National Training Aircraft Symposium (NTAS) | 2022 - Bridging the Gap

Utilizing Drones to Streamline Wildlife Hazard Management Efforts by Airport Operators

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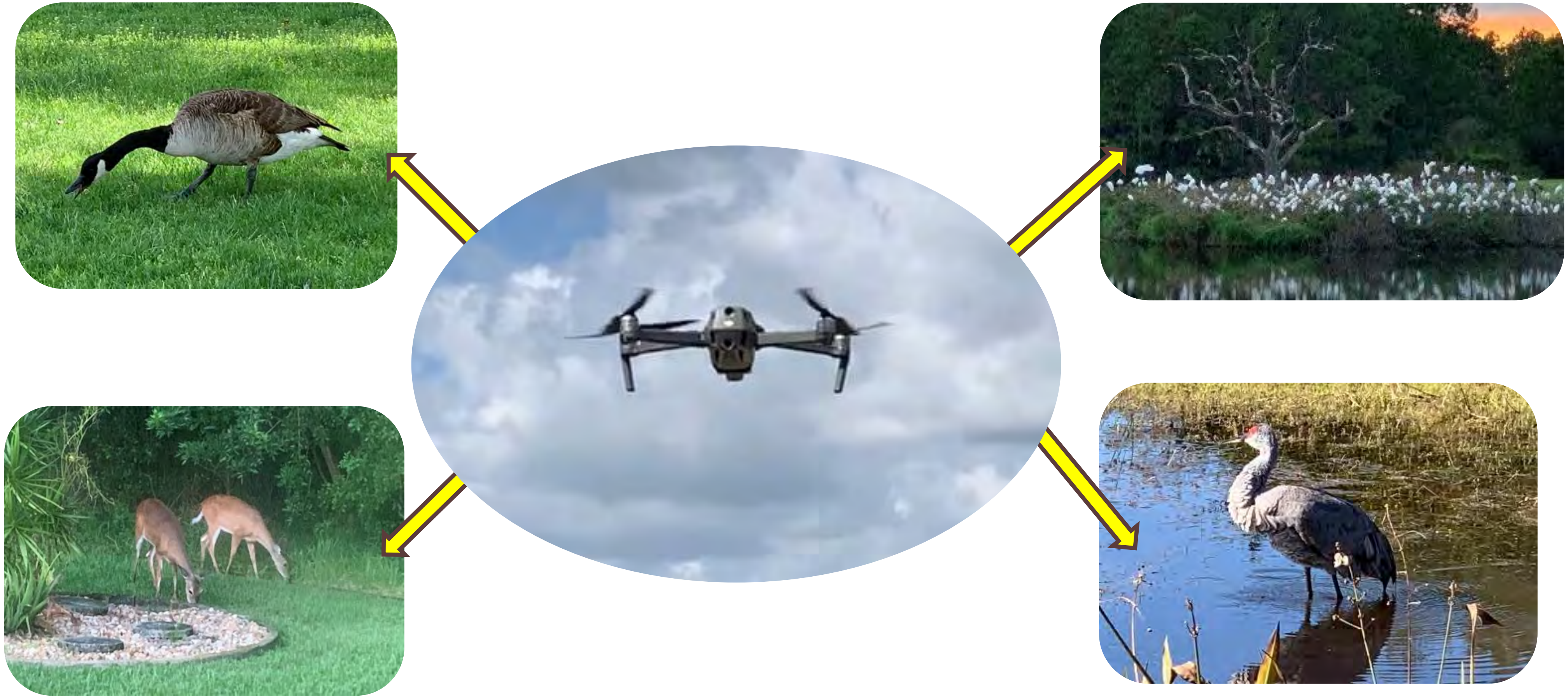

Utilizing Drones to Streamline Wildlife Hazard Management Efforts by Airport Operators

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Utilizing Drones to Streamline Wildlife Hazard Management Efforts by Airport Operators

Introduction

- Airports operating under Title 14 C.F.R. Part 139 ➡ conduct a Wildlife Hazard Assessment (WHA) when certain "strike incidents" occur on or near the airport
- WHA ➡ conducted by a qualified airport wildlife biologist
  - Provides the scientific basis for the development and implementation of a wildlife hazard management plan
- UAS have been used in several disciplines for multiple purposes

Photo by A. Gosser, USDA
Source: Cleary & Dolbeer, 2005

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Purpose of this Ongoing Study

