



Washington State

## Smart Smoke Signals: AI Vision and Data for Faster Fire Response

**PROJECT:** AI for Improved Wildfire Detection

**CATEGORY:** Artificial Intelligence

**PROJECT TIMELINE:** Project started in 2023 and is expanding throughout 2025

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# EXECUTIVE SUMMARY

As wildfires increase in frequency, size, and intensity across the western United States, the Washington Department of Natural Resources (DNR) with assistance from Washington Technology Solutions (WaTech) has embraced the power of **artificial intelligence** to revolutionize wildfire detection and emergency response. In partnership with industry experts, DNR has deployed an AI-powered platform that leverages 360-degree wildfire detection cameras, computer vision, and geospatial data to identify fires in near real-time, often faster than traditional methods or human reporting.

The system integrates live feeds from over 20 cameras with historical burn data, weather modeling, and AI-powered smoke detection to deliver accurate, timely alerts to fire crews. These capabilities allow for rapid assessment, validation, and deployment of suppression resources—minimizing damage, protecting lives, and preserving Washington’s natural landscapes.

This first-of-its-kind statewide implementation of AI in wildfire detection reflects DNR’s broader commitment to climate resilience, data-driven governance, and public safety innovation. With this initiative, Washington is setting a new standard for how artificial intelligence can strengthen frontline operations and interagency coordination in the face of a changing climate.

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## PROJECT DESCRIPTION

### **What problem or opportunity does the project address?**

Washington's wildfire detection program addresses a critical need for early, accurate fire detection to protect lives, property, and natural resources. Historically, fire discovery depended heavily on public reports and unstructured observations, leading to delays, false positives, and misallocated resources. Using AI for camera feeds, data analysis, and improvements on detection speed and accuracy, Washington state now identifies wildfires in real time, enabling dispatchers to act proactively.

### **Why does it matter?**

Wildfires cost Washington state millions and endanger communities. A delay of even 20 minutes can be the difference between a small contained fire and a multi-acre disaster. By enabling rapid, AI-powered detection and triangulation, Washington agencies can now deploy assets within minutes—minimizing risk and improving safety for both responders and communities.

## What makes it different?

This is the **first statewide AI wildfire detection deployment** of its kind in the U.S. Rather than wait for public reports, the system autonomously scans live camera feeds, detects smoke, and sends geospatial alerts directly to dispatch. Its distinct capabilities include:

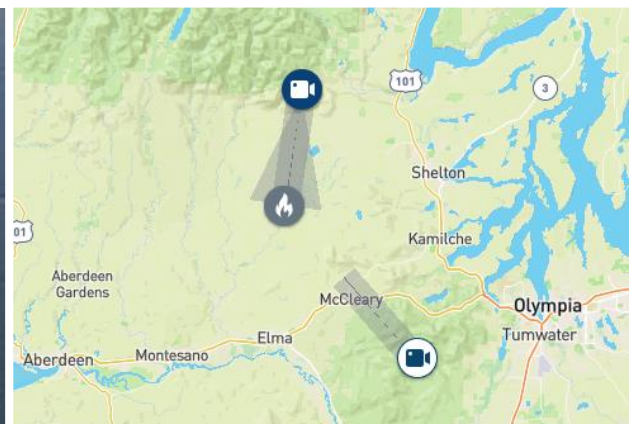
- **AI + GIS Triangulation:** AI visually identifies smoke plumes across multiple cameras angles, calculates location, and alerts teams via email/SMS. In some instances, alerts are generated prior to public reporting.
- **Integration with Intterra Common Operating Picture dashboard:** Enables real-time monitoring through a statewide dashboard.
- **Early impact:** The AI was the only source to detect the Warden Fire in early 2024—providing a live alert and location coordinates. The fire was contained at just **15.6 acres**, with no injuries or property loss.

This system also feeds into WaTech's **GeoPortal**, allowing responders to overlay population, mobility, and infrastructure data for informed evacuations. It's modular, cloud-based, and continually improved by feedback from dispatchers and crews. These maps play a key role in identifying and evacuating at-risk communities, including residents who may require more time to evacuate due to mobility or medical issues.

## Spotlight: Early Success – The Warden Fire

On June 17, 2024, AI-powered cameras spotted smoke from the Warden Fire in Mason County—before any 911 call. The Pano platform auto detected the plume at 2:55 PM, triangulated its location, and sent the first and only alert to DNR dispatch.

Armed with live visuals and precise data, DNR confirmed it wasn't a residential burn, alerted local responders, and launched a rapid response. Thanks to this early AI alert, the fire was **contained to just 15.6 acres—with no injuries or structural damage**. A textbook case of AI in action saving time, resources, and risk.



**Left:** Early moments of the Warden Fire from the Pano platform

**Right:** Map showing the incident triangulation from the North Mountain Station and the Capitol Peak Station

## What makes it universal?

The project aligns with NASCIO Top Ten Priorities including AI & Data Management, Risk Management, and Enterprise Architecture. It's cloud-based, modular, and interoperable, making it replicable across other states and scenarios for not only wildfire detection but areas like floods, hazardous spills, or utility infrastructure monitoring.

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# IMPLEMENTATION

## What was the roadmap?

The phased roadmap ensured real-world validation at each step:

- **2023:** Pilot with AI cameras in fire-prone zones; integration with DNR and initial dispatch teams.
- **2024:** Expansion to 21 sites, Single Sign-On (SSO), integration with federal centers, live testing during active fires.
- **2025:** Adding 5 new cameras; features like weather overlays, utility line mapping, and enhanced AI modeling.

