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UPPER GUNNISON

Zones of Concern Assessment

Prepared for the Upper Gunnison River Watershed Conservancy District

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Table of Contents

List of Tables

List of Tables - continued

List of Tables - continued

List of Maps

List of Maps - continued

List of Maps - continued

Photo - Blue Mesa Reservoir - Credit Brad Piehl

Introduction

The Watershed Wildfire Protection Group (WWPG) is a state-wide collaborative group of water providers, watershed collaboratives, non-profits, private businesses, and federal, state and local agencies in Colorado. The WWPG has been in existence for 15 years and is focused on protecting Colorado water supplies and critical infrastructure from catastrophic wildfire and other threats by maintaining healthy, resilient watersheds through collaboration, implementation, leveraging funding, and education.

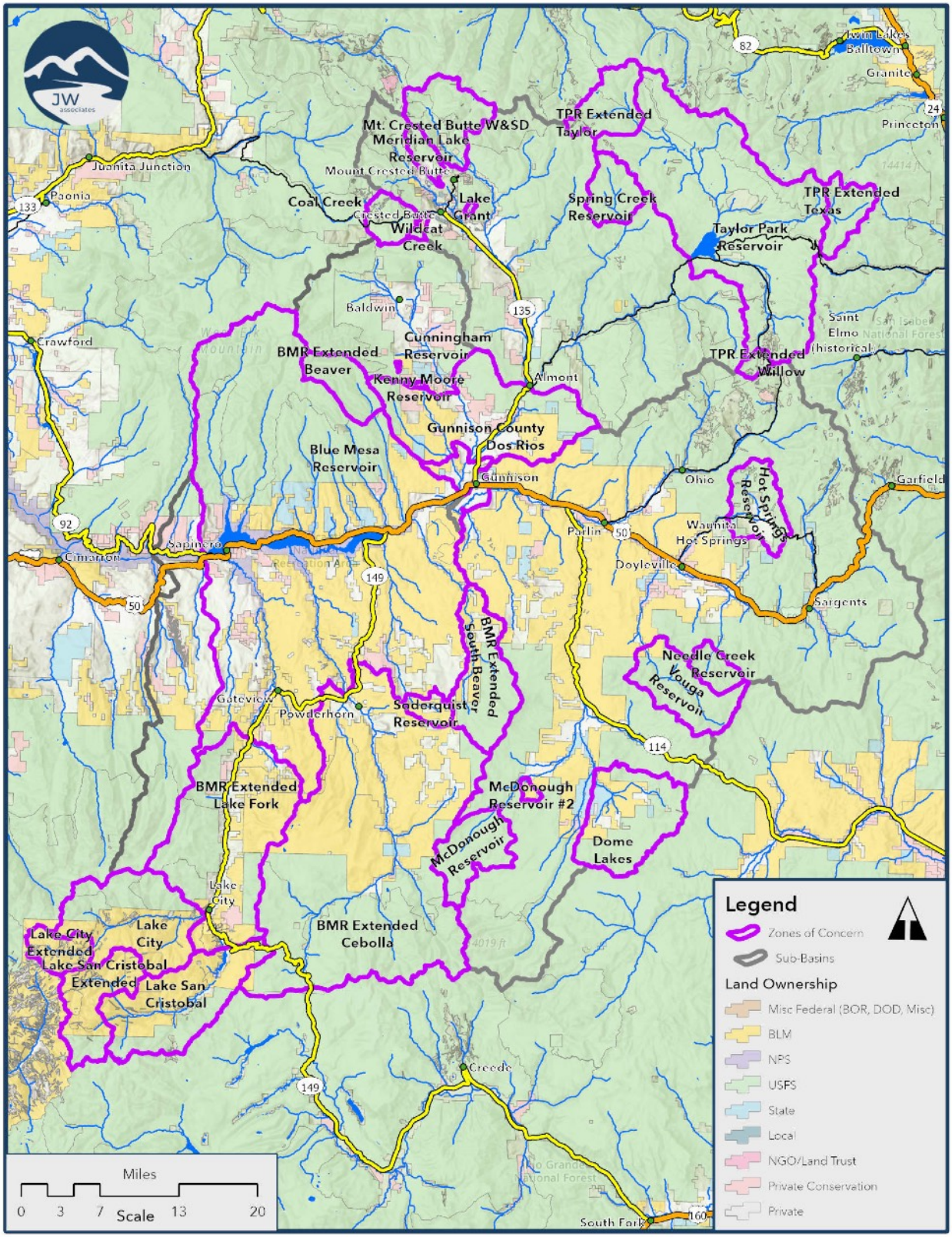
The WWPG identified an important hazard for water supply related to transport of debris and sediment from upstream source water areas. The source water areas (i.e. watershed areas) above important surface water intakes, upstream of diversion points and drinking water supply reservoirs have a higher potential for contributing significant sediment or debris. These areas, called Zones of Concern (Zone of Concern), can be used by stakeholders to define project areas for watershed protection planning and actions.

Two criteria are suggested by the Colorado Watershed Protection Data Refinement Work Group (2009 now called the WWPG) to define Zones of Concern. The initial criteria is to use a five-mile upstream distance from water supply features or infrastructure. This approach is based on Colorado State Statute 31-15-707 which allows municipal water providers to enact an ordinance to protect their water intakes within five miles upstream of their location. This municipal statute has been in place since the late 1800s and has been tested and upheld in court several times. Many of the Zones of Concern end at a watershed divide before they reach the five mile upstream distance.

The WWPG additionally suggested extending Zones of Concern to 11 miles upstream in situations where the extra protection appears warranted, such as steep topography with high transport capacity or clear connection to important water infrastructure beyond the initial 5 miles. Application of this criteria resulted in extending several important Zones of Concern to 11 miles upstream. The debris flow and flooding following the Buffalo Creek fire in the Upper South Platte watershed in 1996 traveled 11 miles down Spring Creek (Colorado Watershed Protection Data Refinement Work Group 2009). These “extended” Zones of Concern were added as separate areas covering from five to 11 miles upstream, or to where they encountered the watershed divide. For the basic analysis and discussion presented here, the initial Zone of Concern and the extended Zone of Concern are combined.

Stakeholder groups may want to expand their Zones of Concern to include all the sixth-level watersheds that have any portion of those watersheds within the Zone of Concern. Erosion, flooding and debris flows can originate high in watersheds and travel long distances. Decisions regarding what areas to include would be made at the next level in planning (see Recommendations section below).

Twenty Zones of Concern within five miles upstream of diversions and reservoirs were delineated in the Upper Gunnison Watershed (Map 1 and Table 1) totaling over 830,000 acres. Several of the Zones of Concern were extended to 11 miles upstream, increasing the total Zone of Concern area to more than 1.2 million acres. More detailed maps and analyses of the Zones of Concern are presented in the Opportunities & Constraints section below. Some of the Zones of Concern overlap with others or come very close. In those situations, multiple Zones of Concern can be viewed as one, combining several stakeholders into a single, larger Zone of Concern.



