

The background of the slide is a light gray color with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance.

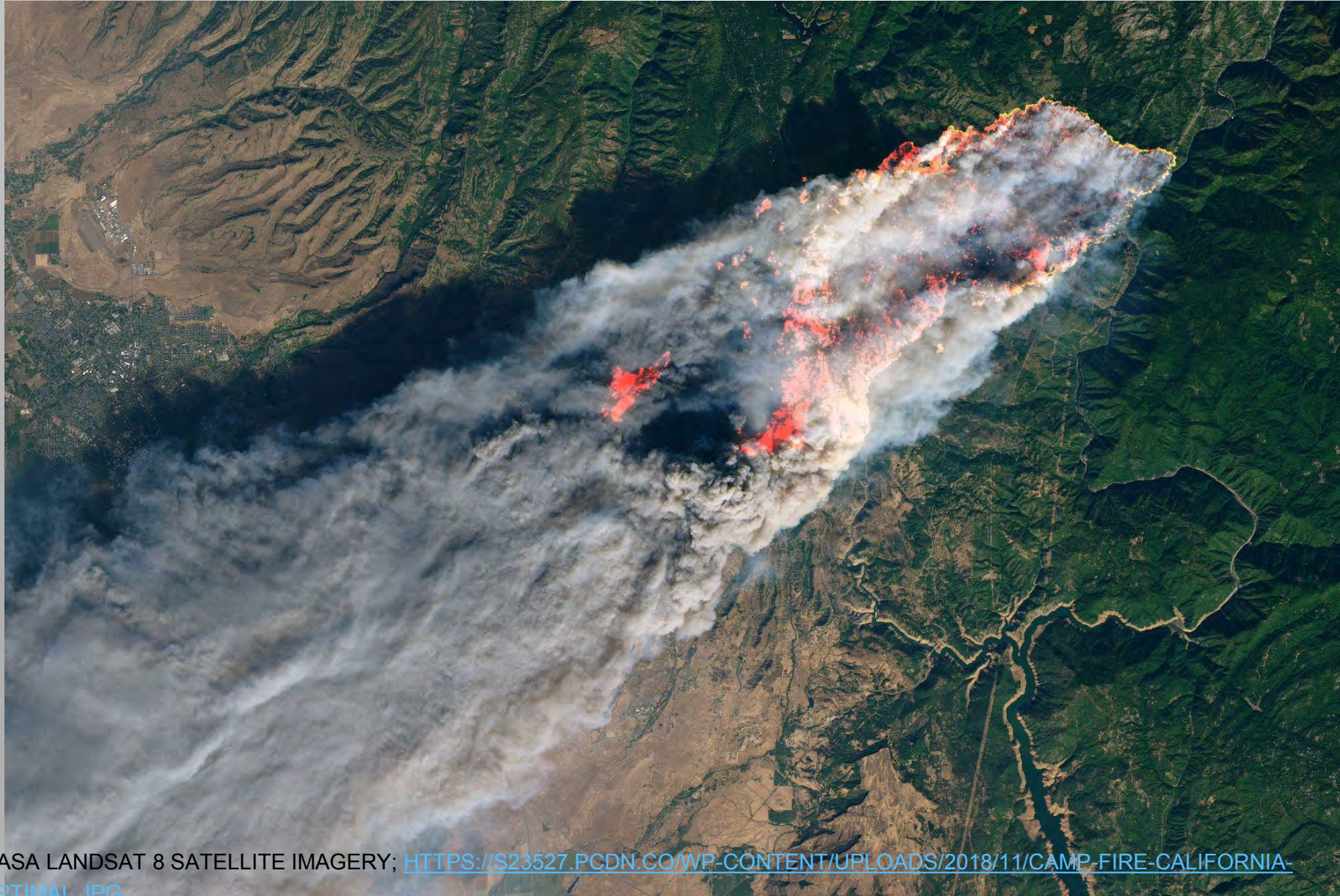
CAMP FIRE; RAPID INITIAL RESPONSE OF BEST MANAGEMENT PRACTICES (BMP'S) FOR WATER QUALITY