- Investigate how UAS and related technologies could be used to support the airport operator safety management efforts to mitigate the risk of wildlife strikes to aviation
  - Apply the SMS tenets to ensure safe operations of UAS at an airport environment
  - Explore best practices and create workflows that facilitate the application of UAS during a WHA
  - Identify the benefits of using UAS and related technologies during a WHA
  - Identify the challenges associated with safe UAS operations at and around the airport environment

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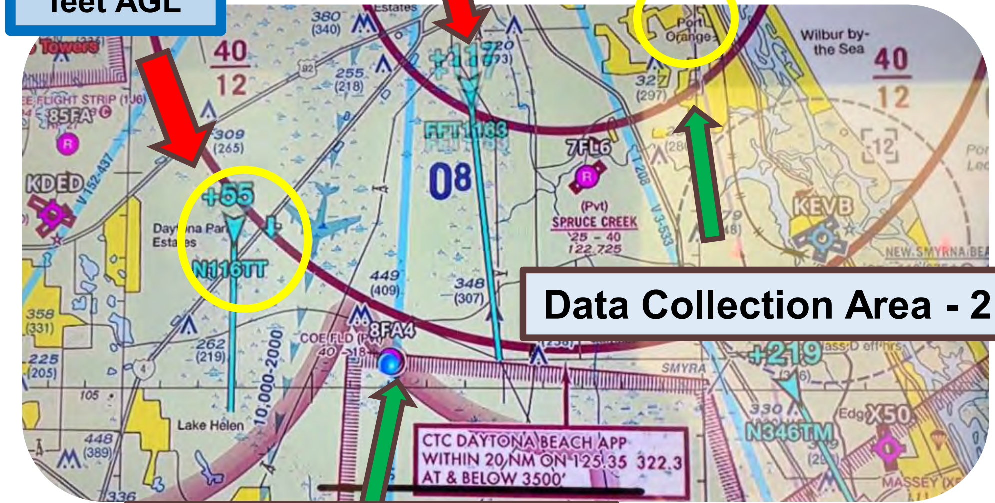
Concept of Operations

- Includes methods of operations & risk management
    - Our team has utilized a mobile operations station (trailer)

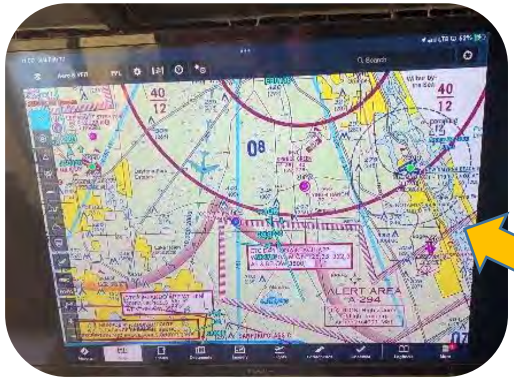
Air Traffic at ~11,700 feet AGL

Air Traffic at ~5,500 feet AGL



Data Collection Area - 2

Data Collection Area - 1



ADS-B Flight Box

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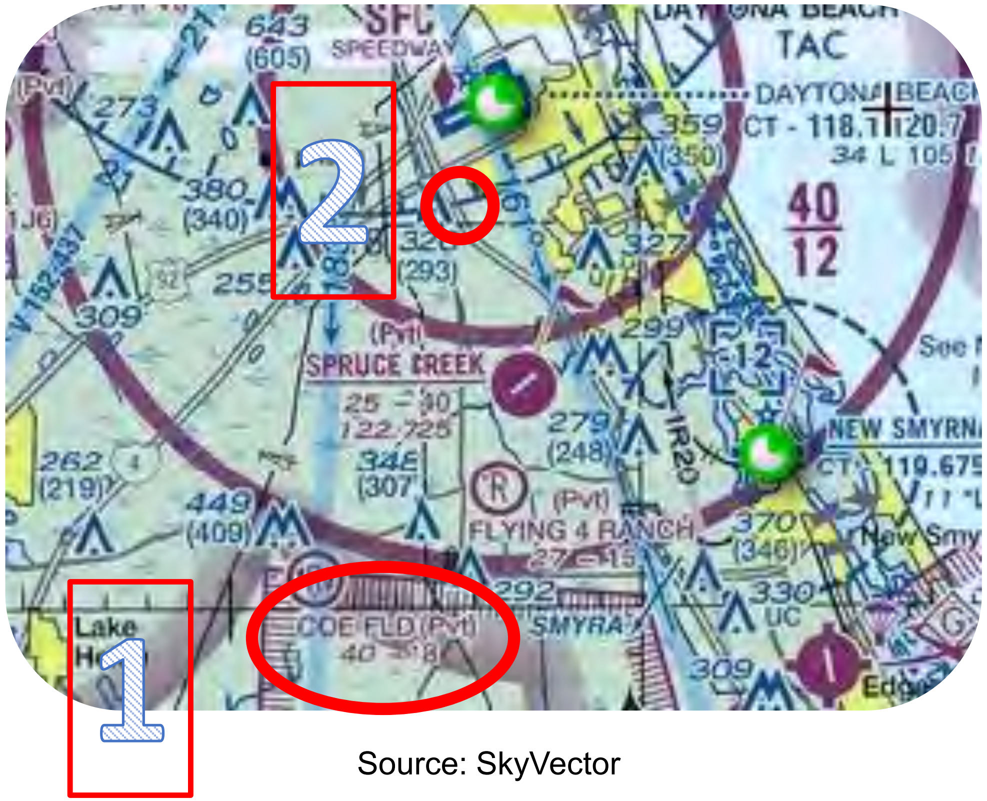
Coe Field (8FA4) - Source: Google Earth