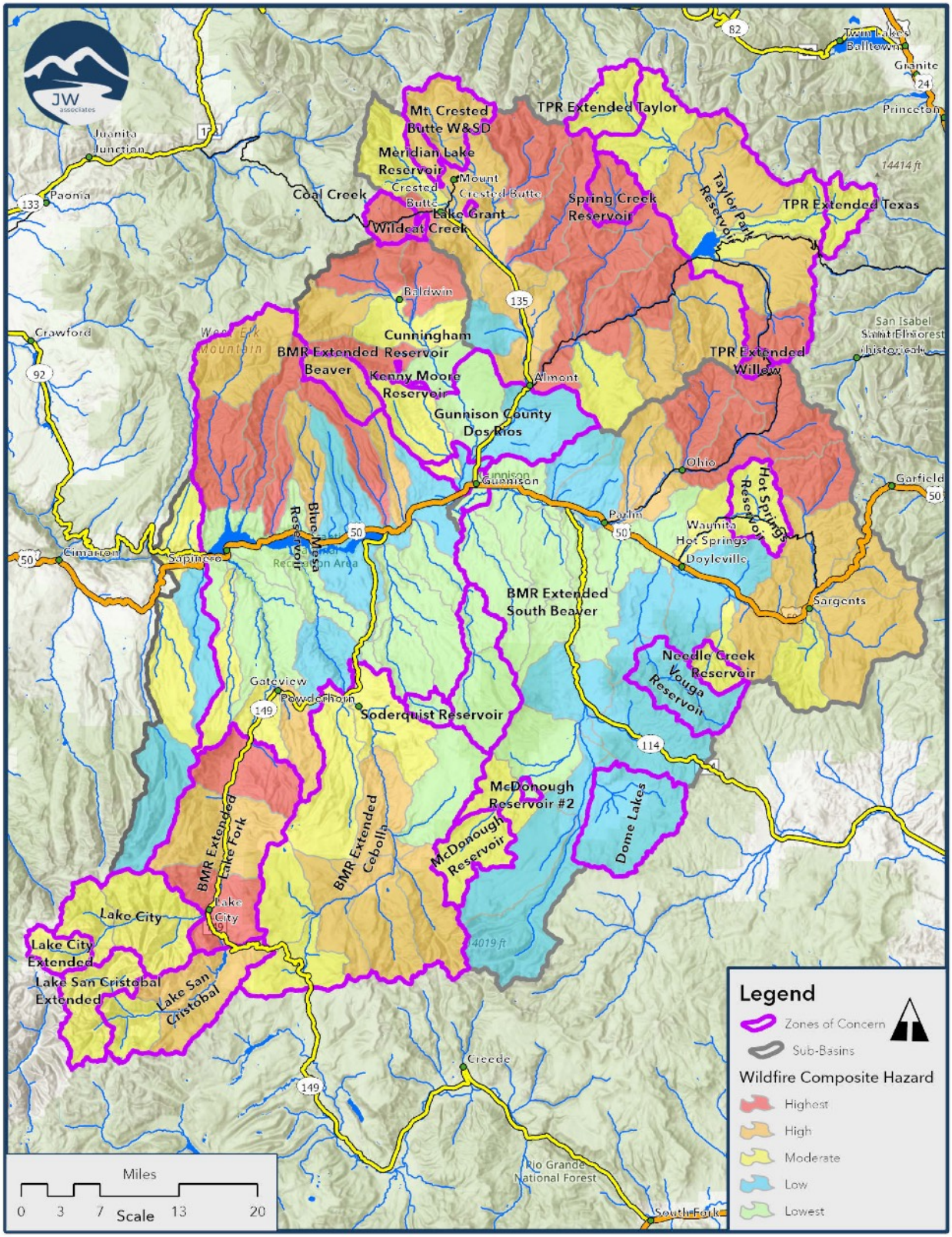
Map 1. Upper Gunnison Zones of Concern and Ownership

Table 1. Upper Gunnison Identified Zones of Concern

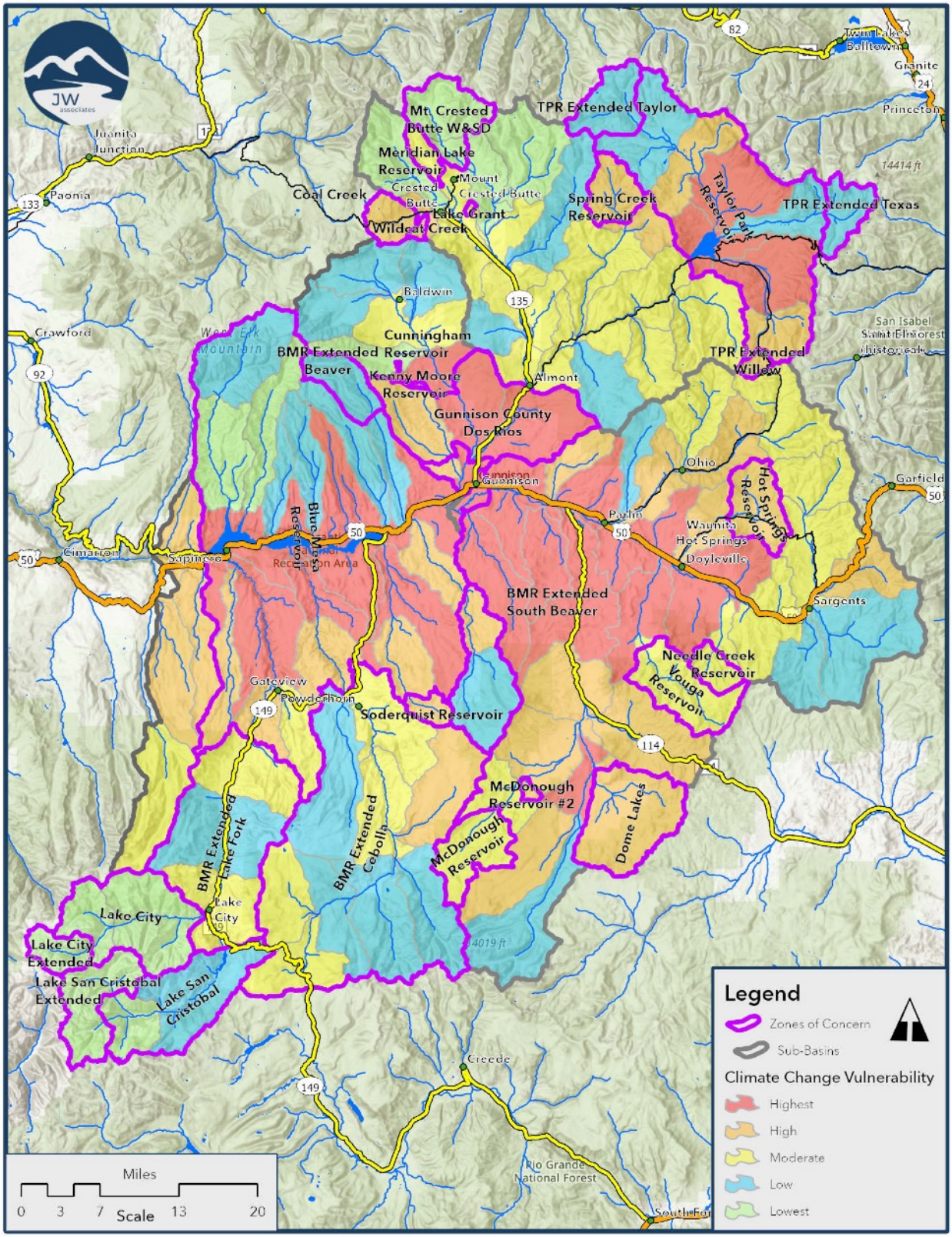
Zone of Concern	Area (acres)	Extended Area (acres)	Total (acres)
Blue Mesa Reservoir	379,283		725,400
BMR Extended Beaver		13,316	
BMR Extended Cebolla		217,629	
BMR Extended Lake Fork		84,990	
BMR Extended South Beaver		30,182	
Coal Creek	8,596		8,596
Cunningham Reservoir	124		124
Dome Lakes	36,607		36,607
Gunnison County Dos Rios	70,339		70,339
Hot Springs Reservoir	17,401		17,401
Kenny Moore Reservoir	468		468
Lake City	44,049		53,484
Lake City Extended		9,435	
Lake Grant	424		424
Lake San Cristobal	44,773		68,144
Lake San Cristobal Extended		23,371	
McDonough Reservoir	19,567		19,567
McDonough Reservoir #2	1,349		1,349
Meridian Lake Park Reservoir	5,044		5,044
Mt. Crested Butte W&SD	20,792		20,792
Needle Creek Reservoir	6,974		6,974
Soderquist Reservoir	4,996		4,996
Spring Creek Reservoir	12,486		12,486
Taylor Park Reservoir	132,477		162,588
TPR Extended Taylor		16,119	
TPR Extended Texas		11,344	
TPR Extended Willow		2,648	
Vouga Reservoir	23,789		23,789
Wildcat Creek	1,160		1,160
Totals	**830,697**	**409,034**	**1,239,731**

