

When eagles scare—there are other ways to stop a rogue drone

February 10 2016, by Anna H. Jackman

Reckless or criminal uses of drones are on the rise and police forces have reported <u>"a spike"</u> in the number of drone-related incidents in the UK, mirroring the growth in the technology's popularity. This ranges from <u>hobbyist operators fined</u> for "flying dangerously" and a <u>rise in</u> <u>close-calls</u> with manned aircraft, to incidents of drones ferrying drugs into prison and even <u>unspecified "sexual offences"</u>. Authorities around the world <u>have also warned</u> of the growing use of drones by <u>hostile</u> <u>actors</u>, including insurgents and terrorists.

The mounting threat of drone users not following <u>aviation regulation</u> or committing crimes means police need effective ways to <u>stop and capture</u> <u>rogue devices</u>. One novel and widely reported idea being explored by the Dutch National Police is the training of <u>bald eagles to down drones</u>. While this "<u>low tech solution for a high tech problem</u>" has some advantages, the dangers it poses to the animals themselves suggests we shouldn't write off alternative counter-measures.

One of the key challenges for any anti-drone counter-measure is that the typical small size of most <u>drones</u> makes them difficult to detect and target. Drones are mobile, nimble and can use <u>technologies such as</u> thermal cameras to operate day and night. At first glance, the bald eagle may seem well suited to the task of downing a drone because of its "natural" ability to spot a target and rapidly intercept it – as the video below shows. By seizing the drone out of the sky, the bird disables the device without raising fear of it falling onto people below and instinctively finds a safe area to land.



But <u>critics have argued</u> that the idea of using the bird's natural hunting instincts fails to understand that <u>bald eagles</u> are not falconry predators who typically grab other birds out of the sky but rather eat mostly fish and carrion. Other more <u>practical issues</u> include the cost of training and keeping eagles for the occasional use of intercepting rogue drones, and the time it could take for a bird to be deployed to the drone's location. It's also worth considering that evidence shows animals are <u>physically</u> <u>affected</u> by a drone's presence, and the technology is banned in all US National Parks due to its <u>impact on wildlife</u>, especially birds nesting birds of prey.

Guard From Above, the company that trains the eagles being used by the Dutch police, claim the birds are used to overpowering large and dangerous prey, and that the scales on their talons which protect them from victims' bites will <u>also shield them</u> against drones. But the carbon fibre blades of many drones are unlike a natural hazard, and have been known to cause serious injuries, including a child's eye being <u>sliced in half</u>.

Interception

Eagle interception may appear simple but there are numerous other ways to intercept rogue drones already under development. Alternative physical interception methods also provide a way to deliver the target safely to the ground so the police can confiscate and examine it, without raising animal welfare issues. Police in Tokyo, for example, recently announced plans to deploy drones that can drop nets on rogue platforms, an approach that has been described as "robotic falconry". But, as with eagles, these relatively new and untested systems require trained officers to deploy them.

Other potential approaches include using another drone to intercept the rogue unit and <u>cause it to crash</u>, or one that fires projectiles or "<u>drone</u>



<u>munition</u>" at the target. However, this has the obvious downside of causing it to drop out of the sky, creating a considerable safety hazard and making the drone more difficult to retrieve.

Another idea for intercepting a drone is to manipulate its software or interfere with its electromagnetic operating range. A key advantage of these approaches is that they don't necessarily require a police officer to be present at the drone's location. One such method is known as geofencing because it involves erecting an <u>invisible "electronic fence"</u> that prevents drones from <u>flying into certain areas</u> or at certain times.

These areas are embedded into a drone's software <u>by the manufacturer</u> and can be added or altered with each software update. While this may be a particularly good way to protect sensitive sites such as airports, there are already concerns that some drone users may be able to <u>bypass</u> <u>the software</u>.

Other non-physical approaches to countering drones are more active and involve interfering with and manipulating the drone. Jamming involves sending out an electronic signal that blocks the GPS navigation system and attacks the <u>command link</u> to the operator, essentially confusing the drone. This can also affect other GPS users in the area, however, and unauthorised jammers are often illegal.

More active still are spoofing or hacking techniques that involve fooling the drone's GPS system and <u>taking control</u> of the device. While this approach can be effective against rogue drones, legitimate users are also vulnerable to spoofing technology that is relatively <u>easy to construct</u>.

A perfect solution has yet to be found, but interest and investment in drone countermeasures <u>is increasing</u>, giving authorities a growing number of options for tackling rogue drones. While reactions to the Dutch police's idea <u>may at times be amusing</u>, choosing a humane answer



to the problem deserves a more thorough and thoughtful reflection, one that's less hasty than an eagle downing a drone.

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