WildTrack Annual Report 2021

A male jaguar walks along a beach in Brazil.

WildTrack has developed an algorithm to distinguish jaguar from puma footprints for use in many areas of central and south America where the two elusive species coexist.

Welcome, and thank you for joining us

Sky Alibhai & Zoe Jewell
WildTrack co-founders

As we entered the second year of the global pandemic 'business as usual' was over. Data-driven conservation was needed more than ever, yet we could not travel to collect it.

Our field partners in remote corners of the world struggled to survive because of greatly reduced revenue in other areas. Poaching increased as jobs were lost in local communities.

Yet these challenges highlighted opportunities to deliver low-carbon, or Clean Tech, conservation. The money we saved on travel helped support our field partners. Without tourists they spent more time collecting data. We solved challenges remotely, and focused on processing the data they sent, increasing our number of species algorithms from 14 to 30.

In April 2021 we launched the WildTrack Specialist Group (WSG) - more than 20 professional wildlife conservationists using non-invasive and community-accessible conservation technologies 'from the ground up'. We combine skills and resources to provide safer and more effective monitoring of endangered species across the world, and drive awareness of the need for collaboration across communities to solve the pressing issue of biodiversity loss.

WildTrack Board Members

Zoe Jewell, President and co-founder of WildTrack, Programs and Strategy. M.Sc., M.A., Vet. M.B., M.R.C.V.S.

Sky Alibhai, Director and co-founder of WildTrack, Programs and Software Development. D.Phil. (Oxon).

James Baker, Director. Legal Affairs. B.S., J.D, Attorney at Law, Hedrick Gardner Kincheloe & Garofalo LLP.

Laurie Durham, Director, Finance. B.A. Finance Director, SAS.

Charles Hall, Director, Web applications. B.Sc. Web Applications Developer, SAS.

Joseph Morgan, Director, Technology and Innovations, B.Sc. Principal Research Statistician, JMP.

Onyi Nwafor, Director, Operations and Logistics. Ph.D. Assistant Professor, Bryan School of Business, UNC Greensboro

Maggie Sergio, Director, Marketing and Communications. M.A. Environmental advocate, writer and non-profit consultant

In 2020 we welcomed Maggie Sergio as a new member of our board of Directors.
WildTrack is a Platinum member of GuideStar and our organisational reports and credentials are available here.

2021 by numbers

38 Species Projects

16 Students Undergraduate and Postgraduate

17 Partner Universities

30 Species Algorithms Developed

26 Scientists supported to use FIT in JMP software

20 Countries across 5 Continents

Our Mission and Objectives

WildTrack's Mission is to protect endangered species using a unique combination of advanced data analytics, artificial intelligence, and traditional ecological knowledge. By integrating traditional ecological tracking skills with a customised model in JMP software and artificial intelligence, we engage the whole community from scientists, to indigenous trackers, local communities and recreational citizen scientists. The data we gather inform on species protection and the mitigation of human-wildlife conflict. They are also essential to reduce the risk of future pandemics.

A two way learning process - we learn from traditional ecological expertise, and we help local communities use technology to democratize data collection for conservation. It's a win-win.

Objectives:

To develop and apply non-invasive and objective censusing and monitoring techniques as a fundamental resource for wildlife conservation.

To revive, value and engage expert local ecological knowledge in communities who have lived with endangered and elusive species over generations.

To use the power of scientific networking to augment data collection from endangered species around the world. Footprints are ubiquitous, and can be easily and opportunistically collected by anyone with a smartphone or camera

WildTrack's Footprint Identification Technology (FIT) offers a transformative solution

We have developed the world's first end-to-end solution to monitor species using footprints.

Footprints are a rich source of data, and a transformative solution for conservation monitoring. They're much easier to find than animals themselves, they're easy to collect with a smartphone app, and they're rich in information (Jewell et al, 2020)

Footprint Identification Technology	Other commonly used techniques
Footprints are ubiquitous data - easy to collect and accessible for citizen scientists	Locating endangered species is difficult, and sometimes dangerous
Footprint collection is cheap - using just a smartphone app or simple camera, large volumes of data can be collected	Fitting instrumentation to animals is very expensive so can only be undertaken with small subsets of populations.
Collection is non-invasive, no impact on data quality	Tagging/collaring etc is invasive, which can negatively impact physiology and behaviour
Is based on expert tracking skills, so engages local indigenous communities.	Rarely engage traditional ecological knowledge
Objective and rapid classification at species, individual, sex and age-class using AI	Are often dependent on subjective assessment - eg Camera trap arrays and usually only to species level

WildTrack Projects

Mountain lion
Fisher
Small mammals
Bengal Tiger
Box Turtle
Mountain lion
Jaguar
Small mammals
Golden Jackal
Wolf
Carpathian lynx
Eurasian river otter
Small mammals
Tortoise
Striped Hyena
Monitor Lizard
Leopard
Indian Rhino
Bengal Tiger
Snow Leopard
Amur Tiger
Amur Leopard
Giant Panda
Small-clawed otter
Smooth-coated otter
Hairy-nosed otter
Jaguar
Lowland Tapir
Lowland tapir
Jaguar
Cheetah
Black Rhino
White Rhino
African Lion
Leopard
African Elephant
Tasmanian devil
Mountain lion

WildTrack ™
Non-invasive Wildlife Monitoring
Footprint Identification Technology FIT.