**CAMP FIRE WATER RESOURCES
MONITORING AND RESEARCH SYMPOSIUM
JUNE 4, 2019**

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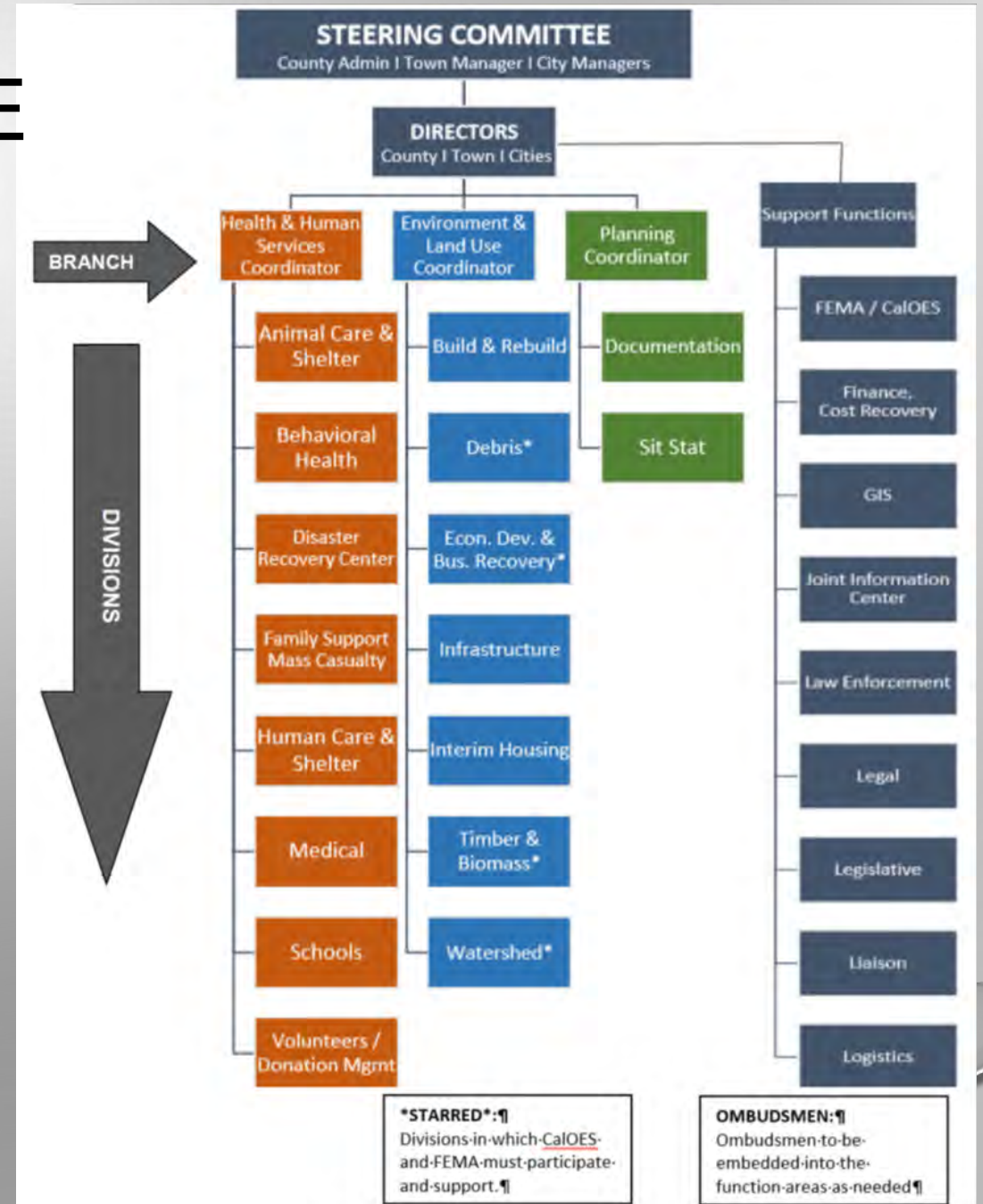
NOVEMBER 8, 2018



SOURCE: NASA LANDSAT 8 SATELLITE IMAGERY; <https://s23527.pcdn.co/wp-content/uploads/2018/11/camp-fire-california-2018.jpg>

IMMEDIATE RESPONSE

- INCIDENT COMMAND SYSTEM
 - BUTTE EOC, JOINT COMMAND (LAW AND FIRE)
 - OPERATIONS DIVISION- PUBLIC WORKS BRANCH
 - TRAFFIC AND ROAD; NRRWF
- “WATERSHED” DIVISION (RECOVERY)
 - ON-GOING MULTIAGENCY COLLABORATION
 - PHYSICAL PROCESSES
 - WATER QUALITY



WATERSHED DIVISION- PHYSICAL PROCESSES

- WATERSHED EMERGENCY RESPONSE TEAM (WERT) COMMISSIONED
 - STATE AND FEDERAL AGENCIES
 - EXCLUSIVE FOCUS ON LIFE-SAFETY, AND PROPERTY FROM POST FIRE HAZARDS.
 - PHYSICAL PROCESSES FOCUSED (NOT WATER QUALITY)

State of California
Watershed Emergency Response Team (WERT) – Camp Fire

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CAMP FIRE Watershed Emergency Response Team Draft Report



