

# CASE STUDY



# FEMA

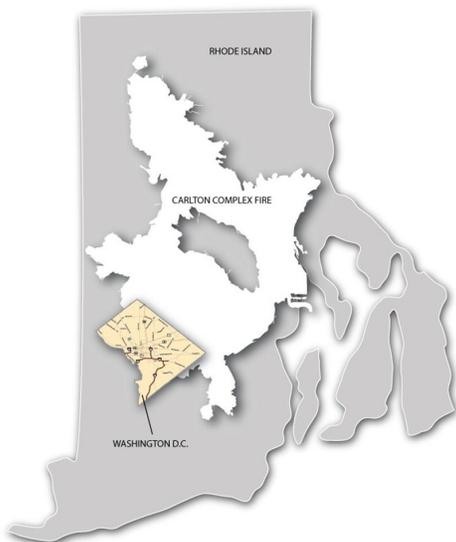
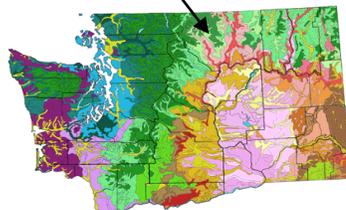
Whole Community Partnerships Working in Washington 4188-DR-WA

## Innovative Response to Imminent Disaster



This **CASE STUDY** provides an example of how to rapidly organize and coordinate a multijurisdictional, interdisciplinary team. The approach may be a good model for responding to extreme wildfires and other complex events.

2014 Carlton Complex Fire



The Carlton Complex Fire was approximately 1/3 the size of the State of Rhode Island, or 6 times the size of Washington, DC



Severe erosion and property damage following wildfire

# CASE STUDY - TABLE OF CONTENTS

**INTRODUCTION TO ETART .....Pages 1 - 2**

**POTENTIAL FOR ETART APPROACH TO OTHER DISASTERS.....Pages 3 - 7**

**APPENDIX A—ETART PRODUCTS .....Pages 8 - 9**

**APPENDIX B - POTENTIAL ASSISTANCE .....Page 10**

**APPENDIX C - AFTER INCIDENT MPROVEMENTS .....Page 11**

**APPENDIX D - AFTER ACTION REVIEW .....Pages 12 - 13**

**SUMMARY .....Page 14**

**CONCLUSION .....Page 15**

## EROSION THREAT ASSESSMENT REDUCTION TEAM (ETART)

ETART is a multijurisdictional, interdisciplinary team formed jointly by FEMA and the State of Washington in response to the 2014 Central Washington wildfires to address the threat of flooding, mudslides, debris flows and other erosion over the approximately 415 square miles of burned lands.

In the summer of 2014, the Carlton Complex Fire burned more than 250,000 acres of land in Washington, the largest wildfire in state history. The fire burned private, federal, state and tribal lands, consumed 300 homes and destroyed critical infrastructure in its path. Then intense rainstorms over the scarred landscape caused more damage from flooding, mudslides and debris flow.

Fire suppression costs topped \$68 million. But post-fire recovery costs have yet to be tallied.

President Obama issued a major disaster declaration on Aug. 11, which authorized the Federal Emergency Management Agency (FEMA) to coordinate federal disaster relief and to help state, tribal and local agencies recover from the disaster. Once firefighters contained the Carlton Fire on Aug. 25, the U.S. Forest Service (USFS) deployed its Burn Area Emergency Response (BAER) team to measure soil quality, assess watershed changes, identify downstream risks and develop recommendations to treat burned federal lands.

FEMA officials and the State of Washington acted fast. They knew more floods may follow without vegetation to soak up rainwater. More silt and debris in the runoff can plug culverts and raise water levels, which may further threaten downstream communities and properties. To reduce the vulnerability of those downstream communities, FEMA created ETART. Responding to the need for multijurisdictional and interdisciplinary cooperation, ETART participants would collaborate to measure soil quality, assess watershed changes, identify downstream risks and develop recommendations to treat burned state, tribal and private lands.

FEMA and the State of Washington recruited biologists, engineers, hydrologists, mapping experts, range

specialists, soil scientists and support staff from more than 17 entities.

### SPIRIT OF COOPERATION

ETART participants included: Cascadia Conservation District, FEMA, National Weather Service, Okanogan Conservation District, Skagit Conservation District, Spokane Conservation District, U.S. Army Corps of Engineers, U.S. Bureau of Land Management, U.S. Department of Agriculture, U.S. Department of the Interior – Bureau of Reclamation, United States Forest Service, Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife, Whatcom Conservation District and Yakama Nation Fisheries, Washington State Conservation Commission, and Underwood Conservation District.

Team members scored the benefits of working together across jurisdictional boundaries and overlapping authorities right away. To start, they stitched their maps together and overlaid their findings to gain consistency and a better perspective. Field assessments used extensive soil sampling. Computer modeling showed the probability of debris flow and other hazards.

Standard treatments in their erosion control toolbox include seeding and other ground treatments, debris racks, ditch protection, temporary berms, low-water crossings and sediment retention basins. Suggested treatments were evaluated based on their practical and technical feasibility.

Regional conservation districts provided a vital and trusted link to private landowners. They:

- held public meetings and acted as the hub of communications;
- posted helpful links on their websites;
- collected information on damage to crops, wells, fences, livestock and irrigation system;
- secured necessary permits that grant state and federal workers access to private property to assess conditions.

Local residents shared up-to-the minute information on road conditions. They had knowledge about seed mixtures that worked best for their areas, existing partnerships, and more. Residents proved key to the success of ETART.

