## March Meeting

Topic: The evolution of RCAF Search and Rescue (SAR)
Speaker: LCol Clinton Mowbray
Reporter: Gord McNulty

LCol Clint Mowbray
*Photo Credit - Neil McGavock*

CAHS Toronto 2nd Vice-President Neil McGavock introduced LCol Clinton Mowbray, who hails from Parry Sound. Joining the Canadian Forces in 1989 through the Regular Officer Training Program, he immediately attended Royal Military College in Kingston, and earned a Bachelor of Applied Science degree. After two years of pilot training, LCol Mowbray was awarded his wings. He was posted to 444 Combat Support Squadron in Goose Bay, Labrador, to fly CH-146 Griffon helicopters. In 2000, LCol Mowbray was posted to 3 Canadian Forces Flight Training School in Portage la Prairie, MB, as a helicopter pilot instructor. During this tour, LCol Mowbray held the role of Deputy Flight Commander and Standards Officer. He also achieved 900 hours of instructional time and an A2 instructor rating. LCol Mowbray was posted to 424 Transport and Rescue Squadron at CFB Trenton in the summer of 2005, where he flew CH-149 Cormorant and Griffon helicopters on SAR operations. After returning from a short deployment in the Middle East, he was promoted to the rank of Major in December 2006 and appointed the 424 Sqdn. Readiness Officer. In 2008 LCol Mowbray was deployed to Kabul, Afghanistan, as the NATO Personnel Recovery Director where he was responsible for co-ordinating the recovery of isolated soldiers and civilians in a war zone. Following his tour in Afghanistan, LCol Mowbray was posted to A3 SAR at the 1 Canadian Air Division, where he spent three years providing operational advice at the HQ level on all SAR equipment including four different aircraft types, life support equipment and mission kit. In August, 2011, he was appointed Commanding Officer of 103 Search and Rescue Squadron in Gander, NL, where he also flew the Cormorant. He is currently attending the Joint Command and Staff Program at the Canadian Forces Staff College, where he is working on a master's degree in defence studies. This summer he will be posted to Comox, BC, to take command of 442 Transport and Rescue Squadron.

Beginning his presentation on the evolution of SAR in the RCAF, Clint traced how aviation grew rapidly after the Silver Dart made the first powered, heavier-than-air flight in Canada at Baddeck on 23 February, 1909. Aviation pioneers experimented with how fixed-wing aircraft could be used for aerial photography, reaching remote locations and conducting "mercy" (now called humanitarian) flights. Aircraft were equipped with floats, or flying boat-style hulls. It was ad hoc as the military, police and civilian pilots responded to emergencies as best they could. Motor torpedo boats were used during the Second World War to provide fast rescue, particularly to save aircraft crews who might otherwise be lost. They would often be pre-positioned in clusters along the expected flight routes to expedite response time. Wilfrid 'Wop' May, OBE, DFC, became especially famous as a pioneer. After serving with the Royal Flying Corps during the First World War, May went on to an illustrious career as a commercial and bush pilot who flew a wide variety of humanitarian, rescue and transport missions in Canada's North. He helped many people in distress in remote locations. May's innovative leadership overcame the problem that some people could be helped only by dropping supplies from the air. If they were seriously hurt, such assistance wouldn't be that effective. So May developed the concept of para rescue. He sent his mechanics to a new course offered in the United States to fight forest fires. They learned how to parachute from aircraft to the ground. Back home, an initial experiment went awry after one of them landed in the wing of a wooden and fabric aircraft on the apron. To reduce the risk, May approached the RCAF about para rescue and within a year, the air force adopted the idea.