Footprint identification technology for wildlife conservation

Baseline data from Footprint Identification Technology (FIT)

Data-driven conservation strategies

Reducing human-animal conflict

Preventing Illegal trade in wildlife products

Key achievements 2021

An aerial view of a black rhino showing marked rhino trails and those of other species
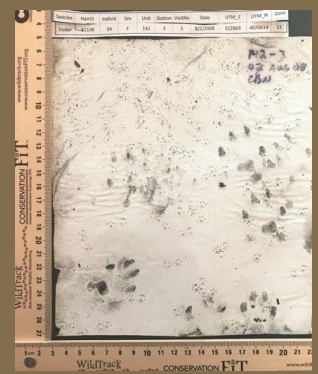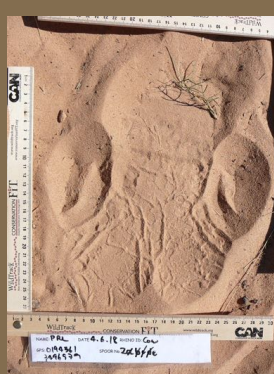
We continued to develop our award-winning AI pipeline to collect, process and communicate inference on large volumes of data in near real-time. Our vision is for users (on the ground and flying drones) to collect data that will feed to the cloud inference platform and then communicate back in real-time to the user. Specifically, we:

1.Worked with partners at University College, London, to build a WildTrack AI app to give users from indigenous trackers, to scientists, recreational users and K-12 groups full access to the pipeline.

2. Worked with partners at Harvard Computer Science Dept. on data flow and curation on a new Hasty.ai platform, automated the detection of scale in images, built a new data dashboard, and strengthened our inference algorithms.

We worked with partners at UC Berkeley I-School, Microsoft Azure and Microsoft AIForEarth, to develop a drone protocol to collect, infer and relay data to the end-user

With partners at Stanford University we worked on an unsupervised learning component
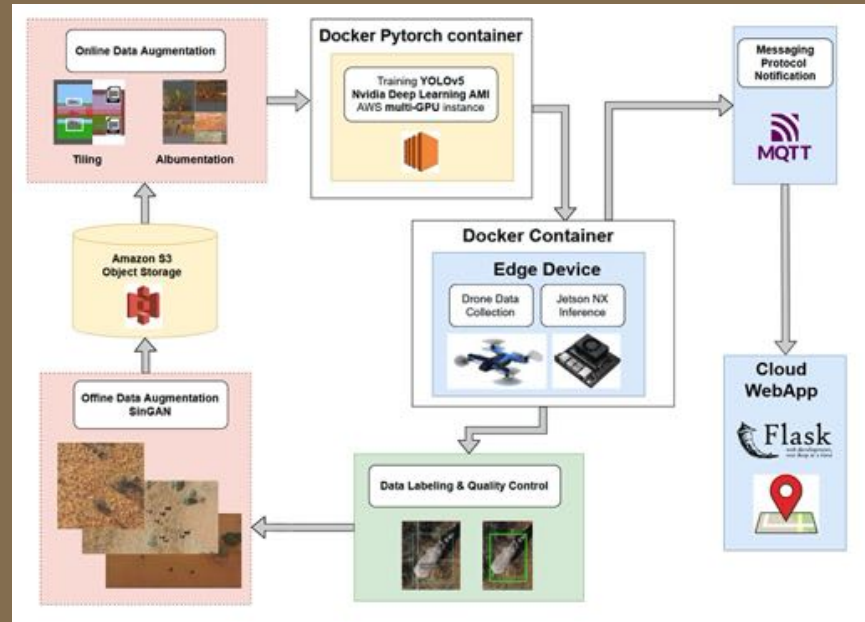
Smartphone App takes footprint images and uploads to cloud.

AI Solution classifies species, individual and potentially sex and age-class

User gets rapid feedback, education and ongoing engagement as part of community of collectors

Database grows, algorithms strengthen, conservation strategies become solidly data-driven.