CA-BTU-016737

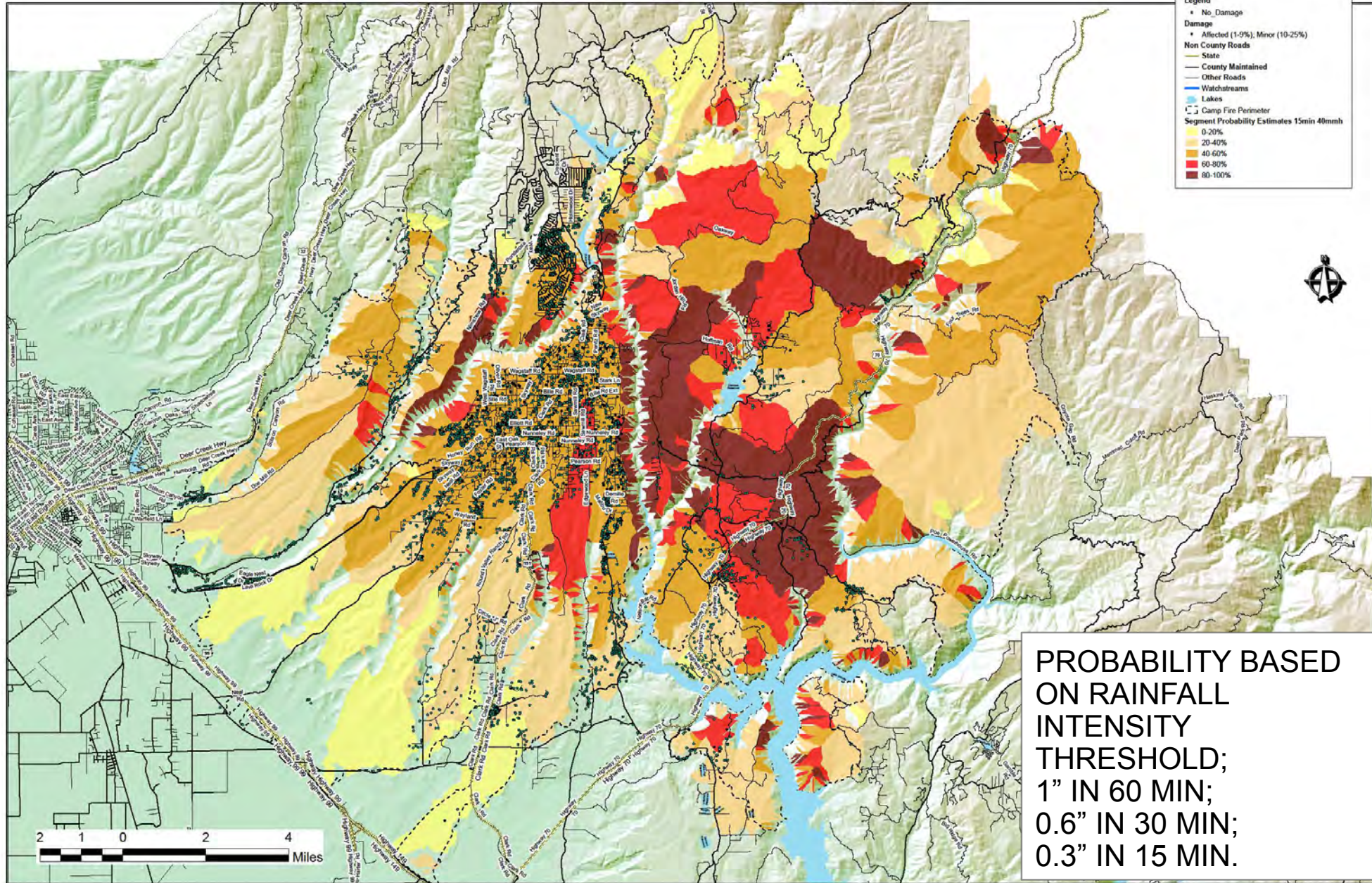
November 29, 2018



The California Watershed Emergency Response Team (WERT) helps communities prepare after wildfire by rapidly documenting and communicating post-fire risks to life and property posed by debris flow, flood, and rock fall hazards.

