

System: FHP Aerial Detection Surveys - Aircraft											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		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			
	Emergency response compromised due to aircraft ELT communication or activation failure	Remote	Marginal	Medium	Analogue ELTs conforming with FAA TSO 91A broadcasting on 121.5 MHz and 243.0 MHz are no longer monitored by SAR Satellite systems... where feasible, encourage aircraft to monitor 121.5 MHz; though not mandated by FAA, digital ELTs conforming with FAA TSO 126 broadcasting on 406 MHz are monitored by SAR Satellite systems reducing SAR launch time; transmission out of "designated mountainous areas" referenced in the AIM is improved; encourage operators to upgrade as avionics-related upgrade opportunities arise; Recognize either system can fail with loss of battery power, in post crash fire or with high impact force; Always consider a "package" of effective location technology and processes available that when combined provide reasonable likelihood for locating an aircraft in a timely manner (flight plans, radio and automated flight following, personal ELTs)	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			
	Inability to clear obstacles on takeoff, inability to stop within short distances on normal or emergency landing	Remote	Catastrophic	Serious	Know specific aircraft capabilities, complete weight & balance/load calculation; review Flight Guide runway information for local hazards, utilize airport or backcountry strips of suitable dimension; always consider your present location during flight and search emergency landing locations; consider STOL-equipped aircraft in project planning (typical in bush planes but some designed for developed airstrips); minimum control airspeeds are significantly reduced with STOL alterations, enabling slower glide in event of engine failure; use of flap gap seals will increase lift when flaps are up (also increases cruising speed); ensure any modifications are covered under Supplemental Type Certificate (STC)	Improbable	Catastrophic	Medium			

System: FHP Aerial Detection Surveys - Aircraft (cont.)											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
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Configuration (cont.)	STOL alterations result in slower airspeeds, therefore, can reduce control authority and stall regime may progress toward ailerons	Remote	Critical	Medium	STOL configurations include larger wing and varying combinations of aerodynamic devices (specialized flaps, slots, slats and vortex generators); maintenance and pilot inspectors assure modifications are correctly engineered and serviceable (STC), check ride to evaluate pilot ability with STOL during all phases of flight (follow manufacturer's recommended techniques); permission briefing to include flight characteristics of STOL configuration	Improbable	Critical	Medium			
Terrorist or malicious activity	Aggressive public, verbal or physical threats (including gun threats) to do harm	Remote	Catastrophic	Serious	Conduct outreach to educate the public on purpose of survey and timing, gain understanding and trust to prevent surprises; treat all threats as serious, know and brief on procedures, have emergency contact information handy, notify base of operations and pilots; obtain all physical description info possible without placing self at risk (name, address, description of person, vehicle and license plate)	Improbable	Critical	Medium			
	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 Performance (including horsepower, turbo vs. normally aspirated, etc.)	Occasional	Catastrophic	High	Project Aviation Safety Plan & contract to address minimum requirements, reference Airman's Information Manual (AIM) for "mountainous terrain"... carding process doesn't necessarily address FHP performance needs... FHP UAOs remain involved in a/c selection; if concerns, consult regional mtc inspector or subject matter expert	Remote	Critical	Medium			
	High density altitude operations	Probable	Catastrophic	Serious	Match machine to task & environment, monitor weather, reduce load; high density altitudes may be experienced in any flight profile; preflight briefing to include review of particularly dangerous terrain, pressure altitude, discuss potential effects on flight characteristics and how mission can be modified to reduce risk (for example: fly higher than typical AGL, avoid operating within tight terrain); make risk decisions to survey or not based on a combination of factors including forested/nonforested area, environmental conditions that day, historic levels of forest damage	Remote	Critical	Medium			
	Insufficient payload capabilities	Probable	Catastrophic	High	Perform weight & balance/load calculations, consider multiple observer and overnight gear; for the record, retain copy of calculation on the ground	Improbable	Critical	Medium			

System: FHP Aerial Detection Surveys - Aircraft (cont.)											
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Performance - low altitude	Inability to glide to suitable emergency landing area in event of engine out	Probable	Catastrophic	High	Preflight briefing to include Maximum Glide Distance; as an example: a Cessna 180 at 2,000' AGL may glide for 3.5 miles, a Cessna 206 at 2,000' AGL may glide for 3 miles; see Pilot's Operating Handbook for your particular aircraft (distances are calculated based upon optimum conditions with propeller windmilling, zero wind, flaps up, recommended airspeeds are specific to make/model); directing aircraft away from mountainous terrain can increase these distances significantly; twin engine aircraft with a single engine out allows continued power, however, sudden stoppage of one engine affects asymmetric thrust and torque, is an emergency situation increasing in severity when combined with factors such as position AGL, payload and adverse environmental conditions (twins require increased pilot skills and attention to engine management, pilot training has potential to fully mitigate)	Occasional	Critical	Serious			
	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			
	Reduced lift due to surface conditions (tall grass, native soil/gravel vs. hard surface like helipad)	Remote	Critical	Medium	Flight manager/observer discuss flight plan and potential landing zones with helicopter manager	Improbable	Marginal	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			

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CWN - agency (cont.)	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 agency aircraft; consider exclusive use contracts	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			

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Cooperating Aircraft particularly state operations not under MOU with FS (could be private, guard, other... may not be P135, and 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 or letter of authorization	Probable	Catastrophic	High	Check for pilot and aircraft carding, federal employees will not fly in uncarded aircraft	Remote	Marginal	Medium			
	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			

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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			

