Chapter 26 – "Working With Helicopters"

Optimism can only take you so far. After that, you may need a helicopter.

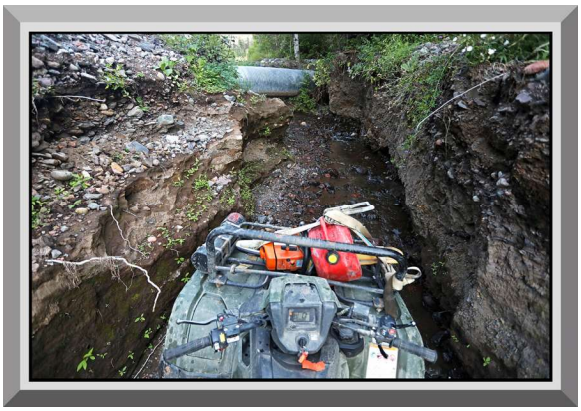

Figure 26.01
Ground-Based Tree Delivery Can be Hard.

Sometimes, it's just not possible to get trees to the blocks by using trucks and ATV's.

In the early years of logging, companies tried to harvest their lumber in the most cost-effective manner, a practice which obviously continues today. Today, the cost of transporting raw logs to the mills (which is usually directly related to the distance from the blocks to the mill) is often one of the most significant expenses. For this reason, tree stands that are easily accessible and close to the mills are usually the first to be harvested. With each passing year, however, companies need to venture further into the bush (or into more inhospitable terrain) in order to find decent harvestable stands.

The further one travels from the mills, the more likely it is that conventional road systems (especially in areas with a lot of mud or muskeg, like Alberta) will prove to be impassible in any season except winter, when the ground is frozen. Logging these areas can take place quite easily in the winter, but when the planters go back to plant those blocks the following summer, accessibility becomes a huge problem. In some areas, the use of helicopters has become increasingly common as the only viable option to get crews and seedlings into the work sites during the spring/summer growing season.

The excitement of using helicopters on a work site is usually high among the inexperienced planters in a camp, who are excited to go flying for the first time. However, after a few days of chopper work, the novelty quickly wears off, and these planters begin to realize the drawbacks of helicopter work. Every morning, many planters will end up sitting for at least thirty minutes, or maybe more than an hour (unpaid time), just waiting their turns to be flown into the block. Also, helicopter work can sometimes mean long days (to maximize production per flight hour), especially when a block must be finished before the crew can leave.

For the crew leaders and supervisors, helicopter work is even more stressful. While it only costs about $150-200 per day to rent a truck (including fuel & maintenance), a typical small chopper usually costs around $1200 per HOUR, and a bigger machine will be well over $2000 per hour. Yes, two *thousand* dollars per hour. Companies that don't operate with maximum efficiency on helicopter contracts will find costs skyrocketing, and can easily lose a lot of money.

This chapter will cover three main areas that planters will find useful. First, helicopter safety will be addressed, which includes learning about various features and equipment associated with the aircraft. Although motor vehicle accidents are the leading cause of death in our industry, planters need to be aware that helicopters are much more dangerous to work with than trucks. It is absolutely critical to be paying very careful attention to the machine and pilot at all times. Next, I'll cover some very basic strategies to maximize efficiency on the blocks when using choppers. Finally, I'll talk about some of the different aircraft you may encounter in the field, and characteristics that are associated with each.

Helicopter Safety

I can't over-emphasize how dangerous a helicopter can be. For instance, a tail rotor under power, which looks like a blur to a planter who is probably barely paying attention to it, can be spinning at a rate of several hundred revolutions per minute. Anyone who walks into a tail rotor will die instantly (that happened out west in 2017 to a non-planter), and the main overhead rotor is equally dangerous.

Figure 26.02
The Tail Rotor.

Never walk near the tail rotor of a helicopter.

On another front, the machines are incredibly expensive. Damage incurred through negligence on the part of planters, such as allowing a seat belt to hang out the door and damage the paint job, may "only" run to a four or five thousand dollars in damages. However, a more serious incident, such as allowing a loose tarp to blow up into the main rotor, will necessitate grounding the machine with repairs costing upwards of a hundred thousand dollars, and can shut down planting operations for at least the rest of the day (probably much longer). Your fellow planters aren't going to be very happy with you if you do something negligent that grounds the helicopter, and they have to walk fifteen kilometers to get back to the trucks. That's happened to planters before, more than once.

Before you get into a helicopter, every pilot will take you through a basic safety orientation, and point out the features of his particular machine. Pay very close attention to him, even if you have seen or heard a similar lecture before. There is nothing that a pilot dislikes more than planters who are ignoring him, or who are talking to each other during his safety talk.

Figure 26.03
The Safety Briefing, and Test Seating.

The pilot will give a safety briefing before anyone is allowed to fly. If you haven't flown before, there should be an opportunity for everyone to get in and out of the machine while it is still shut down. This lets planters figure out exactly how the doors and belts work.

If you have questions during the safety orientation, don't be scared to ask the pilot for clarification, and make sure that you get up close for a demonstration. The whole point of the safety pre-work is to educate the planters about this information, and the pilot will take as long as necessary, until everybody is comfortable. The helicopter isn't billing for its time when it's sitting on the ground, turned off. So after a safety orientation, I always encourage everyone to get in and out of the machine, to practice opening and closing the door latches, and working with the seat belts. It's better to discover small problems at this point, rather than when the engine is running and the machine is costing $20 to $40 per minute.

The first thing that you should know is that you never move to the back of a helicopter. The area behind the cargo bay is extremely dangerous. For one thing, the pilot cannot always see you when you are back there. Most machines do have a "rear-view mirror," although it is difficult for a pilot to see clearly behind the machine using the mirror. The reason concern, however, is that there are turbine exhausts which emit hot gas (at high speeds) at hundreds of degrees Celsius. And of course, the tail rotor is also back there. The pilot will emphasize that you are not allowed to approach the machine from the back, walk around the back, or duck under the tail boom.

