



USDA Forest Service Fire and Aviation Management

Fire Imaging Program

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Infrared Missions for Fire Operations

FAM-Operations continues to focus on four IR mission types:

1. Detection
2. Large Fire Mapping
3. Tactical Incident Awareness and Assessment
4. Strategic Dashboard

Each mission has different requirements/capabilities. No “silver bullet”

- “Right tool for the job”

Detection Mission

- Detect new fire starts (lightning and human caused)
- Early-detection to support rapid response and public safety
- Detection Platforms:
 - Manned fixed wing aircraft with EO/IR camera ball (DRTI and Contract)
 - Ignition Point (IgPoint) in EGP*
 - FireFly w/ CalGuard and CO-Guard*
- Issues with satellite detection:
 - False positives from sat detection
 - Fidelity (500m to 1KM spatial resolution)
 - Size of the fire able to be detected by satellite vs manned AC
 - Availability of Analysts

Detection Deliverables (DRTI or CWN Vendor)

- Lat/Long coordinates of detected fires
- Metadata
 - Basic size-up information
 - Staffed or not
 - Proximity to values or roads
 - Map perimeter if >10 acres
- Pictures (RGB and IR)
- Dissemination of information
 - Real-time data transfer (cell, satlink, radio)
 - Notification to Dispatch Center
 - Dashboard Display: NIFC-AGOL
- Special Acknowledgement: Craig Ducey and Tristan Holland

Expand this box for more information on DRTI. Use the pull out window on the left side of the screen to filter heat detection points or zoom to a specific

DRTI Heat Detections

- 10/19/2020, 1:49 PM Local

- Central Oregon Interagency Dispatch Center
- Lat/Long: 44.41, -120.21

- 9/30/2020, 4:00 PM Local

- Grangeville Interagency Dispatch Center
- Lat/Long: 46.84, -115.84

Last update: 2 minutes ago

Daily Count

0

YTD Count

194

Last update: 2 Last update: 2

DRTI Heat Detection (point)

Time Since Detection

< 12 Hours

12 - 24 Hours

24 - 48 Hours

48+ Hours

Current Wildfire (point)

