Welcome to ATF with Conservation X Labs

Esther Duke | Chief Operations Officer
Coalitions & Collaboratives | co-co.org

Visit CO-CO.org or AftertheFlames.com

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I'm a

1
Student
1
Consultant
4
Non government entity or nonprofit
3
Local government employee
2
State government employee employee
1
Federal government employee employee
2
Other

14

What geographic location are you joining us from?

cle elum
eastern us
springs
pacific northwest
colorado
jackson wy
utah
grand junction
washington
pnw
kauai
southwest
tennessee
western washington

22

What do you hope to get from this webinar?

Innovative ideas

Stay in touch with ATF activity

Learn about remote sensing and post fire seeding en masse

Learn best practices

Creative fire mitigation/restoration ideas.

Ideas for moving ahead with our program for post fire flooding

Introduction to new technologies/approach es

Understanding how to better engage with partners on innovative post-wildfire strategies and solutions.

What do you hope to get from this webinar?

All knowledge is appreciated:)

Creative ideas on wildfire recovery

I'm excited to see progress from concepts to large larger scale testing

Learn sh*t

Sense of optimism!

Continue learning

Fire restoration

15

Firelance

Fire Safety Technology

A collaboration between Envisioning Labs and San Juan Islands Conservation District (SJICD)

October 2025

Summary

Deploying a sensor suite that allows agencies and fire districts to monitor fires during and post fire mop up to increase safety around reignition and increase public investment in prescribed fire.

- Fire in the San Juan Islands (history, cultural fire, restoration)
- San Juan Islands Conservation District (SJICD) experienced a post burn reignition in 2023
- Community concern for safety: still needs to be addressed

State of Today

According to the National Interagency Fire Center, 2,187,642 acres of prescribed fire occurs annually on average over the last 10 years.

Every year, an average of **7 million acres burn from wildfire** and **nearly 6,000 structures are lost** to Wildland Urban Interface (WUI) fires in the United States.

Research on Public Approval for Prescribed Fire (Northern Rockies Fire Science Network)

Public “approval” of prescribed burning as a management tool is *relatively high* (80-90% in a range of surveys) though only ~30% of respondents in some studies gave *strong* approval (vs more moderate approval).

Research on Concerns with Prescribed Fire (USFS Research and Development Program)

Concern about a burn “escaping”, and trust in the implementing agency were consistently key factors in shaping concerns.