A second very important thing to be aware of is that all of the landing zones (LZ's) that the chopper will use must be completely cleared of garbage and other debris, at least as much as possible. It's impossible to eliminate sticks and dust, of course, but you must make sure that plastic and tarps and other such items are secured. Even a tiny bundle wrapper in the tail rotor could cause the machine to crash within seconds. All planters should always take a close look around any cache that the chopper is landing at, even if it is not your own cache, to make sure that any plastic wrappers and tarps are eliminated or secured.

One of the most memorable quotes I've heard from a pilot, which was very direct and to the point, was from a pilot named Doug (Silver Helicopters). During one safety orientation, he pointed to a nearby plastic shopping bag on the ground and said, "If that little plastic bag ever got caught drawn up into the engine of the machine, it would be devastating. You could instantly be looking at over $100,000 in damages." Bundle wrappers may be just about the most dangerous item on the work site, because they seem so innocent.

If you're planting or working on a heli block, you should always keep an eye on any cache near you. The communal goal is to have all caches in a state of being "ready to fly" at all times. Break down boxes as you go and fold them up inside other empties – don't just flatten them (your crew leader will teach you how to "heli-pack" garbage boxes). Weigh all tarps down sufficiently (this means a LOT of weight), so the rotor wash from a visiting chopper will not blow the tarp off the cache. Keep all bundle wrappers buried in the bottom of closed garbage boxes, and preferably covered under the cache so the wrappers won't be able to sneak their way out even in high winds. Planters can also help with overall block efficiency by always trying to drain each cache of trees when finished a piece (bag up with the last box), before moving to another area. Obviously, this is impossible if several boxes of trees remain, but if the numbers are working out properly, this won't be a problem. If you can bag up with the remaining trees, your crew leader won't have to figure out a way to move any remaining boxes to another area. Also, you'll have trees, even if your destination cache is low.

Never flag trees within a couple hundred feet of any landing zone. The pieces of flagging tape can get blown around in the rotor wash, and sucked up into the rotors or the intake systems of the helicopter, necessitating a shut-down. If a piece of flagging tape goes into the engine intake, you can rest assured that your crew will be walking home, and the machine will be grounded for days until a mechanic can tear it apart and re-certify it. I highly recommend that every planter remove rolls of flagging tape from their planting bags when getting ready to fly, and put the roll in your pants pocket or in your day-bag. I've seen dozens of times when a few stray inches of flagger peeking out of the flagger pouch on a set of planting bags started to snake out due to rotor wash, and caused problems. The easy solution is to simply take rolls of flagger out of your planting bags altogether before loading the bags into the cargo basket.

Do not slam the doors of the helicopter. They are very expensive. Most pilots recommend that you hold the latch open, then firmly close the door (pulling from the inside, or pushing on it from the outside), and then release the latch. Some minor pressure may be needed to ensure that the locking mechanism latches properly, but think of it this way: You probably don't like it when people slam the door at your house, and pilots don't like it when you slam the doors on their helicopter. By the way, the outer door latch on Bell choppers needs to be in the "out" position when closing the door – if you have closed it properly, it will then fasten itself inward upon closing. Huey 500's usually have a twist handle.

Figure 26.04
Door Handle from Inside.

The door handles can be very confusing. Thankfully, many of them have labels with diagrams.

Figure 26.05
Door Handle from Outside.

Matters are further complicated by the fact that doors on different models of helicopters can be very different.

When approaching the machine, do so from the front or from the forward part of the side, but do not approach until the pilot gives you a visible nod. Sometimes, especially on rough ground on the blocks, the pilot will touch down briefly, but while easing off the power, decides that the machine is not settling properly, so he'll lift a few feet back off the ground and move slightly sideways to find a better resting place. Don't approach the machine until he is fully settled into place, and motions for you to approach.

To get into a helicopter, don't ever pull on the door or grab it for support as you climb in. It's not designed to hold the weight. The doors are expensive, and the hinges can break fairly easily if a planter is using it pulling themselves up into the machine. You should be grabbing onto the frame when entering the machine. So long as you aren't wearing caulk boots, you can use the foot rests while getting in. Use the designated foot rests when climbing in, rather than stepping onto the skids (which are hollow aluminum tubes). Many pilots do not allow planters to wear caulk boots in the machine, so they will either install hard plastic floor mats, or request that you wear different boots. It might be a good idea to bring a second pair of comfortable hiking boots to wear inside the helicopter, although your supervisor will hopefully have checked with the pilot beforehand to see if caulks are permitted in the machine.

Never approach the helicopter from the "high" side of the machine. The blade on the machine looks like it is spinning at a very constant level, but the truth is that as the main rotor spins, it can wobble up and down by a couple feet at the tips. You should duck slightly when approaching the machine, and make sure that you never carry anything above your head. Don't carry a shovel over your

shoulder, and don't wear a backpack that has a high top. If you're tall and don't crouch while approaching, the tip of the rotor blade may come very close to your head as you enter its shadow. If the rotor ever hits your, even just to barely graze you, you probably would be killed instantly because of its weight and speed of rotation. If you're approaching the machine from the high side, or walking on raised hummocks (which effectively raises your height and brings you closer to the rotor), you are likely to be in serious danger.

Figure 26.06
Watch the Overhead Main Rotors.

If the machine is parked on a slight tilt, or if there is a hump of high ground beside the machine, the rotor blades can actually be low enough to become a fatal hazard to someone who isn't paying attention. This photo illustrates how low the rotors can dip on a slope.

You should also make sure that you aren't wearing a hat when you enter or exit the helicopter. Even if it feels like the hat is fastened securely on your head, the strong winds that surround the helicopter can rip it off. If a hat comes off your head, and is sucked up into the path of the rotor blade, there will be serious damage. For instance, each of the five rotors on a Huey 500 costs in excess of $20,000 to replace. Whether you are wearing something light and form fitting like a tight ball cap, or something heavy like a hard-hat, take it off while working around the chopper.

