# POTENTIAL USE OF DRONES FOR MEGAFAUNA MONITORING IN THE ACCOBAMS AGREEMENT AREA: TRANSITIONING TO THE NEW TECHNOLOGY

# Potential use of Unmanned Aerial Vehicles for megafauna monitoring in the ACCOBAMS Agreement Area: transitioning to the new technology

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## Background

Established under the auspices of the UNEP Convention on Migratory Species (UNEP/CMS), the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) is an Intergovernmental Agreement aimed at achieving and maintaining a favourable conservation status for cetaceans though the implementation of coordinated measures. The Permanent Secretariat of ACCOBAMS, based in Monaco, ensures the coordination of the Agreement implementation and provides assistance to the Contracting Parties.

In this context, the Permanent Secretariat has established the "ACCOBAMS Survey Initiative" (ASI), aimed at responding to the ACCOBAMS strategic objective of improving the understanding of the conservation status of cetaceans at the Mediterranean/Black Sea macroregional level. Implemented in coordination with the riparian countries and with their participation, the ASI project will support the countries to meet their national and international commitments, in particular with regards to the regional policies related to the monitoring of the marine environment (EU MSFD, Ecosystem Approach implemented by the Barcelona and Bucharest Conventions, fisheries policies, etc.).

The final goal of the initiative is to improve the conservation status of the species and their habitats through appropriate management, taking into consideration that cetacean conservation is at the interface of scientific, environmental, societal and economic issues, in a context of growing development of all maritime activities (fisheries, maritime transport, industries, tourism, etc.). In this respect, the initiative will help strengthen international cooperation and synergies between the ACCOBAMS signatory countries, in regards to knowledge, monitoring and conservation of the species, with the view to optimize and increase the efficiency of their efforts to establish a transnational approach to conserving the concerned species.

The ASI will be conducted over a three and a half year period and has several components deriving from the specific objectives of the initiative. One component is to establish an integrated and coordinated monitoring system for cetaceans throughout the ACCOBAMS Agreement Area.

The implementation of surveys of marine megafauna remains a costly and challenging exercise in terms of implementation, in particular at the large spatial scale of the ACCOBAMS Agreement Area. It has become essential to explore the potential to use new techniques and instruments in order to facilitate the monitoring of cetaceans at a wide variety of scales, including for example, at the level of a Marine Protected Area (MPA). The adaptation of Unmanned Aerial Vehicles (UAVs) for various purposes, including for environmental monitoring, has increased significantly during the past decade. UAVs represent a promising approach for surveying cetaceans and marine megafauna in the near future, as they may reduce the human effort needed in the field and may eventually prove more economical compared to current methods. However, a number of limits remain, in particular regarding the current technical capabilities of UAVs, data processing requirements, and administrative and legal aspects related to UAV use throughout various jurisdictions.

Therefore, the aim of this document is to explore the potential of using UAVs in the ACCOBAMS Agreement Area to implement cetacean monitoring. In concert with this desktop exploration, we have conducted a complimentary field study investigating some of the factors affecting the ability of image reviewers to identify small cetaceans to species level within images captured from UAVs (Bigal

et al. 2020). The results from this field study are discussed here in the context of this review and our recommendations.

## Applicability of UAVs to marine megafauna monitoring

It is widely recognised that UAVs have the potential to greatly enhance our wildlife research and monitoring capacity. This potential is highly valued for marine mammals. Aerial platforms have long been used to observe or monitor many species of marine mammals because compared to boat-based observation techniques, an aerial perspective offers greater visual penetration through the water column to animals below the surface and the opportunity to observe animals over a larger spatial scales. UAVs have many advantages over manned aircraft including human safety, a reduced carbon footprint, superior detection and vastly improved capacity to archive georeferenced images.

Although there have been a number of reviews forecasting the potential applications of UAVs (Watts et al. 2010, Linchant et al. 2015, Christie et al. 2016, Gonzalez et al. 2016, Fiori et al. 2017, Colefax et al. 2018), there have been very few empirical studies demonstrating these applications, particularly of species that are strictly marine. The applications that have been tested include surveys for monitoring distribution and abundance of dugongs (Hodgson et al. 2013) and whales (Hodgson et al. 2017), determining densities and abundance of sharks, rays and sea turtles (Kiszka et al. 2016, Sykora-Bodie et al. 2017, Hensel et al. 2018) in nearshore waters, understanding the certainty of detections of humpback whales, killer whales and harbour porpoises (Aniceto et al. 2018), photo-identification mark-recapture studies of bowhead whales (Koski et al. 2015), photogrammetry of various whale species to determine body condition (e.g. Christiansen et al. 2016, Durban et al. 2016), behavioural observations of humpback whales (Hodgson et al. 2017) and sea turtles (Bevan et al. 2016). Other studies have shown the use of UAVs for pinnipeds that are hauled out such as aerial surveys of seals on ice (Moreland et al. 2010) or on land (Johnston et al. 2017) and supplementing aerial surveys of sea lions (Sweeney et al. 2015).

Most of the applications listed above have involved using relatively small UAVs, flown within line-of-sight and for relatively short durations. Some recent reviews of the potential to use UAVs for large-scale surveys suggest they are currently only applicable to small-scale surveys as the UAVs capable of the endurance and range necessary for large-scale surveys are prohibitively expensive, and it is difficult to obtain permits to operate UAV systems beyond visual line-of-sight and at altitudes necessary for such surveys (Christie et al. 2016, Fiori et al. 2017, Colefax et al. 2018). These limitations are dependent on the aviation regulations within the survey area jurisdiction. Hodgson et al. (2017, in prep), for example, successfully demonstrated that fixed-wing UAVs could be used for large-scale humpback whale and dugong surveys in Australia. All trial surveys reported by Hodgson et al. were conducted using the *ScanEagle* UAV, which was 'wet leased', meaning that a third party company owned and operated the *ScanEagle*. This UAV has a range in excess of 100 km from the base station, can fly at altitudes in excess of 5,000 m, and has an endurance of up to 24 hours. Hodgson et al. conducted trial surveys beyond visual line-of-sight and the altitude limitations set for normal operations of UAVs in Australia.

Despite these demonstrations, implementing large-scale UAV surveys to replace existing long-term monitoring programs in the ACCOBAMS Agreement Area, within the current ASI and any future initiatives, requires consideration of the following:

- Integrating historical methods and data
    - How can the ASI adapt this new methodology whilst ensuring previous surveys are comparable?
    - How does detection probability compare between manned and unmanned surveys?
    - Are the effects of the environmental conditions experienced during a survey different for manned versus unmanned surveys?
- Logistical constraints
    - Is it possible to survey the ACCOBAMS Agreement Area with UAVs, whilst capturing the required ground sample distance (resolution), in a cost-effective time-frame?
    - Are the multi-species surveys that are currently conducted under the ASI, realistic for UAVs?
- Selecting UAVs and imaging systems
    - What are the considerations in selecting UAVs and imaging systems for the ASI?
    - Can alternative camera systems (thermal / hyperspectral) increase detection probability, and how can these technologies be integrated to improve detection?
- Image processing
    - What is the current status of image processing methods?
    - Can the image processing be automated to obtain:
        - Sighting data (of multiple species)?
        - Location of sightings (accounting for UAV rotations)?
        - Environmental conditions?
        - Sampled area (accounting for UAV rotations)?
- Regulations
    - Can permission realistically be obtained to fly beyond visual line-of-sight and at appropriate altitudes throughout all of the jurisdictions included in the ACCOBAMS Agreement Area?
    - Are there animal ethics or animal disturbance considerations or regulations?

The following review outlines our current understanding about the above considerations. The feasibility of using UAVs to monitor cetaceans in the ACCOBAMS Agreement Area is discussed with the view of replicating the methods currently used for traditional manned surveys, as this would allow for the transition to using UAVs whilst maintaining consistency and comparability with long-term datasets. However, the applications of UAVs offers new opportunities to collect and analyse data that were not possible from manned aerial, or boat-based, surveys. Therefore, the ultimate aim should not be to simply replicate manned surveys, but continue to improve the data obtained from marine megafauna monitoring under the ASI.

## Integrating historical methods and data

Transitioning from previous monitoring programs for marine megafauna in the ACCOBAMS Agreement Area, to UAV surveys and the subsequent change to collecting images/video rather than human observations provides the opportunity to collect new types of information, but this change also requires a re-think of the traditional methodology used in aerial surveys (Linchant et al. 2015, Hodgson et al. 2017).

The first step in understanding how to transition to UAVs is to gain an understanding of how detections from traditional manned survey platforms compare to aerial photographs captured from either manned or unmanned platforms. A limited number of studies have made this comparison.

Hodgson et al. (in prep) directly compared dugong sighting rates from manned survey observers, to sighting rates in images collected using the *ScanEagle* UAV. The two platforms were flown over the same transects at the same time, with both covering approximately the same transect strip width, and those survey strips partially (but not entirely) overlapped. This procedure provided a comparison of dugong sighting rates (i.e., the aim was not to match dugong sightings) in the same areas and under the same environmental conditions (including sea state, turbidity, and cloud cover). Overall, there was a higher sighting rate of individual dugongs in the UAV images, but a similar sighting rate of dugong groups, with the former result being explained by the detection of significantly larger groups in the UAV images.

Bröker et al. (2019) directly compared narwhal (*Monodon monoceros*) sightings from observers and aerial imagery collected concurrently from a manned aircraft. They found that both platforms detected similar numbers of individual animals and there was no significant difference between the abundance estimate derived from each dataset when applying the same availability correction (see Detection probability). Garcia-Garin et al. (2020) similarly made a direct comparison between sightings of marine megafauna from observers and aerial imagery from the same aircraft. They did not detect a significant difference in the total densities of all megafauna, which included dolphins (3 spp), whales (1 spp), turtles and sunfish, however they note their low sample size may have contributed to this result, and that two of the dolphin species sighted were only detected by the observers on-board the plane.

In order to better understand the potential differences between sightings from direct observations and sightings from imagery, it is useful to assess the probability of detecting animals using the UAV. The following two sections outline the components of detection probability for both manned and unmanned surveys and review the current knowledge on how environmental factors affect marine mammal detections in UAV imagery.

## Detection probability

In manned aerial surveys, it is commonly understood that the probability of detecting an animal is affected by two factors: (1) availability probability – the proportion of time the animal is actually visible from the air, and (2) perception probability – the probability of an observer actually seeing the animal if it is available (Marsh and Sinclair 1989) (Figure 1). Availability has two components: the animal's diving behaviour, and the environmental conditions such as water turbidity (Pollock et al. 2006). Diving behaviour can be affected by numerous factors such as water depth (Hagihara et al. 2018), group composition (e.g. whether a calf is present) (Hodgson et al. 2017), and behavioural state (Dorsey et al. 1989). Various methods have been used and experiments conducted to estimate the availability of marine mammals (summarised in Hodgson et al. (2017), see also Hagihara et al. (2018) and Sucunza et al. (2018) for examples). In order to convert to using UAVs, it is important to understand whether environmental conditions affect the availability of animals differently in the images compared to real-time visual observations from a manned aircraft; the section below outlines our current understanding on this.

UAVs offer an alternative method for assessing availability as this technology allows us to follow and observe the behaviour of marine fauna and directly observe the proportion of time individual animals, or groups, are available to be seen from the air. This idea was demonstrated by Hodgson et al. (2017) using the *ScanEagle* to follow humpback whale groups, and a team from Murdoch

University has used UAVs to assess the availability of Australian humpback dolphins (*Sousa sahulensis*; Brown et al. In prep) and bottlenose dolphins (*Tursiops* spp; Chabanne, unpublished data). This technique may not be applicable to all species but does have a number of advantages over previously used methods (Hodgson et al. 2017).

When we measure perception probability in manned surveys, we generally compare the detections from two or more observers using a mark-recapture approach for observers sitting one behind the other in the aircraft (Pollock et al. 2006). For sightings in UAV images, perception probability depends on how the images are processed (Figure 1). If they are manually reviewed, perception probability can be measured by comparing the sightings from two or more reviewers who have processed the same images (Hodgson et al. in prep). If images are being reviewed automatically by computer algorithms based on machine learning, then perception probability is the recall rate (proportion of visible target animals the algorithm detects), and this can be affected by the design (architecture) of the algorithm, the quantity and quality of example images of animals that have been used to train the algorithm, and image complexity (Maire et al. 2015). If using a fully automated approach (i.e. without post-processing validation by a trained observer), there is an increased potential of retaining false positives, where another species or a background feature within the image is incorrectly recorded as a detection of the target species. Brack et al. (2018) provides some potential solutions to this problem (as well as a review of detection probability issues in UAV wildlife surveys).

In an effort to directly assess the combined effects of detection probability on UAV sightings Hodgson et al. (2017) conducted a series of trial large-scale surveys of humpback whales (*Megaptera novaeangliae*) off Stradbroke Island, Queensland, where their migration route passes close to the coastline. The study compared land-based whales counts with UAV survey counts to provide an understanding of the detection rates from the UAV. Overall, detection probability of humpback whales from aerial images collected using the *ScanEagle* is comparable to that reported for manned surveys (Hodgson et al. 2017).

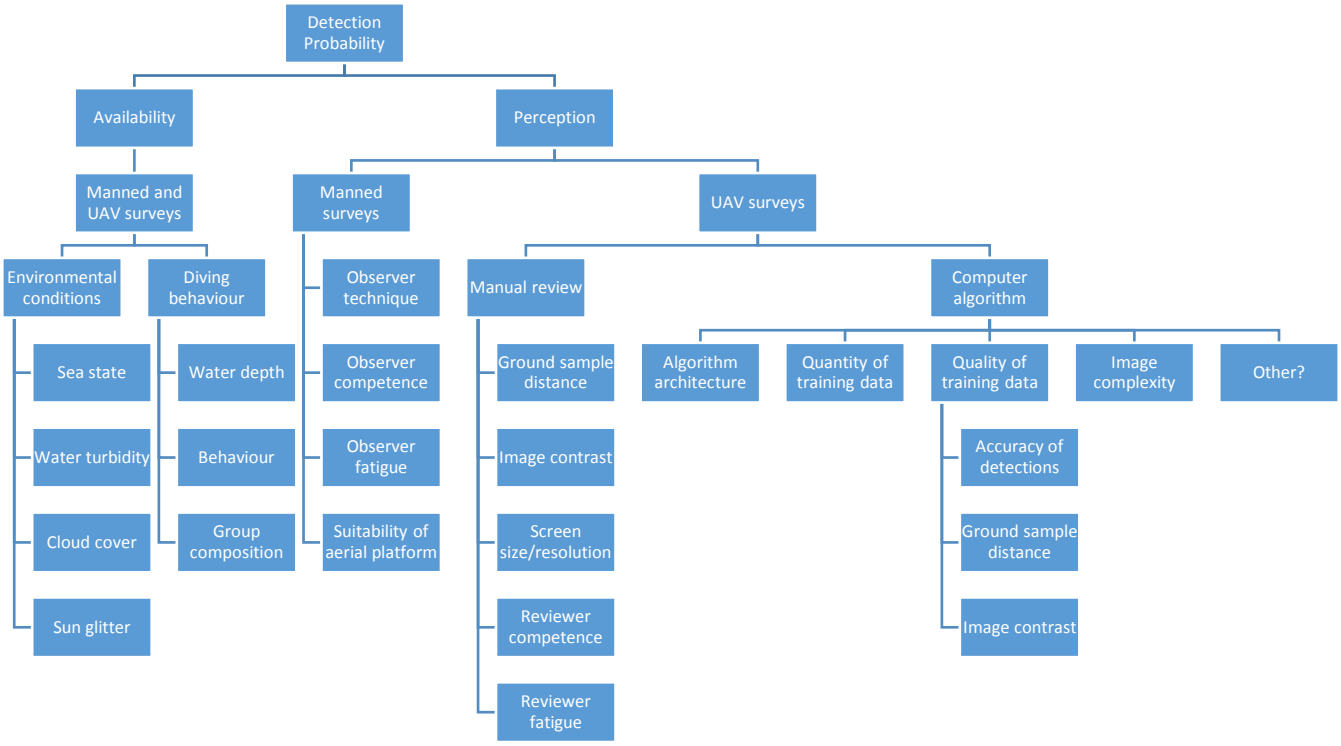


*Figure 1. Factors that could potentially affect detection probability in marine mammal aerial surveys*

## Effects of environmental conditions on animal detections in images

The range of environmental conditions affecting the 'availability' of marine mammals for detection are listed in Figure 1. Although there is some understanding of how these conditions affect sighting rates of marine mammals by observers from manned aircraft, there is little understanding of how these conditions affect sighting rates in aerial imagery.

