of the boat. There will be a bag on either side and at the same time, each diver will turn on the fill valve of the closest bag a quarter turn. The stage bag must remain in place. If the lift fails, or something unexpected happens, this bag will prevent the boat from sinking back to the bottom.

With both bags secured to the sides of the boat and slowly filling, the boat should rise to the surface, at least gunnels high. If you are successful, holes can be patched and water can be pumped out of the boat. If you are unsuccessful, the boat can be towed to a boat ramp and a trailer put under it. But nothing ever goes as planned. Be prepared for everything you can think of. Have alternate strategies in mind. But consider, if you can control the operation by staging the lifts, you build options. If you rig a bag, turn on the fill valve and hope for the best, you will probably fail.
Final Words

*Just because you can, does not mean you should.* Is the task within your training and abilities? Can the task be performed safely with what you have to work with?

Take the time to stage heavier lifts and consider that lifting is only part of the equation. Regardless of what you are lifting, your goal is to get it out of the water. How are you going to accomplish that? Be it as simple as backing a trailer into the water, or using a tow truck or crane, have a plan in place. Plan your lift operation from *finish to start* to insure your ability to get the object out of the water once the lift operation is complete.

Have those extra resources located in advance and give them notice. Be considerate of their time. They may be helping your team as a public service or they may be charging by the hour. Either way, their time is costing someone money. Having them wait around all day is not going to be the best plan.

Plan ahead and develop your plan. Then develop a plan B and C and D. Be ahead of the game and prepared. Secure your lines, control your lift and keep your people safe.

DISCLAIMER

The information provided is not intended to replace formal training and education. There are a great many aspects of lift bag operations that have not been covered and while this information will provide a base of understanding, it is not intended to be a replacement for training or a single source of information for your team.

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**NEWS**

Three Seneca Valley students die after crash into lake


January 28, 2010 By Jim McKinnon, Pittsburgh Post-Gazette

Spencer Mathew was uneasy as the Zelienople Volunteer Fire Department's regular weekly meeting started Tuesday evening and two of his friends, fellow firefighters, were not there.

Spencer would later learn that his two friends and classmates, Elijah Lunsford and Sam Bucci, as well as a third teen, Trevor Barkley, were killed, possibly around the time of the firefighters' 7 p.m. meeting, when the SUV they were riding in crashed upside-down in icy water near the shore of a shallow lake off Route 68 in Zelienople. "I last saw them Monday. We had a half day of school and we came here to hang out," Spencer said. "When they didn't show up [for the meeting], I just had an eerie feeling that something was wrong."
Trevor, 17, and Sam and Elijah both 18, were schoolmates in the Class of 2010 at Seneca Valley High School. Spencer and Sam, friends since about third grade, joined the fire company in their early teens as junior firefighters. Elijah, under Spencer’s influence, joined the department later.

On Wednesday night, the five-bay fire station that had been like a second home to the young firefighters was a place of mourning. More than 50 volunteers from surrounding communities joined a dozen students and parents there to remember the teens and share their grief.

Firefighter Jacob Reeb, 19, said Sam and Elijah liked the camaraderie, the adrenaline rush that came with the call-outs, and helping others. The 48-member company was like a family, said Mr. Reeb, whose father, Fire Chief Rob Reeb, said Sam and Elijah were like sons to him. "They were definitely assets. They were like family down here. They were like our sons," Chief Reeb said.

Only hours earlier, the Ford Explorer that the three teens were riding in was found, at 5:01 a.m. Wednesday, about 40 feet off Ben Venue Road. A short time after the meeting, firefighters, families and girlfriends made calls to the cell phones of the missing teens. The calls were not answered.

A search was launched in earnest after the families reported them missing around 1 a.m. Wednesday. The search included help from a cell phone company that determined the final signal from any of the victims’ phones had been relayed around 6:30 p.m. Tuesday from a tower about three miles from the lake. Police and firefighters from Zelienople and nearby towns, including some from across the Beaver County line a mile away, took up the search.

Turning from Route 68 onto the dark, graveled Ben Venue Road with patches of ice, a New Sewickley police officer spotted skid marks in the snow leading to the lake shore. Just beyond the shore, the wheels were visible on the upended SUV. The bark of a small tree was gouged by the careening vehicle, which then flipped into the lake.
Zelienople police Chief Jim Miller said it is being investigated as a traffic accident. It appears the SUV skidded on the dirt, ice and gravel of Ben Venue Road near the entrance to property owned by the Zelienople-Harmony Sportsmen’s Club. The club includes 26 acres of lakes for fishing, as well as archery and rifle ranges. The chief said he presumed the teens would have been disoriented by the collision, freezing water temperatures and zero visibility. Ice was forming around the truck by the time it was discovered, he said.

Two of the victims' bodies still were in the Explorer when it was hoisted from the water. Divers from Harmony’s fire department found the body of the third teen at about 10:25 a.m. in waist-deep water near where the vehicle had been. The vehicle had been headed away from the hall, situated about a half mile east of Ben Venue Road, when it crashed, Chief Miller said.

The spot is popular but secluded, about 100 yards off Route 68. Chief Miller said people fish at the lake at all times of the day and night, no matter what weather or season. No trouble is reported there, he said.

All three youths were well-liked and regarded in the Zelienople community as having bright futures.

At the Walgreens store in the town's business district, where Trevor had worked since he was old enough, co-workers were grief-stricken. His co-workers said he had an infectious energy and was a car enthusiast who had recently purchased a used Subaru that he intended to fix up. Classmates, too, were hit hard by the news. "It breaks my heart," said Seneca Valley senior Maggie Mignanelli. She said all three were excellent students.

Fire Chief Reeb said Elijah and Sam had been promoted in recent months to senior firefighter status after they turned 18. "They were well on their way to be good firefighters," the chief said.

Spencer choked up when he spoke of his childhood friend, Sam, a pitcher on Seneca Valley’s baseball team. Sam was looking forward to this season and, hopefully a WPIAL title, Spencer said. "We thought this was going to be a big year for him," Eric Semega, the team's coach, said of Sam. "He had gotten a lot stronger, and he had an unbelievable amount of movement on his fastball."

Sam had decided to attend California University of Pennsylvania and planned to play baseball there. "I met with a lot of the senior players today, and we were just reminiscing about him and how we're going to miss him," Mr. Semega said. "Just the laughter alone we're going to miss. He was a great kid with a great sense of humor. He was well-liked by many, many people, and he had that sense of humor that no matter what, he would make
you laugh."

Mr. Semega said the team will put Sam's No. 16 on its uniforms this season. Besides coaching baseball, Mr. Semega is a trigonometry and algebra teacher at the high school. Sam was one of his trigonometry students. "I've been teaching here at Seneca Valley for 18 years and this is by far one of the most difficult days here," Mr. Semega said.

Body found in lake where canoe overturned
Jan 30, 2010 By KOMO Staff

BELLINGHAM, Wash. - A man's body was found Saturday afternoon in Lake Padden, and authorities believe it is a missing canoeist whose boat overturned Friday.

Divers found the body at about 2:40 p.m. Saturday. Officials tentatively identified the man as Clay J. Weden, 28.

Authorities said he and another man were in the red canoe when it flipped over at about 1:15 p.m. Friday in calm conditions.