When people are getting in and out of the machine, it is good to have someone dedicated to assisting with the loading/unloading process at the main landing zone (called "Staging"), and again at the central cache on the block, if possible. Often this isn't feasible, especially on the block side, so the person riding in the front of the machine should instead be designated as the load assistant. At Staging, the load assistant will collect the planters scheduled for the next flight and ensure that they are all standing together in one spot, with their gear, ready to fly. As the machine is landing at Staging, the load assistant will wait for the machine to settle and the rotor RPM to drop, then will wait for a nod from the pilot, and only then will he/she approach the machine with the load of passengers. He or she will then start by moving to the cargo bay/basket, to load all gear so it is properly stowed. Next, the load assistant will make sure that the cargo bay door/basket latches are closed properly, and the gear inside is positioned so that nothing is exerting outward pressure. While this is happening, the planters should have been climbing into their seats and getting settled into the place.

Figure 26.07
Cargo Basket.

Not all helicopters have a side cargo basket. However, if your helicopter does, it's very convenient for flying your gear. Make sure you understand how to close the lid without damaging the hinge.

Figure 26.08
Rear Cargo Hold.

Sometimes you'll need to use the rear cargo hold to fly your gear. Again, learn how to open and close it while the helicopter is still shut down on the ground.

The load assistant helps with seatbelts in the back seat, and does a visual check to ensure that everyone is buckled in securely, then makes sure that the back door is closed properly. Incidentally, everyone always loads from one side of the machine, namely the side that the front passenger sits on. After the back door is properly secured, the load assistant will move to the front seat and help with the seatbelt and door there. Finally, once the front door is also closed, the load assistant will make eye contact with the pilot and give a thumbs-up, and then move away from the machine. It's hard for the pilot to turn to see what's happening in the back seat, so once everyone is fully belted in and has headsets on, it's useful for one person to report "good in back" on their headset microphone.

Sometimes, you will be working on a site with two helicopters running at the same time. The machines may be different, perhaps an A-Star and a Huey 500. Even worse, the passenger side might be on the left for one machine and on the right for the other. Planters frequently seem to freeze in situations like this, because they can't remember which side of the helicopter to go to. There's a simple rule here: Look at the pilot. Don't go to the side of the machine that the pilot is sitting on. That should make sense, right? It's not like you can jump in and sit on their lap. The side opposite of the pilot is always the side that everyone uses for loading and unloading.

Figure 26.09
Foot Step.

This helicopter has a brace and step on the side, to assist passengers with getting in and out of the machine. This is especially helpful on a tall machine like a Huey 500.

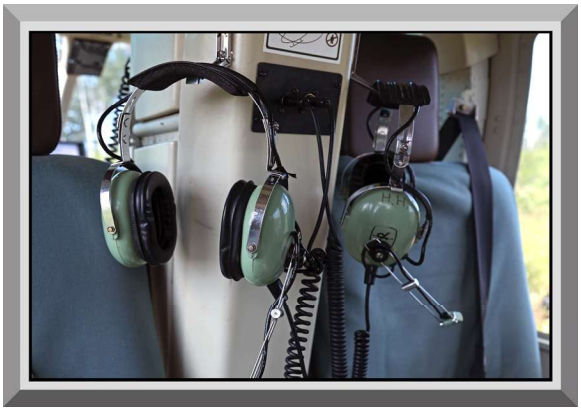

Figure 26.10
Radio Headsets.

Once you're in place and buckled in, you can put a headset on. This will allow you to talk to the pilot.

When people are being unloaded, the process is very similar. First, the load assistant will go to the cargo bay/basket and start removing gear, while the passengers extricate themselves. Do not throw gear. Hand it off to other planters, or place it directly on the ground by your feet. Watch for anything that could open up and blow away. After the cargo bay/basket is empty and latched, the load assistant will check that the seatbelts are fastened back together inside the machine (even though there is nobody using them), and will close the doors properly. One of the worst ways to damage a helicopter through oversight or negligence is to leave the end of a seatbelt hanging out one of the doors. Once the pilot is airborne, the metal head of the seatbelt will start flapping against the body of the machine, and can cause significant damage to the paint job and bodywork. This is why the seatbelts are fastened after use, because if they are fastened, they cannot reach far enough to hang out the door.

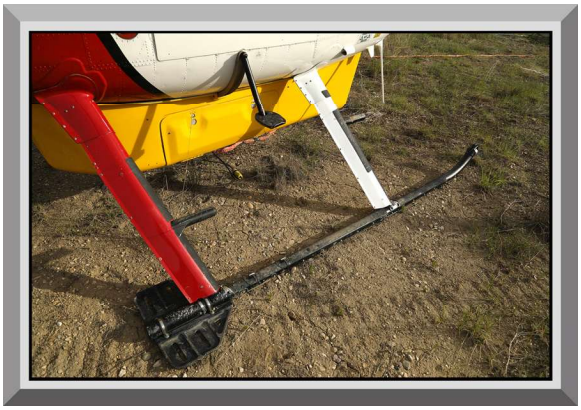

Figure 26.11
Helicopter Skid.

The helicopter rests on two skids when it is on the ground. If you're using caulked boots, and if the pilot allows you to wear them while flying, make sure you don't step on the skid. The caulks on the bottom of your boot could easily puncture the skid, which is a very lightweight metal.

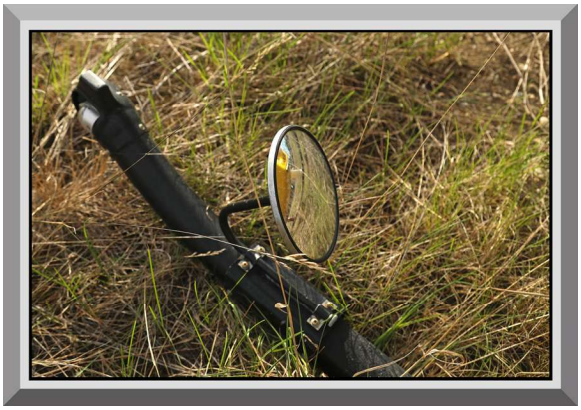

Figure 26.12
The Mirror on the Skid.