Watershed Hazards in Zones of Concern

Wildfire, post-fire hazards, and climate change vulnerability have been evaluated by 6th Level watershed for the Upper Gunnison (JW Associates 2022). These hazards and vulnerabilities can be used in combination with specific characteristics of the Zones of Concern to identify recommendations and actions for each Zone of Concern. That analysis is presented below by Zone of Concern. The Zones of Concern are shown with the Wildfire Composite Hazard ranking on Map 2 and the Climate Change Vulnerability ranking on Map 3.



Map 2. Upper Gunnison Zones of Concern and Wildfire Composite Hazard



Map 3. Upper Gunnison Zones of Concern and Climate Change Vulnerability

Recommendations for Wildfire Hazard Reduction

The Upper Gunnison Watershed Wildfire Hazard Assessment (JW Associates 2022) is an analysis that identifies hazards and priorities by watershed. The information in that assessment should be used by stakeholders to take the essential next steps to address the hazards and vulnerabilities identified through this analysis. This section presents some general recommendations and are intended to guide the reader through the following Opportunities & Constraints section.

It is recommended that water supply agencies and stakeholders plan for wildfires in their watershed(s). Planning for future wildfires now is prudent because actions taken before wildfires can lead to different outcomes. Following wildfires, managers are forced to take emergency actions and there is little time to determine the best approach within the range of potential actions. Wildfire hazard reduction or watershed protection actions are logically different before a wildfire than after one, although there are some common components. Therefore, this section is divided into pre- and post-fire actions.

Pre-Fire Actions

The suggested actions before wildfire are;

- Small-scale Analysis & Planning - Complete small-scale analysis and planning within each Zone of Concern to identify specific hazard areas that will be the priority for treatments before fire, or targeted mitigation efforts after fire. Planning should also include setting long-term watershed/forest management goals such as increasing forest diversity to minimizing impacts from wildfires, or future insect and disease outbreaks. This planning can also be used to provide valuable site-specific information to cooperating agencies on forest management projects or fire management plans in those areas. Small-scale targeting of high hazard areas also allows water supply agencies to target and justify investments in hazard reduction or watershed protection projects.
- Wildfire Severity Reduction - Reduce wildfire intensity and subsequent fire severity in critical locations within and adjacent to Zone of Concern, where possible. Although there are other strategies that can be pursued, the reduction of wildfire severity is the goal for minimizing adverse hydrologic responses following intense wildfires. Wildfire severity is the effect that the fire has on the ground. Vegetative forest treatments can be effective in reducing the threat of crown fire (Graham et al. 1999). Treatments that reduce density and change the composition of forested stands can reduce the extent of crown fire, decrease severity, and enhance fire-suppression effectiveness and safety (Oucalt and Wade 1999, and Pollet and Omi 2002). In forested stands that have developed without regular disturbance, combinations of mechanical harvest/thinning and prescribed fire are the most effective technique for altering the fuels matrix (Graham et al. 2004).
- Non-traditional Approaches - These areas should be evaluated to determine if less traditional approaches could be used to reduce post-fire hazards. These methods could include; hand treatments, prescribed fire, created openings, fuel breaks, and aspen enhancement. These treatments might cost more per acre than mechanical treatments but if they are targeted in identified high hazard areas they can have broader benefits. The higher cost of treatments in targeted areas could provide substantial watershed protection compared to treatments in areas with fewer limitations and lower costs.
- Riparian Areas & Floodplains - The conditions of riparian areas, floodplains and stream morphology can help moderate post-fire effects of increased peak flows and sediment

yields. Riparian areas can be enhanced by removing conifers where they dominate the vegetation and encouraging or planting, aspen and willows. Good floodplain connectivity will help streams maintain function during post-fire runoff and reduce sediment yields and peak flows downstream. In-stream structures such as beaver dams, or beaver dam analogs, also help streams slow down flood waters and reduce sediment yields.

- Roads Analysis - Roads can present hazards both pre- and post-fire. However, post-fire runoff contains more debris and higher peakflows. The situations that are most hazardous are road-stream crossings and roads than run along streams. A roads analysis should be completed within the Zone of Concern that identifies hazardous roads-stream crossings and other road conditions that could present problems post-fire. The roads analysis should include an estimate of pre- and post-fire peakflows.
- Communication/Stakeholder Groups - Establish ongoing communications with key federal, state and local agencies that will be responsible for fire suppression and mitigation following fires. Good working relationships with these agencies and stakeholder groups will allow better communication and trust during decision-making.
- Sediment Basin Planning - Where forest treatments are not possible and/or water supplies are critical and at risk, complete an analysis of potential sediment control structures downstream from high hazard areas. Following the Hayman Fire in 2002, Denver Water installed a sediment control structure in Turkey Creek above Cheesman Reservoir. It took more than one year to get all design, approvals and permits in place to construct that structure. The highest sediment yield from wildfires is usually in the first 2-3 years. Most of the preliminary design and work with permitting agencies can be completed ahead of time, including finding locations, conceptual design and planning with the appropriate government agencies.
- Managing Wildland Fire - Work with federal and state agencies to plan for managing wildland fires in specific locations as a management tool that would allow wildfire to reduce wildland fuels under defined circumstances. The conditions would be monitored frequently to ensure that the fire stays within that management prescription or suppression efforts would be required.