A witness who saw the accident called 911, and an officer arrived within three minutes, said Mark Young, spokesman for the Bellingham Police Department.

The officer and an off-duty firefighter who was on a recreational outing at the lake used two paddle boats owned by the firefighter to reach the victims in the water.

One victim, 28-year-old Cole B. Smith, started swimming towards shore and was pulled onto a paddle boat by the officer, who took him ashore. He was taken to St. Joseph Hospital for treatment of exposure.

The firefighter paddled to where he had last seen the second victim, but could not find him.

Units from the Bellingham Fire Department and the South Whatcom Fire Authority also launched boats and an underwater camera to assist in the rescue and recovery efforts.

The search was called off Friday night due to darkness. Efforts resumed Saturday morning and continued until the man's body was found.

The Whatcom County Medical Examiner took custody of the body and will officially identify the man and determine his cause of death.
Body of Coweta man missing since Friday pulled from pond
http://www.times-herald.com/local/Coweta-man-missing-since-Friday-45365
By Alex McRae

The body of an east Coweta man last heard from Friday evening was found Sunday afternoon in a pond behind his home in Kensington Estates subdivision off Reese Rd.

David Brightwell, 36, was last heard from Friday afternoon when he made a cell phone call to a friend, according to Maj. James Yarbrough of the Coweta County Sheriff’s Office. Brightwell’s car was found at his home Saturday, but he could not be located, and a search by Coweta sheriff’s deputies began, Yarbrough said.

Brightwell’s car was found at his home Saturday, but he could not be located, and a search by Coweta sheriff’s deputies began, Yarbrough said.

Brightwell’s last known communication was just before 5 p.m. Friday when Brightwell sent a cell phone picture to a friend in Arkansas, according to Ass’t. Chief Todd Moore of the Coweta County Fire department. The photo showed the snowy landscape surrounding the pond behind Brightwell’s house. That is the area where authorities began their search Saturday afternoon.

Coweta deputies arrived on the scene first and conducted a search of the area behind the home and around the pond. Searchers walked the area in a grid pattern to make sure the entire area was covered. “We had several people out there and we went over as much ground as we could,” Yarbrough said.

Firefighters and a leader from the fire department’s Special Operations unit were called in to assist and began searching about 7 p.m., Moore said. The firefighters used night vision goggles and thermal imaging equipment to allow them to search after dark, but a three-hour search ended at 10 p.m. Saturday, according to Moore.

The Coweta County Sheriff’s Office helicopter was brought in to aid the effort. When a piece of clothing believed to be Brightwell’s was found floating in the pond, the search

“Underwater Crime Scene Investigation”
By Eric Tackett

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Effort focused on the area around the pond until halted Saturday night.

Sunday morning, Coweta firefighters dragged the lake without results and called in divers from the Peachtree City Dive and Water Rescue team. By this time, searchers had analyzed the photo sent on Brightwell’s cell phone and believed the picture was made by someone standing in a canoe that was also found on the lake, confirming the search location.

Sunday afternoon a cadaver dog was brought in by the Hampton, Ga.-based Omega Team of K9 Search and Rescue, who were recommended for the search by the Georgia Emergency Management Agency.

For over 30 minutes the dog searched the area around the lake and was taken out on a boat to search for evidence that a body was in the water. As the search continued, boats dragged the lake while some divers walked the shallow parts of the pond and others searched areas believed to be up to 10 feet deep.

Brightwell’s body was found about 4:15 p.m. according to Ass’t. Chief Roger Canada of the CCFD. The cause of death remains under investigation. The remains will be sent to the GBI Crime Lab for testing, but it is known that Brightwell had an existing heart condition. “He wore a pacemaker since he was 17 years old,” Yarbrough said.

Divers took 90 minutes to reach River Avon car plunge
http://news.bbc.co.uk/2/hi/uk_news/england/hereford/worcs/8513635.stm
12 February 2010

Divers took more than 90 minutes to reach a scene where a car carrying two children was driven into a river.

The police divers travelled from Gloucester to reach a riverbank near Evesham on Thursday morning.

Chris Grady and son Ryan, six, escaped from the car while Gabrielle, five, was pulled out two hours later. The children remain in hospital. Mr Grady is being held on suspicion of two attempted murders. Gabrielle’s condition is described as "critical" while Ryan is now said to be "stable". Police said Ryan had been sitting up in bed and talking at Birmingham Children’s Hospital.

West Mercia Police does not have a diving team. A spokesman for the force said the closest available on this occasion was Avon & Somerset’s team.
They had to pack up from the scene they were working at before driving to the River Avon. Once they arrived, it took them 12 minutes to release Gabrielle from the submerged car.

The spokesman said police officers are not trained or equipped to enter rivers in order to rescue people. "They are trained and equipped to make rescues from riverbanks," he said. "The risks involved in untrained and ill-equipped officers entering the water in these circumstances are generally too high to contemplate." The rescuers can become casualties themselves, he added.

'Extremely cold'
The force also said the river at Hampton Ferry, where the incident took place, is 20m (65ft) wide, at least 4.6m (15ft )deep in places and fast flowing at this time of year, with strong undercurrents. "The water is extremely cold," the spokesman said. "Low water temperature induces rapid hypothermia, inability to swim or move properly and leads to a high risk of drowning."

Neighbours of Chris Grady said they were very upset by news of what had happened. "He was really jolly with the kids," one said. "We used to hear them laughing when he had them." The children are both pupils at Swan Lane First School in Evesham.

Head teacher Graham Walker said everyone was "shocked and saddened" by the events. He said the school would reopen as normal after next week's half-term break.

'Almighty bang'
Mr Walker added: "Further support will be available if required and pupils will be given the opportunity to express their thoughts and feelings in class."

The silver Vauxhall Estate which went into the water was winched out on Friday. Witnesses said its sunroof and windscreen appeared to be missing. In a statement, police said the investigation was "touching on a considerable number of people and locations as well as Hampton Ferry".

Det Supt Steve Cullen said: "Addresses in Evesham and Worcester form part of the inquiry."

Witnesses have described how they saw the car driving fast through a field and then hit the water with "an almighty bang".
Montreal police divers begin the search of the Rivière Des Prairies Tuesday. Photograph by: Allen McInnis, The Gazette

Montreal police divers find two cars in river

Montreal police have recovered two bodies from the icy waters of Rivière des Prairies. They had earlier confirmed that one of two cars at the bottom of the river was the black Acura that belonged to Hugo Pereira, 22. As dozens of bystanders lined both sides of the Viau Bridge waiting for a glimpse, police cars, trucks, an ambulance and a boat stood at the ready for the police's next move.

Anie Lemieux, of the Montreal police, explained that divers are trying to evaluate how to go back in the water to see whether the bodies of the two missing men are inside.

Pereira is believed to have been with Vincent Lamoureux, 20, when the two aspiring firefighters disappeared Feb. 3. Given the large chunks of ice and the strong current of Rivière des Prairies, police divers say any operation to get bodies out of the car is high risk. But it would have to be done before they move the car out of the water, Lemieux said. Police have cordoned off the area where the car is believed to have missed the bridge heading to Montreal, and practically jumped over a chain-linked fence and into the river. Marks left by the car on the road leading up to the bridge on the southbound side may eventually indicate at what speed the car was travelling when the driver lost control.