Concept of Operations

- Data Collection Area(s)



Source: SkyVector

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Airborne Data Collection

- Automatically in a basic grid pattern and manually
  - DJI Mavic 2 Enterprise (first phase of the project)
  - DJI Matrice 210 (second phase of the project)
  - Parrot Anafi AI

Manual Flights

Basic Grid Pattern

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Preliminary Findings and Discussion


Vulture


Snowy-Egret

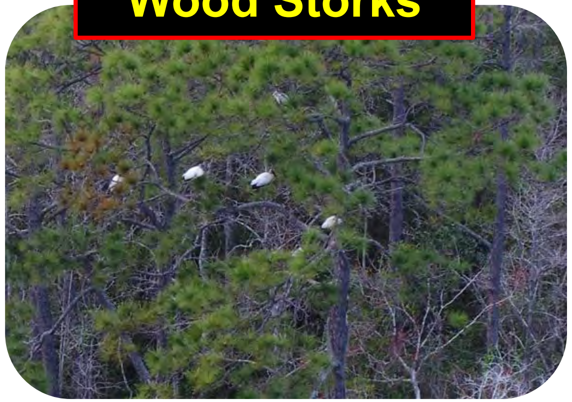
Glossy-Ibis


White-Ibises


Sandhill Cranes


White-Tailed Deer


Cattle & Cattle-Egrets


Wood Storks


Duck

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Preliminary Findings and Discussion

- Natural habitats and man-made features / activities attracting hazardous wildlife species
- Multiple interactions between observed wildlife species as well as animals and the identified features

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Students’ Participation

- Service / experiential learning opportunities for a number of undergraduate students
- Foster critical thinking, problem-solving, teamwork…

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Students' Participation

- 2021 FAA Challenge Smart Airport Student Competition
- Presentations in research symposiums…

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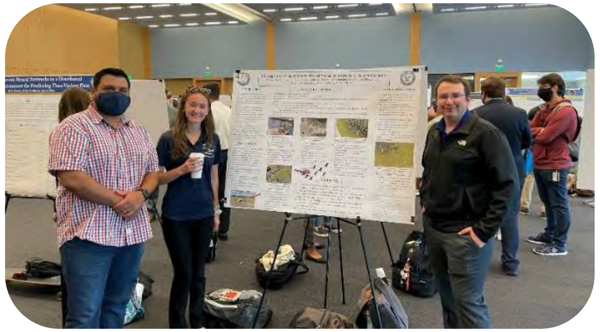

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Key Conclusions

- The safe application of drones during a WHA can help
  - Obtain wildlife data and information in areas that are difficult to access by ground-based means
  - Observe wildlife in areas that are distant from the data collection point(s)
  - Identify habitats, land uses, and man-made activities affecting the presence and behavior of wildlife
  - Observe wildlife species that do not congregate in group
  - Obtain vital information that could be later analyzed by a QAWB

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- Limitations
  - Reduced opportunities for data collection
  - The technical expertise of a QAWB during data collection is needed
- Next steps
  - Engage with a QAWB during a WHA
  - Apply AI to identify the presence, number, and wildlife species