The pilot has a mirror on the skid. Make sure you don't accidentally kick it if you're close to the machine.

Once planters have disembarked, two options are available. The preferred option depends on the pilot. Some pilots prefer for the planters to walk 20-30 feet away from the machine, while crouched low, then turn and kneel down facing the machine until it has departed. Other pilots emphasize that the safest area to be (with respect to the rotor blade) is as close as possible to the machine (without being on the skids, of course), and ask that planters simply kneel in place directly beside the machine until it has lifted and moved out of the area. There are pros and cons to each approach. Your best bet is to ask the pilot which method he prefers – in my recent experience, many pilots are now opting with having planters stay put and kneel, rather than leave the rotor canopy. If the pilot prefers for you to kneel close to the machine, make sure you are far enough "forward" beside the helicopter that the pilot can see all of you.

Some seat belts are very easy to operate, and look exactly like the lap belts you would find in a car or an airplane. Other belts are more comprehensive, especially in the front seat of the helicopter. A "four-point harness" belt will have two straps that come over your shoulders and down to a point in your lap. The lap belt then fastens with the two shoulder straps attached to it. This way, if there is a crash, your lap and upper body are both restrained against the seat.

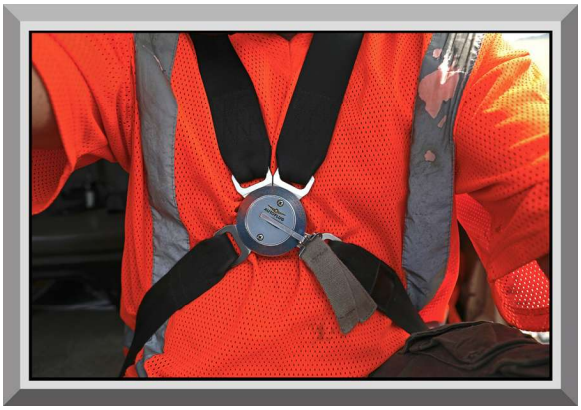

Figure 26.13
Four Point Harness Seat Belt.

This type of seat belt is quite common if you're a front seat passenger, although the belts in the back seat are usually the same as in commercial aircraft. If you've never used one of these before, make sure the pilot demonstrates how to open and close it while the aircraft is still shut down.

The helicopter has some safety items that you should be aware of, namely the fire extinguisher, ELT, first aid kit, and survival kit.

Figure 26.14
Fire Extinguisher.

The fire extinguisher is usually easy to see, and is usually located within reach of the pilot. If there is a fire in the machine, don't grab the fire extinguisher and discharge it until the helicopter has landed, otherwise, the fire retardant may prevent the pilot from being able to see to land!

Figure 26.15
The Survival Kit.

This sticker indicates that the survival kit is hidden in this area (in this case, under the left rear back seat).

In the event of a crash, the ELT is probably the most important item. The ELT contains an emergency transmitter beacon. If the chopper crashes, the beacon may arm itself, but to be safe you should always double-check and manually arm it. There should be a set of instructions written on this box which tell you how to arm it, usually by flipping a switch. When the ELT is armed, it sends out a signal to alert authorities at monitoring bases, so they know that an aircraft has crashed somewhere. They can then home in on the signal, through the assistance of GPS systems, and find the crash site as quickly as possible. This ELT is sometimes located within the pilot's reach, inside the machine, and may be yellow or orange or red in colour. In other aircraft, the ELT might be in the rear seating area, or even in the rear cargo compartment. The other items, a fire extinguisher and first aid kit, are self-explanatory. Ask the pilot to point out exactly where they are located.

Figure 26.16
Emergency Locator Transmitter.

This sticker shows the location of the ELT, in the rear seating compartment.

When you're in the helicopter, you may want to talk to the pilot or to people on the ground. In that case, you will want to wear one of the headsets, so you can hear and be heard. Helicopters usually have access to several "sets" of frequencies, including UHF, VHF, cellular, and other bands. Some headsets are designated as "VOX" which means "voice-activated." A VOX microphone does not transmit anything to listeners until you speak above a certain volume. On other types of headphones, you will have to push a button (usually somewhere on the headset cord or right beside where the cord plugs into the helicopter) to make your microphone active.

Usually, although the occupants of the helicopter can hear what is happening on the ground, the conversations that take place within the helicopter are only heard by the occupants of the helicopter. The pilot has to press a special button if the occupants want their speech to be broadcast outside the helicopter. This allows people on the ground to listen in on the conversation. Of course, the passengers should never press a button on the control panel of the helicopter (assuming that it's the external radio transmitter), without getting permission from the pilot first.

Figure 26.17
The Push-To-Talk (PTT) Switch.

This switch allows the front seat passenger to broadcast a radio transmission outside of the helicopter.

Here is something important to remember: Never carry cans of bear mace inside the helicopter. Have you ever been maced? If so, you'll know that there is no chance you'll be able to see anything for quite a while. If a can of mace were to go off accidentally in a helicopter, the pilot would be blinded. If this happened while you were airborne, you would almost certainly crash and die. Bear mace must always be carried inside the rear cargo bay, in a closed container, or [far better] in the cargo nets.

Fuel is another potential hazard. There are obvious caveats with respect to fuel: Never smoke while the pilot is refueling, never smoke near the fuel drums (within 25 feet), be careful while unloading barrels of fuel from the back of a pickup, and so on. Helicopters use certain types of aviation fuel, such as Jet A or Jet B. These fuels are similar to each other, and are basically either an unleaded kerosene, or a naptha/kerosene blend.

I'd like to revisit loose bundle wrappers, since they typically seem to be the biggest consistent risk at any Staging area or landing site. I can't emphasize enough how careful you need to be when it comes to wrapper management.

Slinging Cargo

Underneath the helicopter there is a hook mechanism, called the "belly hook." This is a special one-way hook which allows an "O-ring" or "pear ring" from a cable or net to slide onto the hook with no resistance, but once it is on the hook, it cannot be removed without the hook being mechanically or electronically opened. Due to this, the loader can attach a sling (net) full of cargo or gear to the helicopter while the helicopter is hovering a few feet over the sling. When the pilot gets to the destination, he has a switch inside his machine which releases the hook and allows the sling to detach from the helicopter.