The second car is believed to be a stolen vehicle unrelated to the Pereira’s car.

Read more:
http://www.montrealgazette.com/news/montreal/Montreal+police+divers+find+cars+river/2547728/story.html#ixzz0fvjNOz0U

Chopper, dogs and divers used in cop chase

A dramatic police helicopter chase ended in the abrupt death of a gunman hiding in a dam. Police used a helicopter, sniffer dogs, special task teams, divers and even closed roads to find the man who held up a general
storage facility earlier in the day.

Cops say the suspect was shot dead while lying flat on his stomach in the Kraaifontein vlei. Pathology testing will now determine whether cops killed him or if he committed suicide as crime fighters closed in on him.

The saga unfolded just after 2pm at the Self Storage offices in Kiaat Street, Kraaifontein Industria, on Tuesday. Kraaifontein police raced to the scene where the gunman is believed to have killed a security guard as he was fleeing the scene.

The movie-like chase began when the armed man left his getaway truck at the scene and ran towards bushes and a dam nearby. Kraaifontein police spokesperson Captain Gerhard Niemand told the Daily Voice the gunman opened fire on police while heading towards a nearby dam. In a matter of minutes, the patch of bush was crawling with police and filled with the ringing of gunfire.

The shootout was so intense that only police wearing bulletproof vests entered the bush. Cops also closed the nearby N1 highway turn-off to prevent motorists being hit by stray bullets. "At the first incident in Kiaat Street, Kraaifontein Industria, a security officer was shot by the suspect," says Captain Niemand. "When police arrived at the scene, they found the security officer lying at the doorway. "Police were called out after the suspect ran towards a dam close by. "At that time he fired at police and police returned fire."

Captain Niemand says cops were not prepared to take any risks and called in all reinforcements. "We called in a helicopter, a task team and a sniffer dog to the scene," he says. Niemand says after the gunfire stopped, cops eventually called in police divers to make sure the gunman's body was still in the dam. "The last resort was to get hold of the police divers to make sure that he was in the dam," says Niemand.

After searching for more than an hour, divers found the corpse in the dam with a gunshot wound to the stomach. Niemand says the suspect's death is making the investigation difficult because police now have the difficult task of determining who fired the fatal shot. "He was on his stomach while the gunfire was being exchanged so we don't know what happened," he says.

Niemand adds that an inquest docket is open. "A pathologist will determine what happened and then we can know what type of case we are dealing with," he says.

Niemand says police have identified the shooter as a 23-
year-old Bloekombos resident. But he says cops won't release his name until further investigation. "We need to determine what his motive was at the scene where the security officer was shot," he says.

Cops say the gun the man used is believed to be stolen.- Daily Voice

**Poor conditions challenge divers**


01 Feb, 2010 VICTORIA MACDONALD

CONDITIONS in the murky depths of the Murray River challenged divers searching for a missing Corowa man yesterday.

Albury Volunteer Rescue Association secretary Paul Marshall said visibility was poor under the surface, with the divers able to see only about an arm’s length in front of them.

Their search for William Hickey, 23, was mostly carried out by touch; the VRA divers worked in teams of two, attached to a rope as they performed the painstaking task. “They dropped a big heavy pipe down into the water, which was an anchor the divers were tethered to,” Mr Marshall said. “Each diver would sweep about three metres ... they’d meet in the middle then move another two metres back. “Then they repeat the same thing: do an arc, move back, do an arc.”

About 2.30pm, the volunteer divers handed over the search to their NSW Police counterparts, who had arrived from Sydney. Mr Hickey’s body was found about 5.15pm close to the bridge.

The police divers’ methodology differs from the volunteers’ tactics; one of the pair keeps their head above the water’s surface while the other searches below. Before Mr Hickey was found, river gates were brought from Narrandera to be set up downstream of the bridge.

But Mr Marshall said
they had not been installed when the search reached its end. The same volunteers had been involved in the search for Catholic College Wodonga student George Sandford, 15, in the Murray River at Albury last year. But Mr Marshall said the conditions of that search had differed from yesterday’s incident. “This was an easier dive (at Corowa),” he said. “The current wasn’t as strong as it is in Albury and it’s a wider part of the river. In Albury, the current was flowing twice as quick as this so it was a lot more difficult search.”

Mr Marshall said searching for a body in the water was confronting. “All the divers, they’re always apprehensive about going in because you just never know what you’re going to find, or what state you’re going to find the person in,” Mr Marshall said.

**Not guilty plea after cops say father threw baby from Driscoll Bridge**

http://www.dailyrecord.com/article/20100218/UPDATES01/302180004

Mother of 3-month-old girl thrown off GSP span had sought restraining order

February 18, 2010 GEOFF MULVIHILL and SAMANTHA HENRY • Associated Press Writers

**NEWARK, N.J.** (AP) — A New Jersey man pleaded not guilty Thursday after police say he told them he threw his 3-month-old daughter off a bridge, as searchers and relatives held out hope that the infant might still be found alive.

Shamsid-Din Abdur-Raheem, 21, of Galloway Township, appeared composed during his arraignment in Newark via video link from the Essex County jail, where he is being held on $700,000 cash bail. Public defender Regina Lynch entered the plea on his behalf.

Abdur-Raheem is charged with attempted murder on accusations that he assaulted the baby’s maternal grandmother after showing up at her home and snatching the girl, Zara Malani-lin Abdur, from her arms Tuesday afternoon. He is also charged with kidnapping, two assault counts and child endangerment.
Police say Abdur-Raheem forced his way into the grandmother's East Orange apartment around 4 p.m. Tuesday, striking her in the face, choking her and pulling the baby from her arms before fleeing in a van.

The 60-year-old grandmother, whom police declined to identify, chased after Abdur-Raheem and was struck when she tried to stop him by throwing herself in the path of his vehicle, authorities said. Abdur-Raheem then headed toward southern New Jersey, and police say he told them he tossed the child from the Garden State Parkway's Driscoll Bridge, over the Raritan River, on his way.

Search teams using boats, helicopters and dogs found no sign of the baby as the search entered its third day Thursday. State Police Sgt. Julian Castellanos said the mission was still a rescue attempt even though the odds of a baby surviving that long were slim.

The child’s mother, Venetta Benjamin, had no visible reaction Thursday as she watched Abdur-Raheem, clad in an orange jail jumpsuit, answer questions on the video screen in court. She left the court, accompanied by a woman in a priest's collar and other relatives, without commenting.

Officials say Benjamin, who has sole custody of the infant, had sought a restraining order against Abdur-Raheem around the same time Tuesday afternoon that he is accused of showing up at her mother's East Orange apartment. Benjamin's lawyer, Mitchell Liebowitz, said the baby was snatched before the restraining order was served.

New Jersey's acting attorney general, Paula Dow, has classified the case as severe domestic violence.

Abdur-Raheem's father, Mushin Raheem, said the relationship between his son and Benjamin, who are not married, had been bumpy since they started dating as freshmen at The Richard Stockton College of New Jersey.