Post-Fire Actions

The suggested actions during and following wildfire are;

- Use Small Watershed Analysis for Priorities - During a wildfire, review the small-scale analysis completed pre-fire, to determine if the fire is burning or will likely burn intensely in high hazard areas. Use that assessment to guide suppression efforts to either let that area burn under current conditions or encourage maximum suppression efforts in high hazard areas.
- Burned Area Emergency Rehabilitation - Contact the appropriate agencies and request to be involved with the Burned Area Emergency Rehabilitation (BAER) Team. Review the large-scale and small-scale hazard assessments and bring that information to the BAER Team meetings. Advocate for watershed protection measures during the determination of mitigation measures by the BAER Team.
- Target post-fire watershed protection in specific areas of high hazard to water supply. Use the small-scale hazard identification analysis and overlay the burn severity mapping to determine high priority areas.
- Effectiveness - Mitigation measures will need to be determined on a site-specific basis. However, it is recommended that mitigation measures focus on effectiveness of treatment

rather than cost per acre. Mitigation that targets fewer acres but with a higher effectiveness will likely be more successful. For example, wood shred mulch is much more effective on steep, high burn severity slopes than agricultural straw, but costs more. Targeting specific high hazard areas to be treated allows these more effective, but possibly more expensive, treatments to provide higher levels of watershed protection, sometimes at the same overall cost.

- **Additional Treatments** - Consider additional mitigation measures in high hazard areas. These could include grade control structures high in watersheds to minimize gully head-cutting, felling of dead trees into small channels to provide roughness, and hand application of wood shred or wood straw mulch.
- **Roads** - Use the pre-fire roads analysis to target road crossings and roads by streams for treatments. One of the most effective treatments on low volume forest roads is to replace culverts at stream crossings with low water crossings. These can be installed quickly and at low cost. They allow sediment and debris to move across the road. Road crossing failures are common post-fire and can initiate debris flows downstream and/or stream channel instability. It is also possible that high post-fire peak flows will blow out a road that is vital for access to important water supply structures and/or life and safety.
- **Sediment Control** - Review plans for sediment control structures and determine if they should be taken through the final stages of permitting and installation. Although these structures are expensive, the effects from fire may be even more expensive. Several water agencies with recent experience in Colorado have estimated that it is 10-20 times more expensive to remove sediment from a reservoir than the cost of these temporary structures.

Opportunities & Constraints

This section presents the first step in identifying opportunities and constraints within the numerous Zones of Concern. This analysis is intended to identify potential opportunities that will aid the stakeholders in deciding whether to pursue watershed protection/hazard reduction efforts, and the scope of those efforts. This section first offers general descriptions of possible opportunities and constraints and then presents the more specific opportunities for each Zone of Concern shown on Map 1 and Table 1.

General Opportunities & Constraints

The opportunities and constraints described below were applied to the Zones of Concern as a series of filters and identifiers of potential opportunities.

Ownership

Land Ownership can be a constraint because of different permissions and regulations that affect potential watershed protection actions, required permitting and approvals. Where projects cross ownership boundaries, approvals, funding, and timing can become disconnected.

Major ownership classifications are Federal, State, Local Government and Private. Federal Lands include the National Forest System Lands, Bureau of Land Management (BLM), National Park Service, and potentially other agencies and departments. State lands are typically those owned or managed by the State Land Board or Colorado Parks and Wildlife. However, there are other agencies or institutions that may also own significant acreage.

Local Government lands typically include county, city, or town-owned properties. County-owned lands are often managed as open space or park lands. City-owned lands are also often owned and managed for open space or parks, but also for watershed protection or other purposes.

The final category, Private Lands, is a catch-all that can include a myriad of other types of ownerships including special district lands, company or corporate-owned lands, privately-owned properties and more. Privately-owned parcels can form an extremely complex ownership pattern, particularly where they are comprised of old mining claims. The overall ownership pattern for the Upper Gunnison watershed is displayed on Map 1.

Access

Access to and within a watershed or Zone of Concern is a key factor in determining opportunities for mitigating wildfire hazards as well as the ability to install, operate, and maintain erosion and sediment control structures following wildfires. The analysis often is limited by the data available in determining what roads exist within any given area. Normally, data layers available for the analysis show major roads and access routes, but often fail to include small, local roads and trails, particularly on non-federal lands. Such roads are very important for accessing backcountry areas for conducting mitigation activities. Experience has shown that old roads used for mining or logging that can be temporarily re-opened to conduct project work may not be shown on any maps. Another option is temporary roads that can be constructed and closed following treatment, but they add costs to projects and current policies on many federal lands make the use of even temporary roads difficult.

Wilderness Areas

Operations in designated Wilderness Areas are highly restricted by law and agency policies. Often the only treatments possible would be to plan for use of natural fire to reduce wildfire hazards. Some fuels treatments have been recently approved in wilderness areas but they are limited to hand tools only and therefore the scale of those treatments is also limited. The wilderness areas are shown in the individual Zone of Concern presentations. There are some wilderness areas that are a combination of Bureau of Land Management and US Forest Service lands.

Roadless Areas

Operations in designated Roadless Areas are restricted primarily by agency policies. Regulations allow construction of temporary roads, and closure upon project completion, for the purpose of conducting harvests and wildfire hazard reduction treatments. Agency policy has caused treatments to focus on areas other than roadless whenever possible.

Colorado has developed rules for treatments within federal Roadless Areas. Treatments within Colorado Roadless Areas may be possible when they are adjacent to at risk communities and for reducing wildfire hazards within watersheds. Areas within ½-mile of communities, and in some circumstances up to 1½-miles from communities, may be treated to reduce wildfire hazards. Areas within watersheds may be treated if the USFS Regional Forester determines a significant risk of wildfire exists.

The Colorado Roadless Areas include some areas that are designated as Upper Tier where activities are further restricted. The Upper Tier designation does not allow tree cutting and temporary road building for watershed protection. These Upper Tier areas are displayed on the maps for each Zone of Concern below. There are many roadless areas in the assessment area, and many are associated with adjacent wilderness areas.

Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are zones within existing public lands that have special management to protect natural resources, scenic landscapes, people and property from hazards on public lands. These areas are designated by the Bureau of Land Management (BLM), in collaboration with local, state, federal and tribal governments, stakeholders, and the public. A land use plan is established for all ACECs, determining activities and usage based on the natural resources and values being protected.

ACEC designation provides the opportunity for a higher level of protection of most rivers and streams, as well as public waterways. In gaining ACEC designation, resources are provided to aid in collaboration between local citizens, agencies, and organizations to identify problems, develop stewardship goals, collect information about natural resources, design management approaches, monitor resource quality, and conduct public outreach to protect, restore and enhance ACEC resources. Presently, there are 88 ACECs in Colorado.