Figure 26.18
The Belly Hook.

This apparatus is what a sling of gear or trees gets hooked onto. Pilots are not allowed to sling gear if there are passengers inside the machine.

Figure 26.19
Empty Helicopter Nets.

These nets are also referred to as slings. There are four nets here. The pilot can teach you how to roll them up properly, so they look more organized than these ones do.

Most pilots will always set the cargo load gently down on the ground before releasing the hook, so the cargo doesn't drop and get damaged (an exception might be for empty nets which are sometimes dropped from a few dozen feet above the ground). Occasionally, there will be a problem that prevents the hook release mechanism from working properly, and the pilot will be stuck hanging in mid-air with the sling attached to the machine. Under the direction of the pilot, a grounds-crew person can approach the machine and manually release the hook by twisting a round knob on one side of the hook mechanism. If you're ever in the rare situation where you have to do this, make sure that the sling is resting on the ground so that it doesn't fall or roll onto you after you release the load. As a planter, the expectation that you'd have to do something like this is close to negligible. The pilot

would probably just fly away (with the problematic sling) to a location where a trained grounds-crew can help out and figure out what's wrong.

Figure 26.20
A Loaded Sling.

This sling has been loaded and is ready to fly.

In the past five or six years, it has become increasingly uncommon for pilots to allow planting operations to belly-hook slings. Instead, a "long line" is usually attached to the machine. This is basically a 100-foot or 150-foot steel cable extension which ties into the belly hook at one end, and has its own hook mechanism at the other end. If the lower hook mechanism is a standard single hook, it's called a "single point." It's also possible to have a "carousel" device, which has multiple numbered hooks. When a carousel is being used, it's often possible to have several light nets attached to the helicopter at the same time. The only real limits are the overall weight of the combined load, and the number of hooks on the carousel. We frequently work with carousels that have up to eight separate hooks.

Figure 26.21
Hooking a Net to a Carousel.

After hooking up the net, the Staging crew should radio the pilot to let them know which numbered hook the load is attached to. It's generally best to attach loads to the lowest available hook number.

Each sling net, when laid on the ground, looks like a webbed square. The net will typically have four hooks in the corners, one of which is the "master hook," as indicated by the fact that it may have a larger hook, or may instead be a slightly larger O-ring or pear ring. When the sling is being prepared for moving cargo, typically it is laid out flat on the ground, then all the cargo is loaded into it. Next, the four corners are brought up to the center, and the three smaller corner hooks are all attached to the main hook (or O-ring). It is important at this point to check the sides of the net, and try to figure out if there is anything in the load that might fall out when the sling gets lifted off the ground. If you are transporting smaller objects that could fall through the net, and especially shovels, it is wise to either pack them inside a set of planting bags, or if you have a D-handle shovel, to clip the waist

straps of a set of bags through the D-handle, so it can't fall out of the sling while in mid-air. This is one of the most significant drawbacks of owning a staff shovel, since a staff is sometimes too long to fit into the cargo bay, and cannot be tied firmly into a sling load of gear. If you're placing a tarp in a sling of trees, always place the tarp (folded) at the bottom of the sling, under some boxes.

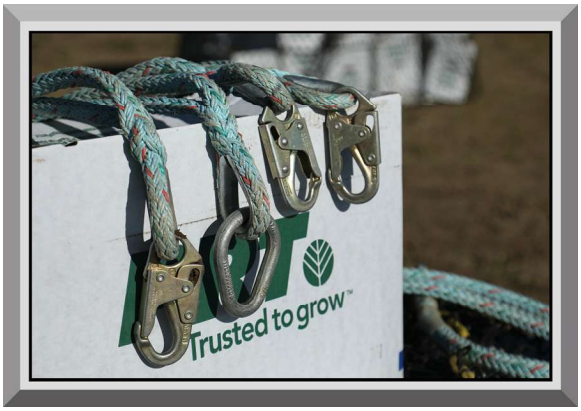

Figure 26.22
Hooks and Pear Ring.

A helicopter net has locking hooks on three corners, and a solid ring called an "O-ring" or pear ring on the fourth corner. The three hooks all attach to the pear ring.

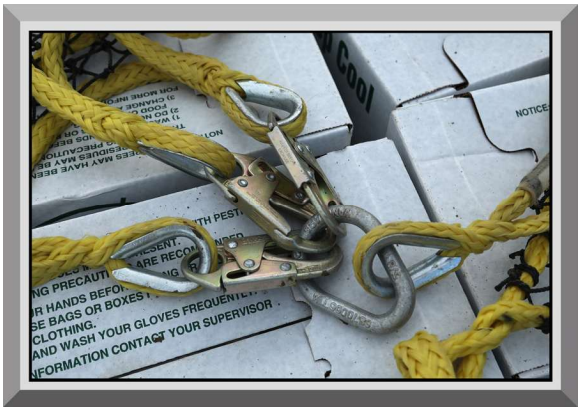

Figure 26.23
Hooks Fastened Properly.

Each of the three hooks should be attached to the pear ring like this. Do not attach hooks to each other, or to the rope.

This is very important: If you have loose bundle wrappers in your planting bags, always dispose of them in a garbage box before you load them into a sling of gear (even when using a long-line), or else secure them in a silvicool insert bag and tie the drawstring, so they can't spill out of the planting bags and get sucked up into the rotors.

When loading a heli net with tree boxes, the number of boxes that the machine can lift will vary widely based upon a number of factors. The most significant is the type of machine, for example, an A-Star (especially the B3 variety) can lift far more boxes than a Jet Ranger. The second significant variable is the amount of fuel that the machine has on board. The third main variable to consider is the weight of the boxes, and the variability of that weight within the shipment. Obviously, if the average box weight is sixty pounds, the helicopter will only be able to lift half as many boxes as it could for a request key that has thirty-pound boxes. The amount of moisture in a request key is one of the biggest determinants of weight. If you're flying trees that have been in a shade tent during rain, expect to be able to lift far fewer boxes per load than trees straight from the nursery.

