INTRODUCTION

Wildlife workers use helicopters for a variety of missions. These expensive and powerful machines must be treated with respect. People have been injured, some fatally, in helicopter accidents that would not have occurred had they been briefed on helicopter safety. Equally important is the understanding of the operational and co-ordinating procedures for fixed-wing and helicopter work. Safety and planning is essential, as this type of work is often conducted in remote and wild places with minimal mechanical and medical assistance.

Helicopters provide versatile flight capabilities: they are agile, extremely manoeuvrable and allow flexibility in wildlife missions. For example, they can be used for mass capture of animals, aerial darting platforms, telemetry tracking, underslung heavy-lift missions, and to deploy tracking teams ahead of poachers.

Helicopters are expensive to operate, extremely noisy and in many wildlife missions, it is prudent to combine a fixed wing with a helicopter to increase flexibility in terms of cost and operational logistics. Proper planning is really important to ensure that the cost associated with the use of a helicopter is effectively
spent. Experience of the dart operator or ground operator is absolutely essential to complement the experience of the helicopter pilot, in order to make dart or mass capture operations safe and cost effective. It is important to appreciate that when one begins operating in this field, one must work with experienced persons to gain the necessary field experience. Sufficient knowledge of the operating conditions and animal species is necessary. Inexperience, unnecessary risk taking and poor planning will result in animal and human injury and or death!

8.1 CHOICES: MAKES AND MODELS

8.1.1 Helicopter – Robinsons

a. Robinson 22

The ‘Robby 22’ is a two-seat, piston-powered, two-blade rotor-craft. More than 3 600 have been sold worldwide. It is the most popular training helicopter. The R22 is best suited for mass capture and mustering operations, which ideally only require the pilot. It must be mentioned that this helicopter was not designed to do technical capture operations and most insurance companies will not insure these helicopters any longer if they are used for wildlife capture.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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</thead>
<tbody>
<tr>
<td>☑ Low capital cost</td>
<td>☒ Limited power</td>
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<tr>
<td>☑ Low operating cost</td>
<td>☒ Limited operational uses</td>
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<tr>
<td>☑ Unit can be ferried on a trailer</td>
<td>☒ Low ground clearance</td>
</tr>
<tr>
<td>☑ Good availability</td>
<td>☒ Darting done from opposite side to pilot</td>
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Figure 8.2: White rhino field operation in Hwange National Park using a helicopter and fixed wing

Figure 8.3: Robinson R22 being used to transport a six-month-old immobilized black rhinoceros in Sinamatella, Hwange NP, Zimbabwe
Note: One of the weakest links when working with helicopters and fixed-wing aircraft in the field is communications. It is essential to ensure that ground-to-air communications are in place and work, including spare batteries for mobile radios. Smoke flares are a useful addition to equipment carried as well as water, both for cooling animals and drinking. There have been a number of deaths in Africa over the last decade or two of people working in the field with dangerous wildlife, resulting from poor or no communications between ground crews, individuals and aircraft.

**8.2 BASIC HELICOPTER THEORY AND SAFETY**

There are three key factors that relate to helicopter theory and safety around the helicopter:

- factors affecting helicopter performance
- understanding height vs. velocity graph or dead man’s curve
- general safety around the helicopter.

**8.2.1 Factors affecting helicopter performance**

**Air density is the single most important factor affecting helicopter performance.** Three factors determine air density:

- humidity
- pressure
- temperature.

Air density increases with increasing humidity and pressure, and decreases with decreasing pressure and increased temperature. More than one of these factors may combine to reduce flying capabilities.

**The most important conditions to consider are:**

- altitude (pressure)
- temperature.

Air density has a direct bearing on ‘lift’ generated by the blades and the amount of oxygen taken into the engine, determining its power capabilities.

You will often hear the words ‘hot and high’ or density altitude. How does a pilot compensate for these conditions and remain within safety limits?

**The load on the rotor blades can be influenced by operating in optimal temperature conditions:**

1. Early mornings – cooler conditions are favourable to both helicopter and the animals being handled.
2. Late afternoon – a suitable choice but be careful of diminishing light and managing animals in the dark.
3. Minimizing fuel carried – spare fuel can be carried by ground support.
4. Minimizing equipment carried. Carry essential kit only – try to carry only what you will need, especially water. Spare kit can be carried by ground support. It’s better to do ‘ferry’ trips than forgo safety.

**8.2.2 Understanding the height vs. velocity graph or dead man’s curve**

Under normal flight conditions, a safe forward airspeed with corresponding height will allow a pilot to execute recovery procedures (autorotation). Darting, game capture and other wildlife missions require the helicopter to work in conditions known as ‘the dead man’s curve’.
The graph illustrates the condition where the helicopter is operating between ground level and 500 feet with a forward speed of less than 30 knots. This condition can worsen if trees, power lines and obstacles restrict the options available to the pilot. The tail rotor or anti-torque rotor provides directional stability by countering the torque produced by the main rotor blades. In normal flight conditions, high forward speeds compensate the anti-torque requirements due to the ‘weather cock’ action of the tail boom and vertical stabilizer.

Within the ‘dead man’s curve’, the anti-torque rotor is working at its maximum to provide directional stability. Therefore, it is critical to ensure nothing negatively influences the effective operation of the tail rotor.

Pilots are trained to operate helicopters in these conditions.

Figure 8.11: Helicopters often operate in adverse conditions. Good maintenance, adherence to safety procedures and good communications are essential.

8.2.3 General safety around the helicopter

**Loading and unloading a helicopter**

1. Preferably, load and unload when the helicopter is not operating.
2. Do not smoke around a helicopter under any circumstances.
3. Cargo should be loaded in the sequence relating to its removal: first in, last out. Items needed first must be loaded last.
4. Ensure the pilot agrees with the loading.
5. Do not load anything near or close to the control mechanism – cyclic, collective and anti-torque pedals.

Figure 8.12: Approaching and departing from a helicopter – areas of concern.