"They had their problems, you know what I mean?" Raheem said, saying his son could get angry but not unusually so. "Everybody has a temper," he said. "He's mad, you get mad, you know."

Raheem said his son and Benjamin moved into an apartment together in Galloway Township about two weeks ago. She moved out within a week, Raheem said, going to live with her mother.

Raheem said that the couple had brought the baby to his home four or five times, and that the idea that his granddaughter could be dead was weighing heavily. "Man,
I'm distraught," he said. "I'm distraught."

Raheem said that Amin Muhammad, an Atlantic City imam who was close to his son, brought the young man to his father's home Tuesday night. Police arrested Raheem there later. He wouldn't say what his son, who aspired to go into criminal law, told him then. "It's very difficult," Raheem said. "Everybody in my family's hurt by this."

**Related**
- VIDEO: Attorney General's press conference in case of baby allegedly tossed from bridge
- Search for baby tossed from bridge

Year after Lake Winnebago tragedy, Calumet County Dive team in training

**Group needs $74,000 for equipment, more training**
Gannett Wisconsin Media • February 18, 2010

CHILTON — A dive team that will serve the east side of Lake Winnebago is moving closer to reality now one year after a fatal ice incident that spurred volunteers into action.

The Calumet County Dive Team continues training and fundraising with hopes of soon having divers prepared for emergency responses. While organizing a team had been discussed before, the project was fast-tracked after a Valentine's Day 2009 incident in which a father and daughter died on Lake Winnebago off the shore from Quinney.

The dive team will meet today to continue researching equipment. They have 21 divers trained. Funds are an obstacle. They still need another $74,000 to purchase 10 sets of equipment and train 28 more divers.

Its leaders set sights on having the team operational for this year's sturgeon season, which is expected to end today. While they fell short on that goal, members still find it amazing to see how much they have accomplished in a short period of time. "It's almost impossible to sit down and pinpoint all the people involved, because so many have been doing so much," said Mike Funk of the Stockbridge Fire Department.

On Valentine's Day 2009, Dan Kleinhans, 44, and his daughter Savannah were killed when their truck went through the Lake Winnebago ice. (Gannett Wisconsin Media photo by Patrick Flood)
Plans developed quickly after Dan Kleinhans, 44, and his 9-year-old daughter Savannah died last year. Another passenger, Tiffany Dombrowski, now 8, survived when Kleinhans' pickup truck plunged through Lake Winnebago's ice. With every minute critical, emergency crews had to wait for the nearest dive team to arrive from Fond du Lac County.

The dive team plans to keep equipment at five locations in the county to speed responses regardless of where emergencies occur. Joe Nelesen of Chilton kick-started the project with a $7,000 donation.

Fishing and conservation clubs contributed funds. A foundation created in honor of Savannah Kleinhans continues to raise money for the project. The Savannah Pay it Forward Foundation contributed $6,000 and hopes to raise an additional $1,000 for the team through a campaign it is running this month.

Justine Katze, Savannah's mother, said on the foundation's Web site that the team's volunteers represent the "pay it forward" concept. They're out there to help others without expecting anything in return. "We are extremely honored to be a sponsor of this project and they have our full support for as long as it takes for them to be fully operational and financially secure," she wrote. Funk hopes that's soon. The first year brought plenty of work.

Members visited other dive teams in Wisconsin to learn more about equipment needs. Training was also a significant commitment. Classes were held in Door County.

The team's 21 certified divers will have ice dive training in upcoming weeks, which would leave them just one course short of what they need to work as rescue divers.

They plan to begin training for the next group of volunteers in spring.

**A real bone-chiller - Local rescue divers get practice time in icy waters in Joliet**

http://www.suburbanchicagonews.com/heraldnews/news/2050187_4_1_JO16_ICE DIVE_S1-100216.article

February 16, 2010  By BRIAN STANLEY

**JOLIET** -- Brandon Vainowski is risking brain freeze. The Plainfield firefighter wore a dry suit -- like a wet suit, but not water permeable -- to practice ice diving at the former Joliet Beach Club on Rowell Avenue, but he opted
to skip the hood that pulls over the forehead to create a seal with the mask. "I've done it before, and today's a warm day," he said.

Warm is a relative term in the freezing conditions required to stand safely in the middle of a frozen lake, but Ron Fox, leader of the Joliet Fire Department dive team, agreed the lack of wind made the chilly temperatures bearable on this day of training. "It was much nicer on the third day than the second since the wind wasn't blowing everything at you," he said.

**Classroom lessons**
The first day of the 24-hour Ice Diving Operations class was held in the classroom and Inwood Athletic Center's indoor pool.

Students evaluated the specialized equipment all dives require, discussed safety protocols for rescuing live victims and recovering dead ones, and examined the benefits of different techniques for reaching the water when the surface is solid.

Besides Vainowski and Fox, local fire departments were represented by Joliet's John Stachelski, Pat Strocchia, Terry Foster, Craig Sayles and Lockport Township's Brian Dobczyk. Firefighters from Cary, Fox River Grove, Park Ridge and Warsaw, Ind., also practiced under Dive Rescue International instructor Dave Owens. "It's great that Joliet can host the class so we can use something larger than a retention pond for the outdoor stuff," Owens said.

**Outdoor experience**

Each diver spent about 15-20 minutes under the ice on their final dives. Working as "shore support," other students wore headsets and held tethers while standing on wooden pallets near the dive hole.

Water was heated over an elevated flame nearby to keep lines from freezing and a pinwheel shape was made by clearing a circle in the snow around the entire area and letting the sun shine through the spokes to direct divers below back to the hole.

"It's a little murky when you first go down and stir up the silt," Vainowski said. "But the visibility is
about 10 feet, which is better than some other bodies of water." "I've done over 150 dives," Fox said. "Winter dives need to be practiced because they're the most dangerous. There's only one (hole) to the water so there's only one way out." "But when you get to the bottom during a practice, when you can take your time and look up at that pinwheel, it is so neat because that's something most people don't get to see," he added.

**Divers recover body of toddler**


22nd February 2010 Anne-Louise Brown and AAP

A MASSIVE search for a missing toddler in a Wiggles singlet has ended in tragedy with the discovery of the little boy’s body in a dam on the family’s property.

Conan Ruster, 22 months, wandered off after playing in his yard while watching his uncle mow the acreage property at Cooroibah yesterday.

Police said his frantic parents raised the alarm about 6pm. More than 50 Police, SES volunteers and fire and rescue officers as well as 60 neighbours were called in to search around the toddler's home on Carriage Way last night.

Grave concerns were held for the boy’s welfare as the area where he went missing was heavily wooded with about 16 dams in the area. The boy’s parents' worst fears were realised this morning when his little body was recovered from a dam about 40 metres from the family’s home by police about 7.30am.

The boy, dressed only in the singlet and nappies, is the third toddler to die in a dam in Queensland in the past week.

The terrible find comes after a week of tragedies on the Sunshine Coast which have included the deaths of two teenagers in a crash at Tinbeerwah and the deaths of three young men who fell from a cliff at Pt Cartwright.

**Stay off the ice, fire chief urges**

Police divers spend a night and a day searching river


*Police divers joined the search for a toddler at Cooroibah. Photo: Cade Mooney*
Const. Brent MacIntyre, head of the Ottawa police dive team, described the search as 'like looking in pea soup.' He said his divers' safety is paramount.

