Summit Lake Paiute Tribe

Natural Resources Department

Unmanned Aircraft System Operations Plan

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Unmanned Aircraft System Operations Plan

Introduction

The Summit Lake Paiute Tribe (SLPT) Natural Resources Department (NRD) is implementing the use of Unmanned Aircraft Systems (UAS) for several of its projects. This UAS Operation Plan (Plan) will serve as a guide for flight operations planning and execution by documenting best practices and internal processes for safe and effective UAS operations. This includes roles and responsibilities, mission phases, and emergency procedures. While this Plan may not address all potential UAS activities, it is intended to be the baseline for NRD UAS procedures and it applies to all UAS activities conducted by NRD personnel. Wherever possible, this Plan draws its terminology and best practices from the Federal Aviation Administration (FAA), other Federal and State government entities, and other industry leaders. This Plan is adopted from several established UAS plans developed by the California Department of Fish and Wildlife (2018), Texas Department of Transportation (2019), and City of Gaithersburg, Maryland (2018). All flight operations are to be conducted under the Federal Aviation Administration (FAA) 14 CFR Part 107/Certificate of Airworthiness.

The procedures described in this Plan apply to all NRD UAS activities. If regulations referenced in this Plan change, or safer and more effective operational methods are developed, it is the responsibility of all UAS operations personnel to notify and provide input to the NRD Director to effect changes to this document. This Plan, as well as the policies and procedures provided herein, will be reviewed regularly and updated as needed. UAS operations personnel shall study this Plan and have a working knowledge of the policies and procedures contained herein. A copy of this Plan and all forms specified herein shall be physically available wherever UAS operations are conducted.

Safety is a fundamental consideration in all NRD UAS activities. The NRD requires open reporting of all safety hazards. It is the duty of every crew member involved in UAS activities to contribute to the goal of continued safe operations. This contribution may come in many forms and includes always operating in the safest manner practicable and never taking unnecessary risks. Any safety hazard, whether procedural, operational, or maintenance related should be identified as soon as possible after, if not before, an incident occurs. Any suggestions in the interest of safety should be made to the Pilot in Command or the NRD Director.

UAS activities are to be conducted in a manner that provides an accident-free workplace, including no harm or damage to people, biological resources, equipment, or property, and to make every effort to respect the public's privacy. Ultimately, each UAS crew member is responsible for their own safety. Everyone is responsible for knowing their own limitations and should inform their supervisor immediately when a task or conditions are beyond their capability or training, or if they believe a situation is unsafe.

Scope

The scope of this Plan includes all operations conducted by NRD UAS personnel and applies to all locations where UAS activities may be conducted. This Plan is also intended to achieve the following objectives:

- Facilitate the administration of UAS activities;
- Ensure the safety of NRD UAS crew members and the public when conducting UAS activities;
- Establish minimum guidelines for qualifications, safety, training, security, and operational procedures when conducting UAS missions;
- Ensure that impacts to biological resources are minimized, and
- Ensure that operations of UAS do not intrude upon the rights of the public.

Roles and Responsibilities

The Pilot-in-command (PIC) is responsible for the overall safety during UAS operations. A UAS crew will consist of, at a minimum, an FAA Certified UAS Pilot in the role of PIC for the mission, and a Visual Observer (VO). Additional personnel may also be present as support crew members such as a thermal camera operator. The responsibilities of each position are detailed below:

Pilot-In-Command (PIC)

The PIC is an FAA Part 107 Certified UAS Pilot serving as the PIC for a specific mission. The PIC is the crew leader and is directly responsible for mission safety and objectives. During the flight, the PIC's primary duty is to focus on flying the aircraft safely until it is back on the ground. The PIC leads onsite Pre- and Post-flight UAS activities and is responsible for:

- To be considered for selection as a PIC, personnel must meet the requirements for and successfully pass the FAA Part 107 Remote Pilot Certification.
- Ensuring the UAS is flown within visual line of sight (VLOS) and lower than 400 feet above ground level (AGL).
- Logging the mission and documenting any accidents, near misses, or unanticipated hazards that occurred during flight and any lessons learned.
- A PIC's primary duty is the safe and effective operation of the UAS in accordance with the manufacturers' approved flight manual, FAA regulations, and NRD policy and procedures.
- PICs must remain knowledgeable of all FAA regulations, UAS manufacturer's flight manual and bulletins, and NRD policy and procedures.
- It is the responsibility of the PIC to ensure that all UASs are FAA registered and in airworthy condition prior to UAS operations.
- The PIC shall maintain a file for each airframe. The file shall include copies of training records, flight incidents, maintenance records, etc.
- It is the responsibility of the PIC to be current and to update NRD personnel with all Federal and State regulations as they change.
- The PIC shall ensure that the NRD has all documents required as per FAA, State, and NRD guidelines.

- The PIC should ensure that applicable NRD personnel are current with up to date training and knowledge.

Visual Observers (VO)

The Visual Observer (VO) is responsible for aiding the PIC with a dedicated set of eyes and ears during UAS missions. The primary communication during flight is between the PIC and the VO.

- Observers must have been provided with sufficient training to communicate clearly to the PIC any turning instructions required to stay clear of conflicting traffic and obstacles.
- Assisting the PIC in identifying any potential hazards or changing conditions that may affect the mission or the safety of persons or property.
- Watching and listening for any abnormal sounds or flight characteristics being exhibited by the UAS.
- Being prepared to carry out emergency plans and procedures in the event of an emergency incident or accident.

Support Personnel

Support personnel refers to employees that are part of the UAS crew providing added support to the PIC or VO. The support personnel's duties are similar to the VO's responsibilities. Support personnel are responsible for:

- Following the instructions of the PIC during UAS activities.
- Helping to maintain a "Sterile Cockpit" environment for the PIC and the VO, such that they have minimal distractions, keeping conversations out of their earshot, and ensuring any spectators do the same.
- Monitoring airspace and site conditions that could adversely affect UAS operations.
- Being prepared to carry out emergency plans and procedures in the event of an emergency incident or accident.

Training and Qualifications

NRD personnel engaged in UAS activities shall possess the necessary certifications, training, and experience as defined in this Plan and will maintain a professional level of competency and proficiency to safely perform the assigned work.

UAS Pilot

PICs must possess both the appropriate knowledge and sufficient skills to legally and safely operate NRD UASs. These requirements include:

- FAA Remote Pilot certificate;
- Valid Driver's License;
- Training in all specific details of the UAS to be operated including normal, abnormal, and emergency procedures.

Visual Observer

The qualifications required to be a UAS VO includes:

- Valid Driver's License or signed note from a licensed medical professional indicating that personnel has sufficient corrected visual acuity to pass the vision screening required for a Nevada Driver's License.
- Pass the online FAA ALC-451 course, "Part 107 small Unmanned Aircraft Systems (sUAS)" https://www.faasafety.gov/gslac/ALC/course_content.aspx?pf=1&preview=true&cID=451.

Recurrent Training

NRD Pilots are required to keep their knowledge and skills up to date to maintain operational eligibility. The FAA Remote Pilot Certificate is valid for 24 months, and pilots must recertify every 24 months.

