**Protocol for Using Unmanned Aircraft Systems (UAS) during an oil spill response or exercise**

*UAS Protocol Version 2020.0 (Incorporated by reference into AWA Area Contingency Plan [Section 3410.3], via References and Tools website*

The following protocol has been developed for the use of small (less than 55 pounds) unmanned aircraft systems (UAS) in support of oil discharges, or hazardous substance release, responses and exercises in Alaska. These specific types of environmental responses are authorized by the National Oil and Hazardous Substances Pollution Contingency Plan 40 CFR Part 300 (National Contingency Plan or NCP). The NCP establishes the National Response System (NRS) and this protocol describes the roles and responsibilities for UAS integration into the incident command structure of authorized NRS actions that may include UAS flight requirements and UAS-relevant agency requirements in the presence of wildlife in marine and terrestrial environments.

UAS can be utilized in an oil spill response to;

* Provide situational awareness (including tactical deployment observations)
* Map oil extent
* Identify resources at risk (including habitat)
* Identify critical infrastructure
* Determine locations of wildlife relative to the spill (e.g. species, group size, heading)
* Monitor air quality
* Other incident-specific uses approved by the Unified Command

# UAS Team Roles and Responsibilities

UAS operations are under the authority of the Federal Aviation Administration (FAA). During an emergency response, the UAS Team (FEMA, 2017c) operates under the authority of the federal or state on-scene coordinator, typically in the Air Operations Branch if/when the incident management team (IMT) is fully functional. The UAS Team is composed of UAS Pilots, UAS Visual Observers, UAS Technical Specialists, and other UAS support roles as needed (e.g. engineers). The key responsibilities of the UAS Team are to provide situational awareness by transmitting real-time imagery, data, or verbal assessment, using multiple technologies, such as photogrammetry, live video, thermal imaging, and air quality sensors to enhance the Common Operating Picture (COP), planning functions, and Incident Action Plan (IAP) development (FEMA, 2017c). UAS Teams are resources that can be requested as part of an NRS response or exercise. Costs will be dependent on the UAS service providers.

Many oil spill removal organizations/primary response action contractors OSROs/PRACs) maintain their own small UAS for situational awareness. It should not be assumed that imagery collected by OSROs/PRACs will be incorporated into the COP unless UAS-based data collection and provision is expressly defined as part of the OSRO contract. If/when OSRO UAS contracting is secured and/or integrated into the NRS response action organization, this UAS protocol shall be followed. UAS assets shall be managed by the federal and state on-scene coordinator and/or IMT as they would any other NRS response asset provided by OSROs/PRACs, authorized contractors, or other government agencies.

**UAS Pilot** UAS pilots (FEMA, 2017a) working on an NRS authorized response or exercise need to be able to safely operate under one of two FAA regulations,

* 14 CFR Part 107 - Small Unmanned Aircraft Systems; regulation addresses legal operation of aircraft less than 55 lbs. flown following Subpart B (Operating Rules) performing the role of Remote Pilot in Command as outlined in § 107.19; pilots flying using Part 107 certification as defined in Subpart C (Remote Pilot Certification) will be considered to have acceptable credentials for individuals representing Federal, State, Tribal or themselves as citizens; civil operator.
* Certificate of Waiver or Authorization (COA); regulation addresses legal operation of UAS performing governmental functions (Federal, State or Tribal) and statutory requirements of 49 US Code 40102(a) and 40125 for public aircraft; public operator. Due to elevated risks when operating in potentially hazardous environments, Unified Command’s liability and agency personnel’s indemnification when operating under the Unified Command’s direction, remote pilots operating under COAs shall be considered by OSC(R)s on a case-by-case basis before being allowed to operate within the Unified Command’s structure.

UAS pilots are responsible for maintaining Flight Logs for each individual UAS flight. Each log should at a minimum include date, crew, aircraft, sensors, and additional notes. It is not recommended to have UAS pilots perform UAS data management and assurance roles due to their primary requirements to fly aircraft and observe the airspace in support of safe operations.