Photograph by: Chris Mikula, The Ottawa Citizen, The Ottawa Citizen

March 3, 2010 By Meghan Hurley, The Ottawa Citizen

Police divers groped through a metre-and-a-half of murky, slushy water under the frozen Ottawa River as they struggled to find the body of a man presumed dead after his truck fell through the ice Monday. "It's like looking in pea soup. It's like looking in mud -- you feel for everything," said Const. Brent MacIntyre, head of the Ottawa police dive team.

The divers pushed their way through the sludge, feeling blindly for the man's body. On the surface of the ice, just off Petrie Island, divers dressed in thick protective gear were sweltering.

The team searched Monday night and Tuesday for the body of Jocelyn Bélanger, who was pulled into the river along with his truck. Twice during their search, divers underwater calmly told the crew they were stuck under the ice and had to be pulled free by the surface crew, hauling on the cords attached to the searchers. "The fear was we were going to get our divers stuck. Obviously, we don't want to risk their lives," MacIntyre said.

Ottawa police Supt. Charles Bordeleau said the police divers faced the risk of being pinned beneath the man's sunken truck, or being trapped beneath the ice in the shallow, fast-flowing water. "Safety is paramount when we have divers out there, especially in wintry conditions when there is ice," he said.

The fire department handles ice rescues; the police divers deal with recoveries.
Two people died in slightly more than a week after their vehicles fell through ice, prompting the fire department to call a news conference about ice safety on Tuesday. Fire Chief John deHooge offered his condolences to Bélanger's family, and urged people to stay off the ice. "Don't let your kid, don't let your pets, don't let your family go on the ice," he said.

MacIntyre's team got the call at about 8 p.m. Monday and reached the water about two hours later. Two divers took turns looking for Bélanger's body, following a cloverleaf search pattern. They started on the driver's side of the truck, searched under the vehicle and made a circle around the entire truck. It took hours to move the vehicle to make sure the man wasn't lodged underneath.

MacIntyre said he could see the green light from the glowsticks his divers wear through the ice as the team worked into the night. By about 4:30 a.m., the exhausted dive team turned in for the night. They returned early Tuesday morning to resume the search.

Nearly 12 hours later, the team was about to change its game plan when a diver's gloved hand closed on Bélanger's booted foot a mere four metres from the truck. One diver pulled Bélanger from the water; at the surface, the team erected barriers -- to thwart gawkers and spare the family waiting on the riverbank the sight of the delicate operation.

Once everyone was out of the water, a relieved MacIntyre kissed the diver on the forehead. "At the end, it's the sense of relief," he said. "We did what we are trained to do and we accomplished the mission."

Ottawa's fire department, equipped with the safety gear to operate on the surfaces of frozen waterways, has responded to 17 ice rescue calls since Jan. 1, compared with 33 in all of 2009.

Two people died in slightly more than a week after their vehicles fell through ice, prompting the fire department to call a news conference about ice safety on Tuesday. Fire Chief John deHooge offered his condolences to Bélanger's family, and urged people to stay off the ice. "Don't let your kid, don't let your pets, don't let your family go on the ice," he said.

Divers rescue man from Chicago River
06 March 2010

CHICAGO (STMW) -- Divers rescued a man from the Chicago River Friday night near the River North neighborhood.

Crews responded to the north branch of the Chicago River about 9:40 p.m. near the 400 block of North Canal Street on a report of a man in the water, Fire Media Affairs spokesman Quention Curtis said.

Divers were able to pull the man from the river, and the 37-year-old man was taken to Northwestern Memorial Hospital in critical condition, Curtis said.

Divers were able to pull the man from the river, and the 37-year-old man was taken to Northwestern Memorial Hospital in critical condition, Curtis said.

People walking their dogs outside a nearby apartment building called emergency crews and said they saw the man jump into the river, Curtis said.

No divers were hurt during the rescue, Curtis said.
Evesham river plunge tragedy: Dad accused of murder attacked in prison


Mar 8, 2010

THE MIDLAND dad accused of murdering his daughter and trying to take his son’s life has been attacked in prison. Officers have now been forced to segregate Christopher Grady for his own protection at HMP Hewell, in Redditch, an insider has revealed.

Grady, 41, is awaiting trial for the murder of five-year-old daughter Gabby and attempted murder of six-year-old son Ryan after his car plunged into the River Avon. But sources claim inmates have targeted him by knocking food trays out of his hand, verbally abusing him and making threatening stares.

Terrified Grady was moved to the segregation wing of the prison which houses sex offenders. But even they are said to have shunned the man accused of intentionally driving his Vauxhall Vectra into the River Avon at Boat Lane, Evesham, Worcestershire, with his two children inside.

His only company is said to be his solicitor, who comes to visit him every day at the prison. “Grady was moved to a segregated wing because he was getting grief from the other prisoners,” said the prison worker. “He had a lot of stick like inmates throwing his meals on the floor and having a go at him. “He’s not popular at all behind bars.

“Grady was put in a separate area with the sex offenders for protection, but they don’t like him either as he accused of being a child killer and they draw the line at that. “Staff were trying to get him a job in the prison kitchens but he keeps hiding behind legal visits with his solicitor every day. “I think he is scared of being around other prisoners and what they might do to him.”

The death of Gabby Grady left her community devastated.

Trapped

More than 700 people have signed a tribute page on social networking site Facebook to leave condolences for the little girl from Evesham. She died three days after being trapped under the freezing water for two hours.

Grady and Ryan managed to free themselves from the car and were quickly pulled from the river at about 9.30am on February 11.
But Gabby was trapped until a specialist team of police divers arrived to free her from the vehicle.

Heartbroken mother Kim Wise, 36, is separated from Grady. She described her daughter as “the cutest angel there has ever been” who sparkled “like a diamond in my life”.

The youngster was a pupil at Swan Lane First School, in Evesham, along with older brother Ryan. He has made a quick recovery from the ordeal and led tributes to his sister at a memorial.

Grady, of no fixed address, has been remanded in custody at HMP Hewell until his next appearance at court. He is due to enter a plea as part of court proceedings on May 31.

The Independent Police Complaints Commission has launched an investigation into contact between West Mercia Police and the family of the children leading up to the incident.

**Sonar used to search for body**


Andrew Korner | 10th March 2010

ROYAL Australian Navy searchers are using sonar equipment in an effort to pinpoint the location of Dulcie Birt’s remains. The Navy’s Mine Warfare Geospatial Deployable Systems Team joined police in the operation at Green Lakes, near Riverview, yesterday morning.

A long, cylindrical, remote controlled device will be manoeuvred around the water, taking pictures of the bottom, which will then be sent to a computer observation area on the banks of the lake. Members of the Navy team will then analyse the images closely, looking for any signs of human remains.

Police divers have already spent several weeks conducting fruitless underwater searches of the abandoned coal mine, which is now 32m deep at its deepest point.

The dark depths are home to countless dumped cars, dead trees and various junk which have made previous searches dangerous. Although it hampered efforts in the past, the poor underwater visibility should not stand in the way of the Navy’s equipment.

