also go off the base and give the State Wardens a helping hand in their areas. This includes game, fish, waterfowl and boating law enforcement.

Another phase of coordination and cooperation is the instruction of hunter safety courses to school children. The Virginia Game Commission has an outstanding program for school children of Virginia. Their safety course is a four-hour course that teaches guns, gun safety, hunting safety, game laws and sportsmanship. The Base Game Warden and Wildlife Manager have qualified to instruct this course. Last year over 2,000 children were instructed on the base and in the city and county schools in the Northern Virginia area. Also, over 20 teachers were trained to qualify them as instructors.

Gentlemen, this is not all work. We have a lot of fun also. Each year a game warden's hunt and banquet is held at Quantico. The Virginia Game Commission personnel, Commonwealth Attorneys, County Judges, and other members of the Virginia Law Enforcement Staff meet at Quantico for a full day of hunting followed by a big feast afterwards. Also, each year the Virginia Game Wardens have a big hunt and all the Quantico game law enforcement personnel are invited.

With the outstanding help given by the Virginia Game Commission and the Bureau of Sport Fisheries and Wildlife, we have an excellent program at Marine Corps Schools. Without this cooperation it could not have been so. We have tried to show the outstanding relations in the Quantico area and it is sincerely believed that it can work on all bases.

THE HELICOPTER

A Versatile Management and Enforcement Tool

By JOSEPH W. PERROUX

We need only repeat its title to summarize the contents of this paper. Yet with all its versatility, the helicopter should not be viewed as a full substitute for all other vehicles used in wildlife management operations. With a minimum of accessories, it is readily adaptable to many uses by which both time and manpower can be most productively employed.

During the 1963 waterfowl season, a small helicopter was rented by U. S. Game Management Agents and used for enforcement in the marshes of south Louisiana. This limited use indicated the helicopter's potential for wildlife enforcement purposes. In 1965, the Bureau of Sport Fisheries and Wildlife purchased its first machine. Subsequently, it has been used extensively on the breeding grounds of Canada, and in enforcement along the Gulf and Atlantic Coasts. This broader employment further substantiated its utility as a management and enforcement tool.

The helicopter is available in several models, from single seat to 35-passenger capacity. Each has its limitations and capabilities. As with other means of transportation, the user may choose a model best suited to a particular job or need. Over 40 models are available from at least 10 different manufacturers. The price range is quite wide, upward to $500,000. Machines suitable for wildlife management purposes are available in the $40-$60,000 bracket. This may seem exorbitant, but when compared with cost of equipment now in use and considering its potential for broader usage, it could be a bargain. Today, even a small airplane costs $10,000, and cost alone should not be a deciding factor.

The helicopter is not new. It was conceived as early as the 16th Century. The autogiro, a sort of half helicopter and half airplane, has been flying since the early 30's. The true helicopter was perfected just prior to World War II. Although testing continued during the war, none was produced for other than experimental use until 1947. Wide use during the Korean War established the machine as a practical piece of

flying equipment. With several manufacturers currently competing for the military and expanding civilian market, the result is a wide choice of models and a better and more dependable machine. What is the prospective role of this machine in modern game management programs? A few activities in which helicopters may be potentially useful are suggested below.

The use of aircraft in census and survey work has so increased efficiency that planes are considered routine working tools of the modern game manager. Valuable time and manpower are saved. A statewide survey is completed in a matter of days. Transect coverage verified by air-ground comparison checks and projected by expansion factors produces a reasonably accurate inventory. These data usually are sufficient for determining annual trends in expansive habitat. Game management and public hunting areas are relatively small, are scattered throughout a State, and may require a much more intensive inventory of wildlife populations.

Hunter interest demands maximum wildlife production and utilization on such areas. The manager must be intimately acquainted with annual production and carrying capacity. This cannot be determined by once-over-lightly methods. It calls for specialized equipment and techniques, and the helicopter may fit this need perfectly. Altitude and speed can be varied to suit the particular job. The machine can land on or near objects or areas of interest, thus saving time and increasing efficiency.