Operational Procedures

Pre-UAS Project Procedures

In general, a UAS Project is composed of one or more missions (single-day or near consecutive multi-day UAS operations). Prior to any UAS project, NRD personnel will develop a Mission Plan. Crew members involved in UAS activities are encouraged to visit the site location, if possible, prior to conducting the mission to assist in preparing the UAS Mission Plan. A copy of this UAS Operational Plan, UAS Mission Plan(s), FAA certification(s), land administration permission(s), UAS checklists, Logbook, Downed Aircraft Recovery Checklist, aeronautical sectional chart, and applicable permits will be kept on hand during any UAS missions. A workflow outlining basic steps to follow during the development of a UAS Mission Plan is located in Appendix D. The general elements of a UAS Mission Plan are:

- Define the purpose and objective of the UAS Mission;
- Site location: site physical description, with potential hazards identified (airspace check, presence of overhead obstructions, risks to biological resources, privacy rights issues, identify flight boundaries);
- Site map with target areas outlines, potential access and launch sites identified, and land ownership identified;
- Land administration permission, especially if the project is conducted over designated wilderness lands;
- Name, location, and Emergency Contact information.

Pre-UAS Flight Procedures

Prior to heading out for a UAS mission, NRD personnel will check off the items on the NRD UAS Pre-Flight Checklist (Appendix C) and complete applicable Logbook entries in-office. This includes:

- Check airspace;
- Check for Notices to Airmen (NOTAMs) and Temporary Flight Restrictions;
- Charge batteries and other equipment;
- Check the weather forecast;
- Ensure the required documents are in hand for flight.

All pre-flight items shall be checked off prior to conducting any flight activities.

On-site UAS Flight Procedures

Safety Briefing

Prior to UAS operations, the PIC will conduct an on-site briefing for all personnel (UAS crew, biologists, applicable property owner(s), and any other staff or observers). It will include a review of the UAS Mission Plan, tasks to be undertaken, sterile cockpit procedures, safety procedures, any unusual hazards or environmental conditions, and modifications of standard procedures, if necessary.

UAS Flight Checklist

Immediately prior to every flight, the crew will check off every item on the NRD UAS Flight Checklist (Appendix C) and initiate initial Logbook entries not already completed in-office. This includes:

- Conduct safety checks;
- Re-check for Notices to Airmen (NOTAMs) and Temporary Flight Restrictions;
- Ensuring the required documents are in hand for flight;
- Recording current weather conditions;
- Checking airspace for aircraft and other hazards immediately prior to the flight;
- Equipment prep and inspection;
- Pre-flight power-ups and settings check;
- Ensuring the launch area is clear of people and other hazards;
- Low altitude flight test.

All items shall be checked off prior to conducting any flight activities.

Flight Procedures

During UAS flights, all FAA regulations will be followed. Additionally, the following rules will apply:

- A PIC and a VO must be present for all flights;
- The PIC or the VO must maintain visual contact with the UAV at all times;
- A sterile cockpit environment must be maintained at all times;
- If a manned aircraft enters the proximity of the UAV mission, the UAV will be landed until the manned aircraft is outside of the area.
- In the event of any unplanned in-flight situation, contingency plans will be followed immediately;
- On landing, power-down and checklist procedures will be followed immediately.

Post-UAS Flight Procedures

Upon finishing a UAS Mission, the PIC will be responsible for filing a completed NRD Post-Flight Checklist(Appendix C) and completing Logbook entries summarizing the flight activities. All mission data and applicable information shall be copied to the appropriate project folder on the NRD server.

General UAS Safety Procedures

The procedures described in this section apply to all NRD UAS activities. Depending on the nature of the task, the PIC may prescribe additional requirements as needed. NRD UAS crew members

who fail to follow these safety procedures may have their UAS privileges revoked. Safety rules do not exist as a substitute for common sense, sound judgment, and a continuing vigilance for maximum safety.

Safety Precautions Applicable to All UAS Activities

It is the duty of every crew member involved in UAS activities to contribute to the goal of continued safe operations. This contribution may come in many forms and includes always operating in the safest manner practicable and never taking unnecessary risks. Any safety hazard, whether procedural, operational, or maintenance related should be identified as soon as possible to avoid incidents. It is the responsibility of every crew member to ensure the following unless otherwise authorized:

- UAS operations are limited to daylight hours (official sunrise to official sunset), although civil twilight (30 minutes before sunrise and 30 minutes after sunset) operations may be approved with appropriate UAS lighting. UAS operations conducted outside of civil twilight hours will require an FAA § 107.29 – Daylight Operations Waiver: https://www.faa.gov/uas/commercial_operators/part_107_waivers/
- UAS operations shall not be conducted over any persons not directly involved in the UAS project operations;
- All aircraft must use flight controllers that incorporate stabilization and autopilot systems with GPS "Return to Home" (RTH) capabilities;
- Once UAS crew members arrive on-site for a project, they should be in an alert status actively scanning the airspace and listening for aircraft as well as observing any other activities in the area which could affect or be affected by the UAS flight activities;
- UAS crew members should continuously monitor weather conditions, specifically, wind velocity and the potential of dust or sandstorms developing;
- An appropriate level launch area should be selected with sufficient space (preferably away from bystanders) to unpack and assemble the necessary equipment for the UAS project. Try to select an area where the UAS will not kick up a dust cloud on take-off and always use a portable launch pad to mitigate damage to the UAS;
- UAS operations tend to attract local bystanders so be prepared to implement controls for safety;
- A first-aid kit with laceration supplies and a fire extinguisher must be readily available on-site. An InReach device shall also be readily available on-site in the event of an emergency.
- At a minimum, all UAS operations must include both a PIC and a VO.

Limits and Termination of UAS Activities

UAS projects shall not be conducted under the following conditions:

- When weather conditions or visibility are deemed unsafe by the PIC;
- When manned aircraft are observed within the immediate vicinity;
- In any situation where local conditions have changed considerably prior to, or during flight;
- If significant risks to biological resources, equipment, staff, or observers are identified that can't be mitigated for;
- The PIC has final authority regarding safe conditions for flying;
- Should any UAS activity be terminated due to safety or changing conditions, the PIC will inform the NRD Director of the decision.

Equipment, Inspections, and Maintenance

Small UAS aircraft are exposed to high-frequency vibrations and should be well maintained to ensure they are always in a condition for safe flight. It is important to ensure the safety of the UAS crew by regular inspection and maintenance of all UAS aircraft, radio transmitters, and accessories. Maintenance logs should be maintained for each aircraft and at a minimum, the following UAS components should be checked and replaced per manufacturer guidelines or if otherwise necessary:

- Motors;
- Batteries;
- Propellers (check for nicks and abrasions);
- Electrical connections, (plugs and solder connections);
- Antennae and GPS mounts;
- Screws that secure the body of the UAV, its arms, motor mounts, landing gear, camera gimbal, etc;
- The PIC is responsible for choosing the appropriate equipment.

