FHP Aerial Application - Aircraft

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation		
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome
Avionics (for radios see "Technology" tab)	Unplanned avionics failures (overheating, faulty wiring, etc.)	Occasional	Marginal	Medium	Have portable radio/handheld, users prepared to use alternate frequencies (guard), land and repair or replace aircraft	Remote	Marginal	Medium
	Loss of emergency locator ability (analog ELT systems will be discontinued)	Remote	Marginal	Medium	Switch to 406 MHz digital ELT systems before February 1, 2009	Improbable	Negligible	Low
Aircraft Configuration	Fixed wing may be more difficult to land in event of engine failure (flight below 500')	Remote	Catastrophic	Serious	Consider value of helicopter to reduce risk in this event, however cost prohibitive to use in all operations	Improbable	Catastrophic	Medium
	Contract may not accurately specify application equipment, pesticide formulation, and rates of application (EPA, NEPA & possibly state violations - env. Hazard, double applications increase exposure)	Improbable	Negligible	Low	Specify in project design and in agency and state contracts: nozzle type, rate of application, pesticide formulation, dose, droplet size, swath width, and environmental parameters during application.	Improbable	Negligible	Low
	Reduced visibility due to low wing or bi-wing application aircraft	Remote	Catastrophic	Serious	Contracts use only aircraft designed and built for aerial application, conduct reconnaissance for aerial hazards prior to project	Improbable	Critical	Medium
Terrorist or malicious activity	Remote, unsecure work areas and service landings (risk to containment, aircraft, personnel… theft or damage to aircraft/equipment… threat to public safety) 24 hr security/agency-supplied at airport is not required for all Agency and state contracts.	Remote	Catastrophic	Serious	Adhere to Project Aviation Safety and Security Plans. Contract to address security in remote locations, reference local Unit Aviation Plan (on all agency and state contracts, security plan required for both insecticide & aircraft/support equipment… prop lock, fuel lock, chain of custody for insecticide)	Remote	Critical	Medium
Performance Standards- Fixed Wing	Insufficient Horsepower	Improbable	Catastrophic	Medium	Contract to address minimum requirements: observation aircraft capable of transporting a minimum payload of 530 pounds on a standard day at sea level and Power loading not greater than 13.5 pounds, (aircraft with a power loading greater than 13.5 pounds per horsepower (PPH) must be turbo-charged), if multi-engine aircraft are used they shall have 240-horsepower per engine, or more, unless turbo-charged. Application aircraft must be Turbine engine powered.	Improbable	Critical	Medium
	Typically one-size spray tank, tendency to fill and overload aircraft	Remote	Catastrophic	Serious	Perform load calculations based on weight of pesticide formulation, weight of fuel and consider distance to treatment area; conduct performance check for helicopters	Improbable	Catastrophic	Medium
	High density altitude operations	Remote	Catastrophic	Serious	Match machine to task & environment, monitor weather, reduce load	Improbable	Catastrophic	Medium
	Propensity for fixed wing to operate near stall speeds or helicopters to settle with power in downwind turns/operations	Frequent	Catastrophic	High	Brief on heavy load, wind direction & speed/downwind leg, avoid high G turns	Occasional	Catastrophic	High
Performance Standards - helicopter	Hover out of ground effect (HOGE), increased likelihood if using observation helicopter	Remote	Catastrophic	Serious	Maintain forward airspeed, utilize higher performance aircraft… OR to eliminate need for additional aircraft/personnel, consider other monitoring techniques in contract (e.g. real-time AFF subscription)	Improbable	Catastrophic	Medium
	Propensity to operate within height-velocity curve, increased likelihood if using observation helicopter	Remote	Catastrophic	Serious	Maintain forward airspeed, utilize higher performance aircraft, maintain adequate height above canopy… OR to eliminate need for additional aircraft/personnel, consider other monitoring techniques in contract (e.g. realtime AFF subscription)	Improbable	Catastrophic	Medium
Inspection & Maintenance	Existence of corrosion/fracture in aircraft components due to weights and chemical exposure (e.g.. Skids, landing gear, wing struts/attach fittings)	Remote	Catastrophic	Serious	Partially mitigated by annual inspections per FAA part 91	Improbable	Catastrophic	Medium

	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
	Currently some states have no aircraft and pilot inspection procedures.	Probable	Catastrophic	High	Agency will assist in the development and suggest use of an aircraft and pilot check list. The Agency will provide training to state program managers. Even though aircraft will be inspected by state program managers, agency personnel will not be permitted to board application and observation aircraft.	Occasional	Catastrophic	High
	Aircraft not design/built for the specific mission profile (i.e. low-level, mountainous terrain, aerobatic flight) on agency and state contracts.	Remote	Catastrophic	Serious	Require and implement a Structural Health Monitoring Program approved by the aircraft's manufacturer. A copy of the program shall be provided to the CO and agency aviation inspectors.	Remote	Marginal	Medium
	Aging aircraft and/or not identifying inspecting critical stress points (aerial application aircraft subject to multiple cycles and maximizing payloads)	Remote	Catastrophic	Serious	Require and implement a Structural Health Monitoring Program approved by the aircraft's manufacturer. A copy of the program shall be provided to the CO and agency aviation inspectors.	Remote	Marginal	Medium
	Corrosion/fracture of spray tanks, delivery components leading to leakage, parts detaching	Remote	Critical	Medium	Develop monitoring program for spray operations, critical aircraft components and delivery system	Remote	Marginal	Medium
	Insufficient daily cleaning of aircraft to reduce corrosion (all aircraft)	Remote	Critical	Medium	Agency and state contracts require that all equipment which comes in direct contact with the pesticides must be kept thoroughly clean and free of residues and foreign particulate matter, ensure adequate preflight/postflight inspection, provide for containment of residue in contract	Improbable	Marginal	Medium
	Insufficient cleaning of tanks and delivery components between projects, when changing chemicals (env. hazard)	Remote	Critical	Medium	Agency and state contracts require that all tanks and pesticide delivery systems must be thoroughly cleaned and free of rust, residues, and particulate matter, such as grit and sand and will inspect all tanks before they are filled with insecticide or water.	Improbable	Marginal	Medium
	Unapproved modifications to equipment or unapproved equipment	Remote	Catastrophic	Serious	Both agency and state contracts require a supplemental Type Certificate (STC) or FAA field approval for modified equipment (e.g. pheromone flake pods)	Improbable	Catastrophic	Medium
Contract Aircraft (common to both State and Federal operations = mix of fixed and rotor wing, CWN or Exc Use)	Minimally skilled pilots	Remote	Catastrophic	Serious	Require in all agency and state contracts (1500 hrs minimum for application pilot, 25 hrs in make/model used, 100 hrs experience in aerial application & 200 hrs experience in typical terrain)	Improbable	Negligible	Low
	Using incorrect aircraft type for terrain (fixed vs. rotor wing)	Occasional	Catastrophic	High	Project planning shall determine the type of aircraft required, contracts may specify when important to do so. Establish parameters for a/c type (e.g. some mountainous terrain may be better suited for helicopter)	Remote	Catastrophic	Serious
	Incentive to maximize flight time, regardless if paid by acre treated or hours flown	Remote	Catastrophic	Serious	Flight Managers & Project Supervisor need to be involved in flight hour/duty day monitoring, flight duty limitations, agency standards apply to agency and state operations through contracts.	Improbable	Negligible	Low
	Operations in densely populated/high air traffic areas	Probable	Critical	High	Contractors must file Congested Area Plans with FAA. Contractors must adhere to FAA requirements (i.e. some FAA offices require rotor only, others may allow fixed wing operations)	Probable	Marginal	Serious
	No maintenance requirements under FAA part 137, minimum requirements per FAA part 91	Probable	Catastrophic	High	None	Probable	Catastrophic	High
	Potential for reduced reliability of reciprocating engines compared to turbine-powered aircraft	Occasional	Critical	Serious	Consider requiring turbine-powered aircraft in contracts. (Note: by design turbine-powered aircraft tend to have more power and are more reliable, but does not always guarantee better performance)	Remote	Critical	Medium
	Utilizing inappropriate number and make/model of aircraft for project area	Remote	Catastrophic	Serious	Project planning shall determine and contracts specify quantity & type of aircraft needed to implement the project. For example number of a/c or production rates (ac/hr) may be specified in contracts.	Remote	Critical	Medium
	No pre-application survey of area prior to project for aerial hazards	Remote	Catastrophic	Serious	Contract requirement that all application pilots are responsible for the reconnaissance of each area before treatment.	Improbable	Catastrophic	Medium
Cooperating Aircraft (Hazards unique to state operation only,	No carding system, federal uncertainty as to meeting federal safety standards	Probable	Catastrophic	High	Agency will assist in the development of an aircraft and pilot check list. The agency will provide training to state program managers. Agency personnel will not be permitted to board application and observation aircraft.	Remote	Catastrophic	Serious

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
using mix of fixed and rotor wing)	No flight hour/duty day limitation	Frequent	Catastrophic	High	State contracts should include agency duty limits for mechanics and pilots. Project Supervisor need to be involved in flight hour/duty day monitoring.	Remote	Catastrophic	Serious
Fuel	Starvation	Occasional	Catastrophic	High	Monitor quantity pumped during fueling, monitor flight time and distance to services	Remote	Critical	Medium
	Bad fuel (more likely in portable fuel systems)	Remote	Critical	Medium	Ensure fuel is tested for type and quality prior to fueling. Monitor quantity pumped. Ensure fuel filters are changed as required by manufacturer.	Improbable	Critical	Medium
Foreign Aircraft	Not carded/inspected for use in other country (e.g., US in Canada, Canada in US)	Remote	Critical	Medium	Use in foreign territory not authorized and illegal	Improbable	Marginal	Medium
Availability	Sense of urgency & pressure to perform (pilot, manager, organization)	Occasional	Catastrophic	High	Involve Supervisor, Program Manager & flight Manager in all stages of planning and risk assessment.	Remote	Catastrophic	Serious
	Tendency to over utilize single vendor/pilot & maximize flight hours due to limited availability of other aircraft	Remote	Catastrophic	Serious	Flight Managers & Program Manager need to be involved in flight hour/duty day monitoring. Adhere to contract specifications regarding flight hour/duty limitations.	Improbable	Catastrophic	Serious

FHP Aerial Application - Environmental

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation		
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome
Weather	High wind, high temperatures, low humidity (pesticide drift)	Frequent	Marginal	Serious	Contract specifies thresholds for allowable winds, temperature & relative humidity, cease operations when drift conditions exist	Occasional	Marginal	Medium
	High wind, low humidity, high temperatures (affect on aircraft performance)	Frequent	Catastrophic	High	Contract specifies performance requirements, conduct load calculations/weight & balance; cease operations when conditions out of parameter	Remote	Catastrophic	Serious
	Thunderstorms, lightening, hail, high winds	Occasional	Catastrophic	High	Suggest pilots utilize on-board, real time weather program; program managers monitor weather stations provided at airport office, use observation aircraft to help monitor weather conditions	Remote	Catastrophic	Serious
	Typically morning operations & in shadows/glare conditions	Frequent	Catastrophic	High	Preflight briefing to raise awareness	Probable	Catastrophic	High
Topography/Hi Alt	Turbulence	Frequent	Critical	High	Time application based on anticipated prevailing winds, cease operations if unsafe/out of parameter	Remote	Critical	Medium
	Terrain - box canyons	Occasional	Catastrophic	High	Plan project/treatment block such that application flight lines allow egress brief pilot	Remote	Critical	Medium
	High Altitude - density altitude	Occasional	Catastrophic	High	Perform load calculations for departure and destination	Remote	Critical	Medium
Remote Areas or Poor Road Access	Lack of communications	Probable	Catastrophic	High	Test radio communications prior to project implementation	Remote	Catastrophic	Serious
	Long response time in event of search and rescue	Occasional	Catastrophic	High	Mishap Response Plan to address search and rescue procedures, observation aircraft may be used to assist guiding rescue vehicles/personnel to accident site	Remote	Catastrophic	Serious
	Fuel starvation, proper fuel unavailable	Remote	Catastrophic	Serious	Monitor flight time/fuel consumption, utilize fuel trucks or have optional fuel sources identified	Improbable	Critical	Medium
	Unimproved landing strips or helipads with poor dust abatement and/or poor surface condition	Remote	Marginal	Medium	Contractor required to locate and inspect all landing zones prior to project implementation, secure written permission if on private property; for fixed-wing operations, contractor must obtain permission from airport manager, airstrips must be accessible to vehicles, therefore mostly utilizing developed airports (may use unimproved landing strip only in event of emergency); for rotor wing operations water is available for dust abatement if needed	Improbable	Marginal	Medium
Biological Window	Prioritizing treatment based on pest phenology over safety (must treat within window)	Occasional	Catastrophic	High	Contract specifications include adequate number of aircraft to accomplish mission within biological window, brief daily emphasizing safety over production, adhere to flight and duty limitations	Remote	Critical	Medium