Seed Consulting Team Fall 2021

Kari Dorth

Shay Howell

Maren Linn

Yvette Ramirez

Carissa Tasto

We worked with three excellent Seed Consulting Group teams during 2021, to build a stronger funding base, and develop our outreach and communications protocols

SEED CONSULTING GROUP

slack

bloomerang

Givebutter

Launching the WildTrack Specialist Group (WSG)

On Earth Day, April 2021, we launched the WildTrack Specialist Group (WSG), of more than 20 wildlife conservation biologists all united by a new vision: to develop and implement non-invasive and community-friendly conservation technologies, to better serve both human and wildlife communities.
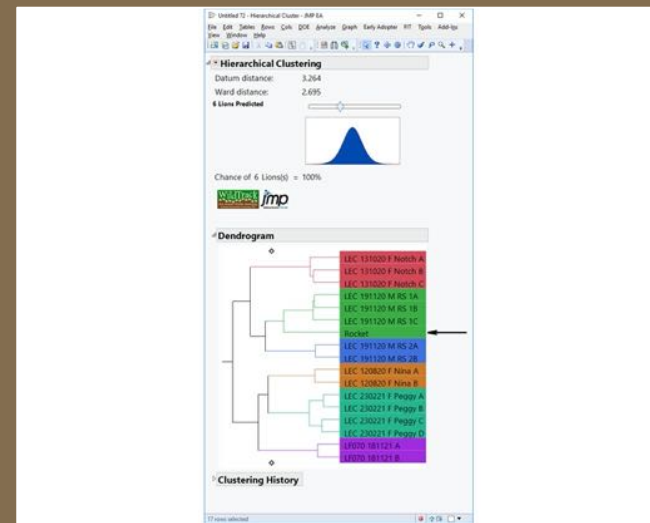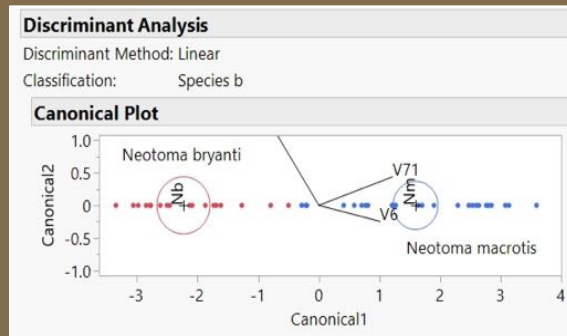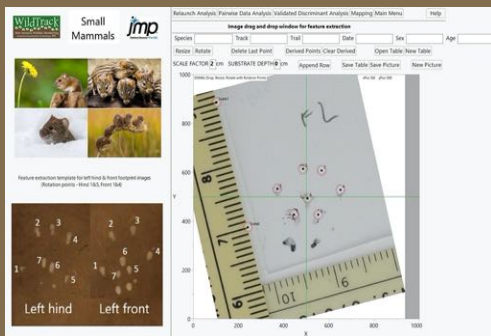
We work over 5 continents and we're passionate about conservation from the ground up.

Featured field projects: From Mice to Lions

Neotoma macrotis

Neotoma bryanti

We're working with our partners 'Leopard Ecology and Conservation (LEC) Botswana' to build a reference library for individual lion and leopard in the area, and help mitigate conflict with local communities.

Small mammal monitoring as a metric for biodiversity and environmental impact surveys. Working with partners in California, Montana, Israel, Greece, Lebanon, UK, Germany and Mozambique we have developed a range of different footprint collection techniques that are independent of substrate and provide excellent resolution of footprint anatomy. In JMP, we are now able to differentiate very similar species such as *Neotomoa bryanti* (Bryant's Woodrat) and *N. macrotis* (Big'eared Woodrat).

The feature extraction (L) and Discriminant analysis platforms (R) in JMP software

This dendrogram in JMP shows the identification of six lions found close to the research station.

Credit Serhat Demiroglu

We worked with Education Director Joshua Lisbon at the MPG Ranch in Montana, to use FIT as a citizen science tool to help identify the individuals both resident and moving through the ranch in winter.

Top L is a pristine trail of footprints from a mother and yearling. Top R is a mountain lion showing the powerfully extended claws to provide stability in snow. Bottom L is a hind track left at a kill site.
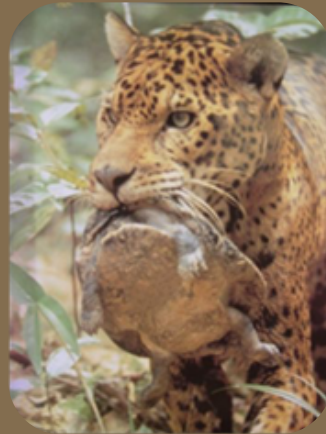
Local knowledge is an invaluable aid in monitoring endangered species. Our colleague in Brazil, Dr Juarez Pezzuti, works closely with indigenous hunters to identify areas with the best jaguar tracks. This is what they told him:

'Every year the jaguars patrol river beaches in search of nesting tracajás (yellow-spotted Amazon River Turtle, Podocnemis unifilis). If you want jaguar tracks, come at this time!"
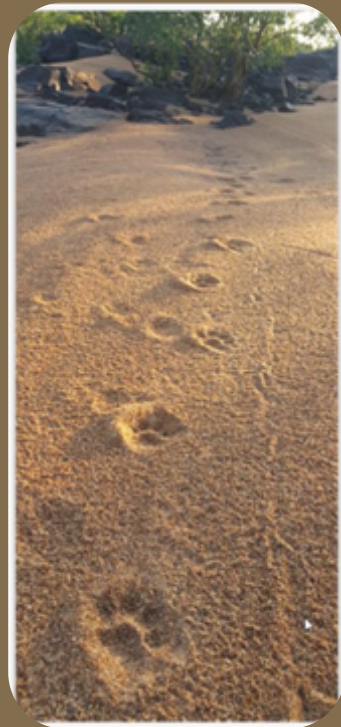
inside unmanned systems
INSIDE ENGINEERING, POLICY AND PRACTICE

"It might take four days to spot a rhino, but a drone can collect footprint data daily. UAS also can identify rhino trails, and then follow them while taking images in autonomous mode"

Partners Skydio report on our black rhino monitoring work with colleagues at Kuzikus

Forbes

Creating Impact With AI: Doing Well By Doing Good

Mark Minevich Contributor
Global Digital Cognitive Strategist , Digital Visionary, Artificial Intelligence expert, Venture Capitalist, Innovation CTO, author & AI contributor to Forbes.com

'Just in the Americas alone, natural ecosystems provide humans an estimated $24 trillion worth of economic value every year, equivalent to the entire GDP. Innovative AI applications like WildTrack are using 'AI-enabled Footprint Identification Technology (FIT) to collect, analyze and distribut data on species numbers and distribution at the scale and resolution required'.

Datamation

How AI is used by 20th Century Studios, Epiq, PureTech Global, Fintech OS and WildTrack: Case Studies.

Collecting lion prints with partners N/a 'an ku se in Namibia

SCIENTIFIC AMERICAN®

COMPUTING

New App Tracks Black Rhinos through Their Footprints

Indigenous trackers inspire a safer way to help rhinoceroses

"A recent study in PeerJ describes a new tracking technology that uses smartphones to record rhino footprints. Called the footprint identification technique (FIT), this system includes software that can analyze the animals' movements from a distance to help keep them safe from poachers."

JMP STATISTICAL DISCOVERY

WSG member Fred Kistner was interviewed by JMP statistical discovery. Where machine learning and ecology collide, formerly threatened species are making a comeback

WildTrack

Non-invasive Wildlife Monitoring

In WildTrack Women in Science we reported on the conservation work done by the amazing women in our WildTrack Specialist Group. We were also interviewed by the wonderful young wildlife advocate, Kate Gilman-Williams!

Kate Gilman-Williams: An 11 yr old animal conservation star putting passion into action!

🕑 July 12, 2021

Kate Gilman-Williams is driven by a passion to protect animals. What marks her apart from most other 11 yr olds is her determination to communicate this, and to act for change! Remarkably, she wrote to Microsoft to ask them if they would help her. Thanks to Sarah Maston and her team at Project15, Kate is now able to put her passion into action!

We were delighted to be interviewed by Kate recently. Check out the interview here!

WildTrack and Conservation FI

WildTrack
Non-invasive Wildlife Monitoring
Footprint Identification Technology FTI
www.wildtrack.org

BBN TIMES

ARE ROBOTS BETTER AT PROTECTING THE ENVIRONMENT?

EI: Environmental Intelligence

..."WildTrack - a computer vision program using Footprint Identification Technology - is salvaging the remains of endangered species." "Poaching can be remodeled. Patrols made more precise. Extinction is not inevitable"

..and many more

WSG founding member Larissa Slaney won best paper award at the Edinburgh EGISS Symposium 2021 for her paper on FIT for Cheetah Conservation. She also presented at BIAZA, and the Zoological Society of London.

WildTrack presented two talks at the North American Wildlife Tracker Conference, which attracted speakers from the USA, UK, Germany, Austria, Nepal and Canada, many of whom have since contributed images to WildTrack's AI database.

WildTrack presented a paper on Carnivore conservation in the Americas with colleagues Jody Tucker of the US-Forestry Service and Dr Juarez Pezzuti of the Federal University of Para in Brazil. at the JMP Discovery Americas conference.

Zoe Jewell, Larissa Slaney and Fred Kistner were interviewed by the National Museums Liverpool for their international exhibit AI:More than Human.

With huge gratitude to our donors, directors, colleagues, supporters and students

You Inspire Our Work

A lioness and her two young cubs strolling in the long grass at sunset, Botswana. Credit: Alessandro Araldi, WSG.