Forest Service Wildfire Technology Modernization

Request: ln lieu of House direction regarding technology modernization, the Committees support technologies such as the Risk Management Assistance framework, machine-learning generated collaborative technology-based strategic wildfire risk planning tools and the productionization of these data-driven decision support tools, and the implementation of the Wildfire Technology Modernization section of the John D. Dingell, Jr. Conservation, Management, and Recreation Act. The Service is directed to make significant financial investments in these technologies and report to the Committees within 90 days of enactment of this Act on ongoing and planned investments in such technologies. Additionally, the Committees expect the Forest Service to increase technological investments in future budgets.

Introduction

In response to the request for ongoing and planned technology modernization investments in the Joint Explanatory Statement to the Appropriations Act of 2021, the Forest Service is encouraged by the Committee's interest to continue exploring and adopting emerging technologies within the wildland fire system. As the country continues to see record-breaking wildland fires causing significant impacts to communities and natural resources, it is imperative to consider new technologies, tools, and analytics to assist our response effort. The Forest Service is committed to modernizing the wildland fire system to better understand where and when response resources are most effective; develop platforms to facilitate virtual support of wildland fire incidents; and develop and operate the capability of tracking wildland firefighters on active incidents. To ensure the Forest Service can effectively deploy and utilize these new resources, standardization of policies and procedures among federal agencies is also necessary and an ongoing effort. Consistency of plans and operations provides the fundamental platform for federal agencies to integrate fire activities across Agency boundaries and provide leadership for cooperation with State, tribal, and local fire management organizations.

The Agency remains focused on investing in several key technology and modernization portfolios: Data Management, Enhanced Real Time Operating Picture, Decision Support Applications and Performance Management, and Modern Tools for a Modern Response. Multiple initiatives directly support the Dingell Act, Section 1114, including the Dingell Act Resource Tracking (DART), Data Cache (for decision support and smoke management), Fire Environment Management System (FEMS) (for predicting where wildland fires will start), and Data Links (for resource tracking data management and further unmanned system integration). The Agency welcomes future opportunities to explore an investment strategy to bridge the capability gap between current outdated technologies and information infrastructure and the development and adoption of new and emerging technologies. Until a comprehensive investment strategy has been completed, it is not possible to accurately state what the total costs may be for technology modernization.

Summary of Wildland Fire Technology Modernization Investments

Data Management for Fire and Aviation

Data is the foundation for the Forest Service's technology modernization efforts, and an interagency data management and governance approach is critical to modernizing the wildland fire system. The Forest Service is working closely with the Department of the Interior (DOI) to develop interagency solutions for data management, storage, and utilization. The Wildland Fire Data Cache will be the backbone of the interagency data management solution - improving, extending, and making data collection, access, use, and reports accurate and consistent. As the single source for all fire related data,

the Fire Data Cache will feed into the applications and systems used by the wildland fire community along with providing a platform to build business intelligence tools to answer questions such as those posed in the Dingell Act.

Enhanced Real Time Operating Picture

A real time operating picture has been used by the military and other emergency response frameworks for years, and the Forest Service is developing a similar interface for the wildland fire system. The Dingell Act Resource Tracking (DART) project is the first step in creating real time awareness of resource location and objectives such as firefighters and other resources. Location data will be displayed in a common operating picture that aggregates interagency information and is viewable on multiple interfaces, including computer and mobile devices. The benefits of developing and fielding a real time operating picture include increasing situational awareness on the location of firefighters and their relation to the wildfire; improving initial attack dispatching by assuring the closest appropriate resource is available to respond; reducing the need for an aerial response in some cases; providing fire managers additional tools to make tactical decisions; improving emergency response for an incident within an incident; and increasing the ability to communicate hazards or changes in conditions. The first stage of the DART pilot project has been completed by the Forest Service, and the Agency will expand the pilot project to larger scale incidents during the 2021 fire season. The focus of the expanded pilot project will be to evaluate technologies to determine the viability of an array of different solutions and the cost benefit analysis for full scale implementation.

The Scalable Traffic Management for Emergency Response Operations (STEReO+) is another complementary effort the Forest Service is exploring to increase the effectiveness of the real time common operating picture by incorporating an airspace management system for the interagency wildland fire airborne resources. The Forest Service expects this system will result in fewer unmanned aircraft system incursions, improved aviator situational awareness, and allow dispatchers or other fire management personnel to see all aviation (manned and unmanned) assets within the fire traffic area. This project leads into the future with an interagency, interoperable traffic management system for aviation operations.

Another important piece of an effective common operating picture is having a real-time understanding of where the fire is and what it is doing. A partnership between multiple National Guard units and wildland fire agencies has been established to provide nationwide wildfire detection and monitoring called FireGuard. The FireGuard program will provide fire managers with critical information on the fires they are responding to and greater access to satellite imagery and other data sources.