*Note:* Teams found a few positive consequences of the wildfire. For instance, debris flow delivered more wood and gravel downstream, which may create a better fish habitat once the debris and sediment settle. The resulting bedload may enhance foraging, spawning and nesting for endangered species, such as Steelhead, Bull Trout and Spring Chinook Salmon.

### STRENGTH OF COLLECTIVE ACTION

Final reports from USFS BAER and ETART have helped multiple federal, state, tribal, and local jurisdictions formulate and prioritize their projects, and leverage their budget requests for more erosion control funds.

Landowners and managers might share equipment, gain economies of scale and develop more cost-effective solutions. In the end, collaboration and collective action may lessen future damages resulting from flooding or erosion.

### CULTURE OF RESILIENCE

While public health and safety remain the top priority, other values at risk include property, natural resources, fish and wildlife habitats, as well as cultural and heritage sites.

Estimated costs for the emergency restoration recommendations on federal lands run \$1.5 million. For short-term stabilization, USFS initiated funding requests for seeding and mulching urgent areas before the first snowfall. Other suggested treatments include bigger culverts, more warning signs and the improvement of road drainage systems.

For state and private lands, emergency restoration and recovery recommendations may cost in excess of \$2.8 million. Erosion controls include seeding, invasive species removal and the construction of berms and barriers. In its final report, ETART also recommended better early warning systems, more warning signs on

county roads and electronic message signs to aid residents evacuating via highways.

Landowners, managers and agencies continue to search for funding to pay for implementation. For instance, BLM regulations may allow it to seed its lands, as well as adjoining properties, after a wildfire. Select state agencies may provide seedlings, technical assistance on tree salvaging, or partial reimbursement for pruning, brush removal and weed control. ETART assessments are being used by FEMA Public Assistance staff to determine eligibility of temporary erosion control measures undertaken by eligible applicants. As of December, 2014, eight eligible applicants (Okanogan County, City of Pateros, Pateros School District, Washington Department of Natural Resources, Washington Department of Fish and Wildlife, Washington Department of Parks and Recreation, Kittitas County, and the Confederated Tribes of the Colville Reservation) are planning and/or implementing projects to lessen the threat of flooding, debris flows, and slides that may occur as a result of the wildfires. Proposed treatments include reseeding, straw wattles, mulching, water bars, conveyance armoring, sediment retention basins and others.

Knowing a short period of moderate rainfall on burned areas can lead to flash floods, the NWS, USFS, Washington Department of Ecology, and Okanogan Conservation District made a joint effort to quickly install 17 real-time portable gauges to monitor rainfall in and around the area. As conditions warrant, the NWS issues advisory Outlooks, Watches and Warnings to the public and emergency management personnel through the NWS Advanced Weather Information Processing System. In addition to the rainfall monitoring, multi-agency team led by NWS began working a long term project to address and close significant gaps in the weather radar coverage for the affected areas.

**Future ETARTs may help to formalize interagency memorandums of understanding, and encourage more comprehensive community wildfire protection plans. This team approach may also be seen as a model that can be adapted to any disaster event that requires a highly coordinated, collective and rapid response.**

## POTENTIAL FOR ETART APPROACH TO OTHER DISASTERS

**Pre-declaration activities.** It is imperative to start thinking about how to address this need prior to declaration, as soon as a Disaster Field Assessment request is received. Identifying necessary staff may be difficult as FEMA does not currently have a cadre of project managers or other non-program specific task force leads. It may be necessary to appoint specific staff with the necessary skill sets, or to Mission Assign another federal agency. Be open and flexible. Strive to meet the needs that exists. They might not be close to what was originally anticipated.

**4188 Case Study:** *Historically, disaster impacts across jurisdictional lines have presented challenges in addressing additional threats in a holistic manner. This is a particular issue after wildfires. Burned over soils can't absorb even minimal precipitation, and runoff volume increases substantially in even a minor event. Small rainfall events can cause catastrophic erosion. Measures taken to reduce this threat on the part of individual landowners or jurisdictions are ineffectual if the issue isn't addressed comprehensively. These significant issues were readily apparent for 4188 as soon as the state/FEMA joint Preliminary Disaster Assessment (PDA) was completed. Almost every potential applicant identified serious concerns related to the threat of additional damage as a result of flash flooding, debris flows, slides, or other erosion over the burned areas. In response, the Governor of the State of Washington requested Direct Federal Assistance (DFA) for a task force to address these threats, and DFA was granted as part of the declaration. The state and FEMA then jointly formed the Erosion Threat Assessment Reduction Team (ETART), a multijurisdictional, interdisciplinary team to address the identified threats over the approximately 415 square miles of burned lands.*

**Getting started.** It is best to start the team effort as soon as the declaration is granted; this will require preparation in terms of where in the organization, the task force, or group will live, along with initial staffing decisions. Depending on the nature of the disaster,

staff may be housed in infrastructure, mitigation, FDRC, or as a stand alone. Similarly, the disaster type will drive initial staffing. At a minimum, a team lead project manager and a Geographic Information Systems (GIS) specialist should forward deploy. The team lead needs to be someone who can make decisions on mission assignments and staffing needs and get right to work, and this needs to be supported by leadership. It is helpful for the GIS specialist to be a regional asset, or, alternatively, to have a regional GIS specialist in the loop in order to build relationships for future efforts.

