

To: U.S. House Natural Resources Subcommittee on Federal Lands

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Subject: Fix our Forests: How Improved Land Management Can Protect Communities in the Wildland-Urban Interface

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Thank you, Chairman Westermann and the House Natural Resource Committee, and the Subcommittee on Federal Lands Chairman Tiffany and the members of the Committee, for your work on the Fix our Forest Act which aims to making our federal response to wildfires more effective through the deployment of new technologies. I am excited about the opportunity to testify about opportunities for technology to reduce the risk and impact of increasingly frequent, destructive, and fast-moving wildfires, particularly those that impact the health and safety of American communities, our economic security, and our natural resources as this was the focus of my career as a wildland fire fighter.

I would also like to thank the men and women from Federal, State, Local, Tribal, and other organizations who are currently engaged in fighting and managing wildfires as the nation sits at Preparedness Level 3. It is only mid-June, and we are already seeing extensive resource mobilization across Alaska, the Great Basin, and the American Southwest. These men and women are the heart and soul of our nation's wildland fire organizations and every day they are tasked to make difficult decisions related to how they engage wildfires, balance risk, and carry out successful operations.

The escalating wildfire crisis facing our nation demands a 21st century response rooted in data, innovation, and collaboration. Effectively confronting this issue requires a national commitment to modern, data-driven tools and technologies—and public-private partnerships are emerging as a powerful pathway to meet that need. The Fix our Forest Act encourages the use of these unique partnerships.

### **National Need: Addressing the Wildfire Crisis and Capability Gaps**

Today's wildfires are growing more extreme in intensity and duration due to multiple factors, requiring vast resources and funding to manage them. The downstream economic impacts are immense when considering insurance property losses, infrastructure damage, economic impacts, and the growing costs of long-term recovery in communities impacted by wildfires. The growing negative impacts of severe wildfires and longer wildfire seasons highlight the critical need for more effective detection, monitoring, and response.

In 2018, while employed by the Forest Service at the National Interagency Fire Center (NIFC), I co-led a group of subject matter experts to identify capability gaps in our wildfire intelligence, decision support, and prediction systems. Our analysis concluded that the nation lacked an adequate system to detect, monitor, characterize, and report prescribed fires or wildfires in a consistent, persistent timeframe.

Within the context of wildland fires, the Incident Awareness and Assessment (IAA) program was developed, which involves a partnership of Federal and State capabilities that task crewed and uncrewed systems to detect and map prescribed fires and wildfires. This program is in practice today as the Bureau of Indian Affairs, Forest Service, California, Colorado, Oregon, and Washington all share aviation resources across political boundaries to support tactical fire mapping and detection. Camera systems have been placed on existing lookout towers and established at new locations to increase viewsheds and enhance situational awareness. Unique systems such as stratospheric balloons were evaluated to provide thermal images of wildfires and to extend communication channels for wildland firefighters who work in remote, rugged, and disconnected environments. However, these systems have limiting factors and still do not provide nation-wide persistent wildfire detection and monitoring.

Seven years later, I am excited to see the interest of this Committee and Congress in addressing this critical technology gap. At the same time, we have new and successful models of public-private partnerships that demonstrate the ability of our commercial and technology base to combine with private and philanthropic organizations to rapidly develop and deploy infrastructure across our nation.

### **Introduction – Personal Perspective**

In my two decades as a wildland firefighter, I participated in and observed advancements in technology that focused on early detection, fire monitoring, and enhanced fuel, fire spread, and weather modeling. However, I saw promising technologies such as firefighter tracking struggle for implementation as agencies were forced to shift priorities based on changing fire conditions, budgets, and resources. I also witnessed bottlenecks and barriers to these and other technologies due to self-inflicted bureaucracy. Time after time, this led to missed opportunities in which the Federal government could have stepped into a leadership role while collaborating with State and Local entities to build partnerships and provide much needed change in the face of the growing wildfire crisis, but each time, this teamwork failed to materialize.

Early in my career, I learned that Interagency Cooperation was the key to successful Fire Management. The Federal Government could not tackle the wildfire crisis and the associated technology gap alone. To close this gap, diverse resources and expertise are

needed. In recognition of this, I worked extensively to build partnerships with States such as Alaska, Colorado, California, Washington, Texas, Florida, and local organizations. I established agreements with numerous other Federal agencies such as NASA, NOAA, DOE, and the National Guard. These partnerships provided valuable experience, expertise, and resources as well as different perspectives that led to a dramatic and rapid impact on wildfire firefighting and management.

However, today there are no mechanisms that facilitate public-private partnerships, which I believe are critical to tackling technology evaluation, adoption, and implementation for the nation's wildland firefighters. We've all seen these partnerships succeed in other areas of the federal government – from space launch to the development of advanced computing.