Incident Type Category

Wildfire

DRTI Heat Detection

9/30/2020, 3:40 PM Local

Kootenai Interagency Dispatch Center

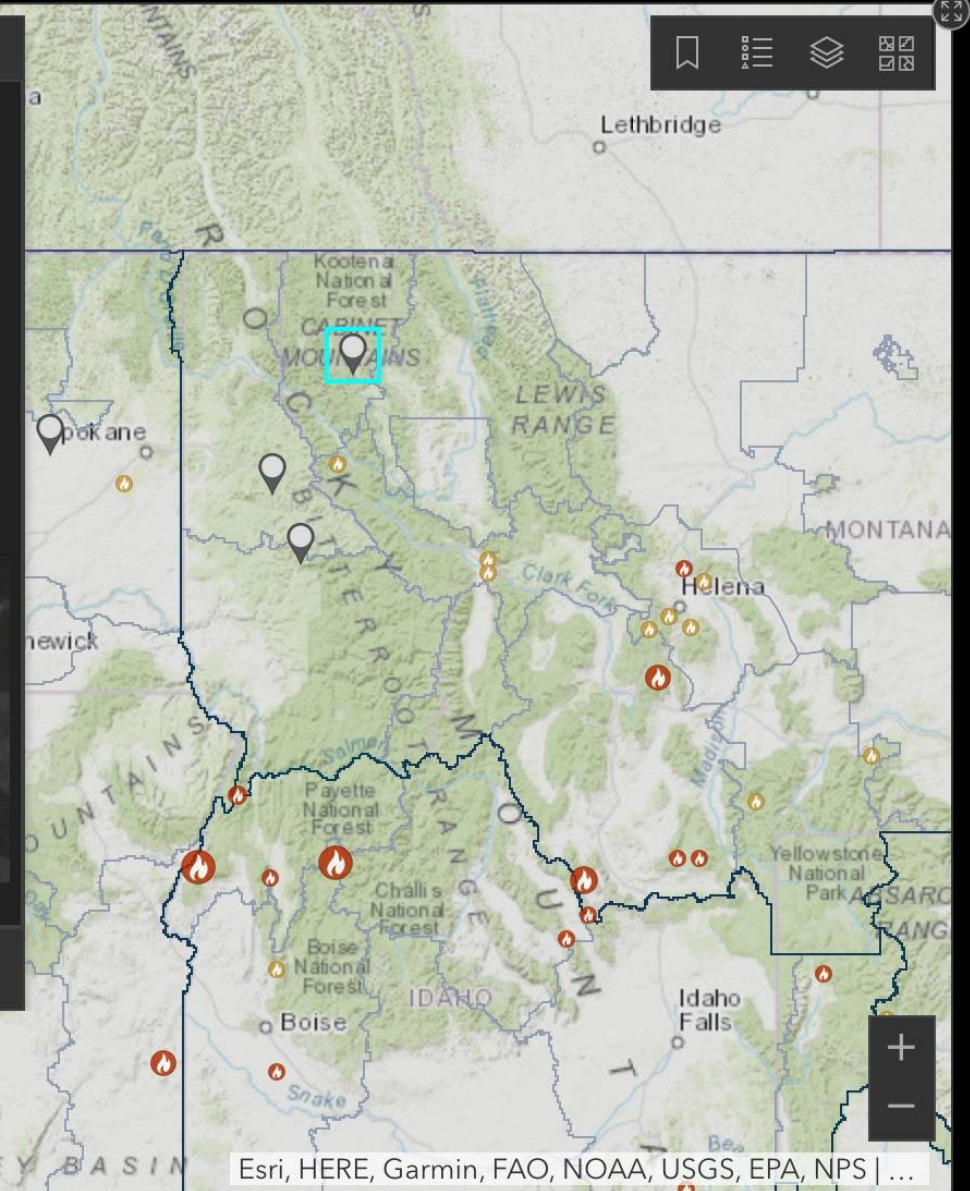
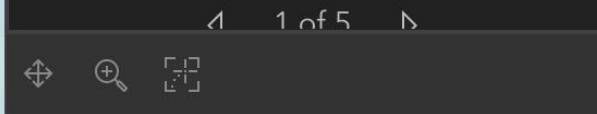
Lat/Long: 48.12, -115.31

Time Since Detection: 40.83 days

Comments:

Approx 100x50 feet. Creeping in medium fuels. West side of FS road.

SO.Snp.0-VIC.jpeg



HAZE
OFF

1.9NM
141M° -34°




MINIMIZE

VIDEO

SPLIT

MAP

SAT

OFF
STREET
VIEW











29 AUG 2020
14:54:57
UTC+0.0

AUTO

DV3
COR-M

SPA

IR

300

12.0

686

Category


Description

LT

Measure

Elko County




-032°

040°

W : OFF - DISARM
N : OFF - DISARM

ACFT
41 48814N 120°

OFF NONE
NEWPOI REC
152° 41 46429N




FLIR SYSTEMS
35°34.1748' N 106°11.5516' W
SPD 202 KTS HDG 147 °T
ALT 18471 FT

196°T
S W

35°31.2451' N 106°12.5638' W
SPD 0 MPH HDG --- °T
ELV 5886 FT SLT 3.7 NM

07/09/20
20:48:00 Z

LRF TARGET
---' ---'
ELV --- FT
SLT --- NM



LRF L ARMED
LP C ARMED
LI ARMED

HDEO
DDE
FOC MAN
EXP AUT
W N 50 FT

GEOPOINT
INS NAV 0.05°

SLAVE ACTIVE



National Guard DRTI Condor-26

- First mobilized DRTI July 7, 2020 to SW and GB
- GACCs identified and prioritized “detection boxes”
- NIFC AGOL Dashboard went live
- Shifted DRTI to NOPS, NW, NR as lightning activity shifted north
- Availability of DRTI unknown in 2021





Owyhee Air (above)

CO-MMA (right)

FireWatch AA-51 (not shown)

MX-15 camera ball with EO/IR (upper right)

- MWIR w/ laser designator (preferred)



