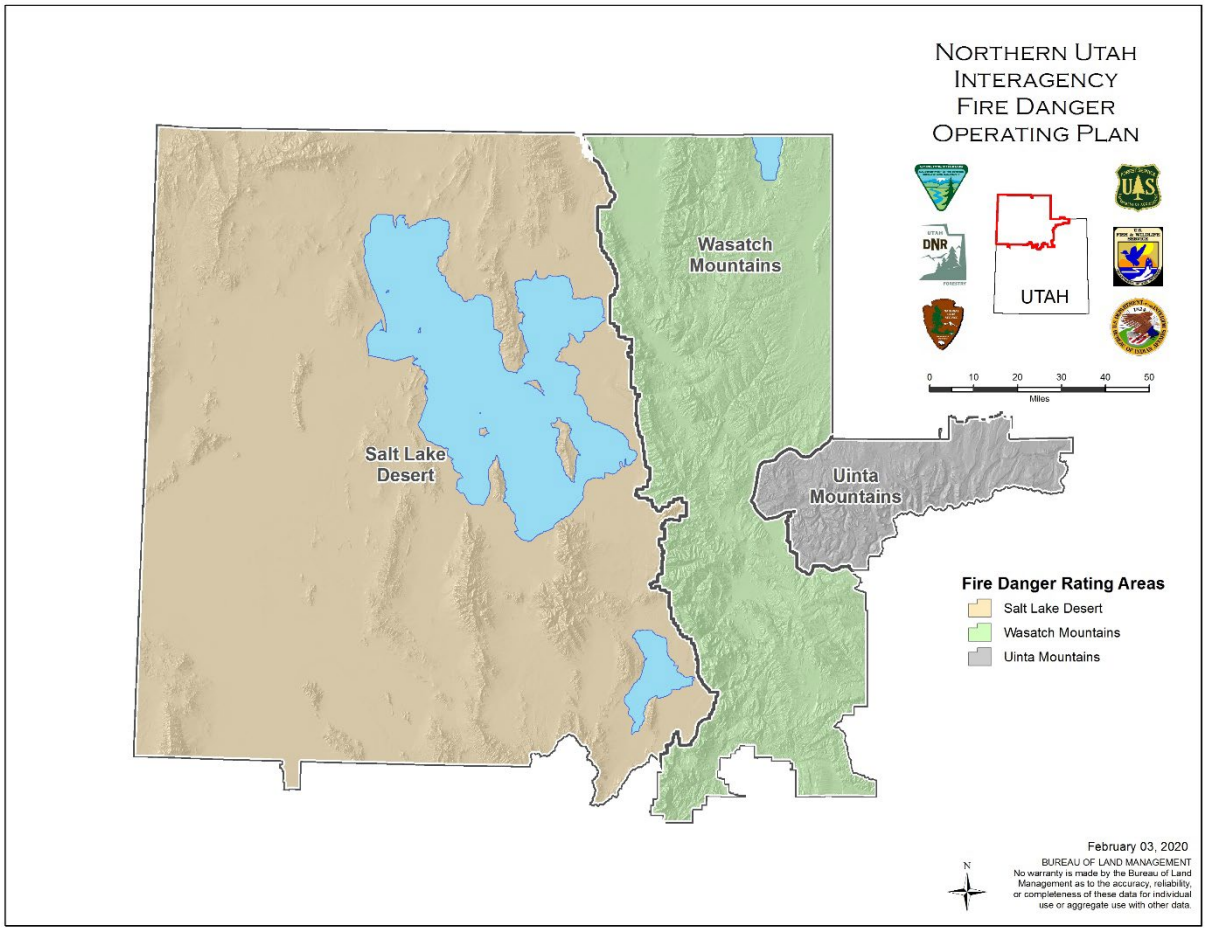
**NORTHERN UTAH INTERAGECY FIRE CENTER**

# Fire Danger Operating Plan

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# 1.0 INTRODUCTION

## 1.1 Purpose and Objectives

The Northern Utah Interagency Fire Danger Operating Plan (FDOP) documents a decision-making process for agency administrators, fire program managers, dispatchers, cooperators, and firefighters by establishing interagency planning and response levels for fire management, using the best available scientific methods, historical weather, and fire data. The public, industry, and agency personnel expect wildland fire management agencies to implement appropriate and timely decisions which result in safe, efficient, and effective wildland fire management actions. An appropriate level of preparedness to meet wildland fire management objectives is based upon an assessment of vegetation, climate, and topography utilizing the National Fire Danger Rating System (NFDRS). This FDOP provides a science-based "tool" for interagency fire managers to incorporate a measure of risk associated with decisions, which have the potential to significantly compromise safety and control of wildland fires.

This plan combines a FDOP with a Preparedness and Staffing Plan for the five primary agencies responsible for wildland fire management in Northern Utah: Bureau of Land Management (BLM); U.S. Forest Service (USFS); U.S. Fish & Wildlife Service (USFWS); National Park Service (NPS); and the Utah Division of Forestry, Fire, and State Lands (UFFSL). The objectives of this FDOP are to:

1. Provide a tool for agency administrators, fire managers, dispatchers, cooperators, and firefighters to correlate fire danger ratings with appropriate fire business decisions in the fire danger planning area.
2. Delineate Fire Danger Rating Areas (FDRAs) within the fire danger planning area with similar climate, vegetation, and topography.
3. Document the interagency fire weather-monitoring network consisting of Remote Automated Weather Stations (RAWS) which comply with the National Wildfire Coordination Group (NWCG) Interagency Wildland Fire Weather Station Standards & Guidelines (PMS 426-3).
4. Determine climatological breakpoints and fire business thresholds using the Weather Information Management System (WIMS), National Fire Danger Rating System (NFDRS), and FireFamilyPlus software to analyze and summarize an integrated database of historical fire weather and fire occurrence data.
5. Define roles and responsibilities to make fire preparedness decisions, manage weather information, and brief fire suppression personnel regarding current and potential fire danger.
6. Determine the most effective communication methods for fire managers to communicate potential fire danger to cooperating agencies, industry, and the public.
7. Provide guidance to interagency personnel outlining specific daily actions and considerations at each preparedness level.
8. Identify seasonal risk analysis criteria and establish general fire severity thresholds.
9. Identify the development and distribution of fire danger pocket cards to all personnel involved with fire suppression within the fire danger planning area.
10. Identify program needs and suggest improvements for implementation.

## 1.2 Fire Danger Operating Plan

Interagency policy and guidance requires numerous unit plans and guides in order to meet preparedness objectives. Some of these plans and guides are inter-related; some plans and guides provide the basis for other plans/guides as shown Figure 1. This FDOP guides the application of information from decision support tools (e.g., NFDRS) at the local level, is supplemental to agency fire management plans (FMPs), documents the establishment and management of a fire weather station

network, and describes how fire danger ratings will be applied to local unit fire management decisions. The actual implementation of the fire business thresholds is described in the following supplemental action plans.

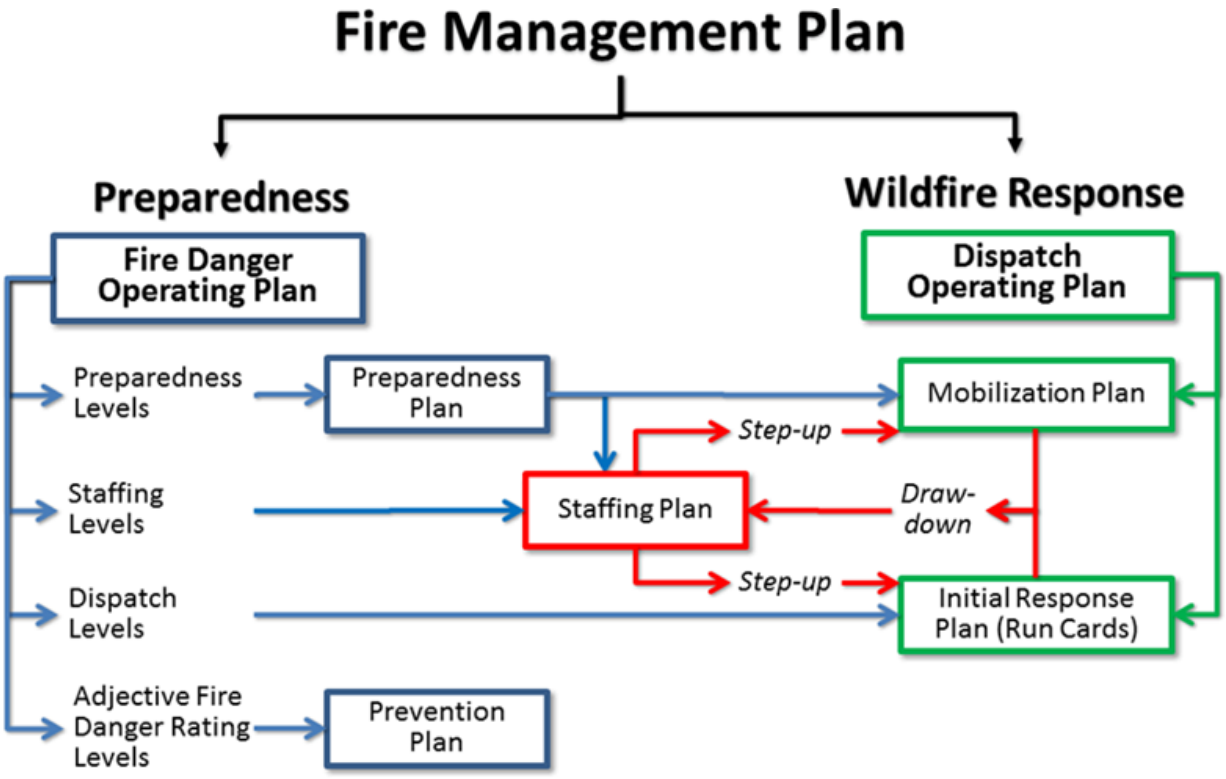



**Figure 1: Relationship of Fire Danger Operating Plan to the Fire Management Plan and Wildfire Response**

### *1.2.1 Staffing Plan*

The Staffing Plan describes escalating responses that are usually noted in the FMP. Mitigating actions are designed to enhance the unit's fire management capability during short periods (e.g., one burning period, Independence Day, or other pre-identified events) where normal staffing cannot meet initial attack, prevention, or detection needs. The decision points are identified and documented in this FDOP.

### *1.2.2 Preparedness Plan*

Preparedness plans provide management direction given identified levels of burning conditions, fire activity, and resource commitment, and are required at national, state/regional, and local levels. Preparedness Levels (1 to 5) are determined by incremental measures of burning conditions, fire activity, and resource commitment. Fire danger rating is a critical measure of burning conditions. The preparedness levels are identified and documented in this FDOP; the associated decisions and planned actions are located in Appendix E.

### *1.2.3 Prevention Plan*

Prevention plans document wildland fire problems identified by a prevention analysis, which examines not only human-caused fires, but also the risks, hazards, and values for the planning unit. Components of the Prevention Plan include mitigation (actions initiated to reduce impacts of wildland fire to communities), prevention (of unwanted human-caused fires), education (facilitating and promoting awareness and understanding of wildland fire), enforcement (actions necessary to establish and carry

out regulations, restrictions, and closures), and administration of the prevention program. The analysis of fire problems and associated target groups within Northern Utah are documented in this FDOP.

Each wildland fire agency in Northern Utah is responsible for maintaining its own prevention plan. These prevention plans can be obtained by contacting agency fire prevention, education, and mitigation staff.

### *1.2.4 Restriction Plan*

A Restriction Plan is an interagency document that outlines coordination efforts regarding fire restrictions and closures. An interagency approach for initiating restrictions or closures helps provide consistency among the land management partners, while defining the restriction boundaries so they are easily distinguishable to the public. Based on fire danger, managers may impose fire restrictions or emergency closures to public lands. Decision points, when restrictions and/or closures should be considered, are identified and documented in this FDOP. Actions and decisions regarding the implementation and coordination of fire restrictions and closures are contained within the Northern Utah Interagency Annual Operating Plan, which can be found on the NUIFC[1] website, and is updated annually.

## 1.3 Wildland Fire Response

### *1.3.1 Initial Dispatch/Response Plan*

Initial response plans, also referred to as run cards or pre-planned response plans, specify the fire management response (e.g., number and type of suppression assets to dispatch) within a defined geographic area to an unplanned ignition, based on fire weather, fuel conditions, fire management objectives, and resource availability. Response levels are identified and documented in this FDOP. The number and type of suppression resources dispatched to a reported fire is documented in the associated Initial Dispatch/Response Plan (Initial Attack Run Cards). Run Cards for the Northern Utah area are updated each year. The current Run Cards can be found on the NUIFC website under the "Predictive Services – Intelligence" heading.

### *1.3.2 Local Mobilization Plan*

The NUIFC Mobilization Plan identifies standard procedures, which guide the operations of multi-agency logistical support activity throughout the coordination system. The mobilization plan is intended to facilitate interagency dispatch coordination, ensuring the timeliest and most cost effective incident support services available are provided. Communication between Local Units, Geographic Area Coordination Centers (GACCs), State and Regional Offices, and other cooperative agencies are addressed. The mobilization plan can be located on the NUIFC website.

## 1.4 Policy and Guidance

Interagency policy and guidance regarding the development of FDOPs can be found in the Interagency Standards for Fire & Aviation Operations. Agency-specific direction can be found in each agencies applicable fire management handbook and/or manual.

[1] https://gacc.nifc.gov/gbcc/dispatch/ut-nuc/index.html

# 2.0 FIRE DANGER PLANNING AREA INVENTORY

## 2.1 Administrative Units

The Northern Utah Interagency Fire Danger Operating Plan encompasses an area of approximately 15.5 million acres in northern Utah, with wildland fire management and suppression responsibilities shared among the BLM, USFS, UFFSL, USFWS, NPS, Bureau of Indian Affairs (BIA), Department of Defense (DOD), and local county and municipal cooperators. Northern Utah has a diverse landscape ranging from high desert to mountain peaks that are over 13,000 feet in elevation, with the Great Salt Lake in the middle of the dispatch zone. Administrative units included in the NUIFC fire danger planning area are presented in Table 1 and Appendix A: Map 1.

**Table 1: Administrative units within the Northern Utah fire danger planning area**

| Agency | Office | Approximate Acres Managed |
|---|---|---|
| BIA | Confederated Tribes of the Goshute Reservation | 1,767 |
| BIA | Skull Valley Goshute Reservation | 17,607 |
| BIA | Uinta Ouray Reservation | 3,164 |
| BLM | Salt Lake Field Office | 3,263,425 |
| DOD | Utah Test and Training Range | 933,199 |
| DOD | Dugway Proving Ground | 801,126 |
| DOD | Tooele Army Depot | 26,201 |
| DOD/NG | Camp Williams | 23,003 |
| NPS | Golden Spike National Historical Park | 2,215 |
| NPS | Timpanogos Cave National Monument | 254 |
| State | Forestry, Fire, and State Lands | 1,433,647 |
| USFWS | Bear River Migratory Bird Refuge | 73,925 |
| USFWS | Fish Springs National Wildlife Refuge | 17,975 |
| USFS | Wasatch-Cache National Forest | 1,307,960 |
| USFS | Uinta National Forest | 806,251 |
| USFS | Sawtooth National Forest | 71,834 |

## 2.2 Fire Danger Rating Areas (FDRAs)

A Fire Danger Rating Area (FDRA) is defined as a large geographic area relatively homogenous with respect to climate, vegetation, and topography. Because of these similarities, it can be assumed that the fire danger within a FDRA is relatively uniform. Fire danger rating areas were delineated based upon an analysis of these three factors: climate (see Appendix A: Map 4 and Map 5), vegetation (see Appendix A: Map 6 and Map 7), and topography/slope (see Appendix A: Map 8). After these environmental factors were considered, the draft FDRAs were edge-matched to existing administrative boundaries using response areas. It is important that existing response areas are not split by FDRAs; a response area must not have two FDRAs to avoid additional workload and confusion for operational personnel. The final FDRA delineation is depicted in Appendix A: Map 3 and described below.

### *2.2.1 Salt Lake Desert FDRA*

**General Location:** The Salt Lake Desert FDRA is geographically defined as paralleling the east side of Interstate 15 along the lower bench of the Wasatch Mountains. The southern end borders the Tooele/Juab and Utah/Juab County lines. The western edge of the FDRA is defined by the Utah/Nevada state line. The northern border follows the Utah/Idaho border. The Salt Lake Desert FDRA encompasses over 10.5 million acres. However, much of this area is comprised of water (i.e., Great Salt Lake and Utah

Lake) and military reservation land (i.e., Tooele Army Depot, Dugway Proving Grounds, Utah Test and Training Range).

**Vegetation:** Lower elevations of this FDRA are salt desert shrublands characterized by greasewood, shadscale, fourwing saltbush, Gardner saltbush, horsebrush, ephedra, gray molly, winterfat, kochia, rabbitbrush, snakeweed, black sagebrush, and small areas of Wyoming big sagebrush. Grasses consist of Indian ricegrass, galleta grass, needle-and-thread grass, squirreltail, sand dropseed, and cheatgrass. Forbs include globemallow, princess plume, evening primrose, and a variety of annual forbs. The middle elevation sites within the unit are dominated by Wyoming big sagebrush, black sagebrush, rabbitbrush, snakeweed, pinyon-juniper woodlands and agricultural areas. Common grasses include bluebunch wheatgrass, western wheatgrass, Sandberg's bluegrass and crested wheatgrass. Forbs are diverse and abundant throughout. Significant sagebrush habitat has been lost due to pinyon-juniper infilling and expansion and infilling asnd well as cheatgrass invasion. Upper elevations have mountain big sagebrush, mountain mahogany, bitterbrush, quaking aspen, serviceberry, white fir, and Douglas fir. This FDRA has been impacted by large and numerous fires in the past and has many areas dominated by cheatgrass. Most wind driven wildfires typically grow large due to the continuity of cheatgrass in the area.

**Climate:** Hot and dry weather typically dominates the Salt Lake Desert FDRA during fire season. Utah is the second driest state in the nation. Annual precipitation averages 4 to 12 inches. Westerly flows generally bring hot and dry air into the region with little or no precipitation. The main concern is that the low-pressure systems or upper level disturbances pass through the area with enough energy and moisture to initiate thunderstorm activity and produce erratic winds. Fire activity may be frequent, and the potential for large fire growth is high. Southwesterly flows typically bring monsoonal moisture into the region. Strong up-canyon winds cause control problems during the afternoon. The Great Salt Lake, like other large bodies of water, has a significant influence on local winds. Lake breezes (or sea breezes) are wind currents that blow from the bodies of water toward the land. Land breezes are wind currents that blow from land towards the bodies of water. In the summertime during the day, lake breezes occur when the cool air over the lake moves inland. During a summer night, the air over the lake may be warmer than the air over the land and the cooler air over the land may move towards the lake resulting in a land breeze. When a lake breeze penetrates inland, the forward edge of the cool lake air is called the Lake Breeze Front. This front is similar to a typical "cold front", but is smaller in scale, but can have a significant influence on the behavior of fires adjacent to the Great Salt Lake or Utah Lake after sunset.

**Topography:** The Salt Lake Desert FDRA is made up of basins that are broken up by several mountain ranges that are generally oriented from north to south. The basin terrain is flat and generally accessible by vehicle, while the mountain ranges are steep, rocky, and inaccessible.

### *2.2.2 Wasatch Mountains FDRA*

**General Location:** The Wasatch Mountains FDRA western boundary is geographically defined as paralleling the east side of Interstate 15 along the lower bench of the Wasatch Mountains. The southern edge borders the Utah/Juab and Utah/Sanpete County lines east of Nephi, UT. The eastern edge follows the Utah/Wyoming state line on the north half, the Summit/Daggett County line in the middle, and the Wasatch/Duchesne County line on the southern portion. The northern border follows the Utah/Idaho border and includes a small area of the Wasatch-Cache National Forest that extends into southwestern Wyoming. The Wasatch Mountains FDRA encompasses over 4.1 million acres.

**Vegetation:** The fuel complex of the Wasatch Mountains FDRA consists of sagebrush, grasses, oak brush, maple and pinyon-juniper at lower elevations. Lodgepole pine, mixed conifer and aspen are found at higher elevations. Conversion of perennial grasses to annual grasses has increased fire risk along the foothills. Fires along the Wasatch front have potential to grow large due to preheating of live woody fuels on steep slopes.

**Climate:** The climate ranges from high desert to alpine forest. Precipitation generally increases with elevation. Lower elevations typically receive 12 to 15 inches per year with higher mountain peaks receiving up to 60 inches per year. February and April tend to be the wettest months while summer and early fall are typically the driest. Summer temperatures can rise to over 100 °F at lower elevations and mid-eighties at higher elevations. The prevailing wind pattern during the fire season is southwest except where modified by local topography. Strong up-canyon winds cause control problems during the afternoon. After sunset, fires adjacent to the Great Salt Lake and Utah Lake will often be influenced by a pressure gradient force resulting in surface winds blowing from the land to the water body. Relative humidity can drop to the lower teens and occasionally into the single digits.

**Topography:** Elevations range from 3,000 to 12,000 feet. The Wasatch Range is generally oriented north to south. The Wasatch Front (from Idaho border to Nephi) is characterized by steep canyons. Upper and mid-elevations of the mountains are steep slopes and canyons where fires can make significant runs. Fire occurrence in this area is generally considered in slope class 2 to 3.

### *2.2.3 Uinta Mountains FDRA*

**General Location:** The western boundary of the Uinta Mountains FDRA is geographically defined from the Wyoming stateline to the Chalk Creek Road, south from Coalville along the eastern side of Interstate 80 to Wanship, south along State Route 32 to Kamas, and south to the Wasatch/Summit County line. Then east along the county line to the forest boundary between the Ashley/Wasatch Forests. Following the Wasatch National Forest boundary to the Wyoming State line at Highway 150 then follows the Wyoming/Utah state line to back around to Chalk Creek Road. The Uinta Mountains FDRA encompasses nearly 900,000 acres.

**Vegetation:** The vast majority of the mountain slopes are forested. Coniferous trees (lodgepole pine, Engelmann spruce, Douglas-fir, sub-alpine fir) grow in large continuous stands. Quaking aspen occur in scattered patches throughout most of the lower elevations. Isolated meadows, resembling large parks, and willow fields add variety to the timbered areas. Many peaks extend above tree line. Recently, several hundred thousand acres of forested landscape in this FDRA have been impacted by bark beetles, in particular the mountain pine beetle and the spruce beetle, resulting in up to 80 to 90 percent mortality in some stands. The vast majority of the beetle killed trees are now in the “gray stage”, when all of the red needles have fallen. Surface fuel loads will continue to increase in this area as the beetle killed trees fall.

**Climate:** The Uinta Mountains receive about 40 inches of precipitation annually, mostly as snow. The growing season is short; consequently, fire season is usually only two months (July to August). Temperatures in areas above 10,000 feet are seldom above 80 degrees during summer days. Nighttime temperatures during the summer are 30 to 40 degrees, with the possibility of freezing. Summer afternoon thunderstorms often occur in late July and August with the probability of precipitation increasing with elevation.

**Topography:** The Uinta Range is the highest in Utah and is the only major range in the contiguous United States with an east-west orientation. Elevations range from 8,000 feet in the lower canyons to 13,528 feet atop Kings Peak, the highest point in Utah. Ridges divide the area into large basins; many ridges rise abruptly several thousand feet above the basins.

## 2.3 Weather Stations

There are 13 permanent operational Remote Automated Weather Stations (RAWS) located within the NUIFC dispatch area, six managed by the BLM West Desert District, and seven managed by the Uinta-Wasatch-Cache National Forest. Table 2 provides information for each RAWS station and Appendix A:

Map 2 depicts the locations of each RAWS. Data can be accessed at the following sites: MesoWest[2] and NWS Salt Lake City Fire Weather[3].

All RAWS operated by the BLM and USFS in comply with the NWCG Standards for Fire Weather Stations (PMS 426-3). Each RAWS receives, at a minimum, one annual on-site maintenance visit by either the local user or contracted personnel to ensure sensors are within calibration standards and to verify site and station conditions.

**Table 2: Remote Automated Weather Stations Information Summary Table**

| FDRA | Station ID | Station Name | Status | Agency/Owner | Data Years | Elevation | Reporting Time |
|---|---|---|---|---|---|---|---|
| Salt Lake Desert | 420901 | Cedar Mountain | Active | BLM-UT-SLD | 1965-present | 4,820 | XX:55 |
| | 420908 | Vernon | Active | BLM-UT-SLD | 1990-present | 5,500 | XX:42 |
| | 420911 | Aragonite | Active | BLM-UT-SLD | 1997-present | 5,030 | XX:58 |
| | 420914 | Rosebud | Active | BLM-UT-SLD | 2002-present | 5,040 | XX:42 |
| | 420915 | Clifton Flat | Active | BLM-UT-SLD | 2003-present | 6,384 | XX:44 |
| Uinta Mountains | 420703 | Bear River | Active | USFS-UT-WCF | 1983-present | 8,475 | XX:03 |
| | 420705 | Hewinta | Active | USFS-UT-WCF | 1984-present | 9,186 | XX:10 |
| | 420706 | Norway Flat | Active | USFS-UT-WCF | 1983-present | 8,200 | XX:04 |
| Wasatch Mountains | 420206 | Red Spur | Active | USFS-UT-WCF | 2007-present | 8,872 | XX:07 |
| | 420403 | Bues Canyon | Active | USFS-UT-WCF | 1993-present | 5,100 | XX:01 |
| | 420912 | Otter Creek | Active | BLM-UT-SLD | 2002-present | 7,160 | XX:45 |
| | 421101 | Pleasant Grove | Active | USFS-UT-UIF | 1970-present | 5,200 | XX:55 |
| | 421103 | Rays Valley | Active | USFS-UT-UIF | 1983-present | 7,300 | XX:13 |
| | 421093 | Green Canyon | Active | USFS-UT-WCF | 2020-Present | 5237 | XX:45 |

[2] http://mesowest.utah.edu/cgi-bin/droman/mesomap.cgi?state=UT&rawsflag=3
[3] https://www.wrh.noaa.gov/fire2/?wfo=slc

# 3.0 FIRE DANGER PROBLEM ANALYSIS

In order to apply a fire danger system which will assist managers with fire management decisions, ignition problems need to be identified, quantified, framed, and associated with a specific target group to determine the most appropriate fire danger-based decision "tool" to mitigate the given issue.

## 3.1 Fire Occurrence

Seventeen years (2004-2020) of fire occurrence data was used for the statistical analysis. U.S. Department of the Interior, BLM, NPS, BIA, and USFWS fire occurrence data was obtained from the Wildland Fire Management Information system. U.S. Department of Agriculture, USFS fire occurrence data was obtained from the National Interagency Fire Management Integrated Database (NIFMID) via Kansas City Fire Access Software. State of Utah data was obtained from their agency database. Since all three agencies may have reported the same fire in their respective databases, the fires were cross-referenced and duplicate fires were eliminated (to the extent possible) to avoid misrepresentation (skewing) of the statistical correlation with large and multiple fire days. FireFamilyPlus software was utilized to produce statistics and graphs. The following fire summary graphs (Figure 2, Figure 3, and Figure 4) do not differentiate between agencies; fires are depicted without regard to agency affiliation for each FDRA. See Appendix A: Map 9 and Map 10 for maps depicting large fire perimeters and point/cause type, respectively.