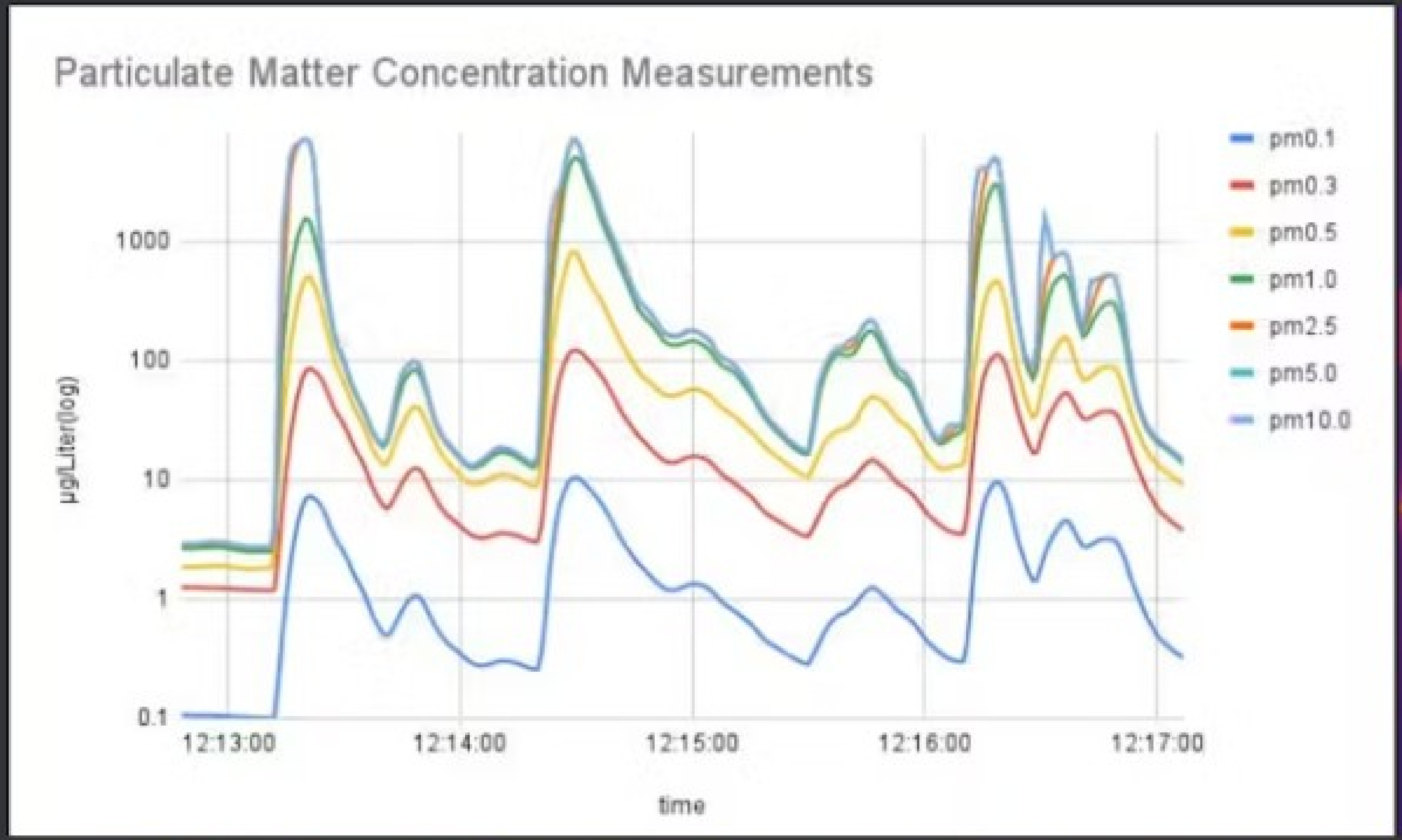
Data on Escaped Prescribed Fires

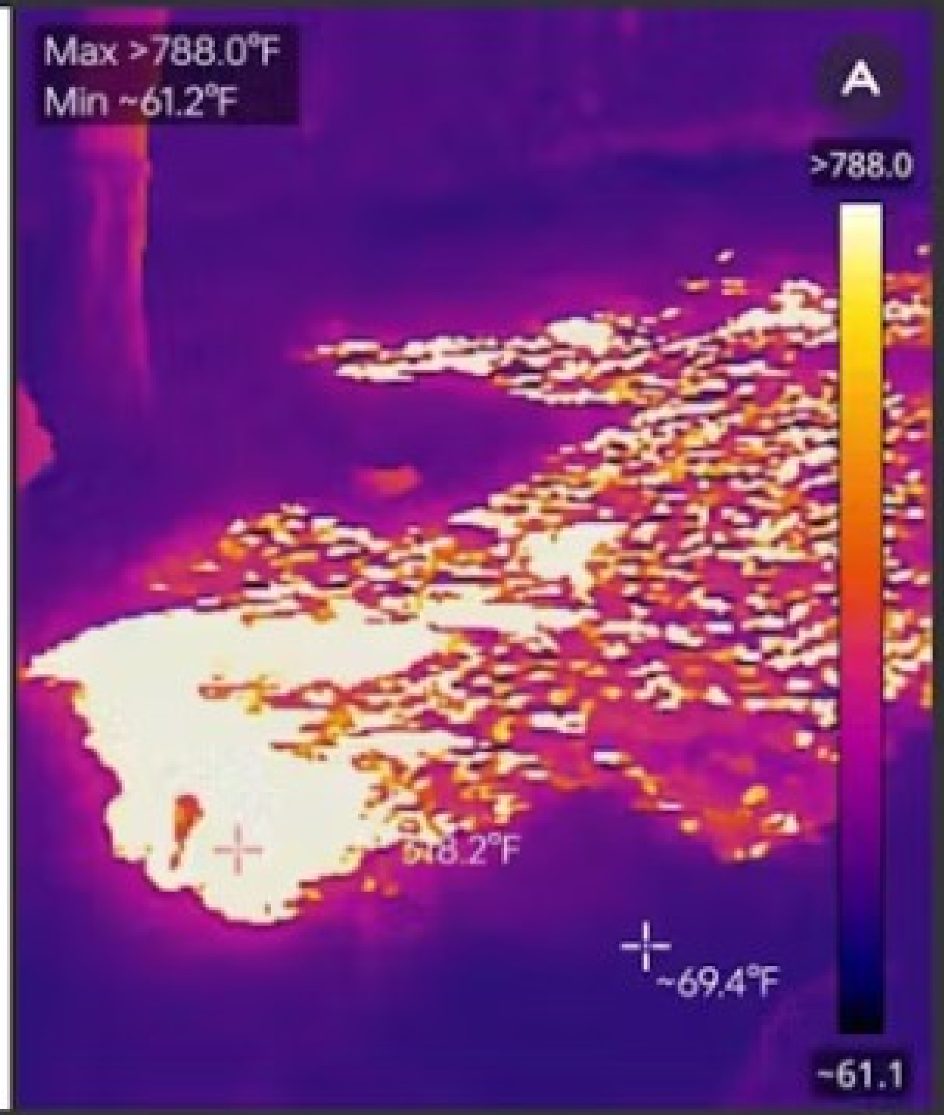
United States (USFS burns): The Government Accountability Office reports the U.S. Forest Service conducts ~4,500 prescribed fires a year and **about seven escape**—i.e., ~0.16%—in a typical year.

A research synthesis for **California** found **~310 escaped prescribed fires from 1991–2020 (~10/yr on average)**

Post Burn Considerations

1. Safety
2. Cost of monitoring
3. Cultural resource
4. Analysis of the burn goals and objectives
5. Community buy-in





What Happened

Performed 3 rounds of sensor fusion testing during grassland burn on San Juan Island.

Sensors Tested

1. Particulate matter (PM)
2. Carbon monoxide (CO)
3. Thermocouple probe (Temp)
4. Infrared and visible light cameras (IR & VIS)

Observations

For remote detection: PM, IR & VIS and perimeter Temp are most promising.

For monitoring prescription conditions: PM, Gas, IR and Temp probes are promising.

To test in future burns: VOC & CO_2 Gas sensing and Fiber Optic Cables for remote perimeter detection.

A New Direction: Linear Sensing

Based on feedback from the SJICD, we are now exploring **Distributed Temperature Sensing (DTS)**.

DTS uses a fiber optic cable to provide continuous temperature readings along its entire length. This technology offers the potential for effective perimeter monitoring, both on the surface and underground, and it can be made robust and capable to withstand fire conditions.

Planning for Second Round of Prescribed Burns

Sensor fusion analysis & user research

The team is currently analyzing sensor data collected during the first burn.

We are also conducting market analysis and working with fire personnel across North America to perform User Research.

Prototyping a linear distributed temperature sensing (DTS) system

During our first field testing we uncovered a new beneficial sensor system to detect broadcasting and creeping effects: fibre optic DTS

We are now creating a prototype to be tested in Autumn during the burns.

500+ pile burns to be conducted in the fall

In Mid-october San Juan Island Conservation District will begin leading over 500+ pile burns.

Envisioning Labs will train SJICD personnel to use sensors. This phase will provide more user feedback on sensor workflows from the field.

Thank you!

For inquiries, please contact:
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Kai Hoffman-Krull (kai@sjicd.org)

envisioning labs

San Juan Islands Conservation District
San Juan County, Washington

Grand County Wildfire Council

Agenda

History and Structure

Large Projects and Programs

Funding vs. Acreage vs. Need

Fire Grand Challenge




History and Structure

- 501(c)(3) in 2015
- Volunteer Based
- Mission and Vision
- Board of Directors
- Executive Director and Mitigation Specialist
- Committees
- Grand County Community Wildfire Protection Plan – GCEmergency.com



GCWC Large Projects and Programs

- COSWAP-DNR Projects
- Roads Safety Projects
- OLRT – Local Sales Tax
- Cost Share – HIZ
- Cost Share – Strategic Fuels
- Community Chipping Days
- Fire Restrictions
- Address Signs
- Community Education


An ounce of prevention is worth a pound of cure.
Benjamin Franklin
quotefancy

East Troublesome – October 21


Estes Park
Grand Lake
Allenspark
Boulder
Granby
Grand
© 2021 Google
Google

Community Impact

- 571 = Number of homes and outbuildings destroyed
- 366 = Number of destroyed homes
- 205 = Number of destroyed outbuildings
- 17,000+ acres of private property burned
- 180,000 +/- acres burned on public lands

- 11% = No insurance
- 38% = Need Financial Assistance
- Grand Foundation raised over $3.8 million and awarded out over $1 million for community recovery
- GCWC became clearing house for funds for post-fire mitigation projects

Fire Grand Challenge – Conservation X Labs: GCWC (Colorado) and Flash Forest (Canada)

- Matchmaking Process
- Pilot Acreage
- Flash Forest GIS
- Logistics
- 2026 and Beyond

