RAMBØLL

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Title: Digitally Transforming Biodiversity Assessmen*ts: How Remote Sensing, AI, and Good Ole' Fashioned Expert Knowledge are Advancing Sustainability*

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Key Topic: Digitalization/Visualization

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Client Name: Dallas Fort Worth (DFW) Airport

Project Name: Biodiversity Baseline Assessment Dallas Fort Worth International Airport

Project Location: 2400 Aviation Drive, DFW Airport, Texas

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ABSTRACT

Background/Objectives:

Large and/or remote areas of land are often challenging and expensive to monitor solely through traditional ground-based methods. Remote monitoring techniques (i.e., satellite and drone imagery) are becoming a prevalent part of environmental monitoring and characterization. Developments in artificial intelligence allows for the rapid analysis of large volumes of remote sensing data. When combined with analysis of publicly available and privately held background data and traditional ecological characterization methodology, locations can be assayed with higher speed and accuracy with lower cost investment for stakeholders. This presentation will focus on a brief introduction to how remote sensing and cloud-computing based artificial intelligence alongside traditional on-the-ground verification, are changing the way environmental monitoring takes place. Following the technical introduction into these technologies, we will present a case study of remote sensing techniques utilized at Dallas Fort Worth (DFW) Airport (17,000-acre site) in which the goal of the project was to understand and measure habitat types and biodiversity. The purpose of this project was to create a system that enables data-driven decision making to support DFWs sustainability goals and quantify key performance indicators.

Approach/Activities:

During the development of DFW's sustainability plan, Ramboll recognized a significant opportunity for the airport to demonstrate the enhancement of biodiversity and habitat uplift. The airport desires to improve biodiversity net gain and has engaged Ramboll to help them achieve their aim. DFW owns more than 17,000 acres of land and needs to improve biodiversity to satisfy their sustainability goals. Galago, the Transformational Sustainability Service Line (TSSL), the ecological restoration and biodiversity team are collaborating to establish a baseline assessment of biodiversity through the combination of science-based targets, remote analysis, and traditional on-the-ground verification. The baseline will help DFW set measurable targets and develop a plan to improve biodiversity. To accomplish this, Ramboll's ecological restoration and biodiversity team evaluated existing habitat tranche studies, tree surveys, landscape plans, and geospatial data from Texas Parks and Wildlife Department (TPWD) to modify the biodiversity quantification methodology developed by Natural England to ensure science-based targets are reflective of local ecology. In concert with these efforts, Ramboll's Galago team compiled and analysed a variety of remote sensing data including high-resolution multi-spectral satellite and aerial imagery as well as light detection and ranging (LiDAR) data. These remotely evaluated datasets were then verified through ground-based ecological surveys. The analysis produced from this project provides support to future sustainability initiatives and creates

the possibility of monitoring biodiversity changes over time with the overall goal of improving biodiversity of the area.

Results/Lessons Learned:

Project success came from the ability to quickly garner information about project wide trends in vegetation, habitat types, and biodiversity enabling fast and accurate decision making. When using remote sensing technologies, selecting the correct data collection tool was important and resulted in large amounts (hundreds of gigabytes) of data. Reviewing this data manually has historically been extremely time consuming or even impossible. By utilizing machine learning (ML) we were able to quickly review and analyse large amounts of data to identify priority locations which were then field verified related. Key Lessons learned also include:

— Biodiversity quantification through the application of international methodology to local applications.

— Interdisciplinary collaboration to streamline and improve traditional site characterization methodology by leveraging remote sensing data and analysis, significantly decreasing time and cost investments with Tech-Enabled Consulting from Galago.

— Identifying opportunities or project areas for preservation, connectivity, and/or habitat uplift.

Overall data deliverables provided an online mapping application to visualize results allowing the client to make strategic decisions to enhance land management, implement sustainability strategies, and minimize environmental impacts to sensitive habitats.

Aspect of Work that Relates to Sustainability:

Galago endeavors to radically digitalize and transform how we work with clients to deliver greater insights and measurable sustainable impact. Combining this work with Ramboll's ecological experts creates a unique opportunity to deliver on Ramboll's Partnership for Sustainable Change Strategy and provides the unifying theme of biodiversity and ecosystem enhancement. By using a combination of remote sensing technology, strategic data processing, and traditional on-the-ground ecological assessment Ramboll was able to direct large scale site evaluation and establish a biodiversity quantification baseline to inform future land management.