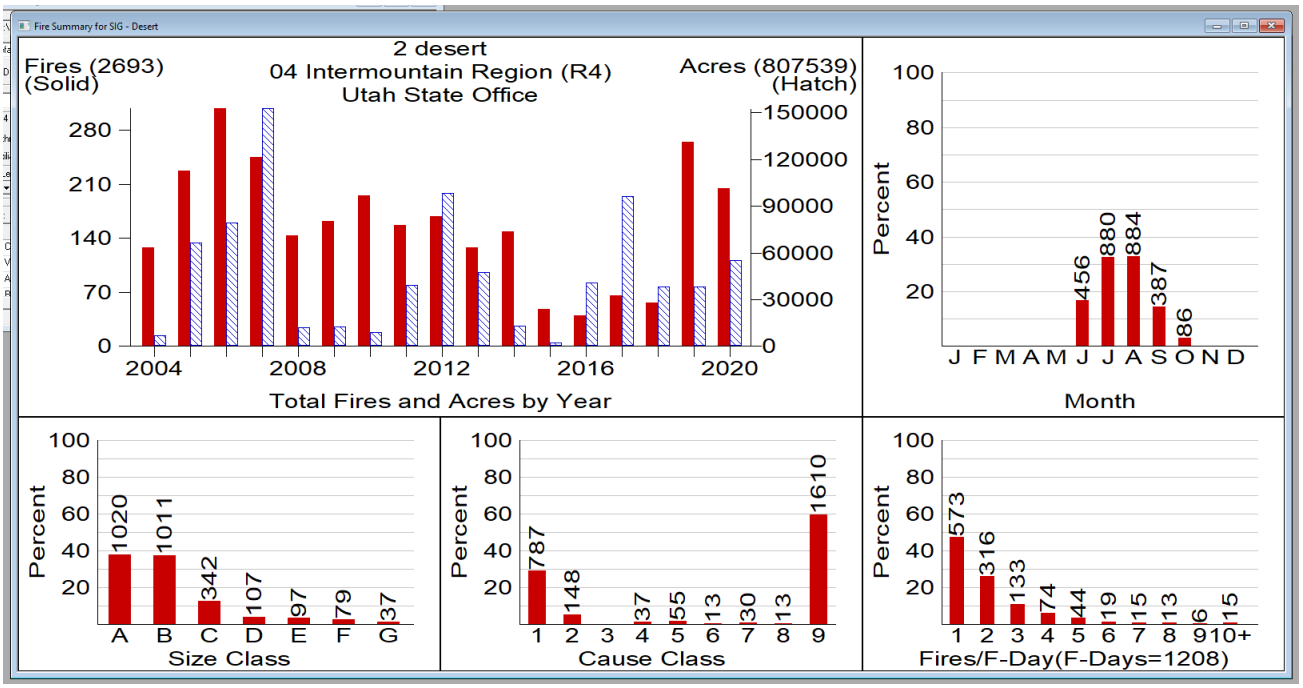



**Figure 2: Fire occurrence data from FireFamilyPlus for the Salt Lake Desert FDRA (2004 to 2020)**

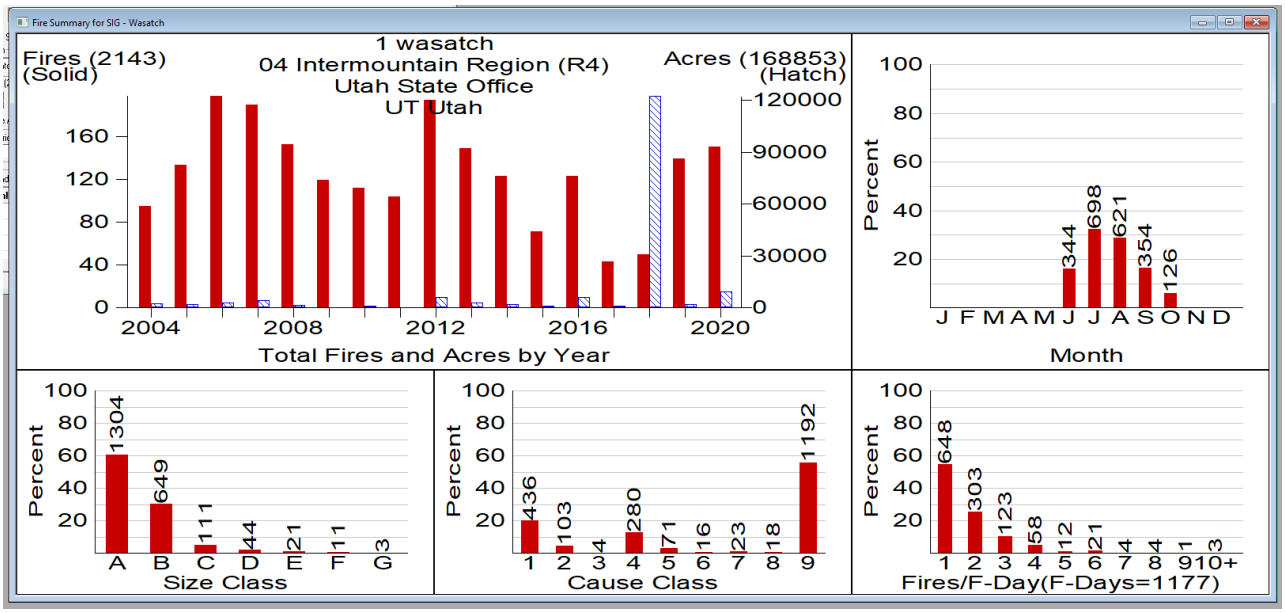



**Figure 3: Fire occurrence data from FireFamilyPlus for the Wasatch Mountains FDRA (2004 to 2020)**

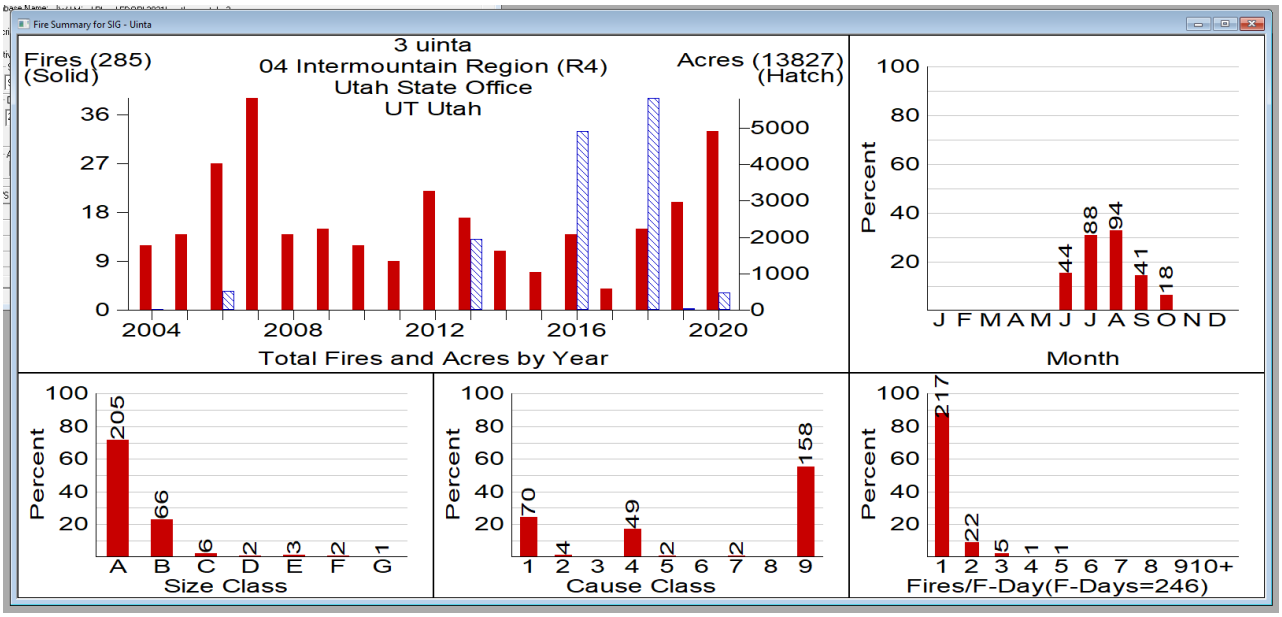



**Figure 4: Fire occurrence data from FireFamilyPlus for the Uinta Mountains FDRA (2004 to 2020)**

## 3.2 Identification / Definition of the Fire Problem(s)

The ability to regulate, educate, or control a user group will be based upon the interface method and how quickly they can react to the action taken. Consequently, the most appropriate decision tool would depend upon the sensitivity of the target group to the implementation of the action. In addition, each action will result in positive and/or negative impacts to a user group. In selecting a component and/or index, several factors must be considered:

- **Affected Target Group:** The group of people commonly associated with the problem.
  - Agency: Employees of federal, state, and local governments involved in the cooperative effort to suppress wildland fires. This includes federal, state, and county land management employees, along with county, municipal, and volunteer fire departments who share a similar protection mission to manage wildland fires.
  - Industry: Employees affiliated with organizations that utilize natural resources and/or hold permits or leases to conduct commercial activities on federal, state, or private lands. These entities or activities include ranchers, wilderness camps, railroads, mines, timber harvesting, filming, construction, oil and gas production, electric generation, guiding services, etc.
  - Public: Individuals who use public lands for non-commercial purposes such as off-highway vehicle (OHV) use, camping, hiking, hunting, fishing, skiing, firewood gathering, mountain biking, general travel and recreation. This group also includes those living within the wildland/urban interface (WUI).
- **Problem Definition:** This is the problem specific to the area of concern and includes ignition causes. The problem is "framed" to focus on the wildland fire management issue associated with a specific target group.
- **Degree of Control:** This is a general description of how much control the fire management agencies have over the target group. This is a measure of how quickly the affected target group can respond to changing fire danger levels.
- **Communication:** Various methods of communication are utilized to influence an affected target group to change their behavior. Depending upon the target group, communication may include face-to-face conversations, radio, telephone, e-mail, newspaper, television, signing/posting, text-messaging, etc.
- **Potential Impacts:** The potential impacts on the target group and the likely consequences of a bad or unfortunate decision.
- **Component/Index:** Sensitivity of the NFDRS outputs should be commensurate with the ability to react (or communicate) to the target group. Memory and variability of the selected component or index must be understood to appropriately match the task and user group. If a situation where control and ability to communicate with the target group is high, the component and/or index that would be most appropriate should also be highly reactive to changing conditions (i.e., ignition component, spread component). If the situation was reversed where the control and ability to communicate with the target group is low, the appropriate component and/or index should not vary significantly over time (e.g., energy release component).
- **Management Action (Application):** The action or application is a set of pre-defined decision points based upon an analysis of fire danger indices and fire occurrence. Collectively, the decision points represent levels of fire danger applied as a communication mechanism to specific target groups. The intent is to minimize the risk of a fire ignition problem by controlling or influencing a specific target group. Nationally, the following fire danger management applications and their associated levels are recognized: staffing level, dispatch level, preparedness level, and adjective fire danger rating level.

**Error! Reference source not found.** demonstrates the differences between the target groups (agency, industry, and public). The ability to regulate, educate, or control a user group is based upon the

interface method and how quickly they can react to the action taken. In addition, each action will result in positive and/or negative impacts to the user groups. Consequently, the decision tool that would be most appropriate would depend upon the sensitivity of the target group to the implementation of the action. In selecting a component and/or index, several factors must be considered (see **Error! Reference source not found.**).

**Table 3: Fire Problems and Issues by Target Group**

| Problem / Issue | Affected Target Group | Degree Of Control | Communication | Potential Impacts | Index / Component | Management Action |
|---|---|---|---|---|---|---|
| Unattended and/or escaped campfires at developed recreation sites | Public: Campers, Picnickers | Moderate | Communicated by dispatch daily to agency personnel for implementation. Raise awareness of potential fire danger in simple, easy to communicate terms via local web, radio, TV, and "Smokey" signs at the entrance to developed recreation areas. | Public anger and resistance; LEO, recreation, prevention, and patrol workload; reduction in suppression costs. | ERC / 7-day significant fire potential | Fire restrictions. Roadside prevention signs. Fire prevention education. Signs at campgrounds and picnic areas. Face-to-face contacts by recreation staff. |
| Unattended and/or escaped campfires in wilderness, roadless, or other undeveloped areas | Public: Backcountry Hikers, Campers | Low | Communicated by dispatch daily to agency personnel for implementation. Patrols will be necessary to conduct face-to-face awareness of fire danger. | LEO, recreation, prevention, and patrol workload; reduction in suppression costs. | ERC / 7-day significant fire potential | Wilderness Patrols. Roadside prevention signs. |
| Motorized equipment and vehicles | Public: Equipment, Vehicles | Low | One Less Spark campaign; Media messaging; Increase level of public awareness of fire danger via local radio, TV, newspaper, adjective rating signs at typical problem areas. | Public anger and resistance; LEO, recreation, prevention, and fire patrol workload; reduction in suppression costs | ERC / 7-day significant fire potential | Fire restrictions. Roadside prevention signs. Face-to-face contacts. Public education. Media emphasis on motorized equipment and vehicles. Patrols by LEOs. Cost recovery. |

| Problem / Issue | Affected Target Group | Degree Of Control | Communication | Potential Impacts | Index / Component | Management Action |
|---|---|---|---|---|---|---|
| Fires caused by target shooting | Public: Target Shooters | Low | Communicated by Dispatch daily to agency personnel for implementation. Increase level of public awareness of fire danger via local radio, TV, adjective rating signs at typical problem areas. Fire prevention order prohibiting steel ammo during fire season. “Know Your Ammo” signs and educational materials. | Public anger and resistance; loss of agency credibility; LEO, prevention, fire patrol workload | ERC / 7-day significant fire potential | Adjective Rating restrictions and/or closures. Focus on retailers and exploding targets. Public education via recreation, LEO, and fire prevention staff. |
| Fires resulting from debris burning | Public: Property Owners | Low | Communication through permit stipulations. Post adjective fire danger via web, radio, TV. Fire prevention patrols for communication and enforcement. | Public Anger; loss of credibility; agency costs (false alarms) | ERC / 7-day significant fire potential | Modify daily operational activities based on Adjective Rating |
| Fires caused by power infrastructure | Industrial: Power Companies, Railroads | Moderate | Powerline easements updated to address requirements for certain fire danger levels. Dispatch to communicate Adjective Rating daily during fire season. Prevention personnel should communicate annually with power companies. | Loss of productivity; socio-economic; reduced ignitions; reduced suppression workload. | ERC / 7-day significant fire potential | Adjective Rating |
| Railroad (maintenance issues and grinding) | Industrial: Railroads | Low | Obtain maintenance schedules from railroad. Inform of fire danger in relation to maintenance (phone, e-mail). | Infrastructure impacts; Commerce impacts. | Adjective Level | Grinder schedule cooperation. Cost recovery. |
| Fire resulting from agricultural burns | Industrial: Agriculture | Low | Post adjective fire danger via web, radio. Fire prevention patrols for communication and enforcement. | Public Anger; loss of credibility; agency costs (false alarms) | ERC / 7-day significant fire potential | Work through legislature to gain more control through permitting. |
| Fires resulting from equipment (e.g., chainsaws, | Industrial: Contractors; Permittees | Low/ Moderate | Communication through permit stipulations. Post adjective fire danger via web, newspaper, radio. Fire prevention patrols for | Public anger; loss of credibility; LEO and fire | ERC / Ignition Component | Modify daily operational activities based on Adjective Rating. Permit |

| Problem / Issue | Affected Target Group | Degree Of Control | Communication | Potential Impacts | Index / Component | Management Action |
|---|---|---|---|---|---|---|
| vehicles, heavy equipment, welders) | | | communication and enforcement. | patrol workload | | stipulations for fire prevention. |
| Suppression resources committed to multiple fires | All Agencies | High | Dispatch orders/releases resources based upon each agencies staffing plan. Preposition resources and extend or supplement staffing. | Agency mob/demob costs vs. suppression costs; reduced response time and efficiency of resources. | BI | Dispatch Level / Staffing Level |
| Suppression resources unavailable after work hours and/or scheduled days off | All Agencies | High | Dispatch Center notifies Duty Officer(s) of indices. Duty Officer extends staffing as needed. | Agency costs vs. suppression costs; improved readiness. | BI | Staffing Level |
| Military-caused fires on or off of military lands. | All agencies | Moderate | Interagency agreements with DOD and National Guard. | Public anger; fiscal impacts for suppression costs; public perception of military and/or land management agencies. | Adjective Rating | Fuel breaks around military boundaries; preposition of resources duing military activities during higher fire danger periods. |

# 4.0 FIRE DANGER THRESHOLD / DECISION ANALYSIS

This Fire Danger Operating Plan will be used to support preparedness, staffing and response decisions that are made at specific decision points. A "decision point" is a point along the range of possible output values where a decision shifts from one choice to another. When the combination of events and conditions signal that it is time to do something different, a "decision point" has been identified for each Fire Danger Rating Level within each FDRA. Decision points can be based upon climatological breakpoints or weather station analysis.

## 4.1 Climatological Analysis

Climatological breakpoints are points on the cumulative distribution curve of one fire weather/danger index computed from climatology (weather) without regard for associated fire occurrence/business. For example, the value at the 90th percentile energy release component (ERC)[4] is the climatological breakpoint at which only 10 percent of the ERC values are greater in value. Climatological percentiles were originally developed for budgetary decisions by federal agencies and area predetermined by agency directive: BLM (80th and 95th percentiles); USFWS (90th and 97th percentiles); NPS (90th and 97th percentiles); and USFS (90th and 97th percentiles). See Appendix D for more information.

It is equally important to identify the period or range of data analysis used to determine the agency percentiles. The percentile values for the calendar year (January to December) will be different from the percentile values for the fire season (June to October). Each agency will have specific (and perhaps different) direction for use of climatological percentiles.

*Note: The decision thresholds identified in this FDOP are based upon the statistical correlation of historical fire occurrence and weather data and, therefore, do not utilize climatological (percentiles) for decision points.*

## 4.2 Weather Station Analysis

Remote automated weather stations (RAWS) located in different geographical locations with common sensitivity to NFDRS model inputs can be grouped together to form a Special Interest Group (SIG). Of the 13 active RAWS in Northern Utah, five were grouped into the Salt Lake Desert SIG, five into the Wasatch Mountains SIG, and three into the Uinta Mountains SIG.

**Salt Lake Desert SIG:** The Vernon, Cedar Mountain, Aragonite, Rosebud, and Clifton Flat RAWS have been combined as a SIG to compute an equally weighted set of fire danger indices for the Salt Lake Desert FDRA. See Appendix C: Figure 6, Figure 7, Figure 8, Figure 9, Figure 10, and Figure 11 for average daily observed paramaters for the Salt Lake Desert SIG RAWS sites between May 1 and September 30, 2014.

**Wasatch Mountains SIG:** The Otter Creek, Pleasant Grove, Rays Valley, , and Bues Canyon RAWS have been combined as a SIG to compute an equally weighted set of fire danger indices for the Wasatch Mountain FDRA. See Appendix C: Figure 12, Figure 13, Figure 14, Figure 15, Figure 16, Figure 17 for average daily observed paramaters for the Wasatch Mountains SIG RAWS sites between May 1 and September 30, 2014.

**Uinta Mountains SIG:** The Bear River, Hewinta and Norway Flats RAWS have been combined as a SIG to compute an equally weighted set of fire danger indices for the Uinta Mountain FDRA. See Appendix C: Figure 18, Figure 19, Figure 20, Figure 21, Figure 22, and Figure 23 for average daily observed paramaters for the Uinta Mountains SIG RAWS sites between May 1 and September 30, 2014.

[4] ERC is a number related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire.

## 4.3 Parameters Used to Calculate Fire Danger

Table 4 presents information on the parameters used by the Northern Utah Interagency Fire Danger Operating Plan Committee to calculate fire danger for each FDRA.

**Table 4: Parameters used to calculate fire danger by FDRA (NFDRS 2016)**

| Parameter | Salt Lake Desert FDRA | Wasatch Mountains FDRA | Uinta Mountains FDRA |
|---|---|---|---|
| **RAWS** | Cedar Mtn, Vernon, Aragonite, Rosebud, Clifton Flat | Otter Creek, Bues Canyon, Pleasant Grove, Ray's Valley, | Bear River, Hewinta, Norway Flat |
| **Data Years** | 2004 to 2020 | 2004 to 2020 | 2004 to 2020 |
| **Annual Filter (Time of Year)** | June 1 to October 31 | June 1 to October 31 | June 1 to October 31 |
| **Analysis Period Length (Days)** | 1 | 1 | 1 |
| **NFDRS Fuel Models** | Y | Y | Z |
| **Slope Class** | 1 (0%-25%) | 3 (41%-55%) | 3 (41%-55%) |
| **Herbaceous Type** | Annual | Annual | Perennial |
| **Annual Precipitation (inches)** | 5-12 | 12-15 | 40 |
| **Elevation Range (feet)** | 4,000-12,000 | 3,000-12,000 | 8,000-13,523 |
| **Acres** | 10,500,000 | 4,100,000 | 900,000 |
| **Large Fire Day (acres)** | 300 | 20 | 1 |
| **Multiple Fire Day** | 3 | 2 | 2 |

# 5.0 FIRE DANGER RATING LEVEL DECISIONS

The NFDRS utilizes the WIMS processor to manipulate weather data and forecasted data stored in the National Interagency Fire Management Integrated Database to produce fire danger ratings for corresponding weather stations. The NFDRS outputs from the WIMS processor can be used to determine various levels of fire danger rating to address the fire problems identified previously in the Fire Problem Analysis Chart (see section 3.2; Table 3). The system is designed to model worst-case fire danger scenario. The NFDRS, along with other decision support tools, will be utilized to produce levels (thresholds) of fire business to address local fire problems by targeting public, industrial, or agency groups. The NFDRS will be utilized to produce outputs to assist fire management with four sets of decisions:

- **Dispatch Levels** will be used as a decision tool for dispatchers to assign initial attack resources to a fire reported in a specific run card zone.
- **Staffing Levels** will be used to determine appropriate day-to-day suppression resource staffing.
- **Preparedness Levels** will assist fire managers with long-term (or seasonal) decisions with respect to fire danger.
- **Fire Danger Adjective Rating** levels are intended to communicate fire danger to the public (e.g., fire danger signs).
    - Extreme Fire Danger Thresholds: Seasonal risk escalation in fuel complexes of northern Utah relies upon a combination of factors, which may ultimately trigger an extreme state of fuel volatility and a high potential for large fire growth or multiple ignition scenarios.

## 5.1 Dispatch Level Analysis

Dispatch levels are pre-planned actions which identify the number and type of resources (e.g., engines, crews, aircraft) initially dispatched to a reported wildland fire based upon fire danger criteria. Dispatch levels are established to assist fire managers with decisions regarding the most appropriate response to an initial fire report until a qualified incident commander arrives at the incident. The FireFamilyPlus software has been used to establish the dispatch level thresholds. A statistical analysis of fire occurrence and historical weather has been completed for each FDRA. The correlation of various combinations of NFDRS outputs with weather records is listed in the appendix. Each agency will utilize the same dispatch levels calculated for each FDRA in response to wildland fires in Northern Utah. See Table 5 for descriptions of the analysis factors used for evaluating each FDRA in FireFamilyPlus.

Agency personnel use the dispatch level to assign initial attack resources based on pre-planned interagency “Run Cards.” Combined with predefined dispatch zones, the dispatch level is used to assign an appropriate mix of suppression resources to a reported wildland fire based upon fire danger potential. The dispatch levels are derived from the most appropriate NFDRS index and/or component that correlate to fire occurrence. Burning Index (BI)[5] has been determined to be the most appropriate NFDRS index that statistically correlates to the potential for large fires to occur (see Table 6). Due to the ability of BI to reflect the most current fire danger potential and the NUIFC’s ability to track agency personnel throughout the course of any given day, BI will be computed and implemented for initial attack response levels until a qualified incident commander evaluates the need for the dispatched resources.

[5] BI is a number related to the contribution of fire behavior to the effort of containing a fire. The BI (difficulty of control) is derived from a combination of spread component (how fast it will spread) and energy release component (how much energy will be produced).

**Table 5: Dispatch Level, FireFamilyPlus Analysis Factors (NFDRS 2016)**

| FDRA | RAWS NWS # | RAWS Name | Data Years Used | Weight Factor | Fuel Model | NFDRS Index | Class | Range |
|---|---|---|---|---|---|---|---|---|
| **Salt Lake Desert** | 420901 | Cedar Mtn | 2004 – 2020 | 1.0 | Y | BI | Low | 0 - 27 |
| | 420908 | Vernon | 2004 – 2020 | 1.0 | | | Mod | 28 - 38 |
| | 420911 | Aragonite | 2004 – 2020 | 1.0 | | | High | 39 + |
| | 420914 | Rosebud | 2004 – 2020 | 1.0 | | | | |
| | 420915 | Clifton Flat | 2004 – 2020 | 1.0 | | | | |
| **Wasatch** | 420912 | Otter Creek | 2004 – 2020 | 1.0 | Y | BI | Low | 0 - 24 |
| | 420403 | Bues Canyon | 2004 – 2020 | 1.0 | | | Mod | 25 - 35 |
| | 421101 | Pleasant Grove | 2004 – 2020 | 1.0 | | | High | 36 + |
| | 421103 | Ray's Valley | 2004 – 2020 | 1.0 | | | | |
| **Uinta** | 420703 | Bear River | 2004 – 2020 | 1.0 | Z | BI | Low | 0 - 29 |
| | 420705 | Hewinta | 2004 – 2020 | 1.0 | | | Mod | 30 - 74 |
| | 420706 | Norway Flat | 2004 – 2020 | 1.0 | | | High | 75 + |

**Table 6: Northern Utah Interagency Fire Center Dispatch Level Worksheet (NFDRS 2016)**

| DISPATCH LEVEL WORKSHEET<br>Northern Utah Interagency Fire Center | | | | |
|---|---|---|---|---|
| **Fire Danger Rating Area (FDRA)** | **Fuel Model (NFDRS 2016)** | **Burning Index (BI)** | | |
| **Salt Lake Desert** | **Y** | **0 – 27** | **28 – 38** | **39 +** |
| **Wasatch Mountains** | **Y** | **0 – 24** | **25 – 35** | **36 +** |
| **Uinta Mountains** | **Z** | **0 – 29** | **30 – 74** | **75 +** |
| **Dispatch Level Rating** | | **Low (1)** | **Moderate (2)** | **High (3)** |

## 5.2 Staffing Level

Staffing levels will be used to make daily internal fire preparedness and operational decisions. At the unit level, the staffing level can form a basis for decisions regarding the "degree of readiness" for initial attack and support resources. Specific preparedness actions are defined at each staffing level. Although staffing level can be a direct output in WIMS, the WIMS output is only based upon weather observations and climatological percentiles. The use of climatological percentiles for daily staffing decisions is optional. The preferred methods to delineate staffing level thresholds are based on statistical correlation of weather and fire occurrence.

Staffing levels are established to assist fire managers with agency staffing decisions. Staffing levels will be a function of dispatch level, current fire activity, and the potential for ignitions in the next 24-hour period. The NUIFC's process for determining local staffing levels is not the same as staffing level calculated directly from WIMS. WIMS calculates staffing level on climatological breakpoints; NUIFC will calculate staffing level on fire business thresholds (Table 7). Each agency will develop their respective management actions based upon five staffing levels.

**Table 7: Northern Utah Interagency Fire Center Staffing Level Worksheet**

| Staffing Level Worksheet<br>*Northern Utah Interagency Fire Center* | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Dispatch Level →** | | **Low (1)** | | **Moderate (2)** | | **High (3)** | |
| **Fire Activity? (Y/N)** | **N** | **1** | **2** | **2** | **3** | **3** | **4** |
| | **Y** | **2** | **3** | **3** | **4** | **4** | **5** |
| **Significant Fire Potential/Red Flag? Forecasted High Risk Day/Event (Y/N)** | | **N** | **Y** | **N** | **Y** | **N** | **Y** |

The staffing level is based on an analysis of cumulative frequency of occurrence of BI as they relate to a dispatch level. Staffing levels are expressed as numeric values where 1 represents the low end of the fire danger continuum and 5 the high end (Table 7). Staffing level will be used to determine staffing which requires employee overtime associated with working people beyond their normal schedules (e.g., days off, after hours). In addition, the extended staffing of shared resources such as air tankers, helicopters, hotshot crews, and other large fire support resources will be a function of the staffing level.

- **Dispatch Level:** actual or forecasted dispatch level will be the first factor input to the Staffing Level Worksheet.
- **Fire Activity:** defined as any wildland fire, including prescribed fire, within the Northern Utah Interagency Dispatch Area (regardless of FDRA) that requires a commitment of NUIFC suppression (ground or aviation) resources. For example, if NUIFC suppression resource is committed to a local incident, Fire Activity is "YES".
- **Significant Fire Potential:** The Predictive Service Area (PSA) 7-Day Fire Potential Outlooks combine forecasted fuel dryness with significant weather triggers to identify high risk areas. The 7-day Significant Fire Potential Outlook is posted daily during fire season and forecasts significant fire potential for the next 7 days. Tomorrow's Significant Fire Potential can be found on the Predictive Services (Outlooks) page of the GBCC website. As Red Flag Warning issued within Northern Utah Interagency Fire Dispatch Area (regardless of FDRA) is considered high risk.

**Table 8: Northern Utah Predicative Service Areas and Fire Weather Zone by FDRA**

| FDRA | Predicative Service Area (PSA) Zone | Fire Weather (FWX) Zone |
|---|---|---|
| Salt Lake Desert | GB25 | UT478 |
| Uinta-Wasatch Mountains | GB26 | UT-480/UT479 |

If a high risk event in PSAs GB25, or GB26 for wind[6] or lightning[7] is forecasted for today or tomorrow, Significant Fire Potential is a "Y" input; otherwise, it is an "N" input. If a Red Flag Watch or Warning has

[6] Wind gusts 25 miles per hour or higher in the mountains and gust 30 miles per hour or higher elsewhere AND relative humidity 15 percent or lower.
[7] Scattered or greater coverage of lightning (thunderstorms)

been issued by the National Weather Service for FWX Zone UT478, UT479, or UT480, the Significant Fire Potential is a "Y" input for that respective FDRA.

## 5.3 Preparedness Level

The preparedness level is a five-tier (1 to 5) fire danger rating decision tool that is based on NFDRS output(s) and other indicators of fire business (such as projected levels of resource commitment). Preparedness levels assist fire managers with weekly or monthly planning decisions based upon seasonal fire danger elements. The FireFamilyPlus software has been used to establish the fire business thresholds. A statistical analysis of fire occurrence and historical weather has been completed for each FDRA. The correlation of various combinations of NFDRS outputs with weather records is listed in the appendix. The final preparedness level determination will also incorporate a measure of current and projected levels of resource commitment due to fire activity and a measure of ignition risk. The Northern Utah Preparedness Level Worksheet is presented in Table 9.

Worksheet Instructions:

- **ERC:** Energy Release Component, Fuel Model Y for Salt Lake Desert and Wasatch Mountains FDRAs, and Fuel Model Z for Uinta Mountains FDRA. These indices, forecasted by the Salt Lake Weather Office, are based on the 1300 RAWS observations that are inputted to the WIMS processor by NUIFC personnel.
- **Live Fuel Moisture:** Place a checkmark in Row Two indicating the appropriate live fuel moisture for the associated FDRA. Data can be obtained from the National Fuel Moisture Database (NFMD)[8] Sample Site or the NUIFC webpage under Predictive Services (Fuels / NFDRS).
  - **Salt Lake Desert FDRA – Sagebrush LFM:** Average of the most recent samples from the Muskrat and Vernon sagebrush sites.
  - **Salt Lake Desert FDRA – Juniper LFM:** Average of the most recent samples from the Muskrat and Vernon juniper sites.
  - **Wasatch Mountains FDRA – Gambel Oak LFM:** Average of the most recent samples from the Squaw Peak, Maple Canyon, Hobble Creek, and Bues Canyon Gambel oak sites.
  - **Uinta Mountains FDRA – Lodgepole Pine LFM:** The most recent samples from the Norway Flat and Bear River lodgepole pine sites.
- **Large Fire Activity or Multiple Small Fires:** Multiple large fire activity will be defined when two or more Incident Status Summaries (ICS-209s) have been (or will be) submitted within the next 12-hour period for incidents managed within the NUIFC (regardless of FDRA). Incident Status Summaries submitted for fires in "monitor" status will not be included; only ICS-209s submitted for incidents which are utilizing local resources will be included in the count. Multiple small fires is defined as: 3 small fires in the Salt Lake Desert FRDA, 2 small fires in the Wasatch Mountains FDRA and 2 small fires in the Uinta FDRA. Or one fire with commitment of resources in 2 or more FDRA's.