Category	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
Airspace	Working within Military Operating Area, potential mid air collision	Probable	Catastrophic	High	Contact flight service station or ATC to determine if active and, if so, may request traffic advisories from the controlling agency prior to entry; address during premission planning and briefing	Remote	Catastrophic	Serious
	Working within or proximity to Military Training Route, potential mid air collision	Probable	Catastrophic	High	Address during permission planning and briefing; keep alert (application aircraft and observation aircraft); contact flight service station to determine if active and, if so, request times of scheduled activity, altitudes in use, actual route width (route may extend several miles beyond shown center line); not all MTRs are published on sectionals... obtain copy of AP1B for phone numbers to military installations and contact schedulers to deconflict MTR; project manager post NOTAM for military to review during their daily briefing	Remote	Catastrophic	Serious
	Unable to establish TFR for applications projects	Probable	Catastrophic	High	Post applications projects as NOTAM, remain aware of potential for other aircraft to enter project area	Remote	Catastrophic	Serious
	Military using application aircraft as "training targets"	Occasional	Catastrophic	High	COR/Project Manager & National Airspace Coordinator to communicate problem to military, describe distraction to application operations and risk (Air Force & Navy have contact points, also a primary single contact "Airspace Manager" for all branches)	Remote	Catastrophic	Serious
	Inability to post NOTAMs due to FAA office closures and difficulty identifying contact point	Occasional	Catastrophic	High	Go to FAA.gov to identify contact and follow procedures for filing NOTAMs... post aerial application NOTAM within 3 days of project	Remote	Catastrophic	Serious
	Working in proximity to or within FTA or TFR	Remote	Catastrophic	Serious	Typically avoid, however, Project Manager may request permission to work within FTA or TFR if possible and absolutely necessary, coordination between dispatch, application pilot, and aerial supervision is required	Remote	Critical	Medium
	Restricted Areas (artillery firing, guided missiles or aerial gunnery)	Remote	Catastrophic	Serious	Typically avoid, however, if necessary permission to enter may be coordinated through ATC; know intercept procedures, reference in contracts/prework and include in daily briefings	Remote	Critical	Medium
	Prohibited Areas (e.g.. lack of coordination prior to entering Camp David, White House, Presidential Ranch…)	Remote	Catastrophic	Serious	For all intents and purposes "permanently off limits", typically avoid, however, applications projects are sometimes prescribed within PAs; if necessary permission to enter may be coordinated through ATC, DOD, Secrete Service... Example: procedure for P-40 (Camp David) Project Manager contacts Park Service, Park Service contacts Secrete Service; a minimum prebrief by Project Manager includes Secrete Service to establish agreed flight plan/flight lines, pilot must strictly adhere to plan; know intercept procedures, reference in contracts/prework and include in daily briefings	Remote	Critical	Medium
	Mid Air collision while working within or crossing Class B, C, D Airspace	Occasional	Catastrophic	High	Observation and application aircraft remain aware of other traffic, pilot request clearance, maintain communication with ATC or tower as required	Remote	Catastrophic	Serious
	Airspace in general - near miss/collision in congested areas	Occasional	Catastrophic	High	Communicate with & utilize observation aircraft, ATC, etc... see and avoid, consider TCAS to warn of transponding aircraft in proximity to application aircraft	Remote	Catastrophic	Serious
Airstrip Availability, Condition and Services	No alternative or suitable landing location for emergency situations	Probable	Catastrophic	High	Identify emergency landing zones in advance (fields, open areas, meadows)	Remote	Critical	Medium
	No alternative fuel source	Occasional	Marginal	Medium	Call FBO/airport ahead of time to determine fuel availability, use alternate airport or fuel tender	Remote	Critical	Medium
	One-way landing/departure	Probable	Marginal	Serious	Be aware that preferred approach/departure based on wind may not be an option, be aware of the potential for oncoming air traffic	Probable	Negligible	Low
	No windsock at landing zones	Frequent	Marginal	Serious	Use vegetation (grass, tree tops) as reference; if available, ground support can call pilot with conditions prior to landing, hang flagging	Remote	Marginal	Medium
	Effects of prevailing wind	Frequent	Marginal	Serious	Know local conditions, retrieve automated weather	Frequent	Negligible	Medium
Terrain/Obstructions	Operations below 500' in either helicopter or fixed-wing, potential to impact terrain or obstruction - aerial application typically 50-200 feet above tree tops	Frequent	Catastrophic	High	Contract specifications require FAA part 137-qualified pilots. Maintain situational awareness, identify emergency landing zones (fields, open areas, meadows); preflight briefing, review aerial hazard map, contract specifies reconnaissance of area prior to treatment	Remote	Critical	Medium
Animal activity	Potential for serious injury/aircraft damage from birds	Occasional	Critical	Serious	Know flyways, observation aircraft and ground support to communicate avian activity if present in area	Remote	Critical	Medium

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Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
	Potential for serious injury/aircraft damage from wildlife on runway (common at remote and county airports)	Occasional	Critical	Serious	Ground support to clear runway, communicate activity to pilot	Remote	Marginal	Medium
Containment & Handling	No spill plan for fuel & chemicals, no label and MSDS for pesticide, no PPE	Remote	Marginal	Medium	Contractor is required to have spill plan, agency and state contracts require safety plan (includes spill plan) follow pesticide label regarding PPE	Improbable	Negligible	Low
	Human exposure due to treatment areas not posted	Remote	Marginal	Medium	Treatment areas are posted on public lands only (not necessary for private landowners requesting treatment), roads may be closed on public lands at discretion of site manager	Improbable	Negligible	Low

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FHP Aerial Application - Personnel

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		Pre Mitigation				Post Mitigation		
Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
Pilot and/or vendor	Minimal local experience/unfamiliar with area	Frequent	Catastrophic	High	Preflight briefing, review aerial hazard maps, conduct reconnaissance flights	Frequent	Marginal	Serious
	No current State Applicator License	Remote	Marginal	Medium	Agency and state contracts require contractor to obtain current State Applicator License… obtain certification within all states where project is planned, be aware that project may cross state lines	Improbable	Negligible	Low
	State contracts are not required to meet agency standards for aerial application	Probable	Critical	High	Maintain/improve working relationship with state agencies (most states voluntarily adopt agency standards), involve states in risk management	Remote	Marginal	Medium
	Minimal flight hours/mission hours	Occasional	Catastrophic	High	Contract specifies number of hours by mission type (number of hours in typical terrain, number of hours in make/model), check flight log files & be aware possibility exists for these to be falsified/unable to verify	Remote	Marginal	Medium
	Inordinate attention to application, impacting aerial hazards (new hazards installed often, e.g. cell towers)	Occasional	Catastrophic	High	Agency and state contracts provide aerial hazard maps of known hazards on aerial photo or topo, some states will GPS hazards prior to project implementation, agency and state contract require "all application pilots are responsible and required for the reconnaissance of each area before treatment"	Remote	Catastrophic	Serious
	Coerced into uncomfortable situation	Occasional	Catastrophic	High	Not all pilots equally skilled, do not pressure into uncomfortable situations (encourage all to speak up)	Remote	Catastrophic	Serious
	Inadequate briefings from Project Manager	Occasional	Critical	Serious	Make contract requirement to hold preseason, premission/daily, postmission briefings	Remote	Marginal	Medium
	lack of awareness leading to fuel starvation	Occasional	Catastrophic	High	Proper preflight planning, Project Manager & pilot monitor flight time	Remote	Catastrophic	Serious
	Self-medication	Occasional	Catastrophic	High	All project personnel to be aware of illness (may be colds to serious health issue), ask if medicated, know FAA regs for use of over-the-counter and prescription drugs while operating equipment	Remote	Critical	Medium
	Incomplete preflight inspection	Occasional	Catastrophic	High	Pilot to utilize preflight check list, FAA requirement	Remote	Critical	Medium
	Accepting unreasonable risk, "barnstormer" attitude	Occasional	Catastrophic	High	Preflight briefing to establish tone for the day, "aviation program first, pest management second"	Remote	Critical	Medium
	Pilot incapacitated	Remote	Catastrophic	Serious	Contracts specify that pilot may be relieved of duties (in event of sickness under influence of alcohol or drugs, insufficient rest/time off)	Improbable	Negligible	Low
	Fatigue	Occasional	Catastrophic	High	Contract specifies duty limitations and rest periods; contract specifies contractor not allowed to do other projects until completing current agency or state project	Remote	Marginal	Medium
	Complacency	Occasional	Catastrophic	High	Be aware that experienced pilots may tend toward complacency… conduct morning safety briefings, retain situational awareness throughout day	Remote	Critical	Medium
Agency or State Personnel	Exposure to increased risk by boarding unauthorized aircraft (FAA part 137 not carded for personnel transport)	Remote	Critical	Medium	Most fixed-wing application aircraft seat pilot only, federal and state personnel may not fly in restricted category (FAA part 137) aircraft	Improbable	Marginal	Medium
	Minimal experience with mission type	Probable	Critical	High	Include expert aviation and pest management personnel in project planning, briefing and implementation; train and mentor new employees (subordinates and supervisors)	Occasional	Critical	Serious

Category	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
	Undue pressure upon employees or contractor to perform by Program Manager/Supervisor	Occasional	Catastrophic	High	Utilize crew resource management, all are empowered to stop an unsafe act	Remote	Critical	Medium
	Exposure to risk for personnel if participating in observation flight	Frequent	Marginal	Serious	State and federal employees never ride in application aircraft under FAA part 137 but may in observation aircraft (federal requirements: pilot carding per FAA part 135, monitoring personnel on board must be qualified Fixed-wing Flight Manager or Helicopter Manager); consider utilizing AFF to monitor operation	Frequent	Negligible	Medium
	Fatigue (air or ground personnel)	Occasional	Critical	Serious	Responsibility of Project Manager to ensure adequate rest for all personnel (crew resource management)	Remote	Marginal	Medium
	Complacency (air or ground personnel)	Occasional	Critical	Serious	Be aware that experienced project personnel may tend toward complacency… conduct morning safety briefings, retain situational awareness throughout day (crew resource management)	Remote	Marginal	Medium
	Condoning unreasonable risk	Occasional	Catastrophic	High	Complete Risk Assessment for each project; preflight briefing to establish tone for the day, "aviation program first, pest management second"	Remote	Marginal	Medium
Training	Lack of educational opportunities for pilots and pilot operators that help reduce aircraft and drift accidents	Remote	Catastrophic	Serious	Consider including in contract specs that all application pilots must attend Professional Aerial Applicator Support System (PAASS) certification course	Remote	Marginal	Medium
	Minimal experience in areas with sporadic application programs (particularly in west, occasionally in east)	Frequent	Catastrophic	High	Agency to support and fund aerial application and safety training for all agency and state personnel, implement mentoring program, share expertise across regions	Occasional	Marginal	Medium
	Lack of aviation awareness training and risk management in general	Frequent	Catastrophic	High	Consistent with the goals of the Aerial Application Safety Council, develop and provide aerial application training program (e.g., ACE training for agency & state personnel)	Occasional	Marginal	Medium
Flight Following Personnel (typically dispatch on FS contracts, FS land)	Lack of mission understanding and scheduled activities	Remote	Critical	Medium	Notify dispatch of planned activities and provide Project Aviation Management Plan for Agency contracts and any state contracts in proximity to National Forest	Remote	Marginal	Medium
	Inconsistent flight following procedures - federal	Occasional	Critical	Serious	Agency follow established protocol… address flight following procedures in communications plan	Improbable	Negligible	Low
	No dispatch available/inability to communicate to center	Probable	Catastrophic	High	Establish flight following in the field using ground personnel in treatment area - specify in communication plan and utilize a combination of communication methods (e.g., ground to ground, air to ground, cell phone)	Remote	Catastrophic	Serious
	Inconsistent flight following procedures - state	Occasional	Catastrophic	High	Recommend states utilize protocol similar to federal... State projects often conducted with no dispatch but with flight following performed by state employees positioned at airport… adhere to procedures in communications plan	Occasional	Critical	Serious
	Flight following personnel fatigued or complacent	Occasional	Marginal	Medium	Ensure adequate rest; follow agency protocol for duty limitations, recommend similar for state contracts	Remote	Marginal	Medium
	Poor frequency management/frequency congestion	Occasional	Marginal	Medium	Coordinate with dispatch or communication technicians to obtain additional frequencies and set up portable repeaters if necessary	Remote	Marginal	Medium
	Lack of staffing on weekends or outside of flight hours	Occasional	Catastrophic	High	Brief dispatch on operational periods, ensure dispatcher staffing or flight following personnel	Remote	Marginal	Medium
	Jurisdictional/boundary awareness and inability to maintain flight following	Occasional	Critical	Serious	Circulate flight plan to all dispatch centers in project area, communication plan includes all necessary frequencies/brief pilot, assure handoff from one center to next	Remote	Marginal	Medium
Maintenance Inspector (aircraft & support vehicles)	Not current on maintenance issues for specific aircraft that could lead to accidents	Occasional	Catastrophic	High	Regularly check for new Airworthiness Directives, stay current on required training	Remote	Critical	Medium
	Insufficient number of inspectors may lead to fatigue, complacency, accepting or transferring unreasonable risk	Occasional	Catastrophic	High	Ensure adequate staffing, Project Managers attend aircraft inspections	Remote	Critical	Medium
Oversight & Coordination in General	Lack of mission understanding among RAOs/RASMs, FAOs, state directors, etc…	Probable	Catastrophic	High	Project Managers participate in annual Forest Aviation Officer meetings, RAOs/RASMs review/approve aviation management plan	Remote	Critical	Medium