**4188 Case Study:** *ETART was housed in infrastructure for 4188. Eight days after declaration, ETART leads attended a meeting in the field. Attendees included dozens of federal, tribal, state and local agencies, conservation and advocacy groups, as well as private citizens. Land jurisdiction in Okanogan County is varied, with many private, state and federal owners, and the burned area covers hundreds of square miles of forests, agricultural property, recreational areas and other lands, requiring a comprehensive and holistic approach. At the meeting, ETART identified a need for training and coordination to ensure availability of the resources and expertise needed to conduct thorough, consistent assessments across jurisdictions. The next day, ETART issued a Mission Assignment (MA) to USFS for a team of BAER Subject Matter Experts (SME) to train and coordinate multijurisdictional/interdisciplinary teams. They would learn how to conduct burned area assessments on state, local and private lands that are consistent and simultaneous with USFS Burned Area Emergency Response (BAER) assessments on contiguous Federal lands. The team lead, the FEMA mitigation SME, and two FEMA GIS specialists (one regional, one reservist) co-located with the lead local agency at their office.*

**Integrating into ongoing efforts.** It is important to recognize that there are significant state and local efforts underway before our team arrives on the scene after a declaration, and the first task is to identify participating agencies, partners, and authorities and get

a handle on the ongoing efforts. This requires getting out in the field where the work is happening, as this is not something that can be done remotely. It has to be clear that we are there to supplement and support existing federal, state, tribal, and local efforts, and not to take over. There may be significant skepticism about the ability of the federal government to achieve this. Consistent face-to-face contact is essential to develop a functional working relationship across jurisdictions amongst personnel who have not previously met.

**4188 Case Study:** *ETART recognized immediately that there was sufficient expertise amongst locals, but also a pressing need for an overarching, coordinating umbrella to pull everything together. The very first thing the ETART team lead did was put together a comprehensive contact list that collated multiple email chains and sign-in sheets from meetings. We then sent out an introductory message to share what we were doing, and to ensure we had the right contacts. This list was used extensively by multiple agencies who were seeking assistance for various efforts. For example, there was a group placing temporary rain gauges in remote locations that needed satellite phones to ensure that the gauges were uplinking properly. They sent a message out to the group and had three offers of loaned sat phones within hours, enabling the gauges to be installed and working correctly in short order. ETART staff were embedded with the local efforts, and this proved a very effective way to foster the vital communication that led to this and other successes.*

**Data sharing issues.** Different agencies have different IT security policies, and many of them are prevented from logging onto ftp sites, using flash drives, and sharing access to networks. This is a significant and ongoing problem that needs to be resolved across FEMA and other federal and state agencies.

**4188 Case Study:** *ETART did not resolve this problem satisfactorily during 4188 operations. Because personnel from different agencies were all working out of the same office, they were able to pass around external hard drives, CDs, etc. One participant noted*

*that he found it extremely useful to have more than one laptop computer to better handle simultaneous requirements of data collection, reporting, and other constant demands. While all of this helped alleviate the problem to some degree, timely compilation of satellite and field data was significantly delayed because of this issue, even with the workarounds that were found.*

**Mission Assignments.** Fast execution of applicable Mission Assignments will allow ETART personnel to hit the ground running. It is important to have at least an initial plan for anticipated tasks to determine the appropriate scope and category for any necessary MAs. If team leads, project managers or other essential staff from non-FEMA federal agencies are needed, issue a 30 day Federal Operations Support Mission Assignment (FOSMA) to get started.

**4188 Case Study:** *While establishing the ETART, it was immediately apparent there were not Pre-Scripted Mission Assignments (PSMA) available for the necessary tasks. There is a PSMA for a BAER team from Department of Interior (DOI) under the National Disaster Recovery Framework (NDRF), but it wasn't appropriate for the mission. We didn't need an assessment team, but a team leader/instructor and SME to teach non-Federal teams to do their own assessments. The local USFS staff was willing and able to support this mission, so a custom MA was crafted. Similarly, there is no PSMA for project management support, and a new one was written in coordination with the USACE. Similar project management support could probably be acquired from other federal agencies as well. In the case of 4188, the local knowledge and expertise of both USFS and USACE were invaluable. FEMA, state, and USFS officials are now in the process of creating pre-scripted language to address the need for rapid coordination between agencies.*

**Implementation of functional groups.** There are different technical and functional facets to any event or incident that would warrant an ETART-type DFA.

Establishment of small functional groups at the appropriate time can provide benefits in multiple arenas:

- reducing duplication of efforts;
- economies of scale during project implementation;
- ensuring there are no missing pieces that preclude getting the full picture;
- streamlining environmental review;
- feeding into implementation of Unified Federal Review.

**4188 Case Study:** *At 4188, the ETART developed functional groups as necessary tasks and activities became evident. A GIS group was developed first, with a Point Of Contact (POC) from each active agency available to share data layers, incoming assessments, project proposals and other information. A project implementation team followed as various entities began planning and implementing projects. This group consisted of a project manager or other POC from each jurisdiction who was knowledgeable about what projects were being planned or constructed. An environmental conditions coordination group was established in conjunction with the implementation group. Jointly, the implementation and environmental groups were able to synchronize implementation and maximize efficiency both in construction and the environmental review process. Potential environmental impacts of proposed work could be addressed on a holistic basis by the ETART team and the environmental staff of local jurisdictions. Greater comprehensive knowledge of ongoing proposals enabled better decision making and realized cost savings. For example, coordination amongst six state and federal agencies on reseeding activities allowed agreement on seed mix and shared contracting, providing significant cost reductions for each agency. Similarly, a multi-agency hydrologic and hydraulic modeling group was formed and efforts from five different agencies were evaluated to determine if additional modeling work would provide cost effective benefits. No additional modeling was needed and various jurisdictions are using the existing models and analyses in a variety of ways.*

**Tie-ins to FEMA programs.** FEMA Program Subject Matter Experts should be included in the launching of

an ETART, or similar project. Public Assistance (PA) and Mitigation programs, in particular, may be relevant. Program staff can help maximize assistance to impacted communities by using data developed by ETART. Similarly, FEMA Environmental and Historic Preservation (EHP) staff should be part of the team effort from the very beginning, boosting the potential to use ETART information to streamline compliance review for FEMA funded assistance.