Thank you

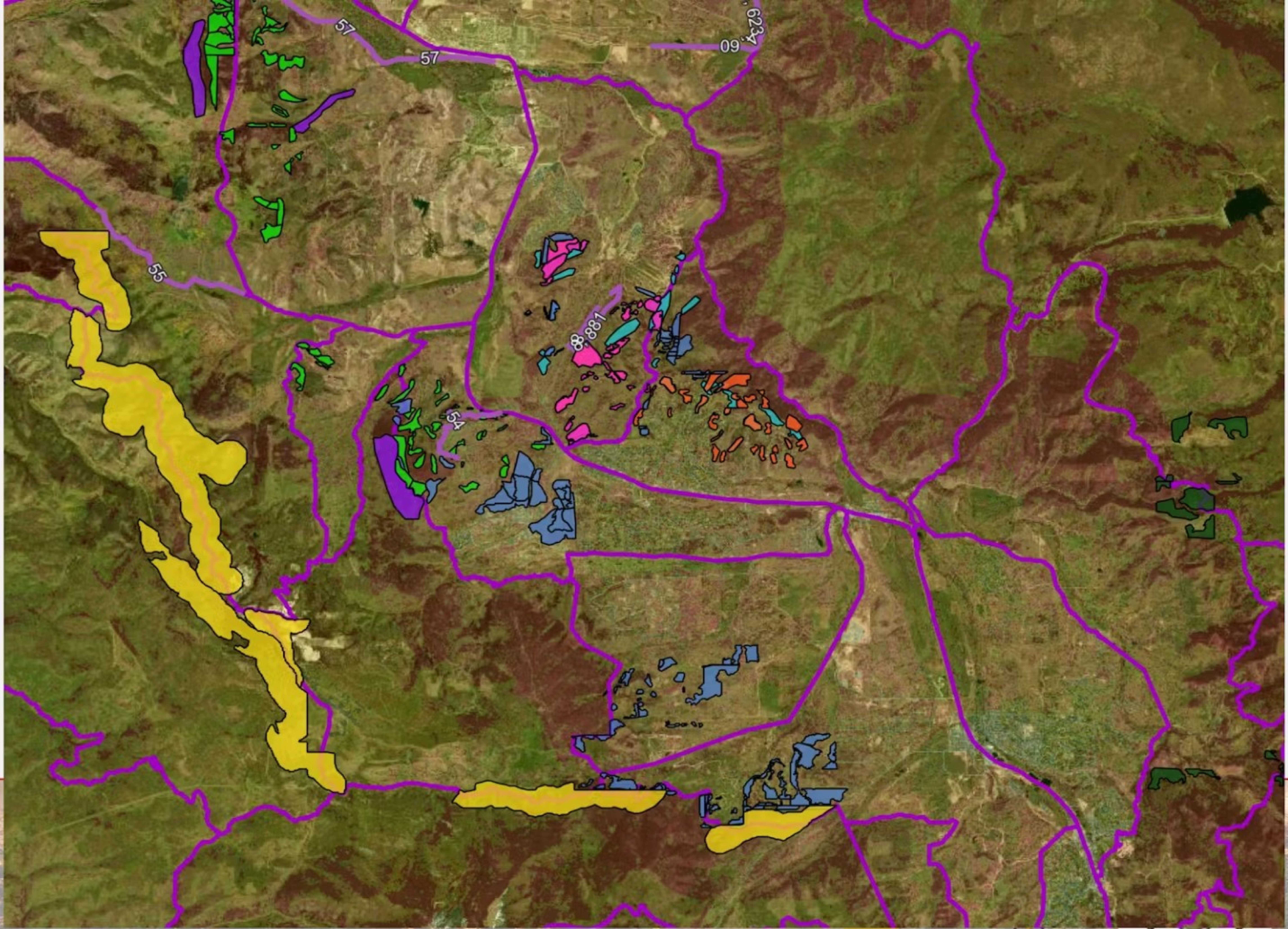
Grand County Wildfire Council

BeWildfireReady@gmail.com

BeWildfireReady.org

Grand County Post Fire

- Planning
  - CMAT/ CPAW/ CWPP
  - GIS Project
  - Mitigation Priorities Group
  - WUI Code?
- Response
  - Joint Wildland Team
  - New Station
  - DFPC Shadow Mtn Mod
  - State CMAS



COCO ATF

Grand County Wildfire Council
PREVENT PREPARE SURVIVE
BeWildfireReady.org

Flash Forest

Grand County Restoration Project:

Grand County Wildfire Council

Flash Forest Inc.

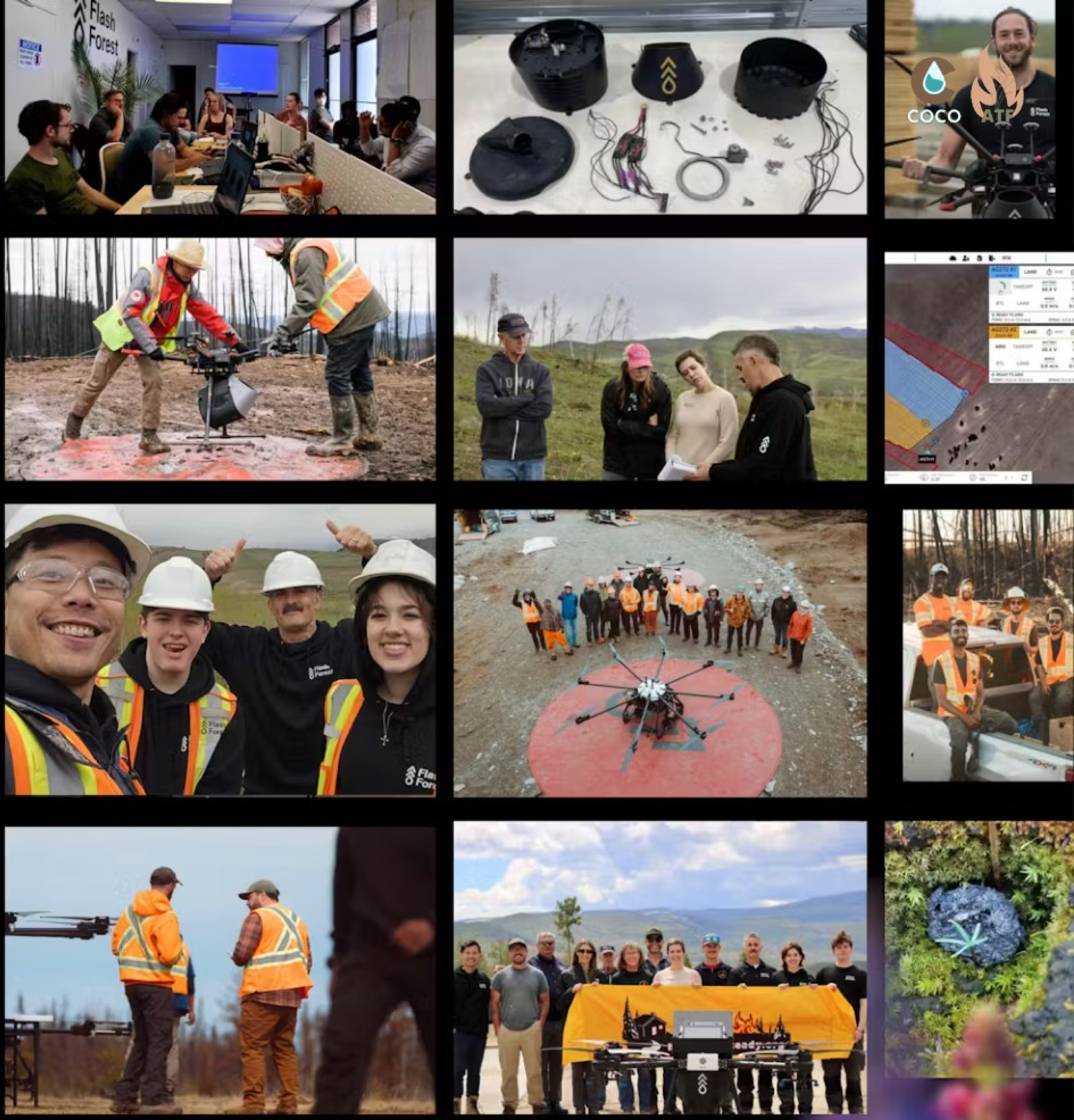
Marc Apduhan

Our Story

Five years on: we’re on our mission to holistically plant **1 billion trees and beyond.**

We’re a reforestation company that has **successfully used automation and technology to scale our seedpod + deployer solution** to plant in the millions in post-wildfire restoration and reclamation work.

Now, we’re focused on future wildfire-resilient forests. We use a biodiversity-centric, data-driven approach to rebuild healthy resilient forests with the right partners.