Hodgson et al. (2013, 2017) investigated whether the sighting rates of dugongs and humpback whales were affected by sighting conditions. During both studies, dugong and humpback whale sighting rates were not affected by sea state and sun glitter. Overlap between successive images along the transect line was important for countering the effects of sun glitter and for providing multiple opportunities to confirm sightings. The lack of effect of sea state on sighting rates suggested that UAV surveys could be conducted in a wider range of wind conditions than traditional manned surveys. However, Aniceto et al. (2018) conducted some small scale (within line-of-sight, under 400 ft) trial UAV surveys of three species of cetaceans – humpback whales, killer whales and harbour porpoises – in two fjords in northern Norway. They found that 'certainty of detection' (which was used as a proxy for detectability) for humpback and killer whales was negatively affected by increasing sea state. Hodgson et al. (2013, 2017) may not have been large enough sample sizes from the various combinations of conditions to adequately quantify their effects on animal detections in the images, especially for high sea states. More recently Hodgson et al. (in prep) investigated whether environmental conditions affected dugong sighting rates differently by directly comparing detections from observers on a manned aircraft and with UAV detections. They found that sea state did affect dugong counts and group size estimates which decreased as sea state

worsened (an effect observed for both the manned and unmanned platforms). It would be important to investigate whether these effects are similar for other small marine mammals.

Aniceto et al. (2018) also found that whale sighting rates were positively affected by increasing luminosity within the images. Although Hodgson et al. (2017) found that humpback whale sighting rates were not affected by cloud cover, Hodgson et al. (in prep) found that the size of dugong groups detected by both the manned and unmanned platforms dropped as cloud cover increased, but the effect was largest for the manned observations.

Similarly, our current understanding of how water turbidity affects sighting rates in aerial images is inconclusive. Hodgson et al. (2013) found that water visibility, which was a subjectively scored measure of water clarity and bottom visibility (so incorporates an element of depth) did affect dugong sighting rates, although the observed effect was counterintuitive during these trial surveys (i.e., when comparing shallow clear water to deep unclear water the sighting rate was counterintuitively higher in the latter). Hodgson et al. (in prep) used the same water visibility categories and found that group size, group sighting rates, and individual dugong sighing rates, were all affected, but that the effects were more intuitive, with lower group sizes and rates in deeper and more turbid waters.

## Logistics

One the challenges of using UAVs to survey the ACCOBAMS Agreement Area with the ASI is the scale of the area. As can be seen in Figure 2 which shows the extent of the 2018 summer survey transects, there are vast areas of sea that extend up to 300 km from land. High-end drones will be required to cover such a large area. There potentially are UAVs that have sufficient endurance and range to cover the scale of the ASI, for example, theoretically the *ScanEagle* UAV used in the trial surveys by Hodgson et al. (2013, 2017, in prep) has this capability. The coverage would be achieved by (a) using 'hub and spoke' operations whereby repeaters are able to extend the range of the *ScanEagle* by handing off to a nearby communications link, or (b) using multiple *ScanEagles* flying concurrently and themselves acting as repeaters. The challenge would be to optimise the placement of the communications links, especially along areas of remote coasts if land access is limited. A third option is to operate the *ScanEagle* (or similar system) from a research vessel, which would have to have suitable deck space to host the launch and retrieval systems required for these large UAVs.

Another potential logistical limitation in using UAVs is that these systems general fly at half the ground speed of a manned plane, and therefore a survey could take twice as long. However, UAVs like the *ScanEagle* have enough endurance to fly continually for a whole survey day, as opposed to a manned aircraft where regular refuelling is necessary. And as mentioned, it is possible to fly multiple systems concurrently from one ground control station, which would greatly increase the distance covered per day. The slower speed of the UAVs also means that movement bias corrections (i.e., correcting for whales missed because of their systematic movement through the survey area) are important for these surveys when surveying migrating animals, as demonstrated by Hodgson et al. (2017) using simulations of whale movements.

In addition to speed limitations, UAV images tend to cover less area (a smaller swath) than human observers (Koski et al. 2013, Hodgson et al. 2017, Bröker et al. 2019, Garcia-Garin et al. 2020). An

important consideration then, is the minimum ground sample distance (GSD) required to identify the species of interest, and how to achieve the greatest coverage whilst maintaining the required GSD. This issue is discussed below.

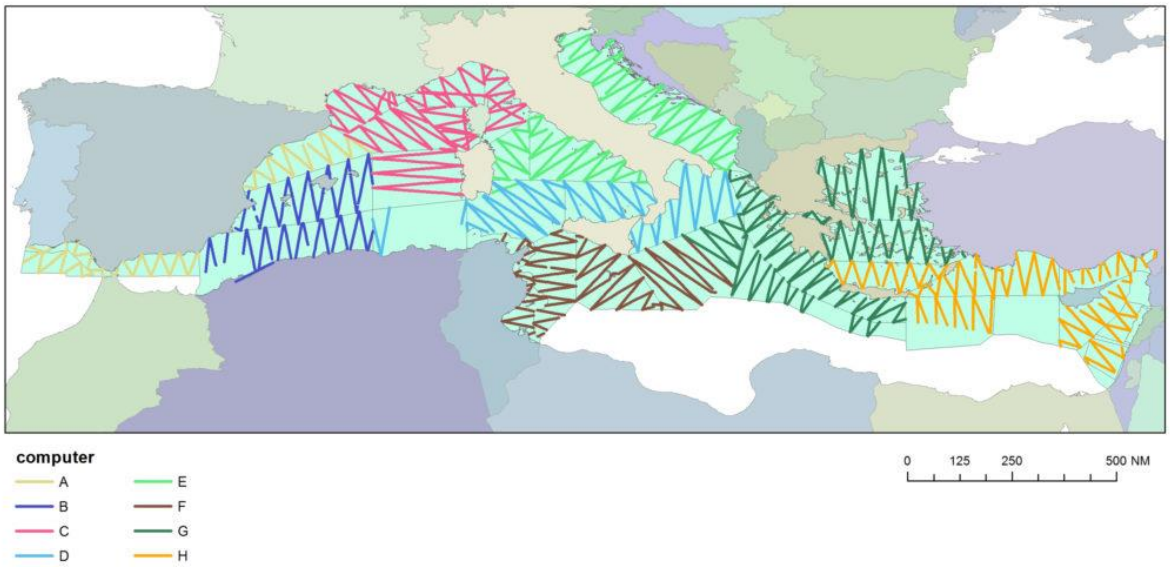


*Figure 2. ASI 2018 summer survey transects. Source: https://accobams.org/main-activites/accobams-survey-initiative-2/asi-preliminary-results/*

## Ground sample distance and coverage

Ground sample distance (GSD) is the distance on the ground between the mid-point of two adjacent pixels in an aerial photograph. It is a result of the combination of the camera's resolution and the UAV's (or aircraft's) altitude. The lower the GSD, then the greater the on ground resolution of the images (i.e. a GSD of 1 cm / pixel is higher resolution than a GSD of 2 cm / pixel, so the lower GSD provides more pixels per distance). One advantage of conducting aerial surveys with UAVs, is that sighting data can be collected for multiple species, without the biases introduced when human observers are asked to target particular species, and the likelihood of missed sightings when human observers are asked to call all animals sighted. During the trial UAV surveys reported in Hodgson et al. (2013), unpublished sighting data was also recorded for dolphins, turtles, sharks, rays and sea snakes. Other UAV survey trials have also recorded multiple species (Aniceto et al. 2018, Hensel et al. 2018, Garcia-Garin et al. 2020). Successful multi-species surveys using UAVs would require a list of target taxa, and knowledge of the minimum GSD required to identify all sightings of these taxa to species.

The GSD required to identify small cetaceans depends on the species expected in the area of interest and how similar they appear from the air. In the ACCOBAMS Agreement Area, there are six large and six small cetaceans residing within the Mediterranean Sea, and three small cetaceans within the Black Sea. The small cetaceans require the lowest GSD, and some species, such as common bottlenose dolphins (*Tursiops truncatus*) and short-beaked common dolphins (*Delphinus delphis*) are likely to be difficult to distinguish from the aerial perspective.

Aniceto et al. (2018) assessed the certainty of detections of harbour porpoises according to image resolution in an area where harbour porpoises were assumed to be the only species present and the

'certainty' of sightings concerned whether the image reviewers were sure the sightings were actually dolphins. The GSD for these surveys was approximately 2.9 cm / pixel (estimated according to the image on-ground width of view and resolution provided). Of 57 dolphin sightings, only five were considered certain. Pixel size (which changed slightly as a result of pitch, roll and altitude of the UAV) did not affect the rate of certainty of detections. However, the authors acknowledge that this null result may have been symptomatic of the low rate of certain detections. The authors did not comment on the low rate of detection certainty and what the possible causes might have been.

Hodgson et al. (2013) found that dugongs (including calves) could be distinguished within images captured at a GSD of 3 cm / pixel. However, distinguishing dugongs only required discerning them from dolphins, and all dolphin species within the region covered were beaked dolphins so were visually quite different to dugongs from the aerial perspective. Unpublished data from that same UAV trial survey series include dolphin detections in images with GSDs of 1.7, 2.5 and 3.4 cm / pixel. A total of 28 images contained 'certain' dolphin sightings of 42 individual dolphins, however the original image reviewer (who was an experienced aerial survey observer) was not able to classify any sightings to species with certainty, and dolphin experts who have viewed a subset of these images agreed. Most sightings at the study site (Shark Bay, Western Australia) were likely one of two species – Indo-Pacific bottlenose (*Tursiops aduncus*) or Australian humpback (*Sousa sahulensis*) dolphins, two morphologically similar dolphin species.

Subsequently, Raudino et al. (in review) conducted manned aerial surveys from a high-wing aircraft equipped with three SLR cameras to supplement counts of dolphins recorded to estimate population size and found that a GSD of 1.25 cm per pixel was adequate to differentiate bottlenose dolphins and Australian humpback dolphins, but this was the only GSD tested.

It is worth noting that during the Hodgson et al. (in prep) trial surveys, where the target species was again dugongs, the human observers in the manned aircraft were also asked to identify the dolphin sightings to species level where possible. They classed their species ID as 'certain', 'probable' or 'guess'. During this trial survey, 45% of dolphin sightings include a 'certain' species ID and 33% were 'probable'. The remaining were 'guess' or unknown species. Dunshea et al. (2020) note the difficulties of observers on manned planes identifying species in real time and quantify the implications of misidentifying species. The experience and skills of the observers can greatly affect the reliability of the data obtained from manned surveys, and there is no opportunity to review species identification post survey. Once the appropriate GSD is established for the species of interest in the ACCOBAMS Agreement Area, UAV surveys have the potential to provide more reliable data than manned surveys. Therefore the GSD required to identify dolphins to species needed further investigated, and a minimum GSD established. The results of field tests conducted in concert with this desktop study to address this question are summarised below.

## GSD for small cetaceans under the ASI

Bigal et al. (2020) assessed the ability of experienced aerial survey observers to identify the species dolphins captured in UAV images with various GSD and captured under a limited range of sea states. They used 117 images of three morphometrically similar small cetaceans found in overlapping ranges within the Mediterranean: the striped dolphin (*Stenella coeruleoalba*), short-beaked common dolphin (*Delphinus delphis*) and common bottlenose dolphin (*Tursiops truncatus*). A total of 13 image reviewers, with varying levels of experience, were asked to assign a species to each UAV

image of a dolphin group, and select a certainty level from 'definite', 'guess', or 'unidentifiable'. The GSD of the images had the strongest effect on whether the dolphins were identified correctly, with a mean of 70% of reviewers providing the correct species identification for images with a GSD of 0-1 cm / pixel, and 50% of reviewers for images at 1-2 cm / pixel. For images with a GSD > 2 cm / pixel, the rate of correct identifications is was ≤ 30% of reviewers. If only considering the reviewers' responses that were classed as 'definite', a GSD of ≤ 3 cm was sufficient to achieve a > 70% correct response rate. However, only 20% of answers were classed as 'definite' for the 2-3 cm / pixel images, and this only increased to 56% for the 0-1 cm / pixel images.

There was also an effect of sea state on the reviewers' identifications, with significantly more correct answers in Beaufort sea state (BSS) 0 or 1 than in BSS 2. This results warrants further investigation as to whether reliable species identification in UAV images can only be achieved during surveys in low wind. The number of individual dolphins in the image (group size) also significantly affected species identification, with larger group sizes yielding a higher proportion of correct identifications. Therefore it would be important to acknowledge that estimates of abundance that rely on group size may be biased upwards if larger groups are more likely to be correctly identified to species level.

Bigal et al. (2020) did not investigate the potential for repeated sightings of dolphin groups in sequential overlapping images to enhance our ability to identify species, as was shown in the study by McClintock et al. (2015), and the potential to improve species identification using overlapping images also warrants further research.

### GSD and survey methodology

Strip transect survey designs, such as those conducted for dugongs (Marsh and Saalfeld 1989, Marsh and Sinclair 1989), are potentially easier to replicate using UAVs, than the distance sampling methods used for many other species and used within the ASI survey design. Strip transects lend themselves well to the UAV design because they can be replicated using a nadir (downward) facing camera to continually capture overlapping images along transect lines. Hodgson et al. (in prep) used two SLR cameras, mounted on the *ScanEagle* at slightly oblique angles, so that combined, they were able to provide a strip width that matched most traditional manned surveys of dugongs, which is ~400 m (i.e., the combined width of the strips observed on each side of the manned aircraft).

To date, there have been no documented tests for replicating distance sampling methods using UAVs. In previous surveys of the ACCOBAMS Agreement Area using traditional manned methods, the effective strip width (esw) of the observed area was 300 m, although an 800 m esw was also considered reasonable, thus providing a total coverage swath (the combination of the observers on both sides of the aircraft) of between 600 and 1600 m along the transect line (Panigada et al. 2017). Hodgson et al. (2017) conducted trial surveys of humpback whales, and found that a GSD of 11.5 cm / pixel was sufficient to discern this species. Their single nadir-facing camera provided an effective strip width of 490 m. Therefore, to achieve a similar sample rate as a traditional manned survey using the distance sampling methods, their *ScanEagle* would need to fly more transects. If employing the two-camera payload and higher resolution cameras used by Hodgson et al. (in prep), it would be possible to achieve the required GSD by flying at ~5,000 ft. The combination of this altitude and the two-camera set-up would provide a strip width of ~1,400 m. The disadvantage of flying at such high altitude is the potential to be flying above cloud. Therefore, there is a trade-off among all of these factors and these are important considerations when selecting UAV systems (see Selecting UAVs).

## Selecting UAVs

As with any other research tool, it is essential to select an appropriate UAV for the intended research question. There are a large number of UAVs available, with new systems and improved systems continually becoming available, and there are many variables to consider when selecting an appropriate system (Verfuss et al. 2019). The vast majority of UAVs on the market are from start-up companies and their systems have not been field tested to the extent needed for them to be reliable for marine research. Authors, Hodgson and Cleguer, have worked with five different systems all developed by different companies, and all five UAV systems used have had inflight or landing failures and crashed at least once. Therefore, it is critical to ensure that any UAV system selected has been rigorously field tested and that redundancies are factored into costings. If a start-up system is chosen, it is important that (a) the terms of the warranty agreement from the UAV company and reviewed and well understood, (b) the UAV company offers after sale support and is willing to take responsibility for, and replace, any lost systems, and (c) it is understood that the researcher is contributing to the research and development of the UAV, i.e., that the time and cost of this contribution is factored into planning and budgeting. Safety is also a concern when using untested start-up systems, and it may be difficult to get aviation approvals to use such systems in populated areas.