**4188 Case Study:** *ETART at 4188 was housed in the infrastructure branch and run by a Project Manager/ Task Force Leader that reported to the Infrastructure Branch Director Public Assistance Group Supervisor (ISBD/PAGS). This provided PA staff with scientific soils and hydraulic modeled data to assess the eligibility of emergency protective measures under Category B for eight applicants to address immediate threats to lives, safety and improved property. PA staff used the language below to document eligibility of measures such as reseeding, retention ponds, water bars and others:*

*“Under Direct Federal Assistance authorized for FEMA-4188-DR-WA, the joint state-FEMA Erosion Threat Assessment Reduction Team (ETART) coordinated a multijurisdictional and interdisciplinary assessment of flood, slide and debris flow threats across the entirety of the burned area associated with the Carlton Complex Fire. Assessments have also been completed for other fires, including Snag Canyon Fire and Devil’s Elbow Complex. The 2014 Central Washington Wildfires have left vast areas in the declared areas burned over and denuded of vegetation. These burned areas are extremely vulnerable to flash flooding, debris flows, and landslides during future precipitation events. Burn severity varies across the burn scars, ranging from high to low. The comprehensive threat analysis determined that high and moderate severity areas present an immediate threat of additional damage as a result of flooding, debris flows, breaching of ponds and other effects from high volumes of runoff and erosion/*

*transportation of unstable sediment in drainages, while adjacent and lower elevation burned areas with lower burn severity rankings present an immediate threat as a result of extensive moderate-high burn severity at higher elevations, due to the lack of vegetation to slow the runoff and sediment flows from the upper more severely impacted areas. Values at risk include highways, county roads, homes, outbuildings, other public infrastructure, and Endangered Species Act (ESA) listed wildlife habitat.*

*Measures taken by eligible applicants to lessen these threats are PA eligible if they meet the criteria below:*

*•44 CFR 206.225(a)(3)(i)/(ii) In order to be eligible, emergency protective measures must: (i) eliminate or lessen immediate threats to life, public health or safety; or (ii) eliminate or lessen immediate threats of significant additional damage to improved public or private property through measures which are cost effective.*

*•44 CFR 206.221(c) Immediate threat means the threat of additional damage or destruction from an event which can reasonably be expected to occur within five years.*

*•44 CFR 206.221(d) Improved property means a structure, facility or item of equipment which was built, constructed or manufactured. Land used for agricultural purposes is not improved property.*

*In accordance with guidance in the PA guide and 44 CFR 206.225(a)(3)(i)/(ii), the state and FEMA have determined that these measures are necessary to lessen immediate threat to lives, public health or safety, and/or improved public or private property.”*

**Unified Federal Review considerations.** Section 429 of the Stafford Act, added as part of the Sandy Recovery Improvement Act of 2013, requires an expedited and unified Environmental and Historic Preservation (EHP) process. Establishment of this process is ongoing, but will require significant efforts,

data acquisition, agency coordination, and analyses to integrate various procedures and paths.

**4188 Case Study:** *As noted above, an environmental conditions group was established during 4188. This, along with robust data collection and analyses in the GIS/technical group, helped streamline the environmental review process. Multiple agencies, doing similar types of work, could coordinate on review and permitting requirements, hastening approval. Similarly, agencies with regulatory authority may get a more comprehensive picture of potential impacts than if they are reviewed independently as submitted by the various agencies. This provides an opportunity for consistency in permitting/approval conditions. Regional Environmental / Historic Preservation (EHP) leadership used this opportunity to further explore how ETART activities could be utilized for complying with Section 429.*

**Coordination with state agencies, OFA, VAL and FDRC.** Assistance available through FEMA programs may be limited or non-existent, depending on the nature of the disaster and the unmet needs. State or other federal agencies may have more relevant programs, and they may not be readily apparent. Make contact with any possible stakeholders; cast a wide net and see what can turn up. If there is a FEMA Voluntary Agency Liaison (VAL) deployed, stay in contact with him/her. The VAL can help identify unmet needs that the ETART group can then attempt to address. If a VAL is not deployed, perhaps it would make sense to get one under the ETART umbrella. Similarly, if the Federal Disaster Recovery Coordinator is deployed, he or she will have contact with any recovery groups that come together. While ETART efforts during 4188 focused on assessing and alleviating erosion threats to public health and safety and improved property, a similar comprehensive approach could also be taken to address threats of any kind to other values. For example, the Central Washington Wildfires caused significant damage to agricultural interests including fences, grazing lands, and crop lands. There are programs available through

multiple agricultural agencies to assist with some of these losses, but they vary in criteria, timing, and application procedures, and this has been frustrating to landowners and other impacted groups. Natural and cultural resources were also negatively affected by the wildfires, and this is a common occurrence after disasters of many types. A project manager or task force leader could potentially provide assistance to comprehensively address these issues. This could be provided through a mission assignment to an appropriate federal agency (USDA for agricultural issues, for example). Other possibilities may be activation of NDRF or state assets.

**4188 Case Study:** *In addition to FEMA and NRCS assistance made available to address the immediate threat of flooding and debris flows to improved property, ETART helped to identify potential assistance to landowners for agricultural and natural resource related issues through coordination with state and federal agencies (see list in Appendix B).*

**Use of data for future PDA.** ETART activities can lead to collection of vast amounts of data: aerial photos, drone footage, assessments and mapping products from multiple agencies, photos, and more. This data can prove useful in evaluating potential damage from future events, particularly if the disaster has left the impacted area at greater risk for damage of the same or a different nature.