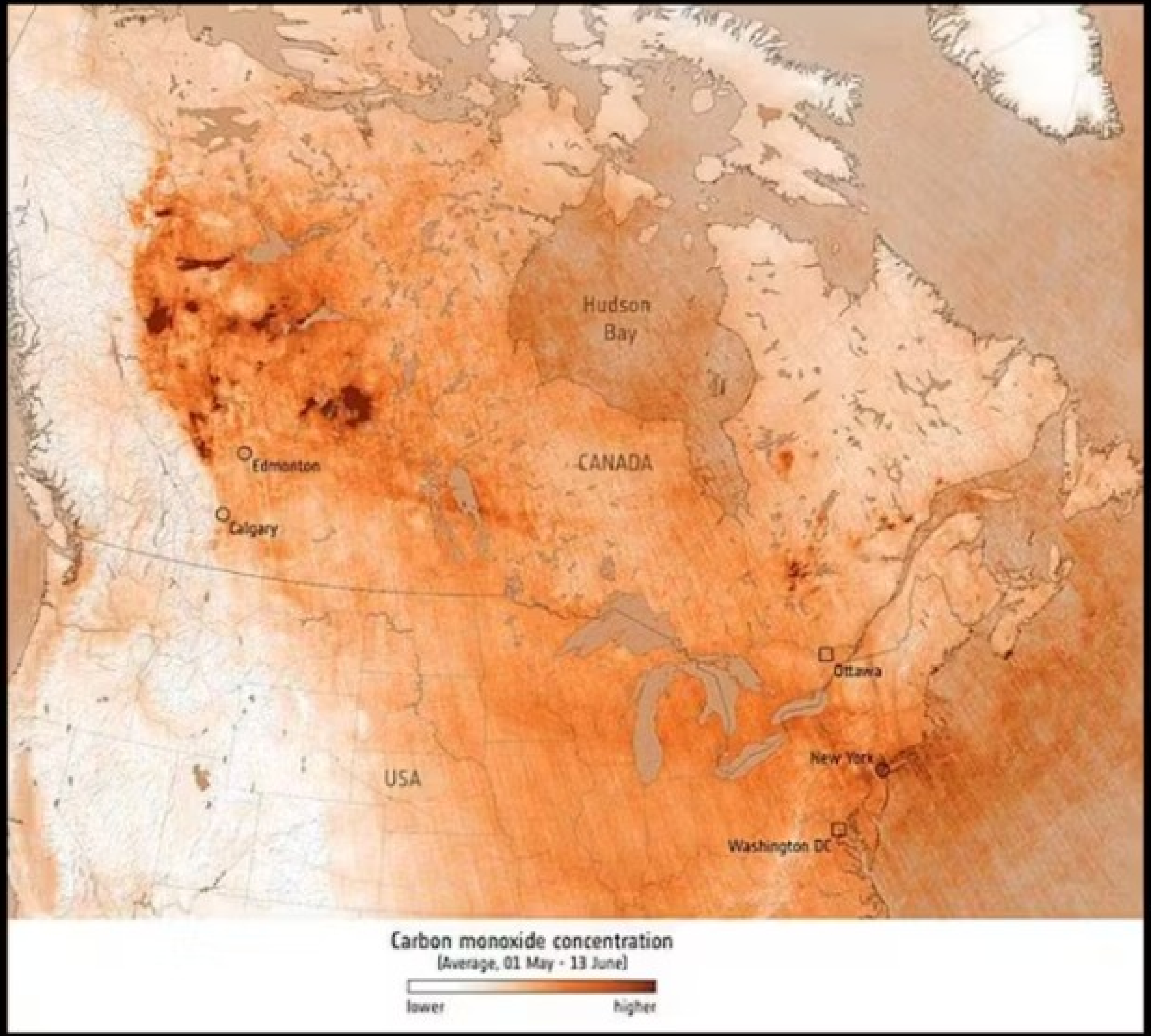


Addressing The Issue at its Core

To adapt Flash Forest technologies in today's issues, FF proposes three wildfire resilient transformative approaches in the context of restoration and post-fire rapid reforestation to really address the issue at its core:

- AI-Enabled Site Suitability Software + FTG Assessments;
- Next-Gen Hybrid (Pod and Seedling) and Drone Reforestation; and,
- Biological Seedpods for Native Conifers and Deciduous Species.

Map of carbon monoxide concentration caused by wildfire smoke



Wildfire smoke in Calgary overlooking Scotiabank Saddledome.