### **An Opportunity - Public-Private Partnerships**

Today, we have more advantageous conditions for change than ever before. The United States has the most advanced commercial space and information technology industry to ever exist. We have mission-oriented philanthropies and non-governmental organizations that can jump start our investment in resilient wildfire communities and needed technologies, and we have a fire community that is ready to leverage these technologies.

Encouraging partnership and collaboration among industry, state and federal agencies, and the non-profit and philanthropic community will enable the United States to rapidly improve our ability to address the threat of destructive wildfires.

The benefits of encouraging and leveraging public-private partnership include:

- **Maximizing Limited Resources:** Nonprofits can provide tools, expertise, and support at low or no cost, helping state agencies make the most of limited personnel and budgets. Earth Fire Alliance can increase access to new technological capabilities without burdening existing budgets or staff.
- **Flexibility in Innovation:** Nonprofits and the public sector can co-develop innovative solutions that address the immediate needs of fire agencies, based on the lived experience of end users. Earth Fire Alliance is designed to react quickly and raise funds for early development of user-driven projects like FireSat, the first satellite constellation purpose-built to address the global wildfire challenge.
- **De-risking New Technology:** Earth Fire Alliance can de-risk new technologies by securing quick non-government funding and executing rapid development and test cycles, addressing the wildfire community's need for improved tools.
- **Adoption and Scale:** Nonprofits like Earth Fire Alliance can turn user expertise into real-world tools, while state agencies provide initial use cases and demonstrate

effectiveness through early adoption and ground testing, which is crucial for full-scale operational funding.

- **Infrastructure:** Once nonprofits validate technology use cases, public fire agencies can advocate for long-term investment in operational implementation to legislatures and the public. State agencies also provide the structure, authority, and regulatory framework for large-scale technology rollout.

Shared resources and responsibility accelerate change, adoption, and impact. By coordinating efforts, steps that are typically sequential in technology development (like user feedback and development, or testing and raising capital) can occur concurrently, significantly reducing the overall timeline and jump-starting adoption. **Benefits of FireSat / Early Detection**

Early and ongoing fire detection offers significant value across multiple fronts, leading to improved outcomes for decision-makers and substantial reductions in the negative impacts of wildfires.

#### **Economic Benefits and Promoting Community Resilience:**

- **Reduced Suppression Costs:** A quicker response time directly translates to lower fire suppression expenses. For instance, a 15-minute reduction in response time can decrease the frequency of large, uncontained fires by 3% to 7%. In California alone, this improved capability could generate an estimated \$3.5-\$8.2 billion in economic benefits and \$150-\$350 million in direct fiscal benefits annually. The FireSat constellation, with an estimated cost of \$390 million, could pay for itself within 2-3 years through reduced suppression costs, with potential savings of over \$360-\$677 million per year across the United States.
- **Property and Infrastructure Protection:** Early detection helps to prevent fires from becoming destructive, saving homes, structures, and critical infrastructure. The analysis suggests that up to 3,500 structures could be saved from wildfire destruction in the U.S.
- **Reduced Post-Disaster Costs:** Investing in upstream solutions like early fire detection can be significantly more cost-effective than focusing solely on relief and recovery efforts after disasters. Studies have shown that every \$1 spent on resilience can save between \$4 and \$11 in avoided future losses.

#### **Operational Benefits for Fire Agencies:**

- **Better Informed Resource Deployment:** High-quality, frequently updated data from systems like FireSat allows incident commanders and dispatchers to deploy resources more confidently and effectively.

- **Enhanced Situational Awareness:** Continuous monitoring provides up-to-date information on fire spread and intensity, aiding decision-makers in balancing suppression efforts by allowing beneficial fires to burn.
- **Faster Initial Attack:** Real-time alerts and updates to the front line can drastically reduce the "initial attack delay" - the time between ignition and the arrival of a fire suppression team. A refresh rate of 67 minutes is considered necessary to improve upon low initial attack times in priority regions.
- **Better Pre-season Preparedness:** High-resolution images for terrain and fuel mapping prior to fire seasons assist with comprehensive fire risk mapping and hazard reduction efforts.
- **More Effective Recovery and Evaluation:** Data on fire-affected areas helps in quickly evaluating damage, refining response strategies, and expediting support to recovering communities.

### **FireSat – A National Wildfire Monitoring Capability**

The Earth Fire Alliance and its public and private partners have developed the FireSat constellation to provide the nation with early detection, enhanced fire characterization, and data for all first responders and fire managers. EFA is working to ensure that data collected by the FireSat constellation will get into the hands of firefighters, decision- and policymakers, and local communities to enhance their awareness of the current fire situation and their understanding of how fires impact the landscape which they live and recreate in. The Fix our Forest Act establishes the Community Wildfire Risk Reduction Program and strengthens the Joint Fire Science Program which will benefit from FireSat data as they look to support the establishment of resilient communities. Although FireSat was developed with wildfires as the driver, its capabilities will also support prescribed fires as it will provide enhanced characterizations of these burns, including measuring intensity and power to provide users with a better understanding of fuel consumption and impacts on the vegetation post burn.