The imaging system (or mounted 'payload') is one of the most important considerations when choosing a UAV system. Some UAVs carry a fixed payload that cannot be interchanged, while for others the operator can select from a range of different payloads, and finally some allow the operator to attach their preferred payload. The appropriate payload depends on the required GSD and sample rate (see Ground sample distance and coverage), and spectral requirements (e.g. normal RGB images, multi-spectral, infrared or thermal images) to detect the feature of interest. The imaging system can determine the UAV needed to carry the payload, so determining the appropriate payload for a survey should be one of the first steps in the UAV system selection process. A helpful step in this selection process is to run different flight scenarios using flight planning software for the candidate UAV systems and payloads, which would have variable capabilities, and use this approach to assess which system is likely to be the most cost-effective at achieving the intended GSD and sample rate (coverage).

Surveying the ACCOBAMS Agreement Area would realistically require long-range UAV operation it is important to understand the telemetry capabilities of these systems. Many systems can be operated over large ranges, but the ability to take or maintain manual control may be restricted to a much smaller range than the advertised maximum range of the system.

It is also important to verify the capabilities, ease of use and compatibility of any flight planning, operation and image processing software supplied with the UAV system to ensure that these programs will allow the ASI to collect and process the data according to the requirements of the survey design. For example, the 2018 ASI survey design Figure 2 would involve creating flight lines with negative side overlap between images (i.e. there would be an intended gap between the coverage of images from adjacent transect lines). When reviewing a range of mid-size UAVs Cleguer and Hodgson found that the planning and operation software provided with the UAV systems were designed for complete coverage applications (i.e. orthomosaics), and did not allow for spacing between transects (or indeed allow the operator to input pre-prepared flight plans).

Another key consideration is the potential locations for ground control stations, or operational bases, which will dictate the most appropriate launch and retrieval system / methods and the range and endurance needed. For example, is it possible to cover the ACCOBAMS Agreement Area from land-bases or will the UAV need to be operated from a research vessel (see Logistics)? Further considerations about the need for trained or certified pilots, and the legality of importing UAVs into various countries and the expertise (and associated costs) required to operate the system are covered in our review of the regulation requirements of the parties to ACCOBAMS (below). Cleguer and Hodgson at Murdoch University are currently preparing a journal article out-lining these and other considerations and best practice for selecting UAVs for wildlife research using real-world field illustrations.

### Alternative imaging systems

All of the research presented here has tested UAVs that carry RGB imaging systems, that is, cameras that capture images in the normal visible colour spectrum. Other types of imagery include thermal, infrared, multispectral and hyperspectral imaging. The applicability of thermal or infrared imaging depends on the context and research question. One main limiting factor is that these two forms of imaging cannot be used to 'view' animals below the water surface, thus negating one of the main advantages of aerial surveys. However, using thermal or infrared cameras on UAVs could be useful for marine megafauna that haul out, as demonstrated for New Zealand fur seals (Gooday et al. 2018) and grey seals (Seymour et al. 2017), or for detecting nesting turtles at night (Rees et al. 2018), or for detecting marine fauna at the sea surface at night.

Multispectral imaging provides the opportunity to capture particular bandwidths of the electromagnetic spectrum, which means that for aerial images over the ocean, it is possible to target the bands that would provide the greatest penetration through the water column and eliminate obstruction from glare, sun glitter, and other reflectants. Schoomaker et al. (2011) showed evidence that multispectral images could provide clearer detections of whales in images, and even reveal whales that were not visible in RGB images.

Using imaging systems on UAVs that provide data on animals that are not visible in normal RGB images, and using these data to estimate animal densities or population sizes, will require recalibration of availability estimates. These non-RGB imaging systems would need to be used to collect focal follow observations of the target species, as per Hodgson et al. (2017) so that new availability estimates could be calculated.

Hyperspectral imagery may provide even more detailed observation data. Both multi- and hyper-spectral imaging systems need to be tested and the potential advantages of these systems investigated. Increasing the detection probability for any species would provide more reliable population estimates and therefore produce better results under the ASI.

## Other techniques for UAVs and aerial photography

This review is focussed on using UAVs to replace manned aerial surveys. There are two other related techniques to consider:

1. Aerial photography from manned aircraft could augment or replace human observer data.

Most of the information provided here on comparisons between data obtained from human observers and UAV photography is applicable to aerial photography from manned aircraft, and indeed, with manned aircraft there is the opportunity to use both observation techniques. When combining both techniques on one aircraft, the main considerations are to ensure that the photography from the manned aircraft can be captured at an appropriate GSD, whilst providing sufficient coverage, to provide data comparable to those from observers. Both fields of view (the observers' and the camera's) also need to overlap, which can be logistically difficult to achieve.

2. Small multi-rotor UAVs could be used to augment boat-based line-transect surveys.

   This application is being investigated by NOAA's Southwest Fisheries Science Centre (Marine Mammal Commission 2016). The UAVs, if operated at relatively low altitude could be used to assist in identifying dolphin sightings to species and to estimate group size. This assistance could speed up boat-based surveys as the boat would not need to go off transect to collect this information. It could also reduce movement bias as a result of dolphins avoiding or being attracted to boats approaching them. Oliveira-da-Costa et al. (2019) compared the detections of two Amazon dolphin species in video from a small multi-rotor UAV with detections by observers on board a research vessel. They suggest that the UAV provided more accurate group size estimates than the boat-based observations, although they do not present these data.

## Image processing: sighting and spatial data

A key advantage to using UAVs and imaging systems for marine megafauna monitoring is the potential to standardise data collection. This advantage could apply to the sighting data, spatial data, and data on environmental conditions experienced during the survey, if all of these data can be recorded from the images automatically using computer algorithms. Also, by integrating the imagery and the telemetry data (flight characteristics such GPS tracks, altitude and the rotations of the UAV in space) which is recorded to relatively high resolution (i.e. to nearest second or millisecond) by most UAVs, this technology can provide more accurate and higher resolution spatial data than manned surveys.

### Automating the collection of sighting data

Weinstein (2018) provides a review of the use of computer vision in animal ecology, and in particular, for identifying animals in images. He recognises the difficulty of this task as the natural world is complex and heterogeneous – changes in illumination and backgrounds, as well as animal appearance and shape, make animal detection difficult. In most cases, the human eye is still better than computer vision systems, however, for large image datasets, it is not time- or cost-efficient to continue to manually record animal sightings.

There are a number of automated detections systems that are being developed for terrestrial animals (Kellenberger et al. 2018, Weinstein 2018), as well as images of fish underwater (e.g., Hernández-Serna et al. 2014). Seymour et al. (2017) present an automated detection algorithm for thermal imagery of hauled out seals and Gray et al. (2019) showed that there is promise for convolutional neural networks to detect turtles on nesting beaches.

Detections of animals in-water from aerial images using convolutional neural networks (a form of machine learning) is now also feasible, and Guirado et al. (2019) had success in using a combined approach of two CNNs to find satellite images with whales in them, and then count the whales in those images. They found that the resolution and contrast of the whales against the background of the images affected their detection success, as did weather conditions. Bigal et al. (in prep) have also demonstrated that there is a loss of automated detection capacity of CNNs with increasing GSD (i.e. decreasing resolution). Maire et al. (2015) developed a machine learning system to detect dugongs in UAV images using training images provided from the trial surveys described in Hodgson et al. (in prep). The aim of the system is to produce a set of potential dugong detections that are then verified by the researcher. The recall of this system (i.e., the proportion of known dugongs detected in a set of test images) was 80%. The precision of the system (proportion of detections that were true dugongs as opposed to false detections) was 27%. The images used were of high complexity as the dugongs often occurred in areas where the sea floor was visible, and were often on the bottom feeding. Image complexity and the position of the animals in the water column influence the success of CNNs in detecting animals, and may mean that more complex CNNs and more training images are required to achieve a reasonable recall rate, when compared to detecting animals at the surface of open water.

The dugong detection system (Maire et al. 2015) is now being adapted to detect other marine megafauna, including whales, dolphins and turtles, using training images sets from around the world that have been manually reviewed images with labelled animal sightings. The ability to automate the whole detection process, including identifying species, so that no human input is required, would depend on the resolution of the images. Species classification has been proven for other taxa (Hernández-Serna et al. 2014), but this capability currently does not exist for marine megafauna.

## Spatial data processing

The challenge with collecting aerial images over water is in georeferencing the images – there are generally no land marks and therefore the standard 'image stitching' software cannot be used to spatially reference these survey images. Hodgson et al. (2017, in prep), used a customised version of VADAR (www.brahss.org.au/content/vadar.html) to map the outline of all images using GPS data and UAV rotation data (pitch, tilt and roll) written to each image at the time of capture. VADAR was also used to plot the GPS location for each individual animal within the images. The data from VADAR were imported into ArcGIS and the total area surveyed could be calculated to a high degree of accuracy. The accuracy is an improvement on manned aerial surveys in which the altitude is not recorded to the same precision and resolution, and rotations of the aircraft are not recorded at all. Therefore, estimates of the spatial coverage from a manned plane are much coarser than from a UAV. As population estimates include a correction for the sample rate of the survey (i.e., the proportion of the survey area actually covered by the survey), the of accuracy population estimates are dependent on establishing an accurate area of coverage. Lisein et al. (2013) also reviews methods to produce survey area coverage from UAV images and found that the method used in VADAR is the most accurate and easiest to implement.

As this customised version of VADAR is no longer being supported, Hodgson et al. have since collaborated with Martin Wieser, a photogrammetric engineer who has developed *OceanMapper*. This new mapping software works very similarly to VADAR, but is integrated with the output from the automated animal detector developed by Maire et al. (2015), so that every individual animal

detected can be easily mapped by importing the csv file produced by the detection system. Similar to VADAR, *OceanMapper* can map the outline of the images, but can also display the actual image on the map. *OceanMapper* outputs shapefiles that can then be imported into GIS software.

In addition to sighting data, there is also a requirement to extract data describing the environmental conditions experienced during aerial surveys. This information, including water clarity, bottom visibility, sea state (wind conditions), sun glitter (glare) and cloud cover, is needed to correct sightings for availability (e.g., Pollock et al. 2006). The ability to record these data automatically from the images would significantly reduce image processing time, and could result in more reliable, standardised information about the environmental conditions in which the survey was conducted, which would ultimately produce more reliable estimates of population size, distribution and habitat use. Under a Google initiative, Murdoch University, in collaboration with Queensland University of Technology, are developing this capability.

## Aviation regulations

One of the greatest challenges in implementing UAV surveys within the ACCOBAMS Agreement Area with be getting the appropriate permissions from all of the aviation authorities of party countries. We conducted a review of the regulations governing the use of UAVs within each of the party countries. In seven of the countries, UAVs are not permitted at all. Of the remaining countries, there is a wide variety of registration and/or permitting requirements for the UAVs, pilots, flight plans, and insurance, summarised in Table 1 and provided in detail in Appendix 1.

In order to achieve the coverage required for a large scale aerial survey, the UAVs will need to be flown at relatively high altitude (e.g. Hodgson et al. (2017) flew at 732 m to survey humpback whales) and beyond visual line of sight (i.e. beyond the distance that the UAV can be seen by the operator with the naked eye). These two requirements usually mean that the UAVs are being flown outside of the standard operating procedures outlined by aviation safety authorities, and that permits would be required from each of the countries. In our review, only seven countries indicated that it may be possible to obtain permission for these non-standard operations. However, we mapped the area that could potentially be covered according to our review of regulations, and a reasonable proportion of the northern Mediterranean Sea and contiguous Atlantic area could feasibly be surveyed if permits could be obtained from all countries that indicated possible exemptions to their standard operational requirements (Figure 3).

*Table 1. Summary of regulation requirements for the use of UAVs within each ACCOBAMS party.*

| Country | Total Score[a] | Drones Permitted | | | | | | | | | | Drones Prohibited | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | E | F | G | H | I | | J |
| **Albania** | Y(1) | Y | X | | | | | | No info | | | | |
| **Algeria** | N | | | | | | | | | | | N | |
| **Bulgaria** | Y(1)* | Y | | | X | | | | No info | | * | | |
| **Croatia** | Y(4)* | Y | WD[c] | WD | | X | X | | No info | * | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cyprus** | **Y(2)** | **Y** | X | WD | | | | | No info | | | | |
| **Egypt** | **N** | | | | | | | | | | | N | |
| **France** | **Y(3)*** | **Y** | X | X | | | X | | No info | * | | | |
| **Georgia** | **Y(1)*** | **Y** | WD | | | | | | No info | * | | | |
| **Greece** | **Y(2)*** | **Y** | | | | X | X | | No info | * | | | |
| **Italy** | **Y(1)*** | **Y** | X | | | | X | | No info | * | | | |
| **Israel** | **Y(0)*** | **Y** | | | | | | | No info | | * | | |
| **Lebanon** | **N*** | | | | | | | | | | | N | * |
| **Libya** | **N** | | | | | | | | | | | N | |
| **Malta** | **Y(1)** | **Y** | X | | | | | | No info | | | | |
| **Monaco** | **Y(2)*** | **Y** | | | X | | X | | No info | | * | | |
| **Montenegro** | **Y(4)** | **Y** | X | X | | X | | | X | | | | |
| **Morocco** | **N*** | | | | | | | | | | | N | * |
| **Portugal** | **Y(1)*** | **Y** | | | | | X | | No info | | * | | |
| **Romania** | **Y(5)** | **Y** | X | WD | X | WD | X | | No info | | | | |
| **Slovenia** | **Y(1)*** | **Y** | | | | | X | | No info | * | | | |
| **Spain** | **Y(4)*** | **Y** | X | X | | X | X | | No info | * | | | |
| **Syria** | **N** | | | | | | | | | | | N | |
| **Tunisia** | **N*** | | | | | | | | | | | N | * |
| **Türkiye** | **Y(5)** | **Y** | | X | X | | X | X | X | | | | |
| **Ukraine** | **Y(1)*** | **Y** | WD | | | | | | No info | | * | | |

[a] In brackets is the number of categories within A to G where the regulations require registration/permit. A star (*) indicates that H, I or J applies.

[b] See Table 2 for the key for the A – J codes.