Lithium Polymer (LiPo) Battery Management

Batteries used for UAS operations are made from Lithium Polymer (LiPo) and are especially sensitive and potentially dangerous if not maintained and stored properly. As an example, if a LiPo battery is discharged to less than 20 percent of capacity they can potentially catch fire or explode during the next charging. Special battery chargers with cell balancing capabilities must be used and the batteries must be monitored and stored safely. All batteries should be charged, maintained, and stored in accordance with the battery manufacturer's recommendations. The charging of batteries must always be monitored closely. Never leave a charging battery unattended, it could catch fire. Batteries should be charged only with appropriate LiPo capable battery chargers. Never charge a LiPo battery with a non-LiPo battery charger. LiPo batteries should also be drained to approximately 60 percent of capacity if stored for more than a few days. Some batteries have auto-discharge capability, but not all. Storing LiPo batteries charged to 100 percent for long periods will cause the battery to begin to off-gas and start bulging. Bulging batteries must be properly discharged and disposed of immediately at an approved disposal site.

UAS Crew Equipment Requirements

Separate from the UAS Aircraft, Radio Control Transmitter, and Mission Plan documents, each crew must have the necessary equipment, provided by the NRD, to use for the UAS Project. This includes, but is not limited to, the following:

- Spare propellers, spare batteries, field battery charger;
- Launchpad;
- Handheld anemometer to measure wind velocity;
- First aid kit;
- Fire Extinguisher.

Emergency Procedures

UAS accidents or incidents are defined as an injury or illness occurring during or as a result of a UAS activity. An incident is further defined as any adverse consequence that caused or could have caused injury to personnel and/or damage to equipment, properties, or biological resources. Biological resource incidents are more than just collisions, and include, but are not limited to:

- Displacement of wildlife;
- Nest or den abandonment;
- Aggressive behavior towards the UAS by wildlife; and
- Out-of-ordinary vocalization or alarm calling by wildlife.

Accidents resulting from UAS activities can range from minor injuries and mishaps to life-threatening injuries, or even death. All accidents and incidents, regardless of the severity or whether or not an employee is injured, must be reported to the NRD Director. All accidents requiring medical treatment or resulting in a serious injury or death must be reported immediately after taking necessary actions to preserve life or respond to injuries. In an emergency, dial 911 or activate InReach SOS to reach local authorities and medical aid as soon as possible.

Incident Reports

If an incident or accident resulting from UAS activities occurs, the PIC must complete and submit an NRD UAS Incident Report (Appendix F). Incidents from the operation of a UAS that results in serious injury or property damage in excess of $500, must also be reported to the FAA within 10 days. The PIC must coordinate with the NRD Director to file this report. The PIC will report all near misses involving UAS activities to the NRD Director.

A key element of any successful accident prevention program is the timely reporting and investigation of all accidents and incidents. Determining the root cause of an incident and implementing corrective actions will lead to continual improvement in UAS safety. All crew members involved in the UAS activity; PIC, VO, NRD Director, and any support personnel, must freely discuss and document any incident or near miss to determine what went wrong and develop ways to prevent a recurrence.

UAS In-Flight Contingency Procedures

The UAS In-Flight Contingency Procedures cover several potential unplanned in-flight situations. The procedures listed below provide the basic steps for each situation. These procedures may be modified to the capabilities of a particular UAV as needed.

Loss of Visual Line of Sight: Defined as when neither the PIC nor the VO has a visual on the UAV.

Procedure: If the UAV is visually reacquired promptly, the mission may continue. Otherwise, the mission shall be aborted, and the PIC shall attempt to assess the location of the UAV. Prior to piloting the UAV in any direction, the PIC will utilize the map and data readouts on the controller and the camera on the UAV to determine its position. If still unclear, the PIC will direct the UAV to ascend to gain more clearance from ground objects and will then try to assess the location again. If a visual line of sight is not then reacquired, a Return-To-Home shall be executed. If the UAV is on an autonomous mission, Return-to-Home shall be executed if the UAV is not visually reacquired promptly. Once visual line of sight is reacquired, the Return-to-Home may be canceled and the mission may be continued.

Lost Link: Defined as when the Remote Controller and the UAV are no longer connected, and the PIC no longer has control of the UAV.

Procedure: The UAS will be pre-programmed to issue the Return-to-Home command to the UAV in which the UAV climbs/ascends to a preset altitude, returns to the Home Point, and lands.

Fly-away: Defined as a Lost Link condition where the Return-to-Home command is not being issued or not being executed by the UAV.

Procedure: This is an emergency situation and all attempts should be made to regain control of the UAV by moving closer to the UAV. If this situation occurs while operating in controlled airspace, or if there's a chance of the UAV entering controlled airspace, the PIC must notify the appropriate aviation authority as soon as possible.

Evasive maneuvers: Defined as unplanned manual maneuvering of the UAV to avoid wildlife interaction or other collisions.

Procedure: To avoid an aggressive bird, the first option is to ascend rapidly. Birds generally cannot ascend as fast as a drone. If the drone is already at max altitude, move laterally away from the bird. Once clear of the bird, move laterally until enough distance has been created to safely descend and land the drone. Do not resume operations until the bird has left the area.

UAS Incident Procedures

Near Miss incidents

A near miss is an event in which personal injury or damage to equipment, property, or the environment nearly occurred, but was averted. If a near-miss incident occurs, submit a completed copy of the NRD UAS Incident Report with a description of the incident to the NRD Director within 48 hours of the incident. By definition, in a near-miss, the list of persons injured and environmental, property, and equipment damaged should be entered as "Not Applicable". The description should include distance details of the near-miss and what actions were taken to avoid injury or damages.

UAV Crash

A crash includes any incident that results in damage to the UAS, persons, property, equipment, or the environment resulting from a collision with people, wildlife, trees, structures, wires, terrain, other obstructions, or mechanical failures. Following a crash, NRD staff should immediately take appropriate actions to protect people and property from further damage as well as to administer appropriate first aid or seek medical assistance for injured persons. If the UAS contains LiPo batteries, they may be crushed or punctured in a crash. Acting to mitigate fire risk is a critical secondary consideration after treating injured persons.

If a crash occurs, the PIC must submit a completed NRD UAS Incident Report to the NRD Director within 24 hours of the incident. The incident report must include a clear description of the incident, any injuries to persons, and all damage to equipment, property, or the environment including estimates of costs to repair or replace any property or equipment. Should damage or injury occur to non-NRD personnel or property, provide contact information for the PIC and the NRD Director to any involved parties and collect contact information from them for inclusion in the incident report and follow-up.

NRD staff should recover the UAV involved in a crash if the recovery can be accomplished without placing staff or other equipment at risk of injury or damage. During recovery, a fire extinguisher should be carried by the recovery staff and photo documentation of the crash site should be made for inclusion with the incident report. A general Downed Aircraft Recovery Checklist is provided in (Appendix G).

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Appendix A – General Definitions

Aircraft

Any contrivance invented, used, or designed to navigate, or fly in, the air.

Altitude (ATTI)

The height measured from directly above ground level (AGL) is the absolute altitude. The height measured from mean sea level (MSL) is the true altitude.

Autonomous Aircraft

An aircraft that does not require pilot intervention in flight operations.

Autopilot

The component of an aircraft that is capable of guiding movement of the aircraft without real-time human guidance.

Ceiling

Height above ground or water of the base of the lowest layer of cloud below 20,000 feet [~6000 meters] which covers more than half of the sky.

Certificate of Waiver or Authorization (COA)

The terms “certificate of waiver” and “certificate of authorization” means a Federal Aviation Administration grant of approval for a specific flight operation.