Officer in charge of the Navy search team, Lieutenant Commander David Ince, said a full search of the lake should only take one day to complete. “Our piece of equipment is very good at finding quite small pieces of clutter, although this dam is a very different operating area to what we would expect.”

**A RAN officer with the side-scan sonar equipment used to search Green Lakes for Dulcie Birt’s body. Photos: Rob Williams MA0910WI**
have worked in previously,” Lieutenant Commander Ince said. “It’s basically called a side-scan sonar; it works in the 900 to 1800 kilohertz range, and with that we can get centimetre resolution. It’s a commercial piece of equipment but it has got very high definition, high-frequency sonar. “I’m never going to say we’re confident of finding what we are looking for – I don’t want any expectations – but I will say that this equipment is very good at finding small objects and we’re hopeful of a successful outcome.”

Police divers are on standby in case the Navy search does uncover something that is worth recovering from the dam. “The purpose of the search is to repatriate the body of Dulcie Birt back to her family,” Det Insp Mick Niland said.

Police are also keen to find the missing side tray from a Mitsubishi Triton utility that was seized at the beginning of the investigation into Dulcie’s disappearance – in October last year.

**INFORMATION YOU CAN USE**

**Caribbean Surface Current Data Now Available to Rescuers, Hazmat Crews**

A new NOAA data feed will streamline search and rescue efforts and hazardous material cleanups in the Caribbean. Measurements of surface current speed and direction off the west coast of Puerto Rico are now feeding into a single Web site, making the information easily accessible and understandable to a broad user community of ocean rescuers and responders for the first time.

“Knowing what the current is doing is critical for tracking the probable path of people lost at sea or drifting survivor craft,” said Zdenka Willis, NOAA’s director of the Integrated Ocean Observing System. “This is about saving lives and protecting ocean resources.”

Operated by IOOS® Caribbean Region, users including the U.S. Coast Guard, NOAA, and other federal and state agencies can now access this new data in a consistent format. Existing IOOS efforts to make data available in standard formats eased efforts to get this data into the national server and fill an important geographical gap.

These data are collected with high frequency radar systems which bounce signals off the water to create a map of the surface currents. Scientists can make conclusions about water quality, assess our ecosystems and even make fisheries management decisions based on these surface current maps. The maps improve accuracy of predictions of how victims lost at sea or other objects will travel in the water.
These new data are available through a partnership effort among NOAA, the Mid-Atlantic and Caribbean regions of the U.S. IOOS, Clarkson University, Scripps Institution of Oceanography and the National Data Buoy Center.

IOOS® is a federal, regional and private-sector partnership working to enhance our ability to collect, deliver and use ocean information. IOOS® delivers the data and information needed to increase understanding of our oceans and coasts, so decision makers can take action to improve safety, enhance the economy and protect the environment.

NOAA understands and predicts changes in the Earth’s environment, from the depths of the ocean to the surface of the sun, and conserves and manages our coastal and marine resources.  www.noaa.gov

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**Found on the Web:**

**Tips on proper lifting techniques while using a 100-250 pound open bottom lift bag**

http://www.ucidiver.com/use_a_lift_bag.html

Mike Berry

It takes practice to become proficient in using a lift bag! Is there a right way and a wrong way to go about it? Of course there is! The wrong way is to simply go underwater carrying a bag without any training or thought of how it should be rigged and used. When rigging and lifting an item off the bottom, there are a number of things to keep in mind that will make your recovery safer and more professional:

- Do not use brute force to lift any object from the bottom.
- Always use a lift bag or other salvage technique when the item weighs more than 10 pounds.
- Never get underneath an item being lifted.
- Never use your main regulator for filling a bag. Rather, use your octopus regulator (being very careful of entanglements and air consumption), a low pressure hose with an attached inflator mechanism or a separate tank with an inflator device.
- Try to use a bag that has a lifting capacity just over the approximate weight of the item. Remember that the pressure on the bag will decrease as you ascend, which will cause the volume of the air inside to increase (Boyle's Law), thereby increasing the
rate of ascent. If too large a bag is selected that can be only partially filled, the expanding air will fill the bag more and more during the ascent and thus increase the rate to where the bag may become uncontrollable and shoot to the surface. This in turn could snag a diver and pull him to the surface, resulting in an air embolism or decompression sickness, or could make the bag "burp," causing the bag to lose its air and let the lifted object come crashing back down to the bottom.

- "Burping" can occur when the bag is over-inflated, as just mentioned, and goes to the surface too fast, lifting the bottom of the bag out of the water and allowing the air to escape. Burping can also be done by the diver to deflate the bag by grabbing the bag's top D-ring or the top of the bag and pulling down sharply. This can be done during training exercises as well as during actual operations when you want a fast way to vent off expanding air or to dump all the air. Keep in mind that you can only burp smaller bags like a 100-pound lift bag.

- When you're filling the bag, fill it only to the point where it is still a little negative (not quite neutrally buoyant). The reason for this is that when you're ready to lift, you would physically lift the item up a few feet and then slowly swim with the item to the surface, controlling its ascent rate. As you come off the bottom a few feet, the item becomes neutral and after a few more feet, positive. If you start out positive, your chances of having an out-of-control bag increase tremendously. The first diver photo shows a diver using his octopus regulator to fill the lift bag. Notice the safe is secured with a 15-foot rigging line. In the next photo, notice the diver controlling the lift.

- Stay next to the bag as it is ascending. This position allows you to control its rate of ascent by using the bag's easy dump or by burping it. If the bag gets away from you and goes to the surface out of control, swim away from the area and ascend. Check to see if the bag burped and went back under or is waiting for you on the surface.

- Bottom suction can be a major problem. Quite often a diver will either have to dig around the item in the mud/silt, breaking its "seal," or over inflate the lift bag to overcome the bottom suction. When this latter procedure is resorted to, the bag usually breaks free due to the extra air and shoots to the surface out of control.

- Rig your bag as close to the item as possible. This procedure takes a little practice but will allow the bag to lift the item close to the surface so that when you tow the item in, it will hit the bottom as close to the shore as possible (in shallow water). This will save you from dragging it great distances across the bottom and instead of having to get into water that's over your head to remove
the item, you can walk in, bend over and carry it out.

- When using the air in your tank to fill the bag (using your octopus regulator or using a low pressure hose), always fill the bag up slowly. If you fill it up too fast while breathing off your regulator, you can overwork your first stage and cause a free flowing regulator situation.

Two lift bag companies that I highly recommend are:

- Subsalve USA Division - Web: www.subsalve.com
- Carter Lift Bag, Inc. - Web: www.carterbag.com

The only way you're going to become proficient in light salvage, or any other law enforcement recovery technique, is to get the **training** and **practice** needed to allow you to participate safely and comfortably. So next time you make a practice dive, dust off your lift bags. If you don't own bags, buy some or borrow some.

### AMAZINGLY SIMPLE HOME REMEDIES

Avoid cutting yourself when slicing vegetables. Get someone to hold them while you chop.

Avoid arguments with your wife about lifting the toilet seat – use the sink. If you have a bad cough, take a large does of laxatives. You’ll be afraid to cough.

You only need two tools in life .WD-40 and duct tape. If it should move but doesn’t - use WD-40. Otherwise –Duct tape.