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
	Lack of trend information helpful in preventing incidents/accidents	Probable	Critical	High	Expand knowledge & how to use SAFECOM system, should include all agency funded aerial application projects (e.g., gypsy moth cooperative suppression projects); periodically query, review and report any trends	Remote	Critical	Medium
	Lack of safety awareness and need to further develop safety culture within state and federal agencies	Probable	Catastrophic	High	Encourage initiatives through the Aerial Application Safety Council that foster interagency safety awareness (e.g., through training, presentations at annual meetings, close coordination with other state and federal aviation staffs)	Remote	Critical	Medium
	Lack of (or minimal) interagency coordination on aerial application projects that span private, state, and federal lands	Occasional	Catastrophic	High	Host annual interagency coordination meetings (e.g., Gypsy Moth Program Managers Meeting includes all state and federal agencies involved with gypsy moth)	Remote	Critical	Medium
Contracting	CO, COR/COTR turnover leading to lack of mission understanding and shortage of personnel performing oversight	Occasional	Catastrophic	High	Include expert aviation and pest management personnel as COTRs during contract development and administration; train and mentor new employees (future CORs, COTRs)	Remote	Critical	Medium
	Short time frame from contract advertising to implementation (impacts operating season, quality of contract, limits desirable/qualified bidders and awarded contractor readiness)	Occasional	Catastrophic	High	Begin drafting contract early enough to ensure that a quality contract has been developed, draw highest number of qualified bidders possible	Remote	Critical	Medium

FHP Aerial Application - Technology (Hardware/Software)

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation		
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome
AFF	Typically not used in application projects, dispatch centers do not have visual display of application aircraft relative to other aviation operations	Frequent	Catastrophic	High	Utilize observation aircraft to monitor operations and alert other aircraft that may approach project area, consider including AFF requirement in state and agency contracts	Remote	Catastrophic	Serious
	Possible AFF antenna conflicts with other antenna on aircraft	Remote	Critical	Medium	Maintain separation between antenna per manufacturer, check that AFF is working prior to take off	Improbable	Negligible	Low
	When in use AFF may lead to a false sense of security if user thinks dispatch always knows location OR if dispatch thinks all aircraft are visible	Occasional	Catastrophic	High	Be aware that all aircraft are not visible to flight following personnel (not everyone uses AFF) and that AFF is not "air traffic control" (intended to augment radio communication); maintain positive radio communication at all times	Remote	Critical	Medium
	AFF system failure in aircraft or on ground at computer	Occasional	Catastrophic	High	Always maintain positive radio communication, radio checks/position reports are still required (may be at greater time interval, 30 minute checks instead of 15 minute) per communications plan	Remote	Critical	Medium
Aircraft GPS	Application aircraft flying in wrong area and/or misapplication of pesticide	Occasional	Critical	Serious	State and agency contracts require all application aircraft have panel-mounted aerial application GPS (limitations are called out in the contract: able to update location 5 times per second, upload shapefile of treatment blocks, download flight files, etc...); contract requires application aircraft to return to base if GPS malfunction	Remote	Marginal	Medium
	Observation aircraft unable accurately locate to specific treatment area(s)	Occasional	Critical	Serious	State and agency contracts require all observation aircraft have at a minimum handheld GPS and "...conveniently located for the pilot"	Remote	Marginal	Medium
	Inexperienced users pay too much attention to GPS (head in cockpit) rather than flying the mission	Frequent	Catastrophic	High	Contract requires that application pilots must demonstrate GPS proficiency (examples of flight files working in similar operations)	Remote	Catastrophic	Serious
	Cockpit clutter/loose equipment in observation aircraft (handheld GPS with wires for power and external antenna)	Occasional	Marginal	Medium	Properly mount antenna, stow handheld GPS and cables so as not to interfere with flight	Remote	Marginal	Medium
Radios	No repeater available in project area	Occasional	Catastrophic	High	Test frequencies and set up portable repeaters if necessary; communication plan requires backup communication by cell phone or satellite phone if necessary; in federal plans/suggest requiring in state plans	Remote	Catastrophic	Serious

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
	No communications (in general) air-to-ground, with other aircraft or dispatch centers	Remote	Marginal	Medium	FAA requires ability to communicate with general aviation aircraft; contracts include necessary radio specifications; communications plan lists frequencies	Remote	Marginal	Medium
	Inaccessible radios/controls, difficult to operate	Improbable	Marginal	Low	Break from flight pattern to access radio and make adjustments	Improbable	Negligible	Low
	P-25 Digital, Analog & Narrow Banding compatibility issues	Probable	Marginal	Serious	Identify issues prior to contract and operation, radio check prior to project implementation - address in communication plan; provide time and training on new equipment	Occasional	Marginal	Medium
	Portable radios - not secure, controls easily bumped	Remote	Marginal	Medium	Secure and properly place portables so as not to interfere with aircraft operations, use keypad/control locks	Occasional	Marginal	Medium
	Panel mounted radios - bump controls	Improbable	Marginal	Medium	Use keypad/control locks	Improbable	Negligible	Low
	Flight crew unfamiliar with components	Probable	Marginal	Serious	Preflight to include familiarization & programming radios	Remote	Marginal	Medium
TCAS	If not using TCAS: potential for midair collision	Remote	Catastrophic	High	Use TCAS, continue practice of "see and avoid", apply CRM	Improbable	Catastrophic	Medium
	If using TCAS: false sense of security that all other aircraft have functioning transponders	Occasional	Catastrophic	High	Recognize that all other aircraft may not have functioning transponders, continue practice of "see and avoid", apply CRM	Remote	Catastrophic	Serious
	If using TCAS: Signal interference, antenna positioned too close to other antennas	Occasional	Catastrophic	High	Follow manufacturer's installation requirements	Remote	Catastrophic	Serious
Pesticide Delivery Systems	Atomizer blades detaching and impacting fuselage, rotor, or ground	Occasional	Catastrophic	High	Contract requires that rotary atomizer must be installed in strict accordance to manufacturers recommendations. All atomizers must be serviced and in good working condition. Agency and state program managers inspect nozzles prior to project implementation	Remote	Catastrophic	Serious
	Emergency dump valve malfunction causing load to dump (misapplication of pesticide)	Occasional	Marginal	Medium	Inspect and assure functioning dump valves for helicopter & fixed-wing	Remote	Marginal	Medium
	Hose to nozzle detaching, pesticide misapplication (not aviation hazard)	Occasional	Marginal	Medium	Preflight inspection to include examining pesticide delivery components	Remote	Marginal	Medium
	Inability to jettison in event of emergency	Remote	Catastrophic	Serious	Inspect and assure functioning dump valves for helicopter & fixed-wing	Remote	Catastrophic	Serious
	Improper pesticide application rate	Occasional	Marginal	Medium	Agency and state contracts specify all aircraft must be equipped with an electronic flow metering system and delivery system must be calibrated prior to project implementation	Remote	Marginal	Medium

FHP Aerial Photography - Aircraft

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation		
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome
Avionics (for radios see "Technology" tab)	Unplanned avionics failures (overheating, faulty wiring, etc.)	Occasional	Marginal	Medium	Have portable radio/handheld as back up, users prepared to use alternate frequencies (guard), land and repair or use alternate aircraft	Remote	Marginal	Medium
	Loss of emergency locator ability (analog ELT systems will be discontinued)	Remote	Marginal	Medium	Switch to 406 MHz digital ELT systems before February 1, 2009	Improbable	Negligible	Low
Configuration	Window configuration - poor visibility of hazards in certain models	Occasional	Marginal	Medium	Consider aircraft with better visibility	Occasional	Negligible	Low
	If non-pressurized aircraft operating at high altitude, encumbrance caused by canulas/mask/hose	Occasional	Negligible	Low	Use pressurized aircraft	Remote	Negligible	Low
	Insufficient work space, inability to use seatbelts during photo mission	Remote	Critical	Medium	None	Remote	Critical	Medium
	Open camera port in belly - cold, fatigue	Occasional	Marginal	Medium	Wear warm clothes, fly fewer hours to avoid fatigue or use aircraft with sealed port (such as King Air)	Remote	Negligible	Low
	Open camera port in belly - loosing items	Occasional	Marginal	Medium	Secure items, keep from port or use aircraft with sealed port (such as King Air)	Remote	Marginal	Medium

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
Terrorist or malicious activity	Theft or damage to aircraft or gear & equipment (remote , unsecured overnight parking, risk to aircraft, personnel … theft or damage to aircraft and equipment… threat to public safety.)	Remote	Catastrophic	Serious	Adhere to Project Aviation Safety and Security Plans; remove valuable equipment if overnight parking, use prop lock and fuel lock	Remote	Critical	Medium
Performance Standards - mountainous terrain	High density altitude operations	Remote	Catastrophic	Serious	Project Aviation Safety Plan and contract to address minimum requirements, reference Airman's Information Manual (AIM) for mountainous terrain.	Improbable	Critical	Medium
	Insufficient Horsepower	Occasional	Catastrophic	High	Project Aviation safety plan & contract to address minimum requirements, reference local unit Aviation Plan if operating out of area	Remote	Critical	Medium
	Insufficient payload capabilities - camera type mismatch to platform, overnight gear	Probable	Critical	High	Match machine to task, perform weight and balance calculation, reduce load	Improbable	Critical	Medium
Contract Aircraft	Many contract aircraft not configured for equipment or experienced with mission type (if turn-key, very expensive)	Probable	Critical	High	Conduct thorough market analysis and solicitation, request performance history, require Part 135	Occasional	Marginal	Medium
	Aging aircraft	Probable	Marginal	Serious	Consider aircraft health monitoring program to include strain gauge, oil analysis, special inspection program	Occasional	Marginal	Medium
WCF (fleet) Aircraft	Identifiable as agency aircraft may encourage vandalism	Remote	Catastrophic	Serious	Utilize secure overnight parking if available	Remote	Catastrophic	Serious
	Most agency pilots have tendency to lack experience with mission type, not dedicated to photography work	Probable	Marginal	Serious	Establish mentoring program for photo pilots, performance plan addresses support to other aviation functions (e.g., fire & photo)	Occasional	Marginal	Medium
	Very few photo-capable aircraft in agency fleet, increases likelihood of contracting minimally skilled pilots/poor performing aircraft through contracting	Probable	Marginal	Serious	Conduct thorough market research and consider best value for contracting if no agency available	Occasional	Marginal	Medium
	Aging aircraft	Probable	Marginal	Serious	Consider aircraft health monitoring program to include strain gauge, oil analysis, special inspection program (FHTET King Air '74, SPO Beavers '59-'64, DFO C206 newer)	Occasional	Marginal	Medium
Fuel	Bad fuel	Occasional	Critical	Serious	Ensure fuel is tested for type and quality prior to fueling	Remote	Critical	Medium
	Starvation	Occasional	Catastrophic	High	Monitor quantity pumped during fueling, monitor flight time and distance to services	Remote	Critical	Medium
Availability	Lack of back up aircraft in event preferred aircraft unavailable (scrambling to find suitable substitute or settling for less than optimum)	Remote	Negligible	Low	R8 has two configured King Airs for back up	Remote	Negligible	Low
	Minimal availability of photo platforms leading to maximizing flight hours with those aircraft/pilots that are available	Remote	Negligible	Low	Adhere to flight duty limitations	Remote	Negligible	Low
	Sharing aviation assets (non-local pilot unfamiliar with area, photographer unfamiliar with pilot and aircraft)	Remote	Negligible	Low	R8 has two configured King Airs for back up	Remote	Negligible	Low
	Not sharing aviation assets (overworking a single asset)	Remote	Negligible	Low	Utilize other aircraft equipped with camera hole (however, others are prioritized for fire... fire season and photo season overlap)	Remote	Negligible	Low

FHP Aerial Photography - Environmental								
		Pre Mitigation				**Post Mitigation**		
Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
Weather	Working in less-than-optimum conditions in order to take advantage of preferred sun angles	Occasional	Critical	Serious	Preflight briefing to include unacceptable conditions for safe photography	Remote	Critical	Medium