Wilderness Study Areas

Wilderness Study Areas (WSAs) are similar to Wilderness Areas but have not been designated as such by Congress. They are maintained by the Bureau of Land Management to preserve the land characteristics and resources in an effort to maintain their suitability for future wilderness designation. Operations in designated Wilderness Study Areas are restricted by law and agency policies, with less overall restrictions than designated Wilderness Areas. Restrictions include no development or use of the following: temporary roads, motor vehicles or mechanical transportation, motorized equipment, landing of aircraft, and building permanent structures. Similar to Wilderness Areas, the main treatment possible for WSAs is planning for use of natural fire to reduce wildfire hazards. General management actions in WSAs include providing location and access information about WSAs, monitoring resources, documentation of usage, restoration projects, and outlining terms of usage for the general public and organizations.

Vegetation

Vegetation is what fuels a wildfire. The vegetation type and its arrangement, size, density, and moisture content; the slope of the ground and the aspect it is found on; whether it is dead or alive; the weather and season of the year, and more all dictate if and how intensely that fuel will burn. A description of the major forest types in the Upper Gunnison Watershed is presented below.

Aspen

Aspen is an aggressive invader to disturbed areas. It quickly populates areas damaged by fire, rockslides or mass soil movement, avalanche paths and run-out areas, large areas of wind-throw, and other areas where conifers have been killed. It is normally a successional species in that as it matures, more shade tolerant conifer species begin to grow and alter the forest type. In some areas, however, aspen can be a climax species.

Aspen is somewhat “resistant” to fire as crown fires will seldom carry through this forest type except under extreme drought combined with windy conditions. Its susceptibility to fire is usually seasonal: normally only burning during dry fall periods, often after their leaves have fallen; and, occasionally, in the spring, prior to green-up if conditions are dry. Because of these characteristics, it is a good species to maintain or promote within the landscape. This can be done using a variety of silvicultural and prescribed fire techniques.

Spruce-fir

Spruce-fir is a major component of the forest vegetation in the Upper Gunnison Watershed. This forest type is comprised of mixtures of Engelmann and Colorado blue spruce, subalpine fir and other minor species. It is a forest type that, under natural conditions, has a very long fire interval – perhaps as long as 500 to 700 years. When it does burn, it burns very intensely and can cause severe erosion and sedimentation problems. Human-caused fires are a wildcard that can occur anytime weather conditions allow, introducing an unnatural fire event into that normally long historic fire interval.

Spruce-fir is difficult to thin sufficiently to develop diversity significant enough, within a short time period, to reduce wildfire hazards. This much needed diversity must be developed by creating varied conditions at the stand and landscape levels by group selection, small patch cutting, creating permanent openings, converting areas to aspen, and other techniques. Once management has begun for watershed protection, in some situations it may be advisable to use less traditional techniques for long-term management. Techniques may include; group selection, patch cuts and small clearcuts to break up crown density and increase diversity.

Spruce beetle has created some areas of significant mortality in spruce-fir forests in the Upper Gunnison Watershed. Dead trees lose their needles quickly, within 2-3 years, which somewhat reduces the wildfire threat. However, the combination of live and dead standing and down trees has shown to be a fuel matrix that carries crown fires even at high elevations in Colorado.

Lodgepole Pine

In Colorado, lodgepole pine is also found in dense, continuous stands. Lodgepole pine normally comes in after a fire. It often can be considered the climax species under normal fire intervals. In the absence of fire, lodgepole stands will transition to more shade tolerant species. Lodgepole pine has a natural fire interval that may begin at about 150 years of age up to perhaps 300 years. Mature stands begin to “fall apart” due to insect, disease, rot and other factors. As trees fall, they add significant heavy fuel to the forest floor, which creates conditions that make the species susceptible to hot, fast-moving crown fires. Similar to spruce/fir, it is difficult to thin lodgepole pine sufficiently to develop diversity, within a short time period, significant enough to reduce wildfire hazards. Diversity must be developed at the stand and landscape levels by patch cutting, creating permanent openings, or converting areas to aspen. Once management has begun for watershed protection, in some situations it may be advisable to use less traditional techniques for long-term management. Less traditional techniques may include group selection, patch cuts and small clearcuts to break up crown density.

Mixed Conifer

The mixed-conifer forest type occurs at approximately 6,900 to 10,500 feet in elevation, nestled between lower-elevation forests such as ponderosa pine and higher-elevation subalpine forests such as spruce-fir. The mixed-conifer forest type includes a diverse range of tree species. The distribution and structure of mixed-conifer forests are strongly influenced by temperature and moisture gradients, in addition to soil types and fire. White fir often dominates as the climax species on moist sites and in the southern part of the state, while ponderosa pine, Douglas-fir or Rocky Mountain juniper tend to be the climax species on warmer and drier sites. Engelmann spruce, blue spruce, subalpine fir, bristlecone pine and limber pine also may be present in the mix. Due to the diverse range of elevation and species composition in the mixed conifer forest type, the wildfire hazard and implications for management are more site-specific.

Climate Change Vulnerability

The Climate Change Vulnerability Ranking was completed for all 6th level watersheds in the study area (JW Associates 2022) which combines a ranking of Ecosystem Sensitivity with the Lack of Adaptive Capacity. Ecosystem Sensitivity includes both intrinsic or natural factors that can place stress on an ecosystem, as well as human alterations to ecosystem function, both of which may be magnified in the face of climate change. Adaptive Capacity is the ability of an ecosystem to respond or adapt to these external stressors such as the effects of climate change. The combination of the sensitivity of a watershed with the ability for the watershed to respond to stress becomes the Climate Change Vulnerability Index (CCVI). Several CCVI ranking factors can be used to identify specific opportunities for increasing those watershed's climate sensitivity or adaptive capacity. Those ranking factors include:

Landscape Condition - This ranking factor basically measures the impacts of roads on the landscape. Roads have been associated with habitat degradation and fragmentation as well as changing the way runoff is routed through forested areas. Road/stream crossings can become initiation points for debris flows if they are undersized and fail during storms. An approach to improve landscape condition would be to complete an analysis on road systems and implement projects to reduce the impacts of roads. Those projects could range from improvements to road drainage, seasonal or administrative closures, and relocation or road decommissioning or obliteration.

Fire Regime Departure - This ranking factor indicates if the structure of vegetation types are within their natural fire regimes or outside of those parameters. This could indicate high density or lack of diversity. The approach to move a watershed back towards natural fire regimes would be restoration of vegetation structure and function.

Insects and Disease - This ranking factor identifies the probability of insect and disease causing mortality in the future. This is different than the measured mortality from insects that is used in the Wildfire Hazard analysis. The approach to reduce the probability of insect or disease mortality in the future depends on the insect or disease to which the watershed is susceptible. Most insects attack larger trees that are not as healthy as younger, faster growing trees. They also are usually specific to one tree species. So, increasing forest health and diversity would likely be good tactics to reduce the probability of insect and disease mortality.

Vegetation Diversity - Watersheds that have a diversity of forest and vegetation types are more resilient to changes in climate. Approaches to increase vegetation diversity include expanding aspen where possible within areas dominated by conifers, creating openings/meadows, creating openings in mature lodgepole pine that would become aspen or young lodgepole pine, breaking up large areas of dense spruce-fir with created openings, etc. These approaches vary by existing vegetation types and may depend on factors that would limit diversity.