http://cdfdata.fire.ca.gov/pub/cdf/images/incidentfile2277_4930.pdf

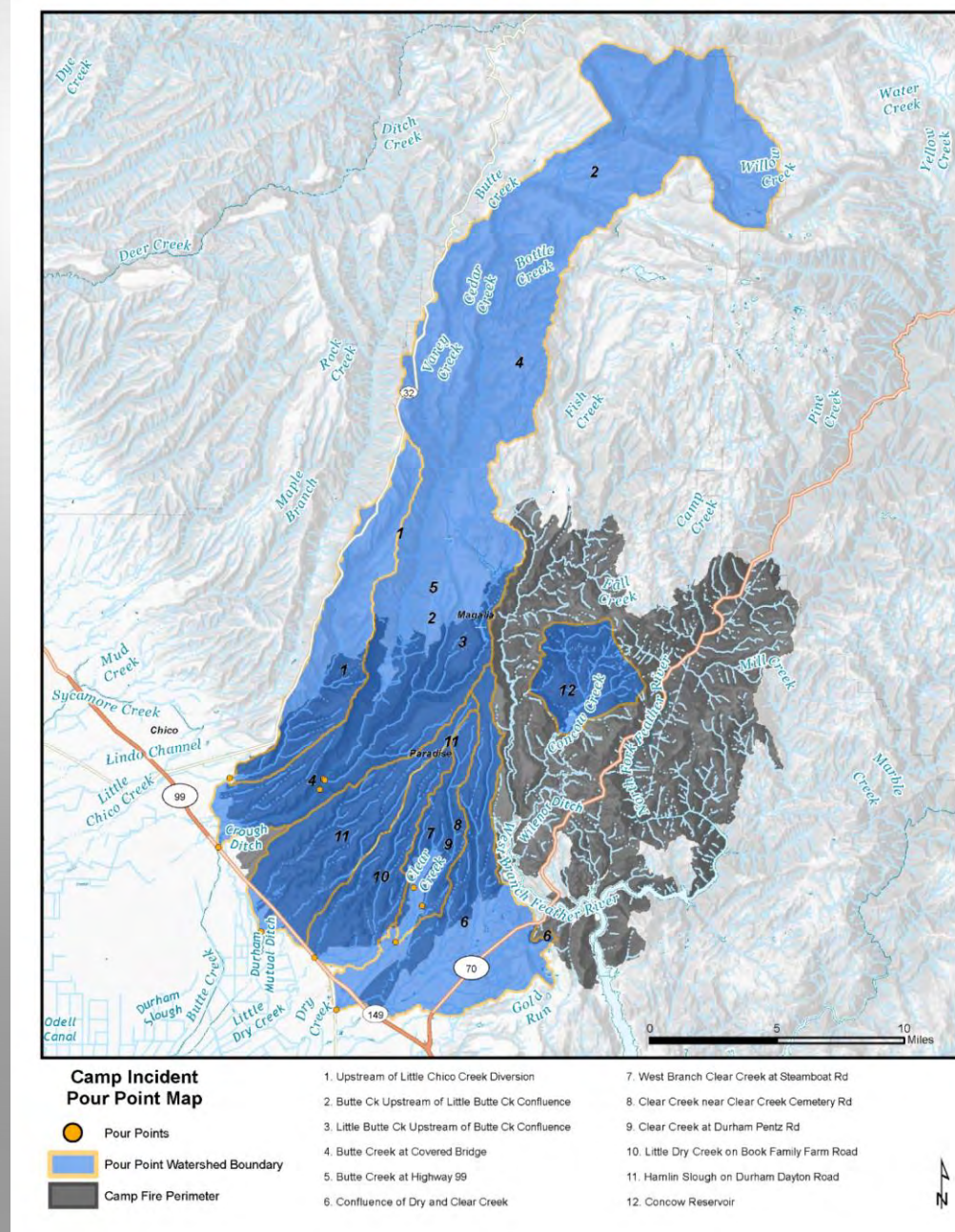
2018 Camp Fire Debris Probability



- Source: CAMP FIRE Watershed Emergency Response Team Data.

WATERSHED DIVISION- WATER QUALITY

- EARLY THINKING
 - MASSIVE URBAN SCALE
 - UNCLEAR MAGNITUDE OF RISK TO WATER QUALITY
 - LITTLE BODY OF KNOWLEDGE AVAILABLE FOR THIS SITUATION
 - EMERGENCY PROTECTIVE MEASURES (FEMA FUNDING) APPLIED TO BMP DEPLOYMENT



WATERSHED DIVISION- WATER QUALITY

- REQUESTED SUPPORT FROM CAL-OES
 - STRATEGIC PLACEMENT OF (BMPS)
 - PROVIDE LABOR (DWR & CCC) AND MATERIALS
 - OPERATIONAL AND LOGISTICAL SUPPORT:
 - RAPID COORDINATION AND DEPLOYMENT
 - MUTUAL AID FROM CHICO AND PARADISE
 - DWR & CVFPB FLOOD FIGHT SPECIALIST TEAM
 - LOCAL FIRMS
- GOALS
 - PLACE AS MANY PROTECTIVE MEASURES AS SAFELY AND EFFECTIVELY AS POSSIBLE
 - DOCUMENT LOGIC AND PLACEMENT FOR ACCOUNTABILITY, FUTURE MAINTENANCE, AND LESSONS LEARNED
 - COMMUNICATE TO DEBRIS REMOVAL PRIORITIZATION OF SITE CLEAN UP.

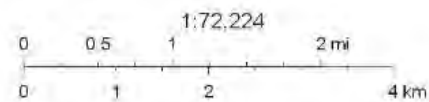


CAMP FIRE: BMP DEPLOYMENT

- HURDLES
- BMP STRATEGY
- SITE ASSESSMENT & PRIORITIZATION
- INSTALLATION OPERATION
- OUTCOMES

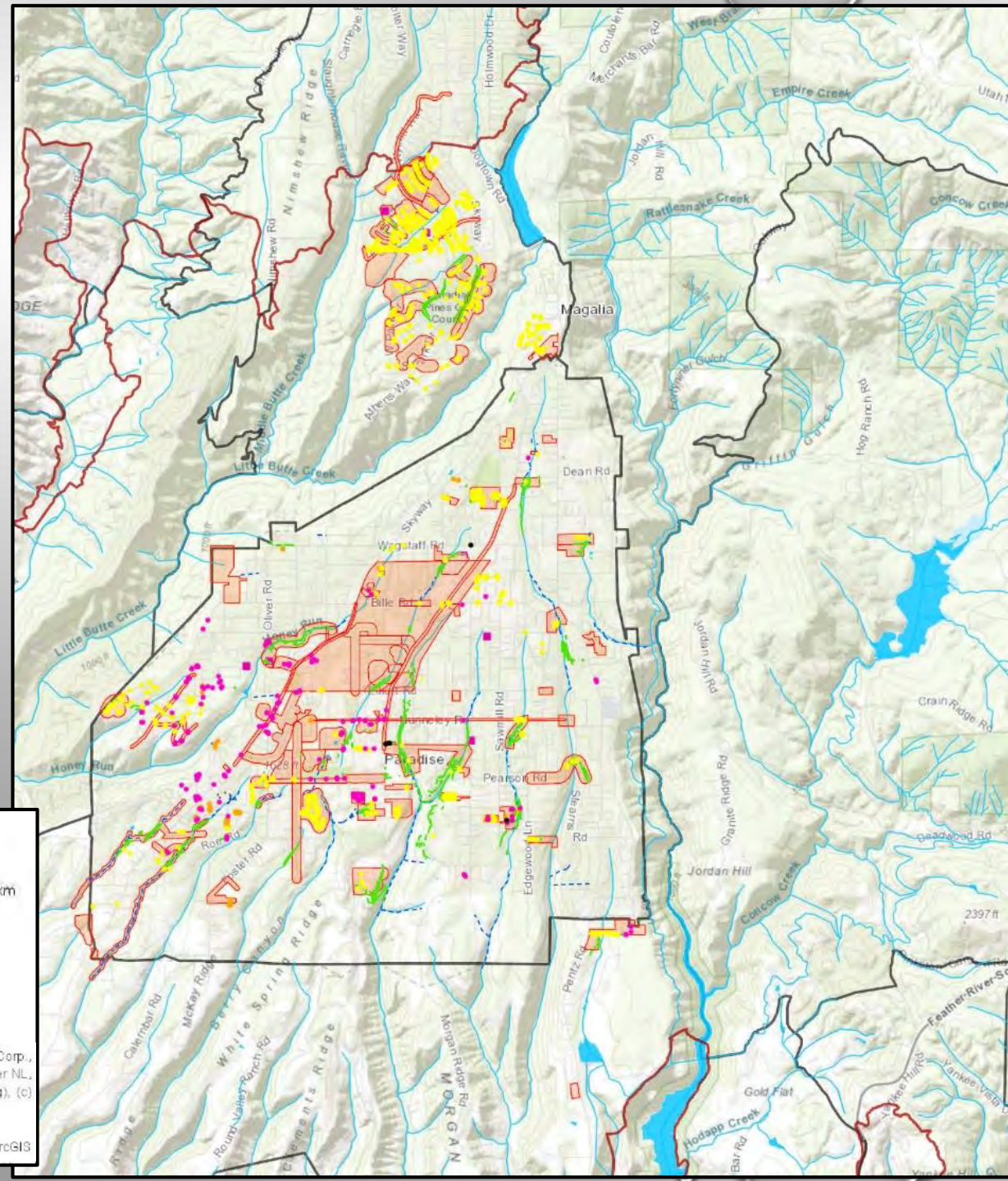
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- Emplaced BMP (point)
- Emplaced DI Protection
- Emplaced Sand Bag(s)
- Emplaced Check Dam
- Emplaced BMP (Linear)
- Emplaced Wattle
- Emplaced Line of Sand Bags
- Emplaced Silt Fence
- Emplaced Sand Bag(s) - Need Maintenance
- Emplaced DI Protection - Needs Maintenance
- Emplaced Wattle - Needs Maintenance
- Observed Waterway
- Focus Areas
- Fire_Perimeter
- Waterbodies (NHD)
- Water courses (NHD)
- City Limits