PL changes, weekly discussion via e-mail from NUIFC with PL recommendation, but with flexibility to change when there is sudden uptick in fire activity, etc.

[8] http://www.wfas.net/index.php/national-fuel-moisture-database-moisture-drought-103

**Table 9: NUIFC Local Preparedness Level Worksheet (NFDRS 2016)**

| Local Preparedness Level Worksheet<br>*Northern Utah Interagency Fire Center* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | Energy Release Component (ERC) | | | | | | | | | | |
| | Model Y (Salt Lake Desert FDRA) | 0 – 36 | | 37 – 49 | | 50 – 64 | | 65 – 72 | | 73 + | |
| | Model Y (Wasatch Mountains FDRA) | 0 – 31 | | 32 – 42 | | 43 – 56 | | 57 – 64 | | 65 + | |
| | Model Z (Uinta Mountains FDRA) | 0 – 14 | | 15 – 52 | | 53 – 76 | | 77 – 90 | | 91 + | |
| #2 | Live Fuel Moisture (%) | | | | | | | | | | |
| | Sagebrush (Salt Lake Desert FDRA) | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 |
| | Gambel Oak (Wasatch Mountains FDRA) | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 |
| | Pine Needles (Uinta Mountains FDRA) | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 | 100 + | < 99 |
| #3 | Large Fire Activity / Multiple Small Fires | | | | | | | | | | |
| | 2 or more ICS-209s | | No | Yes | No | Yes | No | Yes | No | Yes | |
| | Local Preparedness Level | 1 | | 2 | | 3 | | 4 | | 5 | |

## 5.4 Adjective Fire Danger Rating Level

### *5.4.1 Adjective Fire Danger Rating Description*

In 1974, the USFS, BLM, and state forestry organizations established five standard adjective fire danger rating levels descriptions for public information and signing. For this purpose only, fire danger is expressed using the national adjective descriptions and color codes (Table 10). As with staffing level, the adjective fire danger rating level can be obtained as a direct output in WIMS; however, the adjective rating from WIMS is strictly based on weather and climatological percentiles (80th / 95$^{th}$ or 90$^{th}$ / 97$^{th}$) with no regard to historical fire occurrence. The use of agency-specific climatological percentiles is not mandatory. The preferred method to determine adjective fire danger rating thresholds based on statistical correlation of weather observations and fire occurrence. This FDOP will implement adjective fire danger rating based upon fire business thresholds, not climatological percentiles.

**Table 10: Adjective fire danger rating class and color code descriptions**

| Fire Danger Class and Color Code | Description |
|---|---|
| **Low (L) (Green)** | Fuels do not ignite readily from small firebrands, although a more intense heat source such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting. |
| **Moderate (M) (Blue)** | Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy. |
| **High (H) (Yellow)** | All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are hit hard and fast while small. |
| **Very High (VH) (Orange)** | Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high intensity characteristics such as long-distance spotting and fire whirlwinds when they burn in heavier fuels. |
| **Extreme (E) (Red)** | Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessons. |

### *5.4.2 Adjective Fire Danger Rating Determination*

Although NFDRS processors (e.g., WIMS) will automatically calculate the adjective class rating, the NUIFC will manually determine adjective fire danger rating based upon fire business thresholds. The actual determination of the daily adjective rating is based on the current or forecasted value of a selected staffing index (ERC) and 7-Day Significant Fire Potential as depicted in https://fsapps.nwcg.gov/psp/npsg/forecast#/outlooks?state=map

When a FDRA has fire restrictions in place the Adjective Rating may be held at a higher Fire Danger Class than what is calculated using the worksheet. This is in an effort to have consistent messaging around fire danger. If there are restrictions in affect the Adjective Rating should be "Very High" or "Extreme".

Worksheet Instructions:

- **ERC:** These indices, forecasted by the Salt Lake Weather Office, are based on the 1300 RAWS observations that are inputted to the WIMS processor by NUIFC personnel.
- **7-Day Significant Fire Potential: 7-Day Significant Fire Potential:** The 7-day Significant Fire Potential Outlook is posted daily during fire season and forecasts significant fire potential for the next 7 days and can be found at the following website: 7-Day Significant Fire Potential[9]. The Predictive Service Area (PSA) 7-Day Significant Fire Potential Outlooks combine forecasted fuel dryness with significant weather triggers to identify high-risk areas. There are three PSA areas within the dispatch area: PSA GB25 (Salt Lake Desert FDRA); PSA GB26 (Wasatch Mountains & Uinta FDRA).
  - There are four levels of significant fire potential: little or no risk; low risk; moderate risk; and high risk triggers. Each daily level is weighed as follows:
    - Little or no risk = 1
    - Low risk = 2
    - Moderate or High risk = 3
  - Add up the risk values for the 7-day period (present day forward) for each PSA and place a checkmark indicating the appropriate 7-Day Significant Fire Potential Sum: 7-12, 13-17, or 18-21.
  - Example: Day 1 (Low = 2); Day 2 (Low = 2); Day 3 (Moderate = 3); Day 4 (Moderate = 3); Day 5 (High = 3); Day 6 (Moderate = 3); Day 7 (Low = 2). We would add up the daily values which would provide a total of 18. Looking at the adjective fire danger rating worksheet (**Error! Reference source not found.**), we would match this 7-Day Significant Fire Potential Sum with the corresponding ERC value for the appropriate FDRA/PSA to determine the adjective fire danger rating.
- The value can be no less than 7 (which would equal 7 days forcasted as 'little or no risk) and no higher than 21 (which would equal 7 days forcasted as moderate or high).

[9]7-Day Significant fire potential website: https://fsapps.nwcg.gov/psp/npsg/forecast#/outlooks?state=map

| Salt Lake Desert (PSA GB20)<br>Adjective Fire Danger Rating Worksheet | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ERC** | **Model Y** | **0 – 36** | | | **37 – 49** | | | **50 – 64** | | | **65 – 72** | | | **73 +** | | |
| **7-Day Significant Fire Potential Sum** | **7-12** | | | | | | | | | | | | | | | |
| | **13-17** | | | | | | | | | | | | | | | |
| | **18-21** | | | | | | | | | | | | | | | |
| **ADJECTIVE FIRE DANGER RATING** | | **L** | **L** | **M** | **L** | **M** | **H** | **M** | **H** | **VH** | **H** | **VH** | **E** | **VH** | **E** | **E** |

| Wasatch Mountains (PSA GB21)<br>Adjective Fire Danger Rating Worksheet | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ERC** | **Model Y** | **0 – 31** | | | **32 – 42** | | | **43 – 56** | | | **57 – 64** | | | **65 +** | | |
| **7-Day Significant Fire Potential Sum** | **7-12** | | | | | | | | | | | | | | | |
| | **13-17** | | | | | | | | | | | | | | | |
| | **18-21** | | | | | | | | | | | | | | | |
| **ADJECTIVE FIRE DANGER RATING** | | **L** | **L** | **M** | **L** | **M** | **H** | **M** | **H** | **VH** | **H** | **VH** | **E** | **VH** | **E** | **E** |

| Uinta Mountains (PSA GB22)<br>Adjective Fire Danger Rating Worksheet | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ERC** | **Model Z** | **0 – 14** | | | **15 – 52** | | | **53 – 76** | | | **77 – 90** | | | **91 +** | | |
| **7-Day Significant Fire Potential Sum** | **7-12** | | | | | | | | | | | | | | | |
| | **13-17** | | | | | | | | | | | | | | | |
| | **18-21** | | | | | | | | | | | | | | | |
| **ADJECTIVE FIRE DANGER RATING** | | **L** | **L** | **M** | **L** | **M** | **H** | **M** | **H** | **VH** | **H** | **VH** | **E** | **VH** | **E** | **E** |

#### 5.4.2.1 Extreme Fire Danger Thresholds

Seasonal risk escalation in fuel complexes of Northern Utah relies upon a combination of factors, which will ultimately trigger an extreme state of fuel volatility and high potential for large fire growth or multiple ignition scenarios.

- **Fire Activity:** The occurrence of large/multiple fires is a reliable indicator of severity conditions. Any one incident reaching type one or two complexity would also be an indicator of severity. Two or more type three incidents within a two to four-week period would also be a strong indicator. Three or more initial attack fires in the same day indicate a point where resources are limited. A progressive approach to assessing seasonal risk will prepare the local unit for these occurrences and the necessary resources will already be in place.
- **Live Fuel Moisture:** Live woody (Utah juniper) and herbaceous (Wyoming big sagebrush) fuel moisture plots were established in the vicinity of the Vernon (1996) and Muskrat (1995) Fire Stations. Since that time, valuable data has been collected and a direct correlation has been drawn between fire intensity (controllability) and live fuel moisture levels. Consequently, fire severity is determined by comparing current trends to historical averages. Live gambel oak samples have been collected at six sites on the Wasatch Front since 2002. Beginning in 2007, a site at Snowbasin in the Wasatch Mountains has been sampled for live (twigs and needles) Douglas-fir and subalpine fir, and a site at Norway Flats in the Uinta Mountains for mountain big sagebrush, Rocky Mountain juniper, and lodgepole pine. Comparison of fuel moisture to historical conditions at various locations within the Utah and surrounding areas can be located on the National Fuel Moisture Database:
- **Fine Fuel Loading:** There are six fine dead fuel load plots located in the Salt Lake Desert FDRA. Fuel load determinations are made on an annual basis and compared to historical averages in order to determine the potential intensity of wildfires. Fuel loading over 0.5 tons/acre indicates a fire controllability problem. If significant amounts of carry-over fuel and/or matted grass are observed, control problems and increased fireline intensity could be expected.
- **NFDRS Thresholds:** ERC and 1000-hr (3 to 8 inch diameter dead) fuel moisture are used as the primary indicators to track seasonal trends of fire danger potential. NFRDSV4 fuel model Y has been chosen due to its good “fit” with the BI and ERC models for the Salt Lake Desert and Wasatch Mountain FDRA and NFRDSV4 fiel model Z has been chosen for the Uinta FDRA. Other fuel models which might seem to be more appropriate due to their classification (grass/brush) do not correlate very well statistically with the NFDRS models. Consequently, fuel model Y was chosen due to its ability to predict fire occurrence; specifically, a day when a large fire is likely to occur. It has been statistically proven that large fire events will occur statistically more often when these thresholds are exceeded. Early and late-season ERC values that trend above average may indicate an extension of the normal fire season.
- **Weather Thresholds:** Seasonal weather assessments rely upon long-range forecasts which are available in two formats: seasonal long-lead outlooks and 30 to 90 day outlooks. This information is provided by NOAA Climate Prediction Center. The observable weather factors that contribute to large fires and potential for extreme fire behavior can be determined from the same percentiles determined from NFDRS thresholds. Any of these factors significantly increase the potential for extreme fire behavior and large fire growth. When combined these factors will increase the risk.
- **Drought Indicators:** The Keetch-Byrum Drought Index (KBDI) and Palmer Drought Index track soil moisture and have been tailored to meet the needs of fire risk assessment. Current KBDI information is located on the Wildfire Assessment System (WFAS) site. Tracking and comparing 1000-hour fuel moisture is another method to assess drought conditions. Palmer Drought Index graphics display current drought conditions while KBDI values of 500 to 800 indicate the

potential for rapid curing and drying of the fine fuels and potential for live fuel moisture to drop. Values below 10 percent indicate the potential risk for extreme burning conditions.

- **Normalized Difference Vegetation Index (NDVI):** NDVI data is satellite imagery, which displays vegetative growth and curing rates of live fuels. The Wildfire Assessment System (WFAS) site provides several different ways to analyze current and historical greenness imagery, which can be a significant contributor to seasonal risk assessments. An analysis of this imagery will assist in the assessment of current fuel moisture conditions and provide historical as well as average greenness comparisons.

### *5.5 Season-Slowing and Season-Ending Events*

Utilizing the Term Module in the FireFamily Plus software, the Weibull waiting-time distribution was developed from historical season-slowing and season-ending dates. The probability graphs along with the event locator parameters from the FireFamily Plus software dialog box are contained in Appendix E. Historical fire records were examined for all FDRAs to determine the combination of weather parameters which would best indicate the end of the fire season. The following season-slowing and season-ending events have been identified:

- **Salt Lake Desert FDRA**
  - **Season Slowing event:** three (3) consecutive days with an ERC of 50 or less for the Salt Lake Desert SIG, after September 10.
  - **Season Ending Event** three (3) consecutive days with an ERC of 35 or less for the Salt Lake Desert SIG, after September 10.
- **Wasatch Mountains FDRA**
  - **Season Slowing Event:** three (3) consecutive days with an ERC of 45 or less for the Wasatch Mountains SIG, after September 10.
  - **Season Ending Event:** three (3) consecutive days with an ERC of 30 or less for the Wasatch Mountains SIG, after September 10.
- **Uinta Mountain FDRA**
  - **Season Slowing Event:** three (3) consecutive days with an ERC of 50 or less for the Uinta Mountains SIG, after September 10.
  - **Season Ending Event:** three (3) consecutive days with an ERC of 35 or less for the Uinta Mountains SIG, after September 10.

- 
- From this analysis, the 50th percentile date is used as the estimate when there is an equal probability of a season-slowing or season-ending event occurring before or after a particular date.
- For the Salt Lake Desert FDRA, these occur on approximately Sept 23th for season slowing and October 15th for season ending.
- For the Wasatch Mountains FDRA, these occur on approximately Sept 20st for season slowing and October 7th for season ending.
- For the Uinta Mountains FDRA, these occur on approximately Sept 22th for season slowing and September 30th for season ending.

## 5.6 Fire Danger Pocket Cards

The fire danger pocket card is a tool which can aid fire suppression personnel to interpret NFDRS outputs and understand local fire danger thresholds. Pocketcards can relate current NFDRS outputs with the historical average and worst-case values in a specific geographic location. Burning index was the NFDRS output chosen as a measure of fire controllability (Deeming et al. 1978). NFDRS fuel model Y and Z were selected for all fire danger rating areas as it provides a good statistical correlation to large fire

occurrence and responds quickly to changing weather and fuel conditions. Visiting resources can use the pocketcard to familiarize themselves with local fire danger conditions. The Northern Utah Pocket Cards meet NWCG guidelines and are posted on the NWCG website.

# 6.0 FIRE DANGER OPERATING PROCEDURES

## 6.1 Roles and Responsibilities

### *6.1.1 Fire Program Managers*

During periods when local preparedness levels are high to extreme, Fire Management Officers (FMOs) from each agency will strive to achieve the most efficient and effective organization to meet fire management plan objectives. This may require the pre-positioning of suppression resources. The FMO and/or Assistant FMO (AFMO) from each agency will also determine the need to request/release off unit resources or support personnel throughout the fire season.

Unit FMOs will use this FDOP and NFDRS outputs as a tool to coordinate and to make informed fire related decisions. The agency administrator is ultimately responsible for ensuring this plan is maintained, utilized, and communicated.

The FMO from each federal agency will ensure that seasonal risk assessments are conducted monthly during the fire season. The risk analysis will include information such as live fuel moisture, 1000-hour fuel moisture, fuel loading, NFDRS trends, and other pertinent data. This information will be distributed to agency staff and the NUIFC Manager. The NUIFC Manager, AFMOs, and FMOs will ensure information is posted at duty stations.

The FMOs will ensure that the pocket cards are prepared at least every two years and are in compliance with NWCG standards. The cards will be distributed to all interagency, local and incoming firefighters and Incident Management Teams. The pocket cards will be posted on the NUIFC and NWCG pocket card websites. Fire suppression supervisors will utilize pockets cards to train and brief suppression personnel, ensuring that they are posted at their respective fire stations.

### *6.1.2 Duty Officers*

Duty Officers from each agency will be identified to the NUIFC daily from June through October. The Duty Officer is designated to provide input and guidance regarding staffing, preparedness, and dispatch levels. It is the Duty Officer's role to interpret and modify the daily staffing, preparedness, and dispatch levels (if warranted) by extenuating factors not addressed by this plan. Modifications of the staffing, preparedness and/or dispatch levels must be coordinated through NUIFC. The Duty Officer will keep their respective agency's fire and management staff updated (as needed). The BLM, USFS, and State of Utah will ensure the dispatch center is aware of their respective Duty Officer(s) at all times.

### *6.1.3 Northern Utah Interagency Fire Center*

The NUIFC Manager will ensure that this FDOP, along with all necessary amendments/updates, are completed. Updates to this FDOP will be made at least every three years and approved by the agency administrators (or delegates) from each agency. Revised copies will be distributed to the individuals on the primary distribution list as identified in Appendix G.

The NUIFC Manager will ensure that the daily fire weather forecast (including NFDRS indices) is retrieved and that the daily staffing, preparedness, dispatch, and adjective levels are calculated and communicated to the appropriate target group and posted on the internet.

### *6.1.4 Fire Weather Station Owners/Managers*

The BLM AFMO is listed as the station owner for the BLM RAWS. The NUIFC Manager (or Assistant) is listed as the station owner for the Uinta-Wasatch-Cache National Forest RAWS. The owner maintains the WIMS Access Control List (ACL). The station owner will ensure appropriate editing of the RAWS catalogs. The NUIFC Manager will ensure the timely editing of daily 1300 (LST) weather observations of all stations.

The Remote Sensing Laboratory located at the National Interagency Fire Center (NIFC) maintains and calibrates the BLM RAWS stations on an annual basis. The BLM Fuels Techs are qualified as first responders to RAWS malfunctions. The Salt Lake Interagency Fire Cache Manager is responsible for maintaining and calibrating the USFS RAWS stations on an annual basis.

### *6.1.5 Fire Danger Technical Group*

The Fire Danger Technical Group is responsible for reviewing the FDOP annually and advising fire management of necessary updates. This group should be comprised of Northern Utah FMOs, fire planners, fuels specialists, and prevention personnel. Members of the Fire Danger Technical Group will monitor NFDRS to ensure validity, coordinate/communicate any problems identified, review plan implementation, coordinate plan revisions, present the plan, and be available for technical consultation. Some specific elements to monitor and coordinate are ensuring observations are selected appropriately (e.g., time, SOW, wet flag, consistent), station management in WIMS (e.g., herb state, catalog), station maintenance (e.g., instrument errors, transmit times), and station siting (e.g., eliminate redundant/inappropriate, propose new sites where appropriate).

### *6.1.6 National Weather Service – Fire Weather Program*

Weather forecasts and products for the Northern Utah area are provided by the National Weather Service, Salt Lake City, UT office. Fire weather information and forecasts can be found on the Salt Lake City NWS fire weather website[10].

### *6.1.7 Great Basin Coordination Center, Predictive Services*

Great Basin Predictive Services will provide input to this plan through the 7 day outlook and as requested to provide other technical expertise.

### *6.1.8 Education, Mitigation, and Prevention Specialists*

Education and mitigation programs will be implemented by the agency Public Information Officers, Law Enforcement Officers, FMOs, AFMOs, Fire Wardens, and Fire Education/Mitigation Specialists based on Preparedness Level Guidelines and direction provided by each agency's FMO and Duty Officer.

[10] http://www.wrh.noaa.gov/firewx/?wfo=slc

## 6.2 Daily Schedule

### *6.2.1 Daily Timeline*

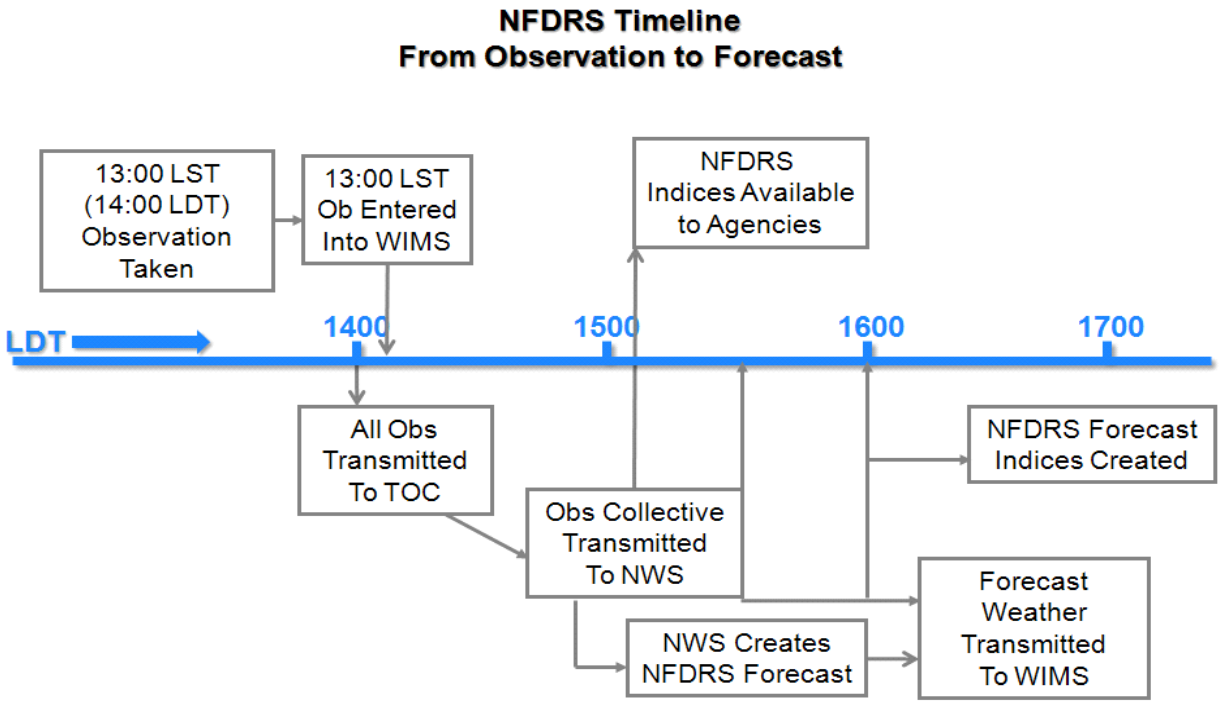



**Figure 5: Daily NFDRS timeline for northern Utah**

### *6.2.2 Dispatch Level*

- **Morning Level (0000 hours to 1600 hours)** inputs will be taken from the Forecasted Burning Index, for each FDRA, issued for that day and available in WIMS by 1600 hours the previous day.
- **Afternoon Level (1600 hours to 0000 hours)** inputs will be taken from the Actual Burning Index, for each FDRA, available in WIMS after the observations are edited by 1515 hours.

### *6.2.3 Staffing Level*

- **Morning Level (0000 hours to 1600 hours)** inputs will be taken from the forecasted dispatch level issued for that day:
  - If a ground or aviation resource has been committed to any wildfire (or prescribed fire) within the NUIFC (regardless of FDRA), Fire Activity is a "Y" input; otherwise, it is an "N" input.
  - If a High Risk Event for wind or lightning is forecasted for that day, Significant Fire Potential is a "Y" input; otherwise, it is an "N" input.
- **Afternoon Level (1600 hours to 0000 hours)** inputs will be taken from the actual dispatch level issued for that day:
  - If a ground or aviation resource has been committed to any wildfire (or prescribed fire) within the NUIFC (regardless of FDRA), Fire Activity is a "Y" input; otherwise, it is an "N" input.

- If a High Risk Event for wind or lightning is forecasted for that day, Significant Fire Potential is a "Y" input; otherwise, it is an "N" input.

### *6.2.4 Preparedness Level*

- **Daily Preparedness Level (0800 hours [today] to 0759 hours [tomorrow])** inputs will be taken from the following:
  - Forecasted Energy Release Component, for each FDRA, issued for that day and available in WIMS by 1600 hours the previous day.
  - Live Fuel Moisture for the FDRA.
  - Large Fire activity or multiple small fires (1 or more on-going incidents which require an ICS-209 or 4 or more small fires within the dispatch zone).

### *6.2.5 Adjective Rating Level*

- **Daily Adjective Rating Level (0800 hours [today] to 0759 hours [tomorrow])** inputs will be taken from the following:
  - Forecasted Energy Release Component, for each FDRA, issued for that day and available in WIMS by 1600 hours the previous day.
  - Forecasted Ignition Component, for each FDRA, issued for that day and available in WIMS by 1600 hours the previous day.

### *6.2.6 Duty Officer Briefing*

- **Morning Level:** Briefing between 0830 and 0900 hours.
- **Afternoon Level:** Briefing between 1600 and 1630 hours.

## 6.3 Seasonal Risk Analysis

Seasonal risk analysis is a comparison of the historic weather/fuels records with current and forecasted weather/fuels information. Seasonal risk analysis is an on-going responsibility for fire program managers. The most reliable indicators of seasonal fire severity have been measurements of fine fuel loading, live fuel moisture, 1000-hour (dead) fuel moisture, and ERC. These levels will be compared graphically to historical maximum values and the average; these graphs will be routinely updated and distributed to fire suppression personnel and dispatch. Seasonal risk analysis information will be used as a basis for pre-positioning critical resources, dispatching resources, and requesting fire severity funding.

# 7.0 FIRE DANGER PROGRAM NEEDS

**Weather Stations**

- Find and input missing weather data.
- Explore the possibility of contracting with the NIFC RAWS personnel to provide annual maintenance of USFS weather stations.
- Analyze the effect of weighting RAWS within each SIG to better represent the potential fire danger for each FDRA.

**Technology and Information Management**

- Integrate preparedness level flow chart into a software package.
- Develop a "burn line" for the public to notify local dispatchers by phone when they are burning to reduce dispatches to false alarms
- Create a crew briefing page on NUIFC's website including the following information or links:
    - ERC and 1000-hr fuel trends bi-monthly (when fuel moistures are updated)
    - Seasonal Risk Assessments (GACC and local FDRA)
    - 1-hour fuel comparisons for each FDRA
    - Live fuel moistures

**Training**

- Provide FDOP training to cooperators including county fire wardens, cooperating dispatch centers, and military fire departments.
- Train more personnel as RAWS first responders.
- Establish local WIMS/NFDRS training courses for agency personnel.
- Emphasize NFDRS training (S-491) for mid-level fire management personnel and Advanced NFDRS for upper-level fire management personnel.

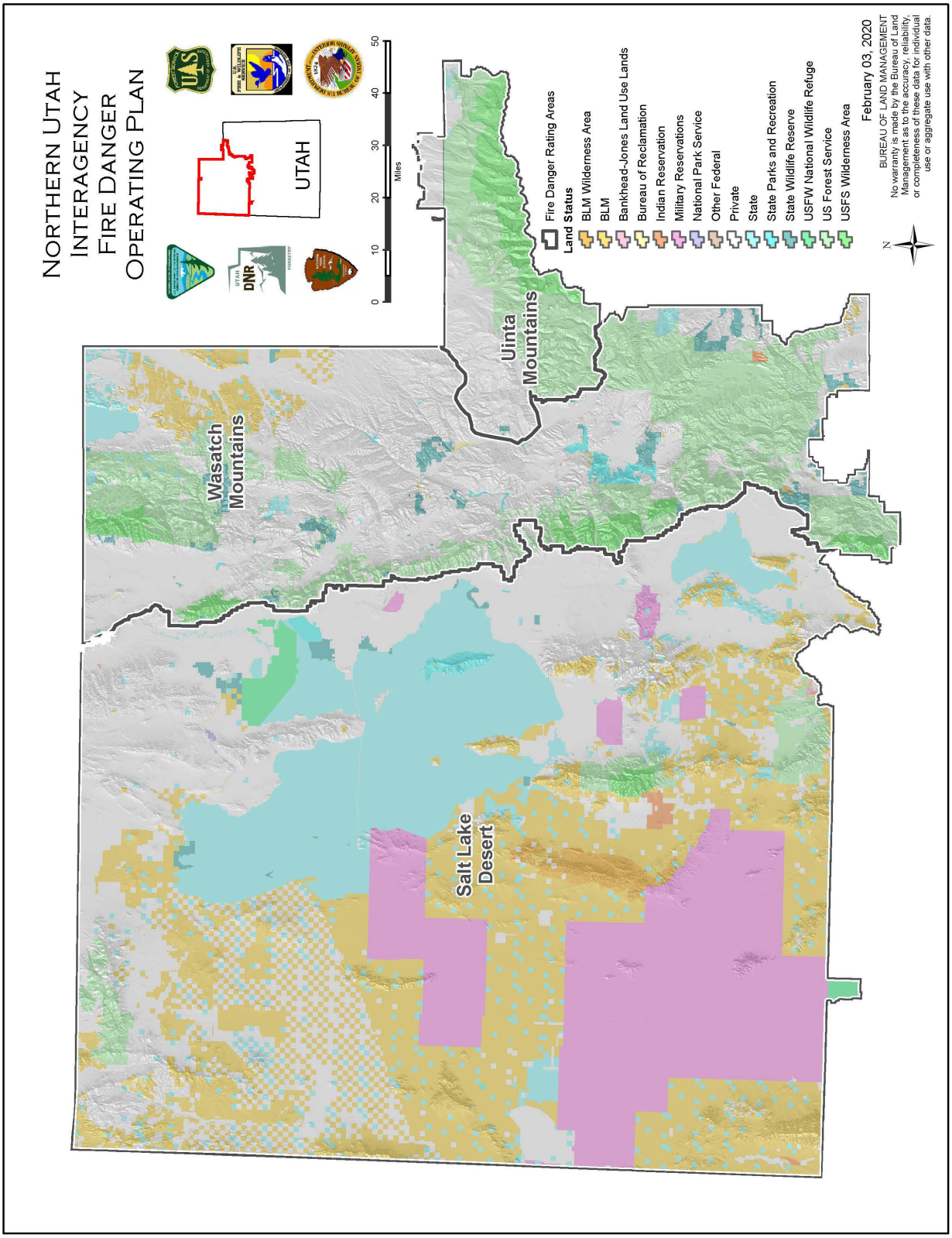
**Preparedness**

- Anticipate that during times of draw-down of Run Card resources, the State of Utah Area FMOs will consider creating a strike team or taskforce of cooperator engines for local response.