Finally, remember that there are "Three H's" that significantly affect the performance of helicopters and other aircraft: Heat, Height, and Humidity. As each of these three things increase, the

performance and lifting power of the helicopter is degraded. Helicopters have a much harder time lifting equivalent loads in the heat of late afternoon than they do early in the morning. Helicopters have a harder time lifting at high altitudes than they do at sea level (because the air is thinner and the blades have less bite). And finally, humidity is bad for helicopters. This is because, counter-intuitive to what most people would assume, moisture-laden or saturated atmosphere is less dense than dry atmosphere (think about the molecular weights of the constituent gases, as H2O vapor is less dense than O2 or N2).

Figure 26.24
The Three H's.

Three environmental conditions which decrease the lift capabilities of any aircraft are height (high altitude), heat (high temperature), and humidity (high moisture content in the air.

Sling nets themselves are very rarely hooked directly to the hook that is on the belly of the helicopter, even though I may have implied that already when talking about belly-hooking. Usually, a lanyard is used as a short connection between the helicopter and the sling. A lanyard is a very strong interwoven fibre-based metal cable. Lanyards are usually short, from three to six feet in length. The lanyard will have a strong hook at one end, and then a pear-shaped or circular ring at the other end. The lanyard's hook will attach to the main O-ring on the net, while the other end is attached to the hook on the belly of the helicopter. If you are using a pear-shaped ring rather than a circular one, it is wise to put the wider "bottom of the pear" end facing upward, because that end will slide off the hook more easily once the pilot releases the hook. One notable exception to this rule is when you are hooking an empty net and short lanyard to a helicopter. If this is the case, you should hook the O-ring directly to the belly hook and let the lanyard dangle beside the net. The reason for this is simple – the lanyard adds extra length to the net. When the net is empty, it blows around a lot. There is a small chance that, despite the weight (thirty or forty pounds), it could possibly swing back and into the tail rotor of the machine. By hooking the O-ring of the net directly to the belly of the helicopter, it shortens the overall length and makes it almost impossible for the net to swing all the way back into the tail rotor. This potential hazard is one of the many reasons why long-lines are almost always used instead of belly-hooking nowadays.

Let's take a closer look at the long-line. There are advantages and disadvantages to using a long-line. The major advantage is safety, which should always trump any other consideration. If a block has a lot of standing timber or residual trees, or was selectively logged, there may not be a lot of areas where the pilot can get close to the ground. Using a long-line allows the pilot to remain above tree level while lowering the cargo loads to the block. This is also handy for load pickups at Staging, because the load assistant does not have to get close to the machine while it is operating. A pilot is

also happier to stay at a higher elevation, to minimize damage from dust or debris swirling around the chopper.

A drawback of using a long-line is that a helicopter is not permitted to carry passengers while the long-line is attached (even if there isn't anything attached to the long-line). The pilot has to land and get out of the helicopter every time that the long-line is attached or taken off. This process wastes a few minutes of flying time. It is therefore not feasible to alternate repeatedly between loads of people and cargo when using a long-line, without a significant amount of wasted time.

One more safety hazard to watch for is the hook mechanism at the bottom of the long-line. On most long-lines, this is a heavy ring assembly which probably weighs in at twenty pounds or more. Never turn your back on the ring, and always anticipate the swing of the ring. If it starts swinging at you quickly, it can build up a lot of momentum, and if it ever hit you in the back of the head it would almost certainly give you a concussion (at best), or crush your skull.

Another danger to be aware of when hooking up slings relates to the netting. If you have large nets, you may have quite a bit of excess netting that you're working with while doing a hookup. Be careful that you don't catch your foot in the net while hooking up the sling. The pilot might not realize that this has happened, and could lift up and throw you off your feet, or break your ankle.

When using several slings at once, it is sometimes hard to keep track of where each net is at any given time. This problem is compounded by the fact that the nets are made of dark woven material, and if they are thrown on the ground away from a cache, they can be very difficult to locate visually. You don't want to leave a net behind, since they are each worth a few thousand dollars. It can be useful to put a couple pieces of flagging tape on the corners of the net, so it can be spotted more easily in the grass. My only reservation about this suggestion is that you should use fairly short pieces of flagging tape, and make sure it is a very strong brand of winter tape, so the tape doesn't rip off and get sucked up into the rotor blades. Lanyards are also easy to lose (perhaps even more so than nets), so you should never remove a lanyard from a net. Keeping each lanyard attached to a net at all times reduces the chance of losing it.

If you are hooking a sling up to the chopper, you should stand beside the sling, and always pay attention to an "escape route." For a belly-hook, it isn't wise to stand directly between the sling and the incoming machine. You want to be able to step out of the way after the sling is attached, and that means sideways or to the front of the machine. Hold the lanyard up in the air, and let the pilot come to you. He/she will come as close as possible, and then hover within a couple of feet (hopefully). At this point, you can reach over and attach your lanyard to the belly hook, so long as he is close enough (remember that your lanyard is short). Long-line hookups are far less dangerous. Even so, a pilot will try to be careful when lifting up so the load isn't directly above someone on the ground, in case the long-line breaks or a hook fails. Pay attention as the helicopter is lifting away, to help ensure that you don't accidentally walk underneath the load.

If you're the person hooking slings up to the chopper, it is very useful to wear safety glasses. The helicopter will kick up a large amount of dust and debris, and this foreign material can get in your eyes and cause a great deal of discomfort over the course of several hours, and can also increase the possibility of an injury if a larger item strikes your unprotected eye. A second item that you should be wearing is a high-visibility vest. This lets the pilot see you more easily. On the landing, a high-vis vest is helpful. On the block, it is almost indispensable. Unless you are wearing a vest, it can be incredibly difficult for the pilot to see you, especially if you are dressed in earth-tone or dark clothing on the block. I've also found that a faller's hard hat, with a face shield and hearing protectors, can be quite handy when doing a lot of slinging work. The hearing protectors protect your hearing and simultaneously keep the rotor wash from knocking off your hard hat.