**2014 Carlton Complex Fire destroyed 300 homes**

**4188 Case Study:** *Wildfires left vast areas in the declared areas burned over and denuded of vegetation. These burned areas are extremely vulnerable to flash flooding, debris flows, and landslides during future precipitation events. FEMA Individual and Public Assistance staff used ETART data to assess residences and infrastructure left at risk of future flooding, debris flow and slides. Should an event occur that damages these values, PDA efforts will be significantly simplified.*

**Future use of GIS data.** Data gathered during an ETART can provide tremendous benefits to day-to-day regional operations. Potential applications include monitoring success of implemented projects, recovery of impacted area over time, floodplain mapping, assessing repetitively damaged sites, mitigation opportunities and successes, preparedness, and many others.

**4188 Case Study:** *Near the close of the JFO, the ETART GIS specialist was deployed to Region 10 for thirty days to provide continuity with regional staff, and to help further understand GIS utilization for pursuing a uniform federal environmental review for this event.*



**Foundation and chimney all that remains after fire**

## APPENDIX A - ETART PRODUCTS

### **BAER Report (State and Local Team) Carlton**

**Complex Fire Sept 14, 2014** – The multijurisdictional assessment team worked in close coordination with U.S. Forest Service BAER teams on the Carlton Complex Fire to create a seamless evaluation of all lands burned. The report summarizes fire and potential post-fire effects to critical values (e.g. human life, improved property, roads, buildings, water systems, etc.). It also addresses the degradation of natural resources (soil productivity and hydrologic function), municipal, domestic, agricultural water supplies, habitat for federally listed species listed under the Endangered Species Act, and cultural resources within or in close proximity to burned lands. The report also recommends emergency stabilization and long-term restoration actions that can be taken to minimize unacceptable impacts resulting from the Carlton Complex Fire that burned private property, and lands managed by the Washington Department of Natural Resources, Washington Department of Fish and Wildlife, Confederated Tribes of the Colville Reservation, Bureau of Land Management, and the U.S. Forest Service.

**Noxious Weeds & Invasive Plants Report** – This report addresses potential treatments designed to protect sensitive native plant communities and supplement remaining native seed banks. These treatments promote native plant community recovery and reduce the potential for invasion of noxious weeds into areas disturbed by fire suppression activities and in all burn severity areas.

**Hydrology Resource Assessment** – Aims to *assess* changes to the watershed process resulting from the fire, *identify* at risk values within the burned areas and downstream of the burned areas, and *develop* treatment

recommendations to mitigate threats to those values.

**Aquatic Resources Report** – Aims to *identify* fisheries values at risk, *assess* how overall changes to soil and watershed function caused by the fire that may affect critical fisheries values, *recommend* non-emergency treatments to reduce the risk to fisheries values, and *identify* possible long term treatments to aid habitat recovery and reduce impacts of future events.

**BAER Soils Resource Report** – This report summarizes fire and potential post-fire effects to soil resources. Its objectives are to *evaluate* the effects of the fire on soil resources, *identify* critical soil resource values at high risk of irreversible damage, and *identify* both emergency and long-term treatments that could rehabilitate or protect soil resources from irreversible damage.

### **Carlton Complex Fire Engineering Resource**

**Assessment** – Aims to *identify* critical values within the watersheds, and develop potential treatments to reduce the risk of flood damage caused by the fires. Values include: structures, homes, wells, dams, surface water impoundments, utilities, irrigation diversions and on-farm systems, trails, mines, and campgrounds.

### **Carlton Complex Fire Cultural Resource Report**

– The objectives of this report are to identify previously documented cultural resources located on state and private lands within the 2014 Carlton Complex Fire area of potential effect, analyze direct and indirect effects and potential future effects of the fires to cultural resources, and to propose specific BAER treatments to prohibit future damage to cultural resources determined “eligible” for listing on the National Register of Historic Places.

**Carlton Complex Fire Engineering Resource Assessment NRCS EWP Program Summary** – The U.S. Department of Agriculture’s Natural Resources Conservation Service (NRCS) administers the Emergency Watershed Protection (EWP) Program, This program responds to emergencies created by natural disasters.

***GIS MAPS AVAILABLE:***

**Soil Burn Severity Map** – The Soil Burn Severity Map is the final version of what begins as Burn Area Reflectance Classification (BARC) data. The BARC is a satellite interpretation of damage, while the Soil Burn Severity is the result of boots on the ground and actual soil/foilage analysis.

**All Agency, Final Calls Map** – This map highlights point-efforts of multi-agency teams walking the land and making soil and foliage analysis. These points range from L, M, H meaning Low, Moderate, and High burn severities. They are also color coordinated as green, yellow, and red. The points are ultimately used to challenge or defend the initial damage estimate, (shown via BARC). The resulting Burn Area Severity Map will now be more accurate based on the team’s eye witness data collection.

**Initial Transects & Severity Calls Map (Final Calls Sept 9)** – This map shows other data collection points besides the Burn Severity Final Calls, these are called Transect Points. The teams would walk Transects and take soil/flora samples and do analysis at these points too, recording their findings as noted in the shapefile’s table data.

**Initial Situation Map as of Aug 19, 2014** – This map shows initial suppression efforts including dozer lines, threatened areas of interest, fire team locations, areas of responsibility, and much more.

