

WILDLIFE
CONSERVATION
DRONES & TECHNOLOGIES
SUMMIT 2023

Oct. 9-12 | **Reveille Peak Ranch** | Burnet, Texas

SCHEDULE



DAY 1

TIME	LOCATION							
	PAVILION	LAKE	TOWER	RAVINE	CORRAL	LZ SOUTH	CLASSROOM	
8 am - 1 pm	CHECK IN AND SPONSOR SETUP							
1 pm - 3 pm	WELCOME AND SECURITY / SAFETY BRIEFING @ PAVILION / KEYNOTE*							
3 pm - 4 pm	EarthRanger							
4 pm - 5 pm	Wildlife Protection Solutions							
5 pm - 6 pm	Advancements in Sensor Technology							
6 pm - 8 pm	DINNER and SOCIAL hosted by ISLAND FOUNDATION							

***KEYNOTE:**

THE INTERNET OF CONSERVATION: CREATING THE CONSERVATION TECHNOLOGY ECOSYSTEM OF THE FUTURE

Jonathan Palmer *Executive Director of Conservation Technology, Wildlife Conservation Society*

Jes Lefcourt *Director of EarthRanger, Allen Institute for Artificial Intelligence*

Eric Schmidt *Executive Director, Wildlife Protection Solutions*

■	ALL
■	PRESENTATION
■	DRONE TRAINING
■	VENDOR DEMO
■	WORKSHOPS & CONTRIBUTED PAPERS

**Exhibition and NIST Lanes
Open 3 PM - 6 PM**

DAY 2

TIME	LOCATION							
	PAVILION	LAKE	TOWER	RAVINE	CORRAL	LZ SOUTH	CLASSROOM	
8:30 am - 9 am	WELCOME AND SECURITY / SAFETY BRIEFING @ PAVILION							
9 am - 10 am	Island Conservation Conservation X		Wildlife Monitoring Drone Training			Insight Up	Basic Camera Operations with Drones	
10 am - 11 am	Strategies for Communicating Data from the Field			Data Collection Drone Training		Conservation X	Insight Up	
11 am - 12 pm	XPRIZE Foundation		DJI			Mapping Drone Training	Program Development & Management	
12 pm - 1 pm	BREAK - Food truck on site							
1 pm - 2 pm	Wildlife Drones				Thermal Drone Training		Conservation Metrics	
2 pm - 3 pm	Skydio		Wildlife Monitoring Drone Training				Large Population Census by AI	
3 pm - 4 pm	Teal Robotics					Wildlife Drones	Post Processing Data	
4 pm - 5 pm	Species and Individual Identification				Teal			
5 pm - 6:30 pm	POSTERS (See Program Book) - DINNER and SOCIAL hosted by ISLAND FOUNDATION							
6:30 pm - 8 pm	NIGHT OPERATIONS DEMONSTRATIONS							

- ALL
- PRESENTATION
- DRONE TRAINING
- VENDOR DEMO
- WORKSHOPS & CONTRIBUTED PAPERS

Exhibition and NIST Lanes Open 9 AM - 5 PM

DAY 3

TIME	LOCATION							
	PAVILION	LAKE	TOWER	RAVINE	CORRAL	LZ SOUTH	CLASSROOM	
8:30 am – 9 am	WELCOME AND SECURITY / SAFETY BRIEFING @ PAVILION							
9 am – 9:30 am	Cornell Lab of Ornithology Acoustic Monitoring							Altunkaya & Liu
9:30 am – 10 am								Rhodes et al.
10 am – 10:30 am	Archbold Ecosystem Monitoring		Skydio	Data Collection Drone Training				Ferrara et al.
10:30 am – 11 am					Barfield			Colburn
11 am – 11:30 am	Texas Parks & Wildlife Drone Program					Mapping Drone Training		Hrynyk et al.
11:30 am – 12 pm								
12 pm – 1 pm	BREAK - Food truck on site							
1 pm – 1:30 pm	Crocodilian Workshop		Wildlife Monitoring Drone Training					Arredondo et al.
1:30 pm – 2 pm								Brack
2 pm – 2:30 pm							Autel Robotics	
2:30 pm – 3 pm								Shafer & Flikkema
3 pm – 3:30 pm	Marine Conservation Technology					Mapping Drone Training		Hanlon et al.
3:30 pm – 4 pm								Sabatier et al.
4 pm – 4:30 pm	Ororatech					Thermal Drone Training		Smucker
4:30 pm – 5 pm								Perotto-Baldivieso et al.
5 pm – 8 pm	DINNER and SOCIAL hosted by ISLAND FOUNDATION							

