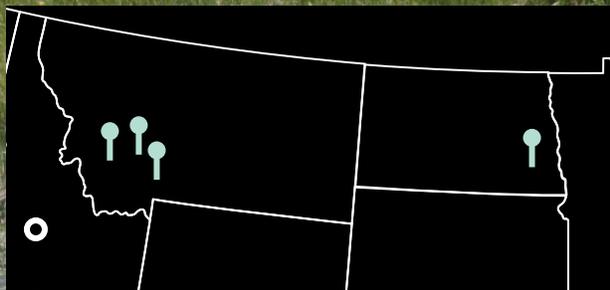


HEADWATERS TECH HUB

SMART PHOTONIC SENSING



Testbed Site FIELD GUIDE



ABOUT HEADWATERS TECH HUB (HTH)

Headwaters Tech Hub unites research institutions, startups, and industry to accelerate smart photonic sensing systems. Our testbeds provide rugged, real-world environments to develop, validate, and scale technologies in defense, disaster resilience, environmental monitoring, and precision agriculture.

Each HTH testbed site offers unique terrain, technical infrastructure, and regulatory flexibility for rapid innovation—from underground tunnels to high-elevation forests and open farmland. Together, these sites form a powerful ecosystem for testing and deploying next-generation sensing technologies.

LEF – Lubrecht Experimental Forest

Rugged Terrain | Fire Tech | Aerial Robotics

Location: 30 miles east of the University of Montana and Missoula, MT
Size: 21,432 acres | Elevation: 6,000+ ft

Key Features:

- FAA waivers for 2,000 ft AGL & 5 mile BVLOS UAV operations
- Biannual live prescribed burns with low regulatory barriers
- Centimeter grade GNSS accuracy using RTK/PPK corrections
- Onsite drone workshop, UAS fleet, & sensor payload lab
- Fiber, Wi Fi mesh, and portable internet infrastructure

Ideal For: Fire resilience, aerial mapping, robotics, AI/ML training, sensor testing



UMEC – Underground Mine Education Center

GPS-Denied Environments | Mineral Access | Subterranean Robotics

Location: Montana Technological University campus in Butte, MT
Underground Access: 3,000+ ft tunnels | Surface: 150 acres

Key Features:

- Underground UAV operations in confined tunnels with Wi-Fi
- Submerged, dry, and wet tunnel environments
- Real-world blasting events and mine tailing samples
- Surface test terrain with wide temperature and elevation swings
- FAA Class E airspace & regulatory flexibility

Ideal For: Autonomy systems, photogrammetry, critical mineral sensing, subterranean navigation

Lutz Farm

Precision Ag | Sensor Development | Crop Innovation

Location: 12 miles north of Montana State University and Bozeman, MT
Size: 600 acres + 12,000 acres across MT (via MAES Network)

Key Features:

- Controlled stress environments for crop & livestock trials
- Multispectral and thermal UAV sensing
- IoT enabled infrastructure with LoRaWAN (planned)
- Access to diverse climate zones for scalability
- Real time analytics and machine learning platform (planned)

Ideal For: Ag tech validation, precision agriculture, breeding trials, livestock tech



Grand Farm Innovation Campus

High Visibility | AgTech Demo Hub | Data-Rich Trials

Location: 24 miles west of Fargo, ND
Size: 590 acres

Key Features:

- 0.5-100 acre curated field plots with advanced data tools
- Support for custom field trials and management
- 25,000 sq ft event space with lab and demo infrastructure
- Access to Grand Farm's network of growers, researchers, and industry leaders
- Thousands of annual visitors and national visibility

Ideal For: Commercialization, outreach, demo-ready tech, precision ag innovation

READY TO PARTNER WITH HTH?

- Test in natural, scalable conditions with expert support
- FAA waivers, flexible regulations, and built-in infrastructure
- Accelerate deployment of technologies that protect land, life, and livelihood

CONTACT: John Beltrone

Testbeds Development Lead

406-868-8764

Johnbeltrone@headwaterstechhub.us