**Carlton Complex Values Maps** – A series of maps zoomed into locations to show the multitude of

threatened ‘Values’ items. Values are points of interest such as wellheads, bridges, roads; many items whose loss would be considered negative. Values maps are used to define mitigation and recovery efforts.

**Carlton Complex Area South, Land Survey Map** – Burn area with land ownership assigned onto it. Federal, state, private, etc. on top of low, moderate, high burn areas. This particular map series (South and North), were used by cultural studies to derive where sensitive sites are located. The sites are not marked on these two maps but cultural point analysis can be done using the included data.

**Carlton Complex Area North, Land Survey Map** – Burn area with land ownership assigned onto it. Federal, state, private, etc. on top of low, moderate, high burn areas. This particular map series (South and North), were used by cultural studies to derive where sensitive sites are located. The sites are not marked on these two maps but Cultural point analysis can be done using the included data.

**Bulldozer and Hand Dug Lines** – This map shows lines dug for firebreaks; both bulldozer and hand dug lines. The lines are colored by State and Private areas. Mileage is given in the index.

**Carlton Complex Land Ownership** – Parcel/Land ownership broken up by agency or community.

**BARC Map With Contours** – The initial BARC (Burn Area Reflectivity Collection) overlain with contour lines, (50' and 100' intervals). Data exists for 2' intervals but the map would have been completely obscured by lines.

**Risk Values Group 1-4** – This series shows points of interest on the map that were considered under risk protection or prevention against future events. An example may include a home's wellhead, or a property's power lines, infrastructure, etc.

## APPENDIX B - POTENTIAL ASSISTANCE

### **Agricultural and livestock programs available through local Farm Service Agency (FSA) offices:**

**The Emergency Conservation Program (ECP):** ECP was approved for Okanogan County. The ECP provides Cost-share assistance emergency funding and technical assistance to farmers and ranchers to rehabilitate farmland damaged by natural disasters and for implementing emergency water conservation measures in periods of severe drought. ECP includes cost-share for fencing, including deer fence around orchards.

*Eligibility: Qualified Producers*

**Conservation Reserve Program (CRP):** An extension of CRP emergency haying and grazing was approved for Adams, Benton, Chelan, Douglas, Franklin, Grant, Lincoln, Okanogan, Walla Walla and Yakima counties. The extension is only for producers affected by wildfires in the summer of 2014. Emergency haying was extended to September 30, 2014, and emergency grazing is extended to December 15, 2014.

*Eligibility: Qualified Producers*

**Livestock Indemnity Program (LIP):** For livestock deaths in excess of normal mortality caused by adverse weather. Makes cash payments that are equal to 75 percent of the average fair market value, and covers beef cattle, dairy cattle, sheep, swine, goats, buffalo, chickens, ducks, geese, turkeys, alpacas, llamas, deer/reindeer/elk raised domestically for agricultural production, emu and equine (as part of ranch operations and not raised as pets). *Eligibility: Livestock producer must legally own the eligible livestock on the day it died.*

*Timeline: Within 60 calendar days from the ending date of the applicable adverse weather event*

**Livestock Forage Disaster Program:** For losses due to a fire on federal land that a farmer is no longer able to use for grazing, payment rate is 50 percent of the monthly feed costs.

*Eligibility: Eligible Livestock Producers*

**Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish:** For livestock and grazing losses not covered by the first two programs. This program covers pasture and forage losses on private lands.

*Eligibility: Eligible Producers*

**Tree Assistance Program (TAP):** Financial assistance to rehabilitate eligible trees, bushes, and vines, requires loss or damage to 15 percent of the crop, and makes

cash payments for replacement at 65 percent of the cost and for salvaging trees at 50 percent of the cost.

*Eligibility: Eligible Producers*

*Timeline: 90 days after the disaster event, or the date the loss is apparent*

**Emergency Conservation Program:** Provides emergency cost-share assistance to help rehabilitate farm and ranch land, up to 75 percent of the cost to implement the conservation practice, and includes repairing fences. This program is subject to the annual appropriations process.

*Eligibility: Eligible Producers*

**Emergency Forest Restoration Program (EFRP):** Provides financial and technical assistance to owners of private forest land, specifically to restore damaged forests or rehabilitate forest resources. This program is subject to the annual appropriations process.

*Eligibility: Owners of nonindustrial private forests with tree cover before the disaster are eligible to apply.*

### **Rural Development Community Programs:**

Provides grants and low interest loans for municipalities, counties, nonprofits and tribes for community needs like fire equipment, community centers, city vehicles, day care facilities, and more. This program is subject to the annual appropriations process.

*Eligibility: Municipalities, counties, nonprofits and tribes.*

**Emergency Physical Loss Loans:** Family farmers in Chelan, Douglas, Grant, Lincoln, Skagit, Stevens, and Whatcom counties may qualify for FSA emergency physical loss loan assistance. Approval is limited to severe physical losses only.

*Eligibility: Documentation of severe physical loss.*

*Loan applications are reviewed on a case-by-case basis.*

*Timeline: Applications will be received for eight months after September 2, 2014*

### **Environmental Quality Incentives Program**

**(EQUIP):** Reestablishing vegetation on private agriculture or forest lands. In addition, farmers can apply to receive up to \$6 per acre on grazing lands if they agree not to graze damaged land for two years. Eligible land includes cropland, rangeland, pastureland, non-industrial private forestland and other farm or ranch lands.

*Eligibility: Qualified agricultural producers and owners of non-industrial private forestland.*

## APPENDIX C - AFTER INCIDENT IMPROVEMENTS

### Flood Warning Rain Gauges

New rain gauges were installed within the Carlton Complex Fire boundaries to provide an early warning system for flash floods.