- ALL
- PRESENTATION
- DRONE TRAINING
- VENDOR DEMO
- WORKSHOPS & CONTRIBUTED PAPERS

DAY 4

TIME	LOCATION						
	PAVILION	LAKE	TOWER	RAVINE	CORRAL	LZ SOUTH	CLASSROOM
8:30 am - 9 am	WELCOME AND SECURITY / SAFETY BRIEFING @ PAVILION						
9 am - 10 am	Meet in the Pavilion for questions and priorities from field conservationists. What are the priorities, questions and follow up from this Summit. How do we implement these technologies in the field where conservation is being done? Jeremy Radachowsky, German Ferraro, Galo Zapata, Martin Garrett						
10 am - 11 am	Opportunity for private gatherings. Jaguar, Galapagos, etc.						
11 am	CLOSING NOTES						

- ALL
- PRESENTATION
- DRONE TRAINING
- VENDOR DEMO
- WORKSHOPS & CONTRIBUTED PAPERS

MAIN PAVILION

LOCATED ON THE MAIN STAGE

EARTHRAINER

Jes Lefcourt *Director of EarthRanger, Allen Institute for Artificial Intelligence*

Jes will present EarthRanger's solution for very effective monitoring, studying, and protecting wildlife movement across ecosystems, ranging from very specific areas to continent-wide migrations.

WILDLIFE PROTECTION SOLUTIONS (WPS)

Eric Schmidt *Executive Director, Wildlife Protection Solutions*

André Klussmann *Chairman 4dignity e.V. & WPS Implementation Partner*

Eric and Andre will present on how a combination of Starlink satellite internet, terrestrial long-range Point-to-Point and Point-to-Multipoint WiFi links, and Long Range Wide Area Network (LoRaWAN) can provide ubiquitous connectivity for remote protected areas with little or not cellular coverage, allowing for the tracking and monitoring of a wide variety of sensors.

ADVANCEMENTS in SENSOR TECHNOLOGY - PANEL

Juan Cantu *Director of Research & Development at Rantizo and Drone Instructor at Austin Community College Public Safety Training Center*

Gene Robinson *President, Gene Robinson Consulting*

Jared Janacek *President, Texas Drone Company*

A discussion of the advanced capabilities of various drone sensors and how they are applicable to wildlife and landscape conservation: RGB, Thermal, Night Vision, Multi spectral, Hyperspectral, LIDAR, Infrared and Lo8. This includes examples of applicability to wildlife and landscape conservation. This panel is made up of subject matter experts who can share their knowledge, experience, and best practices with conservation field biologists to advance a wide range of conservation projects and actions.

ISLAND CONSERVATION - CONSERVATION X

Timo Sullivan *Drone Program Coordinator, Island Conservation*

Henrik Cox *ConservationX Labs*

Island Conservation will present a general overview of IC's drone program, including heavy lift drones, ecosystem monitoring before and after eradication of invasive species and, with Conservation X Labs, the ability of drones to upload camera trap and other data in challenging and remote terrain. *See Program Book for more details.*

STRATEGIES for COMMUNICATING DATA from the FIELD

Eric Schmidt *Executive Director, Wildlife Protection Solutions*

André Klussmann *Chairman 4dignity e.V. & WPS Implementation Partner*

Opportunities and challenges of communicating sensor data from the field. Strategies include LORA, LORA Wan, shortwave, fixed wireless, mesh nodes, cell service, satellite, Starlink and Starlink Mobile.