Collision Avoidance

Actions taken to prevent flying into a fixed object or another aircraft.

Command and Control (C2)

The exercise of authority and direction by the pilot.

Control Station (CS)

An interface used by the remote pilot or the person manipulating the controls to control the flight path of the UAV. [FAA]

Detect, Sense and Avoid (DSA)

DSA can be defined as:

- Detect- is something there?
- Sense- is it a threat/target?
- Avoid- maneuver to miss.

Drone

- Unmanned Aircraft
- Remotely Operated Aircraft (ROA)
- Remotely Piloted Aerial Vehicle (RPAV)
- Remotely Piloted Aircraft System (RPAS)
- Remotely Piloted Vehicle (RPV)
- Small Unmanned Aircraft (SUA)
- Small Unmanned Aircraft System (sUAS)
- Uncrewed Aerial Vehicle (UAV)
- Unmanned Aerial Vehicle (UAV)
- Unmanned Aircraft System (UAS)

Envelope

The maximum performance parameters of an aircraft.

Failsafe Function

If a lost link occurs, the aircraft enters a failsafe mode and it either returns to home or lands autonomously.

Federal Aviation Administration (FAA)

The Federal Aviation Administration (FAA) is the agency of the United States Department of Transportation responsible for the regulation and oversight of civil aviation within the U.S., as well as operation and development of the National Airspace System. Its primary mission is to ensure the safety of civil aviation.

Flyaway

Unintended flight outside of operational boundaries (altitude/airspeed/lateral) as the result of a failure of the control element or onboard systems, or both. Flyaways do not have or do not initiate failsafe mode to return to launch.

Flyaway Protection System

A system that will return the aircraft safely to the surface, or keep the aircraft within the intended operational area when the command and control link between the pilot and the aircraft is lost.

Geofence

A virtual barrier indicating how far a GPS UAV can fly from its home point. Geofence settings are usually height above ground as well as total distance from the home point.

Global Positioning System (GPS)

A global system of U.S. navigational satellites developed to provide precise positional and velocity data and global time synchronization for air, sea, and land travel.

Line of Sight (LOS)

Many small aircraft, including the SLPT UAS feet, are line-of-sight machines, meaning the person controlling the device must be in direct sight of the aircraft so that radio signals can be transmitted back and forth. Most larger aircraft are not line-of-sight aircraft because the radio signals that control them are bounced off of satellites or manned aircraft.

Lost Link

Loss of command and control link contact with the UAV such that the PIC can no longer manage the aircraft's flight.

Minimum Safe Altitude (MSA)

The public domain for airspace starts at the minimum safe altitude (MSA). In general, people's property ends at the highest of the underlying land's trees, buildings, fences, or how high the owner can use the airspace in connection with the land. Consult Appendix B for more information.

Mission Plan

The route planning, payload planning, data link planning, and aircraft emergency recovery planning for a flight.

Multi-Rotor

An aircraft with two or more main rotors.

National Airspace System (NAS)

The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower or material.

Near Miss

An incident in which personal injury or damage to equipment, property, or the environment nearly occurred, but was averted.

Payload

All elements of a UAV that are not necessary for flight but are carried for the purpose of fulfilling specific mission objectives.

Remote Controller

The handheld device used to operate the UAV and typically consisting of a radio transceiver, GPS, and flight controls. Remote controllers may also include First Person View (FPV) screens and camera controls.

Remote Pilot (RP)

The person who manipulates the flight controls of a remotely-piloted aircraft during flight time.

Remote Pilot in Command (PIC)

A person who holds a remote pilot certificate with an sUAS rating and has the final authority and responsibility for the operation and safety of an sUAS operation conducted under FAA part 107.

Return To Home (RTH)

The return of an aircraft to its original launch location (home point). Also known as homing and often performed as a safety procedure in the event of a technical malfunction or emergency.

Rotor

A hub with a number of radiating airfoils (blades) that is rotated in an approximately horizontal plane to provide the lift for a rotary-wing aircraft.

Sense and Avoid Capability

The term “sense and avoid capability” means the capability of an unmanned aircraft to remain a safe distance from and to avoid collisions with other airborne aircraft.

Sterile Cockpit

Federal Aviation Administration (FAA) regulation state that during critical phases of flight (normally below 10,000 feet (3,050 m)), only activities required for the safe operation of the aircraft may be carried out and all non-essential activities are forbidden. No person may engage in nor may any pilot in command permit any conversation or other activity that could distract or interfere with a flight crewmember in the proper conduct of flight duties during a critical phase of flight. Critical phases of flight include all operations from when the UAS is placed in position for takeoff or launch until the aircraft comes to rest at the conclusion of a flight.

Track

The actual flight path of aircraft above the ground.

UAS Mission

A single-day or near consecutive multi-day UAS operation. One or more UAS Missions make up a UAS Project.

UAS Pilot

A certification received once someone completes the requirements to allow them to operate UAS for the NRD.

UAS Project

A single or multi-outing UAS operation to benefit a targeted project or outcome. A UAS Project is made up of one or more UAS Missions.

Unmanned Aerial Vehicle (UAV)

An unmanned aerial vehicle, commonly known as a drone and referred to as a remotely piloted aircraft by the International Civil Aviation Organization, is an aircraft without a human pilot aboard. Its flight is controlled either autonomously by onboard computers or by the remote control of a pilot on the ground or in another vehicle. The typical launch and recovery method of an aircraft is by the function of an automatic system or an external operator on the ground.

Unmanned Aircraft System (UAS)

The term "unmanned aircraft system" means an aircraft and associated elements (including communication links and the components that control the aircraft) that are required for the pilot in command to operate safely and efficiently in the national airspace system.

Visual Line of Sight (VLOS)

Unaided (corrective lenses and/or sunglasses excepted) visual contact between a pilot in command and an unmanned aircraft sufficient to maintain safe operational control of the aircraft, know its location, and be able to scan the airspace in which it is operating to see and avoid other air traffic or objects aloft or on the ground.

Visual Observer (VO)

A person acting as a flight crew member who assists the PIC and/0r the person manipulating the controls to see and avoid other air traffic or objects aloft or on the ground.

Appendix B - Best Practices for Avoiding Impacts to Natural Resources and Private Property Rights when Using UAS

Adopted from the National Park Service Guidance for Applicants Proposing the Use of Unmanned Aircraft Systems (UAS) (2017).

PRE-FLIGHT PLANNING

1. Become familiar with the presence of the following in the mission area: noise-sensitive species, habitat, or nesting areas; cultural areas or events; archaeological and paleontological sites; and private property (i.e., Reservation residences, ranches, etc). Assess potential impacts of the mission on resources such as air, archaeological, biological, cultural, geological, hydrological, lightscapes, paleontological, soundscapes, viewsheds, wilderness, and privacy rights. Plan the mission to avoid direct and cumulative impacts by optimizing the route, speed, timing, and frequency of flights, and employ technologies and operational parameters that help avoid impacts.

2. Consider information about impacts to resources found in agency management plans, foundation documents, natural resource condition assessments, and other planning documents. In addition to NRD resources, these resources may include information regarding visual resources, natural, historic, private property, or commemorative locations within the mission area.