Approximately 17 new portable rain gauges were placed throughout the fire-damaged area to provide immediate rainfall accumulation information to the National Weather Service, so that it can alert people about the potential for flash floods or mudslides.

The new rain gauges were installed in the wake of floods and slides that damaged or destroyed several homes and properties following torrential rains on August 21, 2014.

About half of the gauges were placed on mountain peaks in and around the burned area.

The gauges are programmed to send a satellite signal if they measure 5/100 of an inch of rain in less than five minutes. The signal is sent to the NWS in Spokane, which can issue flood warnings for specific locations.

Locations of the new gauges include Thrapp Mountain, Chiliwist Butte, Mount Leecher, above Cow Creek, Buckhorn Mountain, Goat Mountain, and Harmony Heights.

Prior to the fires there were a couple of rain gauges in the area, but they only reported once an hour. The new gauges will report continuously after they are triggered by significant rainfall, and will provide much more site-specific information.

The devices include a solar panel and metal cabinet to house electronic equipment, a small arm with the rain gauge and antennae to send signals.

### Aerial Reseeding Efforts

Washington Department of Natural Resources, Washington Department of Fish and Wildlife, and the US Bureau of Land Management have coordinated seeding efforts. Depending on the burn severity, fires can affect burned-area soils by reducing the effective ground cover, reducing the amount of soil structure, and forming water repellent layers that reduce infiltration. Guidance compiled by USFS BAER hydrologists indicates post-fire soils may allow very little infiltration, such that a very high percentage of any subsequent rainfall becomes runoff. This effect would be in addition to pre-fire conditions where rainfall intensity in excess of soil infiltration rates would be expected to generate surface runoff.

The reseeded efforts are intended to lessen burn effects and secure terrain stability in affected areas. The goal is to reseed 12-14K acres of severely burned areas for stability between USFS, WDNR, BLM, and WDFW. Attempts to partner up with private landowners through the efforts of the State Conservation Commission and the Okanogan Conservation District are also underway. Federal, state, and local seeding efforts will take place in late October through early November for the first phase, and in early spring for the second phase.

## APPENDIX D - AFTER ACTION REVIEW

### What worked

- Everyone working out of the same facility (this also had very positive impacts after the final report was written);
- Having FEMA ETART resources available;
- Having extra USFS employees with BAER experience;
- Having the State/Private BAER team collocated with the USFS BAER team;
- Use of the GIS Collector application;
- Having GIS personnel pre-deploy;
- Having local personal/knowledge of the disaster area;
- Explanation of the USFS terminology.

### What could be improved

- Make sure both agencies and individuals are familiar with what ETART was doing in this past mission. Moving forward, attend as many formal meetings as possible to explain what these new types of teams do and explain the involved coordination between agencies and how that improves disaster response;
- At the beginning of the process and include more time to train up with the soil science SMEs;
- Having more non-SME staff/helpers (this will be critical in future disasters when a local organization won't have as much time to organize a team);
- Having more time at the end of the soil research collection to perform analysis;
- Having the GIS/IT folks pre-deploy sooner, and consistent staffing (same staff throughout process);
- Having an SOP that outlines treatments/action items with the who/what/when/where/how/ifs/ands/buts;
- Secure technology solutions such as basic FTP sites beforehand, so agencies do not need to scramble and deal with technology issues when having to focus on disaster recovery;
- Set up mutual aid agreements or memos of understanding before disasters strike to help facilitate urgent treatments in a more timely and efficient manner.



In future efforts, support from an agricultural SME would improve the capability to assist landowners with agricultural needs such as fence repair, restoration of grazing lands, livestock loss and others.

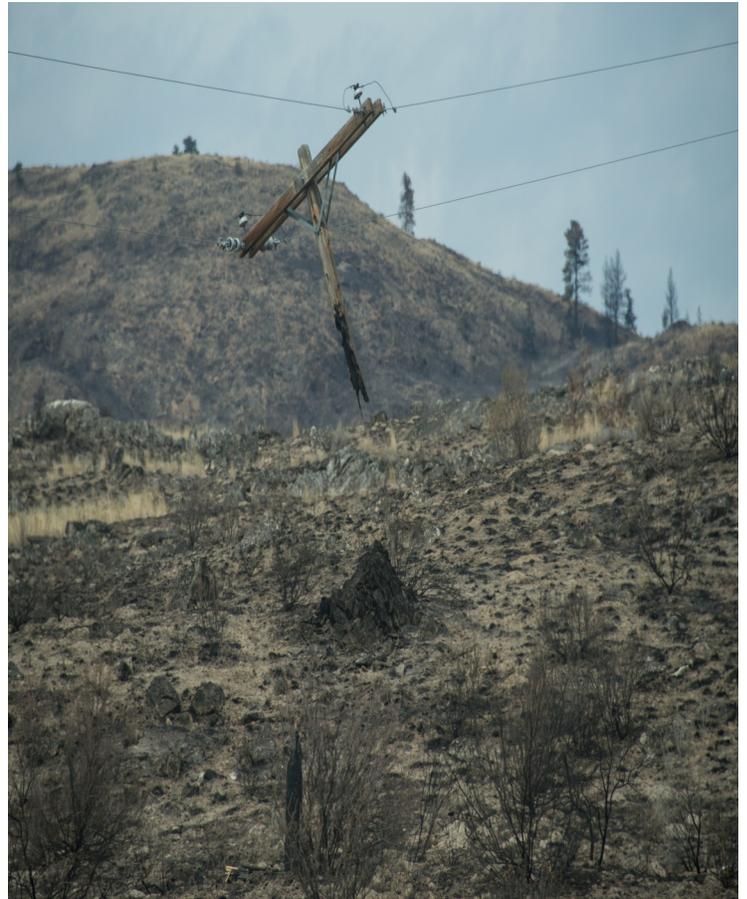
### Next Steps

ETART worked with multiple agencies and organizations to support the implementation of recommended treatments and action items on impacted burn areas.