Blue Mesa Reservoir

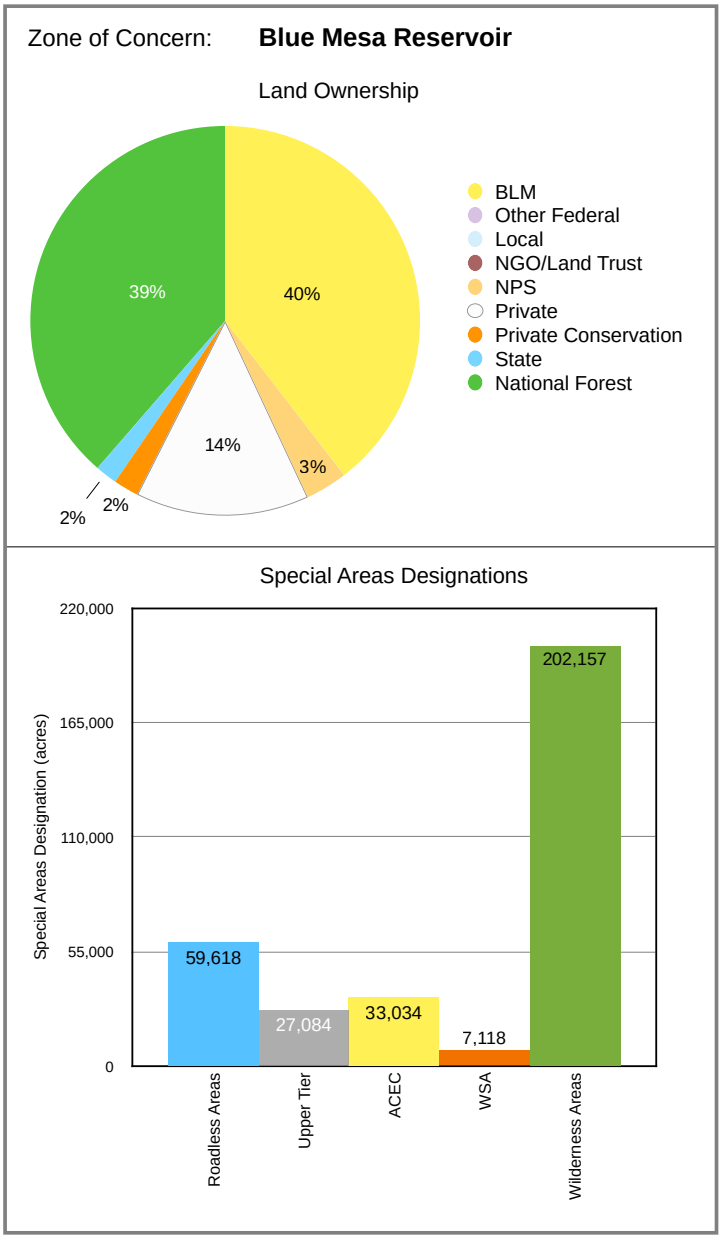
The Blue Mesa Reservoir Zone of Concern includes four extended areas (Table 1 and Map 1): Beaver, Cebolla, Lake Fork, and South Beaver. The Blue Mesa Zone of Concern totals 725,400 acres including the extended areas, which total over 346,000 acres. There are 32, 6th level watersheds in this Zone of Concern. Because of the large size of this Zone of Concern, the maps are presented in two sections, one showing the northern portion and the other showing the southern portion.

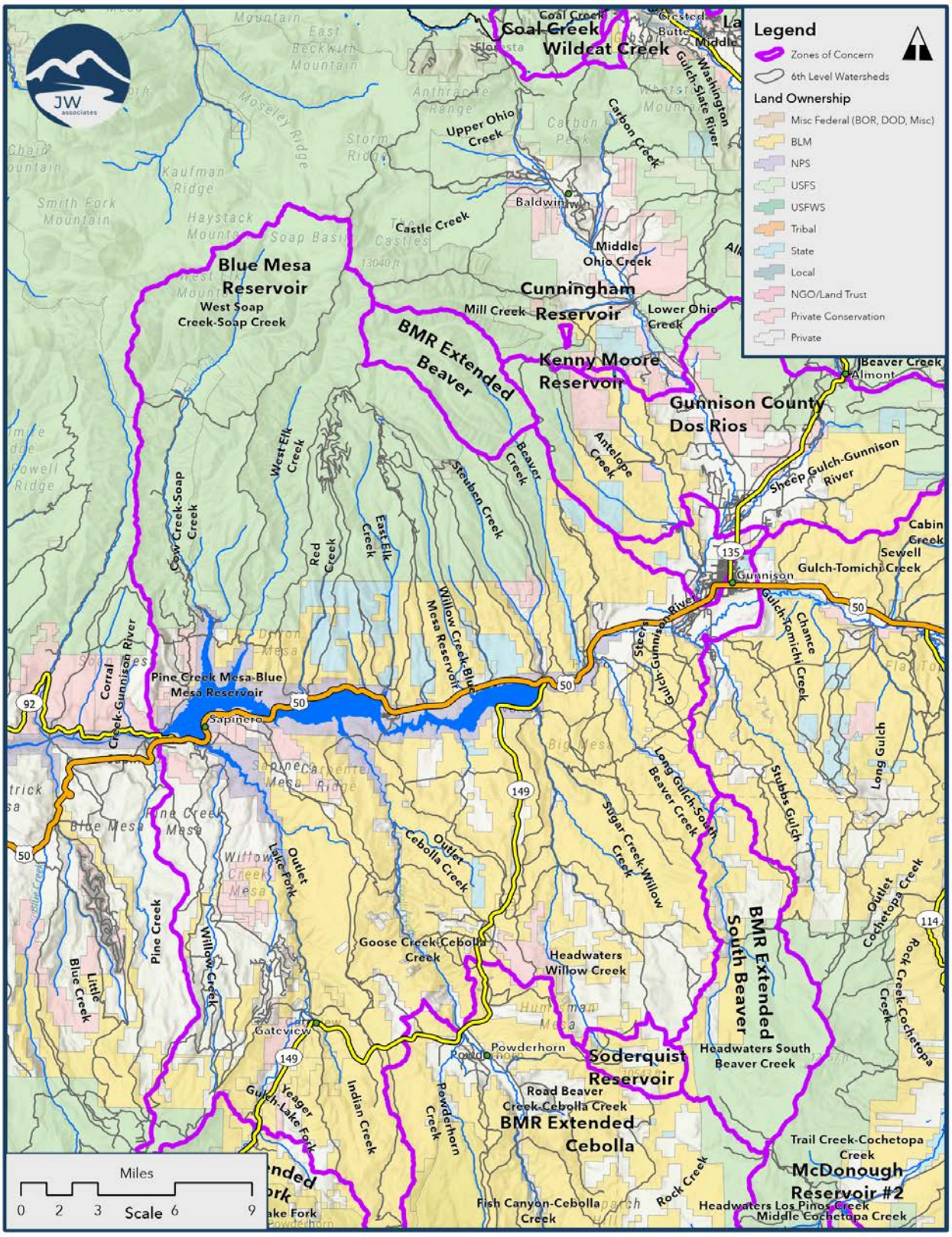
Blue Mesa Reservoir Zone of Concern Ownership

Basically equal areas of approximately 40% of Bureau of Land Management and National Forest lands are present in the Blue Mesa Zone of Concern (Maps 4 and 5). The next largest land ownership is private lands at about 14%. The Curecanti National Recreation Area (National Park Service) covers over 25,000 acres (~3%).