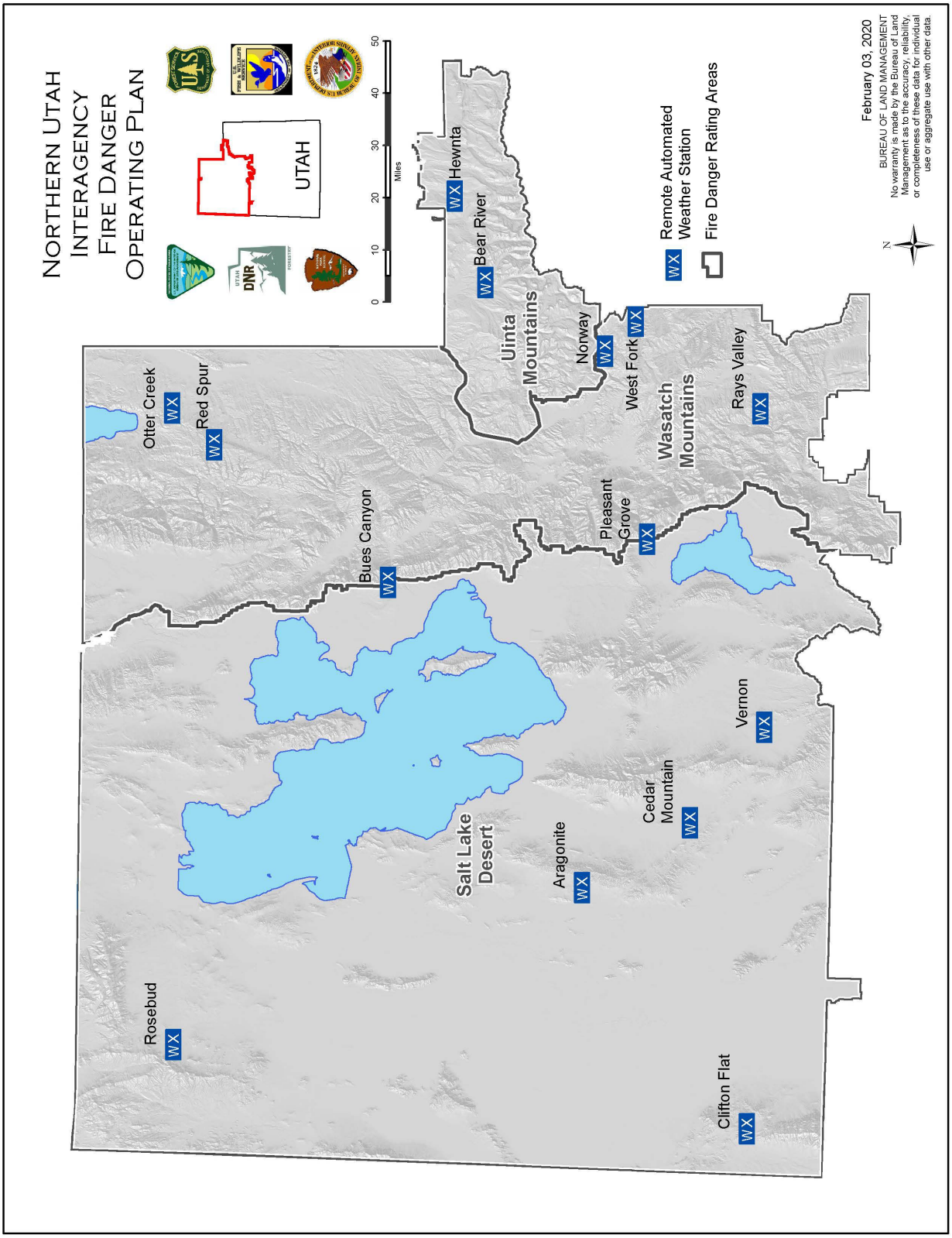
**Other**

- Need to tie the restriction plan back to the fire danger plan. The restriction plan should be based on the FDOP; the long-term fire danger related to preparedness level actions. Integrate into the OP for Northern Utah.
- Develop an industrial fire protection (go/no-go) system for high fire danger time.