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Web AppBuilder for ArcGIS



BMP DEPLOYMENT: HURDLES

- ACCESS & NAVIGATION
- COMMUNICATIONS
- INCLEMENT WEATHER
- WORKFORCE & EQUIPMENT
- UNCERTAINTY OF FUNDING
- UNPLANNED WATER
- LACK OF INFRASTRUCTURE



| INCIDENT OBJECTIVES (ICS 202) | | | |
|--|-------------------------------|---|-------------------------------------|
| 1. Incident Name: Camp Fire | 2. Operational Period: | Date From: 12/1/2018 Time From: 0700 | Date To: 12/3/2018 Time To: 0700 |
| 3. Objective(s): | | | |
| Management Objectives | | | |
| Site Visit - selected work locations with Office of Emergency Services and CalRecycle. | | | |
| CREW STAND DOWN DUE TO ANTICIPATED RAIN AND POTENTIAL HIGH WINDS AND GUSTS | | | |
| For non stand down Operations: | | | |
| -Provide for emergency personnel and public safety at all times. | | | |
| -Slow water velocity for rain events | | | |
| -Scout and triage sites for treatment. | | | |
| -Protect Drain Inlets | | | |
| -Culvert Cleanout | | | |
| Control Objectives | | | |
| STAND DOWN DUE TO ANTICIPATED RAIN AND POTENTIAL HIGH WINDS AND GUSTS | | | |
| -Apply erosion measures at sites in Aerial IAP. | | | |
| -Record and map site actions (quantity, type materials used, site configuration) | | | |
| -Scout new locations using the Topo IAP (collect intel on quantity, type materials needed) | | | |
| General Situational Awareness: | | | |
| -Trees weakened by fire, broken, suspended branches subject to falling - especially in wind. | | | |
| -Hazardous waste and unknown chemicals in burned areas and structures. | | | |
| -Undermined roadways at or near stream crossings. | | | |
| -Sharp objects in burn debris. | | | |
| -Slip hazards with water and ash. | | | |



BMP DEPLOYMENT: BMP STRATEGY

WHAT?

- PROTECTION OF WATERWAYS:
 - FROM BUILDING ASH/DEBRIS
 - FROM SOIL
 - FROM CHEMICALS
- PROTECTION OF INFRASTRUCTURE:
 - CULVERTS & CROSSINGS