3. Consider impacts to resources that may occur from "lost link" situations or downed UAS and utilize available technologies that allow the NRD to track and find UAS within the mission area to help avoid any such impacts.

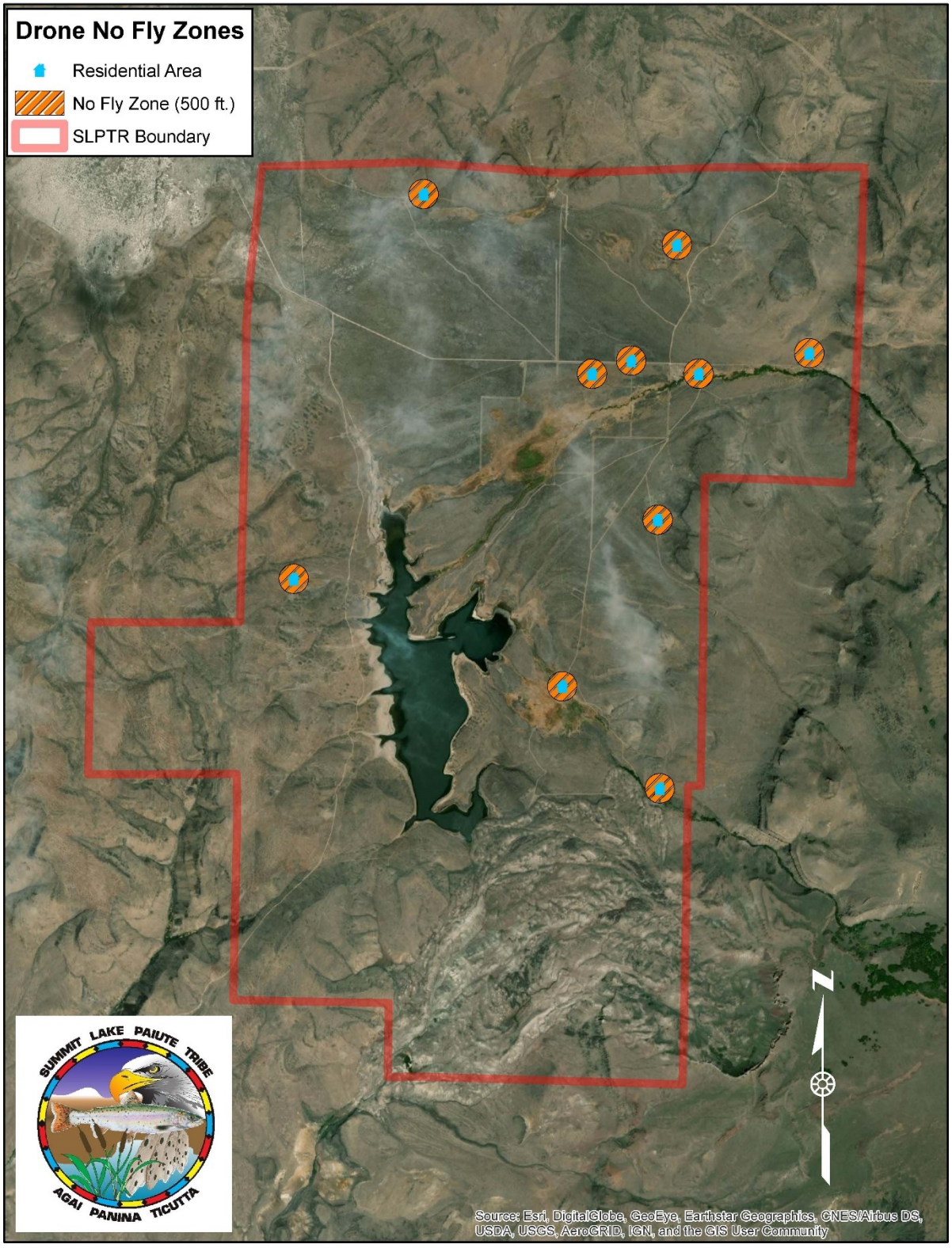
4. Use the quietest UAS available that will accomplish the mission because the noise from UAS can impact wildlife and other resources, especially when flown at low altitudes. Various models of UAS with different noise characteristics are available.

DURING MISSION

5. Operate UAS in a manner that minimizes audible and visual impacts to resources, including wildlife and private property. If wildlife or other resources are encountered during the mission that may be affected by the UAS, modify the route, altitude, airspeed, or other operating parameters to minimize potential impacts, if possible without compromising the safety of the mission. ***Check your flight plan to assure that you do not operate within 500 feet of an existing residential structure on the Reservation without first obtaining permission, in writing, before the mission. A No-Fly Zone Map is located at the and of this appendix and a No-Fly Zone ArcGIS layer is available for pre-flight planning procedures. Know before you go.***

6. Note any valuable resource information gathered from the UAS mission in any post-flight communications, including wildlife sightings, identification or conditions of natural, cultural, or historical resources, and any impacts to resources (including changes in wildlife behavior) resulting from the UAS operation. Implement safeguards to ensure that locations of sensitive resource areas will not be made public in accordance with existing policies and laws. Sensitive areas may include archaeological sites, paleontological sites, caves, residences, and sensitive wildlife habitat or nesting areas.

7. Never approach wildlife vertically (90° angle of approach where a UAV drops down on wildlife from directly overhead) and launch missions at least 100 meters from wildlife (Vas et. al 2015).



Appendix C – UAS Flight Checklist

Summit Lake Paiute Tribe - Natural Resources Department

UAS Flight Checklist

DATE: **PIC:** **VO:** **MISSION NAME:**

OTHER STAFF: **LOG BOOK FLIGHT NUMBER(S):**

BEFORE THE DAY OF FLIGHT

- ☐ **Check the Weather**
- ☐ **Ensure Updated Firmware**
- ☐ **Ensure Updated DJI App**
- ☐ **Flight Plan Completed**
- ☐ **Site Survey/Obstacle Check**
- ☐ **Permission/Permits Obtained**
- ☐ **NRD UAV Plan On-hand**
- ☐ **FAA Certification(s) On-hand**
- ☐ **Check NOTAMS**
- ☐ **File NOTAMS Briefing** https://www.1800wxbrief.com/
  - o **NOTAMS#:**
- ☐ **Charge Batteries**
- ☐ **Charge Remote Controller**
- ☐ **Pack Equipment**
- ☐ **Pack First Aid Kit & Fire Extinguisher**
- ☐ **Format SD Card(s)**

IMMEDIATELY BEFORE FLIGHT

- ☐ **Ensure All Equipment is Present**
- ☐ **Log Book Entry Started**
- ☐ **Deploy LaunchPad**
- ☐ **REMOVE GIMBAL COVER**
- ☐ **Inspect Aircraft for Faults**
- ☐ **Propellers Tightened**
- ☐ **Antenna(s) Deployed**
- ☐ **Batteries in Good Condition**
- ☐ **Turn On Controller**
- ☐ **RC Compass Calibrated**
- ☐ **Turn On UAV**
- ☐ **UAV Compass Calibrated**
- ☐ **IMU Calibrated**
- ☐ **Check RC/UAV Signal Strength**
- ☐ **Check GPS Satellite Signal Strength**
- ☐ **Correct Flight Mode Selected**
- ☐ **Take-off and Landing Point(s) Established**
- ☐ **Set Return-To-Home Elevation**
- ☐ **Set Home GPS Point**
- ☐ **Set Pilot's GPS Point**
- ☐ **Check the Weather**
  - o **WRITE-IN WIND SPEED:**
- ☐ **Inspect Area For Hazards (People, Planes, Wildlife, Etc.)**
- ☐ **Review Flight Requirements (Back Page)**