Category	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
	Lack of visibility - smoke, haze	Probable	Catastrophic	High	Maintain VFR, establish good communication w/air attack, remain outside of FTA/TFR w/out permission, practice see & avoid	Remote	Catastrophic	Serious
	High winds	Frequent	Critical	High	Abort mission until more favorable wind conditions	Remote	Marginal	Medium
	IFR conditions take off/landing, ferry	Probable	Negligible	Medium	Stay on ground or use twin engine/IFR qualified	Remote	Catastrophic	Serious
	Sudden changes in weather, unexpected extreme conditions	Remote	Negligible	Low	Preflight weather briefing, maintain VFR	Remote	Negligible	Low
	Lack of visibility - fog	Probable	Critical	High	Maintain VFR, continuously monitor conditions, have contingency plans for alternate airports/survey areas, consider utilizing twin engine aircraft in project areas w/strong likelihood of fog during take-off/landings.	Remote	Catastrophic	Serious
	Lack of visibility during IFR take off/landing (OK for twin engine only)	Remote	Catastrophic	Serious	Pilot maintain IFR currency, abort mission until conditions improve.	Remote	Critical	Medium
	Marginal VFR (having to avoid scud runners)	Remote	Catastrophic	Serious	Preflight weather briefing, maintain VFR, see and avoid scud runners	Remote	Negligible	Low
Topography/Hi Alt	Turbulence	Frequent	Critical	High	Obtain weather briefings, move to alternate location or abort mission until more favorable weather.	Remote	Critical	Medium
	Terrain - operating in box canyons (rare, photo mission altitude fixed high above terrain)	Remote	Critical	Medium	Maintain awareness of altitude above terrain, fly ridges rather than drainage bottoms	Remote	Critical	Medium
	High Altitude - density altitude	Frequent	Critical	High	Obtain weather briefings, review aircraft performance charts and data or abort mission until more favorable weather.	Remote	Critical	Medium
	High Altitude above 18 thousand	Frequent	Marginal	Serious	Mission planning, IFR clearance, working with IFR traffic	Frequent	Marginal	Serious
	Large scale photography/closer to terrain	Frequent	Critical	High	change lens or camera	Remote	Critical	Medium
Minimal Topography/Low Alt	Increased probability of encountering aerial hazards in areas with minimal topography	Probable	Catastrophic	High	Address in safety briefing, consider TCAS, practice see and avoid	Occasional	Catastrophic	High
Remote areas	lack of communications	Probable	Catastrophic	High	Utilize AFF, know and use local repeaters (guard in emergency), possibly carry satellite phone	Remote	Catastrophic	Serious
	Search and Rescue - delayed response within critical period	Probable	Catastrophic	High	UtilizeAFF, carry aircraft and personal survival gear, handheld radio/know frequencies, satellite phone	Occasional	Critical	Serious
	Fuel availability	Occasional	Marginal	Medium	Ensure mission planning includes fuel resources (call ahead), considers ferry distance/time, monitor flight time & distance to fuel location during flight	Remote	Marginal	Medium
	Oxygen availability to aircraft (if using non pressurized aircraft)	Occasional	Marginal	Medium	Ensure mission planning includes oxygen resources (call ahead) & ferry distance/time, monitor flight time & distance to location or if not available, spend less time at high elevations	Remote	Marginal	Medium
Urgent Photography	Forcing timing of flights to meet photo needs rather than safety	Probable	Catastrophic	High	Utilize additional assets to complete survey or prioritize high interest areas & complete first, it's okay not to finish	Remote	Marginal	Medium
Water	Amphibious aircraft landing on water with gear down	Occasional	Catastrophic	High	Use pilot check list, confirm gear up… (typically not using amphibious aircraft for photo missions)	Improbable	Catastrophic	Medium
	Amphibious aircraft landing on land with gear up	Occasional	Critical	Serious	Use pilot checklist, confirm gear down… (typically not using amphibious aircraft for photo missions)	Improbable	Catastrophic	Medium
	Poor depth perception to surface of water during landing	Occasional	Critical	Serious	Be aware during hazy conditions or dead-calm, more difficult to see water surface; Use experienced pilots, scan for water surface irregularities (wind, wake, fish, etc	Remote	Marginal	Medium
	Ill-equipped with survival gear and beyond glide distance to shore	Occasional	Catastrophic	High	Carry survival/mustang suits cold water, PFDs	Remote	Critical	Medium
	Difficulty exiting aircraft after ditching or crashing in water	Probable	Catastrophic	High	Attending water ditching course, consider adding area-specific currency requirement in task book (alternatively, other companies and universities offer)	Remote	Critical	Medium
	Other watercraft & recreational users	Occasional	Catastrophic	High	Pilot/crew increase SA (watch for fishermen, swimmers, jet skis, canoes, etc. speed boats can become a hazard quickly...), no radio communication with these hazards; make reconnaissance pass prior to landing and search for watercraft/other users	Remote	Catastrophic	Serious
	Turbidity - subsurface obstructions obscured	Probable	Catastrophic	High	Utilize pilots experienced with local waters; acquire local knowledge if operating away from familiar areas, check with dispatch; emergency landing only in unfamiliar waters	Remote	Catastrophic	Serious

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
	River current	Occasional	Critical	Serious	Landing typically into wind and may be up or down stream, dock upstream	Occasional	Marginal	Medium
	Floating debris	Probable	Catastrophic	High	Be aware not all floating debris may be visible on surface; Increase situational awareness… make reconnaissance pass prior to landing, all flight crew search for hazards	Occasional	Marginal	Medium
Airspace	Working within active MTR, MOA, warning areas	Probable	Catastrophic	High	Call ATC/military agency (possibly flight service station, less reliable) to determine "hot" or not, see and avoid, request deconfliction through dispatch	Remote	Catastrophic	Serious
	Working in proximity to or within FTA/TFR	Probable	Catastrophic	High	Maintain VFR, establish good communication w/air attack, remain outside of FTA/TFR w/out permission, practice see & avoid	Remote	Catastrophic	Serious
	Working within restricted (military, presidential, nuclear, etc.)	Remote	Catastrophic	Serious	Check TFRs daily, know intercept procedures, Call ATC/ military agency to gain permission, determine if any other activity	Remote	Catastrophic	Serious
	Grid & altitude is fixed and within high traffic or controlled airspace	Occasional	Catastrophic	High	Comm. w/ATC… pilot & photographer to be extra vigilant in scanning for other aircraft & hazards while flying in a fixed patter (maintain SA, pilot to avoid inordinate focus on following GPS/photographer on operating camera)	Remote	Catastrophic	Serious
	All B, C, D Class	Frequent	Catastrophic	High	Mission planning, requesting prior permission from controlling tower & conducting mission during minimal traffic times	Remote	Catastrophic	Serious
	Risk of mid-air IFR altitudes (>18,000')	Occasional	Catastrophic	Serious	Mission planning, IFR flight plan, comm. w/ATC	Remote	Catastrophic	Serious
Airstrip Availability, Condition and Services	No alternative or suitable landing location (surface condition, environmental limitations)	Remote	Critical	Medium	Premission planning to maintain options, call ahead to check on runway condition, check NOTAM	Occasional	Negligible	Low
	No fuel source	Occasional	Negligible	Low	Call ahead to check availability of fuel	Remote	Negligible	Low
	One-way landing - wind, terrain	Probable	Catastrophic	High	Premission planning for terrain/fixed approach, plan for alternative airports	Remote	Catastrophic	Serious
	One-way departure - wind, terrain	Probable	Catastrophic	High	Premission planning for terrain/fixed departure, stay on the ground & wait for favorable conditions	Improbable	Catastrophic	Medium
	No windsock	Occasional	Critical	Serious	Observe ground/water conditions (tree lean, dust, water ripples, etc.)	Remote	Critical	Medium
	Prevailing wind may not be favorable to landing/departure	Probable	Critical	High	Know prevailing wind premission, use alternate airport	Occasional	Critical	Serious
Animal activity	Areas of high bird activity (flyways, nesting areas, etc.)	Occasional	Critical	Serious	Some areas are marked on sectional charts, local knowledge of flyways - incorporate in premission planning; see and avoid	Remote	Critical	Medium
	Survival in hostile wildlife habitat	Remote	Catastrophic	Serious	Stay with the plane, carry appropriate survival equipment for survey area/time of year (pepper spray, fire arm & mitigate carrying such items)	Improbable	Catastrophic	Medium
	Potential for serious injury/aircraft damage from wildlife on runway (common at remote and county airports)	Occasional	Critical	Serious	Contact ground to clear runway, communicate any observed activity to pilot	Remote	Marginal	Medium

FHP Aerial Photography - Personnel

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation		
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome
Pilot	Minimal local experience	Occasional	Critical	Serious	Manager to brief pilot on project and area to be photographed, frequencies, hazards, refueling sites, etc.	Remote	Critical	Medium
	LackJurisdictional/boundry awareness	Occasional	Negligible	Low	Premission planning/briefing, utilize digital mapping system information, load backgrounds on portable GPS	Remote	Negligible	Low
	Unfamiliar with mission type - carded for reconnaissance/photo but no FHP mission-specific flight review	Frequent	Critical	High	Conduct mission-specific flight review/training and utilize FHP flight review checklist as required (applicable to agency-contracted pilots)	Remote	Critical	Medium
	Unaware of hypoxia effects in event of loss of cabin pressure (whether nonpressurized or pressurized aircraft)	Probable	Critical	High	Recommend hyperbaric chamber training for pilots and crew members/flight managers if program includes high altitude photography	Remote	Critical	Medium
	Minimal flight hours or experience with mission type (varies annually)	Probable	Critical	High	Thorough preflight briefing to new pilots, utilize FHP flight review checklist as required	Occasional	Critical	Serious

Role	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
	Inordinate attention to photo mission rather than flying	Occasional	Critical	Serious	Thorough preflight briefing to new pilots, observer/flight manager let pilot know if becoming a problem	Remote	Critical	Medium
	Pilots may not have dedication, skills to perform mission or may be "pushed" into uncomfortable situations	Probable	Critical	High	CRM, discuss comfort level and environmental conditions, adjust flight profile accordingly	Remote	Critical	Medium
	No preflight mission briefing from flight manager (photo area, profile, objectives, aerial hazards)	Occasional	Critical	Serious	Pilot request thorough briefing, manager provides	Remote	Marginal	Medium
	lack of awareness leading to fuel starvation	Occasional	Critical	Serious	Proper preflight planning, monitor consumption, CRM to include crew observe flight time and fuel gauge; consider fuel totalizer for monitoring consumption & reset when fueling	Remote	Critical	Medium
	Has not checked for current NOTAM	Remote	Catastrophic	Serious	Proper preflight planning to include checking NOTAMs, CRM to include crew.	Remote	Negligible	Low
	Incomplete preflight/post flight inspection	Occasional	Critical	Serious	Take the time necessary to evaluate aircraft thoroughly, CRM to include crew in inspection & feel comfortable reporting anomalies	Remote	Marginal	Medium
	Self-medicated (could range from a simple cold to serious health issue)	Occasional	Critical	Serious	All crew to crosscheck how each other is doing, ask if medicated, know FAA regulations pertaining to prescription & over-the-counter medication	Remote	Critical	Medium
	Check list not utilized	Remote	Critical	Medium	Utilize appropriate check lists, CRM to encourage crew ask for check list.	Remote	Negligible	Low
	Accepting unreasonable risk (e.g., fixed photo transect and proximity to rising terrain)	Remote	Catastrophic	Serious	Conduct project-specific risk assessment, job hazard analysis and incorporate into premission briefing	Remote	Critical	Medium
	Incapacitated	Remote	Catastrophic	Serious	Crew/Manager attend pinch hitter	Remote	Critical	Medium
	Under the influence or hung over	Remote	Catastrophic	High	CRM to include awareness of regulations for 8 hours no alcohol, BA < .04 crew to cancel mission if in question	Improbable	Catastrophic	Medium
	Fatigue, complacency	Probable	Catastrophic	High	10 hours off duty, limit flight day to 8 hrs or less depending on conditions (usually not prudent to push for full 8-hour flight days)	Remote	Critical	Medium
	Shortage of qualified, skilled pilots	Probable	Marginal	Serious	Implement mentoring program	Remote	Marginal	Medium
	Gear up landing	Remote	Critical	Medium	Pilot training including simulation training twice a year and aircraft check ride, utilize checklist & CRM	Remote	Critical	Medium
Photographer (or flight manager)	Minimal experience with aircraft	Occasional	Catastrophic	High	Obtain pilot safety briefing, don't board or egress w/engine(s) running	Remote	Marginal	Medium
	Minimal experience with mission type	Probable	Marginal	Serious	Utilize Fixed-wing Flight Manager Special-Use Task Books (sections relevant to aerial photography)	Remote	Negligible	Low
	Fatigue, complacency	Probable	Marginal	Serious	Consider flying less than 8 hour/ day, CRM	Remote	Marginal	Medium
	Self-medicated (colds to serious health issue)	Occasional	Critical	Medium	All crew to crosscheck how each other is doing, ask if medicated, know FAA regulations pertaining to prescription & over-the-counter medication	Remote	Marginal	Medium
	Not ensuring pilot checklist used	Occasional	Critical	Medium	Practice CRM, assure checks complete	Remote	Marginal	Medium
	Accepting unreasonable risk in general (refers to individual's character and state of mind)	Occasional	Critical	Serious	Participate in project-specific risk assessment, job hazard analysis and incorporate into permission briefing	Remote	Negligible	Low
	Lack of mentoring	Remote	Marginal	Medium	Use experienced photographers, keep them current; train new people that have interest	Remote	Negligible	Low
	Not obtaining safety briefing	Probable	Negligible	Medium	Photographer/Flight Manager refer to 5 steps to safe flight & request safety briefing from pilot	Remote	Negligible	Low
	Not using CRM	Remote	Catastrophic	High	Involve pilot or crew (as appropriate) during project-specific risk assessment, job hazard analysis and incorporate into permission briefing	Remote	Marginal	Medium
	Pressure employees to complete project	Remote	Catastrophic	Serious	Photographer/Flight Manager refer to "5 steps to safe flight" card & request safety briefing from pilot	Remote	Negligible	Low
	Lack of qualified photographer/flight manager	Occasional	Catastrophic	High	Cancel mission until rectified	Improbable	Negligible	Low
Supervisor/Program Manager	Fatigue, complacency	Probable	Marginal	Serious	Communicate w/FWFMSU, consider requiring employees to fly less than 8-hrs/day, practice CRM to include all aviation personnel	Remote	Marginal	Medium