**UAS Visual Observer (Observers)** – Observers are responsible for scanning the airspace where the small UAS is operating, and maintaining awareness of the position of the small UAS through direct observation. Observers must remain in communication with the pilot in command at all times and be able to coordinate collision avoidance maneuvers with the pilot in command as necessary. It is not recommended to have UAS observers perform UAS data management and assurance roles due to their primary requirements to observe the airspace in support of safe operations. However, observers may be able to fulfill other mission support functions, as long as those function do not interfere in anyway with the safe observation of the airspace and aircraft in flight.

**UAS Technical Specialist** - The UAS Technical Specialist (FEMA, 2017b) is responsible for coordinating the UAS Team (pilots, observers, UAS support personnel) within the Air Operations Branch of the IMT, and supporting data integration with the Situation Unit of an IMT. The two primary roles of the UAS Technical Specialist are to, 1) work with the Air Tactical Group Supervisor (or other Operations Section personnel, dependent on IMT organization) to ensure that UAS are safely integrated into the airspace above and near an oil spill response or exercise, and 2) coordinate collection, COP integration, and archival of UAS-collected data. The UAS Technical Specialist is responsible for identifying requirements from decision-makers in the command post to efficiently task the UAS Team in support of the response or exercise. Specific tasks associated with the UAS data management include,

* Performs pre-flight and post-flight safety and security checks of on-board data gathering and streaming equipment, and informs pilots and observers of any potential safety concerns,
* Ensures that data recording and streaming equipment is secure and operational preflight, during flight, and post-flight to achieve the mission objectives,
* Checks data recorded, creates back-up copy, and forwards original data to designated operations and planning authorities, in a secure manner,
* Documents the Chain of Custody for information gathered from the aircraft.

Ideally, there are multiple UAS Technical Specialists to perform the numerous duties required in the command post and in the field. The UAS Technical Specialist in the field can also perform other roles such as flight engineer.

**Wildlife Observers** – Wildlife observers are dedicated to observing animals and habitat that has been or could be impacted by an oil spill. Wildlife observers are responsible for recording by location animal species sighted, numbers of animals, heading of animals, proximity of animals to oil (bearing and distance), behavior, and precise location of oiled animals or oiled habitat. It is recommended to have dedicated wildlife observers accompany UAS pilot/observer teams to report any animal sightings and to the Wildlife Branch of the IMT in real-time.

# UAS Notification and Authorization Protocol during Oil Spill Responses and Exercises

During NCP/NRS authorized response actions or other emergency response, UAS resources may be requested at any time. The UAS Team will require support for UAS operations, data collection and information processing that is best provided by an established IMT. As the incident duration, number of UASs, and complexity of the response increases, the IMT support should increase concurrently. Table 1 outlines the step-by-step procedures for activating UAS support.

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| **Table 1. UAS Team Activation and FAA Requirements for UAS Flights (*AWA ACP 3410.3 UAS Operations*)** |
| 1. The Air Operations Branch Director activates the UAS Technical Specialist. If the NRS response action does not immediately have an Air Ops Branch Director, the UAS Technical Specialist shall report to the Operations Section Chief or other authorized response personnel as determined by the federal and/or state on-scene coordinator.
2. The UAS Technical Specialist requests and contacts UAS pilot/observer teams for mobilization.
3. The Air Operations Branch Director or other authorized incident response personnel for the Responsible Party or the federal and/or state on-scene coordinator requests a temporary flight restriction (TFR), inclusive of proposed UAS activity, over the area of operations from the Federal Aviation Administration (FAA) Anchorage Center Watch Supervisor (907- 269-1103) (*AWA ACP 3410.2 Flight Restrictions*)1.
4. UAS Technical Specialist applies for Special Governmental Interest (SGI) amendment process (formally known as Emergency-Certificate of Authorization or E-COAs) via the Emergency Operation Request Form2, if standing COAs or Part 107 waivers for the area of operations are determined insufficient to support response or exercise.
	1. The SGI can be requested by either a 107 operator or a public entity with a COA.
	2. The UAS Technical Specialist submits E-COA application via email to the FAA System Operations Support Center at 9-ator-hq-sosc@faa.gov
* If approved, the FAA will add an amendment to the pilot’s existing COA or Remote Pilot Certificate authorizing flights under the certain conditions specified in the waiver application.
* If denied, operators can only fly within the provisions of their existing COAs or Part 107 waivers.