TAKE OFF

- ☐ **Hover at 15 Feet for 15 Seconds**
- ☐ **Check That Controls Are Responsive**

POST FLIGHT

- ☐ **Collect UAS, Parts, and Property**
- ☐ **Report Any Accidents or Injuries**
- ☐ **Log Book Entries Completed**
- ☐ **Upload Data to NRD Server**
- ☐ **Were there accidents or incidents?**
  - ☐ **YES**
  - ☐ **NO**

FLIGHT & SAFETY REQUIREMENTS

- ✓ **Do not exceed Manufacturer Requirements**
- ✓ **Fly below 400 feet AGL at all times**
- ✓ **Fly Visual Line of Sight (VLOS) at all times**
- ✓ **Pilot in Command (PIC) must know all FAA rules**
- ✓ **Never Fly at Night (know Civil Twilight in location)**
    - o **Have FAA Night-Flight Waivier On-hand if Flying at Night**
- ✓ **Never Fly Over Groups of People**
- ✓ **Never Fly Within 5 Miles of Airport (or heliport)**
- ✓ **Never Fly Near Emergency Response e.g., wildfires, first responders, etc.**
- ✓ **Never Fly Near other Aircraft (manned or UAS)**
- ✓ **Maximum Speed 87 knots (100 mph)**
- ✓ **Maximum Weight UAS 55 lbs. (fuel & attachments count)**
- ✓ **Ensure 3-mile Visibility**
- ✓ **No hazardous materials attached to UAS**
- ✓ **If possible, consider covered blades/rotors.**
- ✓ **Never Fly Recklessly**
- ✓ **Minimum 1 pilot (PIC) and 1 visual observer (VO) per craft—no exceptions**
- ✓ **Fly away from people (e.g., >500 ft. recommended)**
- ✓ **Always Give Way to Manned Aircraft**
- ✓ **Never fly inside of Reservation No-Fly Zones**

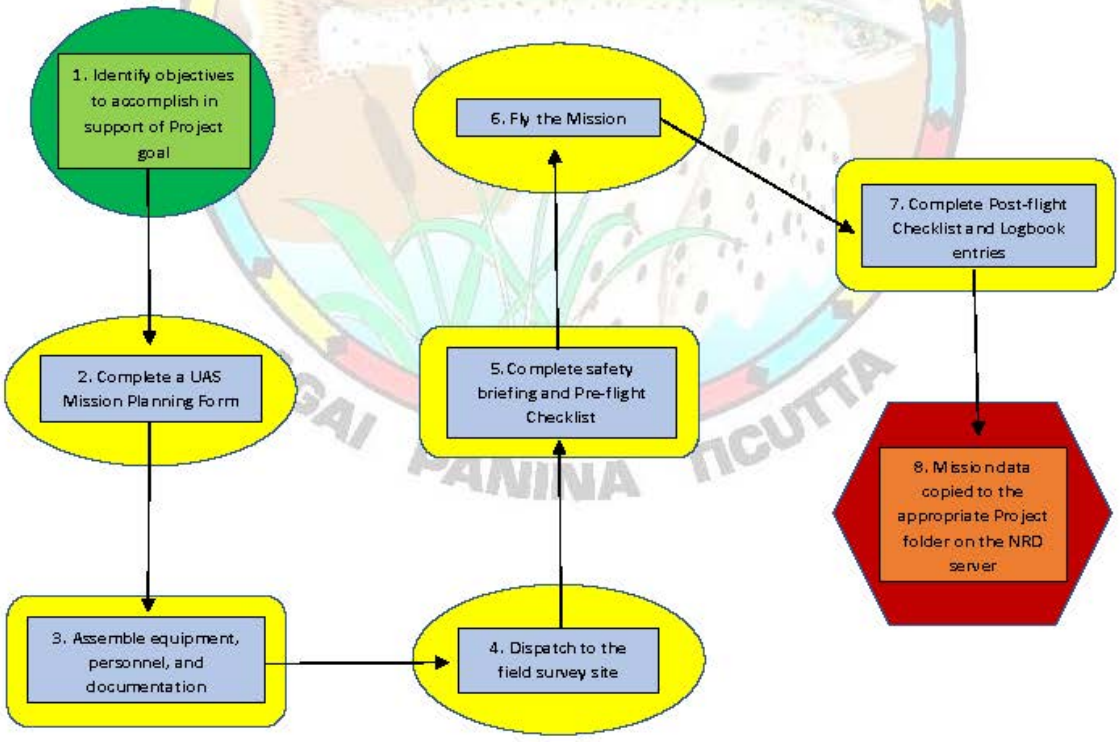
Appendix D – UAS Operations Workflow

Summit Lake Paiute Tribe - Natural Resources Department

UAS Mission Workflow

Prior to any UAS mission, NRD personnel will develop a Mission Plan. UAS mission planning is primarily organized by the PIC prior to mission implementation so as to certify that the mission will be conducted safely and in compliance with all Tribal and Federal regulations. In general, an NRD Project may require one or more UAS missions (single-day or near consecutive multi-day UAS operations) intended to fulfill an objective(s) required to meet the overarching goal of the Project. For example, a sage-grouse lek counting project's main goal is to conduct thorough counts of leks so as to ultimately develop population estimates. Successful accomplishment of this goal would, therefore, require satisfying several objectives such as locating new leks, conducting counts at known leks, formatting lek count data, and analyzing the data to derive abundance estimates. In this sense, the use of a UAS can contribute to satisfying the objectives of locating new leks and conducting counts at known leks. Each of the two objectives would necessitate the development of a respective UAS mission plan before mission implementation.

All crew members involved in a UAS mission must be familiar with the Operational Procedures detailed in the UAS Operation Plan. Crew members involved in UAS activities are encouraged to visit the site location, if possible, prior to conducting the mission to assist in preparing the UAS Mission Plan. UAS mission planning includes a review of the project's goal(s) and objectives, airspace analysis, equipment configuration, identifying crewmembers, assessing land jurisdictions, and following weather forecasts. The standard workflow for managing mission operations is shown as follows:



Appendix E – UAS Mission Plan Example

Summit Lake Paiute Tribe - Natural Resources Department

UAS Mission Plan

Project Name: Sage-grouse Lek Counts
Mission Name: Toll House 2
Flight Date: March 12, 2020
Logbook Flight #(s): SLPT-Toll2-1

Maximum Flight Altitude (AGL): 400 Ft
Is an FAA waiver required (i.e. night flight)? ☐ Yes ☒ No

Purpose & Objective(s) of the UAS Mission: Purpose – To collect count data for sager-grouse at the Toll House 2 Lek. Objective- Fly a UAS mission using thermal imagery so as to facilitate ground lek counts.