	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
	Accepting/promoting unreasonable risk	Probable	Marginal	Serious	Supervise and set tone "aviation program first" - participate in programmatic and project-specific risk assessments, do job hazard analysis and ensure incorporated into permission briefing; FWFMSU communicate with supervisor, FHP supervisors to attend required aviation safety training	Remote	Marginal	Medium
	Lack of project level knowledge & involvement	Occasional	Critical	Serious	Supervisor briefed during mission planning	Remote	Marginal	Medium
	Not ensuring subordinates adequately trained on aviation safety/mission tasks	Probable	Critical	High	Supervisor monitor employees training requirements, have training identified on individual training plan (assures subordinates stay current as Flight Manager or other positions as appropriate in FHP IAT Matrix)	Remote	Marginal	Medium
	Not completing required Supervisor training	Probable	Marginal	Serious	Complete appropriate modules per FHP IAT Matrix and stay current	Remote	Marginal	Medium
	ABS issues - contributing to long duty day & vendors/pilots not being paid (contract aviation services only)	Remote	Marginal	Medium	Supervisor, program manager/UAO to remain alert for flight managers having trouble using ABS and/or vendors not getting paid; if occurring, potential to affect daily operations and safety... Respond to needs for additional ABS training (contact CO, other FHP COR's or F&AM staff for assistance)	Remote	Negligible	Low
	Personality conflicts up/down leading to stress and poor communication	Remote	Marginal	Medium	Brief/debrief, CRM, maintain positive attitude, promote honest/open communication	Remote	Negligible	Low
	General lack of mission understanding (within flight crew, also includes aviation support functions)	Frequent	Critical	High	Ensure agency personnel complete appropriate level of training/task books for position, recommend for states. Have regional program managers interact w/FAO, RAO, RASM, dispatchers, State Foresters, etc to increase understanding of photo operations and awareness	Remote	Marginal	Medium
Dispatch	Uninformed or misinformed of Flight Plan	Occasional	Marginal	Medium	FHP UAO disseminate PASP and annual schedule to dispatch centers and FAOs as early as possible; FWFMSU to submit Flight Plan, call dispatch in each area prior to mission, ensure good communication in all areas to be flown	Occasional	Negligible	Low
	Limited FM capability in photo projects due to distance to centers	Occasional	Critical	Serious	Have and utilize a plan for using phone and AFF systems.	Remote	Marginal	Medium
	Work load, fatigue, or complacency resulting in missed flight following	Remote	Catastrophic	Serious	FWFMSU coordinate with dispatch centers, consider moving flight following services or project to alternate area if dispatch workload too high	Remote	Marginal	Medium
	Inconsistent flight following procedures	Probable	Critical	High	FHP UAO clearly identify radio/AFF procedures in PASP, communicate to dispatch, FWFMSU call dispatch daily	Remote	Negligible	Low
	Frequency congestion	Frequent	Critical	High	Consider utilizing local repeater frequencies to ease congestion, provide alternative frequencies; augment radio use with AFF; or, file FAA flight plan	Remote	Marginal	Medium
	Inoperability of National Flight Following	Probable	Critical	High	Have and utilize forest net frequencies, submit safecom for outages or areas that should have NFF coverage	Occasional	Critical	Serious
	Lack of staffing on weekends or outside of flight hours	Occasional	Negligible	Low	Use alternate methods of flight following, request additional staffing, adjust flight hours to accommodate dispatch hours	Remote	Negligible	Low
	Jurisdictional/boundary awareness and inability to maintain flight following	Occasional	Critical	Serious	Ensure positive radio communication and successful hand-off to neighboring dispatch, close out flight following with previous dispatch area.	Remote	Negligible	Low
	Frequency guides unavailable or not current	Occasional	Critical	Serious	GACC's to publish current frequency guides on the internet & have links to neighboring GACC frequency guides	Remote	Negligible	Low
	Not filing flight plan or initiating flight following/closing flight plan	Occasional	Catastrophic	High	FWFMSU or pilot shall initiate and close flight following w/dispatch for each leg of flight.	Remote	Marginal	Medium
	Poor communication between local dispatch, GACC, NICC regarding flight plan	Occasional	Critical	Serious	When utilizing dispatch flight following, FWFMSU to assure mission specifics are communicated; communicate not only with unit through which order is placed but with local centers where project is planned, USFS and other other agencies as needed - assure appropriate distribution of flight plan; FAA flight following required at a minimum	Remote	Marginal	Medium
	Unable to adequately communicate aerial hazards	Occasional	Catastrophic	High	Review hazard maps prior to flight (more of a factor for lower altitude photography, King Air frequently operates out of range from aerial hazards)	Remote	Critical	Medium

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
	Minimally qualified/new dispatchers	Occasional	Critical	Serious	Develop mentoring program for growing centers or for areas where turn over is anticipated (be proactive, provide OJT to potential recruits)	Remote	Marginal	Medium
Maintenance Inspector	Insufficient number of inspectors	Occasional	Critical	Serious	Managers to assure enough inspectors to fulfill area needs; hire additional and/or share inspectors across regional boundaries	Remote	Marginal	Medium
	Not current on AD's	Remote	Catastrophic	Serious	Use FAA website for new AD's, get subscription (CD is available with 28-day updates)	Remote	Marginal	Medium
	Fatigue, complacency	Remote	Catastrophic	Serious	Utilize other region's/agency inspectors to help workload, provide second set of eyes	Remote	Marginal	Medium
	Accepting & transferring unreasonable risk to aviation users	Remote	Critical	Medium	UAO's to participate in inspections for the purposes of 1) gaining knowledge about inspections and 2) for raising general awareness to new issues/ideas on aircraft health	Improbable	Marginal	Medium
Contracting	CO/COR turnover and/or lack of experience	Frequent	Critical	High	Aviation CO developmental positions, mentoring programs, UAOs coordinate with Cos to assure best value	Remote	Marginal	Medium
	Very short timeframe from advertising to award of aircraft contracts (affects operating season, potentially limits pool of most desirable/most qualified bidders)	Frequent	Critical	High	Determine budget, funds available, and start preparing contracts as early as possible	Remote	Marginal	Medium
	Stress in planning and completing missions while coordinating product delivery to customers (added complexity due to contracted services - film acquisition, processing, delivery)	Frequent	Critical	High	Aviation CO developmental positions, mentoring programs, aviation specific training, create contract template, FHP UAO's participate in contract development	Remote	Marginal	Medium
Oversight & Coordination in General	Lack of mission understanding among some RAOs/RASMs, FAOs, other aviation functions	Remote	Critical	Medium	FHP to be proactive, educate and interact with other aviation staff during annual meetings (national and regional)	Improbable	Negligible	Low
	Lack of knowledge, use or misuse of SAFECOM system	Occasional	Critical	Serious	Encourage FHP personnel to use system, provide constructive quarterly summaries to field	Improbable	Marginal	Medium
	Lack of mission understanding among aviation users	Frequent	Critical	High	Ensure agency personnel complete appropriate level of training/task books for position, recommend for states. Have regional program managers interact w/FAO, RAO, RASM, dispatchers, State Foresters, etc to increase awareness.	Remote	Marginal	Medium
	Aviation Management Plan, PASP not current or non existent (required for agency)	Remote	Catastrophic	Serious	FHP UAOs and Safety Manager (as appropriate) to assure plans are completed and distributed within project areas	Improbable	Negligible	Low

FHP Aerial Photography - Technology (Hardware and Software)

		Pre Mitigation				Post Mitigation		
Sub-systems	**Hazards**	**Likelihood**	**Severity**	**Outcome**	**Mitigation**	**Likelihood**	**Severity**	**Outcome**
ABS (if contract aircraft)	Difficulty inputting flight time for payment processing through ABS can cause frustration and long duty days	Occasional	Critical	Serious	Utilize ABS Helpdesk; acquire additional ABS training if necessary; report software problems to be addressed in future ABS versions	Occasional	Negligible	Low
	Disgruntled pilots/vendors due to process or not being paid (rippling effect on attitudes throught operation)	Probable	Critical	High	FWFMSU work with Pilot and/or CO as necessary to assure prompt payment for services	Occasional	Marginal	Medium
AFF	False sense of security (not a method for air traffic control)	Occasional	Critical	Serious	Better communication between pilot and dispatch centers, train dispatchers and flight crew on proper use & limitations of AFF, dispatch must time and monitor display at required intervals	Remote	Negligible	Low
	Flight manager trusting AFF absolutely with minimal voice communication	Occasional	Critical	Serious	Maintain positive radio communication, safety plan & flight plan include protocol for flight following (reference MOB Guide, chapter 20)	Remote	Marginal	Medium
	Signal interruption due to antenna conflicts with other aircraft antenna	Remote	Critical	Medium	Install and inspect per manufactures recommendation (maintain separation from other antenna)	Remote	Negligible	Low
	Portable units not secured, could become projectile in event of emergency landing	Remote	Catastrophic	Serious	securely mount portable components in tail section or strap down to floor	Remote	Negligible	Low
Aircraft GPS	Not having latest software or map updates	Occasional	Critical	Serious	Contract to include GPS specifications and requirement for updates	Occasional	Marginal	Medium

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
	Waypoint input errors	Remote	Marginal	Medium	Train pilots on GPS operation, double check waypoints prior to mission	Remote	Negligible	Low
	Hand-held units not secured, could become projectile in event of emergency landing	Probable	Marginal	Serious	securely mount portable components in tail section or strap down to floor	Remote	Negligible	Low
Radios	No frequency or repeater available in project area	Occasional	Catastrophic	High	Test frequencies and set up portable repeaters if necessary; communication plan requires backup communication by cell phone or satellite phone if necessary; in federal plans/suggest requiring in state plans	Remote	Catastrophic	Serious
	No communications (in general) air-to-ground, with other aircraft or dispatch centers	Remote	Marginal	Medium	FAA requires ability to communicate with general aviation aircraft; contracts include necessary radio specifications; communications plan lists frequencies	Remote	Marginal	Medium
	Inaccessible radios/controls, difficult to operate	Improbable	Marginal	Low	Break from flight pattern to access radio and make adjustments	Improbable	Negligible	Low
	P-25 Digital, Analog & Narrow Banding compatibility issues	Probable	Marginal	Serious	Identify issues prior to contract and operation, radio check prior to project implementation - address in communication plan; provide time and training on new equipment	Occasional	Marginal	Medium
	Portable radios - not secure, controls easily bumped	Remote	Marginal	Medium	Secure and properly place portables so as not to interfere with aircraft operations, use keypad/control locks	Occasional	Marginal	Medium
	Panel mounted radios - bump controls	Improbable	Marginal	Medium	Use keypad/control locks	Improbable	Negligible	Low
	Flight crew unfamiliar with components	Probable	Marginal	Serious	Preflight to include familiarization & programming radios	Remote	Marginal	Medium
	Frequency congestion	Occasional	Catastrophic	High	alternate frequency planning	Remote	Marginal	Medium
	Faulty wiring leading to intermittent operations	Remote	Marginal	Medium	Have portable radio/handheld, users prepared to use alternate frequencies (guard), land and repair or replace aircraft	Remote	Marginal	Medium
	Inoperability of National Flight Following	Occasional	Negligible	Low	Identify and rectify NFF system failures (computer, satellite and aircraft equipment)	Remote	Negligible	Low
TCAS	If not using TCAS: potential for midair collision	Remote	Catastrophic	High	Use TCAS, continue practice of "see and avoid", apply CRM	Improbable	Catastrophic	Medium
	If using TCAS: false sense of security that all other aircraft have functioning transponders	Occasional	Catastrophic	High	Recognize that all other aircraft may not have functioning transponders, continue practice of "see and avoid", apply CRM	Remote	Catastrophic	Serious
	If using TCAS: Signal interference, antenna positioned too close to other antennas	Occasional	Catastrophic	High	Follow manufacturer's installation requirements	Remote	Catastrophic	Serious
Camera & Associated Equipment	Loose Items	Occasional	Critical	Serious	properly secure loose equipment, brief on hazards	Occasional	Marginal	Medium
	Electronic failures & diagnosis cause confusion, mission interruption, deviation from flight plan	Occasional	Marginal	Medium	Make equipment checks before flight in the lab and on the ground	Remote	Marginal	Medium