For exercises, UAS technical specialist submits a Notice to Airmen (NOTAM) for UAS flight operations for the defined exercise area.1. Air Operations Branch Director and UAS Technical add response specific UAS information to ICS-220 form (UAS N#s, UAS operational frequencies, UAS communication frequencies, UAS type, UAS model, COA/waivers in use).
2. All UAS flights must be conducted by certified UAS pilot/observer teams as defined by 14 CFR Part 107 or 49 US Code 40102(a) and 40125 COAs in coordination with the Air Operations Branch Director and/or the UAS Technical Specialist.
3. UAS Pilots can operate a maximum of 8 consecutive hours and a maximum of 14 hours per day under specific direction and permission from the Air Operations Branch Director and the UAS Technical Specialist (Augmented Operations as per 14 CFR Part 117). Each UAS pilot will have one alternate to allow sufficient breaks during response operations.

1 Establishment of a TFR allows for direct management of UAS in the airspace by the manager of the TFR, usually to Air Operations Branch Director. UAS flights performed within a TFR may preclude the need for an E-COA, if the TFR covers all UAS launch areas as well as potential UAS flight locations.2 Emergency Request Form can be accessed via, https://www.faa.gov/uas/advanced\_operations/emergency\_situations/  |

# Wildlife Considerations for Responses vs. Exercises

Wildlife are protected from harm and harassment under a variety of laws (e.g., Endangered Species Act, Marine Mammal Protection Act, Bald and Golden Eagle Protection Act). The recommendations provided in this protocol by National Oceanic and Atmospheric Administration (NOAA), NOAA Fisheries (NMFS), U.S. Fish and Wildlife Service (USFWS), and the State of Alaska Department of Fish and Game (ADFG) (collectively referred to as “wildlife agencies” in this document) are intended to reduce the likelihood that wildlife will be harmed or harassed by UASs during spills and drills. During a spill response, wildlife agencies should be contacted as soon as possible to coordinate response activities in a way that reduces impact to wildlife. To ensure compliance with wildlife laws during exercises, contact wildlife agencies as soon as the exercise has been planned. Please see the Wildlife Protection Guidelines for Oil Spill Response in Alaska (WPG) for wildlife agency contacts, wildlife observation forms, and other information.

# UAS Operational Flight Guidelines for Oil Spill Response

# (Operations Checklist)

These flight guidelines are designed to meet FAA requirements and wildlife agency recommendations for UAS flights in most locations along Alaska’s coast and waters, and to provide operational guidelines for UAS flight planning. The OPERATIONS CHECKLIST (below) is designed to reduce potential disturbance and harm to wildlife during UAS flights as part of an oil spill response or exercise and shall be followed unless alternative, incident-specific, wildlife impact mitigations are defined. UAS flight operations performed in support of an authorized NRS action or other emergency response should be coordinated with input from wildlife agencies, and additional protection measures may be developed as the response continues, for example from an Endangered Species Act emergency section 7consultation. Permits may be required to take off and land a UAS on State Special Areas (Critical Habitat Areas, Refuges, Sanctuaries, or Ranges), or other public lands. These permits can be efficiently obtained from state or federal agencies during a spill response, but should be obtained in advance of exercises. Additional wildlife agency recommendations for the use of UAS near wildlife during spills and exercises can be found in Appendix I.