Flash Forest

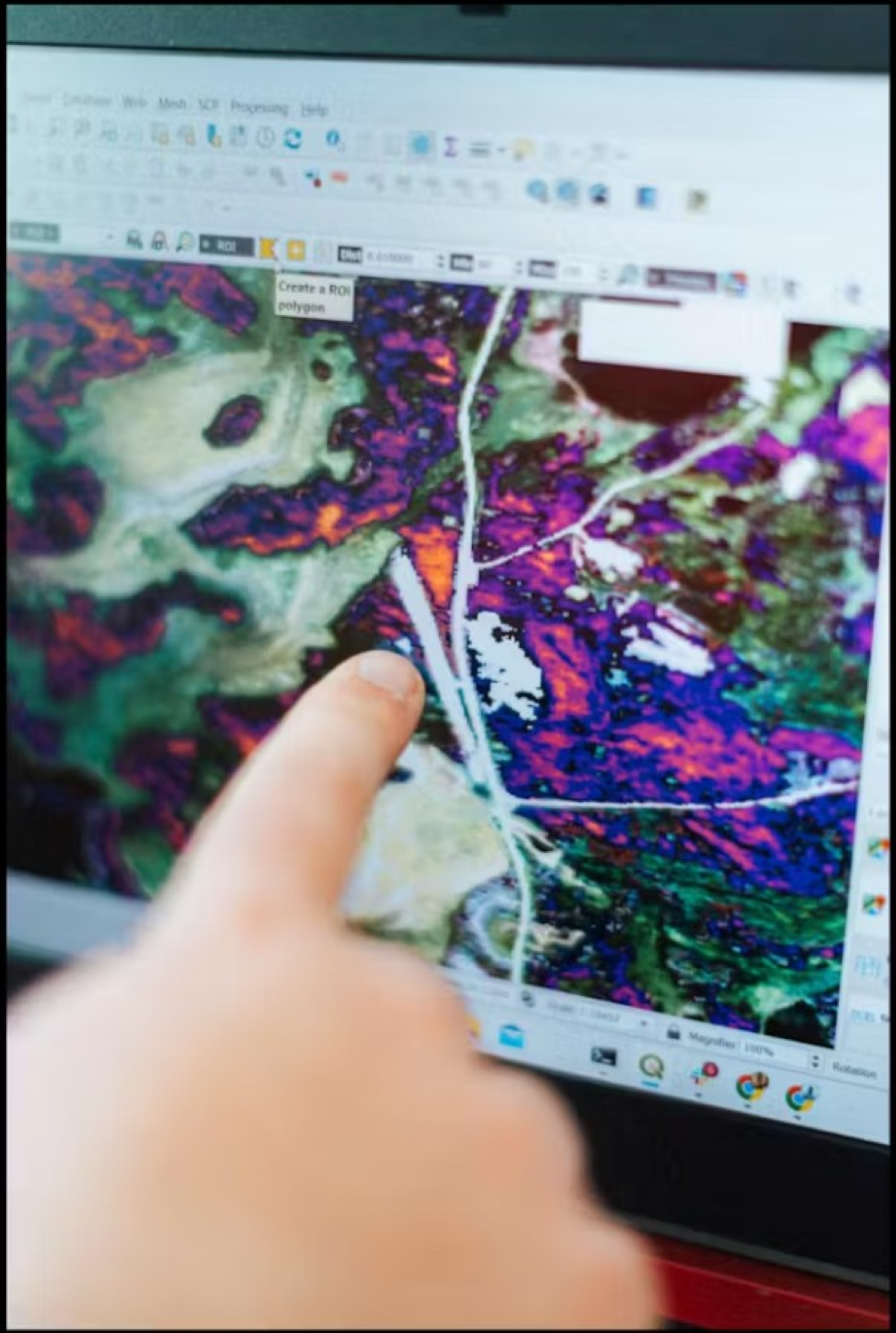
Technology Overview

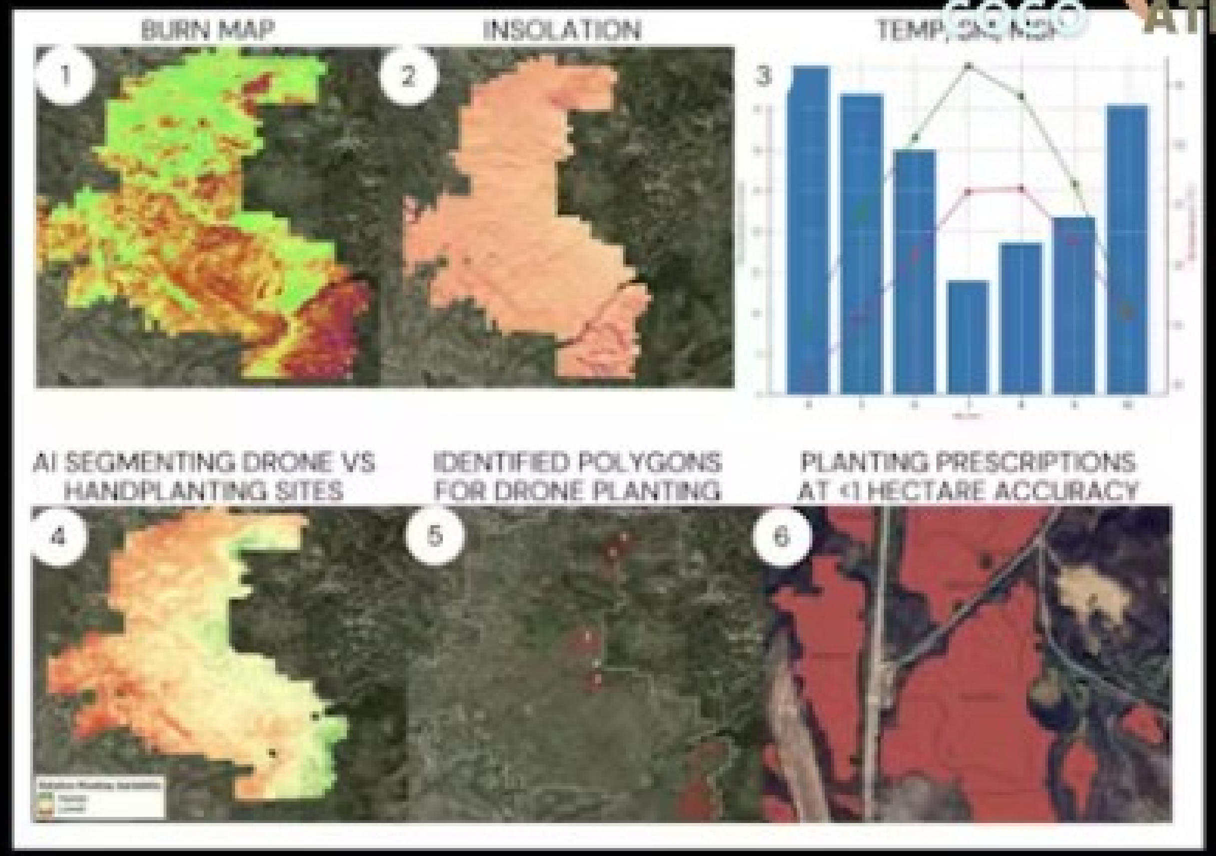
Fire Grand Challenge

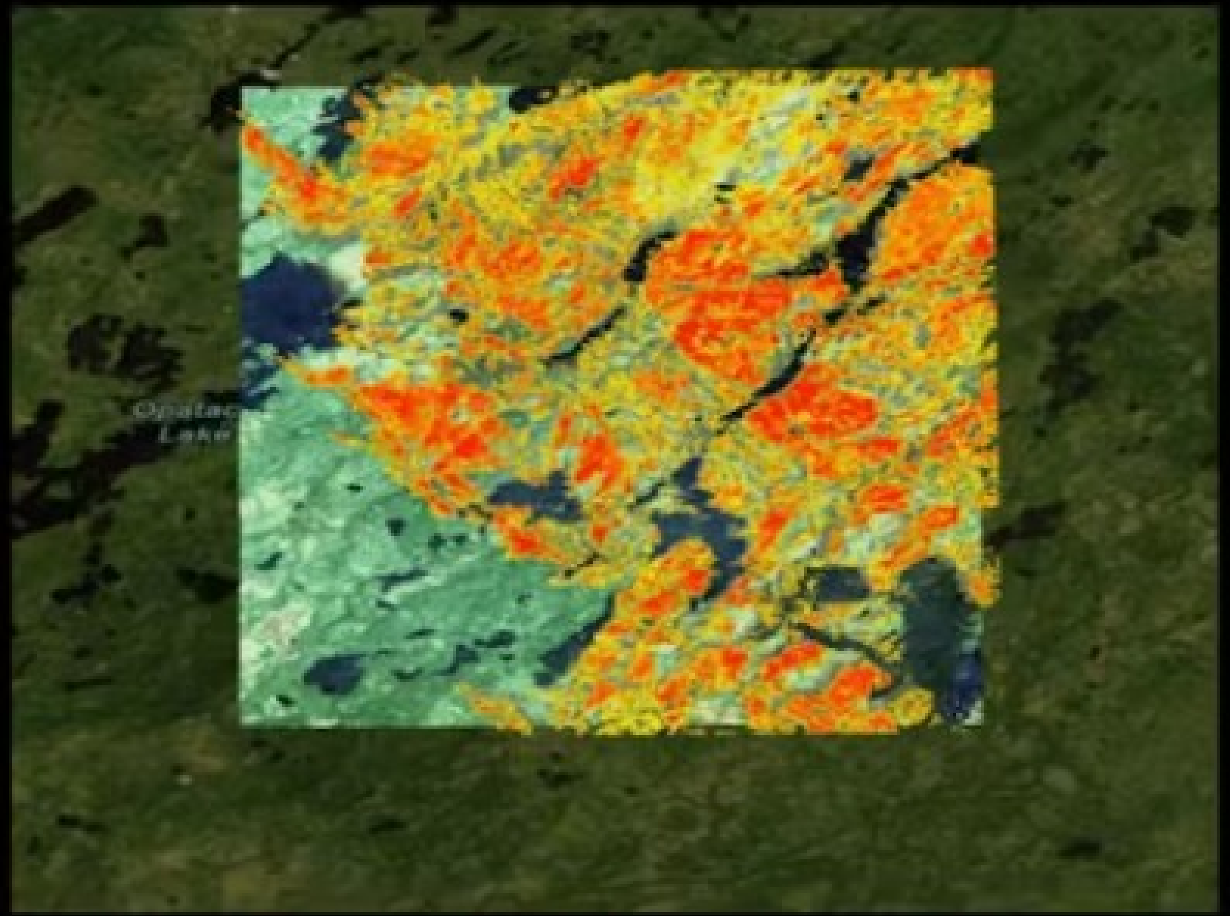
Software

Software Addresses: Where and How to Plant (Macrosites, Free To Grow, and Eco-regions)

- Maximize germination and minimize mortality;
- Acknowledging limitations in technology and cost;
- Observe from RGB, LIDAR, multispectral and reducing variability; and,
- Use seedling assessment data from our projects to refine the approach.