FHP Aerial Detection Surveys - Aircraft

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation		
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome
Avionics (for radios see "Technology" tab)	Unplanned avionics failures (overheating, faulty wiring, etc.)	Occasional	Marginal	Medium	Have portable radio/handheld as back up, users prepared to use alternate frequencies (guard), land and repair or use alternate aircraft	Remote	Marginal	Medium
	Loss of emergency locator ability (analog ELT systems will be discontinued)	Remote	Marginal	Medium	Switch to 406 MHz digital ELT systems before February 1, 2009	Improbable	Negligible	Low
Configuration	Reliability of non-turboprop-powered fixed wing (if used)	Occasional	Critical	Serious	Check into availability of other better performing a/c. Include language in MOU, grant, cooperative agreement for state operations.	Remote	Critical	Medium
	Selection of inappropriate platform for terrain & objectives - windows, low wing, seating (certain models)	Remote	Critical	Medium	Utilize technical specialists in project design and contract preparation	Remote	Negligible	Low

Category	Hazard	Prob	Severity	Risk	Mitigation	Prob	Severity	Risk
Terrorist or malicious activity	Theft or damage to aircraft or gear & equipment (remote, unsecure overnight parking (risk to aircraft, personnel… theft or damage to aircraft/equipment… threat to public safety)	Remote	Catastrophic	Serious	Project Aviation Safety Plan & contract to address security in remote locations, reference local Unit Aviation Plan, use aircraft locking devices	Remote	Critical	Medium
Performance Standards - mountainous terrain (AIM)	Insufficient Horsepower	Occasional	Catastrophic	High	Project Aviation Safety Plan & contract to address minimum requirements, reference Airman's Information Manual (AIM) for "mountainous terrain"	Remote	Critical	Medium
	High density altitude operations	Probable	Catastrophic	Serious	Match machine to task & environment, monitor weather, reduce load	Remote	Critical	Medium
	Insufficient payload capabilities - multiple observers, RON gear	Probable	Catastrophic	High	Perform weight & balance calculation	Improbable	Critical	Medium
Performance - low elevation	Increased probability of encountering aerial hazards in areas with minimal topography	Probable	Catastrophic	High	Review current Aeronautical Sectional Charts, aerial hazard maps	Remote	Catastrophic	Serious
Performance - helicopter	Hover out of ground effect (HOGE)	Remote	Catastrophic	Serious	Maintain forward airspeed, utilize higher performance aircraft, maintain adequate height above canopy	Remote	Critical	Medium
	Loss of power	Remote	Catastrophic	Serious	Perform regular power checks	Remote	Critical	Medium
	Propensity to operate within height-velocity curve (if survey is low and slow)	Remote	Catastrophic	Serious	Maintain forward airspeed, utilize higher performance aircraft, maintain adequate height above canopy	Remote	Critical	Medium
CWN (agency)	Minimally skilled pilots	Occasional	Catastrophic	High	Address in Contract requirements and with flight reviews.	Remote	Marginal	Medium
	Incentive to fly for hourly rate, accept more risk	Remote	Catastrophic	Serious	Flight Managers & Project Supervisor need to be involved in flight hour/duty day monitoring.	Remote	Marginal	Medium
	Aging aircraft (has been a real concern for F&AM's heavy airtankers/heli - likelihood may be more remote for lighter recon. aircraft)	Occasional	Catastrophic	High	(Status: FAA currently defining "aging aircraft", 16 years being considered, more specific mitigations may evolve). Establish more thorough structural inspection program; damage tolerance, maintenance and overhaul standards to address older aircraft operating within FHP mission profile as needed; adhere to original type certificate & maintain manufacturer support (e.g., Rockwell, Aerocommander... original manufacturer Pratt & Whitney not supporting, new manufacturer supporting Beaver); if in doubt about condition, defer use & contact maintenance inspector	Remote	Critical	Medium
	Tendency to have less crew continuity and familiarity with all involved in mission and mission objectives	Occasional	Marginal	Medium	Conduct thorough premission briefing, document performance issues, select another CWN or consider exclusive use	Remote	Marginal	Medium
Exclusive Use (agency)	Incentive to fly for hourly rate, accept more risk	Remote	Catastrophic	Serious	Flight Managers & Project Supervisor need to be involved in flight hour/duty day monitoring.	Remote	Marginal	Medium
	Aging aircraft (has been a real concern for F&AM's heavy airtankers/heli - likelihood may be more remote for lighter recon. aircraft)	Remote	Catastrophic	Serious	(Status: FAA currently defining "aging aircraft", 16 years being considered, more specific mitigations may evolve). Establish more thorough structural inspection program; damage tolerance, maintenance and overhaul standards to address older aircraft operating within FHP mission profile as needed; adhere to original type certificate & maintain manufacturer support (e.g., Rockwell, Aerocommander... original manufacturer Pratt & Whitney not supporting, new manufacturer supporting Beaver); if in doubt about condition, defer use & contact maintenance inspector	Remote	Critical	Medium
	Committed to unsatisfactory vendor and platform	Remote	Critical	Medium	Specify project objectives in solicitation and contract, conduct thorough premission briefing, document performance issues, terminate for performance and use a different aircraft/vendor	Remote	Negligible	Low
Cooperating Aircraft (state ops - could be private, guard, other… may not be P135, usually not carded)	Minimally skilled for mission	Probable	Catastrophic	High	Recommend states complete Aviation Safety Plans & describe minimum skill level... Also address within MOU, grant or cooperative agreement	Occasional	Critical	Serious
	State possibility to utilize inappropriate platform	Probable	Catastrophic	High	Recommend states complete Aviation Safety Plans & include preferred make(s)/model(s)... Also address within MOU, grant or cooperative agreement	Occasional	Critical	Serious
	Uncertain if meeting federal safety standards, no carding	Probable	Catastrophic	High	Check for pilot and aircraft carding, federal employees will not fly in uncarded aircraft	Remote	Marginal	Medium

		Probability	Severity	Level	Mitigation	Probability	Severity	Level
	Relaxed maintenance standards if Part 91 operator	Probable	Catastrophic	High	Federal employees will not fly uncarded, encourage states adopt Part 135 maintenance standards	Occasional	Critical	Serious
	Aging aircraft (has been a real concern for F&AM's heavy airtankers/heli - likelihood may be more remote for lighter recon. aircraft)	Probable	Catastrophic	High	(Status: FAA currently defining "aging aircraft", 16 years being considered, more specific mitigations may evolve). **Recommend states use pilots and aircraft meeting Part 135 experience and maintenance standards.** Establish more thorough structural inspection program; damage tolerance, maintenance and overhaul standards to address older aircraft operating within FHP mission profile as needed; adhere to original type certificate & maintain manufacturer support (e.g., Rockwell, Aerocommander... original manufacturer Pratt & Whitney not supporting, new manufacturer supporting Beaver); if in doubt about condition defer use; consider agency maintenance inspection in cooperative agreements?	Occasional	Critical	Serious
	No flight hour/duty day limitation if pilot operating under Part 91	Probable	Catastrophic	High	Recommend states establish limitations similar to agency - state Project Supervisors/observers monitor pilot & crew fatigue, flight hour/duty day	Remote	Marginal	Medium
WCF Aircraft	Aging aircraft (has been a real concern for F&AM's heavy airtankers/heli - likelihood may be more remote for lighter recon. aircraft)	Remote	Catastrophic	Serious	(Status: FAA currently defining "aging aircraft", 16 years being considered, more specific mitigations may evolve). Establish more thorough structural inspection program; damage tolerance, maintenance and overhaul standards to address older aircraft operating within FHP mission profile as needed; adhere to original type certificate & maintain manufacturer support (e.g., Rockwell, Aerocommander... original manufacturer Pratt & Whitney not supporting, new manufacturer supporting Beaver); if in doubt about condition, defer use & contact maintenance inspector	Remote	Critical	Medium
	Agency pilots have tendency to lack experience with mission type, not dedicated to FHP	Probable	Critical	High	Use experienced agency pilots dedicated to FHP program	Remote	Marginal	Medium
	Minimal availability, necessitating looking to minimally skilled pilots/poor performing aircraft through contracting (increased probability)	Frequent	Catastrophic	High	Hire dedicated pilots and purchase aircraft for FHP and/or carefully address skills/performance through contracts	Remote	Marginal	Medium
	Identifiable as agency aircraft may encourage vandalism	Remote	Catastrophic	Serious	Use secure airport/tanker base facilities or hanger aircraft, use locking devices.	Remote	Negligible	Low
Foreign Agency Aircraft	Minimal or no standards for pilot, aircraft, or operations	Occasional	Catastrophic	High	Look for a/c that meet specifications. Familiarization with aircraft, do thorough pre-flight, set up communication/dispatch plan.	Remote	Catastrophic	Serious
Fuel	Bad fuel	Occasional	Critical	Serious	Ensure fuel is tested for type and quality prior to fueling	Remote	Critical	Medium
	Starvation	Occasional	Catastrophic	High	Monitor quantity pumped during fueling, monitor flight time and distance to services	Remote	Critical	Medium
Availability of Aircraft (in general)	Tendency to settle for less-than optimal platform/pilot	Occasional	Critical	Serious	Delay project until adequate a/c and or pilot is available	Remote	Negligible	Low
	Having acceptable resources currently assigned to project, there may be a sense of urgency & pressure to perform (coming from pilot, flight manager, or upper management) in order to complete - out of fear that slow progress/release of resources may jeopardize completion	Probable	Critical	High	Involve Supervisor, Project Manager & flight Manager in all stages of planning and risk assessment… identify and assign sufficient number of appropriate resources to complete project, schedule conservatively with room for unexpected delays	Remote	Critical	Medium
	Sharing assets from other regions/areas (pilot unfamiliar w/area, observer unfamiliar w/pilot, aircraft)	Probable	Marginal	Serious	Conduct thorough premission briefing identifying expectation and local hazards, practice CRM	Remote	Marginal	Medium
	Not sharing assets across regional/area boundaries (adds burden & pressure on the few assets that are available)	Occasional	Critical	Serious	COR's & FWFMSU monitor flight hours, educate Program Managers and Supervisors of inter-regional needs, FHP coordinate more with RAO's.	Remote	Marginal	Medium
	Tendency to maximize flight hours ("make hay while the sun is shinning")	Probable	Critical	High	Operational risk assessment to address fatigue, consider flying less than 8 hours per day (6 hours is a prudent recommendation)	Remote	Marginal	Medium

FHP Aerial Detection Surveys - Environmental

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation		
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome
Weather	Inappropriate clothing for "field operation"	Occasional	Critical	Serious	Clothing to improve survivability and footware suitable to hike out of remote areas	Remote	Marginal	Medium
	Lack of visibility - smoke	Probable	Catastrophic	High	Maintain VFR, establish good communication w/air attack, remain outside of FTA/TFR w/out permission, practice see & avoid	Remote	Catastrophic	Serious
	High winds	Frequent	Critical	High	Abort mission until more favorable wind conditions	Remote	Marginal	Medium
	Lack of visibility - fog	Probable	Catastrophic	High	Maintain VFR, continuously monitor conditions, have contingency plans for alternate airports/survey areas, consider utilizing twin engine aircraft in project areas w/strong likelihood of fog during take-off/landings.	Remote	Catastrophic	Serious
	Extreme weather - thunderstorms	Probable	Critical	High	Abort mission until more favorable weather conditions, obtain weather briefings	Remote	Marginal	Medium
	Lack of visibility during IFR take off/landing (twin engine only)	Remote	Catastrophic	Serious	Pilot maintain IFR currency, abort mission until conditions improve.	Remote	Critical	Medium
	Lack of visibility - eyestrain caused by shadows/glare and/or collision due to loss of day light	Frequent	Catastrophic	High	Time survey for higher sun angles, wear color enhancing sun glasses to reduce eye strain, use CRM and maintain SA	Remote	Critical	Medium
Topography/Hi Alt	Turbulence	Frequent	Critical	High	Obtain weather briefings, move to alternate location or abort mission until more favorable weather.	Remote	Critical	Medium
	Terrain - box canyons	Probable	Catastrophic	High	Maintain awareness of altitude above terrain, fly ridges rather than drainage bottoms	Remote	Critical	Medium
	High Altitude - density alt	Frequent	Critical	High	Obtain weather briefings, review aircraft performance charts and data or abort mission until more favorable weather.	Remote	Critical	Medium
	Lack of oxygen availability to crew causing hypoxia	Probable	Critical	High	Comply with FAR 135.89 and 135.157, not limited to the following: If more than 30 minutes of operation between 10,000'-12,000', ensure pilot uses oxygen continuously; if more than 30 minutes between 10,000'-15,000', ensure at least 10% of occupants use oxygen; over 15,000' ensure oxygen is used by each occupant (one-hour supply required unless aircraft able to safely descend to 15,000' within four minutes, in which case 30-minute supply is required) or utilize pressurized aircraft	Remote	Marginal	Medium
Remote areas	Lack of fuel availability	Frequent	Critical	High	Ensure mission planning includes fuel resources (call ahead) & ferry distance/time, monitor flight time & distance to fuel location	Remote	Marginal	Medium
	Oxygen availability to aircraft	Frequent	Marginal	Serious	Ensure mission planning includes oxygen sources (call ahead) & ferry distance/time, monitor flight time & distance to location or if not available, spend less time at high elevations	Remote	Marginal	Medium
	Using backcountry airstrips	Occasional	Catastrophic	High	Include back country risk assessment in pre-mission planning, ensure pilot is carded and current for back country mission and communications are established	Remote	Critical	Medium
	lack of communications	Probable	Catastrophic	High	Utilize AFF, know and use local repeaters, possibly carry satellite phone	Remote	Catastrophic	Serious
	Search and Rescue - delayed response within critical period	Probable	Catastrophic	High	UtilizeAFF, carry aircraft and personal survival gear, handheld radio/know frequencies, satellite phone	Occasional	Critical	Serious
Pest Signatures	Forcing timing of flights (or operations in general) to meet survey needs rather than safety	Probable	Critical	High	Utilize additional assets to complete survey or prioritize high-interest areas to complete first, it's okay not to finish	Remote	Marginal	Medium
Water	Amphibious aircraft landing on water with gear down	Occasional	Catastrophic	High	Use pilot check list, confirm gear up	Improbable	Catastrophic	Medium
	Amphibious aircraft landing on land with gear up	Occasional	Critical	Serious	Use pilot checklist, confirm gear down	Improbable	Catastrophic	Medium
	Poor depth perception to surface of water during landing	Occasional	Critical	Serious	Be aware during hazy conditions or dead-calm, more difficult to see water surface; Use experienced pilots, scan for water surface irregularities (wind, wake, fish, etc	Remote	Marginal	Medium