Finally, be prepared for a possible electric shock when hooking up a net (especially when there is a lot of moisture in the air). A large amount of static electricity can be built up between the helicopter and the ground as the rotor spins through the air, and sometimes that electricity uses your body as a conduit to go to ground as soon as you touch the belly-hook or long line, resulting in a rather strong shock. It can be quite startling when you get one of these shocks. Some of them can be quite strong.

Your pilot will show you how he prefers the empty nets to be rolled up at the end of the day, once they are no longer needed. Usually, the sling will be laid out on a flat surface. As you look at it, imagine a line stretching diagonally through the net, starting at the corner that has the main hook or lanyard. The two corners that are not on this imaginary line are then folded into the middle, so the net becomes one long drawn-out line. Then, start at the end opposite the lanyard and roll up the net, tucking in the loose edges and making the package as tight as possible. Sometimes, the lanyard can be used at the end to wrap around the net an extra time, and further tighten the bundle.

If you have a limited number of cargo nets available on a project, you can "cycle" the nets efficiently with as few as three nets, if you're really organized. When cycling nets, it is absolutely critical that an empty net comes back to Staging each time that the machine takes a full load into the block, except of course on the first load. This requires that there either be someone at each cache to unload each full net and hook the empty nets back up to the helicopter, or more commonly, to diaper drop the loads. To cycle nets, the procedure is simple. First, the helicopter takes a full load into the block. This leaves the other two nets at Staging, both of which are full. The helicopter comes back to Staging to pick up the second load. While that is happening, the boxes of trees are being pulled out of the sling on the block. When the machine drops the second load off to the block, it then goes back to where the first sling has been unloaded, and grabs the empty net. It then returns to Staging where the third sling is still sitting ready to go. From that point on, there will always be a full load of trees at Staging, waiting to be flown, plus another sling on the block in the process of being unloaded, and a third empty net in the process of being returned to Staging. Obviously, the availability of additional nets makes it much easier to cycle the loads smoothly, but an organized team can make it work with just three nets so that the helicopter never stops moving.

Commonly Used Helicopters

"Jet Ranger" - Bell 206 Series

The legendary Bell 206B Jet Ranger III is the most successful commercial helicopter ever manufactured. It flies in every type of climate, from the Arctic Circle to South American and African jungles to the hottest deserts, and is an ideal machine for use in tree planting. The Jet Ranger was initially designed in 1962 for military use, but the first prototype did not fly until 1966. Several models were released, including the 206A in 1967, the 206B in 1971, and the 206C in 1977, as a well as a larger heavy-duty 206L (known as the Long Ranger). We usually call the machine simply by the name "the 206". The 206 has the world's best safety record among all single-engine aircraft, and it has [relatively] low operating and maintenance costs. A Jet Ranger usually costs somewhere in the range of $900,000 to $1.3 million.

A Jet Ranger is a light utility helicopter. It seats the pilot plus four passengers (the pilot sits in the right front seat). The rotor has two blades. Its maximum speed is about 225 km/hr. It weighs about 730 kg when empty, and can lift about 680 kg (dependent upon weather, fuel load, altitude, etc.).

Figure 26.25
Jet Ranger on a Coastal Helipad.

Planters are unloading gear from the rear cargo.

Figure 26.26
Jet Ranger in the Air.

The pilot sits on the right side.

Figure 26.27
Jet Ranger on Another Helipad.

The crew is ready to fly home at the end of the day.

"Huey" - Boeing/MD Hughes 500

The Hughes 500 is another of the world's most successful and useful light turbine helicopters. This model was also designed in around 1962 at the same time as the Bell 206, for US military use, and was first produced in 1963. There are a large number of variants which have been produced over the years, including the 500C, 500D, 500E, 530F, 500U, and others. Hughes Corporation was acquired by McDonnell Douglas in 1984, and that company was then merged with Boeing in 1997. This is another chopper which can easily be flown with the doors removed to increase visibility, and one that can hover and land almost anywhere.

A Huey 500 is a light utility helicopter. It typically seats the pilot plus four to six passengers, although due to weight considerations, many pilots will only fly with three passengers at a time (the pilot sits in the left front seat). The main rotor has five blades. Its maximum speed is about 244 km/hr. It weighs about 598 kg when empty, and can lift about 660 kg (dependent upon weather, fuel load, altitude, etc.).

Figure 26.28
Huey 500 on the Ground.

The 500 sits slightly higher off the ground than many other helicopters.

Figure 26.29
Huey 500 Slinging Trees.

Although it's not possible to see all of the blades clearly in this photo, the 500 has five blades on the main rotor. If you look carefully, you can see parts of the two "hidden" blades.

Figure 26.30
Huey 500 Landing.

The 500 is ideal for specialty work, when working with a small group of people.

"A-Star" – Eurocopter AS 350 Series

The "A-Star," known in Europe as the Ecureuil (Squirrel), is Europe's most successful civil helicopter. Another light chopper, the A-Star sees extensive civil and military use around the world. The A-Star was originally developed by Aerospatiale in the early 1970's, with the first prototypes being produced in 1974 and 1975, and regular production starting in 1978. Again, a number of variants have been manufactured, including the AS 350B, 350C, 350D, 350B1, 350B3, and others. Manufacturing currently takes place in France, with American Eurocopter assembling and marketing machines in Texas.

The A-Star is considered to be the Ferrari of civil helicopters. It is very powerful and agile, and its large doors and spacious cabin provides for easy access. A-Stars are often a preferred chopper for tourism-based operations, and activities like heli-skiing.

The A-Star is a light utility helicopter. It typically seats the pilot plus six passengers (the pilot sits in the right front seat). There are different configurations (basic, B2, B3, etc.) so the specs can vary significantly. The main rotor has three blades. The maximum speed is around 246 km/hr. The empty weight is about 1170 kg. The maximum sling load is approximately 1000 kg (dependent upon weather, fuel load, altitude, etc.) but can vary significantly depending on the exact model.