# OPERATIONS CHECKLIST

* **[PRE FLIGHT]** Start new Flight Log for specific flight, including UAS team and response specific roles of members,
* **[PRE FLIGHT]** Establish a UAS ground-station for flight operations (land owner consultation/permitting may be required),
* **[PRE FLIGHT]** Establish real-time flight monitoring station,
	+ Real-time video display via the UAS flight controller, laptop streaming of flight data, or external monitor, as available
	+ Wildlife observers should be co-located with pilots at UAS ground station to monitor the live UAS video feed and scan surroundings for the presence of wildlife
* **[PRE FLIGHT]** Perform pre-flight safety and security checks of aircraft; inform UAS technical specialists and observers of any potential safety concerns,
* **[PRE FLIGHT]** Perform pre-flight safety and security checks of on-board data gathering and streaming equipment; inform pilots and observers of any potential safety concerns,
* **[PRE FLIGHT]** Ensure data recording and streaming equipment is operational, **[PRE FLIGHT]** Provide operational safety briefing,
* **[IN FLIGHT]** Conduct all UAS flights following the express regulations of 14 CFR Part 107 or 49 US Code 40102(a) and 40125 COA (see UAS Team Roles and Responsibilities for UAS Pilots above).
* **[IN FLIGHT]** Conduct UAS operations between 150 and 400 feet above the coastline/water, or as agreed upon in coordination with wildlife agencies, to reduce wildlife disturbance.
* Do not use raptor shaped UAS if the potential for bird encounters exists
* Approach flocks of birds from high altitudes, and reduce altitude from directly above
* Do not conduct flights lower than 150 feet over birds
* Do not fly within 300 feet of bald eagle nests
* Avoid flights near perched or flying eagles
	+ Ground aircraft or move aircraft away if perched or flying eagles encountered
* **[IN FLIGHT]** UAS will avoid buzzing, hovering, landing, taking off, taxiing, excessive speed or sudden changes in speed or direction near wildlife on land or in the water.
* **[IN FLIGHT]** When an animal sighting is made, species, group size, age categories (if determinable), heading (if consistent), and bearing and distance from the spill will be recorded by wildlife observers, the Wildlife Observation Form found in the WPG.
	+ If no wildlife observers are co-located with UAS pilots/observers, the UAS pilots will contact the wildlife observers or wildlife branch of IMT via radio or phone when impacted shoreline or animals are sighted once they are safely able to do so.
* **[POST FLIGHT]** Complete Flight Log for specific flight.
* **[POST FLIGHT]** Perform post-flight safety and security checks of aircraft; inform UAS technical specialists and observers of any potential safety concerns,
* **[POST FLIGHT]** Perform post-flight safety and security checks of on-board data gathering and streaming equipment; inform pilots and observers of any potential safety concerns,
* **[POST FLIGHT]** Check data recorded, create back-up copy, and forward original data to the Situation Unit for integration into the common operating picture, and any other designated recipients, as required by the incident data management and sharing plan.
* **[POST FLIGHT]** Reportwildlife sightings to wildlife agencies or incident-specific designated IMT positions.

# Daily Archiving and Reporting Requirements

Data collected from the UAS flights will be archived by the UAS Team each day according to data archiving and sharing protocols established by the IMT, if established or otherwise requested/mandated by the Federal and/or State On-Scene Coordinator. Minimum archival will include preserving all summary reports (requirements below), manually recorded UAS Flight Logs (scanned as PDF or JPG), digitally recorded flight logs (T-logs and .DAT files), raw data files and data products on two discrete hard drives, to be stored with the UAS Technical Specialist and the IMT Documentation Unit respectively.