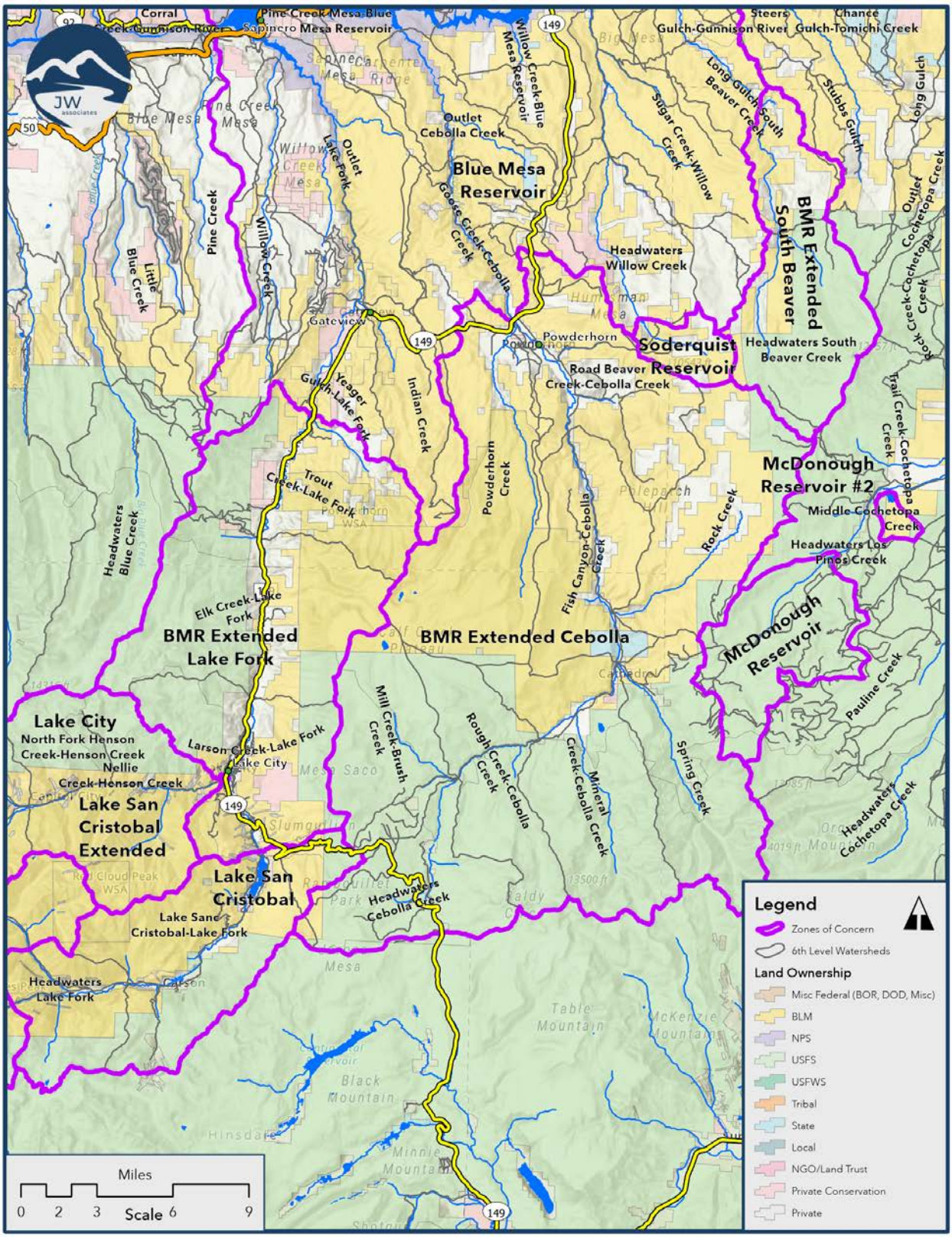
Blue Mesa Reservoir Zone of Concern Special Areas

There are over 200,000 acres of wilderness areas including the West Elk, La Garita, Powderhorn, and Uncompahgre Wilderness Areas (Maps 6 and 7). There are over 59,000 acres within 12 roadless areas, including over 27,000 acres that are designated as Upper Tier. The Blue Mesa Zone of Concern covers over 33,000 acres within four Areas of Critical Environmental Concern (ACEC) and more than 7,000 acres within three wilderness study areas (WSA).