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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			
	Less than enough acceptable aircraft available to project, may be coupled with pressure to perform/sense of urgency to complete (from pilot, flight manager/crew, or upper management), slow progress or aircraft becoming unavailable further threatens 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			
Damaged Aircraft	Engine malfunction due to unforeseen failure or insufficient maintenance	Occasional	Catastrophic	High	Utilize electronic engine monitoring technology to simplify cockpit workload, provide in-flight alerts of critical exceedance, download data card with performance history (aids analysis for scheduled or unscheduled maintenance needs); adhere to FAA requirements and manufacturer specs, stay current on ADs and SBs, consider internet subscription for easy access to daily updates such as through the AD Resource System (or other) also providing maintenance-related ACs and STCs; Second seat and/or observer to be familiar with various guages in order to spot anomalies and inform pilot (CRM)	Remote	Marginal	Medium			
	Utilizing aircraft with any perceived mtc. issue or physical damage	Occasional	Catastrophic	High	Mtc Inspect to return to service, FWFMSU and/or Crew to speak up if uncomfortable with the condition of aircraft, components or instruments	Remote	Catastrophic	Serious			

System: FHP Aerial Detection Surveys - Environmental											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Weather	Inappropriate clothing for "field operation"	Occasional	Critical	Serious	Clothing to improve survivability and footwear 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; always be prepared for rapidly changing conditions and have alternative landing locations	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/ High 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	Create risk maps for your program to highlight areas where DA typically is more of a concern; obtain weather briefings, utilize remote weather station data, review aircraft performance charts and data or abort mission until more favorable weather (also see "aircraft" tab, "performance standards")	Remote	Critical	Medium			

System: FHP Aerial Detection Surveys - Environmental (cont.)											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Topography/Hi Alt (cont.)	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, check www.fs.fed.us/fire/aviation/av_library/AAD2000.pdf for airstrip category by state, ensure pilot is carded and current for back country mission (mitigated if USFS mission) and that communications are established	Remote	Critical	Medium			
	lack of communications	Probable	Catastrophic	High	Utilize AFF, know and use local repeaters, possibly carry satellite phone and/or handheld emergency GPS transmitter	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			

System: FHP Aerial Detection Surveys - Environmental (cont.)											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
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			
	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			

System: FHP Aerial Detection Surveys - Environmental (cont.)											
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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			
	Lack of coordination leading to conflicts within all Class B, C, D (operations or conflicts less likely in A and G)	Frequent	Catastrophic	High	Mission planning, know your airspace categories, request prior permission from controlling tower & conduct 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/fix approach, plan for alternative airports	Remote	Catastrophic	Serious			
	One-way departure - wind, terrain	Probable	Catastrophic	High	Premission planning for terrain/fix 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			

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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 to safe landing, complete congested airspace plan if applicable	Remote	Catastrophic	Serious			

System: FHP Aerial Detection Surveys - Personnel

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
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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	Permission 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	Probable	Critical	High	Brief on hazard whether using nonpressurized or pressurized aircraft, pressurized may lead to false sense of security - recommend hyperbaric chamber training for pilots and crew members/flight managers if program includes high altitude operations (NOTE: use of pressurized aircraft is listed as mitigation under "Hi Altitude")	Remote	Critical	Medium			
	Minimal flight hours or experience with mission type	Probable	Critical	High	Thorough preflight briefing to new pilots or pilots new to survey, 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			

System: FHP Aerial Detection Surveys - Personnel (cont.)

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Pilot (cont.)	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	Complete Position 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			
	Personality conflicts among crew	Occasional	Critical	Serious	Brief/debrief, CRM, maintain positive attitude, allow for & provide honest feedback	Remote	Critical	Medium			

System: FHP Aerial Detection Surveys - Personnel (cont.)

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
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			

System: FHP Aerial Detection Surveys - Personnel (cont.)

Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
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			
	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				

System: FHP Aerial Detection Surveys - Personnel (cont.)											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
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			

System: FHP Aerial Detection Surveys - Technology (Hardware/Software)											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Electronic Payments using Aviation Business System (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			
	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			
Digital Mapping Systems	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 and equipment so as not to interfere with aircraft operations and egress; 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			
	Cigarette lighter adaptor to power mapping system overheating resulting in smoke or in-flight fire	Occasional	Critical	Serious	Utilize only safe power alternatives such as internal mapping system battery or hardwired "Air Attack" plug approved by avionics inspector	Improbable	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			

System: FHP Aerial Detection Surveys - Technology (Hardware/Software) (cont.)											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
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 sketchmap 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			
	New high-powered broadband systems interfering aircraft GPS and (or) other GPS hardware/software utilized in special missions (impacts are unknown)	Probable	Marginal	Serious	Determine existing GPS channels utilized for all aircraft and project GPS, determine if channels may be available now or in the future that will not be affected as high-powered Wi-Fi networks are developed; GPS receivers using the L1 frequency most likely to be affected, L2 unknown, future L5 is stronger and may be far enough from Wi-Fi frequencies to not be affected; utilize frequencies unaffected by Wi-Fi, maintain proficiency in navigational methods that do not rely on GPS (INCOMPLETE: more information is needed to thoroughly assess this hazard and mitigation)	Remote	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			

System: FHP Aerial Detection Surveys - Technology (Hardware/Software) (cont.)											
Sub-systems	Hazards	Pre Mitigation			Mitigation	Post Mitigation			Mitigation Achieved? Yes or No	Additional Local Mitigation	Post Mitigation Value
		Likelihood	Severity	Outcome		Likelihood	Severity	Outcome			
Radios (cont.)	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			