XPRIZE FOUNDATION

John Greisberger *Program Director XPRIZE Rainforest*

Kevin Marriott *Technical Lead XPRIZE Rainforest Program Director XPRIZE*

John and Kev will present XPRIZE and its \$10M Rainforest competition, showcasing its use of UAVs and how the prize is accelerating the development of novel technologies to rapidly and comprehensively survey biodiversity to improve our understanding of complex ecosystems. They will also introduce XPRIZE Wildfire, a new \$11M prize to dramatically improve the detection and suppression of destructive wildfires.

WILDLIFE DRONES

Debbie Saunders *Wildlife Drones*

Innovative radio-telemetry technology enabling efficient tracking of animal movements across challenging landscapes. We provide examples of how innovative drone radio-telemetry technology has been used to bridge the data gap, overcoming many of the challenges faced when using traditional radio-tracking techniques to locate animals on the ground. *See Program Book for more details.*

SKYDIO

Jeremy Crowley *Autonomy Engineer*

Getting started in Wildlife Conservation with Drones: Learnings from Skydio.

TEAL ROBOTICS

Miguel Cotto Morales *Director Flight Standards, PIC, PMP*

Public Safety Sales for the Americas

Jeremy Thunberg *Flight Demo Customer Specialist*

Flying in GPS-Denied Environments Flying small drones in GPS-denied areas presents a significant challenge as the drones cannot rely on GPS signals for navigation, which are essential for precise control and positioning. Operators or autonomous systems must utilize alternative navigation methods such as inertial navigation systems, visual odometry, or other sensor-based solutions to maintain control and navigate effectively in such environments. These methods, however, may not be as accurate or reliable as GPS navigation, making it crucial for operators to exercise extra caution and for drones to have additional safety features to prevent crashes or loss of control.

Launch and Recovering Drones in Adverse Terrain Hand launching/recovering drones in adverse terrain offers the crucial benefit of allowing for deployment in areas where it may be impossible or unsafe to take off from the ground, such as dense forests, rocky landscapes, or steep terrain. This method circumvents the need for a clear, flat surface, enabling drones to be used for a wide range of applications including search and rescue operations, environmental monitoring, and military missions in challenging environments. Additionally, hand launching/recovering minimizes the risk of damage to

the drone from ground obstacles, ensuring that the drone can takeoff and land unscathed, potentially increasing the longevity and effectiveness of the drone in the field.

SPECIES and INDIVIDUAL IDENTIFICATION

Panel

Using AI to identify species and increasingly individuals within species from camera traps or photographs. This will include discussion of distance monitoring by camera trap.

ACOUSTIC TECHNOLOGIES in the FIELD

Holger Klinck *Director, K. Lisa Yang Center for Conservation Bio acoustics, Cornell Lab of Ornithology*

Acoustical strategies for wildlife conservation and ecosystem monitoring: identification of wildlife, assessment of ecosystem health, and monitoring illegal human activity.

ARCHBOLD ECOSYSTEM MONITORING

Vivienne Sclater *Director of Data and Technology, Archbold Biological Station*

Advanced technology for: Saving the rarest of the rare. Sustaining grasslands. Fire. Connecting large landscapes and wildlife corridors in the Southeastern US. Addressing climate change.

TEXAS PARKS & WILDLIFE DRONE PROGRAM

Mathew Bridgefarmer *Lt. Game Warden and Drone Program Manager*

Lt. Bridgefarmer will discuss how Texas Parks & Wildlife uses drones in protecting and supporting the wildlife in Texas.