Figure 26.31
A-Star on the Ground.

The proper traditional name for an A-Star is the Eurocopter 350, although the model number has changed recently.

Figure 26.32
A-Star Slinging Trees.

The A-Star has a lot of power for a light helicopter, and is a good machine for medium-sized loads and medium distances.

Figure 26.33
A-Star Landing.

You can see that the A-Star has three blades on the main rotor, which is one of the quickest ways to distinguish it from a Long Ranger. To a non-pilot, they look quite similar (especially when the paint job is the same, as is shown in the next figure).

"Long Ranger" - Bell 206 Series

The Long Ranger is part of the same 206 series as the Jet Ranger. The Long Ranger variation (206L) is thirty inches longer than a Jet Ranger. This additional space allows it to incorporate two rear-facing seats in the rear seating compartment, allowing for a total of six passengers (plus the pilot).

The Long Ranger is also more powerful than a Jet Ranger. Among other things, it has higher permitted take-off weight, higher horsepower, greater fuel capacity, and higher maximum ceiling.

Figure 26.34
Long Ranger Taking Off.

This machine is about to start doing some slinging. Look at how similar the body style appears when compared with the A-Star in the previous photo. The obvious difference is that the Long Ranger has only two blades on the main rotor.

Figure 26.35
Cargo Basket on a Long Ranger.

This machine has a nice deep cargo basket.

Figure 26.36
Long Ranger on the Ground.

Again, the fact that the Long Ranger only has two blades on the main rotor becomes very obvious in this photo.

"212" - Bell 212 Helicopter

The Bell Model 212 is a medium-sized helicopter which is not often encountered in planting operations, except on very large contracts which feature pure helicopter access (ie. even the camp must be flown in), or which feature very long travel distances and extensive tree delivery requirements.

The Model 212 is a twin-engine machine which follows the earlier 204 and 205 series, developed as a joint venture between Bell and Pratt & Whitney Canada, with support from the Canadian government. Prototypes flew in 1969, and commercial production began around 1971. This model is

significant due to its Twin-Pac engine installation. Although engine failures are certainly not something that planters need to be worried about, from an engineering viewpoint this is interesting because if one engine should fail, sensors in the gearbox instruct the remaining operating engine to switch to full power, thus providing a true "engine-out" capability, even at maximum takeoff weight. The differences between the 204/205 and the 212 are very minor, although the 212 looks slightly different due to an altered nose structure.

The Bell 212 is a medium twin utility helicopter. It has one or two pilots, and seats thirteen or fourteen passengers. The main rotor has two blades. The maximum speed is about 206 km/hr. The empty weight is about 2765 kg. The maximum sling capacity is about 2270 kg (dependent upon weather, fuel load, altitude, etc.).

Figure 26.37
Bell 205.

This larger machine (which carries fourteen passengers) is ideal for moving massive loads of trees, or ferrying passengers for a long distance, although it's not so cost-efficient for light work like spreading out caches. The 205 is very similar to the 212.

Logistics

Sometimes, helicopters are used to fly trees while planters are walking into a block. There are various reasons for this. The most common is when a block is easily accessible on foot, but quads are unable to quad across the block (due to a lack of roads, or swampy/wet roads) to deliver trees to caches.

It's also possible that your crew will be asked to do a significant walk-in, rather than flying into the block (hopefully you get paid extra for this walk). This often confuses planters, especially when the helicopter is already on site, and is flying the trees into the block. Let's look at the math.

It can take quite a while to fly a crew into a block. Depending on the machine used (3 to 5 passengers per flight), the distance to the block (anywhere from two minutes to half an hour or more each way), and the number of planters being flown, it rarely takes less than an hour to fly all of the planters into a block, and sometimes can take two hours or even longer. Based on the total flight time to get all of the planters into the block, you can divide that number by 2 to determine the approximate average time before any individual planter is delivered to the block. If the time for the average planter to walk into the block is less than that, it makes sense for the planters to walk instead of fly (assuming there are no rivers or other obstacles in the way that make walking unsafe or impossible). This

analysis also omits consideration of helicopter costs. If the planters could all walk into a block in an hour, or fly into a block in an hour, would the planters be flown in simply because it is easier or more exciting? Probably not, because most helicopters cost at least $1200 per hour. It makes far more sense to ask the planters to walk in, and the economics even allow the planting company to pay a bit extra per tree (to compensate for walking time) because it's a lot cheaper than flying the crew.

A final consideration is that it doesn't make any sense to fly a crew into a block if the trees aren't already in place. Otherwise, the crew has to sit and wait for trees to be slung. Ideally, if the helicopter doesn't have to spend time moving people, it can start slinging trees immediately and planters will never have to sit on the block and wait for trees to arrive.

The Phonetic (Aviation) Alphabet

Pilots often appreciate the use of the aviation alphabet when giving instructions over radios, especially when the signal isn't five-by-five. When naming caches, it can be especially confusing with a bad radio connection if all the cache names end with the same sound, ie. B, C, D, and E. Better to use names like Bravo, Charlie, Delta, and Echo.

To avoid the all-too-common situation of planters making up random words to associate with letters of the alphabet, here's the complete official aviation alphabet:

A – Alpha
B – Bravo
C – Charlie
D – Delta
E – Echo
F – Foxtrot
G – Golf
H – Hotel
I – India
J – Juliette
K – Kilo
L – Lima
M – Mike
N – November
O – Oscar
P – Poppa
Q – Quebec
R – Romeo
S – Sierra
T – Tango
U – Uniform
V – Victor
W – Whiskey
X – X-Ray
Y - Yankee
Z - Zulu

Figure 26.38
Long Ranger Rear Seating Compartment.

The Longer Ranger has two extra seats compared to the Jet Ranger, as well as being a more powerful machine.

Figure 26.39
Flight Panel of Long Ranger.

In this photo, you can see a small yellow box on the left side of the flight panel. That's the actual ELT device for this helicopter.

For more photo and video resources associated with this chapter of the book, visit:
www.replant.ca/training/helicopters