In 1944, Canada became one of the original 52 countries that formed the International Civil Aviation Organization (ICAO) at Chicago. The agreement, in part, established standards for search and rescue capabilities in Canadian territory. Canada put together an interdepartmental committee on search and rescue, committed to finding resources to meet ICAO commitments, and it continues today. The first helicopter rescue in Canada took place in 1945, when a U.S. Coast Guard chopper based at Goose Bay, Labrador recovered an aircraft that had crashed beyond the reach of conventional aircraft. On 18 July, 1947, the cabinet officially tasked the RCAF to provide the assets and co-ordination for search and rescue across Canada. Four regional rescue co-ordination centres (RCCs) – Eastern, Central, Western and Pacific – and seven rescue units were established. The original aircraft were exemplified by the Canso, the Dakota, the Lancaster, the Sikorsky H-5, the Norseman, the Piasecki/Vertol H-21, and the Sikorsky H-34. The RCAF was also tasked to co-ordinate and assist with marine responsibilities. In the 1950s, the RCAF added the DHC-3 Otter. The Albatross replaced the Canso in 1960 and the Boeing Vertol CH-113 Labrador came along in the 1960s. Subsequent aircraft included the DHC-5 Buffalo, the DHC-6 Twin Otter and of course the CC-130 Hercules which continues to play a major role today. RCAF SAR aircraft were equipped with 121.5MHz emergency beacons, which dated back to the Second World War in various versions. Although mandated for military use only, civilian pilots increasingly used them out of concern for their own well-being. SARSAT (search and rescue satellite automated tracking) was a major initiative to improve search and rescue that came on line in 1982. The system was developed in a joint effort by Canada, the United States and France to establish a satellite-based program that would overcome the limitations of analog beacons. Although121.5 was a very inefficient frequency, it had great momentum with the civilian community. A similar system, COSPAS, was developed by the Soviet Union and the four nations banded together to make the Cospas-Sarsat system fully operational by 1984. This international system uses a network of satellites to detect and locate emergency beacons carried by ships, aircraft or individuals. It allows certain pieces of equipment to be piggybacked on satellites as they are being put up. The system is regarded as a tremendous advance in protecting the lives of aviators and mariners with technology that would have been unthinkable before the Space Age.

After the sinking of the *Ocean Ranger* east of St. John's in heavy weather in 1982, with the loss of 84 crew members, the government appointed the minister of national defence as the lead minister for search and rescue. The National Search and Rescue Secretariat was established by the cabinet in 1986 and while it has made progress, Clint noted it still has work to do in bringing all of the key players in SAR to the table. The volunteer Civil Air Search and Rescue Association (CASARA) was also established around 1986 to assist in SAR operations. The number of large area searches has dropped over the years, as better beacons and communication have come on stream. CASARA now has a lesser role, but it has provided thousands of valuable hours for SAR. The RCAF's RCCs have been trimmed to only three: Halifax, Trenton and Victoria. Trenton, alone, is responsible for a vast area covering more than 10 million square kilometres extending well into the Far North. Night vision goggles came along in the 1990s, helping to improve safety and operational effectiveness across the board. They've really enhanced the ability of SAR crews to look for survivors and to fly aircraft in conditions that would be otherwise impossible. Clint noted that an RCAF officer, Rob Mulholland, devised a SAR mission management system allowing all the RCCs to integrate their efforts across Canada in real time. He developed the system, which has revolutionized the efficiency of the RCCs, in his spare time while working as a rescue co-ordinator at Trenton. The system provides the latest and best information on sightings that have been reported, phone calls that have been made, etc., and has since been upgraded with map data bases. On 1 February, 2009, Cospas-Sarsat finally stopped listening to 121.5 MHz frequency beacons. Although the analog 121.5 frequency had always been prone to erroneous readings and erratic signal strength, it wasn't until around 1999 that Cospas-Sarsat transitioned to the much better 406 MHz beacons. Rather than continually releasing a pulse on the analog band, digital beacons release an instantaneous burst of data once every 50 seconds. One short burst greatly reduces the

strain on the battery and allows a higher wattage input. Also, the digital data includes a unique code which allows searchers to determine the ownership of an aircraft, where it's normally based, and emergency contact numbers. More advanced 406 beacons include GPS and coding providing an exact position for aircraft that had these devices on them.