CROCODILIAN WORKSHOP

A round table on advances in technology and its impact on crocodilian conservation, including the use of drones to find individuals, find croc nests, assess egg and hatchling success, flying at night with thermal and night vision, the ability to identify crocs individ-

ually by scute, and its implications for human wildlife conflict. There will be particular focus on rewilding the 8 crocodilians which are globally ER or CR.

Brinky Desai *Ecology of the Mugger Crocodile (Crocodylus palustris).*

Lonnie McCaskill *A Review of the History of Drone Use in Crocodile Conservation.*

Carlos Ignacio Piña *Advances in Reptilian Imaging Using Uncrewed Aerial Vehicles (UAVs).*

Sounatha Boutxakittilath *Drone Technology Applied to the Conservation of the Critically Endangered Siamese Crocodile in Laos and Cambodia.*

Kasidis Chanpradub *MaxEnt for Modeling Siamese Crocodile's (Crocodylus siamensis) Environmental Preferences in Kaengkrachan National Park, Thailand.*

Herdhanu Jayanto *Drones for Crocodile Conservation in Indonesia: Challenges and Insights from Case Studies.*

German Forero-Medina *Orinoco Crocodile Conservation in Colombia.*
See Program Book for more details.

MARINE CONSERVATION TECHNOLOGY

Dean Apistar *Rare, Philippines*

Julio Maaz *WCS, Belize*

Jes Lefcourt *Director of EarthRanger, Allen Institute for Artificial Intelligence*

Eric Schmidt *Executive Director, Wildlife Protection Solutions*

Discussion on relevant technologies.

ORORATECH

Thermal Intelligence that enables real time monitoring of fire danger globally for conservation and monitoring of illegal activity.

CLASSROOM

LOCATED IN THE PAVILION EXCEPT THE CROCODILIAN WORKSHOP WHICH WILL BE ON THE PAVILLION MAIN STAGE

BASIC CAMERA OPERATIONS with DRONES

Omar Torrico *WCS-Bolivia*

Join Omar to learn more about basic camera skills using drone RGB cameras. He has been exploring drones as a conservation tool since 2019, using this technology to study high Andean wetlands and in the last 2 years counting an endangered freshwater turtle species (Giant South American River Turtle [*Podocnemis expansa*]) on the border of Bolivia and Brazil. Omar will share his experiences, tips, tricks and secrets using drones to capture dramatic images not only for data collection but to use in media and presentations.

UAS PROGRAM DEVELOPMENT & MANAGEMENT

Clay Regan *Granite Defense Technologies*, **Lonnie McCaskill** (*retired*) *WCS*

Program Development An introductory discussion underscoring the significance of establishing a well-structured UAS program. They will emphasize that creating a competent UAS program entails much more than merely providing an employee with a drone and expecting them to fly it. The presentation will shed light on the essential elements necessary for a successful UAS program, emphasizing proper planning, training, and adherence to regulations to ensure safe and effective operations.

Program Management It is imperative for senior-level leaders in an organization to possess a comprehensive understanding of the intricacies of a UAS program, as it directly influences the overall success and safety of the organization's operations. In this regard, Lonnie and Clay will present valuable insights to individuals who may manage conservation UAS professionals in the field. Having a grasp of UAS complexities empowers leaders to make well-informed decisions, allocate resources efficiently, and establish strategic goals that leverage the full potential of UAS technology. By staying informed about the latest advancements and adhering to regulatory guidelines, senior leaders can effectively support and guide conservation UAS professionals, enabling them to carry out their vital work with enhanced efficiency, safety, and impact.

LARGE POPULATION CENSUS by ARTIFICIAL INTELLIGENCE (AI)

Using AI to count large numbers of animals, particularly birds, mammals, and reptile.

INSIGHT UP

Chris Bey

Post-processing of data collected by Quantum VTOL

POST PROCESSING of DRONE IMAGERY in VARIOUS FORMATS

Gene Robinson, Juan Cantu, and Jeremy Crowley

This workshop will provide a deeper dive into drone image analysis using LOC8 color detection software and its companion tool RDT for thermal imagery as well as multispectral and Lidar data.