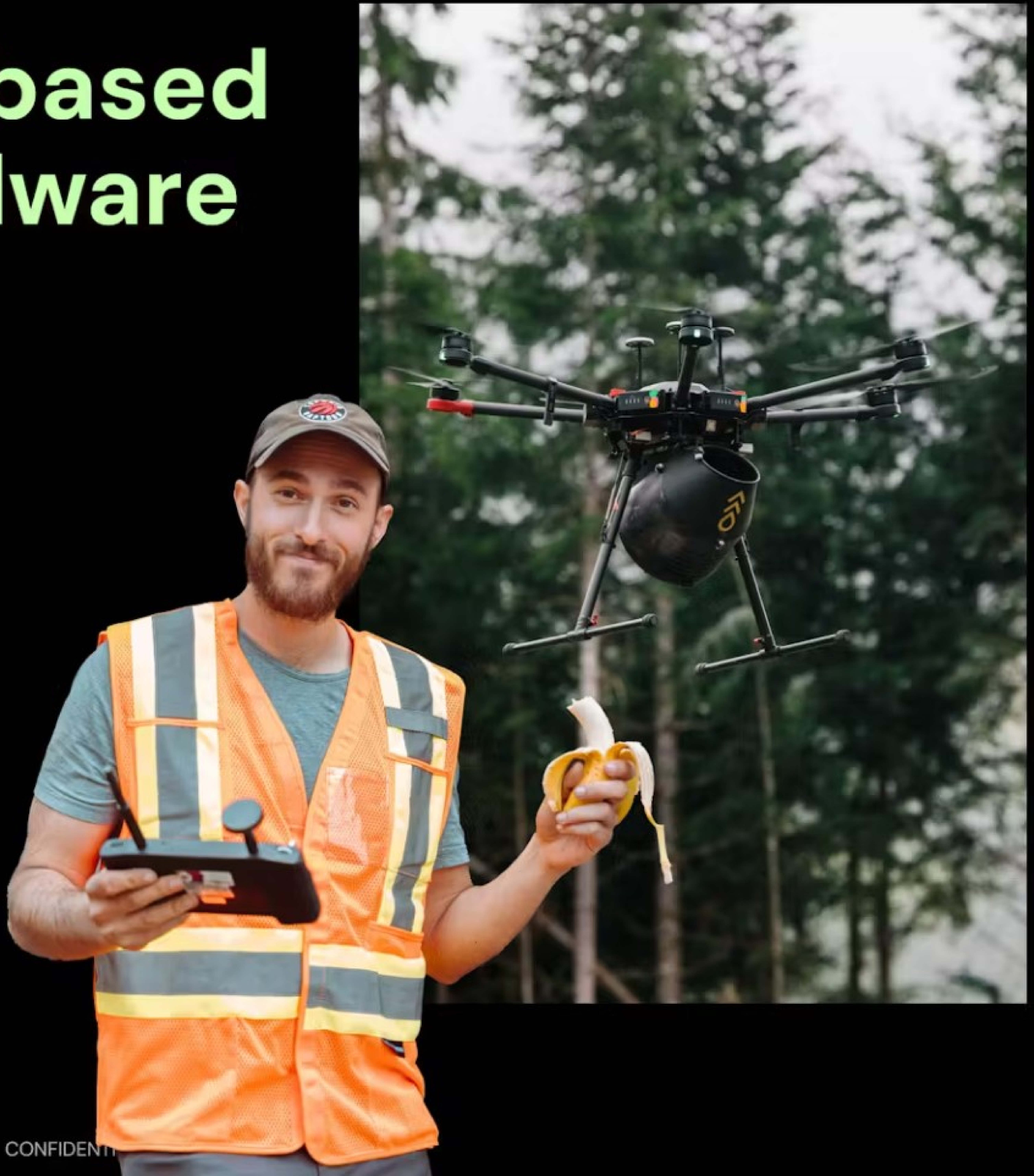


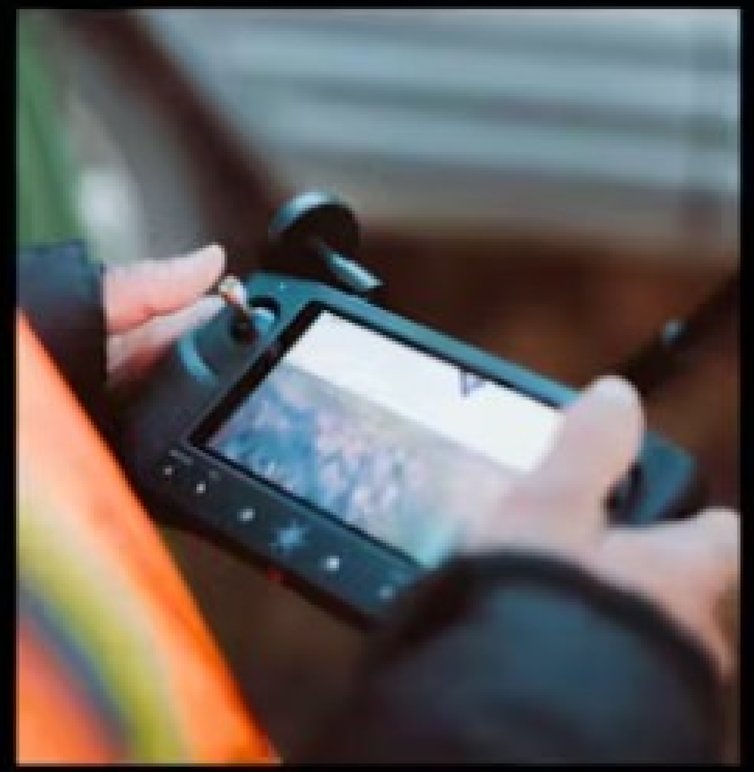


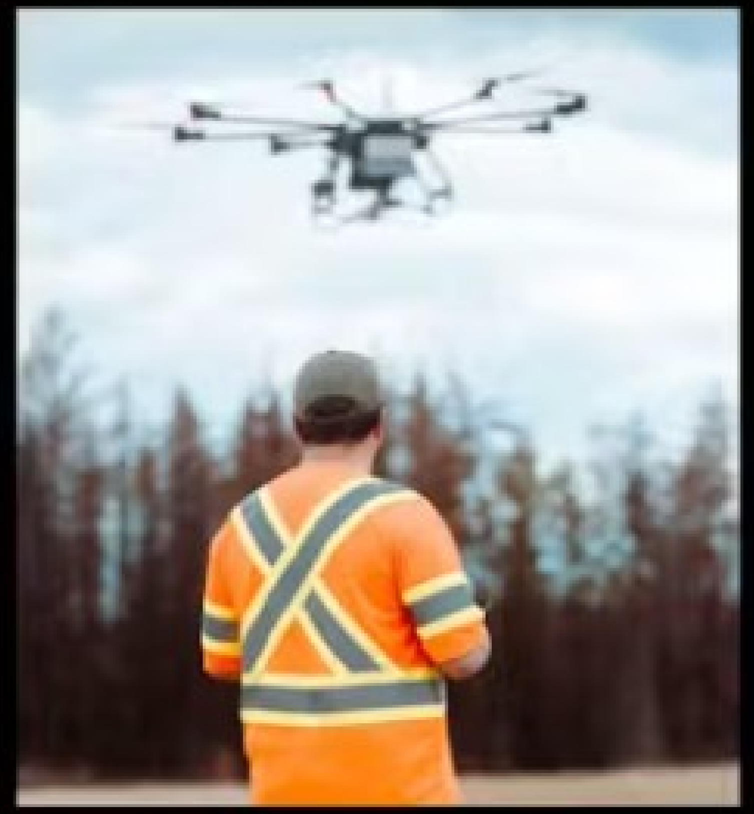


Drone and Land-based Deployment Hardware

- Aside from drones, what is the best methodology of planting for specific sites?
- From hybrid (hand planting and machine), air-based drone embedding, or perhaps automated land-based vehicle deployment systems?







Plant Science and Biodiversity

Biological R&D Addresses: What to Plant

- Based on persisting disturbances such as drought, disease, and wildfire;
- How can we restore wildfire ravaged ecosystems in a biodiversity-centric and increased resilience for forests?

2021

2024



A Holistic Approach

We are taking a holistic approach from years of trial-and-error from over 50+ sites throughout Canada, Asia and now USA to future fire resilient reforestation.

Software Can Address: Predictive Site Suitability on Where To Plant + Free To Grow Post-Planting

To maximize germination and minimize mortality, acknowledging limitations in technology and cost, from multiple sensors to reducing variability and free-to-grow assessments post-plant.

Hardware Can Address: How To Plant