[c] WD= Weight Dependent (of UAV)

*Table 2. Key to codes given in Table 1.*

| Base Assumption | Additional Criteria | Code | Regulation |
|---|---|---|---|
| **YES** | | | **Recreational drones permitted** |
| **YES** | **X** | **A** | registration of drone/permit is required |
| **YES** | **X** | **B** | registration of pilot is required |
| **YES** | **X** | **C** | registration and approval of flight plan is required |
| **YES** | **X** | **D** | insurance mandatory for some or all flights |

| | | | |
|---|---|---|---|
| **YES** | **X** | **E** | additional legislation exists for “commercial operations” / photography/ research |
| **YES** | **X** | **F** | Local pilots/drones only (foreign drones/operators not permitted) |
| **YES** | **X** | **G** | Importation of private drones requires permit |
| | **Comment** | **H** | “extended flight” (BVLOS, high altitude ect.) is possible, though flight plan/permit specific |
| | **Comment** | **I** | legislation is due to change |
| **NO** | | | **Drones prohibited** |
| | **Comment** | **J** | possibly an exception might be made following request submission and bureaucracy |

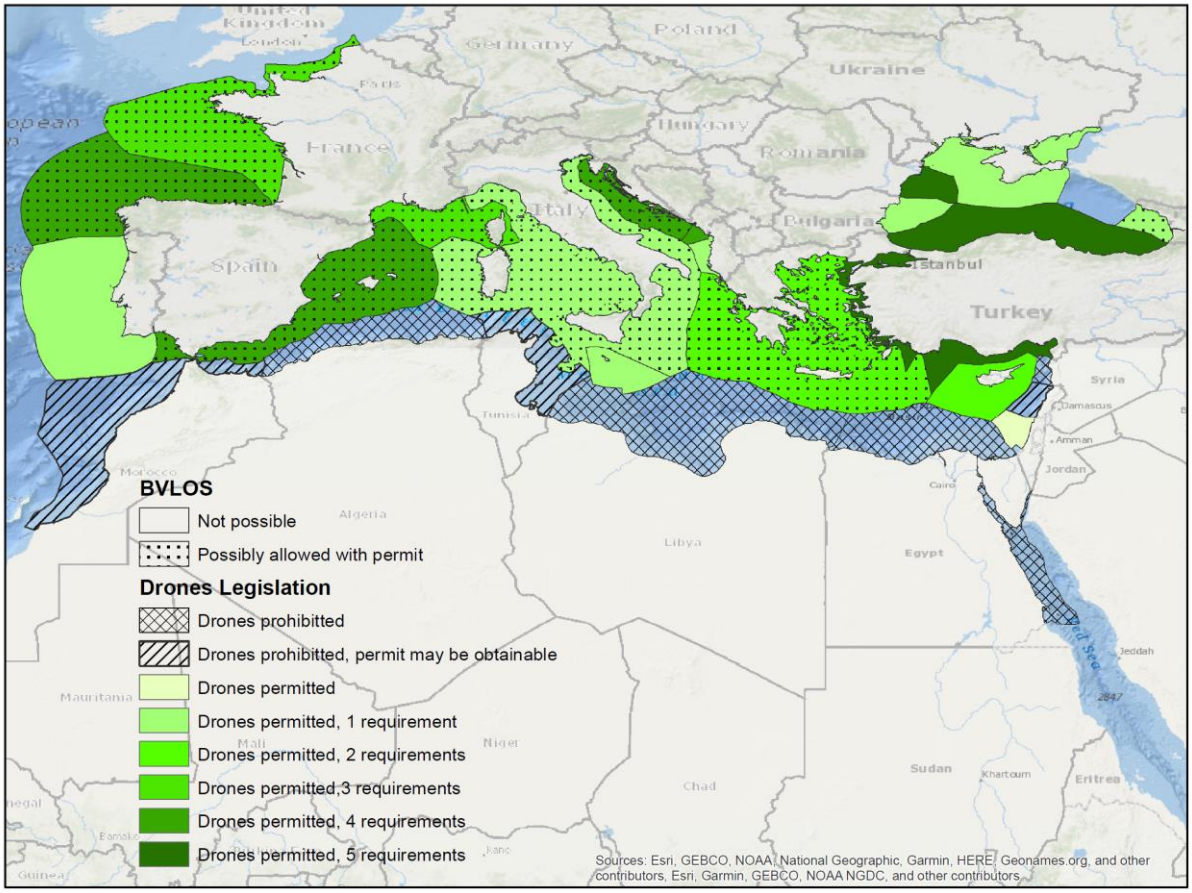


*Figure 3. A summary of the regulatory requirements in the ACCOBAMS signatory countries, with particular reference to the ability to operate beyond visual line of sight (BVLOS). Refer to Table 1 and Table 2 for explanations of requirements, and Appendix 1 for more details.*

## Ethics: animal disturbance

The normal ethics approvals required to observe animals for research are applicable to all UAV operations. As the use of UAVs to observe wildlife is relatively new, there are few empirical studies on the potential disturbance effects of this technology, and a number of reviews note that there is still need for policy and legal frameworks to address potential negative impacts on wildlife, and species specific research on disturbance from UAVs (Smith et al. 2016, Mulero-Pázmány et al. 2017, Wallace et al. 2017). Hodgson and Koh (2016) briefly outline a suggested best practice for observing

wildlife with UAVs, advocating the precautionary principle and that published studies should note any responses to the UAV methodology used.

A review of documented reactions of wildlife to UAVs (Smith et al. 2016) suggested that responses depend on the engine type, where fuel engines which are noisier, elicited the greatest responses, and flight characteristics, where targeted approaches elicited greater responses than passing mode flights. Birds were the most sensitive animal type, while fully aquatic animals were the least affected.

In one of the few direct behavioural observations of the responses of marine megafauna to UAVs seals hauled out on ice showed a marked reduction in disturbance responses to a *ScanEagle* flying over compared to a helicopter, with the latter aircraft being the traditional platform for surveys in this instance (Moreland et al. 2015). There was no disturbance noted by land-based observers to the small UAVs used to survey humpback whales, killer whales and harbour porpoises (Aniceto et al. 2018), and in a direct observations of southern right whale (*Eubalaena australis*) behaviour before and during small multi-rotor UAV flights overhead at 5 m, this species displayed no response (Christiansen et al. 2020). However, bottlenose dolphins (*Tursiops truncatus*) and Antillean manatees (*Trichechus manatus manatus*) responded to small multi-rotor UAV flights overhead at a range of 11-30 m and 6-52 m respectively (Ramos et al. 2018). The response of bottlenose dolphins was brief (lasting only up to 1 min) however the manatees exhibited a strong flight response which lasted up to 11 min.

Research on the potential received noise levels from UAVs, Christiansen et al. (2016, 2020) demonstrated in two separate studies that the noise from multi-rotor UAVs could only be heard above ambient noise when close to the water surface and when the UAV was 10m or lower, with most of the noise from the UAV reflected off the water surface. Erbe et al. (2017) states that:

> *Compared to other platforms of marine observation, underwater levels from the drones in our study were tens of dB lower than those of small motorcraft […], and well below levels considered in environmental regulations of underwater noise […]. Drones therefore may provide a preferable platform in situations where bioacoustic impacts are of concern, or where behavioral responses of marine fauna to the observation equipment would affect data quality and quantity*.

However they do acknowledge that UAVs can be heard about ambient noise in calm conditions and that the sound from UAVs is within the hearing range of many species, so some work is required to determine whether disturbance responses occur in these situations for some marine mammal species.

## Recommendations

### Data integrity

In order to transition to using UAVs to conduct aerial surveys under the ASI, it is important to understand the probability of detecting cetaceans in images captured using UAVs, and how that compares to the probability of observers on-board aircraft detecting the same species. This understanding will allow historical datasets to be compared to future UAV survey datasets. There have been few assessments of the detection probability of marine fauna in UAV images and even

fewer comparisons with detections by observers on board aircraft. The results of the studies that have been done have been mixed. Therefore we recommend that some **direct comparisons between manned aerial surveys and UAV surveys be conducted in an area where a high density and high diversity of cetaceans can be expected.** According to the ASI 2018 summer survey preliminary results, an appropriate area might be just south of the French coastline where a mix of both large and small cetacean species were sighted. Special permission will need to be sought to fly BVLOS in this area.

A relatively small number of previous studies have investigated the effects of environmental conditions on detection of marine fauna in UAV images, and again, the results have been mixed. There have been some experiments that have shown no effect of wind conditions on marine fauna sighting rates. Therefore, in addition to the experiment recommended above, it would be useful to **extend the UAV trial flights to flying within a range of environmental conditions, particularly in high or marginal wind conditions, and a range of cloud cover**, to further investigate the effects of these conditions on sighting rates. Understanding these effects would inform the range of conditions that are appropriate for UAV surveys.

Our field test (Bigal et al. 2020) suggested that if the objective of the UAV survey with the ACCOBAMS Agreement Area was to identify all cetaceans to species level, then **a minimum GSD of 3 cm / pixel is required**. With the current state of automated image processing systems, species identification would need to be done manually by experienced reviewers, and ideally, a **team of reviewers should be asked to identify species** for images with cetaceans visible. Reviewers should be asked to provide a certainty with their identification (definite or guess) and **only 'definite' responses should be used**. The species identification would then be assigned according to the consensus of 'definite' responses. To further understand the conditions under which cetacean species can be reliably identified in UAV survey images, the experiments described above should include a comparison between the proportion of manned survey sightings identified to species, and the proportion of UAV sightings identified. Some time could also be dedicated to replicated the study by Bigal et al. (2020) across a wider range of sea state conditions to augment that study.

## Logistics

The ASI summer aerial survey effort in 2018 involved 8 aircraft and covered 70,000 km of survey transect lines. Whether this survey could be repeated using UAVs depends on the UAV systems available and the ability to find appropriate locations on land, or access to appropriate vessels, to act as base stations for UAV launch, retrieval and operations. High-end, long-range UAVs could feasibly cover the same area covered in the 2018 survey, with appropriately located relay stations. Some next steps in determining whether UAV surveys are logistically feasible include:

1. **Investigate the UAVs available within the ACCOBAMS countries** to determine whether systems with suitable range, endurance, payloads, launch/retrieval systems (from an appropriate company as per our advice above) can be accessed, ensuring that the systems considered comply with regulations within all countries (see Aviation regulations).
2. According to the UAVs available, **investigate the potential locations for base stations**, and/or the potential to use vessels as base stations.

A large challenge would be to adhere to the multitude of aviation regulations within each ACCOBAMS country. Our summary in Appendix 1: Regulations for operating UAVs in ACCOBAMS

signatory countries provides an excellent first step in understanding the requirements from each country and the appropriate contacts to get further information. We suggest however, that this **aviation regulations summary needs to be regularly updated**, as UAV regulations are continually changing as each country adapts to this relatively new technology.

Development of automated systems for UAV image processing is in progress by a number of research groups around the world. There are currently no systems published that have been trained to detect all species of cetaceans found within the ACCOBAMS Agreement Area. Therefore **we recommend investment into the training of image processing systems that are currently being developed, using images collected during the experiments described above**. These images would need to be manually reviewed and labelled so that they can be used as training data. We suggest that ACCOBAMS assumes the first few UAV surveys will require images to be manually reviewed until there are enough training data to develop a reliable and well tested automated detection system.

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# Appendix 1: Regulations for operating UAVs in ACCOBAMS signatory countries

| **Albania** | |
|---|---|
| Importing drones | No information was found |
| Drone types that can/cannot be used | N/A |
| Licensing requirements for owning or operating each different type | A drone permit is not required for recreational drone use. Please adhere to the above General Albania Drone Laws however when flying your drone |
| Licensing requirements for commercial operations | A permit is required for commercial drone use in Albania. Click here to purchase a permit, or contact the local aviation authority. |
| Standard Operating Conditions | Drone use is allowed in Albania, but there are several drone laws that need to be followed when flying in the country.<br>Albania is currently developing legislation for the use of unmanned aerial vehicles,<br>Operators must ensure that they follow the following drone laws when flying in Albania,<br>Do not fly your drone over people or large crowds<br>Respect others privacy when flying your drone<br>Do not fly your drone over airports or in areas were aircraft are operating<br>You must fly during daylight hours and only fly in good weather conditions<br>Do not fly your drone in sensitive areas including government or military facilities. Use of drones or camera drones in these areas are prohibited. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | http://www.aac.gov.al/<br>No info readily available, attempt made at emailing the aviation authority- info@acaa.gov.al<br>All info reference here obtained from: https://www.uavsystemsinternational.com/drone-laws-by-country/albania-drone-laws/ |
| Contact Info | |
| **Algeria** | |
| Importing drones | Not permitted |
| Drone types that can/cannot be used | N/A |
| Licensing requirements for owning or operating each different type | A permit is required for recreational drone use in Algeria.<br>All foreign operators must have authorization from the Minister of National Defense. |
| Licensing requirements for commercial operations | A permit is required for commercial drone use in Algeria.<br>All foreign operators must have authorization from the Minister of National Defense. |
| Standard Operating Conditions | Drone use is allowed in Algeria with the proper permission, but there are several drone laws that need to be followed when flying in the country. Operators must ensure that they follow the following drone laws when flying in Algeria,<br>Do not fly your drone over people or large crowds<br>Respect others privacy when flying your drone<br>Do not fly your drone over airports or in areas where aircraft are operating<br>You must fly during daylight hours and only fly in good weather conditions<br>Do not fly your drone in sensitive areas including government or military facilities. Use of drones or camera drones in these areas are prohibited |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or | N/A |

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| at higher altitudes, and what is the permit process/cost? | |
| Other | It appears that drones are altogether prohibited. Made an attempt at emailing the Directorate of Civil Aviation and Meteorology of Algeria (DACM) – received email failure notification.<br>Another message was sent at this website: http://www.mtp.gov.dz/Aviation_civile_Algerie/index.php/contacts/<br>And this one: http://aaca.mtpt.gov.dz/<br>According to https://www.uavsystemsinternational.com/drone-laws-by-country/algeria-drone-laws/ drones are permitted if a permit is acquired<br>https://drone-traveller.com/drone-laws-algeria/<br>A reader of our blog traveled to Algeria and got his drone confiscated when entering the country. According to the officials, the import of unmanned aerial systems is only permitted with prior approval by the Ministry of National Defense. Apparently, foreigners do not receive this permission. Also, drones in Algeria are probably prohibited in general. If you get caught, even imprisonment threatens. Police and gendarmerie are familiar with the ban, so you will face penalties if you fly with a drone in Algeria and get caught. |
| Contact Info | dg@egsa-alger.dz (e-mail failure) |
| **Bulgaria** | |
| Importing drones | No information could be obtained |
| Drone types that can/cannot be used | N/A |
| Licensing requirements for owning or operating each different type | BULATSA (Bulgarian Air Traffic Services Authority) would like to inform all airspace users who use remote controlled aircraft (for example: drones or other unmanned aircraft) that they shall comply with the following:<br>The airspace users must request through a letter to the Directorate General "Civil Aviation Administration" (DG CAA) permission for conduction of the respective flight activity. (The letter must describe the activity, the necessary zone/zones, date of the activity, beginning and end hour, responsible person during the activity and mobile telephone number for contact with him.)<br>The obtained permission by DG CAA (scanned), along with the "Application for Use of Airspace" (please, see a sample below) must be sent to email address: amc@bulatsa.com or fax: +359 2 945 91 80, at least 8 calendar days before the planned use of airspace (point 2, paragraph 1, Art. 18 of Instruction No. 24 of the Ministry of Transport, Information Technology and Communications of 27 September 2013 on the Operations of the Airspace Management Cell of the Republic of Bulgaria).<br>In the case of approval of the application, the Airspace Management Cell produces a NOTAM message and after its publication, sends to the applicant a response, containing information about the permitted to use airspace. |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | Do not fly your drone higher than 50 meters<br>Do not fly your drone over people or large crowds<br>Respect others privacy when flying your drone<br>Do not fly your drone over airports or in areas where aircraft are operating<br>You must fly during daylight hours and only fly in good weather conditions<br>Do not fly your drone in sensitive areas including government or military facilities. Use of drones or camera drones in these areas are prohibited |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | https://www.bulatsa.com/en/services/information-remote-controlled-aircraft<br>https://www.uavsystemsinternational.com/drone-laws-by-country/bulgaria-drone-laws/<br><br>ACCOBMS focal point:<br>In Bulgaria, drone regulation falls under the Bulgarian Air Traffic Authority Services (BULATSA) & the Civil Aviation Authority (CAA).<br><br>Both can be contacted anytime via:<br>Email: amc@bulatsa.com (BULATSA) & caa@caa.bg (CAA)<br>Tel: (+359) 2 937 1111 (BULATSA) & (+359) 2 937 10 47 (CAA)<br><br>Useful relationships:<br>https://www.caa.bg/en/category/641/drones |