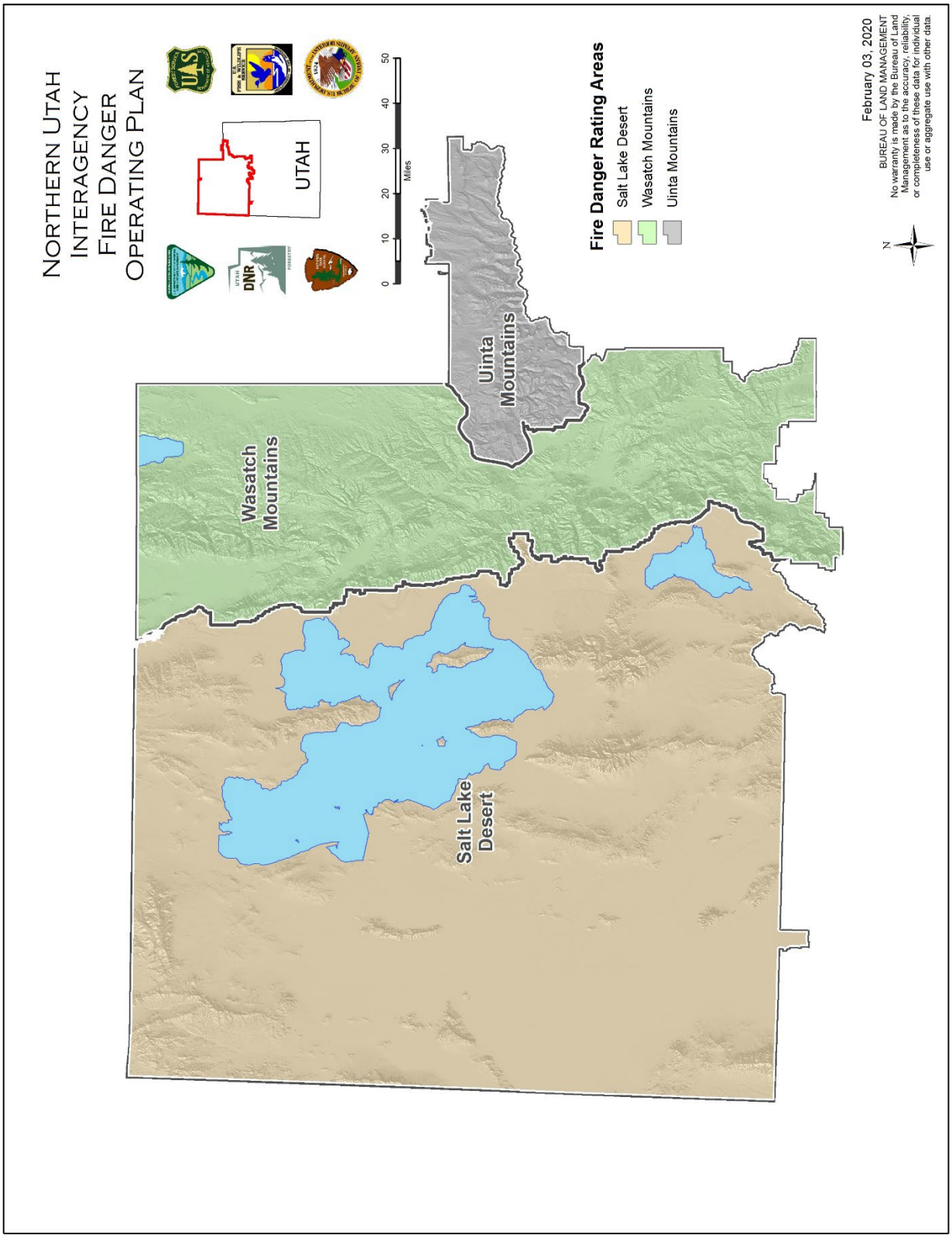
# APPENDIX A: MAPS



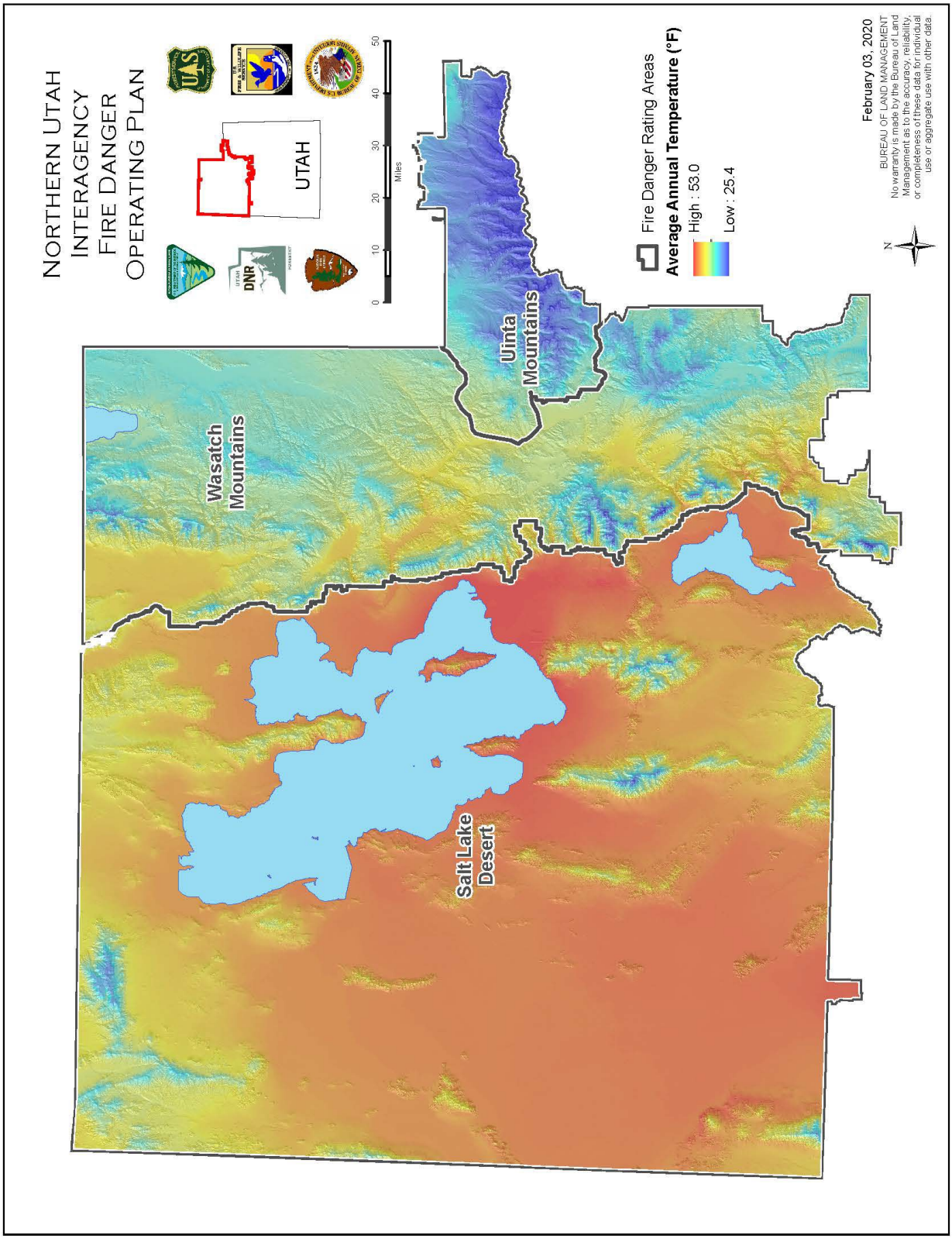

**Map 1: Land ownership and/or management agency within the Northern Utah fire danger planning area**



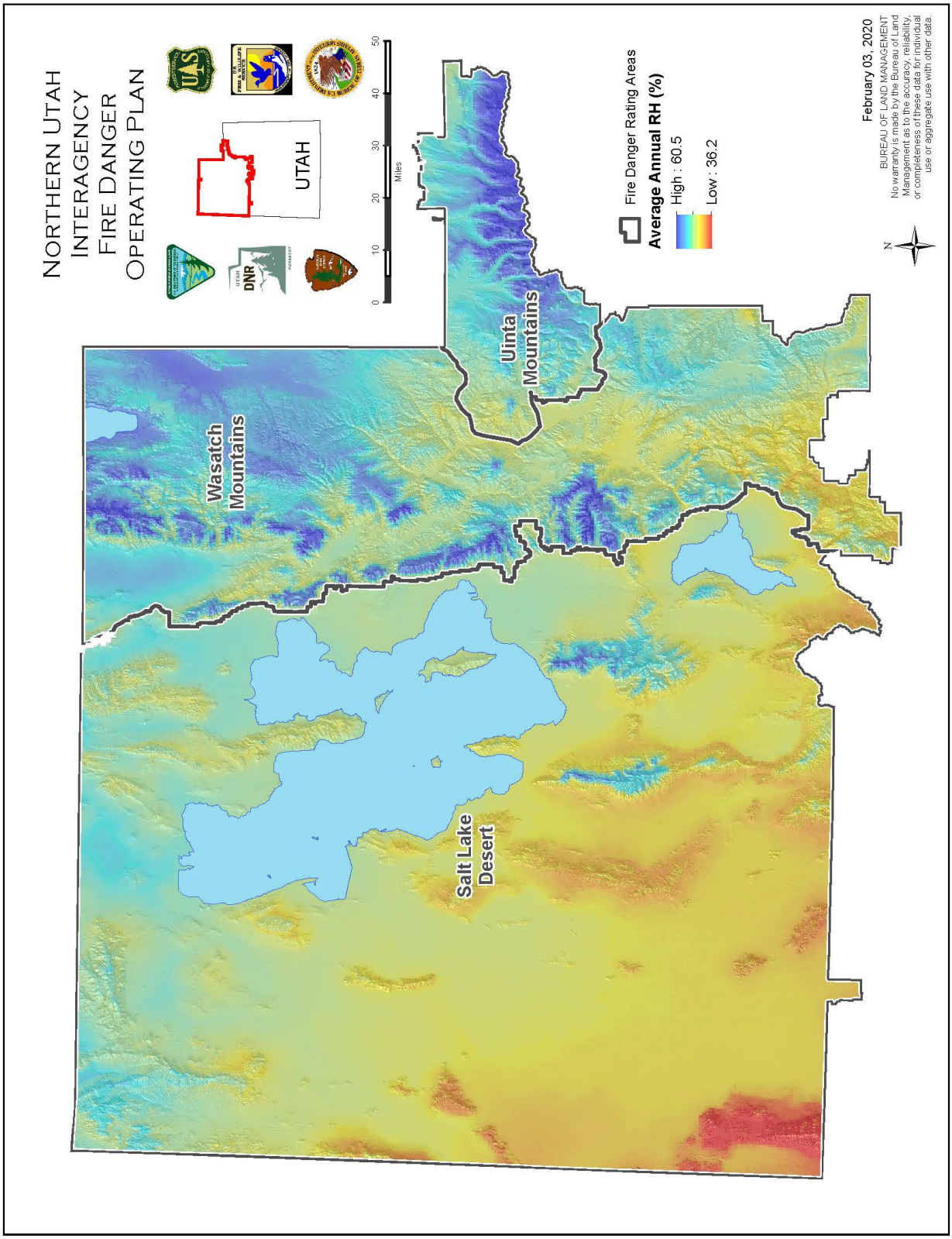

**Map 2: Location of Northern Utah Remote Automated Weather Stations**



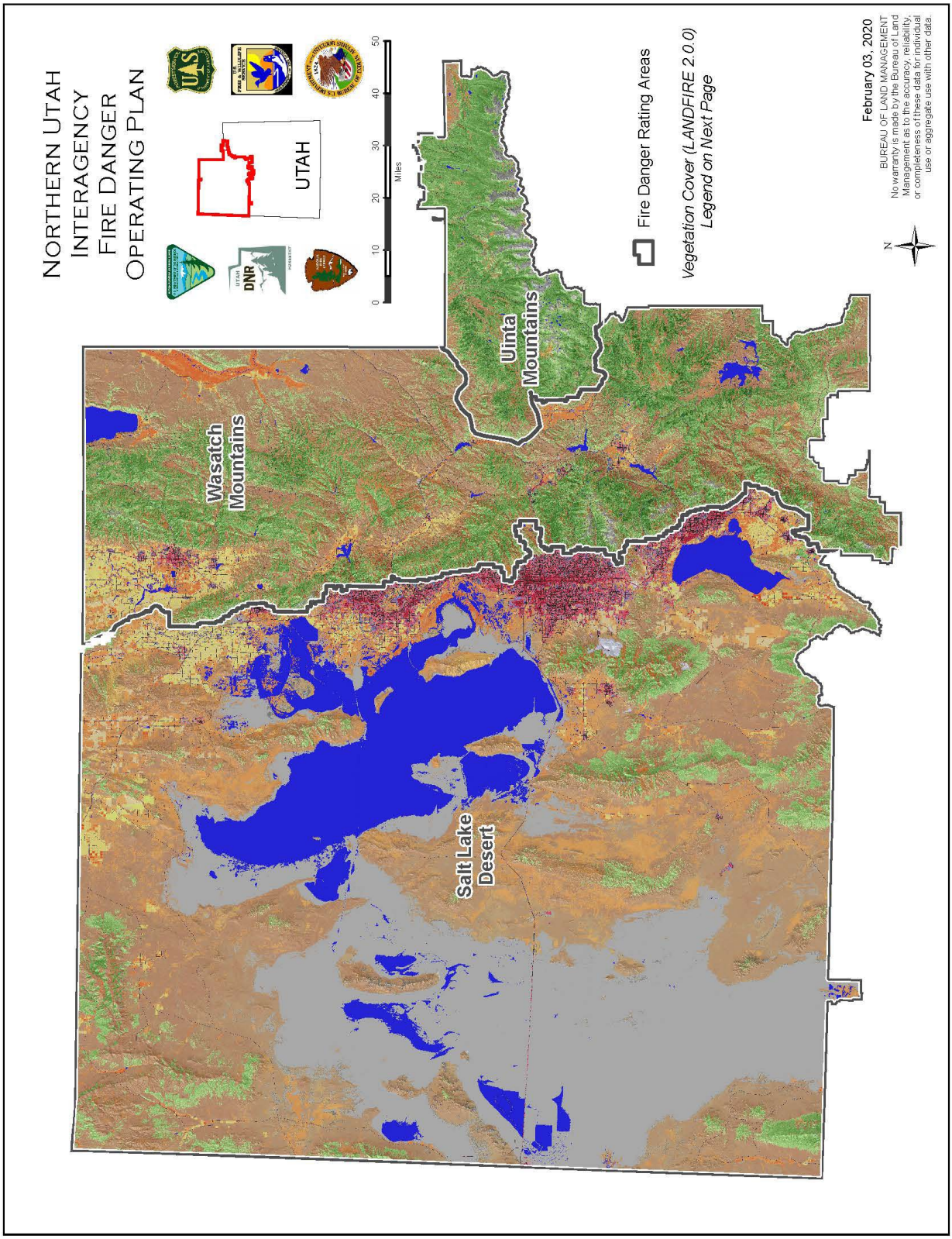

**Map 3 Northern Utah Fire Danger Rating Areas**



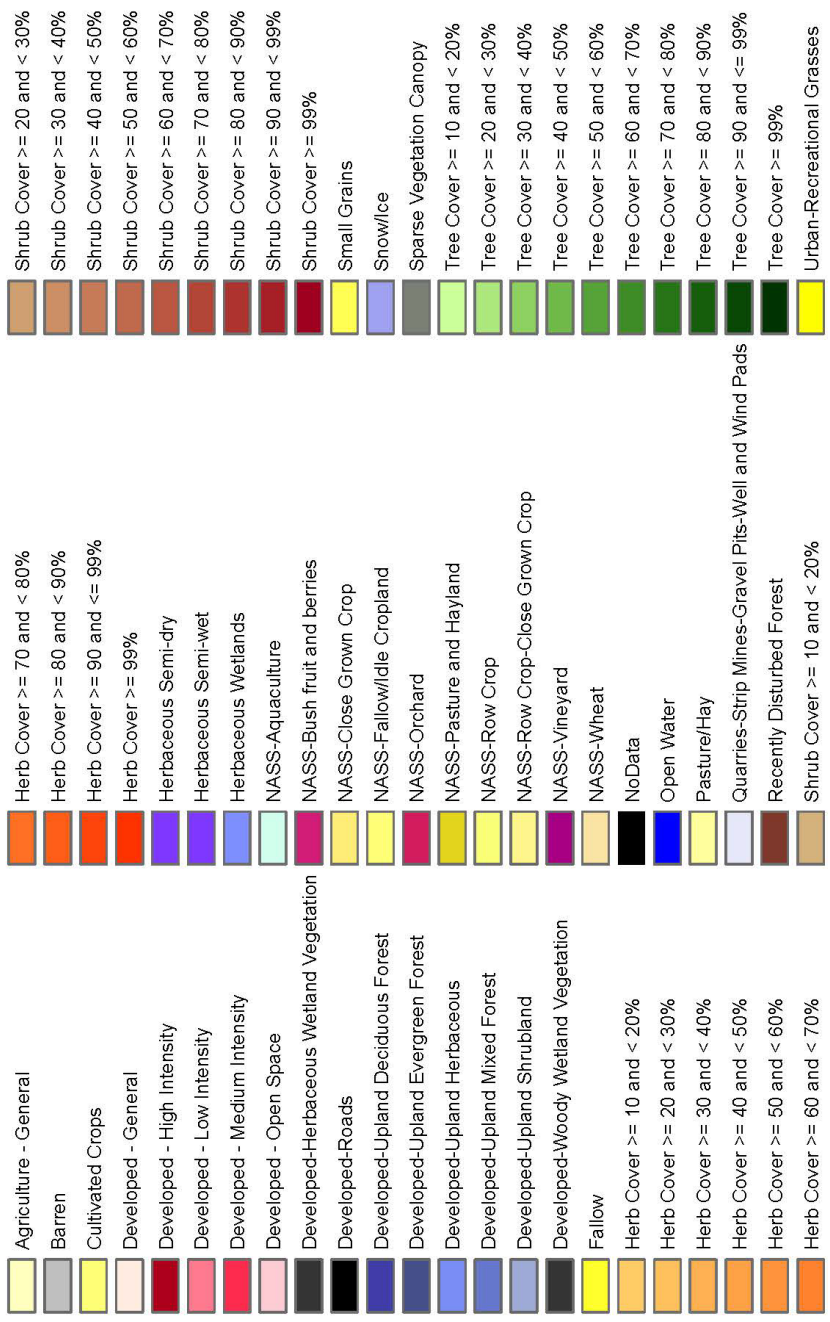

**Map 4: Average annual temperature for the Norther Utah fire danger planning area**



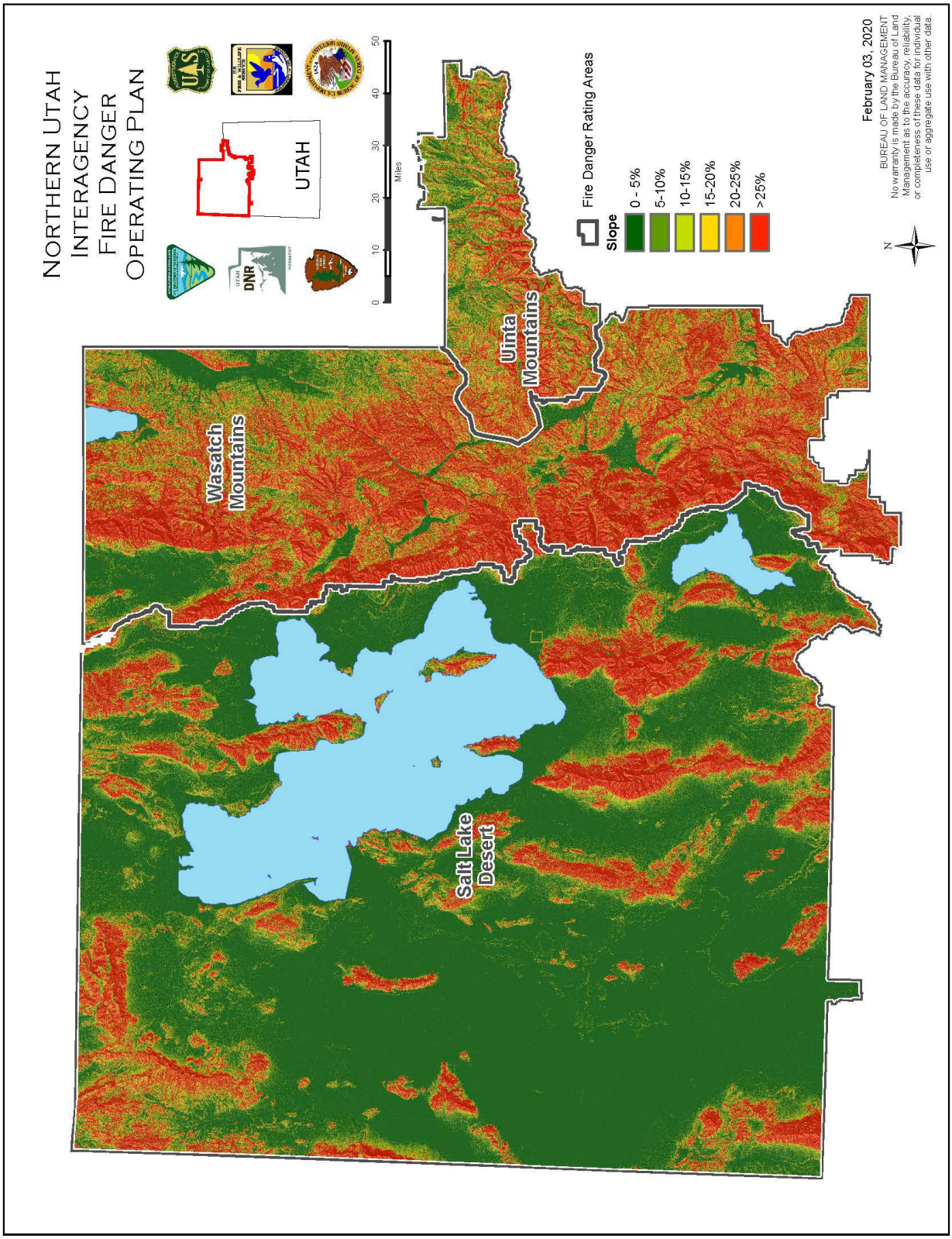

**Map 5: Average annual relative humidity for the Northern Utah fire danger planning area**



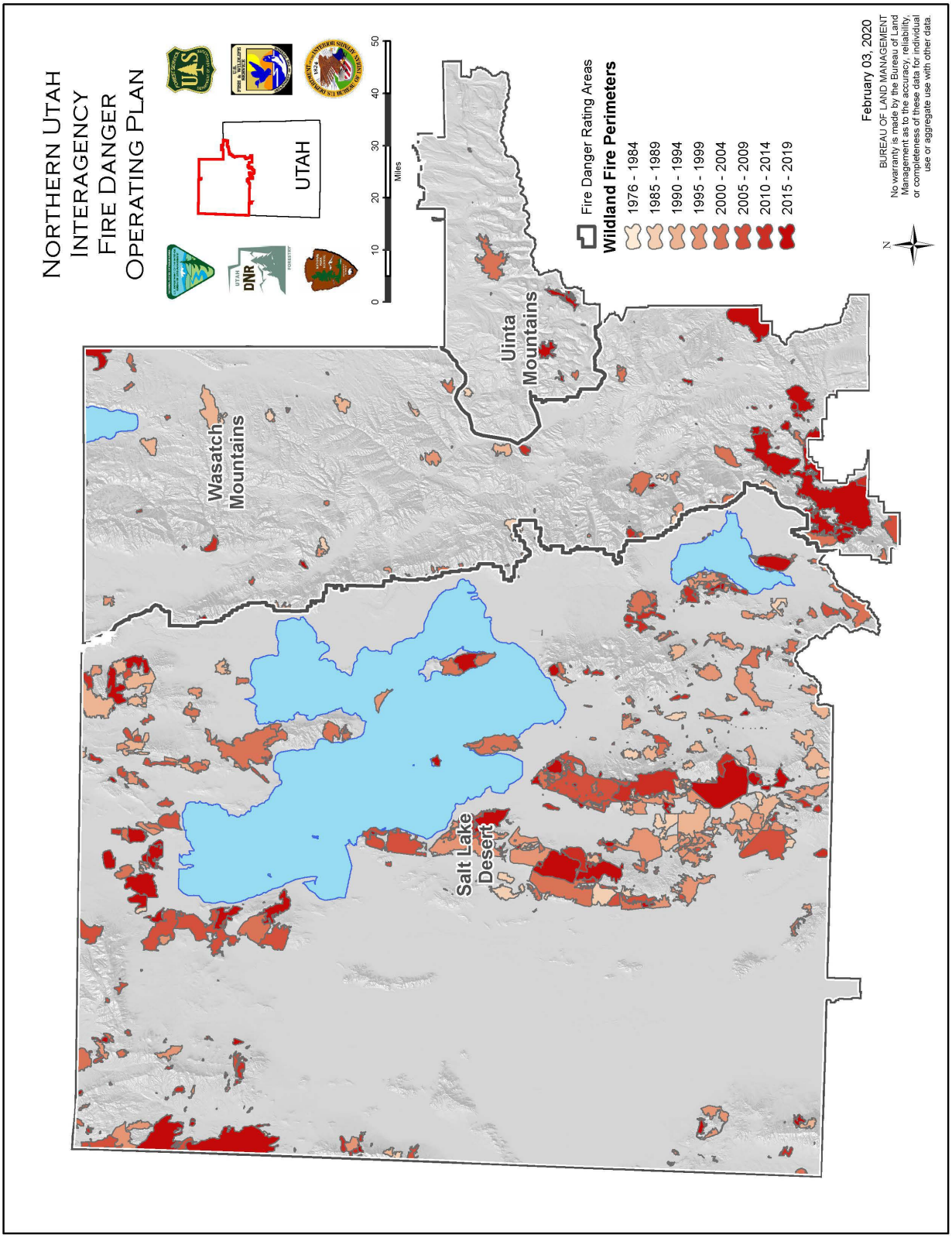

**Map 6: Vegetation cover for the Northern Utah fire danger planning area**



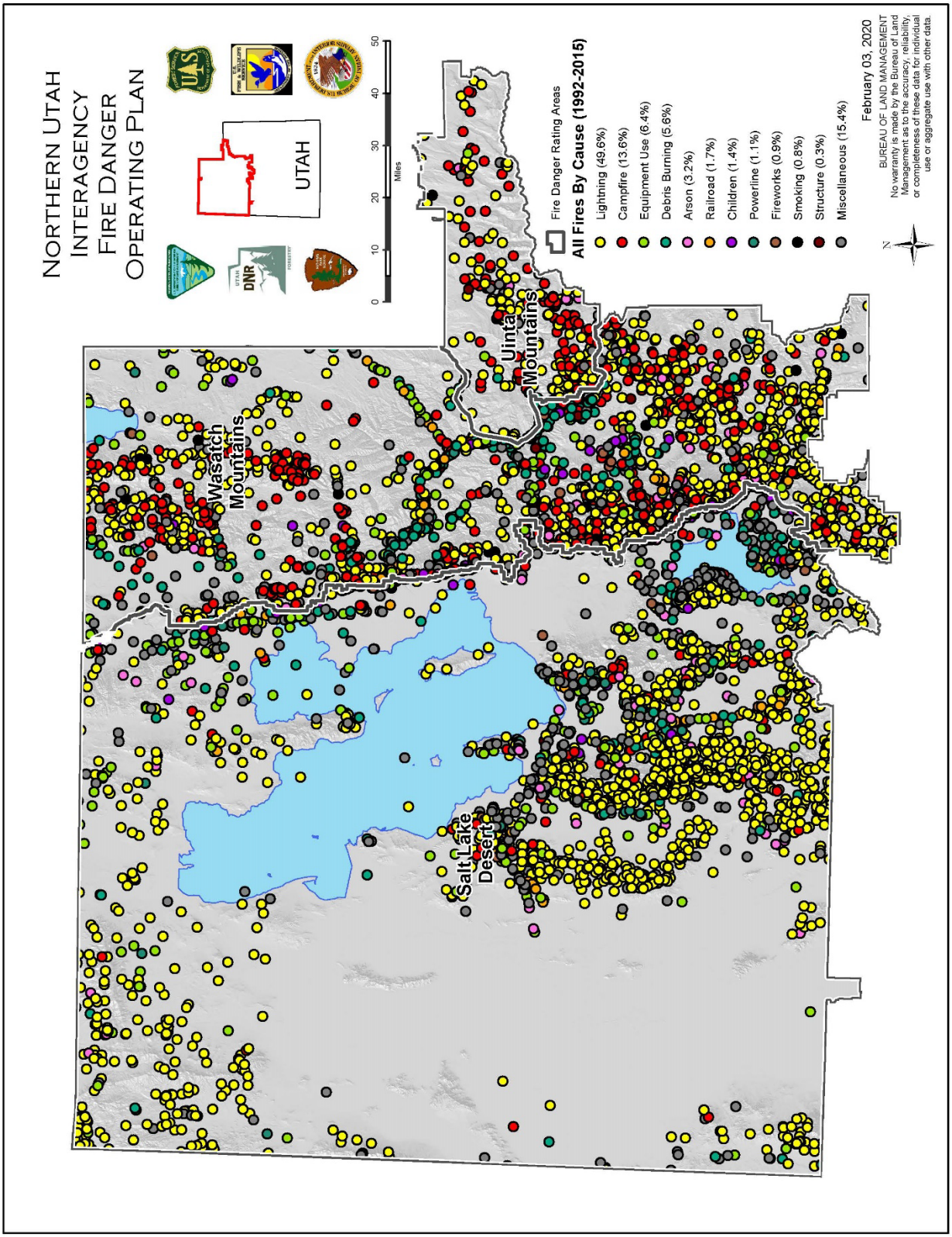

**Map 7: Legend for the vegetative cover map depicted in Map 6**



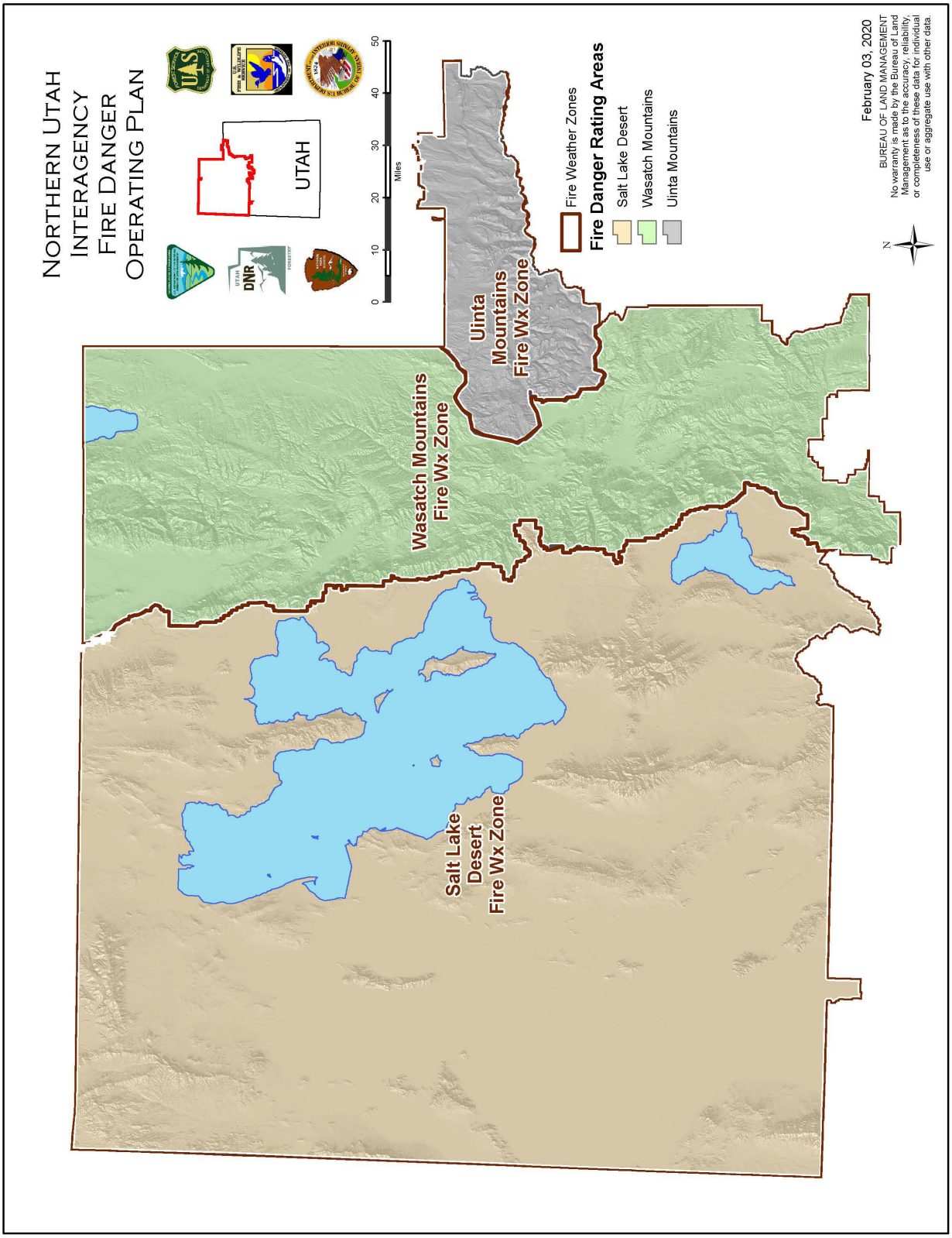

**Map 8: Slope (topography) within the Northern Utah fire danger planning area**




**Map 9: Historic fire perimeters (1984 to 2016) within the Northern Utah fire danger planning area**




**Map 10: Location of wildland fires by cause within the Northern Utah fire danger planning area (2000 to 2015)**




**Map 11: Fire weather zones for the Northern Utah fire danger planning area**

# APPENDIX B: WEATHER STATION CATALOGS

| Station | Priority | Model | Slope | Herb Grass Type | Climate Class | Staffing Index | Decision Classes | Staffing Index Breakpoints | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Low | | High | |
| | | | | | | | | SI% | VAL | SI% | VAL |
| Cedar Mountain (420901) | 1 | 16Y | 1 | A | | ERC | 5 | 90 | 78 | 97 | 85 |
| | 2 | 7G | 1 | A | 1 | ERC | 5 | 80 | 89 | 95 | 99 |
| | 3 | 7G | 1 | P | 1 | ERC | 5 | 80 | 89 | 95 | 99 |
| | | | | | | | | | | | |
| Vernon (420908) | 1 | 16Y | 1 | A | | ERC | 5 | 90 | 73 | 98 | 79 |
| | 2 | 7G | 1 | P | 1 | ERC | 5 | 80 | 85 | 95 | 95 |
| | 3 | 7G | 1 | A | 1 | ERC | 5 | 80 | 85 | 95 | 95 |
| | | | | | | | | | | | |
| Aragonite (420911) | 1 | 16Y | 1 | A | | ERC | 5 | 90 | 82 | 97 | 86 |
| | 2 | 7G | 1 | A | 1 | ERC | 5 | 80 | 96 | 95 | 105 |
| | 3 | 7G | 1 | P | 1 | ERC | 5 | 80 | 96 | 95 | 104 |
| | | | | | | | | | | | |
| Rosebud (420914) | 1 | 16Y | 1 | A | | ERC | 5 | 90 | 74 | 97 | 79 |
| | 2 | 7G | 1 | A | 1 | ERC | 5 | 80 | 90 | 95 | 99 |
| | 3 | 7G | 1 | P | 1 | ERC | 5 | 80 | 90 | 95 | 99 |
| | | | | | | | | | | | |
| Clifton Flat (420915) | 1 | 16Y | 2 | A | | ERC | 5 | 90 | 72 | 98 | 77 |
| | 2 | 7G | 2 | A | 1 | ERC | 5 | 80 | 94 | 95 | 100 |
| | 3 | 7G | 2 | P | 1 | ERC | 5 | 80 | 94 | 95 | 100 |
| | | | | | | | | | | | |
| Bues Canyon (420403) | 1 | 16Y | 3 | A | | ERC | 5 | 90 | 74 | 98 | 80 |
| | 2 | 7G | 3 | P | 3 | ERC | 5 | 90 | 86 | 97 | 91 |
| | 3 | 7G | 3 | A | 2 | ERC | 5 | 90 | 86 | 97 | 91 |
| | | | | | | | | | | | |
| Norway Flat (420706) | 1 | 16Z | 4 | P | | ERC | 5 | 90 | 104 | 98 | 116 |
| | 2 | 7G | 4 | P | 3 | ERC | 5 | 90 | 73 | 97 | 81 |
| | 3 | 7G | 4 | A | 3 | ERC | 5 | 90 | 73 | 97 | 81 |
| | | | | | | | | | | | |
| Otter Creek (420912) | 1 | 16Y | 1 | A | | ERC | 5 | 90 | 59 | 98 | 64 |
| | 2 | 7G | 1 | A | 2 | ERC | 5 | 80 | 80 | 95 | 88 |
| | | 7G | 1 | P | 2 | ERC | 5 | 80 | 79 | 95 | 87 |
| | | | | | | | | | | | |
| Pleasant Grove (421101) | 1 | 16Y | 3 | A | | ERC | 5 | 90 | 94 | 98 | 101 |
| | 2 | 7G | 3 | P | 2 | ERC | 5 | 90 | 94 | 97 | 100 |
| | 3 | 7G | 3 | A | 2 | ERC | 5 | 90 | 94 | 97 | 100 |
| | | | | | | | | | | | |
| Ray's Valley (421103) | 1 | 16Y | 4 | A | | ERC | 5 | 90 | 61 | 97 | 67 |
| | 2 | 7G | 4 | P | 3 | ERC | 5 | 90 | 84 | 97 | 93 |
| | 3 | 7G | 4 | A | 3 | ERC | 5 | 90 | 84 | 97 | 93 |
| | | | | | | | | | | | |
| | 1 | 16Z | 3 | P | | ERC | 5 | 90 | 91 | 97 | 103 |

| Station | Priority | Model | Slope | Herb Grass Type | Climate Class | Staffing Index | Decision Classes | Staffing Index Breakpoints | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Low | | High | |
| | | | | | | | | SI% | VAL | SI% | VAL |
| Bear River (420703) | 2 | 7G | 3 | P | 2 | ERC | 5 | 90 | 62 | 97 | 71 |
| | 3 | 7G | 3 | A | 2 | ERC | 5 | 90 | 62 | 97 | 71 |
| | | | | | | | | | | | |
| Hewinta (420705) | 1 | 16Z | 4 | P | | ERC | 5 | 90 | 88 | 97 | 89 |
| | 2 | 7G | 4 | P | 3 | ERC | 5 | 90 | 61 | 97 | 69 |
| | 3 | 7G | 4 | A | 3 | ERC | 5 | 90 | 61 | 97 | 69 |
| | | | | | | | | | | | |
| Red Spur (420206) | 1 | 16Y | 4 | A | | ERC | 5 | 90 | | 97 | |
| | 2 | 7G | 4 | P | 3 | ERC | 5 | 90 | 78 | 97 | 84 |
| | 3 | 7G | 4 | A | 3 | ERC | 5 | 90 | 78 | 97 | 84 |
| | | | | | | | | | | | |