Category	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
	Ill-equipped beyond glide distance to shore (possible during ferry); applies to both float planes and to planes not equipped with floats operating over large water bodies	Probable	Catastrophic	High	Carry survival/mustang suites for cold water, gain altitude to increase glide distance	Remote	Critical	Medium
	Difficulty exiting aircraft in water	Probable	Catastrophic	High	Attending water ditching course, consider adding area-specific currency requirement in task book (alternatively, other companies and universities offer)	Remote	Critical	Medium
	Other watercraft & recreational users	Occasional	Catastrophic	High	Pilot/crew increase SA (watch for fishermen, swimmers, jet skis, canoes, etc. speed boats can become a hazard quickly...), no radio communication with these hazards; make reconnaissance pass prior to landing and search for watercraft/other users	Remote	Catastrophic	Serious
	Turbidity or subsurface obstructions obscured during landing	Probable	Catastrophic	High	Utilize pilots experienced with local waters; acquire local knowledge if operating away from familiar areas, check with dispatch; recon prior to landing, emergency landing only in unfamiliar waters	Remote	Catastrophic	Serious
	River current may "grab" aircraft on landing, drift after landing	Occasional	Critical	Serious	Landing typically into wind and may be up or down stream, dock upstream	Occasional	Marginal	Medium
	Floating debris	Probable	Catastrophic	High	Be aware not all floating debris may be visible on surface; Increase situational awareness… make reconnaissance pass prior to landing, all flight crew search for hazards	Occasional	Marginal	Medium
Airspace	Working within active MTR, MOA, warning areas	Probable	Catastrophic	High	Call ATC/military agency (possibly flight service station, less reliable) to determine "hot" or not, see and avoid, request deconfliction through dispatch	Remote	Catastrophic	Serious
	Working in proximity to or within FTA/TFR	Probable	Catastrophic	High	Maintain VFR, establish good communication w/air attack, remain outside of FTA/TFR w/out permission, practice see & avoid	Remote	Catastrophic	Serious
	Working within restricted (military, presidential, nuclear, etc… improbable for survey)	Improbable	Catastrophic	Medium	Check TFRs daily, know intercept procedures, Call ATC/ military agency to gain permission, determine if any other activity.	Improbable	Catastrophic	Medium
	All B, C, D Class	Frequent	Catastrophic	High	Mission planning, requesting prior permission from controlling tower & conducting mission during minimal traffic times	Remote	Catastrophic	Serious
Airstrip Availability, Condition and Services	No alternative or suitable landing location (surface condition, grass, native soil, pavement/concrete)	Occasional	Critical	Serious	Premission planning to maintain options, call ahead to check on runway condition, NOTAM	Occasional	Marginal	Medium
	No fuel available	Probable	Negligible	Medium	Call ahead to check availability of fuel, always have options	Remote	Negligible	Low
	One-way landing - wind, terrain	Probable	Catastrophic	High	Premission planning for terrain/fixed approach, plan for alternative airports	Remote	Catastrophic	Serious
	One-way departure - wind, terrain	Probable	Catastrophic	High	Premission planning for terrain/fixed departure, stay on the ground & wait for favorable conditions	Improbable	Catastrophic	Medium
	IFR conditions at the airstrip - potential for mid-air or controlled flight into terrain	Occasional	Catastrophic	High	Maintain VFR, delay landing if reasonable, use alternate airstrip or use twin engine aircraft w/IFR rating	Remote	Critical	Medium
	No windsock	Occasional	Critical	Serious	Observe ground/water conditions (tree lean, dust, water ripples, etc.)	Remote	Critical	Medium
	Prevailing wind may not be favorable to landing/departure	Probable	Critical	High	Know prevailing wind premission, use alternate airport	Occasional	Critical	Serious
Animal activity	Areas of high bird activity (flyways, nesting areas, etc.)	Occasional	Critical	Serious	Some areas are marked on sectional charts, local knowledge - incorporate in premission planning; see and avoid	Remote	Critical	Medium
	Survival in hostile wildlife habitat	Remote	Catastrophic	Serious	Stay with the plane, carry appropriate survival equipment for survey area/time of year (pepper spray, fire arm & mitigate carrying such items)	Improbable	Catastrophic	Medium
	Potential for serious injury/aircraft damage from wildlife on runway (common at remote and county airports)	Occasional	Critical	Serious	Contact ground to clear runway, communicate any observed activity to pilot; plan for possibility of delay, keep sufficient fuel reserve	Remote	Marginal	Medium
Project over densely populated areas	Emergency landing developed areas (fewer suitable landing areas, increased risk to public safety)	Remote	Catastrophic	Serious	Consider alternative survey methods, increase altitude to improve glide distance	Remote	Catastrophic	Serious

FHP Aerial Detection Surveys - Personnel								
		Pre Mitigation					**Post Mitigation**	

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
Pilot	Minimal local experience	Occasional	Critical	Serious	Manager to brief pilot on project and area to survey, frequencies, hazards refueling sites, etc.	Remote	Critical	Medium
	Lack of jurisdictional/boundary awareness	Occasional	Negligible	Low	Premission planning/briefing, utilize digital mapping system information, load backgrounds on portable GPS	Remote	Negligible	Low
	Carded for reconnaissance but no FHP mission-specific flight review	Frequent	Critical	High	Conduct mission-specific flight review/training (applicable to agency contracted pilots), utilize FHP flight review checklist as required	Remote	Critical	Medium
	Unaware of hypoxia effects in event of loss of cabin pressure (whether nonpressurized or pressurized aircraft)	Probable	Critical	High	Recommend hyperbaric chamber training for pilots and crew members/flight managers if program includes high altitude photography (NOTE: use of pressurized aircraft is listed as mitigation under "Hi Altitude")	Remote	Critical	Medium
	Minimal flight hours or experience with mission type (varies annually)	Probable	Critical	High	Thorough preflight briefing to new pilots, utilize FHP flight review checklist as required; plan and prioritize flight in less challenging terrain before entering more difficult areas	Occasional	Critical	Serious
	Inordinate attention to survey rather than flying	Probable	Critical	High	Thorough preflight briefing to new pilots, observer/flight manager let pilot know if becoming a problem	Remote	Critical	Medium
	Pilots may not have dedication, skills to complete mission or may be "pushed" into uncomfortable situations	Occasional	Critical	Serious	CRM, discuss comfort level and environmental conditions, adjust flight profile accordingly or return to base	Remote	Critical	Medium
	No preflight mission briefing from flight manager (survey area, profile, objectives)	Occasional	Critical	Serious	Pilot request thorough briefing, manager provides	Remote	Marginal	Medium
	Lack of awareness leading to fuel starvation	Remote	Catastrophic	Serious	Proper preflight planning, monitor consumption, CRM to include crew observe flight time and fuel gauge; consider fuel totalizer for monitoring consumption & reset when fueling	Remote	Critical	Medium
	Self-medicated (could range from a simple cold to serious health issue)	Occasional	Critical	Serious	All crew to crosscheck how each other is doing, ask if medicated, know FAA regulations pertaining to prescription & over-the-counter medication	Remote	Critical	Medium
	Incomplete preflight/post flight inspection	Occasional	Critical	Serious	Take the time necessary to evaluate aircraft thoroughly, CRM to include crew in inspection & feel comfortable reporting anomalies	Remote	Marginal	Medium
	Aircraft check lists not utilized (for preflight, run up, & all flight regimes)	Probable	Catastrophic	High	Utilize appropriate check list, CRM to encourage crew ask for check	Remote	Marginal	Medium
	Has not checked for current NOTAM	Occasional	Critical	Serious	Proper preflight planning to include checking NOTAMs, CRM to include crew.	Remote	Negligible	Low
	Accepting unreasonable risk in general (refers to individual's character and state of mind)	Remote	Catastrophic	Serious	Conduct project-specific risk assessment, job hazard analysis and incorporate into premission briefing	Remote	Critical	Medium
	Incapacitated	Remote	Catastrophic	Serious	Crew/Manager attend pinch hitter	Remote	Critical	Medium
	Under the influence or hung over	Remote	Catastrophic	High	CRM to include awareness of regulations for 8 hours no alcohol, BA < .04 crew to cancel mission if in question	Improbable	Catastrophic	Medium
	Fatigue, complacency	Probable	Catastrophic	High	10 hours off duty, limit flight day to 8 hrs or less depending on conditions (usually not prudent to push for full 8-hour flight days)	Remote	Critical	Medium
	Gear up landing	Remote	Critical	Medium	Pilot training including simulation training twice a year and aircraft check ride, utilize checklist & CRM	Remote	Critical	Medium
Observer (FWFMSU trainee; contract or state employee in non-agency aircraft)	Minimal experience with aircraft	Occasional	Catastrophic	High	Obtain pilot safety briefing, don't board or egress w/engine/s running	Remote	Marginal	Medium
	Minimal experience with mission type	Probable	Marginal	Serious	Initiate task books	Remote	Negligible	Low
	Self-medicated (colds to serious health issue)	Occasional	Marginal	Medium	All crew to crosscheck how each other is doing, ask if medicated, know FAA regulations pertaining to prescription & over-the-counter medication	Remote	Marginal	Medium
	Fatigue, complacency	Probable	Marginal	Serious	Consider flying less than 8-hrs/day, CRM	Remote	Marginal	Medium
	Accepting unreasonable risk (likely for trainees)	Occasional	Critical	Serious	Participate in project-specific risk assessment, hazard analysis and incorporate into premission briefing, qualified FWFMSU to fly with trainees	Remote	Critical	Medium
	Not obtaining safety briefing	Remote	Catastrophic	Serious	Observer refer to "5 steps to safe flight" card & request safety briefing from pilot	Remote	Negligible	Low