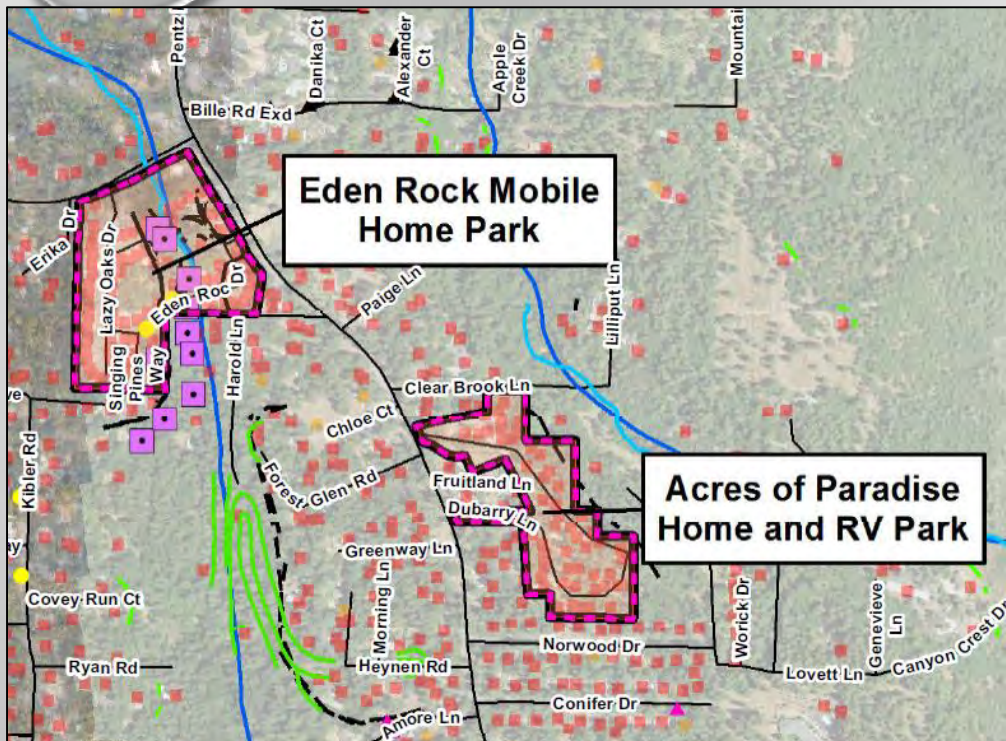


HOW?

- EROSION CONTROLS (PREVENTION)
 - VELOCITY BREAKS
 - DIRECTION/RE-DIRECTION OF FLOW
- SEDIMENT CONTROLS



BMP DEPLOYMENT: SITE ASSESSMENT & PRIORITIZATION



RISK FACTORS:

- DENSITY OF BURNED STRUCTURES OR BURNED MATERIALS
- SITE TYPE (TYPE OF BURNED MATERIALS)
- IMMINENT INFRASTRUCTURE FAILURE
- PROXIMITY TO WATERWAYS
- SLOPE
- HARDSCAPE PRESENT & EXPOSURE



Campfire Rapid Site Risk/BMP Needs Assessment Form

Location Name Pueblo Dr suggested wattle Date 11/24/2018
 Nearest intersection or cross street so Surveyor BSA/SES
 Association North Star

| Risk Type | (1 point) | (2 points) | (3 points) | (4 points) | (5 points) |
|-----------------------------|---|---|---|---|--|
| Site Type | Undeveloped <input type="checkbox"/> | House <input checked="" type="checkbox"/> | Roadside Slope <input type="checkbox"/> | Mobile Home <input type="checkbox"/> | Creek Channel <input checked="" type="checkbox"/> |
| | Agriculture <input type="checkbox"/> | Business <input type="checkbox"/> | Roadside Ditch <input type="checkbox"/> | Industrial <input type="checkbox"/> | Culvert <input type="checkbox"/> |
| Slope | <15% <input type="checkbox"/> | 15%-30% <input checked="" type="checkbox"/> | >30% <input type="checkbox"/> | | |
| Canopy Cover | 75 - 100% <input type="checkbox"/> | 50 - 75% <input type="checkbox"/> | 25 - 50% <input type="checkbox"/> | 10 - 25% <input checked="" type="checkbox"/> | 0 - 10% <input type="checkbox"/> |
| Ground Cover | 75 - 100% <input type="checkbox"/> | 50 - 75% <input type="checkbox"/> | 25 - 50% <input type="checkbox"/> | 10 - 25% <input type="checkbox"/> | 0 - 10% <input checked="" type="checkbox"/> |
| Distance to Waterway | 200 - 300 ft <input type="checkbox"/> | 100 - 200 ft <input type="checkbox"/> | 50 - 100 ft <input type="checkbox"/> | < 50 feet <input checked="" type="checkbox"/> | In Channel <input type="checkbox"/> |
| Site Risk(s) | Large mobilizable debris (that could block water passage) (2 points) <input type="checkbox"/> | | | Significant erosion (rills/obvious sediment loss/infrastructure being compromised) (4 points) <input checked="" type="checkbox"/> | Known mobilizable HazMat On-site (4 points) <input type="checkbox"/> |
| Column totals | Total <u>0</u> | Total <u>4</u> | Total <u>0</u> | Total <u>12</u> | Total <u>16</u> |

Other/Site Characteristic Notes:

| | |
|--------------------|-----------|
| TOTAL SCORE | <u>24</u> |
|--------------------|-----------|

Recommended BMPs:

| Type | Unit measure | Units needed | TOTAL UNITS |
|------------------------|------------------|--------------|-------------|
| Wattle | 1 = 25 linear ft | <u>~20</u> | |
| Sandbags | each | <u>~50</u> | |
| Absorbent Sock | 1 = 4 linear ft | <u>5-10</u> | |
| Visqueen | square feet | | |
| Straw | square feet | | |
| Hydro mulch | square feet | | |
| Drain Inlet Bag | each | | |
| Erosion Control Fabric | square feet | | |

Level of Effort
 (assume 1 team of 16 crew members working an 8 hour day)

1 day

Other/Site Characteristic Notes:

high priority, houses right on creek edge with lots of drainage coming from up slope

BMP DEPLOYMENT: SITE ASSESSMENT & PRIORITIZATION

RAPID SITE ASSESSMENT SHEETS: (VERSIONS 1 & 2)

Campfire Rapid Site Risk/BMP Needs Assessment Form

Street(s) Range/ Location shady ln cre Date 12/1/18
 Description _____ Surveyor/CO DS # BA
 Data Point ID shady Ln

| Site Characteristics | Yes | No | Erosional Features Present | Yes | No |
|----------------------------|-------------------------------------|-------------------------------------|--------------------------------|------------------------------|-------------------------------------|
| hard scape present | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Erosional Feature Undercutting | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| directly adjacent to water | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Erosion Type | (rills/rivules/rivulets) | |
| natural drain | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Infrastructure Undermined | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| tributary | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Type undermined | road / culvert / drain inlet | |
| man-made drain | <input checked="" type="checkbox"/> | <input type="checkbox"/> | other: | | |
| visible slope | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Visible Movement of: | soil | |
| Culverts Present | <input type="checkbox"/> | <input type="checkbox"/> | other: | wood/vegetation ash | |
| Drop Inlets Present | <input type="checkbox"/> | <input type="checkbox"/> | | building ash | |
| Drainage Ditch | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| Continuous Curb Present | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| Gutter Present | <input type="checkbox"/> | <input type="checkbox"/> | | | |
| Sidewalk Present | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | | |

Other/Site Characteristic Notes:

| Recommended BMPs: | | Avg. Units needed per site | Avg. Units needed per street/region | |
|------------------------|------------------|----------------------------|-------------------------------------|--|
| Type | Unit measure | | | |
| Wattle | 1 = 25 linear ft | | | |
| Sandbags | each | | | |
| Short Soxx | 1 = 4 linear ft | | | |
| Visqueen | square feet | | | |
| Straw | square feet | | | |
| Hydro mulch | square feet | | | |
| Drain Inlet Bag | each | | | |
| Long Soxx | 1 = 20 feet | | | |
| Erosion Control Fabric | square feet | | | |

Industrial
 Mobile Home
 House

Level of Effort
 (assume 1 team of 16 crew members working an 8 hour day)

Other/Site Characteristics/Erosion/BMP Placement Notes:

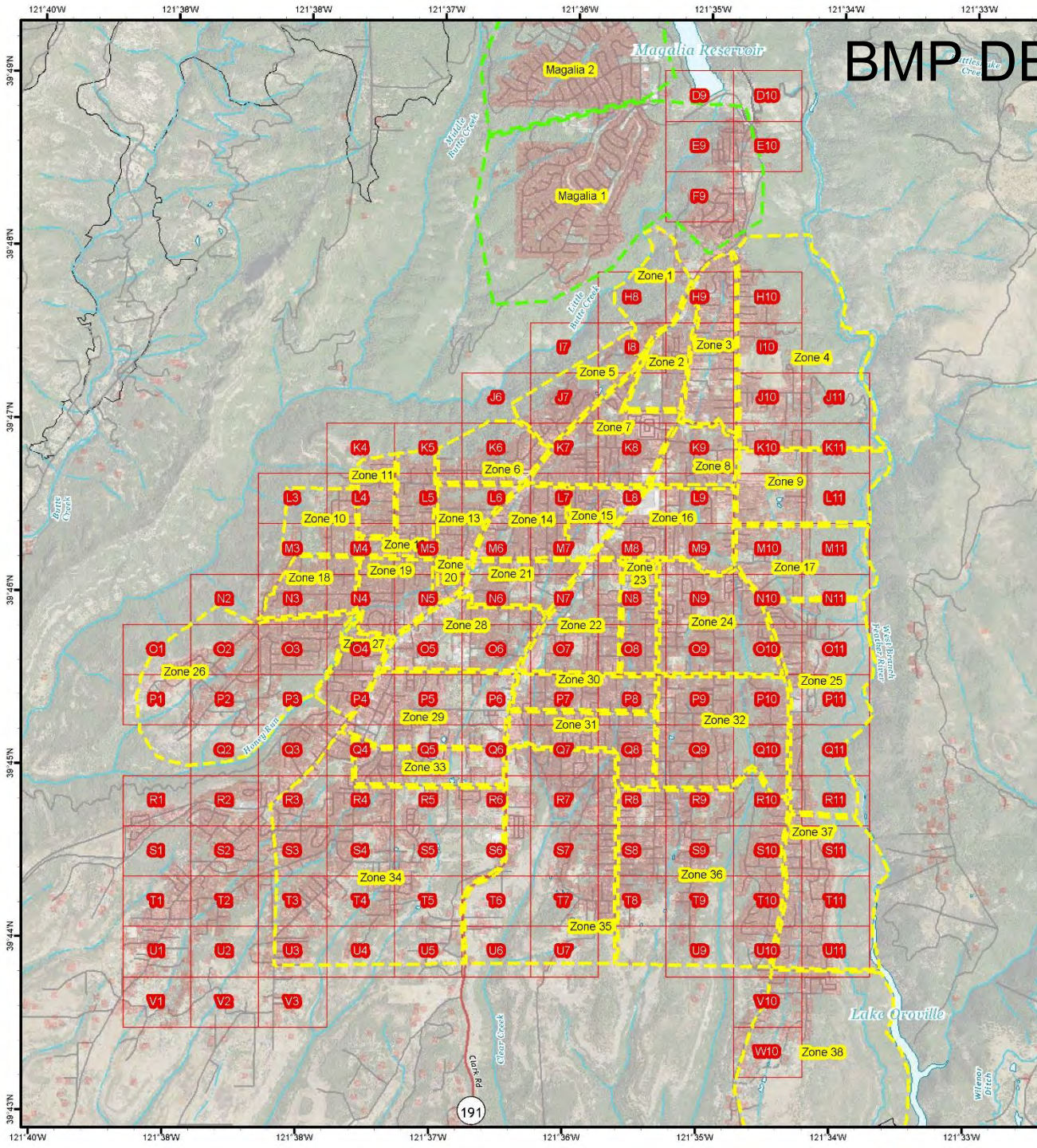
shool parking lot
 - clean & treat DI # channels (socks & bags)
 - wattle along creek where it overtops & discharge near Pearson
 - couple