If it can’t be fixed with a hammer – it must be an electrical problem.

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**Diving Medicine Online**

**Ernest Campbell, MD, FACS**

Comprehensive information about diving and undersea medicine for the non-medical diver, the non-diving physician and the specialist. [http://www.scuba-doc.com](http://www.scuba-doc.com)

**Exercise, Diving and the Heart**

[http://scuba-doc.com/exhrt.htm](http://scuba-doc.com/exhrt.htm)

**Work and Exercise**

Diving can effect the heart and blood vessels mainly by the amount of exercise involved. Exercise produces a need for increased oxygen to produce increased activity, and the heart and circulation are affected in some way by any form of exercise. In diving, the circulatory system is affected by several forces acting on the heart and blood vessels. Some of these are:

- changes in pressure, secondary to breathing a high density gas mixture which increases the pressures in the heart (afterload).
- A high oxygen concentration (hyperoxia) can slow the heart rate, a commonly observed phenomenon.
- An increase in hydrostatic pressure can alter electrical conduction in the heart.(excitability and conduction speed)
- During decompression, bubbles (gaseous pulmonary embolism) may increase right heart pressures and cause a paradoxical
embolism in patients with a right-to-left shunt (patent foramen ovale).

- Immersion, (getting into the water to the neck), increases the blood flowing into the heart (preload).

- Hypothermia also plays a role causing vasoconstriction (afterload), slowing the heart rate. These factors may disturb cardiac function and expose patients with heart disease to accidents during underwater diving.

**Exercise Causes an immediate response**
Exercise generally causes an immediate response in the cardiovascular system. This response includes local blood flow changes which then cause reflexes that then cause an increased cardiac output (how much blood the heart is pumping out). From the cardiovascular standpoint, exercise is any activity that raises the resting oxygen consumption above basal levels. Thus swimming, walking with heavy gear, climbing ladders and performing heavy labor relating to diving are all sensed by the heart and cardiovascular system as forms of exercise and require an increased output.

**Functional reserve**
The normal heart has a backup reserve and the heart at rest is working at a small percentage of its maximal capacity. Measurement of how hard the heart can perform may be necessary to find out if there are any limitations due to heart disease. A reduction in the ability of the heart to pump enough blood to meet maximal needs can go undetected unless it is tested and found to be diminished.

**Exercise Stress Testing**
Exercise stress testing is used to measure cardiovascular reserve when assessing the heart. Used mainly to detect coronary disease, its application in testing for cardiac reserve in divers is also important and useful. A diver should be able to exercise on the treadmill without chest pain, severe shortness of breath, or blood pressure changes.

**Radionuclide Studies**
The physical stress imposed by diving can be simulated by the use of radionuclide (isotopes) standard clinical tests and an assessment of capability to dive can be made from the results.

In dealing with patients with heart disease, it is important to understand the relationships among external physical work, myocardial oxygen consumption, and blood flow to the myocardium. Understanding these relationships will provide the basis for assessing the performance of an individual with heart disease, and determining their ability to dive.

**Cardiac Work, Oxygen Consumption, and Blood Flow**

**Increased Heart Muscle Blood Flow**
As the work demands of the heart increase the heart does not greatly increase its extraction of oxygen. Usually only a small increase in oxygen extraction occurs (e.g., an increase of 2 ml of oxygen per 100 ml of blood from a baseline of 10) whereas large increases in myocardial blood flow provide the increased oxygen needs when myocardial work load increases.

**Why is hypertension so damaging to the heart muscle?**
Increased cardiac work arises from increases in arterial pressure with little change in the amount of blood flow passing through the heart (pressure work), or by increases in blood flow with almost constant pressure (volume work) (Wiggers and Sarnoff). It is possible to experience diving environments which produce either primarily pressure work on the heart or primarily volume work on the heart. For example, isometric work associated with heavy lifting raises the arterial blood pressure and causes an increase pressure load on the heart, whereas the work associated with swimming causes an increase flow demand on the heart and results in a volume load. The studies of Samoff et al demonstrated that a pressure work load is more demanding in terms of myocardial oxygen consumption than an equivalent volume load. It is important to remember this difference when considering the diver with hypertension.

Coronary Artery Disease
Other studies have shown that the heart muscle depends on increasing blood flow to supply oxygen demands: when flow restrictions occur due to narrowed arteries to the heart, the muscle cannot obtain adequate oxygen by increasing oxygen extraction, and oxygen deficits occur during exercise. Chronic pressure or volume overload-induced muscle enlargement of the heart, decreased blood flow in the heart arteries (coronaries), and congenital heart disease (valvular and septal defects) all may affect myocardial oxygen consumption, myocardial blood flow, and blood flow distribution to the myocardium. Better understanding of these blood flow principles will aid significantly in assessing the diver with heart disease.

Physical Fitness
Divers need to obtain a physical fitness that allows maximum oxygen consumption. This is the ability to do work, such as swimming a reasonable distance with diving gear without getting too short of breath, and be able to help a partner who has been injured or requires assistance to return to the boat. One way of adjusting to the fitness needs of diving is to carefully plan your dives, avoiding situations requiring excess physical exertion above and beyond your physical capacities. This works well for the elderly diver or the diver who has physical incapacities. The best way is to exercise regularly. For diving fitness, a moderate exercise program that can be done 4-5 days a week is adequate for the casual diver. Swimming is the best exercise for diving, but jogging, walking, biking or rowing should do the same thing—increase your pulse rate, breathing rate and oxygen intake. Conditioning improves the maximum oxygen intake. You should establish a target heart rate, which can be determined by the formula:

\[
\text{Target Heart Rate} = (220 \text{ minus age}) \times 0.70
\]

When you exercise you should aim for a pulse rate derived from this formula with a five minute warm-up, the 30 minutes of keeping your pulse rate at the target, followed by 5 minutes of cool down. If you are over 35 years of age you should get a medical examination before beginning the exercise program; this should include an Exercise Stress Test. Once started, you should take 2-3 months to build up to your target, then take 40 minutes 5 days a week to maintain yourself at your target level.

References:
1. Medical Seminars Lectures
2. Diving Medicine, Alfred A. Bove, MD, PhD
3. Diving and Subaquatic Medicine, Edmonds, Lowry and Pennefeather.
* EVENTS *

Come out to a DUI DOG Rally & Demo Tour and Actually TEST DIVE DUI Drysuits, DiveWear Insulation and Accessories
http://www.dui-online.com/dog_main.html

All Public Safety Diver programs are held in conjunction with DUI DOG Rally & Demo Tour dates. In most cases, the event is held on Friday for public safety divers only with the DOG Rally event open to the general public on Saturday and Sunday.