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| | DPRVD https://www.bulatsa.com/en/services/information-remote-controlled-aircraft<br>CPMPA amc@bulatsa.com, fax: +359 2 945 91 80;<br>EASA https://www.easa.europa.eu/easa-and-you/civil-drones-rpas#0<br><br>According to the information we have, with the entry into force of the European Commission's Regulation (EC) 2019/945 of 12 March 2019 and European Commission Regulation (EC) 2019/947 of 24 May 2019, the requirements and rules for the deployment of unmanned aerial vehicle systems (UAS) as follows:<br>Until an electronic register is entered, the UAS operators should:<br>- Fill in a model declaration (sample form in Appendix 1 and according to the table for assigning the category of operations and the UAS class in Appendix 2);<br>- The completed declaration is sent to caa@caa.bg in order to obtain a permit for operation;<br>The permission received from the CAA must be used by the Airspace Management Center, the local and state authorities.<br><br>Under Article 61 of the Bulgarian Civil Aviation Act, unmanned aircraft are sanctioned by the authority specified in Article 50, Paragraph 4 of the same document, which states: "The right to carry domestic state traffic by aircraft shall be granted by the Head of the Civil Aviation Administration." |
| Contact Info | amc@bulatsa.com (sent)<br>caa@caa.bg (sent)<br>received a reply from the e-mail which failed to answer my questions but referred me to this site:<br>file:///C:/Users/user/Downloads/Drones%20%20Directorate%20General%20Civil%20Aviation%20Administration.htm which also did not provide the necessary answers |
| **Croatia** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | The current national regulatory framework defines the usage of Unmanned Aircraft Systems with operating mass from 0 grams up until 150 kilograms.<br>In the previous iteration of the Ordinance the technical requirements were more specific and more strict. Following the European guidelines the restrictions were eliminated. Also, there is no differentiation regarding power supply systems in the current Ordinance.<br><br>ACCOBAMS focal point: Ordinance on UAS is applicable to drones up to 150 kgs of operating mass. No other limitations. |
| Licensing requirements for owning or operating each different type | ACCOBAMS focal point: In the two highest risk categories of operations, theoretical knowledge test is required for remote pilots, but no licenses for remote pilots are envisaged by the Ordinance. Operators of UAS in two low risk categories operations are not required to register. UAS operators in two categories of higher risk are required to register with CCAA. Operators of UAS in the highest risk category of opertations are required to obtain approval from CCAA prior to operations. Owner of UAS which are used for sport and leisure operations are not required to register with CCAA.<br><br>• **Category A:** This includes all drones with less than 250 grams take-off mass and a maximum speed of less than 19 m / s.<br>• **Category B1:** This group includes drones with a mass from 250 to 900 grams and a maximum speed of less than 19 m / s. The category B1 includes e.g. the DJI Spark and the DJI Mavic Pro.<br>• **Category B2:** This category includes unmanned aerial vehicles weighing less than five kilograms. Airspeed no longer matters from category B2. Representatives of the B2 class are the DJI Mavic Air, the DJI Mavic 2 Pro / Zoom and the DJI Phantom 4.<br>• **Category C1 and C2:** These categories include drones with a take-off weight of five kilograms or more. Since these are hardly common, I do not go further here on these categories.<br>• For category A and B1 flight operations, the operator is not required to register their drone or to pass an exam.<br>• For category B2 and C1 flight operations, it is mandatory to register your drone using the Registration of UAS Operator Form: FOD-FRM-005<br>• For category C1 flight operations, the drone operator must pass a theoretical knowledge test in addition to registering his or her drone.<br>• For category C2 flight operations, the drone operator must pass a theoretical knowledge test, demonstrate flight proficiency, and receive approval from the Croatian Civil Aviation Agency. |
| Licensing requirements for commercial operations | Any sort of photography requires a permit, which can only be applied for once in Croatia, making it difficult to obtain.<br><br>ACCOBAMS focal point: Croatia does not distinguish commercial from non commercial operations as far as drones operations are concerned. No specific licensing requirements for researchers are envisaged by the rules. |
| Standard Operating Conditions | It is allowed to fly an Unmanned Aircraft:<br>by day,<br>in uncontrolled airspace up to 120 m above the surface or up to 50 m above the obstacle, whichever is greater,<br>in controlled airspace outside a radius of 5 km from the aerodrome reference point up to 50 m above the surface,<br>at a distance of at least 3 km from thresholds and edges of an uncontrolled aerodrome runway, except where specific procedures for the flights of Unmanned Aircraft are depicted in the aerodrome's instructions for use,<br>in such a way that the horizontal distance of an Unmanned Aircraft from a assembly of people is not less than 50 m, except when an Unmanned Aircraft is taking part in a flying display,<br>in such a way that the horizontal distance from uninvolved people is not less than the flight altitude and not less than:<br>i. 5 m when the low-speed mode is activated on the Unmanned Aircraft, and when the maximum speed of 3 m/s is set, or<br>ii. 30 m in all other cases |

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| | ACCOBAMS focal point: Standard operating conditions are: VLOS, in uncontrolled airspace up to 120m of height, in controlled airspace 5km from the ARP up to 50m of height, 3km from RWY edges of uncontrolled aerodrome, 30m horisontaly from uninvolved persons, 50m horisontaly from assemblies of people, compliance with ATC procedures for airspace reservation. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | For every operation which goes outside of the defined rules there is an Application for approval of Unmanned Aircraft Systems Operations (Link). For all those operations a risk assessment documentation is compulsory. The cost is 70 HRK for administrative fees.<br><br>ACCOBAMS focal point: Mentioned operations are subject to prior CCAA approval with no cost incurred. Approval is granted after operator's Safety Risk Assesment of proposed operations is evaluated as appropriate. |
| Other | As of December 2018, laws have become quite strict and there is no official material to read in English, only in Croatian. See links below from drone forums, they are quite informative:<br><br>https://uavcoach.com/drone-laws-in-croatia/<br>https://www.total-croatia-news.com/lifestyle/30327-drone-regulations-in-croatia<br>https://drone-traveller.com/drone-laws-croatia/<br>https://www.drone-made.com/post/croatia-drone-laws<br><br>https://narodne-novine.nn.hr/clanci/sluzbeni/2018_11_104_2040.html<br>http://www.ccaa.hr/upload/files/documents/Courtesy%20Translation.pdf |
| Contact Info | **Zvonimir Šestan**<br>**Hrvatska agencija za civilno zrakoplovstvo**<br>Ul. grada Vukovara 284, 10000 Zagreb<br>tel.: +385 1 2369 397<br>fax.: +385 1 2369 301<br>e-mail: zvonimir.sestan@ccaa.hr<br>web: http://www.ccaa.hr |
| **Cyprus** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | All drones need to be registered.<br>Open Category drone use (also known as recreational) is the use of an unmanned aircraft, having a total take-off mass of less than three kilograms, which is only used for recreational, sports, training, display or racing purposes and which their use does not involve any kind of commercial activity.<br>Special Category drone use (also known as commercial) is the use of unmanned aircraft having a total takeoff mass of less than twenty five (25) kilograms, which are used for any type of commercial activity. Special Category also applies to unmanned aircraft, of a total takeoff mass of more than three (3) kilograms, which are used for either commercial or recreational activities. |
| Licensing requirements for owning or operating each different type | Drone pilots flying under the Open Category are not required to hold an operating license or drone pilot license from the Cyprus Department of Civil Aviation. |
| Licensing requirements for commercial operations | Drone pilots operating under the Special Category must possess:<br>• An operating license issued by the Department of Civil Aviation.<br>• A drone pilot license issued by the Department of Civil Aviation.<br>• A valid, Category 3 aeromedical certificate |
| Standard Operating Conditions | Based on our research and interpretation of the laws, here are the most important rules to know for flying a drone in Cyprus. (UAVcoach.com)<br>• All drones must be registered through this website link before an operation.<br>• The maximum flying altitude for drones is 50 meters (170 feet) above ground or sea level for the Open category and up to 120 meters (400 feet) above ground or sea level for the Special Category. (Exemptions may be granted to special category drone operators by the Department of Civil Aviation).<br>• Direct visual contact with the drone is mandatory and the distance between the operator and the drone should not exceed 500 meters.<br>• Do not fly close to residential areas and people.<br>• Safety distance of 1 kilometer from residential areas.<br>• Safety distance of 500 meters from isolated buildings, people, vehicles, animals, structures, etc., except with the owner's/person's consent.<br>• Do not fly close to airport and heliports. Safety distance of at least eight (8) kilometers from airports and at least three (3) kilometers from heliports.<br>• It is not permitted to fly a drone at night.<br>• No flying above, within, or in proximity to military installations, public utility installations, archaeological sites and public or private facilities. |
| Conditions in relation to flying beyond visual line | Flying BVLOS is prohibited |

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| of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | |
| Other | https://www.mondaq.com/cyprus/Transport/527562/Drone-Flying-In-Cyprus-What-Are-The-Rules<br>https://www.drones.gov.cy/mcw/dca/drones/drones.nsf/page15_en/page15_en?OpenDocument<br>https://www.drones.gov.cy/mcw/dca/drones/drones.nsf/page15_en/page15_en?OpenDocument<br>https://www.drones.gov.cy/mcw/dca/drones/drones.nsf/2F3EF880A9F9B66AC22581ED00447DEB/$file/UAVS%20Decree%20402-2015-english%20tanslation%20last%20revision%20jan%202016%20(3).pdf |
| Contact Info | uav@dca.mcw.gov.cy |
| **Egypt** | |
| Drone types that can/cannot be used | N/A |
| Licensing requirements for owning or operating each different type | It appears almost impossible to obtain a permit for flying a drone in Egypt.<br>Based on our research and interpretation of the laws, here are the most important rules to know for flying a drone in Egypt.<br>• According to Law No. 28 of 1981, which was amended to include legislation about drones by Law No. 92 in 2003, before operating a drone for any reason in Egypt permission must first be obtained from the Civil Aviation Authority.<br><br>Drone use is heavily restricted in Egypt, there are several Egypt drone laws and procedures that need to be followed before and when flying in the country. Operators must ensure that they follow the following laws when flying in Egypt,<br>• You MUST FIRST receive permission from the civil aviation authority of Egypt prior to operating your drone in the country.<br>• Do not fly your drone over people or large crowds<br>• Respect others privacy when flying your drone<br>• Do not fly your drone over airports or in areas where aircraft are operating<br>• You must fly during daylight hours and only fly in good weather conditions<br>• Do not fly your drone in sensitive areas including government or military facilities. Use of drones or camera drones in these areas are prohibited. |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | N/A |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | http://www.civilaviation.gov.eg/ |
| Contact Info | info@civilaviation.gov.eg (e-mail sent) |
| **France** | |
| Drone types that can/cannot be used | Based on our research and interpretation of the laws, here are the most important rules to know for flying a drone in France.<br>• All drones of 800g or more must be registered by their owner on AlphaTango, the public portal for users of remotely piloted aircraft. The drone then receives a registration number that must be affixed permanently, visibly, on the drone and must allow reading at a distance of 30 centimeters, with the naked eye. The drone pilot must be able to provide proof of registration in the event of a check.<br>• Drone pilots must maintain a line of sight with their drones at all times. If a visual observer is tracking the drone, the pilot may fly out of his or her own range of sight.<br>• Drones may not be flown at night (unless with special authorization from the local prefect).<br>• Drones may not be flown over people; over airports or airfields; over private property (unless with owner's authorization); over military installations, prisons, nuclear power plants, historical monuments, or national parks. Use this map to locate flight restrictions by geolocation.<br>• Drones may also not be flown over ongoing fires, accident zones, or around emergency services.<br>• Drones may not be flown above 150 meters (492 feet), or higher than 50 meters (164 feet) above any object or building that is 100 meters (328 feet) or more in height. |
| Licensing requirements for owning or operating each different type | • Drone pilots who fly for leisure or recreation only do not need a training certificate when their drone's mass is less than 800 grams.<br>• Drone pilots operating a remotely piloted aircraft of 800g or more for recreational purposes must undergo training. This training can be: (1) the Fox AlphaTango training offered by the DGAC or (2) training provided by the FFAM or UFOLEP recognized as equivalent by the DGAC. |

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| Licensing requirements for commercial operations | • Drone pilots who fly for purposes other than leisure (commercial drone pilots) must pass a theoretical exam. The exam can be taken online or at specified DSAC facilities. Procedures for taking this exam are described on this page. Upon passing the exam, the pilot will receive a theoretical telepilote certificate. The pilot must have this printed and with them during all flights.<br>• Commercial drone pilots must also undergo basic practical training. The operator must define and provide the necessary additional training, taking into account the types of aircraft they use and the specific activities they perform. At the end of the training, the training organizations will provide the telepilots with a training follow-up certificate for the corresponding scenarios.<br>• A drone pilot cannot provide his own practical training. |
| Standard Operating Conditions | N/A |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | https://www.lexology.com/library/detail.aspx?g=ff38dfea-4522-4b5f-9474-c6adbaa417bc<br>https://aerophoto-drones.bzh/2017/01/30/fly-a-drone-in-france-for-foreigners-and-regulation/<br>https://www.ecologique-solidaire.gouv.fr/modeles-reduits-et-drones-loisir<br>https://www.loc.gov/law/help/regulation-of-drones/france.php |
| Contact Info | Their website was in French and required "signing up" and opening an account in order to get in touch |
| **Georgia** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | There are no weight limits or limits associated with battery or fuel used. Autonomous unmanned aircraft that cannot be controlled during the flight is not allowed to be operated in Georgia.<br><br>ACCOBAMS Focal Point: GCAA regulations allow use of drones in three categories of operation. Drones with MTOW up to 25 kg in Open Category, drones up to 150 kg in Specific Category and 150 kg or above in Certified Category. However, the Certified Category operations are not in force in Georgia yet. If drone operations in Specific Category is intended the typical maximum drone characteristic dimension is less than 8 m / approx. 25ft (e.g. wingspan for fixed wing, blade diameter for rotorcraft, max. dimension for multi-copters, etc.) and typical kinetic energy expected is less than 1084 KJ (approx. 800000 Ft Lb).<br>Any drone weighting more than 5 kilograms is required to be registered at Civil Aviation Agency of Georgia. There no other restrictions related to multi-rotor versus fixed wing, battery versus fuel, etc. |
| Licensing requirements for owning or operating each different type | There is no distinction between commercial or non-commercial operation in terms of licensing requirements. In Georgia there are categories of operation which are Open, Specific, and Certified. Unmanned aircraft can be operated commercially within the limits of Open category (very similar to EASA rules). However, Specific authorization from CAA is required if operation beyond the limits set in Open category is required.<br><br>ACCOBAMS Focal Point: A spatial authorization is required for operations in Specific Category whether the operation is commercial or no commercial. |
| Licensing requirements for commercial operations | There is no specific licensing requirements for commercial operations or for researchers.<br><br>ACCOBAMS Focal Point: There are no specific licensing requirements for researchers enforced by GCAA.<br>If commercial operations are conducted in Open Category there are no licensing requirements imposed by GCAA. If commercial operations are conducted in Specific Category a special permission is required under article 21.<br>Article 21. Documents to be submitted for the RPA Operational Authorization.<br>1. To receive RPAS Operational Authorization in Specific Category an operator shall submit the application in accordance with Article 78 of the General Administrative Code of Georgia which shall comply with the form prescribed by Annex 5 of this Rule.<br>2. The application shall be accompanied by:<br>A) an application in accordance with appendix № 5 of this Rule;<br>B) The document confirming the payment of the fee in compliance with the Order No. 1/1025 of the Minister of Economy and Sustainable Development of Georgia, April 20, 2012;<br>C) Certificate of Public Registry and Organizational structure with the indication of responsible persons (in case of legal person);<br>D) Medical certificate of the person (s) - Form 100, who shall carry out the operation of RPAS<br>E) A copy of user manual (flight manual) issued by the manufacturer of the RPAS;<br>F) A copy of the registration certificate of the unmanned aircraft (s) if applicable.<br>G) Information in accordance with Annex №8 of this Rule;<br>H) geographic coordinates and altitudes of intended operation;<br>I) Operation Manual pursuant to Appendix No. 11 of this Rule;<br>J) Flight folio in accordance with the Annex No.12 of this Rule;<br>L) other additional information requested by the Agency taking into consideration the specifics of the RPAS operation.<br>3. The initial operational authorization is given for one year and each subsequent operational authorization is issued for up to 2 years. |