The rapid development, launch, and operation of FireSat as a national capability is directly the result of advances in commercial space and technology and partnerships across public agencies, philanthropic funding, and state and local fire agencies. In just 12 months, Earth Fire Alliance has assembled resources and leveraged the momentum of the fire community to design, build, and launch FireSat.

The FireSat Constellation is designed to collect and transmit real-time wildfire data to agencies in support of fire operations but also give access to raw satellite data so that scientists, risk managers, and others can analyze fire activity in their geographic areas. .

The system and its data are modeled as a public service, like severe weather warnings or GPS data, and is provided to improve our nation's ability to respond quickly and effectively to the safety and economic threats posed by wildfires. FireSat offers a space-based view of fire monitoring, enabling more timely response decisions, informed resource allocation, and effective land management. This technology is specifically targeted to support wildfire management with timely, accurate, and actionable data.

### **FireSat Makes Other Technology More Effective**

During our analysis, the FireSat Constellation with specific additional sensor parameters (combination of visible, near infrared, short-wave infrared, mid-wave infrared, and long-wave infrared) represented the ideal solution to the mission statement of detecting and monitoring emerging fires on a global basis. One important tenant we learned in the analysis was that the FireSat system design makes the other sensing sources (ground, IOT, airborne) more effective as a force multiplier. Satellites can serve as a 'tip and queue' data source to allow other systems to overcome their current limitations - they can observe the entirety of a fire in one pass and provide complete fire analysis and characterization. The Fix our Forests Act establishes the Fireshed Center ("Wildfire Intelligence Center" in the Senate version) and FireSat will play a critical role in supporting the Center as it will give a nationwide picture of fire activity every 20 minutes.

- Airborne Sensors – FireSat allows airborne sensors to focus on the specific tactical benefits they provide (detailed, local collection and focus on on-incident tactics)
- Ground Sensors – FireSat provides a top-down view which combined with the side view to enable ground system to detect plumbs and fire starts while satellite system can view fire activity obscured by terrain features and growing smoke columns.
- IOT Sensors – Excellent point sources for smoke, chemicals, and different fire effects (including sound) tailored to specific fire regimes based on geography and ecology. Locally deployed IOT sensors present a significant data analysis challenge as they are limited in deployment and require complex analysis to delineate between a point source such as a new fire vs drift smoke coming from other nearby fires.

### **Conclusion**

When the Earth Fire Alliance presented their FireSat constellation proposal based on the outputs of the analysis, it was apparent to me that the only path forward to solve these technological capability gaps was to build public-private partnerships and focus on the first, most important impediment to addressing our nation's risk to wildfire – the lack of a national ability to monitor wildfires. We need to rapidly detect when wildfires start, continuously monitor ongoing events, and understand the effects of wildfire on our people, our economic security, and our way of life. Our perceptions of wildfire should be like that of a developing hurricane – we can see it, understand it, and empower our communities to act. The Federal government can and should be providing states and local communities with national wildfire monitoring coverage and this can be achieved efficiently, cost effectively, and quickly in 2025 with a vibrant public-private partnership.

Wildfires do not recognize political, land management, or other human-induced boundaries. Numerous risk assessments and scientific reports highlight that the Wildland Urban Interface (WUI) continues to grow, and fuel loads are increasing. We know that we can reduce risk to life, property, and critical infrastructure through fuel treatments, building resilient communities, and increasing our prevention messages. But wildfires are still becoming more frequent, unpredictable, and dangerous, and there is a growing demand to provide consistent, persistent detection and monitoring capabilities. FireSat, provides the missing foundation of coverage needed nationally to integrate other local ground, air, and space-based technologies into one always on monitoring network that provides fire fighters and emergency managers in all states with desperately needed early detection information. It is a force multiplier as firefighters will now also have a capability that is always on, not impacted by smoke, wind, or cloud cover, and will measure small, cooler fires as well as hot, large fires, providing decisions-makers enhanced data to better position resources and select the right tools for the task. The FireSat system will be the first system operating nationally and capable of early detection of fires unique to many geographies, from wetland fires in Florida, to brush fires in New Jersey, grassland fires in North Dakota, to Megafires out west.

Today's wildfires are growing more extreme in intensity and duration due to multiple factors. These fires require more resources and immense amounts of funding to control. The downstream economic impacts are immeasurable when you look at property losses and damage, impacts on tourism, and the growing cost to the Federal Government of long-term recovery for communities impacted by wildfires after the smoke clears and "everyone goes home."