Summary information required specific to the UAS flights:

1. Date;
2. Name of incident;
3. Crew members (UAS pilot and affiliation, UAS observer and affiliation, UAS Technical Specialist and affiliation, wildlife observer and affiliation);
4. Description of UAS platform (multi-rotor, fixed wing, vertical take-off and landing);
5. Size and mass of the UAS platform;
6. Description of the payload;
7. Battery life of the UAS/average mission length;
8. Description of the ground control station (geographic location and land ownership status);
9. Flight description (latitude/longitude of flight area, # of flights at location);
10. Mission objectives (e.g. oil extent mapping, wildlife identification, air quality, etc.);
11. Type of survey or sampling method (e.g., line/strip transects, sunburst patterns, etc.);
12. Total time flown;
13. Total distances flown;
14. Sea state, and other factors affecting visibility and detectability of targets (i.e., fog/glare);
15. Minimum (less take-off and landing) and maximum altitude of flights;
16. Data products created;
17. Data chain of custody;
18. Environmental variables;
19. Flight mishaps.
20. Completed Wildlife Observation Forms should be submitted to wildlife agencies or incident-specific designated IMT positions (e.g., Wildlife Branch Director). Review the WPG for procedures and data needed. Specific to UASs, include:
	* Sightings relative to ground station location;
	* Number of passes per group/animal per day;
	* Time spent over each group/animal per day.

This protocol was developed by Jessica Garron of the University of Alaska Fairbanks with input from the United States Coast Guard (USCG), Department of the Interior Office of Environmental Policy Compliance, National Oceanic and Atmospheric Administration (NOAA), NOAA Fisheries (NMFS), U.S. Fish and Wildlife Service (USFWS), and the State of Alaska Department of Fish and Game (ADFG). Additional protocols specific to the UAS operations and data delivery mechanisms can be anticipated. Questions, comments and proposed revisions should be directed to Jessica Garron: jigarron@alaska.edu.

# References

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US Department of Homeland Security Federal Emergency Management Agency. (2017b). *Situational Assessment TECHNICAL SPECIALIST – UNMANNED AIRCRAFT SYSTEM* (pp. 1–3). pp. 1–3.

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US Federal Aviation Administration. (2012). Flight and Duty Limitations and Rest Requirements. 14 CFR Part 117.

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# Appendix I. Wildlife Agency Recommendations for the Use of UAS near Wildlife during Spills and Exercises.

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| **Species Group** | **Exercises** | **Spills** |
| Birds | Do not conduct flights at an altitude less than 150 feet over birds; do not use predator (raptor)-shaped UASs when flying near birds; do not fly within 300 feet of bald eagle nests; ground or move aircraft away if perched or flying eagles are encountered. | Same as exercises. |
| SealsSea lionsPorpoisesWhales | Maintain 1,000-foot distance from these animals. If a UAS is flown inadvertently within 1,000 feet of a seal, sea lion, porpoise, or whale, or if these animals change behavior in response to a UAS, move the aircraft away, *cease operations*, and report these events to NMFS. | Coordinate with NMFS to understand incident-specific protection measures regarding UAS use. |
| Walrus | Do not fly within 0.5 mile (direction or altitude) of hauled-out walrus or known walrus haulout locations. Maintain 2,000-foot distance from individual animals or small groups on ice. Regardless of distance or group size, if walrus change behavior in response to a UAS, move the aircraft away, *cease operations*, and report these events to USFWS. | Coordinate with USFWS to understand incident-specific protection measures regarding UAS use. Do not fly within 0.5 mile (direction or altitude) of hauled-out walruses or known walrus haul-out locations. Maintain 2,000-foot distance from individual animals or small groups on ice. Regardless of distance or group size, if walrus change behavior in response to a UAS, move the aircraft away and report these events to USFWS. |
| Polar bearsSea otters | Maintain 1,500-foot distance. Greater distances from active polar bear dens may be required – coordinate with USFWS during exercise planning. If polar bears or sea otters change behavior in response to a UAS, move the aircraft away, *cease operations,* and report these events to USFWS.  | Coordinate with USFWS to understand incident-specific protection measures regarding UAS use. Maintain 1,500-foot distance; greater distances from active polar bear dens may be required. If polar bears or sea otters change behavior in response to a UAS, move the aircraft away and report these events to USFWS.  |
| Terrestrial mammals | If animals change behavior in response to a UAS, move the aircraft away and report these events to ADF&G. | Same as exercises. |