DUI DOG Rally & 2010 Demo Tour

March 19   San Diego, CA Natl Polytechnic College of Science
March 26   Pelham, AL Alabama Blue Water Adventures
April 9    Austin, TX Windy Point
May 14     Gloucester, MA Stage Fort Park
May 21     Bethlehem, PA Dutch Springs
June 4     Findlay, OH Gilboa Quarry
June 11    Kankakee, IL Haigh Quarry
Aug 27     Seattle, WA Mukilteo Lighthouse Park
Oct 1      Portland, CT Brownstone Quarry
Oct 22     Rawlings, VA Lake Rawlings
Nov 5      Chiefland, FL Manatee Springs
Nov 12     Terrell, TX Clear Springs Scuba Park

Technical Large-Animal Emergency Rescue Training

March 22-24, 2010
Eastern Kentucky University, KY

Beneath The Sea 2010
http://www.beneaththesea.org
March 26-28, 2010
Meadowlands Exposition Center, Seacaucus, NJ

Arkansas' Fourth Annual Search and Rescue K9 Working Dog Seminar
March 31-April 3, 2010
Camp Robinson Wildlife Demonstration Area, Conway, Arkansas.

Search and Rescue 2010
http://www.shephard.co.uk/events/44/search-and-rescue-2010/
April 21, 2010 - April 22, 2010
Aberdeen Exhibition & Conference Centre, Aberdeen, Scotland, UK

9th Annual National Drowning Prevention Symposium
http://www.ndpa.org/events/symposium.htm
Pre-conference workshops on Sunday, April 25
Sheraton at Station Square, Pittsburgh, PA.

SCUBA Show 2010
http://www.scubashow.com/
May 15th and 16th, 2010
Long Beach, California
Biological & Trace Evidence Workshop
http://www.imprimus.net/workshop_forensic_bio_and_trace.html
May 24 - 26, 2010
Springfield Police Training Academy, Springfield, IL

National Search and Rescue Conference
http://www.nasar.org/nasar/conferences.php?id=159
May 13 – May 15, 2010
Tunica, Mississippi

TOPICS IN CRIME SCENE INVESTIGATION: BODY FLUIDS AND TRACE EVIDENCE
http://www.le-seminars.com/011.htm
June 3-4, 2010
Clay County Sheriff Training Academy, Orange Park, FL

Firehouse Expo 2009
http://www.publicsafetyevents.com/emsfh/index.po
July 20-25, 2010
Baltimore Convention Center, Baltimore, MD

EMS Expo
http://www.publicsafetyevents.com/ems/index.po;jsessionid=dWZDOXpNtSo-T-pwDoOYP1GS
Sept. 27 - Oct. 1, 2010
Dallas Convention Center, Dallas, TX

Homeland Security Professionals Conference and Exposition
http://thecounterterroristmag.com/conference/
October 25-29, 2010 - Las Vegas, NV

International Symposium on Human Identification
www.promega.com/applications/hmnid/worformeetings/
October 11-14, 2010 San Antonio, TX

Canadian Underwater Conference & Exhibition
October 24-26, 2010 in Toronto, Ontario
www.underwaterconference.ca

2010 IEEE International Conference on Technologies for Homeland Security
http://ieee-hst.org/
8-10 November
Waltham, MA USA

If you have an event or know of an event that might be of interest to PSDiver Monthly subscribers, send the information to: PSDiverMonthly@aol.com
Intermediate Lift Operations

1) A five gallon bucket will provide _____ pounds of lift?
   a. 50       c. 16
   b. 64       d. 40

2) A 55 gallon drum will provide _____ pounds of lift. 55 gallon drums _________ recommended for PSDiving.
   a. 440, are
   b. 550, are
   c. 440, are not
   d. 550, are not

3) Intermediate Lift operations using bags rated between 100 and 500 pounds can be filled
   a. With surface supplied air
   b. The divers octopus
   c. With an attached air cylinder
   d. A and C
   e. All the above

4) Name at least three of the common knots used in rigging lift bags.
   a. ____________
   b. ____________
   c. ____________

5) An object requiring two lift devices that weighs under 60 pounds should be lifted with
   a. 2 5 gallon buckets
   b. 2 manufacturered bags rated above the lift weight
   c. 2 divers can swimming it to the surface
   d. A standard three leg lift assembly

6) For a vertical lift, recovering a 150 pound object from 60 feet, the lift line should be
   a. Welded alloy chain no less than 3/8”
   b. wire rope
   c. Rope or webbing
   d. Surface supplied line with a hand loop

7) The drawing to the right depicts what type of sling?
   a. A web basket sling
   b. A web choker sling
   c. A cable sling
   d. A bridle sling

8) One method to break bottom suction is to
   a. Use a rope or webbing to cut through the object
   b. Attach a large lift bag directly to one end and fill it
   c. Use webbing or rope to saw through the silt under the object
   d. Rock it until the divers can get it to move

9) What is the lift capacity of a 250 pound, open bottom lift bag at 33’?
   a. 125 pounds
   b. 485.1 pounds
   c. 500 pounds
   d. 250 pounds
10) When is it acceptable for a diver to be under the object during a lift operation?
   a. Only while rigging on the bottom
   b. Never
   c. Once the first stage lift has been completed and lines have been secured
   d. Only after the lift has been completed

11) Displacement weight and dry weight are the same thing.
   a. True
   b. False

12) What type of bags will “burp”
   a. Open bottom bags
   b. Enclosed bags
   c. Pillow bags
   d. Boulder bags

13) Overkill the bag size and rigging, not the air.
   a. True
   b. False

14) Target heart rate can be calculated as
   a. (220 minus age) x 65
   b. An increase in arterial pressure
   c. (220 minus age) x 70
   d. a generic response to hypertension

**TEAM DISCUSSION TOPICS:**

As a team, if you do not have a lift bag, construct an improvised lift bag. Break into groups if you have enough team members and let each team build their own. Then – go to a pool or controlled environment and see if they work. Pick three different objects less than 25 pounds and test your improvised bags on each. Use a 5 gallon bucket and compare its effectiveness to your improvised bags.

If you team has lift bags already, break them out and see if they are serviceable. Do thorough inspection of the valves, material and straps or rigging that is attached to the bag. Service what needs to be serviced. Once inspected and serviced pick two or three different objects and do a dry run using your bag(s). Then go to a pool or controlled water and practice.

As a team, set up and dry run a staged lift. Be attentive to rigging, lines and knots. Once you have these elements set, practice it again with heavy gloves on. Then again blindfolded, then again blindfolded with heavy gloves on.

Once you are satisfied that your team is ready and capable of doing he job, go to a pool of controlled water and practice it again. Then practice it again with heavy gloves on. Then again blindfolded, then again blindfolded with heavy gloves on.

As a team, do a classroom session of “what if”. For example, what if we have to rig a bass boat, what equipment will we need and how will we lift it? What if we have to lift a motorcycle, how will we rig and lift it? What if we do lift a bass boat, how will we get it to shore and out of the water? Depending on your time and participation, turn a practical what if into a training scenario. – even if it is only a dry run.

**Improvised lifting devices over 40 lbs of lift capacity are NOT recommended for PSD teams.**
These training agencies have recognized PSDiver Monthly as a valued addition to their programs and Continuing Education requirements.

**Public Safety Diving Association** (PSDA) recognizes and approves the PSDiver CE program. Each month’s Q&A program credits 1 CEU for renewal up to a maximum of 3 CEUs from this source for each year’s renewal.

**ERDI** Recognizes and supports the PSDiver Monthly CE Program. Contact your ERDI Instructor for details.

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Lifesaving Resources advocates the need for Public Safety and Rescue personnel to be trained in Water and Ice Rescue and recognizes the PSDiver Monthly CE Program for continuing education training and credits.

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