Large Fire Mapping Mission

- National Infrared Operations (NIROPS)
 - Map large fires once per 24 hrs, primarily at night
 - Nation-wide scope
 - Provide pdf map, KMZ/KML, GIS-ready shapefiles, IRIN log
- NIROPS products and services are in high demand
- Demand is increasing
- In 2020 NIROPS consisted of 8 Aircraft:
 - (1) Agency
 - (2) Exclusive Use (July 30 & Sept 20)
 - (2) Call-When-Needed Contractors
 - (3) End Product Contractors
- All Hands on Deck, supplemented with:
 - CO-MMA, AA-51, FireWatch Cobras, NG MQ-9, NG DRTI

NIROPS Take-Aways from 2020

- Demand for NIROPS remains high: 2,795 requests in 2020
- Average of 2017, 2018 & 2020: ~2,800
- 2020 main challenges:
 - Geographic separation between fires when all 7 western GACCs were active
 - Sheer size of fires (>100,000 acre fires became the norm)
- Contract EU and EPC proof of concept worked out
 - Refinement needed with commercial sensors for 2021
 - Not all contractors had same capacity (speed and scan volume)
- NIROPS agency AC/sensor very mature workflow
 - Phoenix (Next Gen) still the “best tool” for the NIROPS mission
 - COVID mitigations: Return to OGD every night, ~20% loss of efficiency
 - However N149Z returning to OGD allowed access to MX
- Special Acknowledgement: Tom Mellin and Jan Johnson as IRCN

Tactical Incident Awareness and Assessment

- Some fires have a need for additional imagery to support tactical operations
 - Monitoring impingement of MAPS or trigger points
 - Spot fire detection in real-time
 - Provide over-watch of ground operations in reduced visibility or inversions
 - Inform mop-up or amount of residual 'risk'
 - Provide real-time Situational Awareness
- Day or Night
- Persistent or Periodic coverage (UAS vs manned aircraft)
- Deliverables
 - FMV or live-stream imagery to ICP and/or ground personnel
 - NIROPS-like map products (in addition to, or in lieu of NIROPS)

Tactical IAA Mission

- Tactical IAA and NIROPS are different “missions”
- Different requirements/capabilities (some overlap)
- Tactical IAA is more real-time application
- Tactical IAA typically loiters over one fire for extended period
- Camera-ball paired with mapping software is “best tool”
- 2020: FireWatch AA-51 and Cobras, DRTI, CO-MMA, contractors

Satellite Options

- National Systems:

- CONOPS approved for use
- Support detection, emerging fires, large fire monitoring
- Strategic, not tactical
- Issues:
 - Coarse scale 500M to 1 KM
 - Limited swath width
 - Analyst support is limiting factor
- Options:
 - Additional analysts from partner agencies, NGB units, etc.
 - Automation?

- Commercial / HDDS Systems:

- 2018-2020 evaluated commercial imagery via HDDS sat systems for fire mapping (AK and NR)
- Some commercial systems capable of providing hi-fidelity imagery
- Issues:
 - Limited coverage
 - Difficult to 'task' satellites
 - 12-24 hr latency
 - Requires additional post-processing
 - Swath width rarely captures entire fire

NIROPS in 2021

- Agency:
 - N149Z w/ Phoenix Next Gen sensor
 - Business case approved to acquire 2 new King Air 200
 - Outfit new AC with camera port and datalink system
 - Delivery fall-winter 2021-2022
- Contract:
 - (2) Exclusive Use IR aircraft: 120-day MAP, mid-June thru mid-Nov
 - Re-new End Product Contract for IR surge capacity
 - Manned aircraft with EO/IR sensor(s)
 - Multiple Line Items (Detection, NIROPS support, Tactical IAA)
 - Multiple awards

Fire Imaging Goals 2022 and Beyond

- Sustain NIROPS capacity
 - 2 agency (new) + 2 EU + new EPC for surge capacity
- Increase Detection and Tactical Day-time IAA capacity
 - Agency assets + EPC
 - Continue to evaluate satellite detection and mapping capability
 - Automation?
- Collection Manager Role
 - Central clearing house for ALL requests for fire imaging (prioritize and task)
 - Task requests to appropriate collection platform (NIROPS, DRTI, UAS, etc.)
 - Disseminate information to end users

After Jan 1, 2021

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