Waterfowl banding in remote areas is built to order for the helicopter. Bait, traps, boats, and motors can be moved to the trapping site in a few hours, whereas it may take days to get in operation by other means. Complete bait-banding traps can be moved by using a sling. Assembled deer traps could be relocated the same way. Most helicopters can "sling" a load of 800 pounds. Bulky objects are hauled easily, and the sling can be released either by the pilot or ground crew. Last summer, these tactics were employed at Ungava Bay in northeastern Canada. The helicopter not only hauled men and equipment but was used to herd geese into the trap. The project was successful and over 2,500 Canada geese were banded.

Collecting is simplified by going directly to the area, leaving the collector at a strategic point, and aiding him by driving specimens within range. Dusting, spraying, or seeding with a helicopter is much the same as with an airplane, except that loading may be accomplished at the work site, thus saving time. A helicopter with a 600-800-pound load capacity can spray 12-14 acres per minute, and the danger of drift can be virtually eliminated. Control of drift is critically important when using any type of herbicide. In tree-lined canals or bayous too choked with water hyacinths or alligator grass for a spray boat to navigate, a channel can be opened by lowering a spray nozzle 50 to 75 feet below the machine and flying the canal. The spray width can be controlled and drift almost eliminated.

In fighting fires, the helicopter can move men and equipment to the edge of the flame. Its use could be ideal in checking the progress and directing control measures. A unit has been perfected consisting of a gasoline-driven two-inch pump and 1500 feet of nylon hose which can be hauled by helicopter to a water supply. The pump is positioned near water, and the hose is then strung out by the helicopter. This may not be practical in all situations, but it demonstrates versatility of the machine.

In game and fish protection, the helicopter is a combination of the best features of the airplane, mudboat, marsh buggy, and jeep. It has no peer in gaining ready access to remote areas. It facilitates team effort. Direct evidence is more often positively verified. Indisputable evidence strengthens the case. Of the more than 60 waterfowl cases made with the helicopter in Louisiana last year, not one was contested in court.

In waterfowl baiting violations the past few years, bait is often placed to one side of the blind or even in an adjacent pond, rather than

in or around decoys. In these circumstances, even a diligent on-the-ground search may not detect its presence. It is readily observed from a hovering helicopter, however, which tends to discourage this unlawful practice. Employing this craft to check hunters in a blind or boat lessens the opportunity to hide excess limits along the trail to be picked up later, or dispose of live decoys.

Of the various types of equipment used by hunters and fishermen today, it is interesting to speculate which may have been designed to aid the intentional violator. For example, the Reelfoot Lake stump jumper, air boat, marsh buggy, motorized pirogue, and Lafitte skiff didn't come originally from the engineer's drawing board. Each was built in someone's backyard with the specific purpose of providing more efficient transportation to areas virtually inaccessible by other means. Speed was not an important consideration in designing some of these vehicles. Others, however, were built with the intent of outrunning the game warden. We in enforcement not only were slow in adopting these new modes of travel, but also failed to recognize their greater versatility. Different types of equipment may often be needed in areas only a few miles apart. The helicopter combines many of these vehicles into one, and through its use two men are capable of covering a very large area in much less time and with greater effectiveness than a large crew using other types of conventional equipment.

In depredations control, our experience with the helicopter has concerned only complaints involving ducks and geese. In southwest Louisiana about 90% of this problem is with blue and snow geese in rice field and marsh pastures. These geese generally feed in deep marshes, but changing conditions in recent years have brought about greater use of pasture lands. In the past couple of years, some flocks of geese may never have utilized the marsh, remaining in farming areas throughout their stay in Louisiana. Disturbance by hunters during the open season disperses these flocks so that feeding is intermittent throughout pasture areas with little damage by geese. But with the closure of hunting and rapid growth of pastures during late winter and early spring, concentrations of birds on such areas quickly result in complaints of severe damage. When blue and snow geese concentrate on succulent grasses, they consume the whole plant. Cattlemen can suffer severe losses within a short time, and corrective action must be taken quickly. The first and most effective control is to move the geese from the area before they establish a feeding pattern; then immediately employ pyrotechnics. Geese will generally return to the field within an hour, but if fireworks are used promptly they will abandon the field. If there's a lapse of three or four hours between initial herding and setting up fireworks, it is more difficult to discourage their return and an entire day may be spent on one complaint. Using a helicopter, it is a simple matter to move them from the area, land in the field, and demonstrate use of fireworks to the farmer in one operation. This machine makes possible a practical demonstration and token assistance which effectively alleviates the problem before it becomes serious.