# APPENDIX C: WEATHER STATION ANALYSIS

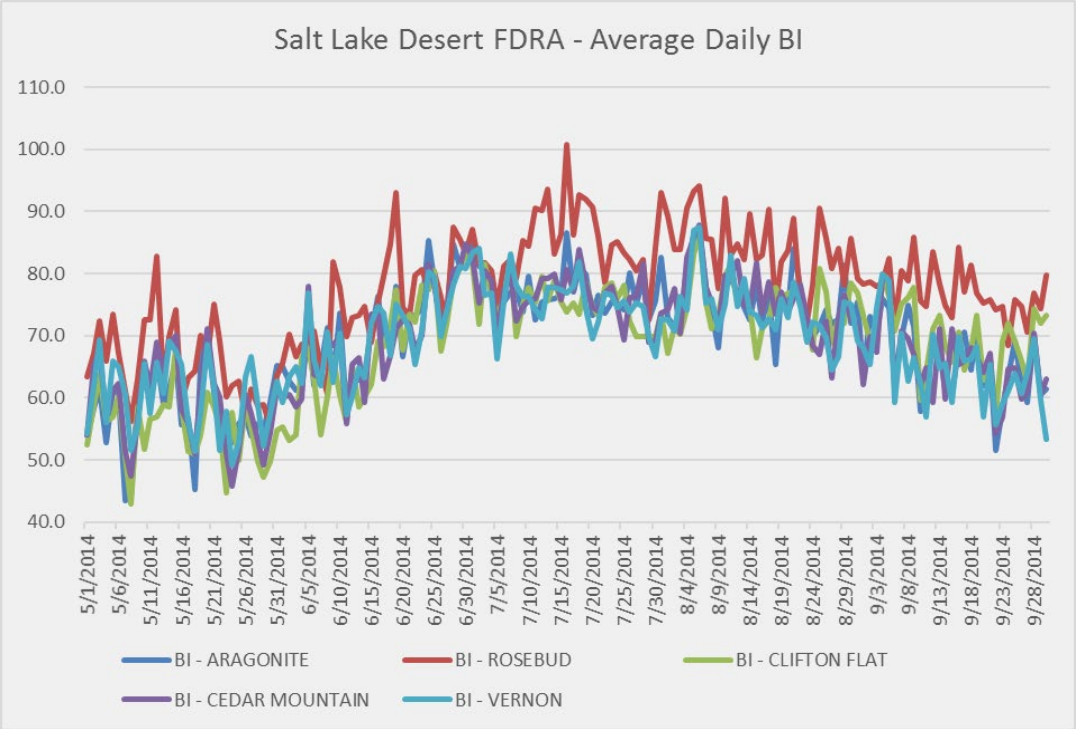



**Figure 6: Average daily burning index (BI), Salt Lake Desert FDRA (May-September)**

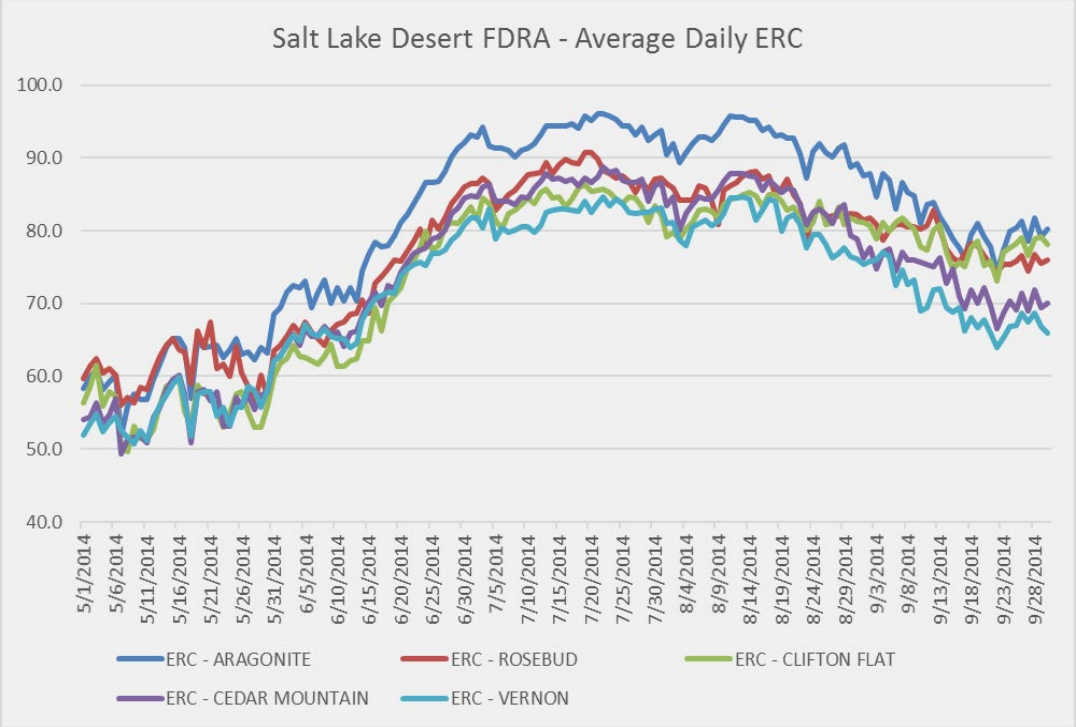



**Figure 7: Average daily energy release component (ERC), Salt Lake Desert FDRA (May-September)**

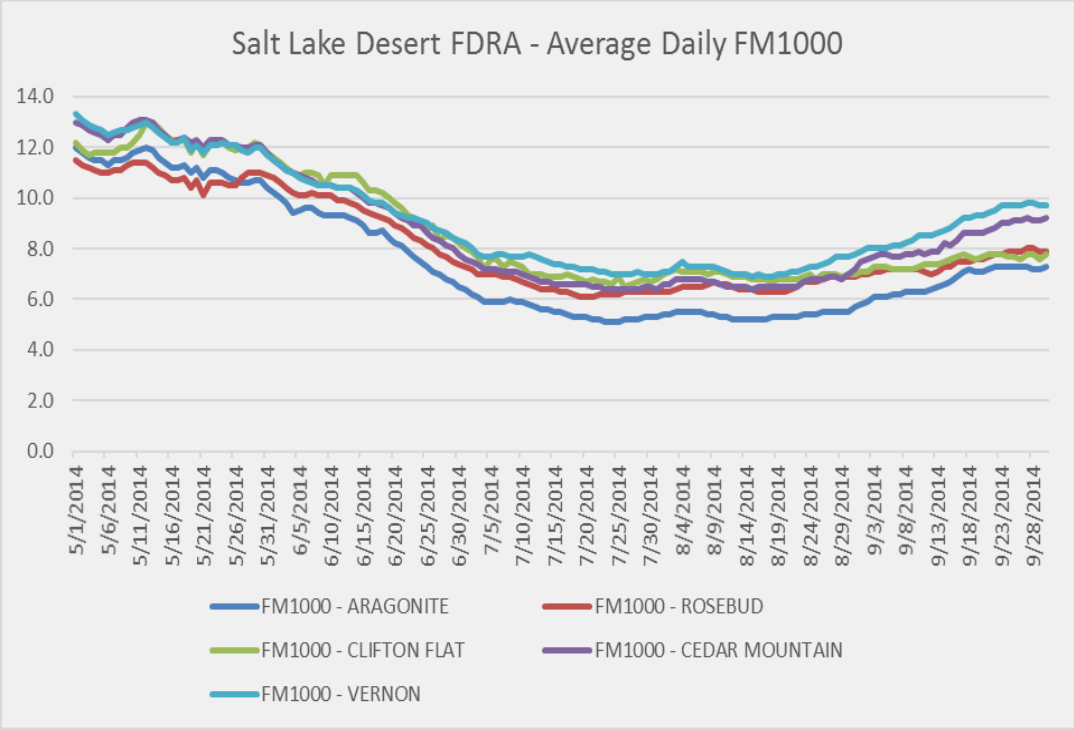



**Figure 8: Average daily 1,000-hr fuel moisture, Salt Lake Desert FDRA (May-September)**

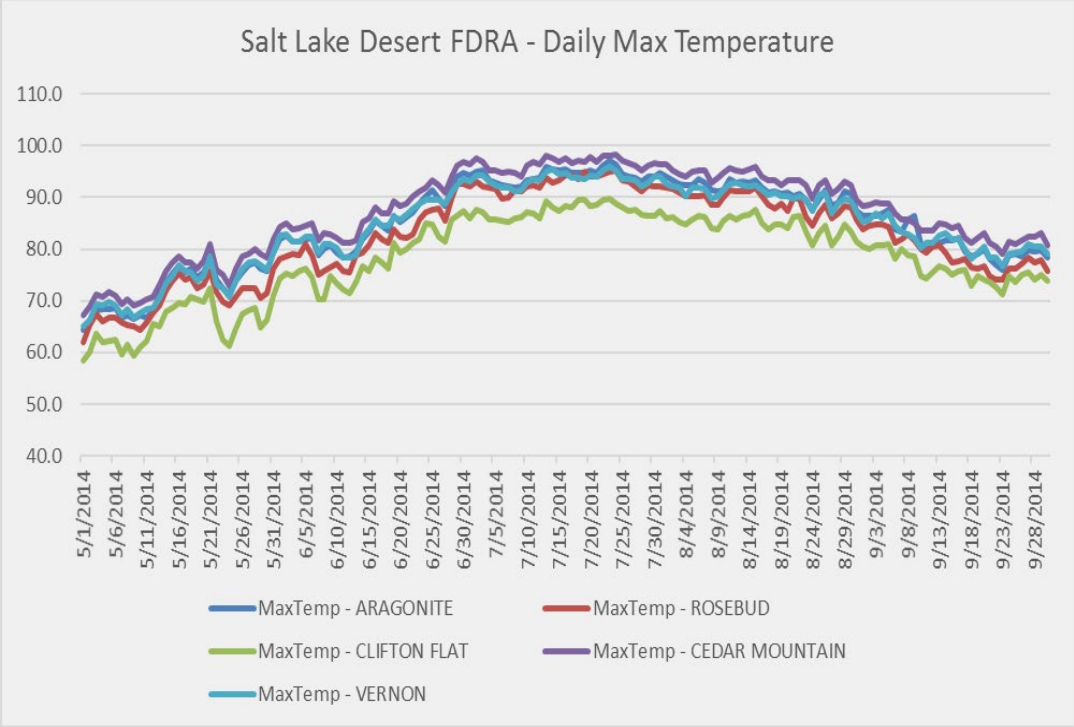



**Figure 9: Daily observed max temperature, Salt Lake Desert FDRA (May-September)**

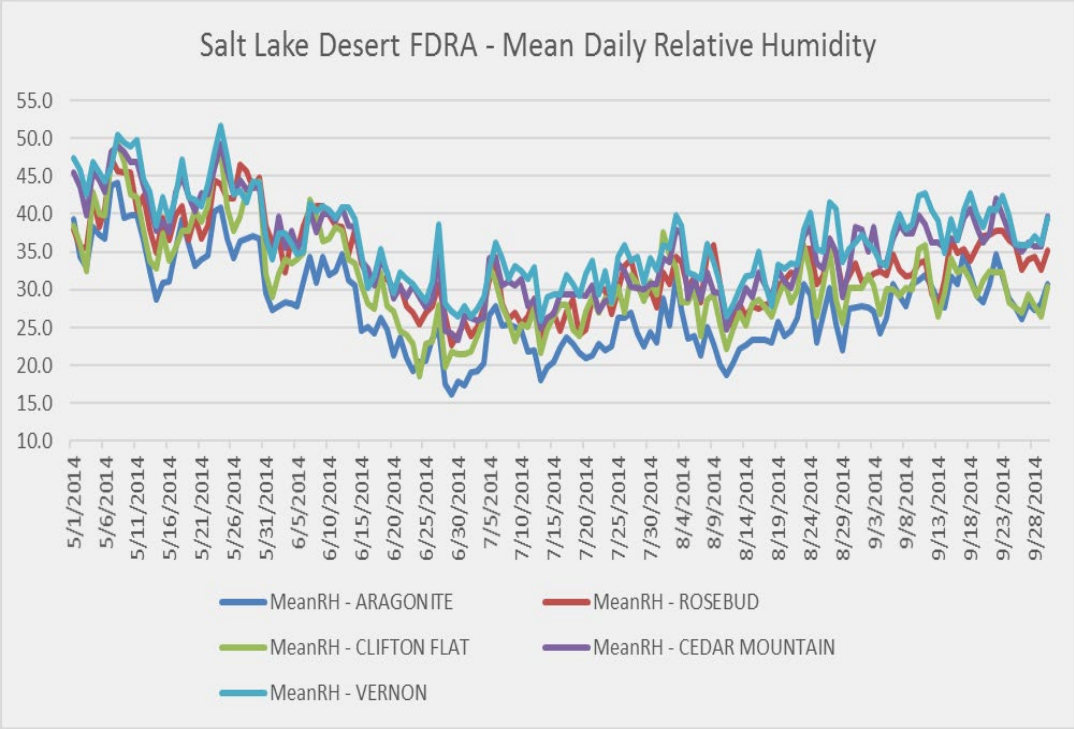



**Figure 10: Mean daily observed relative humidity, Salt Lake Desert FDRA (May-September)**

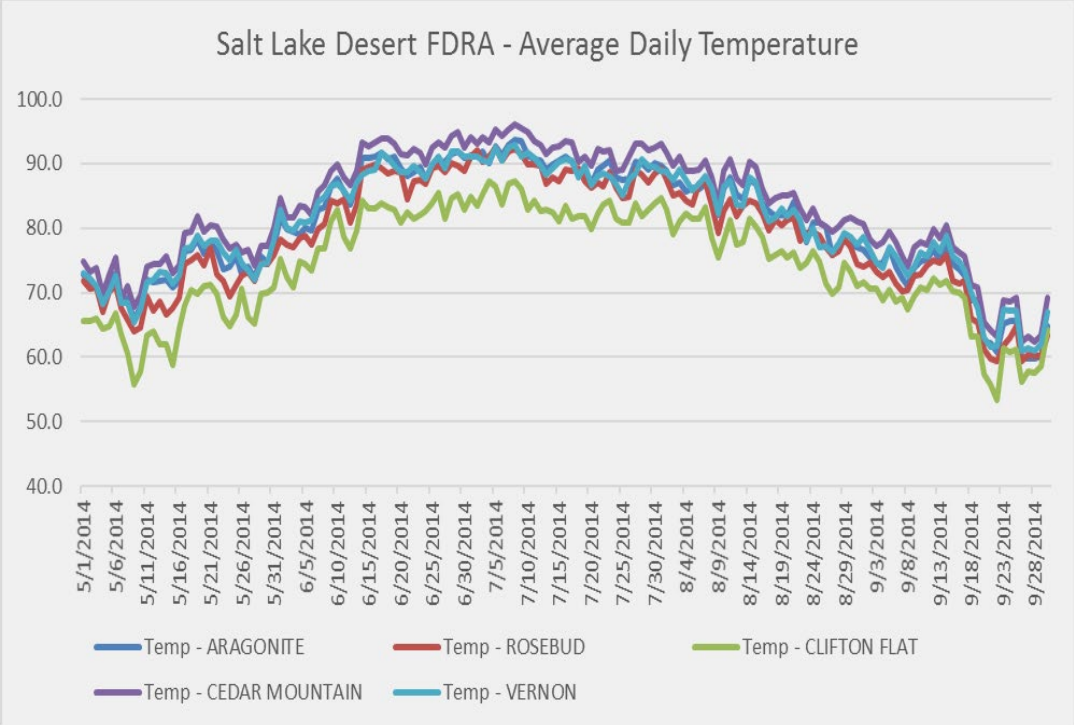



**Figure 11: Average daily observed temperature, Salt Lake Desert FDRA (May-September)**

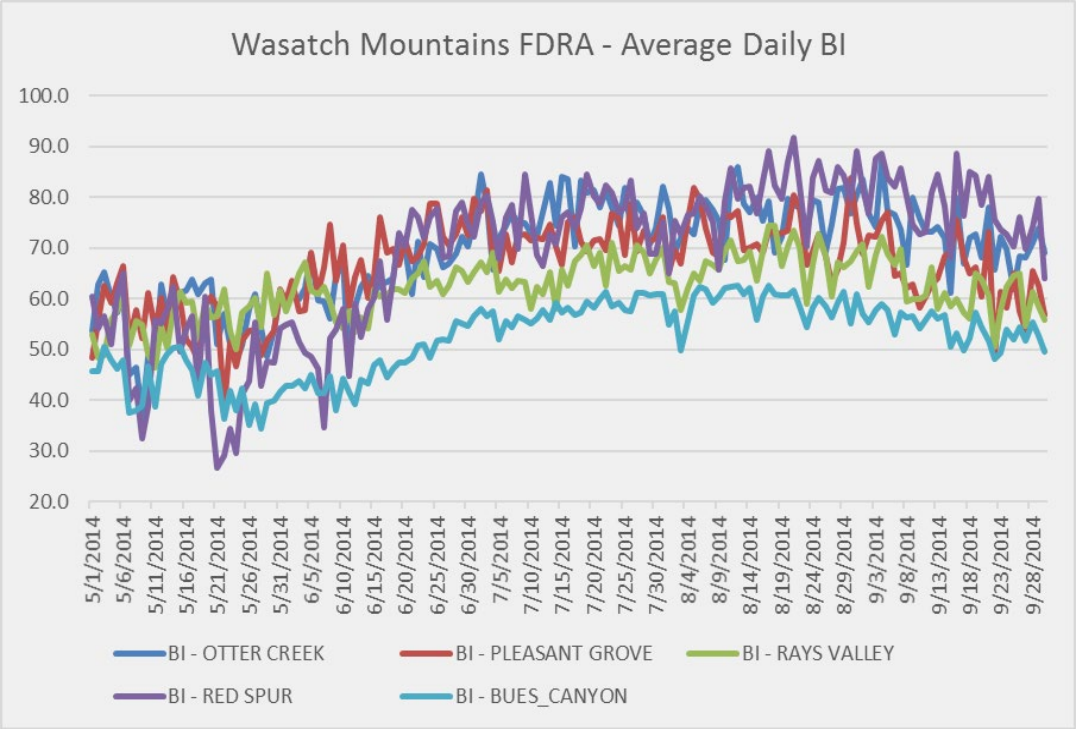



**Figure 12: Average daily burning index (BI), Wasatch Mountains Desert FDRA (May-September)**

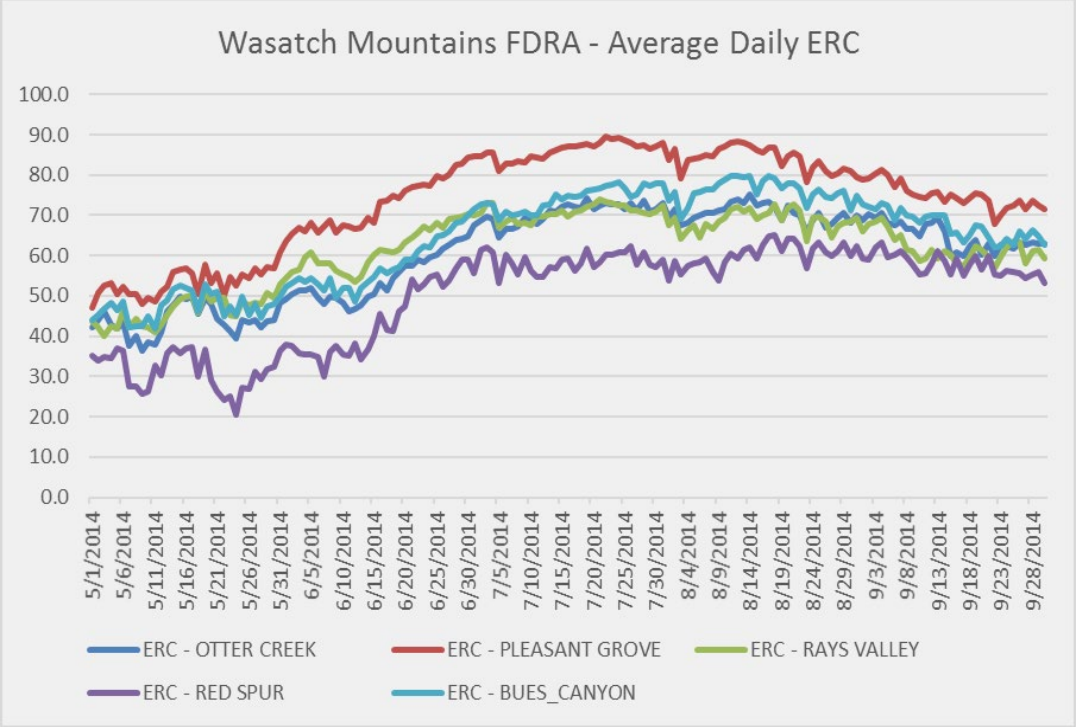



**Figure 13: Average daily energy release component (ERC), Wasatch Mountains FDRA (May-September)**

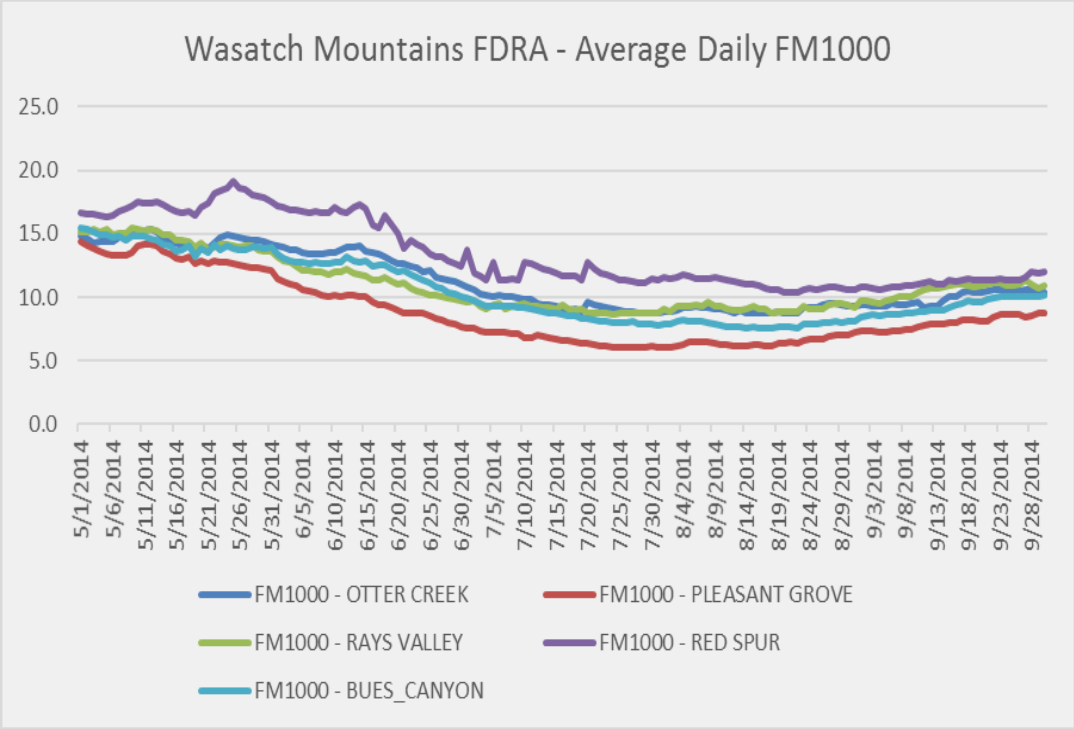



**Figure 14: Average daily 1,000-hr fuel moisture, Wasatch Mountains FDRA (May-September)**

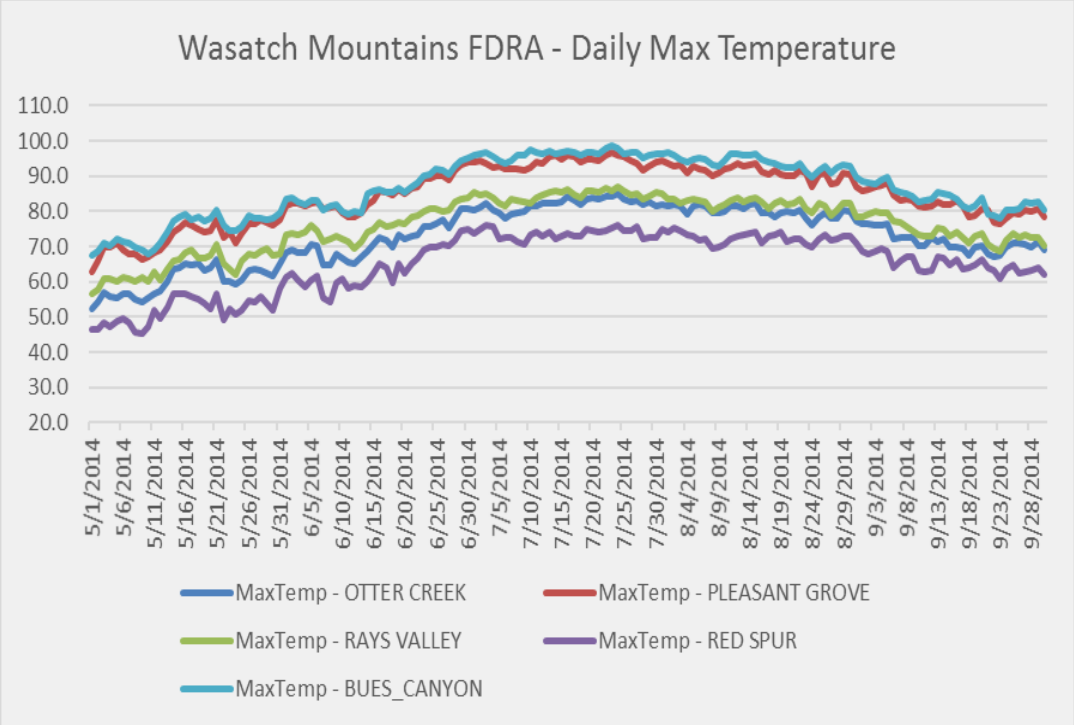



**Figure 15: Daily observed max temperature, Wasatch Mountains FDRA (May-September)**

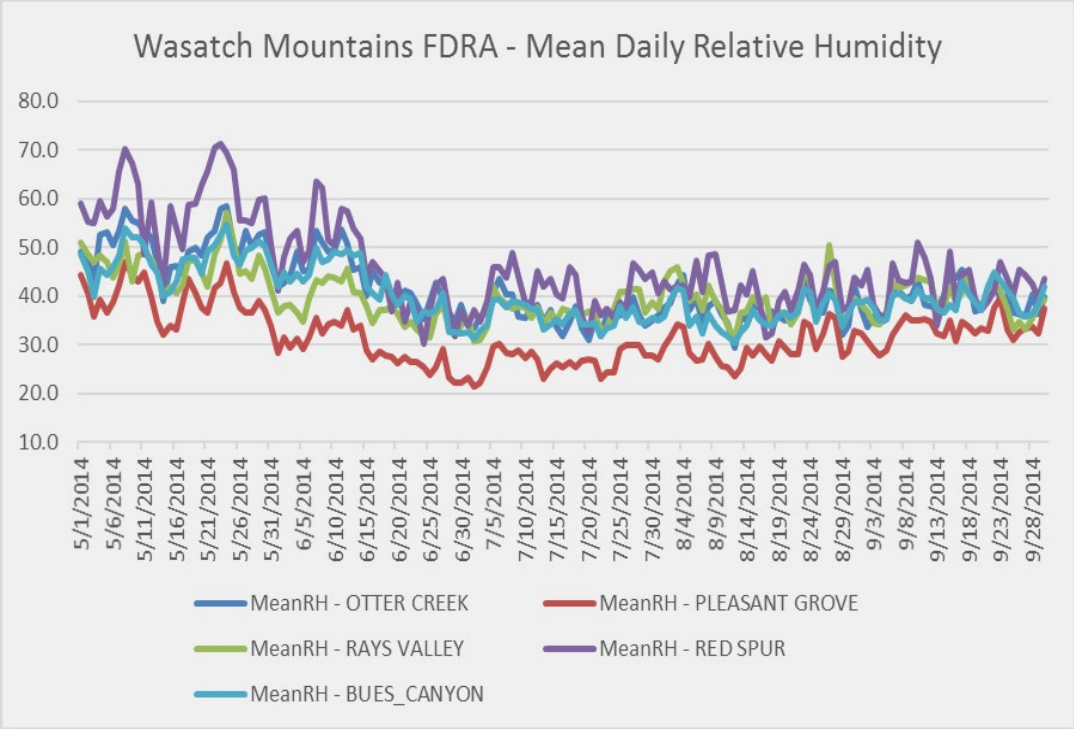



**Figure 16: Mean daily observed relative humidity, Wasatch Mountains FDRA (May-September)**

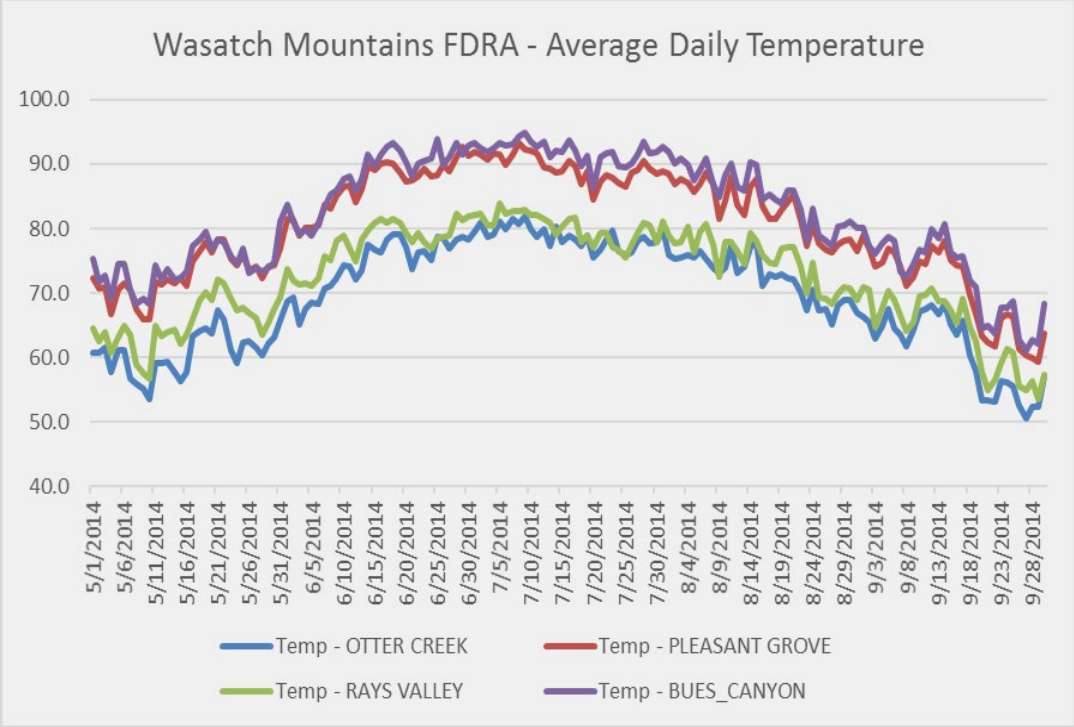



**Figure 17: Average daily observed temperature, Wasatch Mountains FDRA (May-September)**

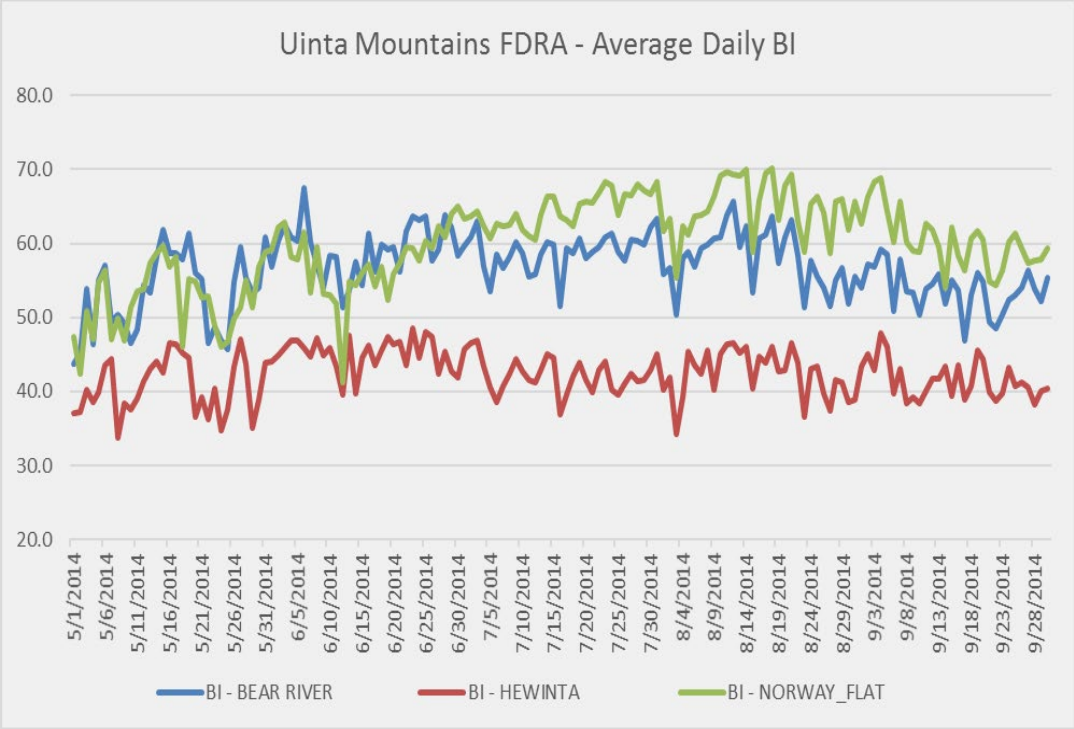



**Figure 18: Average daily burning index (BI), Uinta Mountains Desert FDRA (May-September)**

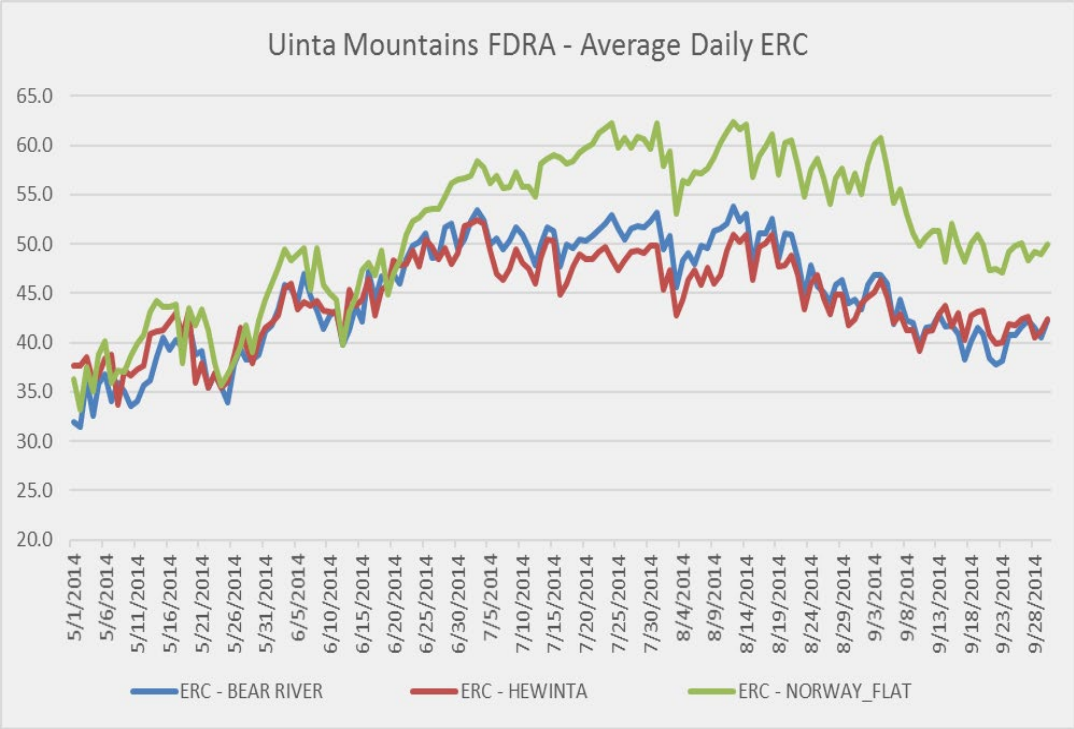



**Figure 19: Average daily energy release component (ERC), Uinta Mountains FDRA (May-September)**

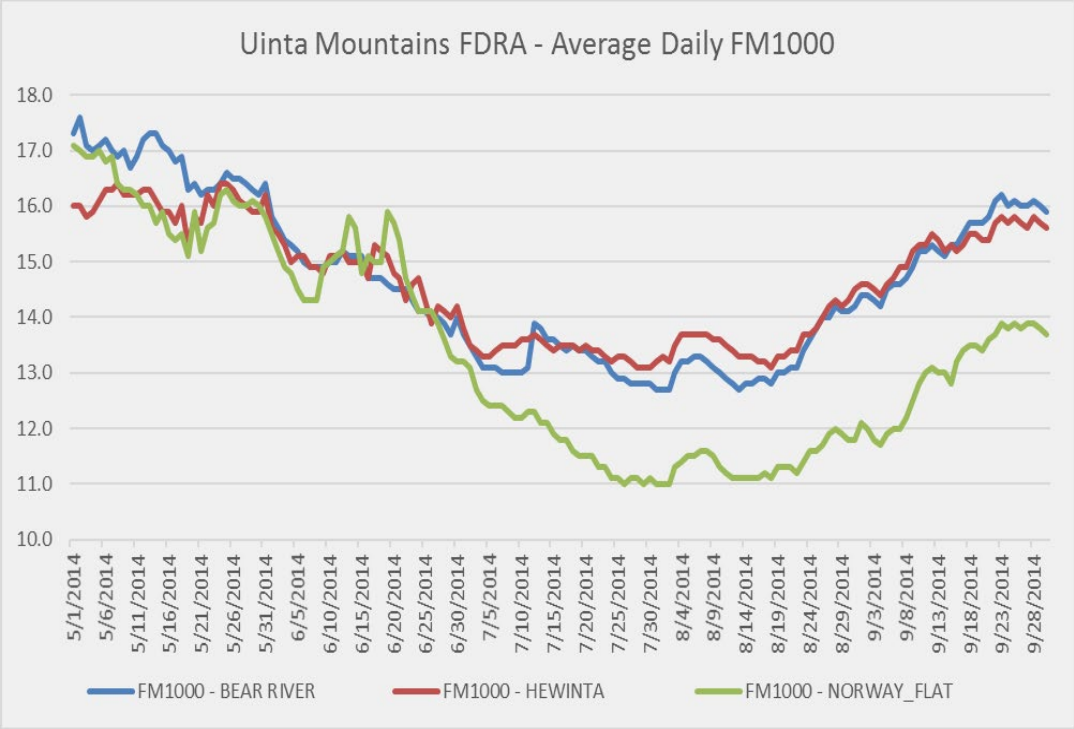



**Figure 20: Average daily 1,000-hr fuel moisture, Uinta Mountains FDRA (May-September)**

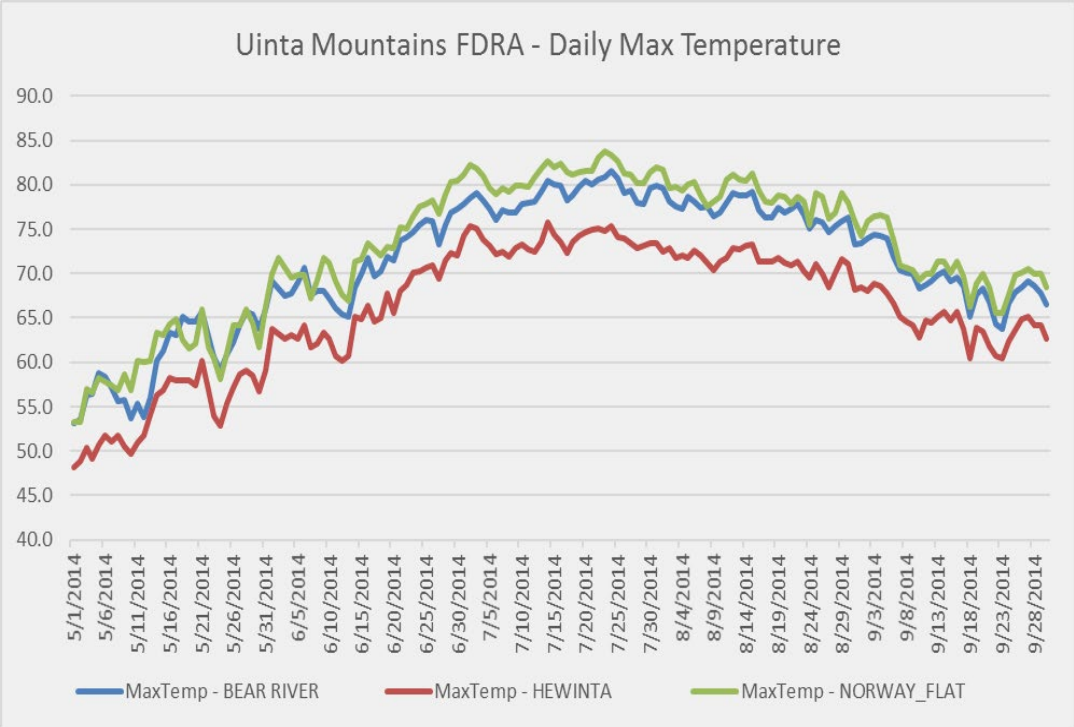



**Figure 21: Daily observed max temperature, Uinta Mountains FDRA (May-September)**

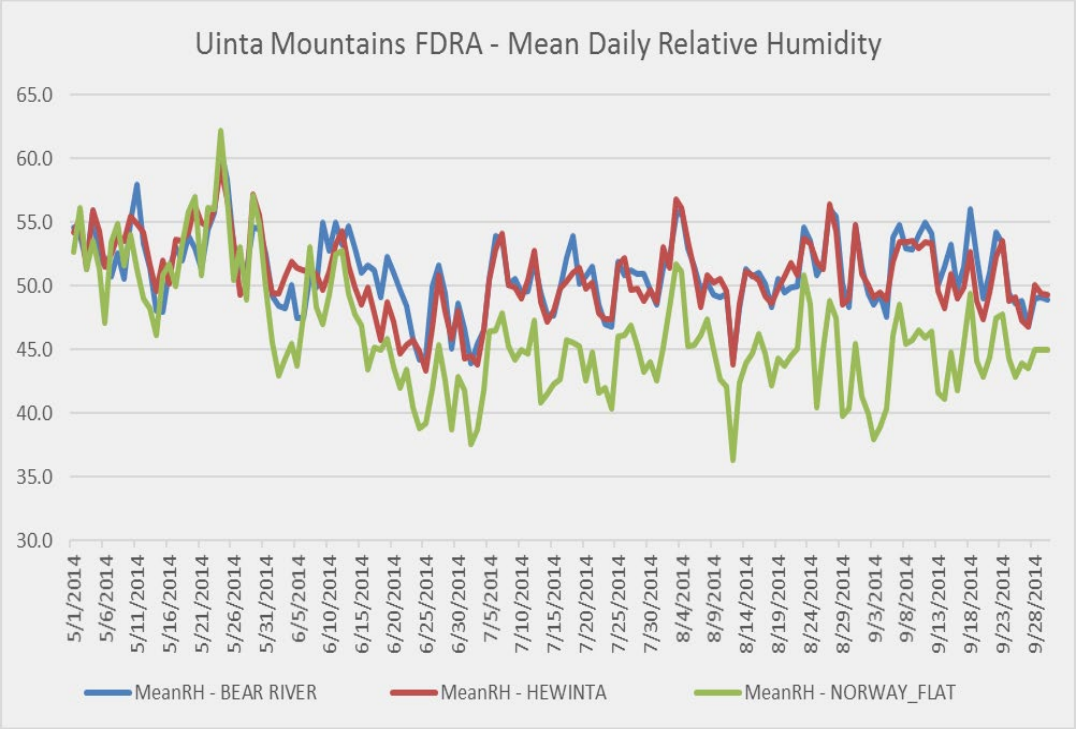



**Figure 22: Mean daily observed relative humidity, Uinta Mountains FDRA (May-September)**

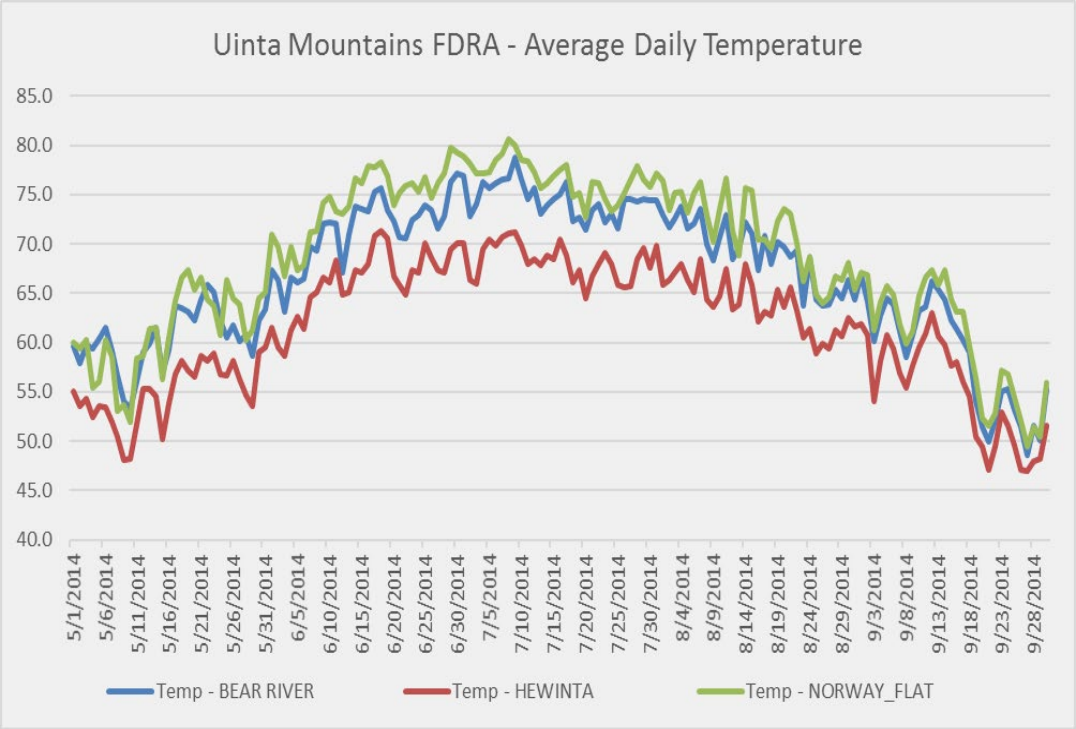
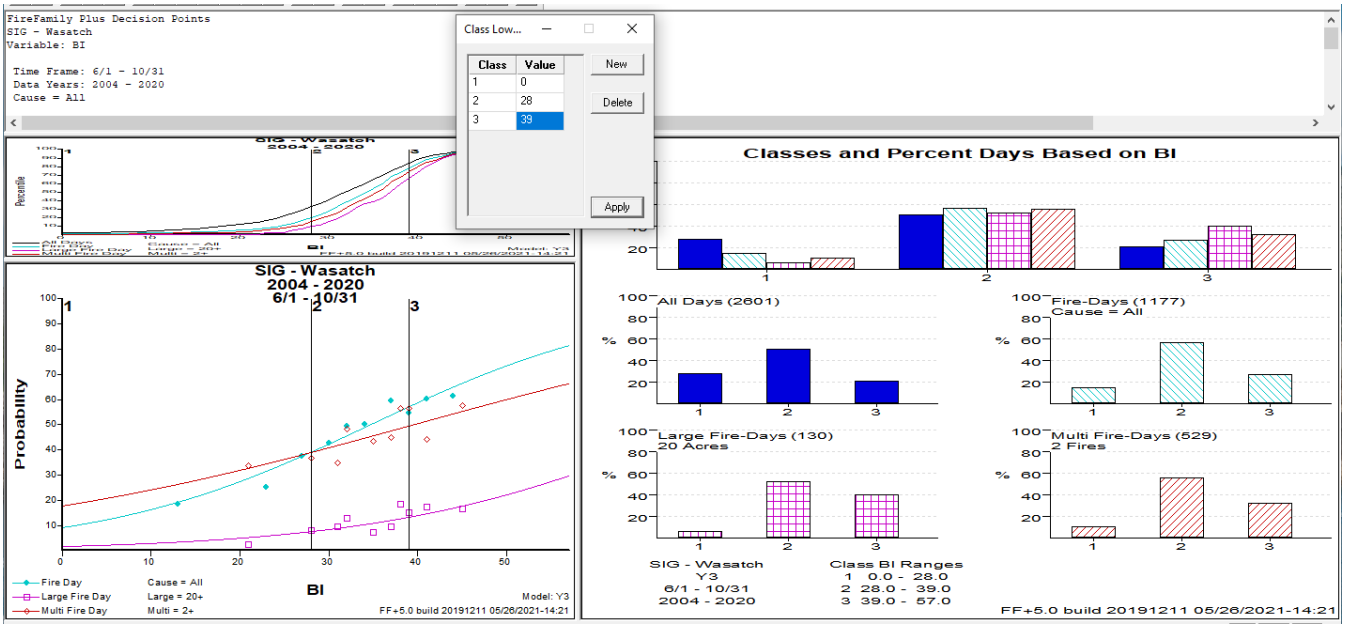