Site Location Description WGS84 UTM Coordinates: 11 T 324819 mE 4593660 mN

Potential Hazards Identified ***(check all the apply)*****:**

Airspace Check

- ☒ Class B- Large Airports: Surface to 10k MSL
- ☐ Class C- Medium Airport: Surface to 4k MSL
- ☐ Class D- Small Airport: Surface to 2.5k MSL
- ☐ Class E- All Not A, B, C, D: Surface to 14.5k MSL
- ☒ Class G- Uncontrolled: VFR Rules Apply
- ☒ Special Use (i.e., Military Operation Area (MOA), list name(s) below)
  - HART F MOA

Potential Presence of Obstructions in Flight Area ***(check all the apply)*****:**

- ☐ Power lines
- ☐ Wires
- ☐ Poles
- ☐ Structures
- ☐ Mountain Peaks/cliffs
- ☒ Birds (Passerines, raptors, waterfowl, etc.)
- ☒ Potential Aircraft
- ☐ Low Cloud Ceiling
- ☐ Water Bodies
- ☒ Roads

Potential Natural Resources Risks ***(check all the apply)*****:**

- ☒ Sage-grouse
- ☒ Raptors
- ☒ Bird Nests
- ☐ Cultural Resources
- ☐ Water Bodies
- ☐ Sensitive Species

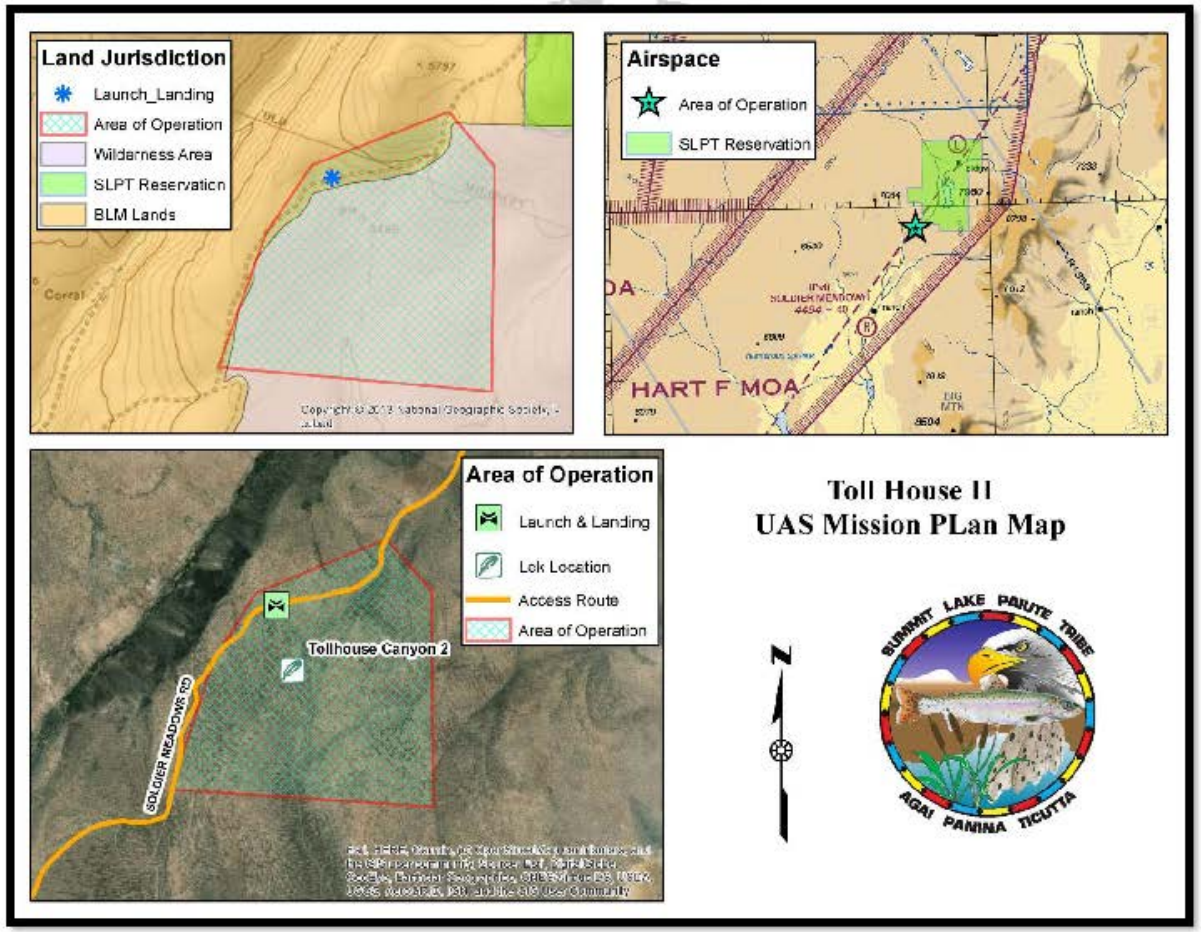
Potential Privacy Rights & Jurisdiction Considerations ***(check all the apply)*****:**

- ☐ Non-Reservation Private Property
- ☐ On-Reservation Private Property
- ☐ Non-private Reservation Lands
- ☒ Designated Federal Wilderness
- ☒ Non-wilderness Federal Lands

Permission Granted to operate on restricted lands (private properties & wilderness)?

- ☒ Yes
- ☐ No

Identify Flight Boundaries – ***insert site map with UAS operations area(s) outlines, potential access, launch/landing sites, and land ownership***



UAS Operations Contact information

UAS Operations Contact List				
Name	**Role**	**Organization**	**Phone**	**Website**
FAA Regional Office	Incident Reporting	Federal Aviation Administration	(775) 858-7700	https://www.faa.gov/about/office_org/field_offices/fsdo/nev/
NTSB Office	Incident Reporting	National Transportation Safety Board	(844) 373-9922	https://www.ntsb.gov/Pages/Report.aspx
NOTAMS	Notices to Airmen	Federal Aviation Administration	N/A	https://notams.aim.faa.gov/notamSearch/nsapp.html#/
NOTAMS	Notices to Airmen	Flight Service	N/A	https://www.1800wxbrief.com/Website/#!/
SLPT Office	Incident Reporting	Summit Lake Paiute Tribe	(775) 827-9670	https://www.summitlaketribe.org/

Appendix F – UAS Incident Report

Summit Lake Paiute Tribe - Natural Resources Department

UAV Incident Report

Date: **Incident Coordinates**

Time: **WGS84 UTM:** _____

UAS Crew Information

PIC Name: **Pilot Name (if not PIC):**

PIC FAA Cert #: **VO Name:**

Aircraft Information

UAV Make: **UAV FAA Registration N#:**

UAV Model: **Remote Controler Make/Model:**

Site Information

Elevation: Feet **Temperature:** F

Time of Day:

☐ Dawn ☐ Dusk
☐ Daylight ☐ Night

Weather (*check all that apply*):

☐ Fog ☐ Thunderstorm
☐ Haze/Smoke ☐ Snow
☐ Dust ☐ Sleet
☐ Rain ☐ Freezing Rain

Wind Direction: **Wind Velocity:** **Max Wind Gust:**

Incident Information

Fill out the information as pertaining to each incident type that occurred during the event

☐ Near Miss (Section A)
☐ Crash - Property Damage (Section B)
☐ Crash – UAV Damage (Section C)
☐ Crash – Injury to People and/or Natural Resources (Section D)
☐ Accident – Damage to UAS components (i.e., dropped & damaged)

Report Continues On Reverse Side

Event Details

Describe events & circumstances leading to the event, and the nature of the same. Include sketch if you desire. Attach extra sheets if more space is needed.