The Forest Service is already investing in many aspects of the development and deployment of an enhanced real time operating picture. The initial investments have been used to explore and pilot new technologies on a small scale. Incorporating the technologies that have been tested and proven, while continuing to invest in the testing and acquisition of emerging capabilities, will be an on-going effort to continually improve the functionality of our real time operating picture.

Decision Support Applications and Performance Management

The current Wildland Fire Decision Support System was integral in modernizing wildland fire planning efforts across the country by providing a geospatial wildland fire planning platform for the first time. The Forest Service and the DOI are currently collaborating to develop and test the next generation of the Wildland Fire Decision Support System. This version will advance current wildland fire geospatial planning capabilities; provide new tools and an analytical platform for mapping,

tracking, and projecting wildland fire activity and the effectiveness of response actions; and is intended to be the foundational platform for fire management once fully deployed. This system will provide the Agency the capability to better understand and learn from every wildland fire, while providing tools to assist fire managers make data informed decisions about appropriate response actions.

In addition to providing updated analytical tools, the Forest Service is developing and utilizing wildland fire Risk Management Assistance capabilities. These capabilities include tools to provide fire managers real time data analytics, risk assessments, and professional fire management support for making informed decisions about particularly challenging incidents while response strategies are being developed and implemented. The Agency continues to invest in further development and integration of Risk Management capabilities into annual fire response operations.

In addition to leveraging available technologies and analytics to improve decision-making and fire outcomes, the Forest Service and its partners are exploring how machine learning or artificial intelligence integration can improve the effectiveness of fire response operations. Current efforts include:

- Participation in the First Five Consortium, a White House-led program to use machine learning and artificial intelligence technologies in humanitarian assistance. Through this effort, the Forest Service provided data and subject matter expertise to automate the detection and mapping of wildfires from remote sensing platforms such as the Forest Service Fire Watch platform.
- Participation in similar efforts with the Joint Artificial Intelligence Command (JAIC) to rapidly generate wildfire perimeters from remote sensing platforms such as the National Guard MQ-9.

The Agency annually assesses the effectiveness, integration, and proliferation of decision support capabilities within the wildland fire system. To date, the existing suite of decision support capabilities have been highly beneficial, providing fire managers with better information to assist in making complex, risk informed decisions during fire suppression operations. The Forest Service continues to seek out opportunities to test and integrate machine learning and artificial intelligence to further refine and modernize our ability to apply learning to generate better decisions on incidents and therefore more desirable post-fire outcomes.

Modern Tools for a Modern Response

Along with investments in new and emerging technologies, the Forest Service continues to improve existing tools to fill critical roles within the response system. The Wildland Fire Land Mobile Radio system provides critical communications support to wildland firefighters using fully deployable radio systems. An overhaul of the entire radio system is necessary to modernize it to current industry standards and to provide increased services to personnel deployed to the field.

Unmanned aerial systems (UAS) are a newer tool with increasing utility and have been utilized for scouting operations, fire mapping, and backfiring operations on active incidents. The Forest Service and the DOI continue to increase the use and application of UAS during wildland fire response operations, leveraging them to accomplish specialized missions and to reduce the risk of exposure to firefighters and aviators when possible.

The Forest Service is also partnering with the National Aeronautics and Space Administration to explore the use of high-altitude long endurance UAS. These platforms can function as “taskable

satellites" to provide near real time imagery or on-demand imagery, such as an infrared fire perimeter, and relay communications or data over designated geographic areas or incidents, such as wildfire or all-hazard incidents. These UAS are generally designed to operate above civilian air traffic for 30 days. Persistent capability will allow uninterrupted situational awareness during critical periods of fire activity and will allow other aviation assets to be reprioritized. This technology will limit human exposure by reducing the need for manned missions. There is significant interagency and partner interest in using high-altitude long endurance UAS to conduct additional earth science or land management information, such as hazardous fuels, forest health, post fire mapping, and hydrology data collection. It is anticipated these missions can be scheduled during non-fire times and will spread flight cost among programs. Aircraft testing is scheduled for early summer, 2022 July 2021.

Further investment in the procurement and fielding of additional UAS will be critical to ensuring adoption and integration of this new wildland fire response resource. The Agency is developing an overarching strategy for the acquisition, deployment, management, and support of an unmanned aerial systems program. Currently, the Agency is just beginning to stand-up a formal unmanned aerial systems program and anticipates it will grow rapidly as the technologies are integrated into many aspects of the Agency's fire and non-fire related work.

Conclusion

Section 1114 of the John Dingle, Jr. Act of 2019 was enacted to promote the use of the best available technology to enhance effective and cost-efficient response to wildfires. The Secretaries of Agriculture and the Interior, in response to the Act, have made significant progress in the implementation of the Technology Modernization initiatives. Continued investments in new and emerging technologies, along with improving existing tools, will allow the Forest Service to stay at the forefront of wildland firefighting to ensure firefighter safety and protect communities and natural resources.