<table>
<tr><td></td><td>4. In case of RPAS with MTOW more than 25kg, a maintenance program shall be submitted.<br>(Annexes 5,8,11,12 attached to this email)</td></tr>
<tr><td>Standard Operating Conditions</td><td>Unmanned Aircraft weighting less than 5 kilograms is not required to be registered in Civil Aviation Agency of Georgia.<br><br>Unmanned Aircraft (UA) weighing less than 25 kilograms does not require Civil Aviation Agency’s approval if operated within the following limits of Open Category:<br>- Do not fly above 400 feet above ground level;<br>- Keep horizontal distance of not less than 50 meters from groups of people unless the groups are under your direct supervision;<br>- Keep horizontal distance of not less than 50 meters from public roads/railways;<br>- Keep horizontal distance of not less than 50 meters from buildings unless you have obtained permission from the relevant owner;<br>- Keep horizontal distance of not less than 6 kilometers from aerodromes;<br>- Keep the UA always in Visual line of Sight (VLOS);<br>- Do not fly above the speed of 54 km/hrs.;<br>- Do not carry any specific items with the UA;<br>- Do not drop or spread any liquids from the UA;<br>- Do not transport dangerous goods with the UA;<br>- Do not perform towing by the UA;<br>- Do not engage in Air Show with the UA;<br><br>ACCOBAMS Focal Point: RPAS weighing less than 25 kilograms is not subject to Civil Aviation Agency’s approval if operated within the following limits of “Open Category”.
<table>
<tr><td>Maximum flight altitude</td><td>At or below 400 feet AGL</td></tr>
<tr><td>Horizontal distance form a group of people unless the group is directly supervised by RPAS operator</td><td>Not less than 50 meters</td></tr>
<tr><td>Horizontal distance form public roads/railways;</td><td>Not less than 50 meters</td></tr>
<tr><td>Horizontal distance from buildings and private property unless a permission is obtained from the relevant owner/agency.</td><td>Not less than 50 meters</td></tr>
<tr><td>Horizontal distance form aerodromes</td><td>Not less than 6 kilometers</td></tr>
<tr><td>RPAS range</td><td>Visual Line of Sight (VLOS)</td></tr>
<tr><td>RPAS speed</td><td>At or below 54 km/hrs.;</td></tr>
<tr><td>Carriage of items</td><td>Not allowed</td></tr>
<tr><td>Dropping or spraying of liquids</td><td>Not allowed</td></tr>
<tr><td>Transport of Dangerous goods</td><td>Not allowed</td></tr>
<tr><td>Towing</td><td>Not allowed</td></tr>
<tr><td>Air Show</td><td>Not allowed</td></tr>
</table></td></tr>
<tr><td>Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost?</td><td>For BVLOS operations the operator shall apply for Specific authorization to CAA. The authorization involves a safety risk assessment conducted by the operator with the use of SORA methodology. The process can take up to 45 days depending on the complexity of operation. The Operations Manual and some additional documentation shall also be developed. (detailed info can be submitted if requested).<br><br>ACCOBAMS Focal Point: In case drones operation beyond the above limits of Open Category are sought a special permission shall be obtained from Civil Aviation Agency of Georgia.</td></tr>
<tr><td>Other</td><td>ACCOBAMS Focal Point: Please, find attached to this letter excerpts from the regulation related to registration and authorization of operations in Specific Category.<br>Other information about the special areas of certain aviation activity is published through NOTAM and is available at the following link in Georgian:<br>http://www.gcaa.ge/geo/activenotams.php<br>In case you need any additional info, please contact: uas-ga@gcaa.ge.<br><br>http://www.gcaa.ge/geo/<br>http://www.gcaa.ge/eng/RPAS.php</td></tr>
<tr><td>Contact Info</td><td>Akaki Maisaia<br>a.maisaia@gcaa.ge</td></tr>
<tr><td>Greece</td><td></td></tr>
<tr><td>Importing drones</td><td>No information available</td></tr>
<tr><td>Drone types that can/cannot be used</td><td>Drones may not weigh more than 25 kilograms (55 pounds).<br>Categories of unmanned aircraft systems (UAS) 1. For the classification of UAS, the following criteria are taken into consideration: - The maximum take-off mass (MTOM) - The type of use -The height above the surface of earth or sea where allowed to fly - The areas (exclusive or not) to fly in - The technical capabilities of each UAS - The complexity of the environment of the flying operations of UAS 2. Taking into account the criteria of the previous paragraph the following categories UAS are specified: A. The "Open" category (UAS Open Category) B. The "Specific" category (UAS Specific Category) III. The "Certified" category (UAS Certified Category)<br>Drone operators who fly for commercial purposes or in the “Specific” or “Certified” category must have drone insurance.</td></tr>
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| | Drone operators who fly for hobby or recreation only do not need drone insurance unless their drone weighs more than 4 kg, falling into the "Open-A2 category." See Articles 7, 8, and 9 of this document from the HCAA for more information on UAS categories. |
| Licensing requirements for owning or operating each different type | If you want to fly less than 50 meters away, you may do so without an application or prior approval.<br>If you plan to fly with permission, you may fly up to 120 meters (393 feet) above the ground.<br>If you plan to fly 50 meters (164 feet) or more away, you must complete an application for each individual drone flight you plan to conduct. You can find the application here. If your application is approved by the HCAA, you then must verify our identify and share your flight plans with the local police department. |
| Licensing requirements for commercial operations | Commercial pilots must obtain permission for all operations.<br>More information can be found on this page on the HCAA website.<br>Need to contact: public.relations1@minipress.gr |
| Standard Operating Conditions | Drones may not be flown at night.<br>Drones may not be flown over people, prisons, hospitals, government and military facilities, and other sensitive areas.<br>Drones may not be flown over private property without permission from the property owner. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | Special permit required.<br>Any any case, flying beyond 400 meters height is not permitted. |
| Other | http://www.ypa.gr/en/HCAA_UAS_FLT_request_editable.pdf<br>https://dagr.hcaa.gr/docs/HCAA%20UAS%20Regulation.pdf<br>https://www.drone-made.com/post/greece-drone-laws<br>http://www.hcaa.gr/en/<br>See 2 attached forms; form 1 for recreational flight, form 2 with legislation and links |
| Contact Info | YPA@HCAA.GR (email sent) |
| **Italy** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | Your drone must weigh under 25kg<br>Drones must be identified by a plate showing the identification of the system and of the operator. An identical plate shall be installed also on the remote ground pilot station. As of the 1st of July 2016, in addition to plates required by the Art 8.1, all drones that allow the transmission of data in real time must be equipped with an Electronic Identification Device.<br><br>ACCOBAMs Focal Point: Pursuant to the Regulation of the European Parliament and of the Council (EC) No 216/2008, RPAS of operating take-off mass not exceeding 150 kg and those designed or modified for research, experimental or scientific purposes pertain to ENAC competence.<br>RPAS in the scope of this Regulation are classified according to the operating take-off mass of the RPA, as follows:<br>a) RPAS with RPA having operating take-off mass of less 25 kg but more than 0.3 kg<br>b) RPAS with RPA having operating take-off mass equal to or more than 25 kg and less than 150 kg. |
| Licensing requirements for owning or operating each different type | ACCOBAMs Focal Point: Remotely piloted aerial vehicles operated or intended to be operated for specialised operations or for experimental, scientific or research activities, are established to be Remotely Piloted Aircraft Systems (RPAS) and the provisions of the Italian Navigation Code apply, in accordance with this Regulation. No license for commercial use are pursued.<br>Different licensing are related to weight (critical vs non critical operation): < 2kg they are always considered non dangerous but > 0,3 kg they always need licensing and flights cannot be done over. |
| Licensing requirements for commercial operations | Commercial drone pilots conducting low-risk operations must submit a statement of compliance with specific requirements to ENAC along with a 94 Euro processing fee. For higher risk operations commercial drone pilots must obtain a training and operating certificate as well as a health certificate. Learn more about the requirements for commercial operations on this page on the ENAC website.<br><br>ACCOBAMs Focal Point: Same licensing since commercial operations are not considered. |
| Standard Operating Conditions | Drone pilots must maintain a direct line of sight with their drone during operations.<br>Drones may not be flown at night.<br>Drones are not allowed to fly over people or crowds, including sports events, concerts, and other large events.<br>Drones being flown for recreational purposes may not fly more than 70 meters (230 feet) above the ground, and drones being flown for commercial purposes may not fly more than 150 meters (492 feet) above the ground.<br>Drones may not be flown within 5 kilometers (6.8 miles) of any airport or airfield.<br>You may not carry dangerous goods on your drone<br>Do not fly your drone over people or large crowds – This is taken VERY seriously, there are many reports online of individuals being arrested and having their drones seized within minutes of takeoff when trying to fly them around tourist attractions with many people nearby<br>Do not control your drone using goggles such as the DJI Goggles unless you have someone else next to you visually watching the drone at all times |

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| | ACCOBAMs Focal Point: VLOS operations are permitted in daylight, up to maximum height of 150 m AGL, within maximum horizontal distance of 500 m, and shall be carried out safely, without causing damages to third parties. Higher distances and heights may be evaluated and authorized by ENAC as appropriate, following submission of an appropriate risk assessment by the RPAS operator. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | You may not fly your drone further than 650 feet horizontally or out of visual line of sight, whichever is first<br><br>ACCOBAMs Focal Point: BVLOS operations are carried out beyond VLOS horizontal or vertical distances, at a distance where procedure to avoid collisions by visual observation cannot be applied. BVLOS operations require systems and procedures to maintain separations and avoid collision which shall be authorized by ENAC. 2. BVLOS operations may require airspace segregation (permanent or temporary), without prejudice to limitations and conditions established by ENAC, based on the kind of operation and the findings of the risk assessment performed by the RPAS operator. |
| Other | https://www.enac.gov.it/en<br>https://www.enac.gov.it/repository/ContentManagement/information/N1068541283/Regulation_RPAS_Issue_2_Rev_3_eng.pdf<br>https://www.enac.gov.it/sites/default/files/allegati/2018-Lug/Regulation_RPAS_Issue_2_Rev_4_eng.pdf |
| Contact Info | protocollo@pec.enac.gov.it (email failure) registro.aeromobili@enac.gov.it (email sent) |
| **Israel** | |
| Importing drones | Only limitations refer to communication frequencies |
| Drone types that can/cannot be used | No limitations. |
| Licensing requirements for owning or operating each different type | No limitations.<br>In the future- drones above 250 grams will need registration, ID markings and pilot license |
| Licensing requirements for commercial operations | Commercial operations permitted to fly at night in some cases |
| Standard Operating Conditions | 50 meters height<br>VLOS only<br>Daytime only<br>250 meters away from people<br>2 km from airports |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | Not permitted |
| Other | There is a special procedure for bringing foreign drones to the country and flying them recreationally or commercially<br>https://caa.gov.il/index.php?option=com_docman&view=download&alias=6681-what-is-the-law-of-drone-flying-in-israel-1&category_slug=2015-10-13-06-38-50-7&Itemid=669&lang=he<br>https://caa.gov.il/index.php?option=com_content&view=article&id=1538:2018-04-17-11-03-05&catid=157&Itemid=731&lang=he |
| Contact Info | |
| **Lebanon** | |
| Drone types that can/cannot be used | In Lebanon, drones must be registered with the army. Anyone who misses the registration and still flies with a drone in Lebanon must expect prosecution. When registering you already have to specify where and when you want to operate, what purpose the flights have and which copter (with serial number) you want to use. Also, various documents must be submitted. Costs do not accrue for the permit. |
| Licensing requirements for owning or operating each different type | N/A |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | N/A |
| Conditions in relation to flying | N/A |

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| beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | |
| Other | https://uavcoach.com/drone-laws-in-lebanon/<br>https://www.tripadvisor.com/ShowTopic-g294004-i2871-k10718766-Can_I_fly_drone_in_Lebanon-Lebanon.html<br>https://techgeek365.com/flying-your-drone-in-lebanon-everything-you-need-to-know/<br>https://drone-traveller.com/drone-laws-lebanon/<br>https://www.lebarmy.gov.lb/en/administrative_transactiont/request-filming-permit-using-flying-camera<br>site does not open from Israeli IP/computer location. Screenshots and files saved in folder. |
| Contact Info | |
| **Libya** | |
| Drone types that can/cannot be used | No official drone laws were found, or any other information regarding flying drones in the country. |
| Licensing requirements for owning or operating each different type | N/A |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | N/A |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | |
| Contact Info | |
| **Malta** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | The Civil Aviation Directorate has published a "Self-Declaration for the safe Operation of Drones". This form may be accessed by using this address: https://www.transport.gov.mt/aviation/drones-2604 |
| Licensing requirements for owning or operating each different type | Use of drones is still unregulated however, one has to notify the Competent Authority through the above mentioned Self Declaration form and follow all the provisions stated in the same form meticulously. |
| Licensing requirements for commercial operations | Use of drones is still unregulated however, one has to notify the Competent Authority through the above mentioned Self Declaration form and follow all the provisions stated in the same form meticulously. |
| Standard Operating Conditions | Use of drones is still unregulated however, one has to notify the Competent Authority through the above mentioned Self Declaration form and follow all the provisions stated in the same form meticulously. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | BVLOS operations are not permitted in Maltese airspace. Neither can a drone be flown above ground or water at an altitude of more than 60 metres. For out of the norm operations the proposer is kindly requested to approach the Transport Malta, Civil Aviation Directorate before embarking on any such operations inside Maltese sovereign airspace. |
| Other | https://www.transport.gov.mt/aviation/drones-2604 |
| Contact Info | **Major Stephen Spiteri Staines Ret'd**<br>Inspecting Officer, Air Navigation Services & Aerodromes |

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| | Civil Aviation Directorate<br>stephen.a.spiteri-staines@transport.gov.mt |
| **Monaco** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | Only drone using batteries are allowed in the Principality of Monaco. No weight limit for the moment (expecting in few years taxi drones) |
| Licensing requirements for owning or operating each different type | Research and commercial drone use are the same. Some documents are needed to be registered in Monaco, before flying. |
| Licensing requirements for commercial operations | For the moment only VLOS is allowed, but we may deliver dérogation for BVLOS |
| Standard Operating Conditions | Standard operating conditions are : Having an agreement, asking for flight authorization, contacting services before and at the end of the flight, VMC conditions, no night flight 150m high max, 100m from pilot |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | For "out of norm" flights, depending of the subject, issues and specials procedures, Not allowed, but could receive a derogation to be done. |
| Other | Documentation available only in French. Files attached to e-mail. |
| Contact Info | grobini@gouv.mc |
| **Montenegro** | |
| Importing drones | Permit required in advance |
| Drone types that can/cannot be used | operational mass less than 20 kg<br>3 categories:<br>Up to 5kg<br>5kg-10kg<br>10kg-20kg |
| Licensing requirements for owning or operating each different type | Drone needs to be registered<br>Insurance mandatory<br>License may be required for certain weight categories in certain flight zones (see attachment) |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | Flights need be performed during the day<br>Max height: 150 meters<br>Max distance: visual range, max 500 meters |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | http://www.caa.me/cms/site_data/propisi/OPS/Pravilnik%20o%20uslovima%20i%20na%C4%8Dinu%20za%20vanaerodromsko%20slijetanje%20i%20polijetanje%20vazduhoplova%20-%20ENG.pdf<br>http://www.caa.me/cms/site_data/safety%20orders/SO/SO%202017-001%20Rev%2000.pdf<br>http://www.caa.me/cms/site_data/zahtjevi/OPS/IZJAVA%20za%20izvo%C4%91enje%20leta%C4%8Dkih%20operacija%20sistemima%20bespilotnih%20vazduhoplova.docx<br>Links discontinued.<br>https://drone-traveller.com/drone-laws-montenegro/<br>https://utjeha.me/fileadmin/user_upload/downloads/drohne-in-montenegro.pdf<br>https://www.reddit.com/r/drones/comments/cea6b2/import_drone_into_montenegro/expln6f/<br>See attachment from ACCOBAMS focal point. |
| Contact Info | Isidora Pelevic<br>Advisor - Administrative assistant<br>Josip Broz Tito bb, |