Use of the helicopter in pollution control has real possibilities. Time is an important factor here. A sudden shift in wind, heavy rain, or fast flowing stream may in a matter of hours severely aggravate the problem. Investigation must begin immediately after the complaint is received. In some circumstances, a helicopter is the only piece of equipment which could be used to check the complaint, gather evidence, and land and initiate corrective measures all in one trip.

The helicopter has unlimited potential in the field of public relations. The conservation officer contacts a broad segment of the public and his services are in wide demand. He is intimately familiar with the streams, lakes, forests, and marshes of his assigned area of responsibility. Usually, he is the first to learn that a hunter or fisherman is lost. His time and equipment are at the disposal of those who coordinate relief operations in time of local disasters. The helicopter fits this need in a way that cannot be met with other conventional equipment at his disposal.

Although the advantages of the helicopter far outweigh its shortcomings, prospective users should be aware of its less favorable points. First is cost. An adequate machine costs some $45,000, about twice that of aircraft commonly used in conservation work. Cost per hour of operation is about 1½ times that of a conventional aircraft. Speed is another consideration. Helicopters are relatively slow by today's flight standards, ranging from 80-100 MPH. On the other hand, its capacity for operating at reduced speed best suits requirements for many operations. Helicopters can be operated in inclement weather when other aircraft may be grounded. Its ability to fly forward, backward, sideways, up or down, and to hover are features not found in fixed-wing aircraft; but caution must be exercised in these maneuvers at certain altitudes or airspeed to avoid unnecessary danger. Each manufacturer's product has its particular limitations; but with the helicopter's ability to auto-rotate (dead engine landing). If properly flown it can be the safest aircraft flying today.

Only a few of the many wildlife management jobs for which the helicopter appears to be ideally suited have been briefly described. In some, flying techniques must be developed to preclude adverse public reaction, and to assure safe operational procedures.

Limited use of this machine by the Bureau of Sport Fisheries and Wildlife in several programs has demonstrated its potential for broader use in other conservation activities. Because of its unique flying capabilities, it may be broadly suited to the various needs of the wildlife manager. It is hoped this paper will stimulate an interest in further exploring use of the helicopter as a means for enhancing all programs concerned with preservation of our country's wildlife resources.

TRAINING AND EDUCATION FOR LAW ENFORCEMENT IN LOUISIANA

The need for training and education is very simple. For a person to do his job well, he must know what is involved and how to do it. Experience is an excellent teacher, but we no longer have time to learn by trial and error. So much knowledge has been accumulated and it is developing so swiftly, that constant efforts must be put forth by a person in any field just to keep abreast of developments.

Since the L.S.U. Law Enforcement Training Program began in 1953, there have been more than 11,000 course completions by more than 5,000 individual officers. We believe, with a feeling of satisfaction, that the program has assisted in upgrading law enforcement in the State.

The primary functions of our program have been, and are, to furnish training to personnel of those departments which do not have training facilities and to supplement the training given by those departments which give training.

The program has prospered as the result of continued efforts of the leaders in law enforcement.

The program started with one instructor who operated on a limited budget provided by the University. After much consideration as to what would be the most effective way of conducting the training, it was decided to operate it on an itinerant basis. Classes were organized in five sites or centers in the State where instruction was offered for three hours, one day per week for seventeen weeks. This made it possible for officers to attend the classes while still working full time.

Basic subjects in law enforcement were offered in the beginning, but in time more advanced training was offered in this category.

The 1955 Legislature provided additional funds and the program was expanded to three instructors. This provided for two men to conduct itinerant courses (Principles of Law Enforcement) and one devoted his time to specialized schools.