ALTUNKAYA & LIU

Deep Learning Prospects for Cheetah Identification via Tear Marks: ResNet-50 Framework and Future Outlook.

See Program Book for more details.

RHODES ET AL.

Monitoring Waterfowl Brood Abundance, Movement, and Survival Utilizing a Drone-Based VHF Radiotelemetry System.

See Program Book for more details.

FERRARA ET AL.

*Can Mass Nesting of the Giant South American River Turtle (*Podocnemis expansa*) be Estimated by Drone?*

See Program Book for more details.

COLBURN, MARK

Saving the Silverspot Butterfly: Using a Drone to Identify Suitable, Hard-to-Reach Habitats.

See Program Book for more details.

ARREDONDO ET AL.

Technologic Opportunities for the Effective Management of a Coastal-Marine Public-Private Protected Areas Network at the Edge of the World.

See Program Book for more details.

HRYNYK ET AL.

Estimating Bank Swallow Roost Density Using UAV-Based TIR Imagery.

See Program Book for more details.

BRACK, ISMAEL

Abundance Estimation and Monitoring of Threatened South American Deer Using Drones.

See Program Book for more details.

SHAFFER & FLIKKEMA

Drone-based Wildlife VHF Radio Telemetry.

See Program Book for more details.

HANLON ET AL.

Drones and Machine Learning Promise Advancements in Lek-Based Population Surveys of Prairie Grouse.

See Program Book for more details.

SABATIER ET AL.

Enhancing Breeding Pair Count Surveys of Ducks through Uncrewed Aerial Vehicle (UAV) Implementation.

See Program Book for more details.

SMUCKER, TY

Incorporating Drones into Monitoring and Managing Montana's Wildlife.

See Program Book for more details.

PEROTTO-BALDIVIESO ET AL.

White-tailed Deer Population Estimation with Thermal Drones and Distance Sampling.

See Program Book for more details.

DRONE TRAINING

HANDS-ON FIELD TRAINING. LOCATION LISTED NEXT TO TRAINING TITLE

WILDLIFE MONITORING (*Tower*)

Drones equipped with cameras and sensors can be used to monitor wildlife populations, track animal movements, and conduct surveys without disturbing their natural habitats. Participants will be proctored through a practice session in a wildlife monitoring scenario. After conducting preflight checks and confirming an open airspace the team will develop skills in maneuvering their UAS platforms around nesting birds located in an elevated environment. Once on scene the pilot will locate, identify, count and document various species of birds and other data on birds and their habitat.

RESEARCH AND DATA COLLECTION (*Ravine*)

Drones provide an efficient and cost-effective means to collect data in remote areas, including biodiversity surveys, climate monitoring, and ecological research. In the ravine the participants will be assisted by a conservation professional in maneuvering the UAS in a challenging environment consisting of a creek area, trees, and elevation changes. The participant will conduct a biodiversity survey by identifying several mock species of animals and counting specifically selected targets.

THERMAL OPERATIONS (*Livestock Corral*)

Thermal-equipped drones can be highly valuable in various conservation applications due to their ability to capture thermal imagery of target species. Thermal imaging detects the infrared radiation emitted by objects, allowing for the visualization of temperature variations. The participant will be guided through the operation of thermal equipped drone platforms to locate wildlife at night. The pilot will be assisted in the complexities of night flight as they conduct an accurate count and identification of species, if possible.

BASIC/INTERMEDIATE/ADVANCED UAS PILOTING (*NIST Lanes*)

The NIST Lanes will be open for those at all levels of UAS Pilot proficiency. Those who have no flight experience will be provided with a basic level of instruction and be allowed to operate the controls of the UAS to gain a greater understanding of the various aircraft system. Those with more advanced pilot skills will be able to maneuver their UAS through the various levels of NIST Courses.

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