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| | 81000 Podgorica<br>Montenegro<br>tel: + 382 20 625 506<br>+ 382 20 625 507<br>fax: + 382 20 625 517<br>e-mail: acv@caa.me<br>(additional e-mail has been sent) |
| **Morocco** | |
| Drone types that can/cannot be used | It appears that drones are strictly prohibited in Morocco and will be confiscated at the airport, additionally may or may not be returned to owner upon departure… I attempted to find out if specialized permits could be obtained but was unable to find a registration page or contact email.<br><br>ACCOBAMS focal point: No aircraft operated without a pilot may fly over Moroccan territory unless specially authorized by the Civil aviation Authority.<br>The use of unmanned, engine-powered and remote-controlled flying objects (drones, scale models of aircraft, etc.) is subject to prior import licensing in accordance with Article 1 of Law No 13/89 on foreign trade. |
| Licensing requirements for owning or operating each different type | ACCOBAMS focal point: Certain administrations, companies or public bodies may be authorised, at their request, for specific professional needs (film production, entertainment, etc.) to import the equipment in question. Each use must be specifically authorised by the local authority. |
| Licensing requirements for commercial operations | ACCOBAMS focal point: Import requests must be submitted to the Delegate Ministry of Foreign Trade and will only be satisfied with the agreement of the Ministry of the Interior. |
| Standard Operating Conditions | ACCOBAMS focal point: For the use of a drone in Morocco, the first contact is the Ministry of Foreign Trade, which delegates the case to the Ministry of Interior for an investigation into the presumed use of the drone and the intentions of the company making the request. In addition, an authorization from the National Communications Regulatory Agency is required. The final decision rests with the Ministry of the Interior. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | ACCOBAMS focal point: For any type of overflight of drones in Morocco, the Ministry of the Interior conducts an investigation into the presumed use of these drones and the intentions of the company making the request before deciding on the final decision. |
| Other | http://www.onda.ma/en/I-discover-ONDA/Newsroom/Press-contact<br>http://dronemaroc.ma/imports-authorisations-moroccan-drone-say-yes/<br>https://drone-traveller.com/drone-laws-morocco/ |
| Contact Info | https://www.facebook.com/EquipemenTTransport<br>Could not find any e-mail addresses and most pages were in Arabic with no translation. Sent a message on Facebook |
| **Portugal** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | The Drone Code sets that in airspace where there is no set restrictions you are able to use your *drone* without previous authorization from Portuguese Civil Aviation Authority if cumulatively you are operating:<br>Uncontrolled Airspace operation;<br>During daylight (From Sunrise (-) 25 minutes until Sunset (+) 25 minutes);<br>In Visual Line of Sight;<br>Until 120 meters above surface maximum height.<br>RPA <25Kg take-off weight. |
| Licensing requirements for owning or operating each different type | ANAC is the CAA/NSA for UAS operated in the airspace. Please find below a resume of our current regulations that will shortly be surpassed by European Regulations.<br>Kindly note that no authorizations from ANAC are required if you comply with general operating rules referred in Article 3 of the applicable legal diploma on drones, Regulation N.º 1093/2016 adopted on the 14th of December and in force since 13th of January of 2017 (lower risk operations). In order to operate a drone out of the regulation limits, thus in a higher risk scenario, such operation will only be approved if the operator have a way to proof operational integrity and assurance. Currently there is no applicable legislation. The new Portuguese Law concerning register and insurance is still in legislative circuit. (Note that a Decree-law n. 58/2018 demands the development of a web application. Such web application is under development, registration is not necessary so far, since no electronic platform is available. Follow up in an official communication source such as Competent Authority Website is strongly advised). |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | The Drone Code sets that in airspace where there is no set restrictions you are able to use your *drone* without previous authorization from Portuguese Civil Aviation Authority if cumulatively you are operating:<br>Uncontrolled Airspace operation;<br>During daylight (From Sunrise (-) 25 minutes until Sunset (+) 25 minutes); |

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| | In Visual Line of Sight;<br>Until 120 meters above surface maximum height.<br>RPA <25Kg take-off weight. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | If you intend to operate your drone above highest obstacle height, near a secondary aerodrome you will need to request previous permission through aerodrome director (see contact list) if operating in the following areas:<br>Inside 2,5Km meters radius circle from center aerodrome/heliport;<br>Inside Bragança, Vila Real, Chaves, Viseu, Coimbra, Ponte de Sor, Évora and Portimão Aerodrome Traffic Zone (ATZ) See Map (Google earth file) |
| Other | We strongly suggest all operators to perform a risk assessment as per JARUS WG6 SORA guidelines, covering the concept of the operation and achieving Operational Safety Objectives. Guidelines are accessible through the following hyperlink: **http://jarus-rpas.org/content/jar-doc-06-sora-package**<br>If your operation is for leisure purposes I suggest to comply with general operating rules of article 3 of the Regulation, so, no authorization is needed from Portuguese Civil Aviation Authority (www.voanaboa.pt – In Portuguese language only but you can use a chrome browser translator to assist you).<br>Kindly note that to take photos and record videos a prior approval shall be obtained from the Military Aeronautical Authority (AAN - Aerial Surveys (www.aan.pt– e-AAN web application). You shall also request prior authorization to AAN if you intend to fly within Military Airspace.<br>https://www.aan.pt/ |
| Contact Info | **Fabio Camacho**<br>Departamento de Informação Aeronáutica<br>*Aeronautical Infrastructure Department*<br><br>**Autoridade Nacional da Aviação Civil**<br>*Portuguese Civil Aviation Authority*<br>Morada: Rua B, Edifício 4 - Aeroporto Humberto Delgado<br>1749-034 Lisboa<br>Portugal<br>E-mail: fabio.camacho@anac.pt |
| **Romania** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | For drones weighing more than 20 kilograms (44 pounds) insurance is mandatory.<br><br>ACCOBAMS focal point:<br>Under 250 grams no license is needed, just to follow the recommendations of HG no. 912/2010 for approving the procedure for the authorization of flights in the national airspace (....)<br>Over 500 grams should be registered at the Romanian Flaying Authority (AAR), *OMT nr. 1338/2016*<br>*Over 15 kg pilot navigation licence is needed;*<br>*Over 20 kg insurance is needed - Regulation (CE) no. 785/2004 of European Parliament*<br>PZN – Flight permit for UAV, *according with Cap. 6 "Unmanned aerial vehicules (UAV)" of RACR AZAC "Flying Admissibility of certain civil aircrafts", edition 01/2007* |
| Licensing requirements for owning or operating each different type | To fly a drone in Romania, you must register it with the AACR. If you are a foreigner, it appears that a registration with your country of citizenship could take the place of registering with the AACR, but we recommend checking with the AACR to confirm this before traveling.<br>In addition to registering, each flight must be pre-approved by the Ministry of Defense.<br><br>ACCOBAMS focal point: For Romania is needed a Civil Aviation Safety Authority in accordance with EASA rules mainly, and use the same procedures like in the commercial flights, including registration of the drone, pilot (if is larger than 500, departure and arrival, flight plan etc. *para. f, alin. (1), art. 4 al HG nr. 912/2010 for approving the procedure for the authorization in the national airspace ).*<br>Always is easier to be owned by a Romanian entity, in order to be registered in Romania. This is valid for most of the EU countries |
| Licensing requirements for commercial operations | ACCOBAMS focal point: For civil flights are the normal regulation, for research there is a need of special permits from Military, Research Ministry, and several others.<br>According with OMT nr. 8/2014 aerial operators should not request permits for flights under 300 m altitude, the request is for a phone call at COAP/MApN (fdex@roaf.ro). Just in case the flight/flights are crossing special areas/forbidden etc. |
| Standard Operating Conditions | Drones may not be flown over densely populated areas and crowds of people or in cities. For special exceptions to these restrictions an application may be made to the AACR.<br>Drones may not be flown higher than 300 meters (984 feet).<br>Drone pilots must maintain a visual line of sight with their drone at all times.<br>To conduct aerial photography / videography, an application must be submitted to and approved by the AACR. More information can be obtained by calling +421 4106390 or faxing +4 021 4102695 |

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| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | Drone pilots must maintain a visual line of sight with their drone at all times. |
| Other | http://www.caa.ro/stiri/guidelines-for-the-remotely-piloted-aircraft-systems-rpas-operation-within-the-romanian-airspace<br>(was not able to find the detailed page for reference)<br>http://www.caa.ro/<br>Application for photography: http://www.caa.ro/media/docs/A.3.6_c_HG_912-2010_Anexa_2.pdf<br><br>Google translate from link: *http://www.caa.ro/page/rpasuavdrone*<br>**1. The** *authorization to perform flights below the safety height does not exempt the applicant from obtaining all the necessary approvals and / or additional authorizations according to the provisions of Government Decision no. 912/2010, amended and amended;*<br>**2.** Send, in scanned form, the completed application together with the supporting documents by e-mail to AACR using the address zsis@caa.ro with at least 2 working days before the flight or the series of flights (the maximum total size allowed for the attached documents is 10MB). The AACR response will be sent by e-mail and / or fax, to the address, respectively the fax number, communicated by the applicant;<br>**3. The** coordinates / maps / associated drawings must be as detailed as possible and can be determined / realized using any available application (eg Google Earth, Google Maps, etc.). They must have the geographical limits of operation, the directions used and any other information necessary to determine the degree of flight safety.<br><br>**Licensing activities shooting / aerial photography**<br>steps necessary to obtain the opinion of shooting / aerial photographyissued by MApN<br>a. The air operator / drone user completes and sends the type request ( application form ) to the Flight section, aeronautical relations and regulations / MApN at the e-mail address: *survol@mapn.ro* . The applicant has the obligation to complete all the specific fields in the application, making sure that he has attached the information / documents necessary to obtain the opinion;<br>b. If the air operator / drone user requests a flight / series of flights below the minimum safety height, he / she shall contact the AACR to obtain the required authorization ( application form ). The authorization of the AACR will be transmitted to the Flying Section, aeronautical relations and regulations / MApN as an annex to the standard request from point 1);<br>c. The deadline for submitting the request to the MApN is 10 working days before the estimated departure date. This term is necessary for processing the requests from the perspective of the protection of classified information, in accordance with Law 182/2002, amended and supplemented with Law 167/2015;<br>d. Applications that do not meet the legal conditions for approval will be rejected, and for incomplete ones, the MApN will request the necessary information from the airline operators / drone users. In this case, the period of 10 working days required to issue the filming notice will start from the moment of providing the complete information;<br>e. The MApN will issue and transmit to the airline operators / drone users the filming notice requested within 10 working days from the date of acceptance of the applications;<br>f. After obtaining the filming permit, for each flight, the airline operators / drone users will communicate to the Air Operations Center / MApN the data according to the specifications available here ;<br><br>Application for authorization to work filming / photography air is sent to the MoD ( Formular request ). For more information, call +4 021 4106390 or fax +4 021 4102695 or go to the "Aerial shooting / aerial photography" website .<br><br>*Authorization of distributors*<br>Given the fact that unmanned aircraft are civil aircraft and, consequently, their components and / or equipment are considered "aeronautical products", in accordance with the provisions of the Air Code and those of the RACR DPA. aeronautical products ", the commercial agents that operate in the territory of Romania and have as their purpose the sale of unmanned aircraft, components and / or equipment specific to them, must be authorized by the AACR.<br>More details on the stages of the authorization process can be found here.<br>Authorization process specific forms: Authorization application form (F-PIAC-AW-DPA-03); Personal authorization (F-PIAC-AW-DPA-02) ; Presentation memory (development guide / G-MPD ).<br><br>For the purpose of complete information, we emphasize the following:<br>1. At present, operators of unmanned aircraft are no longer required to require segregation of the airspace in which they operate. The authorization of the flight activities is carried out by telephone by contacting the Air Operations Center / Ministry of National Defense (COAP / MApN).<br>**Contacts:**<br>phone: +40 21 315 0105<br>fax: +40 21 3158647<br>e-mail: fdex@roaf.ro |
| Contact Info | dir.gen@caa.ro<br>tudorel.roman@caa.ro |

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| | sorin.encutescu@caa.ro (emails sent to all 3, will update when a reply is received) |
| **Slovenia** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | aircraft model of operation mass up to 25 kilo |
| Licensing requirements for owning or operating each different type | N/A |
| Licensing requirements for commercial operations | Slovenia differentiates between drone use for leisure or sport and commercial activities.<br>Drones for leisure and sport are referred to as aircraft models and may only fly in classes I and II, which means uninhabited areas according to the regulations:<br>● Class I: "area where there are no structures and people, except for operators and personnel necessary to perform flying"<br>● Class II: "area where there are ancillary structures or structures not intended for residential purposes of people and where there are no people, except for operators and personnel necessary to perform flying, and where only the occasional passage without stopping of people in this area (e.g. cyclists, walkers) is allowed"<br>Article 13 (4) of the law provides the crucial information on aviation activities, which include aerial photography. It states that aerial photography is allowed if it is for private use only and the drones weighs no more than 25 kilograms. |
| Standard Operating Conditions | In short, you can use your drone only in accordance with rules applicable for **model aircraft**. **You cannot perform so called aviation activity; accept in accordance with exemption below:**<br><br>Performance of **aviation activity** shall not be considered as such if the activity is performed for its own non-commercial purposes, using an aircraft model of operation mass up to 25 kilogrammes according to the restrictions applicable to the aircraft models.<br><br>So primary you are limited to use drone in flying area Classified as I or II (unpopulated areas) and in accordance with all other applicable rules of the air (primary article 11).<br><br>For that kind of flying, you do not need any exam, application, just your own awareness and application of the rules. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | For operations other than (outside the limitation) specified as 'model flying' you need to submit application, after you fulfil all that is required in DECREE of unmanned aircraft systems and Sprejemljivi načini usklajevanja (SNU) in navodila (NA) k Uredbi o sistemih brezpilotnih zrakoplovov (Acceptable Means of Compliance- AMC) for performing of '**aviation activity'.**<br><br>**This is possible only for category A and B. After you get our response ('Potrdilo'- certificate), you can start performing aviation activity, for which you need to notify us 12 hrs before every flight…** |
| Other | https://www.caa.si/en/unmanned-aerial-vehicles.html<br>https://drone-traveller.com/drone-laws-slovenia/<br>On website above, you can find courtesy translation our regulation (*Decree of unmanned aircraft systems) and* Restricted areas for drone operations (interactive graphical representation of prohibited areas) which is enough for **'model flying'** pilots to understand local regulations about rules of the air. |
| Contact Info | **SAMO HRIBAR**<br>Letalski nadzornik/ Aviation Inspector<br><br>t: +386 (0)1 244 66 35<br>t: +386 (0)1 244 66 00<br>g: +386 (0)51 617 153<br>e: samo.hribar@caa.si<br>w: www.caa.si |
| **Spain** | |
| Drone types that can/cannot be used | Only enabled operators can perform aerial works with drones in Spain<br><br>**ACCOBAMS Focal Point:**<br>Any type of drone can be used. The regulations regulate according to the weight of the drone.<br>Royal Decree 1036/2017 applies:<br>a) To civil aircraft piloted by remote control (RPA) whose maximum take-off mass is less than 150 kg.<br>b) To civil aircraft piloted by remote control (RPA), whatever their maximum mass at take-off, carrying out customs, police, search and rescue activities, fire fighting, coast guard or similar, where appropriate, with the exceptions provided in article 3. |
| Licensing requirements for owning or operating each different type | **ACCOBAMS Focal Point:**<br>Users of remotely piloted aircraft intended exclusively for sports, recreational, competition and exhibition activities, as well as the recreational activities of toy aircraft must not have an authorization.<br>Researchers, in order to take photographs and videos, are considered as professional so they would need a prior communication or a license. |