**Figure 23: Average daily observed temperature, Uinta Mountains FDRA (May-September)**

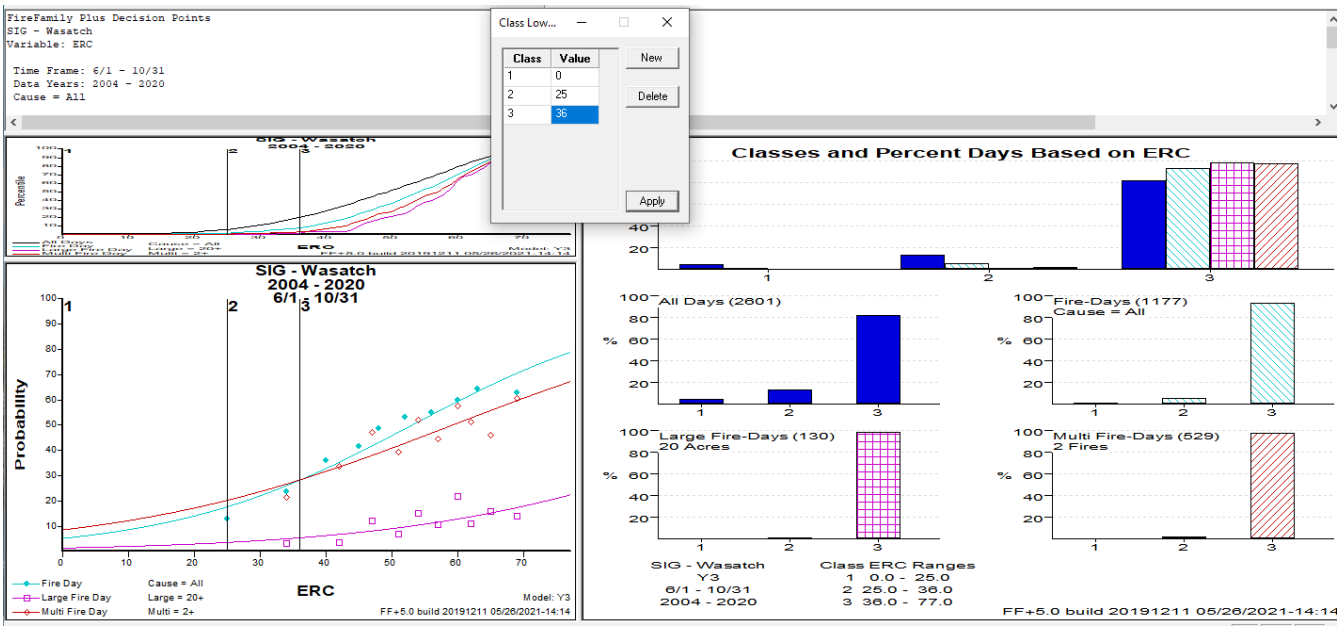
# APPENDIX D: FIREFAMILYPLUS AND RERAP ANALYSIS

## Dispatch Level Decision Points

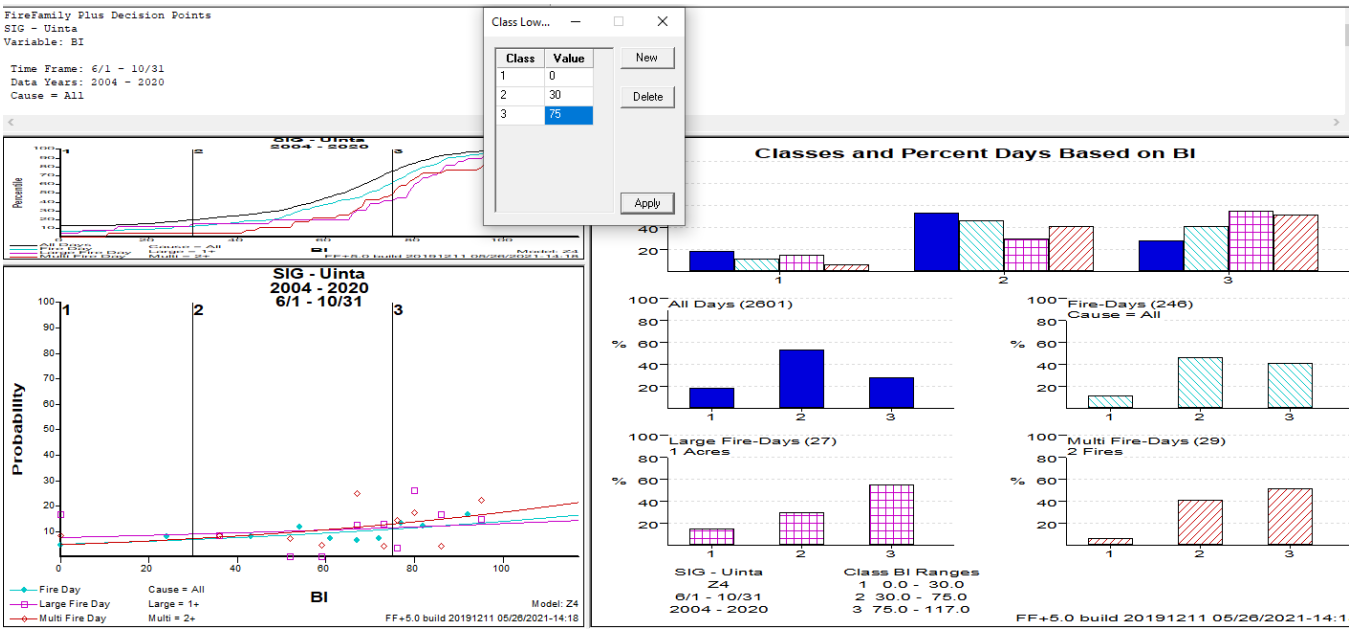
### Salt Lake Desert FDRA




### Wasatch Mountains FDRA

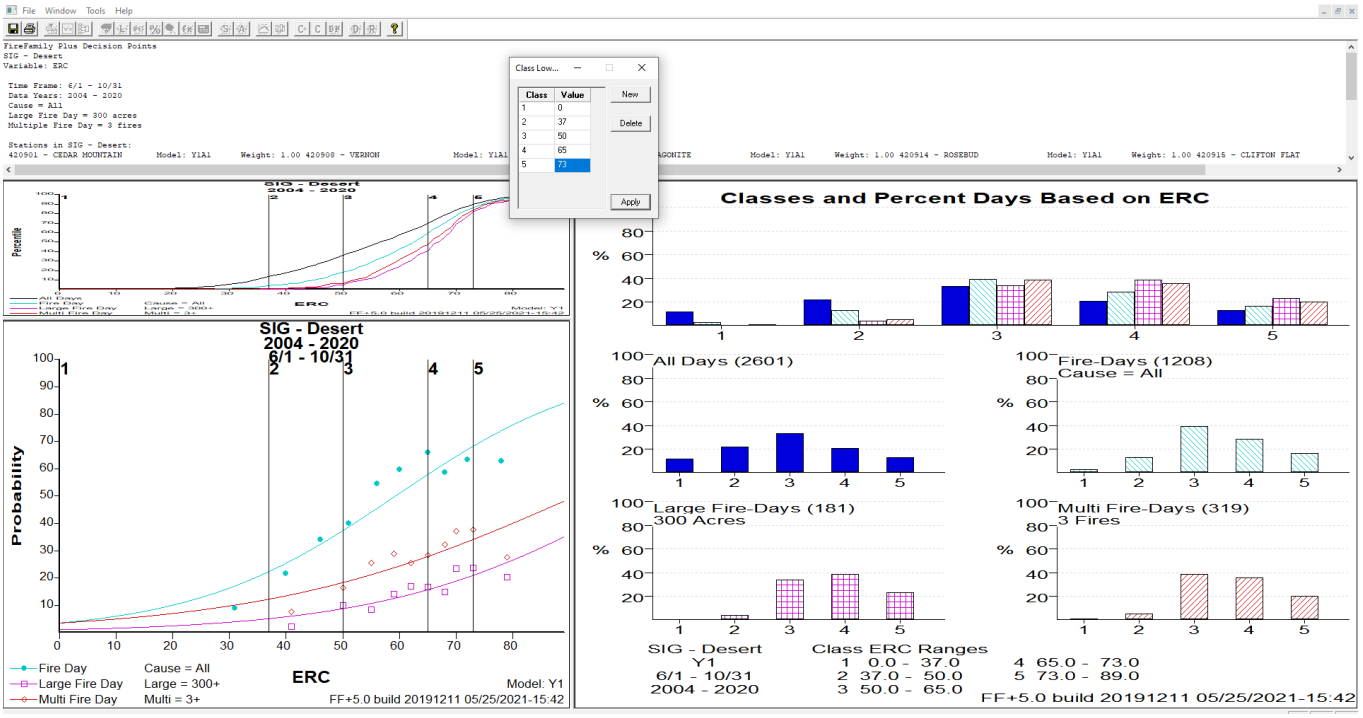


## Uinta Mountains FDRA

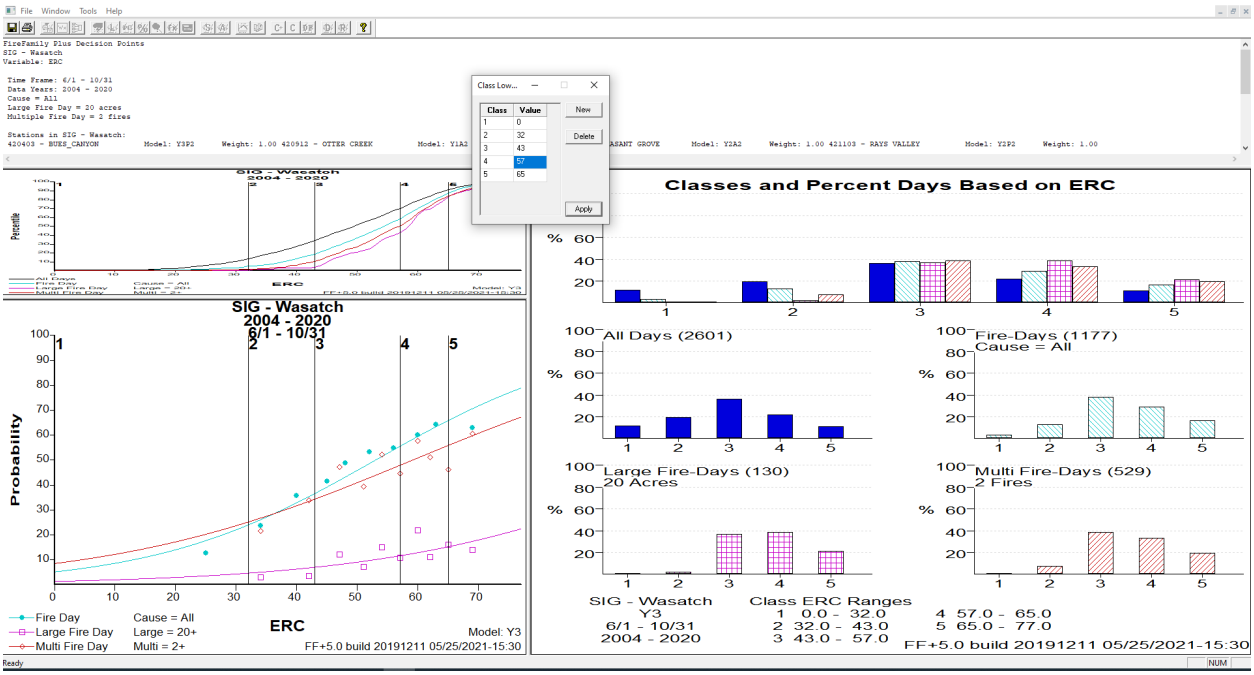



# Preparedness Level Decision Points

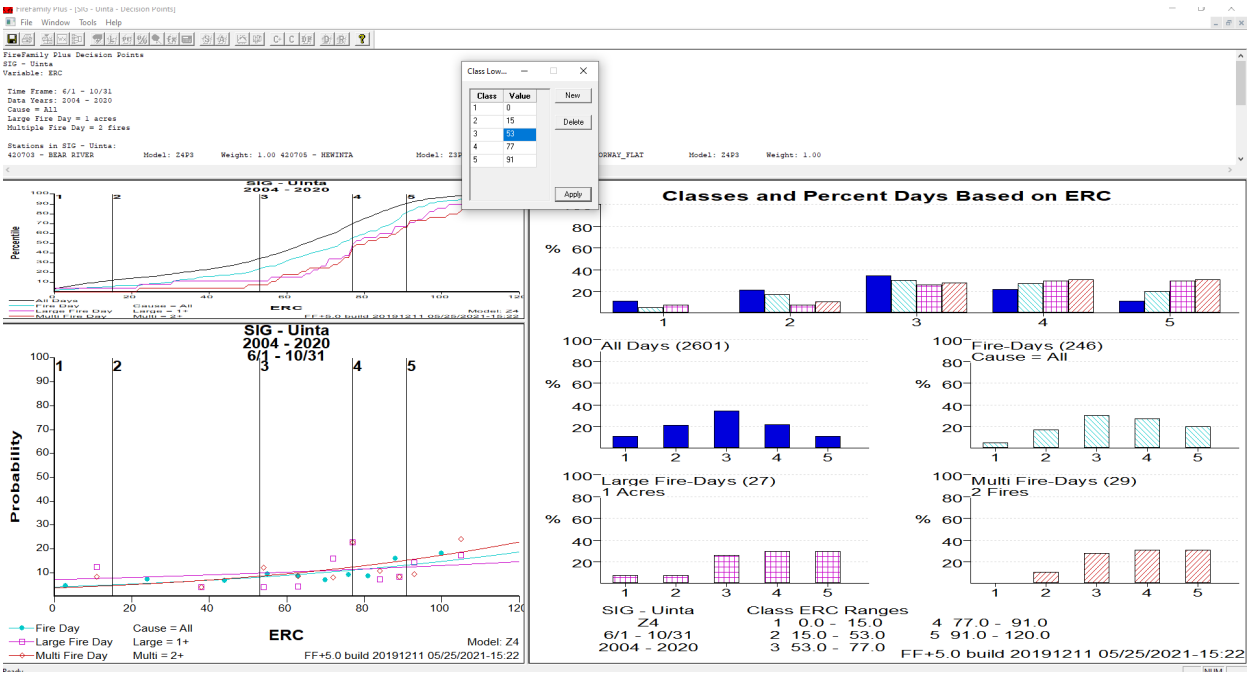
## Salt Lake Desert FDRA



## Wasatch Mountains FDRA

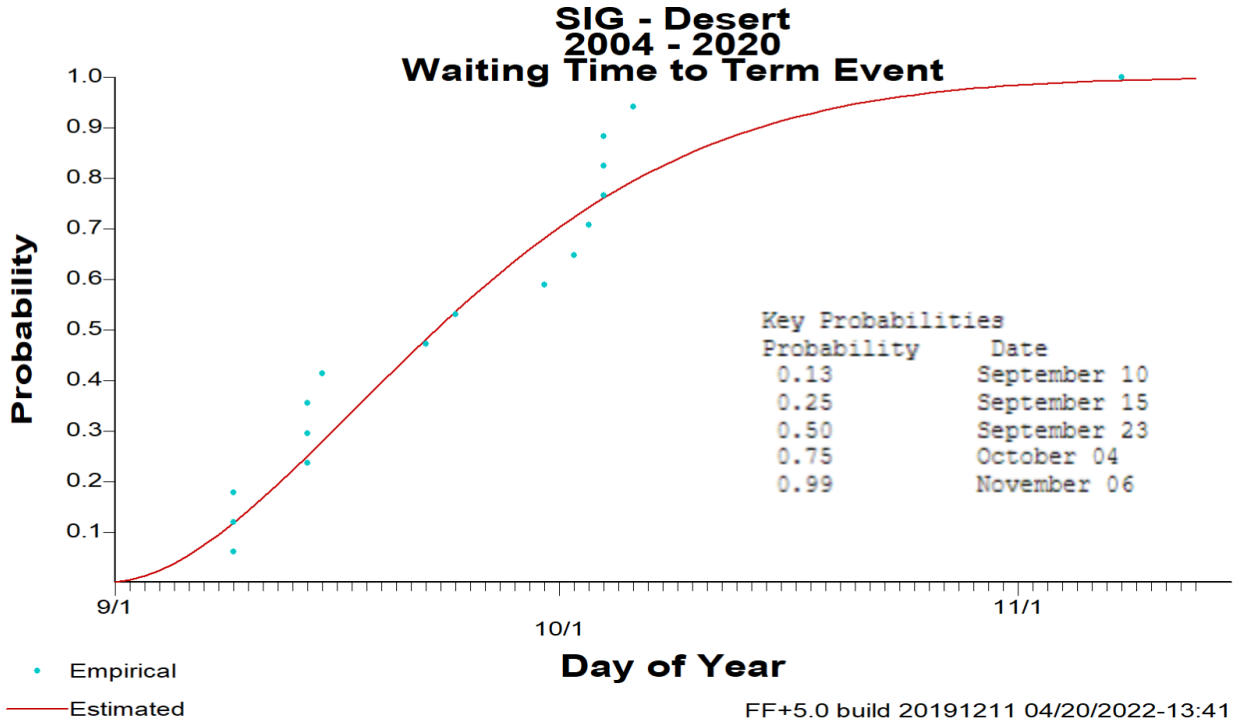



## Uinta Mountains FDRA



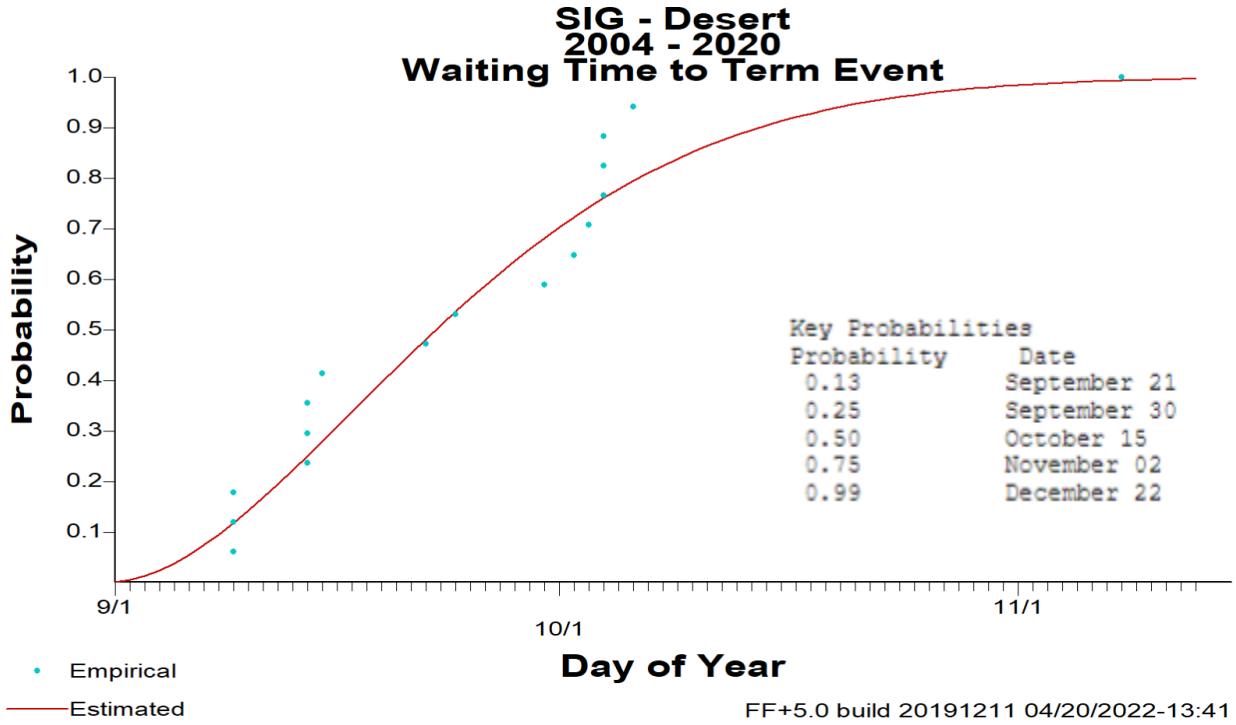
## Season-Slowing and Season Ending Probabilities (RERAP)

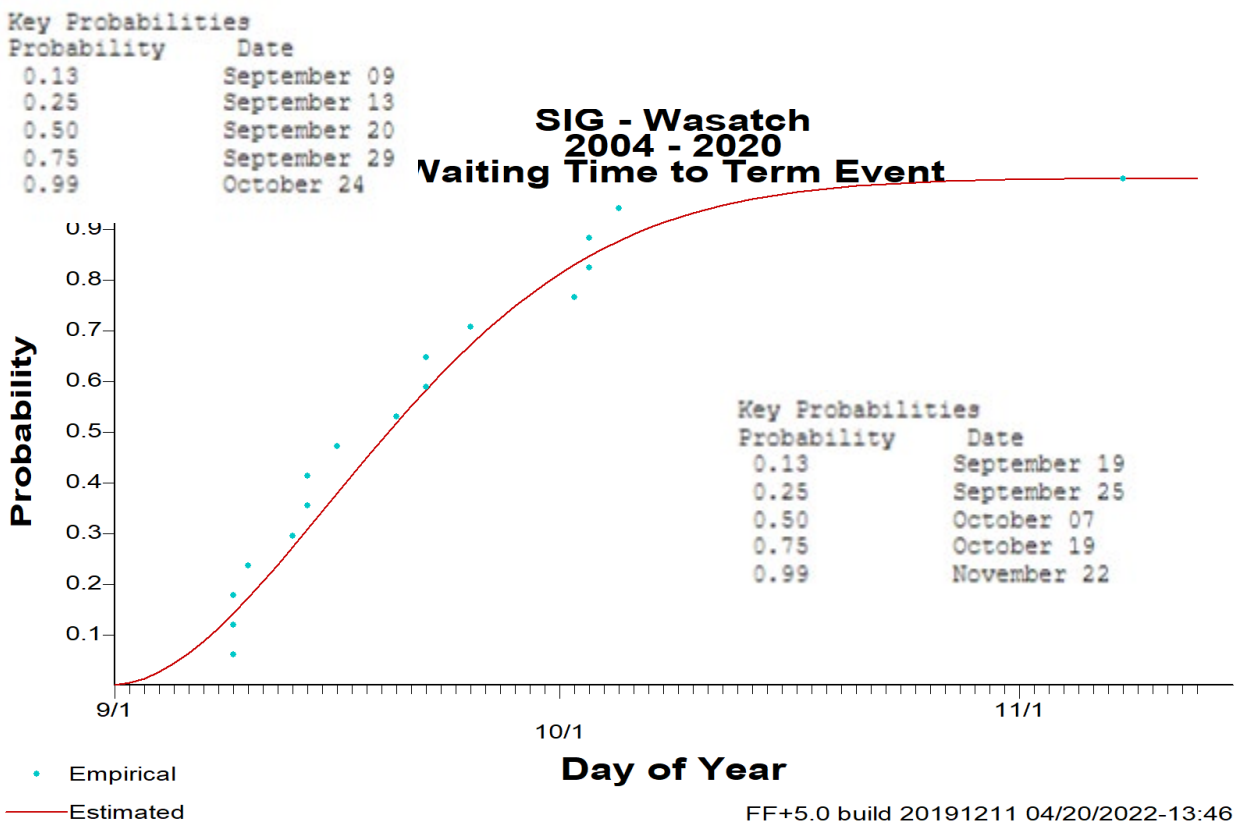
**Salt Lake Desert SIG**




**Above: Salt Lake Desert SIG, Season-Slowing Event Probability**

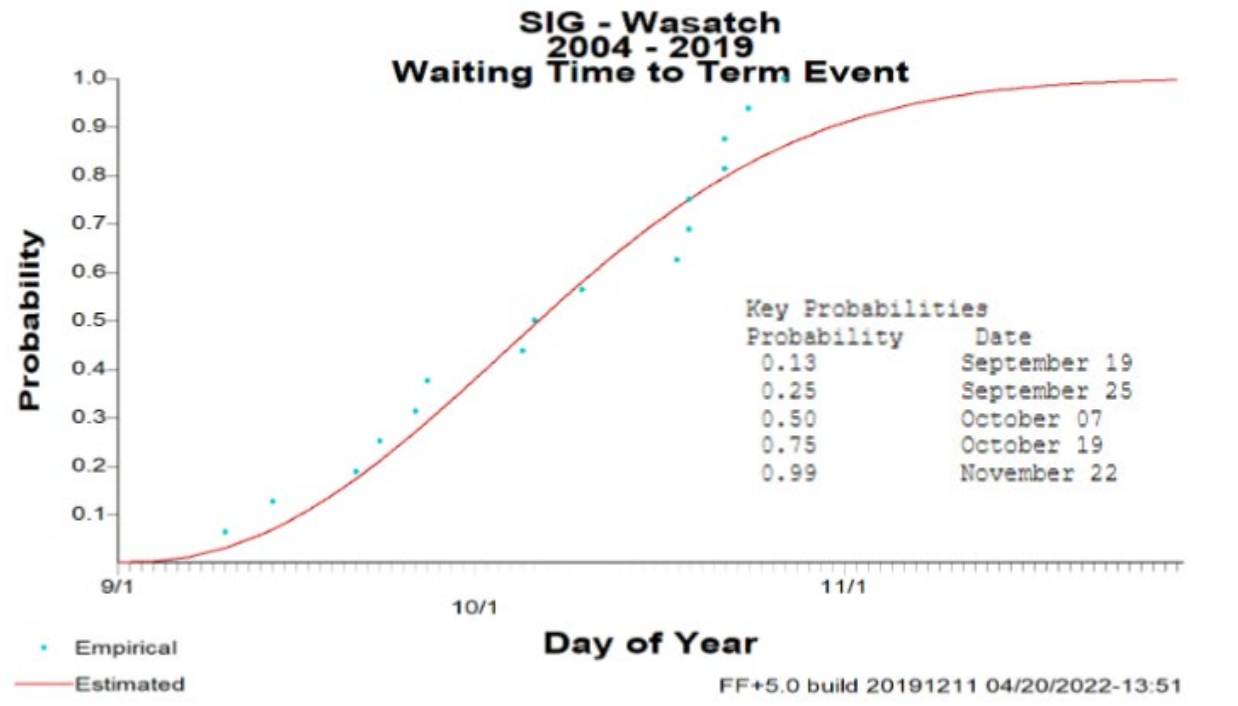
**Below: Salt Lake Desert SIG, Season-Ending Event Probability**