### *The Mighty Cormorant*

Clint then focused on the AgustaWestland CH-149 Cormorant, which came into Canadian Forces service in 2002. During its first 10 years, the three-engined helicopter experienced some teething pains in what Clint attributed to factors such as brand-new technology and extensive use of composites. The problems have generally since been overcome. General equipment includes standard UHF/VHF/FM radios, which allows crews to work on marine and standard aviation frequencies. Satellite communications, through commercially available systems, have made a big difference in allowing Cormorant crews to change flight plans, get updates in weather and search positions, and communicate with RCCs. Clint outlined various navigation tools such as two IFR-certified GPS units, allowing Cormorant crews to conduct GPS approaches. The Cormorant is certified to fly in moderate icing conditions, which is a huge plus in Canada's harsh weather. If icing accumulation exceeds 16 mm, the crew has to find a place to land, shut down, and inspect the aircraft and clear the ice before taking off again. Of note, AgustaWestland test pilots took the helicopter to 180 mm of ice and never had any issues. Clint noted ice builds up only on surfaces that are not deiced. The complete rotor system, lift system, engine intakes and all other sensitive parts of the helicopter are all heated. The radar, unfortunately, is about of the same vintage as the CH-113 Labrador. That's a result of cost constraints arising from the government's decision to cancel the order for AgustaWestland's more fully equipped EH-101 and settle for the Cormorant. However, the radar is very good at identifying vessels, mapping coastlines, etc. The Cormorant has a four-axis autopilot, which allows crews to pull the aircraft into the hover manually, then use a button to automatically transition into forward flight over water. The maximum all-up weight is about 14,500 kilograms (32,000 pounds). Internal capacity is 5,000 kg (11,000 pounds) and fuel capacity is 4,200 kg (9,260 pounds). Maximum range is 700 nautical miles (1,300 kilometres). Cruising speed is about 130 knots (150 miles per hour), providing optimum range before higher speeds burn more fuel. Endurance is about six hours. The offshore range, on an ideal VFR day, with light winds and no chance of fog or cloud, is as far as 280 nautical miles from land. Capacity is five crew and 16 passengers. The crew includes two pilots; a flight engineer in charge of maintenance, conning (vertical descents) the aircraft in confined areas, and manning the hoists for the SAR Technicians; and two SAR Techs. The rescue hoist can be extended, in extreme cases involving mountains, to just under 300 feet. SAR Techs also assist with conning duties. Standard fuel load is 2,100 kgs. (4,600 pounds) on the ramp. The crews don't keep a full tank of gas for safety reasons, as they couldn't do a hoist rescue that happens to be near a base with maximum fuel loads. A nearby SAR mission with a heavy load would be especially risky in the mountains of B.C. Accident survivors enter the chopper via a stretcher known as a Stokes litter. A rescue basket is used where there are no spinal issues involved. The Cormorant can operate in poor weather. It doesn't matter what the ceiling is, along as visibility is one-quarter mile. The crew can take off as long as an alternate site is available. For search operations, they try to keep themselves at half-mile visibility and 300-feet ceilings. Often, however, they're lower, especially when they're over water and they don't have to worry about towers or hydro lines. The crew adheres to safety rules, but Clint said they don't always take the rules as hard and fast because there are circumstances where discretion is necessary.