ETART data was transitioned back to Region X on November 3, 2014, and will continue to be used in a variety of ways:

- Continued development and coordination of functional multijurisdictional groups as additional analyses and implementation of recommended projects progresses:
  - Synchronization of project implementation;
  - Hydraulic and hydrologic (H&H) modeling efforts;
  - Unified environmental review.

- Progress with GIS efforts:
  - Leveraging of multi-agency GIS capability and readily available and ETART-acquired data to assist in maximizing efficiency of functional groups described above;
  - Develop baseline information for monitoring recovery over treated and untreated areas;
  - Implement GIS applications and online functionality for analysis and monitoring of affected areas and treatments applied;
  - Create temporal GIS products outlining treatment methodology and effectiveness;
  - Provide ongoing GIS support with analysis and data acquisition.
- Develop a Best Practices blueprint for future ETART-type missions, along with documentation of ETART Best Practices and recommendations for future uses.
- Improve efficiency in coordination with FEMA Environmental and Historic Preservation (EHP) related to unified review under Section 429 of the Stafford Act, and explore future possibilities for collaboration between unified review requirements and ETART-type efforts.
- Evaluate the potential of ETART-type activities to reduce damages related to post-fire flooding/debris flows/slides using historical data.



**2014 Washington wildfires destroyed public and private property. Subsequent erosion will cause additional major damage over the next several years.**



## SUMMARY

In the aftermath of the 2014 Carlton Complex Fire, the largest wildfire in Washington state history, forest and emergency management experts knew that a secondary threat would arrive with the next rainstorm. The burned landscape had little or no vegetation to soak up rainwater, creating a severe risk of flash floods, mudslides, debris flows, and other erosion. This danger can persist for many years after a major wildfire.

The U.S. Forest Service (USFS) promptly deployed its Burn Area Emergency Response (BAER) team to measure soil quality, assess watershed changes, identify downstream risks, and develop recommendations to treat burned USFS lands.

Non-USFS forests and properties would require a separate, yet integrated approach. State, county, tribal and private roads, infrastructure, and all downstream communities and property were in peril.

In response to the approved FEMA-4188-DR-WA Direct Federal Assistance request and with a critical need to collaborate across multiple jurisdictions and take coordinated and collective action, the Federal Emergency Management Agency (FEMA) and State of Washington formed the Erosion Threat Assessment Reduction Team (ETART). This group would address the post-fire threats to vast areas of burned state, tribal and private lands, consistently and simultaneously with BAER.

ETART brought together biologists, engineers, hydrologists, mapping experts, range specialists, soil scientists and support staff from more than 17 entities, and mission assigned USFS to provide BAER training. Together, the teams provided detailed assessments of changes in the landscape, identified risks, and developed recommendations for action across the entire burned area. ETART also integrated USACE efforts, operating under their Advance Measures authorities, into ETART activities.

Local partners, including USFS and Okanogan Conservation District, also proved to be vital to the success of ETART, with their up-to-the-minute

information on road conditions, knowledge about seed mixtures that work best for their areas, existing partnerships, and more.

The team quickly found ways to share their geographic information system (GIS) data to comprehensively map land ownership, wildlife habitats, watersheds, ongoing projects, and more. They were able to identify potential emergency treatments, and begin planning for the short and long-term recovery of the area.

Potential erosion control treatments were evaluated on their practical and technical feasibility, and included seeding and other ground treatments, debris racks, ditch protection, temporary berms, low-water crossings, sediment retention basins, and other measures.

Certain emergency protective measures such as erosion control which meet the immediate threat to public health and safety, and to improved public and private property may qualify for FEMA's Public Assistance grant program under the FEMA-4188-DR-WA disaster declaration. Eligible tribes, state agencies, local governments and certain private nonprofits in declared counties can receive 75 percent federal funding for the cost of eligible projects.

Other ETART recommendations included better early warning systems, more warning signs on county roads, and electronic message signs to aid residents evacuating via highways.

Even a short period of moderate rainfall on burned areas can lead to destructive and life-threatening flash floods. In response, the National Weather Service, USFS, Washington Department of Ecology, and Okanogan Conservation District made a joint effort to quickly install 17 real-time portable rain gauges to monitor rainfall in and around the Carlton Complex Fire burn area.

As conditions warrant, the NWS will issue advisory Outlooks, Watches and Warnings to the public and emergency management personnel through the NWS Advanced Weather Information Processing System.

## CONCLUSION

The successful ETART was able to provide greater coordination of emergency stabilization, restoration, and recovery activities following the 2014 Central Washington wildfires.

Future ETARTs may help to formalize interagency memorandums of understanding, and encourage more comprehensive community wildfire protection plans.

This team approach may be seen as a model that can be adapted to any disaster event that requires a highly coordinated, collective and rapid response.

### More information:

<http://centralwashingtonfirerecovery.info/>

<http://www.okanogancd.org/Carlton>

[http://landslides.usgs.gov/hazards/postfire\\_debrisflow/](http://landslides.usgs.gov/hazards/postfire_debrisflow/)

Several USFS BAER Team technical reports are available at:

[http://www.treesearch.fs.fed.us/search.php?in\\_words\\_phrases=BAER+Teams](http://www.treesearch.fs.fed.us/search.php?in_words_phrases=BAER+Teams)



Intense wildfires cause extreme damage, and bring additional threats for several years