	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
	Personality conflicts among crew	Occasional	Critical	Serious	Brief/debrief, CRM, maintain positive attitude, allow for & provide honest feedback	Remote	Critical	Medium
Flight Manager	Lack of qualified Fixed-wing Flight Manager Special-Use	Occasional	Catastrophic	High	Cancel mission until rectified (FHP FWFM-SU must be current with IAT and have completed task book for the position)	Improbable	Negligible	Low
	Lack of qualified Helicopter Manager/Special-Use	Occasional	Catastrophic	High	Cancel mission until rectified (there are DRAFT task books for Helicopter Manager Special-Use, these need to be finalized and required)	Improbable	Negligible	Low
	Self-medicated (colds to serious health issue)	Occasional	Critical	Serious	All crew to crosscheck how each other is doing, ask if medicated, know FAA regulations pertaining to prescription & over-the-counter medication	Remote	Marginal	Medium
	Fatigue, complacency	Probable	Marginal	Serious	Consider flying less than 8-hrs/day, CRM	Remote	Marginal	Medium
	Accepting unreasonable risk in general (refers to individual's character and state of mind)	Occasional	Critical	Serious	Participate in project-specific risk assessment, job hazard analysis and incorporate into permission briefing	Remote	Negligible	Low
	ABS issues - contributing to long duty day & vendors/pilots not being paid (contract aviation services only)	Probable	Marginal	Serious	Supervisor, program manager/UAO to remain alert for flight managers having trouble using ABS and/or vendors not getting paid; if occurring, potential to affect daily operations and safety... Respond to needs for additional ABS training (contact CO, other FHP COR's or F&AM staff for assistance)	Remote	Negligible	Low
	Managing personality conflicts among crew	Occasional	Critical	Serious	Brief crew before flight... use CRM, maintain positive attitude, promote honest/open feedback… debrief following flight	Remote	Marginal	Medium
	Not ensuring pilot checklist used	Probable	Critical	High	Practice CRM, FWFMSU assures checks completed	Remote	Marginal	Medium
	Pressured by/pressuring employees during the mission or to complete the project	Occasional	Critical	Serious	CRM - recognize when doing this & back off, recognize when others do & speak up	Remote	Negligible	Low
Supervisor/Manager	Fatigue, complacency	Probable	Marginal	Serious	Communicate w/FWFMSU, consider requiring employees to fly less than 8-hrs/day, practice CRM to include all aviation personnel	Remote	Marginal	Medium
	Accepting/promoting unreasonable risk	Probable	Marginal	Serious	Supervise and set tone "aviation program first" - participate in programmatic and project-specific risk assessments, do job hazard analysis and ensure incorporated into permission briefing; FWFMSU communicate with supervisor, FHP supervisors to attend required aviation safety training	Remote	Marginal	Medium
	Not ensuring subordinates adequately trained and current on aviation safety and clear on mission tasks	Occasional	Critical	Serious	Supervisor monitor employees training requirements, have training identified on individual training plan (assures subordinates stay current as Flight Manager or other positions as appropriate in FHP IAT Matrix)	Remote	Marginal	Medium
Training	"Generic" IAT & ACE training for flight managers (as compared to mission-specific training)	Remote	Critical	Medium	ACE training is very good and acceptable, however, AS2M is preferred (at least for initial flight manager qualification) due to AS2M curriculum being more specific to FHP operations and including additional courses that are not offered in any other venue	Remote	Marginal	Medium
	Lack of mission understanding among aviation users, cooperators, and support staff	Frequent	Critical	High	Ensure agency personnel complete appropriate level of training/task books for position, recommend for states. Have regional program managers interact w/FAO, RAO, RASM, dispatchers, State Foresters, etc to increase awareness	Remote	Marginal	Medium
Dispatch	Inconsistent flight following procedures	Probable	Critical	High	FHP UAO clearly identify radio/AFF procedures in PASP, communicate to dispatch, FWFMSU call dispatch daily	Remote	Negligible	Low
	Uninformed or misinformed of Flight Plan	Occasional	Marginal	Medium	FHP UAO disseminate PASP and annual schedule to dispatch centers and FAOs as early as possible; FWFMSU to submit Flight Plan, call dispatch in each area prior to mission, ensure good communication in all areas to be flown	Occasional	Negligible	Low
	Work load, fatigue, complacency resulting in missed flight following at crucial point	Remote	Catastrophic	Serious	FWFM work with dispatch centers, consider moving to alternate area if dispatch workload too high	Remote	Marginal	Medium
	Surveyor not having local frequencies (frequency management in general)	Occasional	Critical	Serious	Flight Plan and premission briefing to address, get alternate frequencies/tones from dispatch, return to airport until communication is reestablished	Remote	Marginal	Medium
	Frequency congestion	Frequent	Critical	High	Consider utilizing local repeater frequencies to ease congestion, provide alternative frequencies; augment radio use with AFF	Remote	Marginal	Medium

Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
	Known aerial hazards not communicated	Occasional	Catastrophic	High	Review hazard maps at dispatch center or request copy of hazard map before mission. FWFM to request updates as to daily activities.	Remote	Critical	Medium
	Inoperability of National Flight Following	Probable	Critical	High	Have and utilize forest net frequencies, submit safecom for outages or areas that should have NFF coverage	Occasional	Critical	Serious
	Lack of staffing on weekends or outside of flight hours	Occasional	Negligible	Low	Use alternate methods of flight following, request additional staffing, adjust flight hours to accommodate dispatch hours	Remote	Negligible	Low
	Jurisdictional/boundary awareness and inability to maintain flight following	Occasional	Critical	Serious	Ensure positive radio communication and successful hand-off to neighboring dispatch, close out flight following with previous dispatch.	Remote	Negligible	Low
	Frequency guides unavailable or not current	Occasional	Critical	Serious	GACC's to publish current frequency guides on the internet & have links to neighboring GACC frequency guides	Remote	Negligible	Low
	Not filing flight plan or imitating flight following/closing flight plan	Occasional	Catastrophic	High	FWFMSU or pilot shall initiate and close flight following w/dispatch for each leg of flight.	Remote	Marginal	Medium
Maintenance Inspector	Not current on AD's	Remote	Catastrophic	Serious	Use FAA website for new AD's, get subscription (CD is available with 28-day updates)	Remote	Marginal	Medium
	Inspectors do not know what to look at in aging aircraft operating in survey profile	Occasional	Critical	Serious	Develop structural health monitoring program as needed for aircraft operating in survey profile (mountainous, turbulent, frequent maneuvering, high number of cycles)	Remote	Marginal	Medium
	Insufficient number of inspectors	Occasional	Critical	Serious	Managers to assure enough inspectors to fulfill area needs; hire additional and/or share inspectors across regional boundaries	Remote	Marginal	Medium
	Fatigue, complacency	Occasional	Critical	Serious	Utilize other region's/agency or AD inspectors to help workload, provide second set of eyes	Remote	Marginal	Medium
	Accepting & transferring unreasonable risk to aviation users	Remote	Critical	Medium	UAO's to participate in inspections for the purposes of 1) gaining knowledge about inspections and 2) for raising general awareness to new issues/ideas on aircraft health	Improbable	Marginal	Medium
Oversight & Coordination in General	Lack of mission understanding among aviation users	Frequent	Critical	High	FHP to be proactive, educate and interact with other aviation staff during annual meetings (national and regional)	Improbable	Negligible	Low
	Lack of knowledge, use or misuse of SAFECOM system	Occasional	Critical	Serious	Encourage FHP personnel to use system, provide constructive quarterly summaries to field	Improbable	Marginal	Medium
	Aviation Safety Plan, PASP not current or non existent (frequently the case for states)	Frequent	Catastrophic	High	Encourage State aviation to include survey mission in their plans	Occasional	Marginal	Medium
	Aviation Safety Plan, PASP not current or non existent (required for agency)	Remote	Catastrophic	Serious	UAO's to complete comprehensive & current FHP AMP for their areas, coordinate as needed for consistency through FHP safety manager	Improbable	Negligible	Low
Contracting	CO/COR turnover and/or lack of experience	Frequent	Critical	High	Aviation CO developmental positions, mentoring programs, UAOs coordinate with COs to assure quality contract & best value/participate in contract development	Remote	Marginal	Medium
	Stress in planning for all in system	Frequent	Critical	High	Start contract development earlier	Occasional	Critical	Serious
	Short windows from advertising to award (limits most desirable/most qualified bidders)	Frequent	Critical	High	Determine budget, funds available, and start preparing contracts as early as possible	Remote	Marginal	Medium

FHP Aerial Detection Surveys - Technology (Hardware and Software)

		Pre Mitigation				Post Mitigation		
Sub-systems	Hazards	Likelihood	Severity	Outcome	Mitigation	Likelihood	Severity	Outcome
ABS	Difficulty inputting flight time for payment processing through ABS can cause frustration and long duty days	Occasional	Critical	Serious	Utilize ABS Helpdesk; acquire additional ABS training if necessary; report software problems to be addressed in future ABS versions	Occasional	Negligible	Low
	Disgruntled pilots/vendors due to process or not being paid (rippling effect on attitudes throughout operation)	Probable	Critical	High	FWFMSU work with Pilot and/or CO as necessary to assure prompt payment for services	Occasional	Marginal	Medium
AFF	False sense of security (not a method for air traffic control)	Occasional	Critical	Serious	Better communication between pilot and dispatch centers, train dispatchers and flight crew on proper use & limitations of AFF, dispatch must time and monitor display at required intervals	Remote	Negligible	Low
	Flight manager trusting AFF absolutely with minimal voice communication	Occasional	Critical	Serious	Maintain positive radio communication, safety plan & flight plan include protocol for flight following (reference MOB Guide, chapter 20)	Remote	Marginal	Medium

	Hazard	Probability	Severity	Risk	Mitigation	Probability	Severity	Risk
	Signal interruption due to antenna conflicts with other aircraft antenna	Remote	Critical	Medium	Install and inspect per manufactures recommendation (maintain separation from other antenna)	Remote	Negligible	Low
	Portable units not secured, could become projectile in event of emergency landing	Remote	Catastrophic	Serious	Securely mount portable components in tail section or strap down to floor	Remote	Negligible	Low
Geolink	Sketchmappers pay more attention to mapping system than flying the mission	Probable	Catastrophic	High	Get familiarity with software updates prior to mission, make sure map groups/backgrounds and projects are created correctly before flight	Remote	Marginal	Medium
	Lack of training and proficiency leads to operator problems, confusion in the cockpit and one less set of eyes outside the cockpit	Probable	Catastrophic	High	Run flight simulations in the office to be thoroughly familiar with software before mission, be familiar with troubleshooting software problems, test operation of equipment before/do not distract pilot during take-off	Remote	Negligible	Low
	Loose equipment, cables & wires	Occasional	Catastrophic	High	Preference to use tablet systems with fewer components; secure peripheral equipment & neatly tuck cables so as not to interfere with aircraft operations; brief on securing any remaining loose equipment in event of emergency landing	Remote	Marginal	Medium
	Portable antennae	Occasional	Critical	Serious	Check with pilot on preferred location, avoid compromising view out front window	Remote	Negligible	Low
	Voltage incompatibility with aircraft	Occasional	Critical	Serious	Use voltage tester to confirm aircraft power supply voltage before operating equipment off aircraft power	Remote	Marginal	Medium
Paper maps	Fumbling with maps, attempting to track position detracts from managing the flight	Occasional	Catastrophic	High	Utilize surveyors that are familiar with local area and/or use the digital mapping system	Remote	Marginal	Medium
	Lack of training and mapping proficiency leads to confusion and one less set of eyes outside the cockpit	Occasional	Catastrophic	High	Demonstrate proficiency before flight, attend survey workshops, utilize digital mapping system	Remote	Marginal	Medium
	Difficulty managing both paper sectional maps and paper survey maps, do not have easy access to aeronautical chart information (e.g.. TFR, MTR, MOA, Restricted & other airspace)	Frequent	Catastrophic	High	Preflight briefing to include any airspace issues, utilize digital mapping system to simply toggle from real-time shetchmap base to chart map display	Remote	Marginal	Medium
Aircraft GPS	Not having latest software or map updates	Occasional	Critical	Serious	Contract to include GPS specifications and requirement for updates	Occasional	Marginal	Medium
	Waypoint input errors (if using to aid flying grid survey pattern)	Remote	Marginal	Medium	Train pilots on GPS operation, double check waypoints prior to mission	Remote	Negligible	Low
	Hand-held units not secured, could become projectile in event of emergency landing	Probable	Marginal	Serious	securely mount portable components in tail section or strap down to floor	Remote	Negligible	Low
Radios	No frequency or repeater available in project area	Occasional	Catastrophic	High	Test frequencies and set up portable repeaters if necessary; communication plan requires backup communication by cell phone or satellite phone if necessary; in federal plans/suggest requiring in state plans	Remote	Catastrophic	Serious
	No communications (in general) air-to-ground, with other aircraft or dispatch centers	Remote	Marginal	Medium	FAA requires ability to communicate with general aviation aircraft; contracts include necessary radio specifications; communications plan lists frequencies	Remote	Marginal	Medium
	Inaccessible radios/controls, difficult to operate	Improbable	Marginal	Low	Break from flight pattern to access radio and make adjustments	Improbable	Negligible	Low
	P-25 Digital, Analog & Narrow Banding compatibility issues	Probable	Marginal	Serious	Identify issues prior to contract and operation, radio check prior to project implementation - address in communication plan; provide time and training on new equipment	Occasional	Marginal	Medium
	Portable radios - not secure, controls easily bumped	Remote	Marginal	Medium	Secure and properly place portables so as not to interfere with aircraft operations, use keypad/control locks	Occasional	Marginal	Medium
	Panel mounted radios - bump controls	Improbable	Marginal	Medium	Use keypad/control locks	Improbable	Negligible	Low
	Flight crew unfamiliar with components	Probable	Marginal	Serious	Preflight to include familiarization & programming radios	Remote	Marginal	Medium
	Frequency congestion	Occasional	Catastrophic	High	alternate frequency planning	Remote	Marginal	Medium
	Faulty wiring leading to intermittent operations	Remote	Marginal	Medium	Have portable radio/handheld, users prepared to use alternate frequencies (guard), land and repair or replace aircraft	Remote	Marginal	Medium
	Inoperability of National Flight Following	Occasional	Negligible	Low	Identify and rectify NFF system failures (computer, satellite and aircraft equipment)	Remote	Negligible	Low
TCAS	If not using TCAS: potential for midair collision	Remote	Catastrophic	High	Use TCAS, continue practice of "see and avoid", apply CRM	Improbable	Catastrophic	Medium

	If using TCAS: false sense of security that all other aircraft have functioning transponders	Occasional	Catastrophic	High	Recognize that all other aircraft may not have functioning transponders, continue practice of "see and avoid", apply CRM	Remote	Catastrophic	Serious
	If using TCAS: Signal interference, antenna positioned too close to other antennas	Occasional	Catastrophic	High	Follow manufacturer's installation requirements	Remote	Catastrophic	Serious