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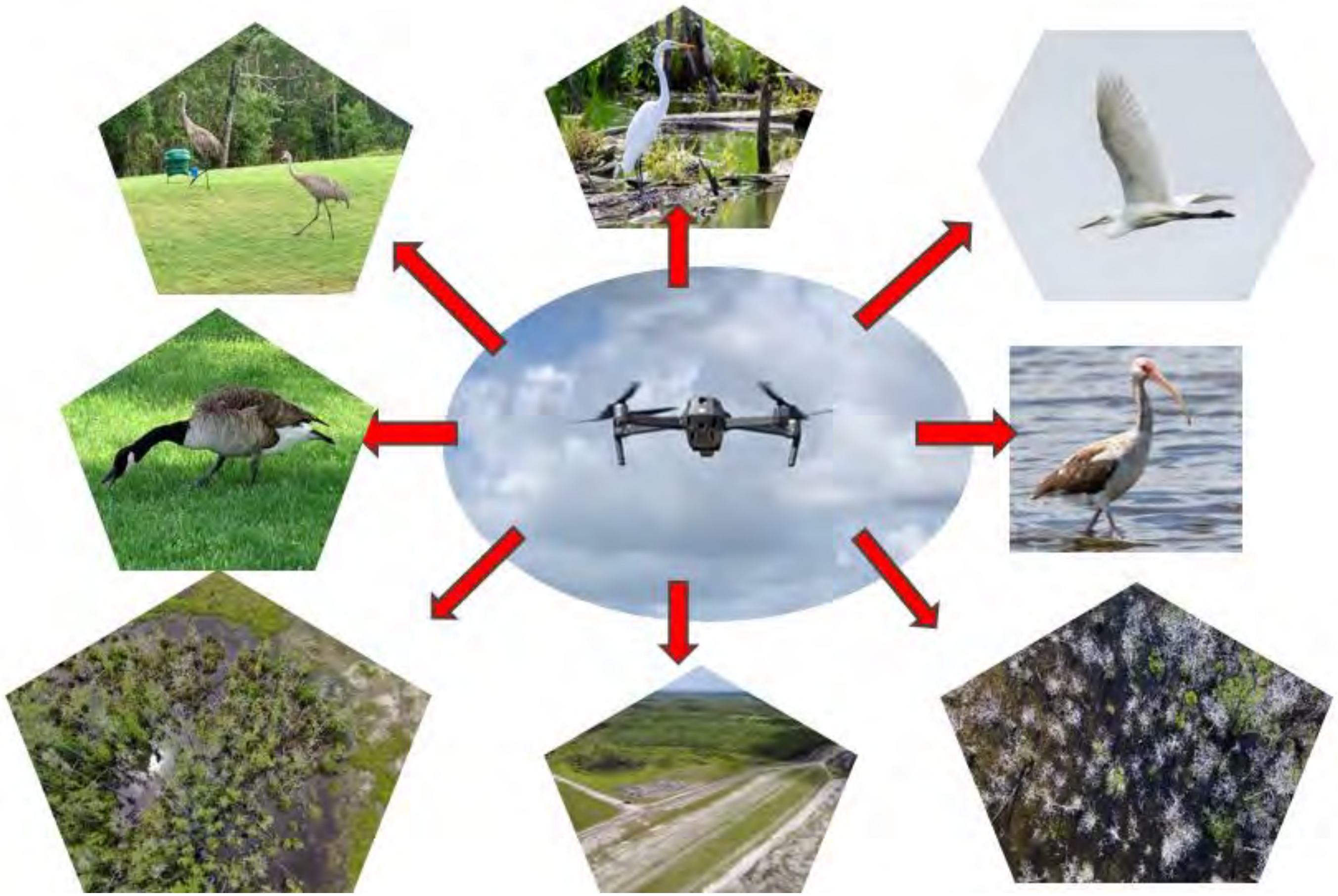
Thank you!