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| Licensing requirements for commercial operations | **ACCOBAMS Focal Point:**<br>There is not a specific license for researchers from the AESA. They might need to do a prior communication o request for a license done depending on the use they will be doing.<br>To make a professional use of the RPAS, whether commercial or non-commercial, must be qualified as an operator, for which it must submit to a prior Communication before the State Air Safety Agency (AESA) according to the Article 39 of RD 1036/2017. The activities and assumptions that require prior communication to AESA, as well as the instructions to follow, are detailed in the "Enabling Procedure (art. 39)", which can be downloaded at the following link:<br>https://www.seguridadaerea. gob.es/media/4629909/procedimiento_habilitacion_v2.pdf<br>Prior communication by operators, enables them to carry out flights with the following characteristics:<br>• With equipment of up to 50 kg MTOW under conditions VLOS or EVLOS, or BVLOS flights with equipment of up to 2 kg MTOW and<br>• In uncontrolled airspace or in flight information areas and<br>• Outside agglomerations of people and buildings and<br>• In meteorological conditions of visual and daytime flight<br>• As a general rule, less than 400 feet (120m) in height on the ground<br>Also, researchers need an authorization from the Ministry for the Ecological Transition to enter within 500 of the Spatial Area that has the Mobile Space of Cetacean Protection with the drone. The prohibition of entering that area is established by Royal Decree 1727/2007, which establishes measures for the protection of cetaceans. |
| Standard Operating Conditions | **ACCOBAMS Focal Point:**<br>All aircraft piloted by remote control (RPA) that do not have a certificate of airworthiness may carry out specialized air operations in areas outside crowds of buildings in cities, towns or inhabited places or meetings of people outdoors, in uncontrolled airspace and outside a flight information zone (FIZ), provided that the operation is carried out within the visual range of the pilot (VLOS), or of observers who are in permanent radio contact with the pilot (EVLOS), at a horizontal distance from the pilot, or, where appropriate, observers, not more than 500 m and at a height above the ground not greater than 400 feet (120 m), or above the highest obstacle within a radius of 150 m (500 ft) from the aircraft.<br>RPA must operate during the day and under visual flight weather conditions (VMC), more than 8 km from airports.<br>Performing night flights will require the express authorization of the State Air Safety Agency, upon request of the operator accompanied by the safety study.<br>Have an insurance policy or other financial guarantee that covers civil liability third parties for damages that may occur during and due to the execution of specialized air operations or experimental flights.<br>A remotely piloted aircraft (RPA) cannot be piloted from moving vehicles.<br>1. Remote pilots must meet the following requirements:<br>a) Be 18 years old.<br>b) To be holders of the corresponding valid medical certificate, issued by an aeronautical medical center or an authorized aerial examining doctor.<br>c) Have the necessary theoretical knowledge.<br>d) Have a document that confirms that they have adequate knowledge about the aircraft of the type they are going to pilot and their systems, as well as practical training in their piloting<br><br>The drone must include an identification plate in accordance with current regulations (aircraft and pilot station).<br>In addition, Article 29 of the Royal Decree for moving vehicles must be taken into account.<br>· A remote controlled pilot aircraft (RPA) can not be piloted from moving vehicles, unless there is an operation planning that ensures that there is at no time an obstacle between the remote pilot station and the aircraft and that The speed of the vehicle allows the pilot to maintain the situational awareness of the position of the aircraft (RPA) in space and in relation to other traffics.<br>· The pilot and the observers will not be able to carry out their functions with respect to more than one remote controlled pilot (RPA) aircraft at the same time.<br>· In the event that a transfer of control is required between pilots or remote pilot stations, the operator must elaborate specific protocols that must be included in the Operations Manual. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | **ACCOBAMS Focal Point:**<br>Specialized aerial operation beyond the visual scope of the pilot (BVLOS), with maximum mass aircrafts at take-off more than 2 kg need a special license. |
| Other | **ACCOBAMS Focal Point:**<br>Royal Decree 1036/2017, December 15, which regulates the civil use of aircraft piloted by remote control.<br>https://www.boe.es/buscar/doc.php?id=BOE-A-2017-15721<br>It is the responsibility of the State Air Safety Agency to resolve the authorizations, certificates and ratings provided for in this royal decree.<br><br>https://www.seguridadaerea.gob.es/lang_castellano/cias_empresas/trabajos/rpas/marco/default.aspx<br>https://www.seguridadaerea.gob.es/lang_castellano/cias_empresas/trabajos/rpas/uso_profesional/default.aspx<br>https://www.seguridadaerea.gob.es/lang_castellano/cias_empresas/trabajos/rpas/material_guia/default.aspx<br>drones.aesa@seguridadaerea.es<br>Royal Decree 1727/2007, of December 21, which establishes measures to protect cetaceans. |

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| | Additionally, you must comply with other mandatory regulations, in particular the data protection (Organic Law 3/2018), the right to privacy (Organic Law 1/1982), the taking of aerial images or those of an environmental type .<br>The taking and filming of aerial images is regulated by the Order of the Presidency of the Government of March 14, 1957<br><br>**Other findings:**<br>Only enabled operators can perform aerial works with drones in Spain. You can find below a list of the already registered operators should you decide to hire any of them:<br>https://www.seguridadaerea.gob.es/media/4305572/listado_operadores.pdf<br><br>The current regulation establishes a series of scenarios in which operations can be carried out, with or without prior authorization from AESA, by enabled operators.<br>Following the link you can see the procedure to request an authorization:<br>https://www.seguridadaerea.gob.es/lang_castellano/cias_empresas/trabajos/rpas/uso_profesional/default.aspx<br><br>You can check the Spanish airspace and their limitations at ENAIRE's website:<br>https://drones.enaire.es/<br><br>As of today, there is no European equivalence among enabled operators, thus only enabled operators in Spain can perform aerial works in Spain with drones.<br>To be enabled as an operator, a certain level of theoretical knowledge has to be demonstrated.<br>There are several ways to do this:<br>By submitting a pilot license issued in accordance with Part FCL of Commission Regulation (EU) 1178/2011 or JAR FCL-1 or 2, or a ULM pilot license issued by AESA, currently valid or valid up to a maximum of 5 years prior to its submission; or<br>By means of a certificate obtained after passing all the tests of theoretical knowledge required to obtain a (manned aviation) pilot license issued by an ICAO Member State; or<br>By means of a certificate obtained after passing all the tests of theoretical knowledge required to obtain a (manned aviation) pilot license, issued by an ATO approved by AESA or EASA or, in the case of an ultralight pilot license, an individual certificate of knowledge after passing the corresponding official examination of theoretical knowledge.<br><br>If the pilot cannot meet any of the previous options, a basic training course (for flights within the pilot visual line of sight) or advanced training (for flights beyond the visual line of sight) must be taken and passed, the content and development conditions of which are fully developed in Appendix I (points 1.2 A and B). The training has to be provided by an approved ATO school from the following list:<br>http://www.seguridadaerea.gob.es/media/4357563/listado_atos_rpas.pdf<br>Once the theoretical knowledge is acquired, a practical course must be taken and passed provided by an ATO, an operator, a manufacturers or a reseller that are enabled to offer practical courses specific to the drone intended to be operated.<br><br>To become an enabled operator, you must follow the following procedure established by AESA:<br>https://www.seguridadaerea.gob.es/lang_castellano/cias_empresas/trabajos/rpas/uso_profesional/default.aspx<br><br>The pilot(s) must have a valid medical certificate of class LAPL or Class 2.<br><br>And the Guidance Material (GM) and Acceptable Means of Compliance (AMC) can be found here:<br>http://www.seguridadaerea.gob.es/lang_castellano/cias_empresas/trabajos/rpas/material_guia/default.aspx<br><br>https://www.lexology.com/gtdt/tool/workareas/report/drone-regulation/chapter/spain<br>https://www.drone-made.com/post/spain-drone-laws<br>✔ Good to know; a new decree came on the 15/12/2017 allowing the use of drones in Spain and specifying how to obtain a commercial license. Prior to this, Spain had a ban out on any drone use (recreational or not) which is why you might find a lot of contradictory information online today (check the dates of publication).<br>https://dronerules.eu/en/professional/regulations/spain<br>You are an operator of a professional drone…<br>**If:**<br>Used for commercial, scientific or manufacturer testing purposes<br><br>**You must:**<br>Be registered nationally and abide by national regulation<br>Have a Type Certificate and a Certificate of Airworthiness for drones greater than 25 kg<br>National drone pilot certificate is obligatory<br>Have Third Party Liability insurance with a coverage of 1 million Euros<br>File a NOTAM<br><br>**You must not:**<br>Operate at night-time<br>Operate in clouds, above crowds, industrial sites, urban areas and other restricted areas<br>Fly 400 ft above ground level<br><br>https://dronerules.eu/assets/regulationspdfdownloads/NatinalRegulatoryProfile_Spain.pdf (full PDF) |

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| Contact Info | |
| **Syria** | |
| Drone types that can/cannot be used | According to Syria's national aviation authority, the Syrian Civil Aviation Authority (SCAA), drones are banned in Syria. Based on our research, if you try to enter Syria with a drone it will be confiscated at customs.<br>If you'd like to contact the SCAA directly with any questions you might have, here is their contact information: SCAA Contact Page / + 963 11 333381 |
| Licensing requirements for owning or operating each different type | N/A |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | N/A |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | http://www.scaa.sy/scaa/ar/ |
| Contact Info | info@scaa.sy (email sent) |
| **Tunisia** | |
| Drone types that can/cannot be used | In Tunisia, you'll need a permit to use drones. However, it is almost impossible to get this permission. Your application passes through four ministries:<br>• Ministry of National Defense<br>• Home Office<br>• Ministry of Equipment and Housing<br>• Department of Transportation<br>It is incredibly time-consuming to get a drone permit in Tunisia. So far, according to media reports, only an insufficient number of permits issued. If you want to bring a drone from overseas to Tunisia, you will have to fulfill additional requirements |
| Licensing requirements for owning or operating each different type | N/A |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | N/A |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | https://uavcoach.com/drone-laws-in-tunisia/<br>https://drone-traveller.com/drone-laws-tunisia/<br>https://www.tripadvisor.com/ShowTopic-g293753-i9122-k11251703-Drones_situation_in_Tunisia-Tunisia.html<br>https://nawaat.org/portail/2018/08/15/tunisias-skies-soon-to-be-opened-up-to-drone-technology/ |
| Contact Info | |
| **Türkiye** | |
| Importing drones | Foreign nationality citizens cannot register as a drone pilot in Türkiye. Moreover, your drone will be seized by customs unless you have received technical confirmation for your UAVs from the Turkish DGCA.<br>To apply for technical confirmation, use Form-336 found in the **forms section of the Turkish DGCA website.** You may also be required to submit your criminal record from your embassy. |

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| | Turkish citizens who wish to bring a UAV through customs must apply for a Technical Compliance Certificate. The application form and details of the application can be found **here**. Once the UAV has passed through customs, the vehicle is added to the General Directorate UAV Registry System. |
| Drone types that can/cannot be used | Drones cannot weigh more than 4 kilograms (8.8 pounds) for private/personal flights. |
| Licensing requirements for owning or operating each different type | Foreign nationality citizens cannot register as a drone pilot in Türkiye. Moreover, your drone will be seized by customs unless you have received technical confirmation for your UAVs from the Turkish DGCA.<br>To apply for technical confirmation, use Form-336 found in the **forms section of the Turkish DGCA website.** You may also be required to submit your criminal record from your embassy.<br>Turkish citizens who wish to bring a UAV through customs must apply for a Technical Compliance Certificate. The application form and details of the application can be found **here**. Once the UAV has passed through customs, the vehicle is added to the General Directorate UAV Registry System. |
| Licensing requirements for commercial operations | N/A |
| Standard Operating Conditions | All drone pilots who wish to fly a drone weighing more than 500 grams must register with the Turkish government prior to flying. **Register here**.<br>Approval is required prior to all commercial drone flights.<br>Drones cannot fly above 120 meters (394 feet). |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | N/A |
| Other | http://web.shgm.gov.tr/doc5/sht-iha.pdf<br>https://iha.shgm.gov.tr/public/index?language=2<br>https://iha.shgm.gov.tr/public/duyurular.html?ID=723316 |
| Contact Info | iletisimmerkezi@dhmi.gov.tr<br>The Reply: "Dear correspondent, As the rules and procedures for transportation, registration, operation, navigation, maintenance and airworthiness of unmanned air vehicle systems is determined by DGCA = SHGM (The Directorate General of Civil Aviation of Türkiye), you are required to apply to DGCA for your complaints and necessary flight permission and licence process. SHGM Call Center: +90 312 444 60 01 Web Site for UAVs: https://iha.shgm.gov.tr/public/index?language=2 Get in touch : ihadestek@shgm.gov.tr Best Regards." |
| **Ukraine** | |
| Importing drones | No information available |
| Drone types that can/cannot be used | As per e-mail:<br>Drones up to 20 kg may be flown without prior permits. Ukraine is working on unifying their regulations according to other EU countries. See email attachment for most accurate information.<br><br>State Aviation Administration of Ukraine:<br>*In accordance with the requirements of Section II, paragraph 4 of the Airspace Use Rules , unmanned aerial vehicle flights up to 20 kg inclusive shall be executed without applying for airspace use , without obtaining airspace use permits , without informing the Armed Forces of Ukraine and the governing bodies of of the United Civil-Military System of Air Traffic Organization of Ukraine (OSVS), bodies of the State Border Service of Ukraine, bodies of air traffic service (ODA) and from Air traffic control (ATR) bodies, subject to the following requirements…*<br>*In other cases, unmanned aerial vehicle flights up to 20 kg inclusive and all but unmanned aerial vehicle masses exceeding 20 kg shall be operated within specially designated areas and routes, subject to the requirements for applying for airspace use , obtaining permits and airspace use conditions , informing the governing bodies of the Air Force of the Armed Forces of Ukraine, State Border Guard Service of Ukraine, OSCE bodies, ODA / UPR bodies*<br><br>ACCOBAMS focal point: Drones are classified by weight, under and above 2 kg. No other limitations. |
| Licensing requirements for owning or operating each different type | https://uavcoach.com:<br>Drones weighing more than 2 kg must register and obtain a permit within UkrAirCenter (submit an application form at least 10+ days in advance)<br>Drones that weigh less than 2 kg do not require a permit<br><br>ACCOBAMS focal point: Operating drones heavier than 2 kg or operations in areas/altitudes specified by the Civil Aviation Service or general safety regulations requires a few permits from the civil aviation, army and/or border control services. |
| Licensing requirements for commercial operations | ACCOBAMS focal point: No specific requirements for researchers are suggested. All the drones heavier than 2 kg or operating higher than 50 m are considered as the aircraft and should undergo all the standard procedures. |

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| Standard Operating Conditions | State Aviation Administration of Ukraine:<br>• *flights are performed no closer than 5 km from the exterior boundaries of aerodrome runways or not closer than 3 km from the exterior boundaries of the runway / helicopter runway, unless agreed with the aerodrome operator / runway / helicopter operator;*<br>• *flights are performed not closer than 500 m from manned aircraft;*<br>*flights are not performed over:*<br>*crowds of people in open space and above dense sites;*<br>*objects (zones) identified by the Ministry of Defense of Ukraine, Ministry of Infrastructure of Ukraine, Ministry of Internal Affairs of Ukraine, State Border Service of Ukraine, Security Service of Ukraine, National Police of Ukraine, National Guard of Ukraine, State Fiscal Service of Ukraine, External Intelligence Service of Ukraine, Office State defense of Ukraine, other military formations and law enforcement structures established in accordance with the laws of Ukraine, and in respect of which protection / states and health (assuming the designation of the area around these facilities information signs banning flights of unmanned aircraft and / or by publishing such a ban limits) except flights with the permission of the aforementioned proxy;*<br>• *flights are operated in line of sight (VLOS);*<br>• *maximum flight altitude is not higher:*<br>*120 m above the ground (water) surface beyond* CTR *,* AFIZ *,* ATCA *,* ATCZ *,* specially designated areas *,* other specially reserved airspace *;*<br>*50 m above the ground (water) surface within* CTR *,* AFIZ *,* ATCA *,* ATCZ *,* specially designated zones *,* other specially reserved airspace *, if information about the actual status of the elements of the airspace structure at the time of flight is missing;*<br>*50 m above static obstacles at a horizontal distance not exceeding 100 m from obstacles such as deviation from the above mentioned height restrictions at the request of the owner of such object;*<br>• *the flight speed of the unmanned aircraft is not more than 160 km / h;*<br><br>https://uavcoach.com:<br>Regardless of weight, drones should not fly over roads, central streets of cities and villages, industrial zones, train stations and railroads, seaports, fuel storages, prisons, places of crashes and emergencies, in the territories of anti-terrorist activities and special ops, above objects of DoD and other military organizations<br>Do not fly above other important government and potentially dangerous objects<br>Pilot must not be further than 500 m from UAV<br>Pilot must not control more than a single UAV at a time<br>Do not fly above 50 m without a permit<br>Do not fly within 5 km from the external borders of airport<br>Do not fly within 30 m of an individual person, within 50 m of a group of ppl under 12 persons, or within 150 m of a group of more than 12 people<br>Do not exceed a max flight speed 160 km/h<br>Fly in the daytime only<br>Failing to observe these rules can result in a penalty of 1020 – 8500 UAH. However in case if UAV activity resulted in danger to manned aircraft or danger to the lives of others, 3 to 15 years in prison may result.<br><br>ACCOBAMS focal point: Daytime, altitude lower than 50 m, speed less than 160 km/h, distance less than 500 m from the operator, stationary platform for the operator; not approaching the state border, airfields and runaways, military objects or oil and gas recovery sites. |
| Conditions in relation to flying beyond visual line of sight (BVLOS) or at higher altitudes, and what is the permit process/cost? | Pilot must not be further than 500 m from UAV<br><br>ACCOBAMS focal point: For all the extraordinary cases the drone should follow general rules for an aircraft, with all the appropriate regulations. |
| Other | https://avia.gov.ua/<br>http://uksatse.ua/index.php?act=Part&CODE=344<br>https://avia.gov.ua/bezpilotni-povitryani-sudna-2/ |
| Contact Info | vdz@avia.gov.ua (email sent) Reply received! See attached documents<br>Also, document received from ACCOBAMS focal point. See attached documents |