Aside from drones, what is the best methodology of planting for specific sites? From hybrid, air-based drone embedding, or land-based disc-trencher deployment (first-of-its-kind) systems

Biological Can Address: What to Plant

based on persisting disturbances such as drought, wildfire to protect future forests, avoid gradual conversion from forest to grassland, promote biodiversity, and increase resiliency in a rapidly changing Climate.

Flash Forest

Fire Grand Challenge

Fire Grand Challenge

Next Steps

It Takes A Village

The team

From our community, underserved, non-profit, academic, and technology partners/clients/learnings… We have accomplished much over the past 5 years.

UBC
Air transat
MOGO
MOLSON COORS beverage company
monday.com
MITSUBISHI HC CAPITAL CANADA
LAFARGE
ECOSIA
ONETREEPLANTED
GRAND COUNTY WILDFIRE COUNCIL · SURVIVE · BEWILDFIREREADY.ORG
AIR MILES
ICUBE UTM
NORDIK WINDOWS & DOORS
ACQUIA
curaleaf
TELUS
Centre for Climate and Business Solutions
native
CONSERVATION X LABS
Saplin

Fire Grand Challenge

August 8, 2024
Challenge Launch

August 8 - December 9, 2024
Open Period

March 25,2025
Finalists' Announcement

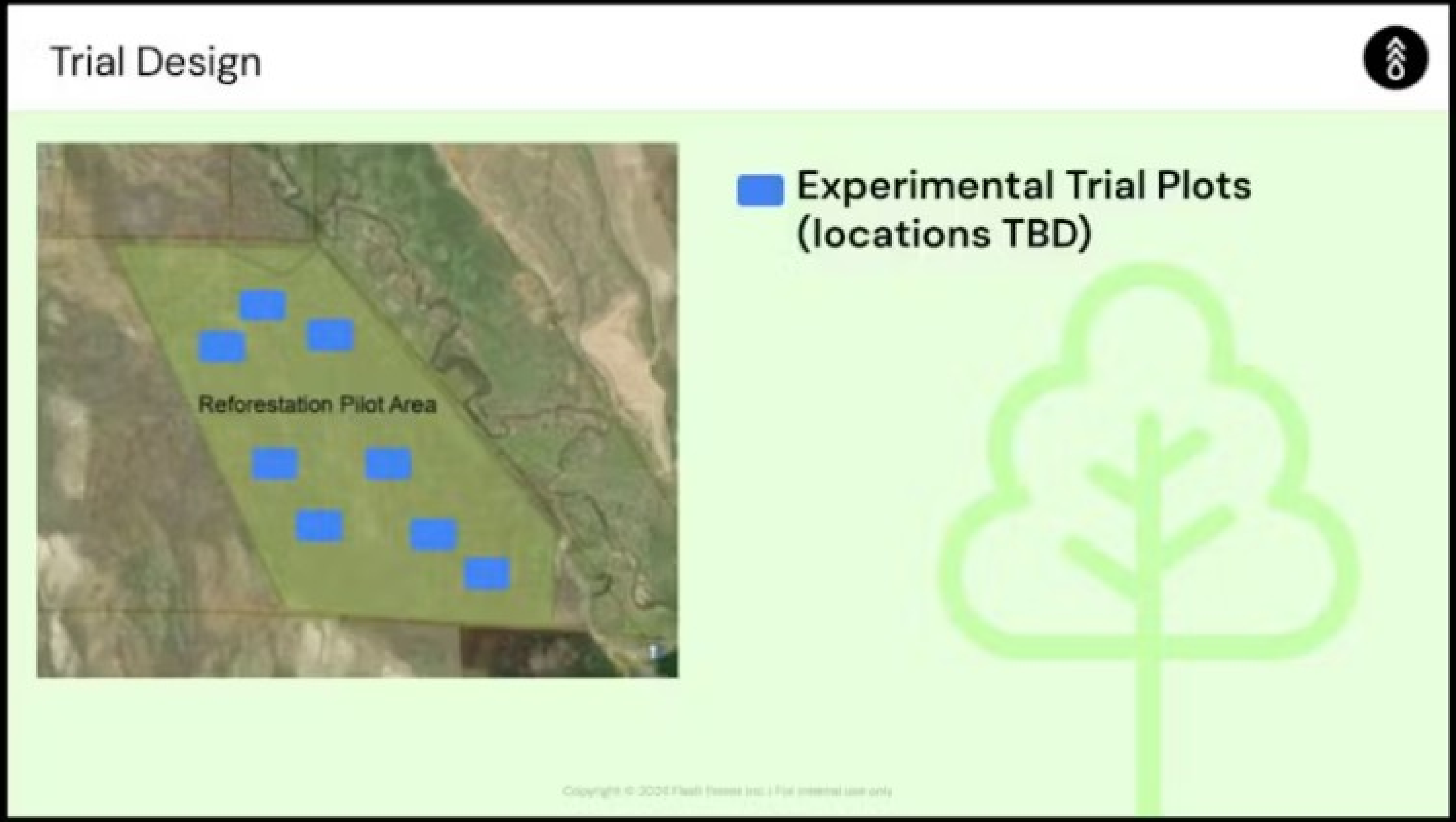
March-November 2025
Field-testing and acceleration phase