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Extra Slides

Utilizing Drones to Streamline Wildlife Hazard Management Efforts by Airport Operators

- Concept of Operations
  - Risk Mitigation
    - Crew Resource Management
    - Site surveys
    - Flight risk assessment tool (FRAT)
    - Automatic Dependent Surveillance – Broadcast (ADS-B) flight box
    - A visual observer

Extra Slides

Utilizing Drones to Streamline Wildlife Hazard Management Efforts by Airport Operators

Risk Mitigation

- Considering the possibility of aircraft operations during the data collection process our team also adopted the following procedures to help mitigate this specific risk:
  - UAS flights were conducted below 200 feet AGL
  - UAS flights were not conducted in the Approach, Departure, and Circling Airspaces of Coe Field airport
  - UAS flights were only conducted with a ceiling of at least 3,000 feet AGL and with visibility at or above five thousand nautical miles
  - A visual observer, in addition to the drone operator, was present during the data collection process
  - Any perceived flight activity in the area at or below a 1,000 feet AGL and/or in the traffic pattern
    - UAS should not be flown or flight should be terminated immediately

Extra Slides

Utilizing Drones to Streamline Wildlife Hazard Management Efforts by Airport Operators

		0	1	2	3	4	Rating
Operational Factors	Type of Operation	Proficiency	Demo	Recurrency / Subsequent	Training	Initial Experimental or Service Learning Flight	
	Duration of Operation	< 1 hour	1 - < 2 hours	2 - < 4 hours	4-6 hours	> 6 hours	
	Simultaneous Operations	1 UA		2 UAs	3 UAs		
Crew Factors (any member)	Hours of Rest in Last 24 Hours (from prior duty)	> 14	> 12 - 14	> 10- 12	> 8 - 10	8 or less	
	# of Flights in UAS category (multi-rotor vs. fixed-wing)	> 50	50 - 41	40 - 31	30 - 20	< 20	
	# of Flights in Last 90 Days	> 12	> 7 - 12	> 5 - 7	> 3 - 5	3 or less	
	Student Crew	VO		PMC		RPIC	
	Total UAS Hours	> 50	40 - 50	30 - 40	20 - 30	< 20	
Environmental Factors	Surface wind (% of OEM UAS max; if not OEM prescribed)	50% or < 8 kts	60% or 9 - 12 kts	70% or 13 - 15 kts	80% or 16 - 19 kts	90% or > 20 kts	
	Weather Forecast for Operation	14 CFR 107 Minimums					
	Surrounding Area	Flat, no obstacles	Flat, with obstacles	Hilly or mountainous	Urban	Confined	
						Total Risk Score →	
No unusual hazards. Use normal flight planning and operational procedures. Requires PIC signoff.							< 21
Elevated risk. Conduct flight planning with extra care. Review personal minimums and operating procedures to ensure that all standards are being met. Consider alternatives to reduce risk. Requires UAS-S Program Coordinator signoff or, for operations outside of the local area, their designee.							21-35
Conditions present much higher than normal risk. Conduct flight planning with extra care and review all elements to identify those that could be modified to reduce risk. If available, consult with a more experienced pilot or instructor for guidance before flight. Develop contingency plans before flight to deal with high risk items. Decide beforehand on alternates and brief crewmembers on special precautions to be taken during the flight. Consider delaying flight until conditions improve and risk is reduced. Requires Department Chair signoff.							> 35

Utilizing Drones to Streamline Wildlife Hazard Management Efforts by Airport Operators

Survey Area /Location:____________________ **Investigator/Biologist:**____________________

DATE:			TIME(Z):		WEATHER:	
LOCATION	SPECIES	NUMBER	BEHAVIOR	DIRECTION	HABITAT	NOTES

WEATHER	BEHAVIOR	HABITAT AREA	DIRECTION OF MOVEMENT
SU- SUNNY	FD- FEEDING	PND- POND	N- NORTH (NS,NW,NE)
CL- CLOUDY	RS – ROOSTING	RES- RESERVOIR	S- SOUTH (SE,SW,SN)
RN- RAIN	NS- NESTING	RIV- RIVER	E- EAST (ES,EW,EN)
SN- SNOW	VO- VOCALIZING	WDL- WOODLAND	W-WEST (WE,WS,WN)
FG-FOG	MT- MATING	MAR- MARSH	
PC- PARTLY CLOUDY	LF- LOAFING	CRK- CREEK	
PS- PARTLY SUNNY	FH- FLYING HIGH	OFLD- OPEN FIELD	
	FM- FLYING MEDIUM	SHB- SHRUB	
	FL- FLYING LOW	SHR- SHORELINE	
		GSH- GRASS, SHORT	
		GLG- GRASS, LONG	

Extra Slides

Utilizing Drones to Streamline Wildlife Hazard Management Efforts by Airport Operators

Extra Slides