While a standard crew day for the rotary wing SAR community is 15 hours, it can be extended to 18 hours. Clint observed that despite technological advances, "at the end of the day nothing beats a human eye and a human brain" in determining that a real-life situation is involved. Innovations such as thermal imaging are not going to revolutionize SAR at this point, but there are places where it could be used. Hand-held thermal imagers are limited in that they can't see through things, including windows, so a helicopter crew can use them only when the door is open. They also have very narrow fields of view, so large areas can't be covered effectively. The capabilities of 424 Sqdn. were shown dramatically on 13 December, 2013, when the crew of a Griffon rescued a worker trapped on a construction crane at the scene of a massive fire in Kingston. Faced with an inherently dangerous situation, the crew's extensive training, experience and judgment were invaluable. Most impressive, exceptional bravery at sea was shown by three SAR Techs in saving the lives of two Inuit hunters stranded in icy waters near Igloolik, Nunavut, on 27 October, 2011. Two SAR Techs jumped in to save the hunters, but tragically Sgt. Janick Gilbert, a third SAR Tech, perished. Clint recalled that a Hercules from CFB Winnipeg, the first aircraft to spot the hunters, stayed as long as it could. Then a Herc from CFB Trenton arrived, with the three SAR Techs. A radio and two life rafts were dropped to the hunters, who were in an aluminum boat. The second Herc lost radio contact with the hunters and a Cormorant that had flown a 2,700-kilometre odyssey from Gander was still a couple of hours away. The courageous SAR Techs felt they had no choice but to parachute from the Hercules. The first SAR Tech reached the hunters and put them into the raft after a 30-minute effort. The second SAR Tech became exhausted after 30 minutes, went into survival mode, and put himself into a one-man raft. High winds, however, blew Gilbert off course during the jump. He became separated, was in the water for five hours, and was found unresponsive. An account of this mission, published in the Toronto Star on 20 April, 2012, cited an initial report concluding that the tether to hold Gilbert's raft to his life preserver had separated and his raft had gone missing. It also suggested that his dry suit, meant to ward off hypothermia, was "not optimized" for the Hercules. Capt. Aaron Noble, the aircraft commander, recently received a Meritorious Service Cross for his role in the operation, which required more than 2,000 kilometres of travel, far exceeding the maximum air crew day. He also received a Meritorious Service Medal for his role in the 2011 removal of a sailor from a fishing vessel due to an emergency. Clint answered several questions. He noted that 14 of the original 15 Cormorants are in service today. On 13 July, 2006, a Greenwood-based Cormorant of 413 Sqdn. crashed off the coast of Canso, NS. Three crew members died in the training mishap, in poor visibility. Cormorants were originally stationed at Gander, Greenwood, Trenton and Comox, but in 2005 they were reallocated and the smaller, twin-engined Griffon was substituted for the Cormorant at Trenton. Despite its limitations, the Griffon has been able to perform all of its assigned tasks. Crews launch immediately when a call comes into Trenton. During the day, Monday to Friday, from 8 to 4, they aim to have wheels up in 30 minutes. After hours and on weekends, the goal is two hours. Clint reviewed figures for 103 Sqdn. showing that over three years, average response time for wheels up was 20 minutes during the day and 55 minutes in the evening. Much depends on the type of aircraft involved. The Cormorant takes longer to fuel and prep than the Griffon with additional crew safety checks involved, IFR versus VFR departures, etc. There are added complexities such as the complexity of the destination or waiting for medical crews to arrive. Website Support Volunteer Bob Winson thanked Clint for a comprehensive and informative overview and presented him with a gift on behalf of the Chapter. The presentation certainly left the audience with a new appreciation of the capabilities and the courage that are essential to the success of search and rescue in Canada.

Graduating Class of SAR Technicians - Only 1 in 3 candidates are accepted for training
*Photo - DND*

**SAR Appendix**


SIkorsky H-5
The first rescue helicopter type operated by the RCAF
*Photo Credit - DND*


Cormorant CH-149
Rescue 912 Demonstrating lowering a SAR Technician
*Photo courtesy - Mike Reyno*


Lancaster FM 104 with Rescue Role Modification. This aircraft is now being restored by the Toronto-based Canadian Air & Space Museum
*Photo Credit - DND*


Sikorsky H-34 and Piasecki Vertol H-21
*Photo Credit - DND*


Grumman Albatross on patrol
*Photo Credit - DND*

DHC-5 Buffalo and CH-113 Vertol Labrador on a joint SAR mission
*Photo Credit - DND*