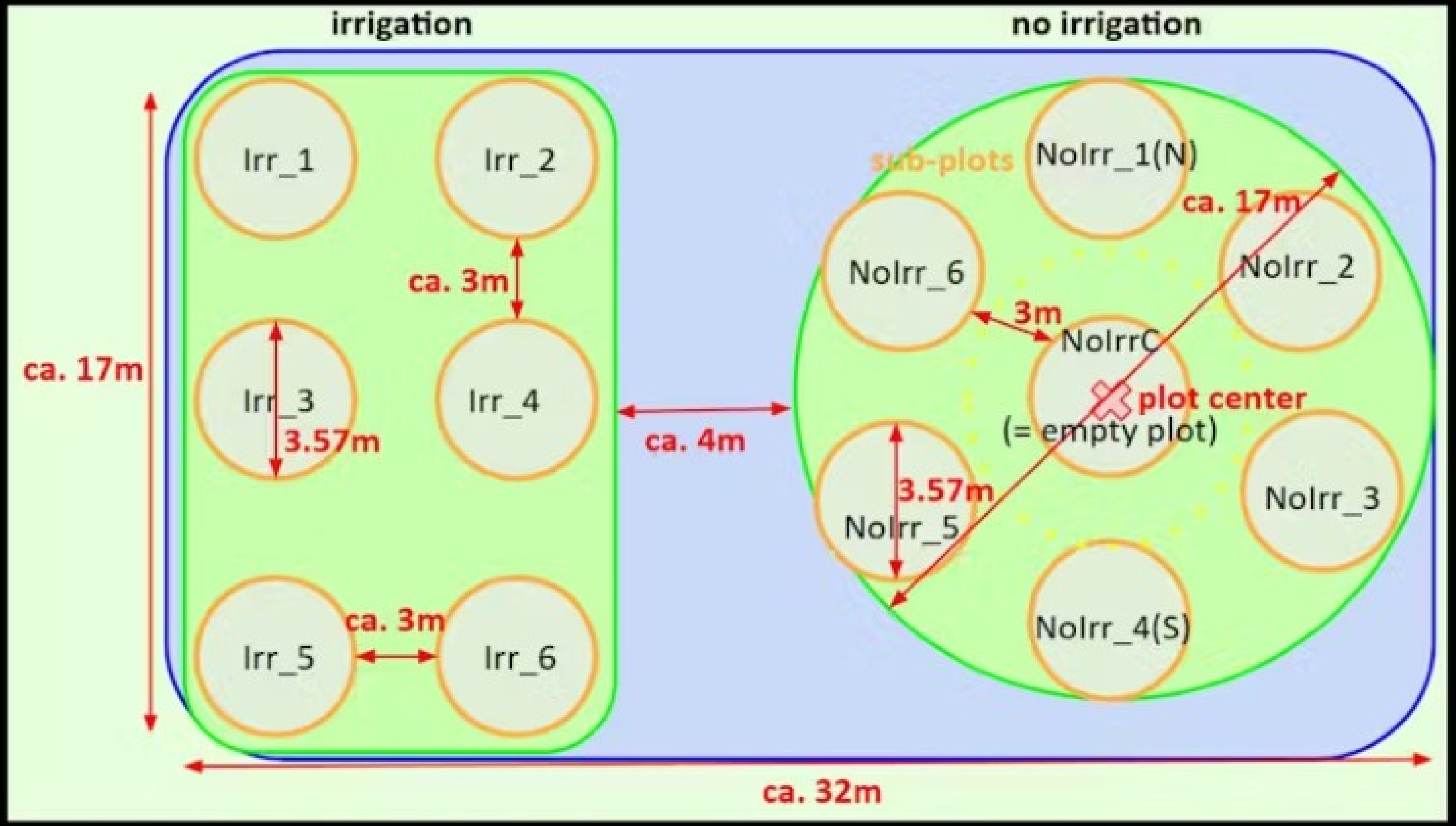
Winners' Announcement

- **Research Question**: How does the seed pod approach developed by Flash Forest perform under the specific circumstances for Grand County (5 years post burn, variable soil, low-precip climate, etc.)?
- **Summary of the problem**:
  - First-of-its-kind planting in Colorado;
  - New (and familiar) species involved in this trial;
  - To maximize the success rate of scaling reforestation in this area beginning 2026, we want to test the pod performance compared to bare seeds and natural regeneration. An irrigation treatment will be included to balance the missed precipitation due to the late planting date.
- **Hypothesis**: Due to the ideal conditions the seed pod technology creates for tree seedlings and the low natural regen of the site; tech increases the restoration success rate (i.e. survival of seedlings) compared to bare seeds and natural regeneration which is distributable via drone or hybrid

Fire Grand Challenge

- **Species**
  - Colorado Blue Spruce
  - Engelmann Spruce
  - Ponderosa Pine (requested by GCWC)
  - Corkbark Fir
- **Treatments**
  - Natural Regeneration vs. Bare Seeds vs. Embedded Pods vs. Dropped Pods
  - initial Irrigation vs. No Additional Irrigation
- **Timelines**
  - Kickoff @ Mar 25, 2025
  - Field @ Late May, 2025 (due to FGC logistics later than usual and typically early Spring)
  - Trial Assessments Prior to Sep 1, 2025 (due to FGC logistics + timelines, earlier than usual and typically after 4-5 months and another after 1 and 2 years)
    - August 25 - 28, 2025





Results From First Phase:

- Ideal planting **late Apr to early May** to maximize establishment rates.
- Increase drought-tolerant and biodiverse species in consultation with local forestry.
- Potential decision-making process (Go-No Go) for **land-based deployer and scarification, hybrid, or drone deployer pilot** with Flash Forest and partners.

NEXT STEPS?

Flash Forest x You.

Post-Fire Forest Restoration

Indicate Interest Via Survey

2026/2027

Local Planting Prescriptions

+ species Consultation + biodiversity focus and other factors

Hybrid Drone Or Land Efforts

Tree planting on behalf of organizations

Different models available, in-kind contributions including seed, contracting, and equipment

Government and Academic Participation

Canada, North America, and globally

Engaging government and academic partners to expand case study applications.

COCO ATP

Flash Forest

Questions & Comments

Will conservation x labs be sharing final project highlights and reports as projects conclude?

Detection & monitoring of fire after everyone leaves a burn is a great tool & resource. As this program grows out of testing- how accessible do you foresee these sensors being after a severe wildfire?

What are the costs associated with the sensor setup that is being recommended for post-fire re-ignition monitoring and alerts? Is this significantly cheaper than drones, satellites, Firebird, etc.?

Wishing I could share reactions on here... LOVE that GCWC/ Flash Forest partnership!

Does Flash Forest harvest seed from local sites when they reseed an area, and incorporate those into their seed pods? We've seen big differences in success in planting local seed versus non-local seed

This is a question for Flash Forest. I am curious if they are using any modeling platforms or their work is mainly hands on in field.

This is impressive and inspiring collaborative work! Fantastic and informative presentations - gratitude to ALL of your diligence & dedication. I'll continue following your work at each organization.

For Flash Fire: Do you have data that compares the success of your re-seeding vs natural regeneration longer term? How much earlier would you expect to see regeneration, and how much more?

Thank You

A recording of this webinar will be available at AfterTheFlames.com. You will also receive a follow-up email of the recording with links to any resources shared.