* E. Oak Priority Clean up Area

BMP DEPLOYMENT: INSTALLATION (RECON)

DAILY BMP NEEDS/BMPS PLACED RECON PROCESS:

- MORNING MEETING
- SAFETY BRIEFING
- ASSIGN RECON STAFF & DISSEMINATE MAPS
- CHECK HOT SPOTS/FIELD INSPECTION
- END-OF-DAY:
 - REVIEW FINDINGS FROM FIELD CREW
 - SETTING UP FUTURE WORKLOAD



BMP DEPLOYMENT: INSTALLATION

DAILY BMP PLACEMENT PROCESS:

- MORNING MEETING
- SAFETY BRIEFING
- ASSIGN CCC CREW LEADS & DISSEMINATE MAPS
- END-OF-DAY:
 - REVIEW WORK COMPLETED BY FIELD CREWS
 - SETTING UP NEXT DAY'S WORKLOAD



BMP DEPLOYMENT: BMP STRATEGY/INSTALLATION

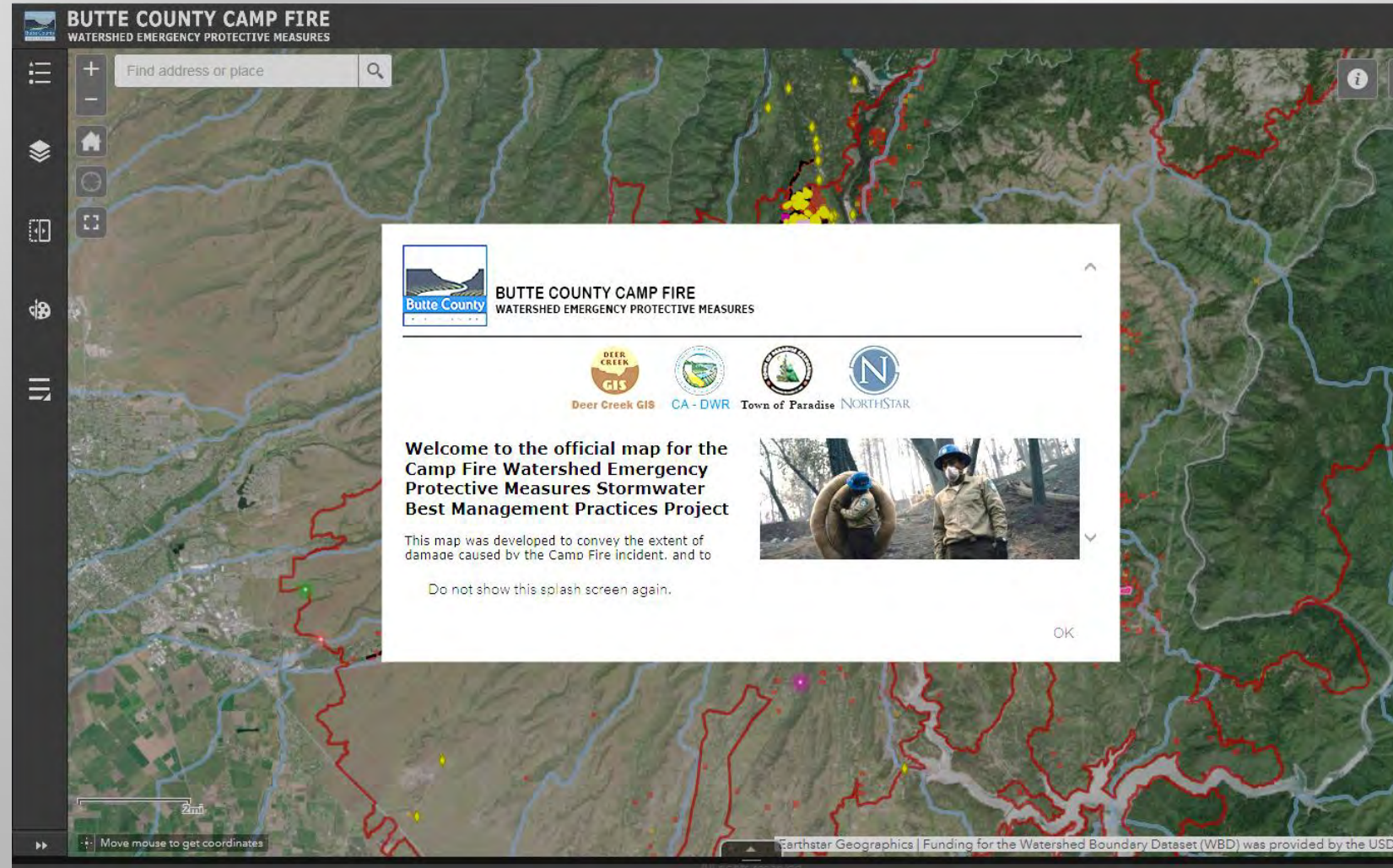


BMP DEPLOYMENT: OUTCOMES

FOUR WEEK PLACEMENT:

- OUTLINE OF RAPID POST-WILDFIRE BMP FRAMEWORK
- DEVELOPMENT OF WEB-MAP

| BMP | Quantity Placed |
|------------------------|---------------------|
| Wattle/Coir Log | 110,975 linear feet |
| Silt Fence | 3,003 linear feet |
| Short Sock (4 ft long) | 1,148 linear feet |
| Long sock (25 ft long) | 11,950 linear feet |
| DI Bags | 125 Bags |
| Sand Bags | 22,514 Bags |





QUESTIONS?



NEXT STEPS?

HOW EFFECTIVE WERE THEY?