Overall, the event was likely caused by (*check all that apply*):

- ☐ Loss of Visual Line of Sight
- ☐ Lost Link
- ☐ Pilot Error
- ☐ Crew Injury/Illness
- ☐ Fly-away
- ☐ Evasive Maneuver(s)
- ☐ Weather Event
- ☐ Mechanical Failure/Malfunction

A. For Near Miss - *Describe circumstances & outcome:*

B. **For Crash Resulting in Property Damage to Items Other Than UAV** - *Damage to any property, other than the small unmanned aircraft:*

- ☐ Repairable Damage to Property (including materials and labor) >$500
- ☐ Repairable Damage to Property (including materials and labor) <$500
- ☐ Irreparable Damage to Property of fair market value <$500
- ☐ Irreparable Damage to Property of fair market value >$500

C. For Crash Resulting in Damage to UAS

Suspected Mechanical Failure/Malfunction (*check all that apply*):

- ☐ Aircraft Airframe
- ☐ Motor(s)
- ☐ Propeller(s)
- ☐ Flight Controler Malfunction
- ☐ Accessories, Etc.
- ☐ Not Applicable

Report Continues On Reverse Side

Damage to UAS (*check all that apply*):

- ☐ Aircraft Airframe
- ☐ Motor(s)
- ☐ Propeller(s)
- ☐ Battery
- ☐ Accessories (Stobe/Spot Light)
- ☐ Thermal Camera
- ☐ Thermal Monitor
- ☐ Video Camera
- ☐ Gimbal
- ☐ Remote Controller

D. For Crash Resulting in Injury to People and/or Natural Resources

Injury to People (*check all that apply*)

- ☐ Minor Injury (not resulting in hospital vist)
- ☐ Moderate Injury (resulting in hospital visit)
- ☐ Serious Injury (resulting in overnight hospital visit and/or head trauma, broken bone(s), sutures)
- ☐ Loss of Conciousness

Injury to Natural Resources

Wildlife Species Involved:

Description of Injury:

Cultural Site Description:

Description of Damage:

UAV Recovery

Was the UAV Recovered?

☐ Yes ☐ No

Did a fire follow impact?

☐ Yes ☐ No

Report Continues On Reverse Side

Federal Aviaition Adminsitrtation (FAA) and National Transportation Safety Board (NTSB) Reporting Information

FAA Reporting Requirements

There are two types of reporting made to the FAA: (1) when there has been a deviation from the regulations and requested to report, and (2) when there has been an accident.

1. Upon Request Following a Deviation Due to an In-flight Emergency:

(a) In an in-flight emergency requiring immediate action, the remote pilot in command may deviate from any rule of FAA part 107 to the extent necessary to meet that emergency.

(b) Each remote pilot in command who deviates from a rule under FAA part 107 must, upon request of the Administrator, send a written report of that deviation to the Administrator.

2. After an Accident (Within 10 Days)

No later than 10 calendar days after an operation that meets the criteria of either paragraph (a) or (b) of this section, a remote pilot in command must report to the FAA, any operation of the small unmanned aircraft involving at least:

(a) Serious injury to any person or any loss of consciousness; or

(b) Damage to any property, other than the small unmanned aircraft, unless one of the following conditions is satisfied:

(1) The cost of repair (including materials and labor) does not exceed $500; or

(2) The fair market value of the property does not exceed $500 in the event of total loss.

NTSB Reporting Requirements

A civil UAS operator must immediately and by the most expeditious means, notify the NTSB of an accident or incident, in which:

(1) Any person suffers death or serious injury; or

(2) The aircraft has a maximum gross takeoff weight of 300 pounds or greater and sustains substantial damage.

Listed serious incidents that apply to small UAS include the following events:

- Flight control system malfunction or failure: For an unmanned aircraft, a true "fly-away" would qualify. A lost link that behaves as expected does not qualify.
- Inability of any required flight crewmember to perform normal flight duties as a result of injury or illness. Examples of required flight crewmembers include the pilot, remote pilot, or visual observer if required by regulation. This does not include an optional payload operator.
- In-flight fire, which is expected to be generally associated with batteries.
- Aircraft collision in flight.
- More than $25,000 in damage to objects other than the aircraft.
- Release of all or a portion of a propeller blade from an aircraft, excluding release caused solely by ground contact.
- Damage to helicopter tail or main rotor blades, including ground damage, that requires major repair or replacement of the blade(s).
- An aircraft is overdue and is believed to have been involved in an accident.

Report Continues On Reverse Side

Appendix G – Downed Aircraft Checklist

Summit Lake Paiute Tribe - Natural Resources Department

Downed Aircraft Recovery Checklist

- ☐ **Verify that all emergency response has concluded**
- ☐ **Verify that the downed aircraft will not cause collateral damage via fire**
- ☐ **Carry a fire extinguisher with you for all recoveries**

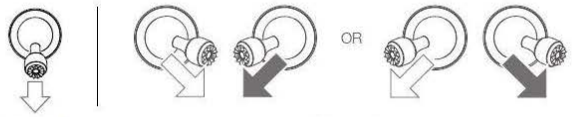
- ☐ **Send power-down command to aircraft**

Stopping the Motors

There are two methods to stop the motors:

Method 1: When the aircraft has landed, push and hold the left stick down. The motors stop after three seconds.

Method 2: When the aircraft has landed, conduct the same CSC that was used to start the motors, as described above. The motors stop immediately. Release both sticks once the motors have stopped.



Method 1 Method 2

Stopping Motors Mid-Flight

Stopping the motors mid-flight will cause the aircraft to crash. The motors should only be stopped mid-flight in an emergency situation such as if there is a collision, a motor has stalled, the aircraft is rolling in the air, or the aircraft is out of control and is ascending/descending very quickly. To stop the motors mid-flight, use the same CSC that was used to start the motors.

- ☐ **Power-down remote control**
- ☐ **Secure the project site by stowing all equipment and supplies no required for aircraft recovery**
- ☐ **Is the downed aircraft on private or public property?**
  - **Private – Unless the risk of fire is considerable, contact landowner before continuing with recovery. *This includes Reservation Allotments and Land Assignments*.**
  - **Public – Continue with recovery**
- ☐ **Can the aircraft be accessed safely?**
  - **No – Contact immediate supervisor or NRD Director for guidance**
  - **Yes- Continue with recovery**
- ☐ **Access the Aircraft**
  - **Power down the aircraft if power-down command failed**
  - **Remove the battery**
- ☐ **Document the crash scene**
  - **Take photographs and make notes as needed**
- ☐ **Remove the aircraft**
  - **Remove all debris from the crash site**

Appendix H – Useful Websites

FAA Know Before You Fly
http://knowbeforeyoufly.org/air-space-map/

Online NOTAM filing service 1800wxbrief.com
https://www.1800wxbrief.com/

Sky Vector flight planning tools – Sectional Airspace Maps
https://skyvector.com/