## Who was involved?

- **Department of Natural Resources (DNR)** – Project lead and operational command
- **Washington Technology Solutions (WaTech)** – GeoPortal integration, data governance, and AI policy oversight
- **Pano AI** – Camera & computer vision platform
- **Intterra** – Dashboard coordination and user interface
- **Dispatch centers, federal agencies, and utilities** – Field users and data contributors

WaTech helped ensure alignment with the [state's responsible AI policy](#).

## How did you do it?

The solution uses AI-based vision to detect smoke plumes, integrate geospatial bearings, and issue structured alerts. Camera nodes are solar-powered, LTE-enabled, and positioned on ridgelines for maximum coverage. AI scans 360-degree video feeds for smoke patterns and triangulates fire locations.

Alerts are distributed through the Pano solution and mobile communications and displayed in real-time on the Intterra dashboard. Integration with WaTech's GeoPortal allows teams to overlay map layers such as population vulnerability, critical infrastructure, and tribal land boundaries which assist with suppression strategies and evacuation coordination. The solution is accessed

by dispatchers, who use it for live monitoring, response coordination, and jurisdiction identification.



A Pano AI camera on Capitol Peak in Western Washington was the first to flag the Warden fire in June 2024. (Pano AI Photo)

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# IMPACT

## What did the project make better?

Success was measured by reduced acres burned, early detection (ahead of 911 calls), enhanced aerial deployment strategy, dispatch engagement, incident containment statistics and feedback from personnel identifying improved situational awareness and confidence. The AI solution continues to evolve based on user feedback from dispatch centers, field crews, and interagency coordination.

The AI-powered wildfire detection system transformed how Washington monitors, assesses, and responds to wildfire threats. It significantly enhanced **situational awareness**, **operational coordination**, and **response speed** across the state's fire management ecosystem.

Key improvements include:

- A **20–25-minute reduction in detection-to-dispatch time**, enabling faster mobilization of fire crews.

- Successful **early containment of fires**, such as the Warden Fire, which was limited to 15.6 acres and the Upper Ruby Fire held at 284 acres with no structural loss due to rapid AI-generated alerts.
- **Zero missed incidents** in 2024 within the system’s camera coverage, confirming the platform’s reliability and reach.
- **Smarter deployment of aerial resources**, minimizing unnecessary costs and overuse.
- Greater **dispatcher confidence** through integrated live feeds and GIS-backed visual confirmation tools resulting in fewer false positives.

Additionally, the system contributes to **evacuation planning** by overlaying fire data with maps of vulnerable populations, mobility constraints, and critical infrastructure—ensuring equitable and informed emergency response decisions.

### How do you know?

The 2024 wildfire season delivered strong validation of the AI system’s value. Within its camera coverage areas, there were **zero missed fire incidents** and a **notable drop in false positives**, improving both reliability and dispatcher trust.

Operators consistently reported **greater situational awareness**, especially in remote, high-risk zones. Real-time AI alerts offered early, verifiable intelligence—empowering faster, more confident decision-making. The integration of GIS layers, such as population density and infrastructure, enhanced interagency coordination and improved the accuracy of smoke report validation.

The AI system directly influenced **response tempo**:

- Fires were flagged **minutes to hours earlier** than traditional methods.
- **Aerial assets were used more efficiently**, reducing unnecessary deployments.
- **Response latency dropped**, enabling action while fires were still small and more controllable.

The result: **faster containment, improved safety, and cost-effective suppression**. Rather than just assisting wildfire detection, the system has **redefined how emergency response decisions are made in Washington**—smarter, quicker, and more strategically.

### AI Action: Upper Ruby Fire Stopped in Its Tracks

On August 20, 2024, the Upper Ruby Fire ignited in United States Fire Service (USFS) managed land in Pend Oreille County threatening nearby private property under DNR protection. At 4:19 PM, AI cameras nearly 20 miles away detected smoke and triggered a Pano alert, prompting a rapid escalation by the Northeast Washington Interagency Communications Center.

Real-time visuals showed fast fire growth, leading to immediate ground and aerial deployment. Shared access to the AI feed enabled DNR and USFS to act in lockstep, keeping the fire **contained at 284 acres with no injuries or structural loss**.



## What now?

In 2025 and beyond, Washington will expand the program by:

- Adding **5 new stations** in underserved fire-prone zones.
- Developing **new AI intelligence layers** (e.g., weather data, utility lines).
- Enhancing single-camera triangulation and visual resolution.
- Increasing **cross-agency access and training** to expand statewide usage.
- Incorporating AI-generated data into **real-time suppression modeling**.

This project is not a pilot—it's a permanent part of Washington's wildfire defense strategy. It's a blueprint for how AI and geospatial data can save lives, land, and dollars—and it's just getting started.

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# CONCLUSION

The AI-powered wildfire detection project exemplifies how Washington is leading with purpose and technology in the fight against increasingly destructive wildfires. By combining artificial intelligence, geospatial data, and cross-agency collaboration, DNR has moved from reactive response to proactive prevention—buying precious minutes that can save forests, infrastructure, and lives.

This initiative is not just about innovation, it's about **impact**. Faster detection means faster suppression. Earlier alerts mean safer communities. By modernizing how we monitor and respond to wildfires, Washington has created a replicable model for states nationwide seeking to protect their natural resources in an era of escalating climate threats.

As AI continues to evolve, so too will Washington's ability to predict, detect, and respond to emergencies with unprecedented accuracy and speed. The future of emergency management is already here—and it's smarter, faster, and more resilient than ever before.