

Rugged Terrain

Testbed Site Field Guide

Headwaters Tech Hub (HTH) Testbeds offer distinct environments, including varied terrain, controlled settings, and advanced connectivity, designed to help partners test and demonstrate near-commercial products in real-world conditions. These testbeds specialize in smart photonic sensing systems with applications in natural resource management, national defense, precision agriculture, wildfire resilience, and disaster prevention.



UAV Sensor Validation



Wildfire Resilience



5-mile BVLOS Operational Radius



Environmental Sensing



Spring/Fall Prescribed Burns



2,000 ft AGL FAA Waiver



103 Beds Onsite



GNSS-Enabled Centimeter Level Accuracy



Forest Robotics

FIELD GUIDE HIGHLIGHT

LEF's controlled environment and flexible regulations make it one of the few testbeds in the country that supports real fire movement and UAS operations at this scale.

LUBRECHT EXPERIMENTAL FOREST (LEF)

- Rugged Terrain
- Fire & Forest Tech
- Advanced Autonomous Systems Operations
- 30 miles east of the University of Montana & Missoula, MT
- 21,432 acres
- Airspace up to 2,000 feet above ground level (AGL)



KEY CAPABILITIES

- Biannual prescribed fire events
- Survey-grade geospatial accuracy (RTK, PPK, CORS)
- Integrated mission control center for autonomous systems operations
- Expansive UAV fleet
- Multiple UAV platforms with advanced payloads (LiDAR, RGB, multispectral, & thermal)
- Remote operational support with Starlink, solar panels, battery packs, generators, & radio systems
- MesoNet stations for precision climate data
- Three flux towers continuously measuring carbon, water, and energy exchange between the land surface & atmosphere in real time for rigorous ground truthing
- Access to world-class researchers

Lubrecht Experimental Forest (LEF) Rugged Terrain & Fire-Ready Research

University of Montana



Biannual Live Prescribed Burns

Safely test fire-resilient technologies and autonomous systems under real fire conditions—without restrictive regulations.



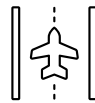
Integrated Mission Control Center for Autonomous Systems Operations

Coordinate, monitor, and manage autonomous systems and sensor deployments directly from mission control.



Advanced UAS Fleet & Sensor Payloads

Access to NDAA-compliant BVLOS, VTOL, fixed-wing, and multirotor platforms equipped with LiDAR, multispectral, and high-resolution RGB payloads for mapping and data collection.



FAA Waivers for 2,000 ft AGL & 5-mile BVLOS

Provides high-altitude and extended-range testing with comprehensive airspace visibility—Remote ID, ADS-B, and phased-array radar fused into a common operating picture—ideal for calibration, mapping, and fire operations.



21,432 Acres of Ecologically Diverse Terrain

Test across real-world environments—forests, meadows, ponds, prior thinning and burns of specific ages, elevation changes, and extremes in temperature that simulate challenging use conditions.



Robust Connectivity Infrastructure

Real-time data collection and communications enabled by fiber internet, WiFi mesh, and Starlink.



Centimeter-Grade GNSS Accuracy

Sensing systems using RTK/PPK from a dedicated GNSS CORS. Robust centimeter positional accuracy, crucial for advanced sensors, robotics, and drones.

FIELD-TESTED VALUE

Lubrecht Experimental Forest is one of the most advanced natural testbeds in the country for UAV, robotics, and sensor validation in dynamic, high-elevation terrain. With over 21,000 acres of forested slopes, open meadows, and microclimates, LEF offers unmatched access to real-world wildfire, forestry, and environmental research conditions. FAA-approved for Beyond Visual Line of Sight and high-altitude UAV flights, the site supports

large-scale aerial missions, live prescribed burns, and centimeter-grade positioning through survey-grade GNSS with RTK/PPK and CORS access. Robust infrastructure, including a centralized mission control center for autonomous systems, reliable connectivity, and on-site lodging, makes LEF a fully equipped basecamp for developing, refining, and validating next-generation sensing technologies.




Cost offsets available for projects that benefit the regional photonic sensor ecosystem.


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