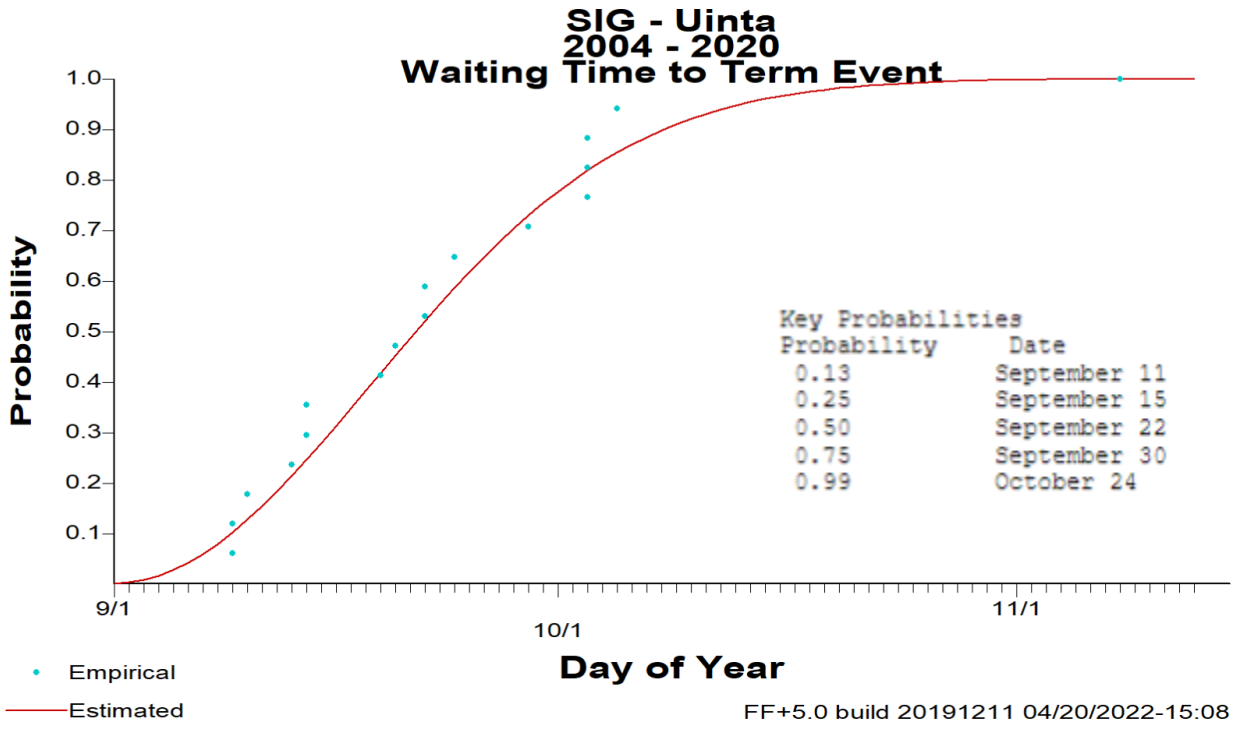



**Above: Wasatch SIG, Season-Slowing Event Probability**

**Below: Wasatch SIG, Season-Ending Event Probability**

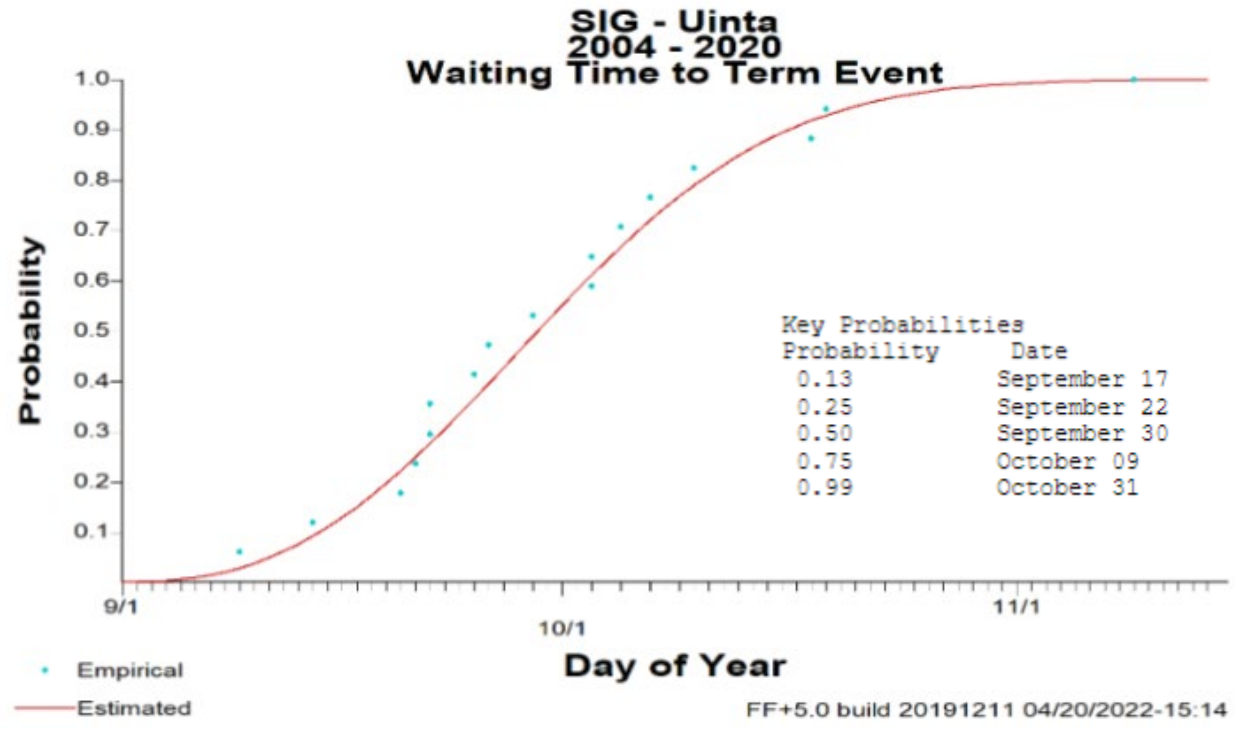


**Uinta Mountains SIG**




**Above: Uinta Mountains SIG, Season-Slowing Event Probability**

**Below: Uinta Mountains SIG, Season-Ending Event Probability**



# APPENDIX E: PREPAREDNESS LEVEL ACTIONS

The following Preparedness Level actions are guidelines for agency personnel. They are discretionary in nature and usually will require a consensus between agency personnel prior to implementation.

| Responsible Party | Suggested Action | PL 1 | PL 2 | PL 3 | PL 4 | PL 5 | Affected Entity |
|---|---|---|---|---|---|---|---|
| Agency Administrator | Ensure supervisors approve fire availability of staff and notify Duty Officer. | • | • | • | • | • | Agency |
| | Ensure resource advisors are designated and available for fire assignments. | • | • | • | • | • | Agency |
| | Evaluate work/rest needs of fire staff. | | • | • | • | • | Agency |
| | Consider need for fire restriction or closures. | | | | • | • | Public Industry |
| | Provide appropriate political support to fire staff regarding the implementation of preparedness level actions. | | | • | • | • | Agency Public Industry |
| | Review and transmit severity requests to the appropriate level. | | | | • | • | Agency |
| | Issue guidance to respective agency staff indicating severity of the season and increased need and availability for fire support personnel. | | | | • | • | Agency |
| Fire Staff Officer or FMO | Evaluate season severity data (BI and ERC trends for season, fuel loadings, live FM, drought indices, and long term forecasts). | • | • | • | • | • | Agency |
| | Evaluate fire staff work/rest requirements. | | • | • | • | • | Agency |
| | Brief agency administrator on burning conditions and fire activity. | | | • | • | • | Agency |
| | Review geographical and national preparedness levels and evaluate need to suspend local prescribe fire activities. | | | • | • | • | Agency |
| | Ensure Education/Mitigation personnel have initiated media contacts and public notification. | | | | • | • | Public Industry |
| | Ensure agency staff is briefed on increasing fire activity. | | | | • | • | Agency |
| | Brief next higher level of fire management on increasing/decreasing fire activity. | | | | • | • | Agency |
| | Consider fire severity request and pre-positioning of resources including: suppression resources, aerial support, aerial supervision, command positions, dispatch, logistical support, and prevention. | | | | • | • | Agency |
| | Coordinate with interagency partners the need for fire restrictions or closures. | | | | | • | Public Industry |
| | Request that the Agency Administrator issue guidance to respective agency staff regarding the need for increased fire availability in support positions. | | | | • | • | Agency |
| | Pre-position a Type 3 organization/Type 2 Team. | | | | | • | Agency |
| Duty Officer | Confirm (or adjust) the Preparedness and Dispatch Levels with the NUIFC Manager. | • | • | • | • | • | Agency |
| | If preparedness level is decreasing, consider releasing pre-positioned and detailed resources. | • | • | • | | | Agency |

| Responsible Party | Suggested Action | PL 1 | PL 2 | PL 3 | PL 4 | PL 5 | Affected Entity |
|---|---|---|---|---|---|---|---|
| | Evaluate work/rest needs of IA crews, dispatchers, & aviation bases. | | | • | • | • | Agency |
| | Consider aerial detection flight. | | | | • | • | Agency |
| | Evaluate need to change or shift duty hours of IA resources. | | | | • | • | Agency |
| | Evaluate draw-down levels for suppression, command, and oversight positions. | | | | • | • | Agency |
| | Consider extending staffing beyond normal shift length. | | | | • | • | Agency |
| | Brief FMO on severity of conditions and consider severity request. | | | | • | • | Agency |
| | Consider pre-positioning and/or detailing of additional IA resources. | | | | • | • | Agency |
| | Consider pre-positioning and automatic dispatch of ATGS. | | | | • | • | Agency |
| | Consider bringing in local IA resources from scheduled days off. | | | | • | • | Agency |
| | Consider patrols and pre-positioning of local IA resources in high risk areas. | | | | • | • | Agency |
| | Consider automatic dispatch of helicopter, SEAT and/or heavy air tankers for IA | | | | • | • | Agency |
| NUIFC Manager | Determine and broadcast the morning and afternoon preparedness, dispatch, and adjective fire danger levels to interagency fire personnel. | • | • | • | • | • | Agency |
| | Evaluate work/rest needs of center staff. | | | • | • | • | Agency |
| | If preparedness level is decreasing, consider release of pre-positioned or detailed dispatchers and logistical support personnel. | • | • | • | | | Agency |
| | Consult with Duty Officer concerning potential for extended staffing beyond normal shift length. | | | | • | • | Agency |
| | Consider pre-positioning or detail of off-unit IA dispatchers and logistical support personnel. | | | | • | • | Agency |
| | Consider discussing activation of local area MAC Group. | | | | | • | Agency |
| | Consider ordering a Fire Behavior Analyst. | | | | | • | Agency |
| | Consult with duty officer and FMO regarding potential need for severity request. | | | | • | • | Agency |
| | Consider bringing additional dispatch personnel in from scheduled days off. | | | | | • | Agency |
| | Notify appropriate military personnel of high/extreme fire danger and request the drop heights of chaff/flares be increased. | | | | | • | Agency |
| | Consult with Great Basin Coordination Center (GBCC) regarding availability of resources at the geographical and national levels. | | | • | • | • | Agency |
| Assistant Fire Staff or AFMO | Ensure that roadside fire danger signs reflect the current adjective fire danger rating. | • | • | • | • | • | Public |
| | Ensure IA crews are briefed on local preparedness level, burning conditions, and availability of IA resources and air support. | • | • | • | • | • | Agency |

| Responsible Party | Suggested Action | PL 1 | PL 2 | PL 3 | PL 4 | PL 5 | Affected Entity |
|---|---|---|---|---|---|---|---|
| | Ensure incoming pre-position or detailed personnel are briefed on local conditions. | • | • | • | • | • | Agency |
| | Evaluate work/rest needs of crews. | | | • | • | • | Agency |
| | Increase patrols in camping and recreation areas. | | | | • | • | Public |
| | Consider suspension of project work away from station. | | | | | • | Agency |
| | Provide duty officer with feedback regarding unique/unexpected fire behavior and severity conditions and the need to increase IA capabilities. | | | | • | • | Agency |
| Fire Education & Mitigation | Ensure that roadside fire danger signs reflect the current adjective fire danger rating. | • | • | • | • | • | Public |
| | Initiate press release to inform public/industry of the potential fire danger. | | | | • | • | Public Industry |
| | Ensure the public and industrial entities are aware of the policy regarding fire trespass investigations for human-caused fires and cost recovery for suppression action. | | | | • | • | Public Industry |
| | Consider need for increased prevention patrols. | | | | • | • | Public Industry |
| | Contact local fire chiefs to make them aware of fire danger. | | | | • | • | Agency |
| | Consider door to door contacts in rural communities or ranch areas. | | | | | • | Public Industry |
| | Post signs and warnings in camp and recreation areas. | | | | • | • | Public |
| | Consult with FMO regarding severity request and potential need for additional prevention personnel. | | | | • | • | Public Industry |
| | Consult with AFMO and FMO regarding need for fire restrictions, closures and the need to order a Fire Prevention Team. | | | | • | • | Agency Public Industry |

PL Plans describing the key actions that would be taken by agencies at different PL levels…

PL Plan (BLM)

PL Plan (USFS)

PL Plan for FMO Group (use the highest PL to initiate…)

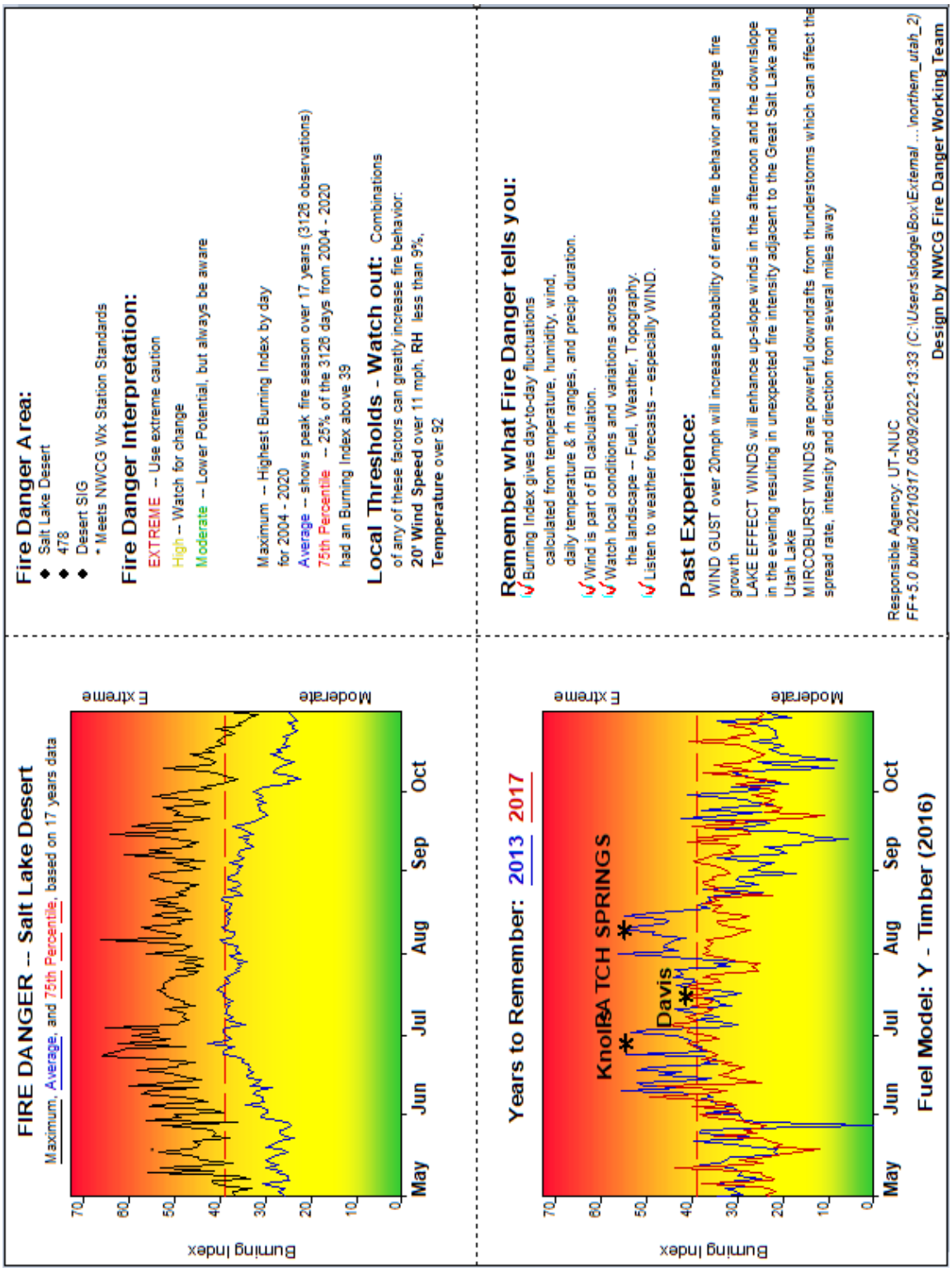
What are the decisions of the interagency FMOs at PL 3, 4, 5?

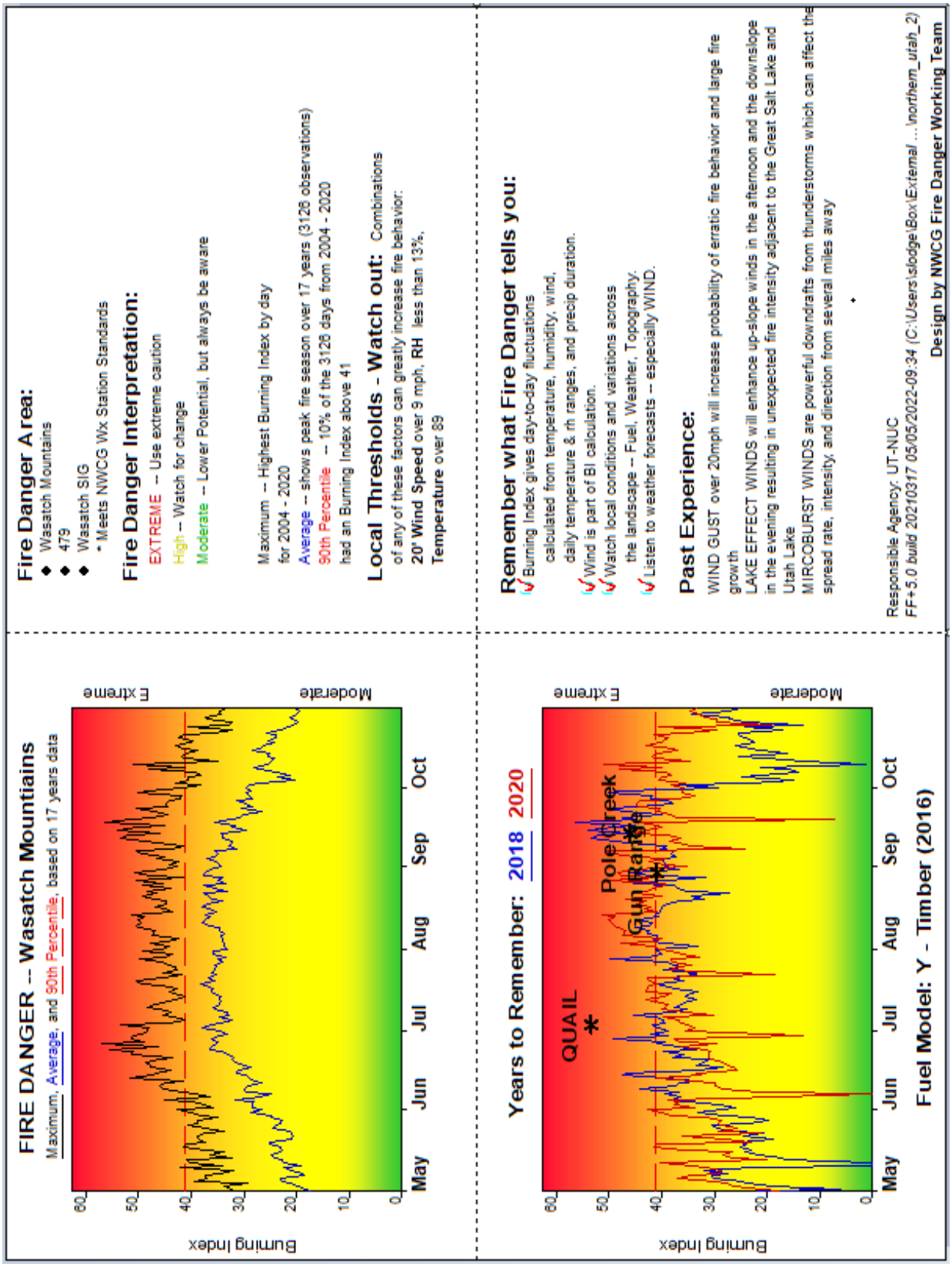
PL 1 / 2: FMO monthly call

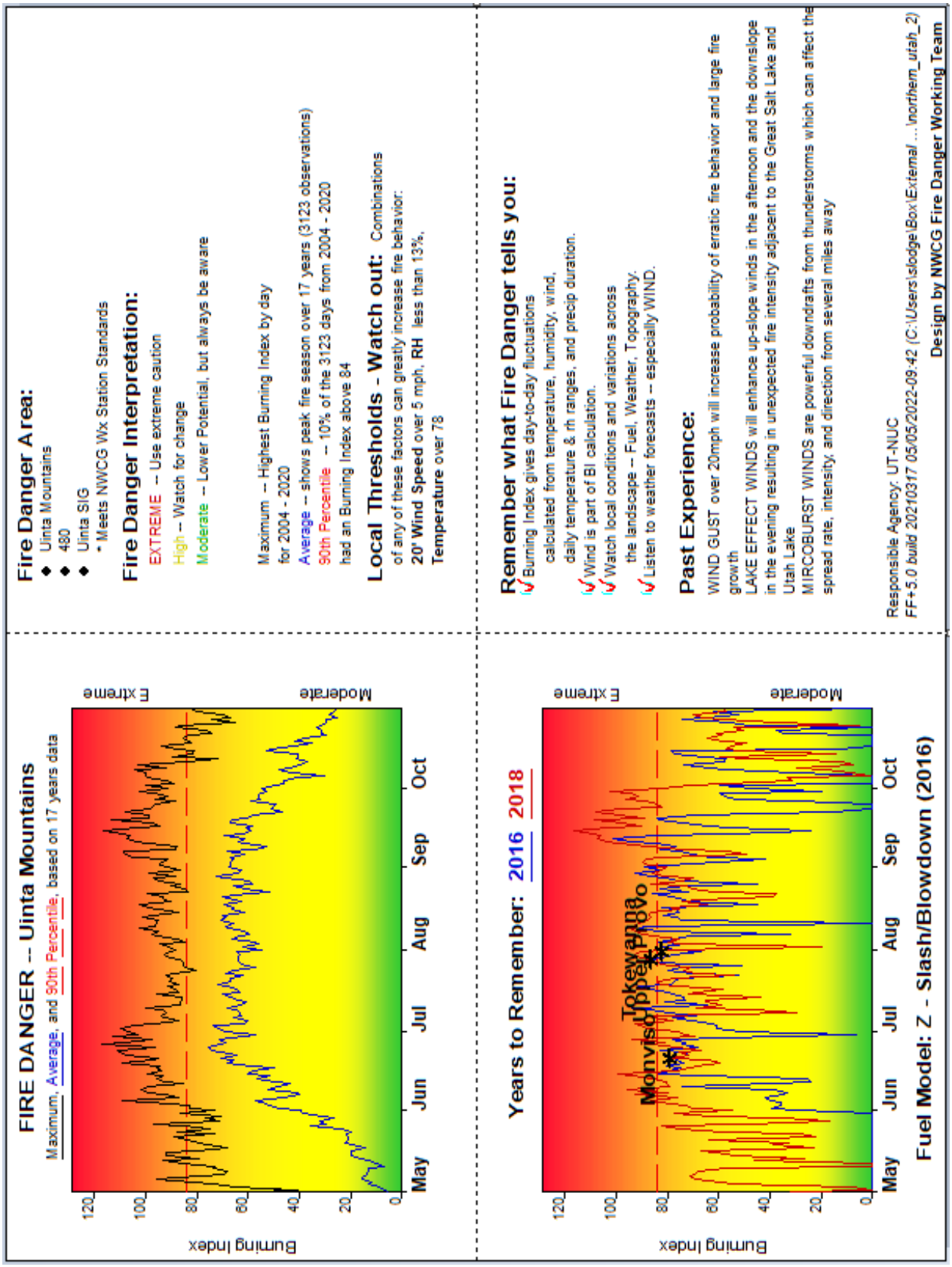
PL 3: Every other week, or more if neecdd, consider LMAC

PL 4 / 5: Weekly call, establish LMAC, prepo of resources/Type 3 team

# APPENDIX F: NORTHERN UTAH POCKET CARDS




FIRE DANGER -- Wasatch Mountains
Maximum, Average, and 90th Percentile, based on 17 years data
Burning Index
Extreme
Moderate
May
Jun
Jul
Aug
Sep
Oct
Years to Remember: 2018 2020
QUAIL
Pole Creek
Gun Range
Fuel Model: Y - Timber (2016)
Fire Danger Area:
Wasatch Mountains
479
Wasatch SIG
* Meets NWCG Wx Station Standards
Fire Danger Interpretation:
EXTREME -- Use extreme caution
High -- Watch for change
Moderate -- Lower Potential, but always be aware
Maximum -- Highest Burning Index by day for 2004 - 2020
Average -- shows peak fire season over 17 years (3128 observations)
90th Percentile -- 10% of the 3128 days from 2004 - 2020 had an Burning Index above 41
Local Thresholds - Watch out: Combinations of any of these factors can greatly increase fire behavior:
20' Wind Speed over 9 mph, RH less than 13%,
Temperature over 89
Remember what Fire Danger tells you:
Burning Index gives day-to-day fluctuations calculated from temperature, humidity, wind, daily temperature & rh ranges, and precip duration.
Wind is part of BI calculation.
Watch local conditions and variations across the landscape -- Fuel, Weather, Topography.
Listen to weather forecasts -- especially WIND.
Past Experience:
WIND GUST over 20mph will increase probability of erratic fire behavior and large fire growth
LAKE EFFECT WINDS will enhance up-slope winds in the afternoon and the downslope in the evening resulting in unexpected fire intensity adjacent to the Great Salt Lake and Utah Lake
MICROBURST WINDS are powerful downdrafts from thunderstorms which can affect the spread rate, intensity, and direction from several miles away
Responsible Agency: UT-NUC
FF+5.0 build 20210317 05/05/2022-09:34 (C:\Users\slodge\Box\External ... \northern_utah_2)
Design by NWCG Fire Danger Working Team


Fire Danger Area:
Uinta Mountains
480
Uinta SIG
* Meets NWCG Wx Station Standards
Fire Danger Interpretation:
EXTREME -- Use extreme caution
High -- Watch for change
Moderate -- Lower Potential, but always be aware
Maximum -- Highest Burning Index by day for 2004 - 2020
Average -- shows peak fire season over 17 years (3123 observations)
90th Percentile -- 10% of the 3123 days from 2004 - 2020 had an Burning Index above 84
Local Thresholds - Watch out: Combinations of any of these factors can greatly increase fire behavior:
20' Wind Speed over 5 mph, RH less than 13%,
Temperature over 78
Remember what Fire Danger tells you:
Burning Index gives day-to-day fluctuations calculated from temperature, humidity, wind, daily temperature & rh ranges, and precip duration.
Wind is part of BI calculation.
Watch local conditions and variations across the landscape -- Fuel, Weather, Topography.
Listen to weather forecasts -- especially WIND.
Past Experience:
WIND GUST over 20mph will increase probability of erratic fire behavior and large fire growth
LAKE EFFECT WINDS will enhance up-slope winds in the afternoon and the downslope in the evening resulting in unexpected fire intensity adjacent to the Great Salt Lake and Utah Lake
MIRCOBURST WINDS are powerful downdrafts from thunderstorms which can affect the spread rate, intensity, and direction from several miles away
Responsible Agency: UT-NUC
FF+5.0 build 20210317 05/05/2022-09:42 (C:\Users\slodge\Box\External ...\northern_utah_2)
Design by NWCG Fire Danger Working Team
FIRE DANGER -- Uinta Mountains
Maximum, Average, and 90th Percentile, based on 17 years data
Burning Index
Extreme
Moderate
May
Jun
Jul
Aug
Sep
Oct
Years to Remember: 2016 2018
Monviso
Upper Provo
Tokewanna
Fuel Model: Z - Slash/Blowdown (2016)

# APPENDIX G: PRIMARY DISTRIBUTION LIST

| Name | Title | Agency | Office | Mailing Address | E-mail |
|---|---|---|---|---|---|
| Mike Gates | District Manager | Bureau of Land Management | West Desert District | 2370 S. Decker Lake Blvd.<br>West Valley City, UT 84119 | mgates@blm.gov |
| Geoff Wallin | FMO | Bureau of Land Management | West Desert District | 2370 S. Decker Lake Blvd.<br>West Valley City, UT 84119 | gwallin@blm.gov |
| Bob Farrell | AFMO | Bureau of Land Management | West Desert District | 2370 S. Decker Lake Blvd.<br>West Valley City, UT 84119 | rfarrell@blm.gov |
| Erik Valdez | Fuels Program Manager | Bureau of Land Management | West Desert District | 2370 S. Decker Lake Blvd.<br>West Valley City, UT 84119 | evaldez@blm.gov |
| Sean Lodge | Dispatch Center Manager | Bureau of Land Management | Northern Utah Interagency Dispatch Center | 14324 Pony Express Rd.<br>Draper, UT 84020 | slodge@blm.gov |
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