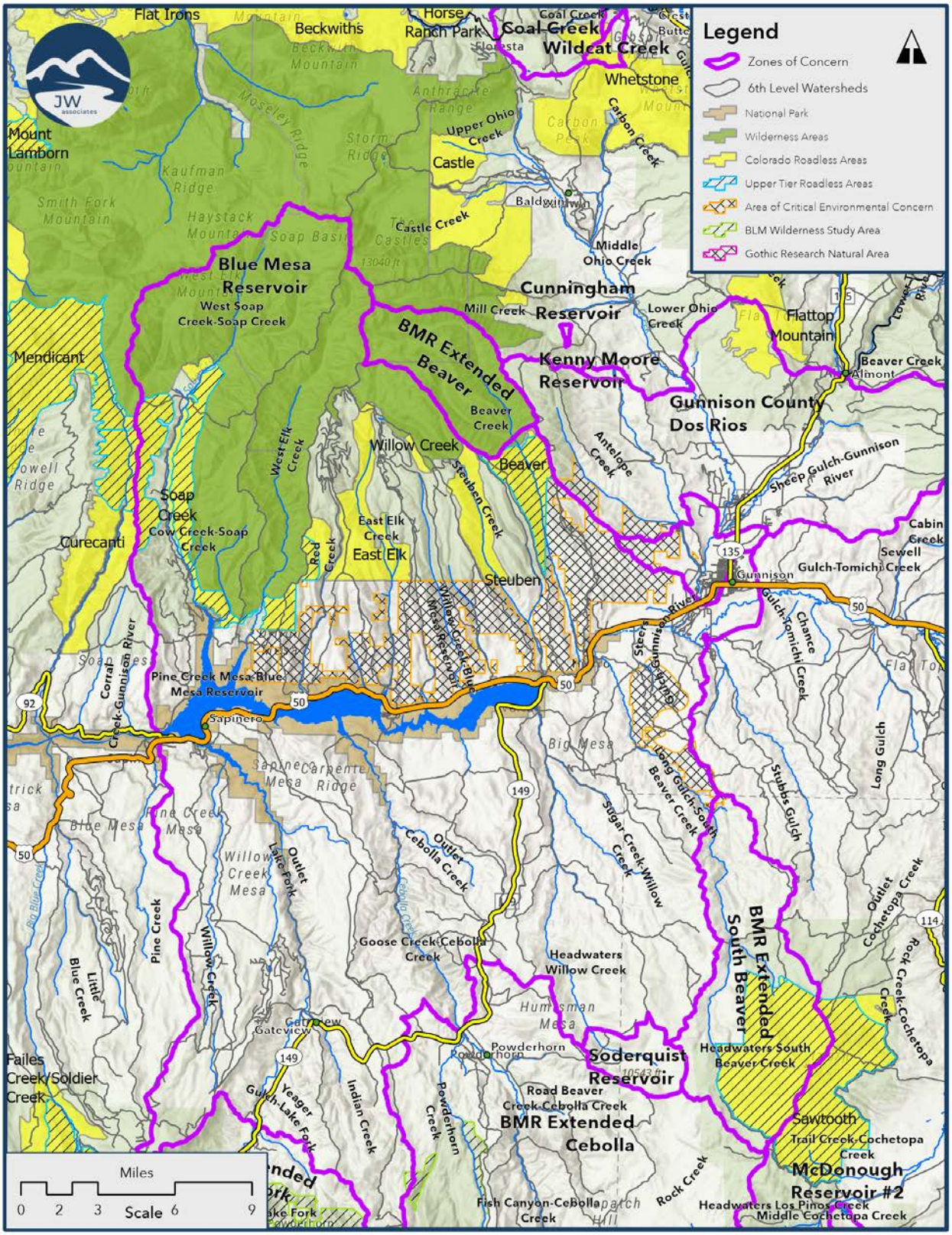




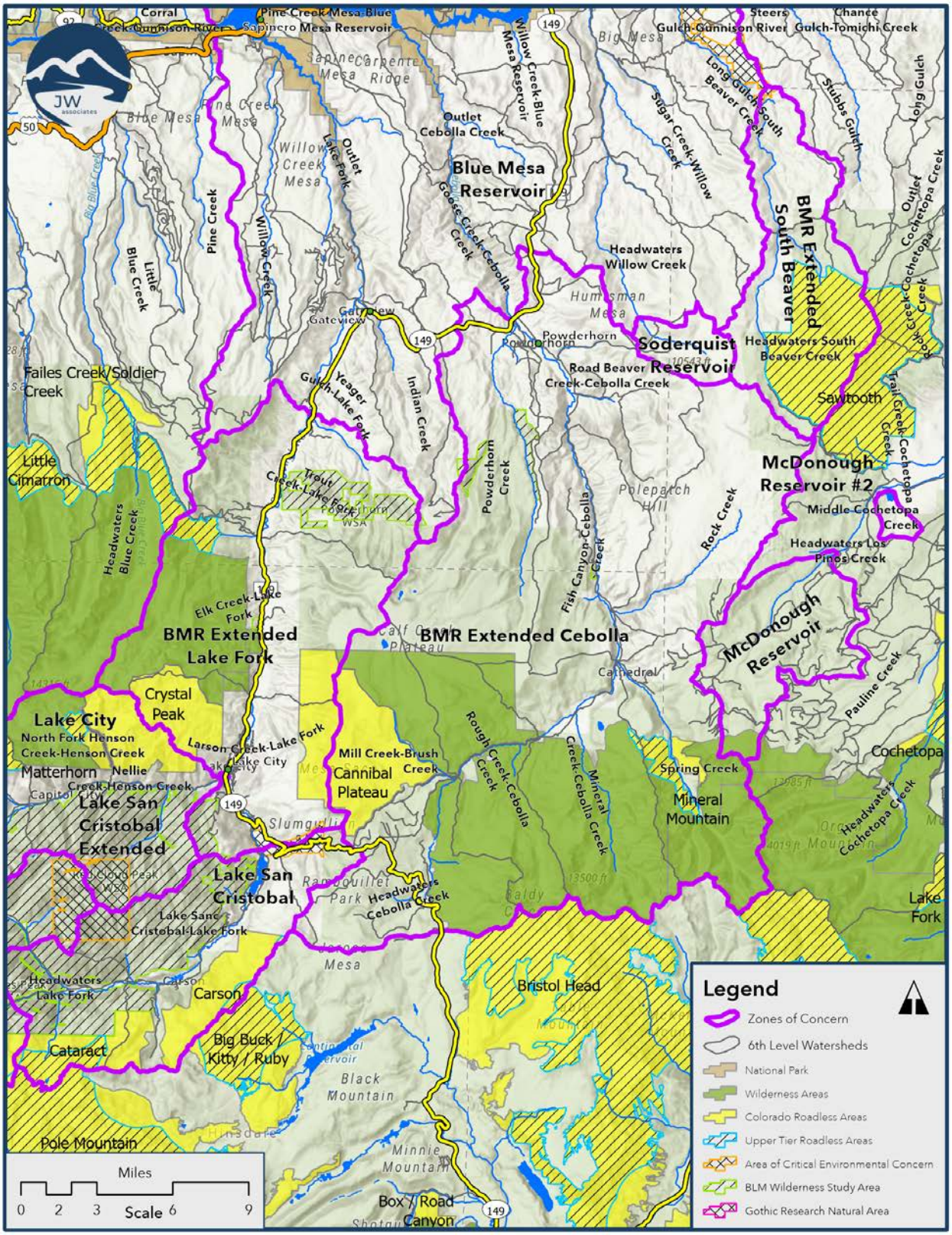
Map 4. Blue Mesa Reservoir North Zone of Concern Ownership



Map 5. Blue Mesa Reservoir South Zone of Concern Ownership



Map 6. Blue Mesa Reservoir North Zone of Concern Special Areas



Map 7. Blue Mesa Reservoir South Zone of Concern Special Areas

Blue Mesa Reservoir Zone of Concern Wildfire Composite

Wildfire hazard is high in many portions of the Blue Mesa Reservoir Zone of Concern. Modeled active and passive crown fire activity covers 42% of this large Zone of Concern. Modeled flame lengths above 11 feet also cover 47% of the Blue Mesa Zone of Concern. The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. There are six watersheds that rank as Highest hazard in the Composite Wildfire Hazard rank (Table 2), with another nine ranked as High (Maps 8 and 9).

Several watersheds that flow directly into Blue Mesa Reservoir from the north comprise a concentrated area of these High and Highest Composite Wildfire Hazard watersheds (Map 8). These watersheds include West Soap Creek-Soap Creek, Cow Creek-Soap Creek, West Elk Creek, Red Creek, East Elk Creek, Steuben Creek, and Beaver Creek. These seven watersheds have a high wildfire hazard combined with high debris flow and soil erodibility ranks that indicate hazards to Blue Mesa Reservoir.

South of Blue Mesa Reservoir the wildfire hazards are further away. There is a group of High and Highest watersheds in the Lake Fork Watershed. These watersheds include Indian Creek, Trout Creek-Lake Fork, Elk Creek-Lake Fork, and Larson Creek-Lake Fork. These four watersheds have a high wildfire hazard combined with high debris flow, soil erodibility, and for some, road hazard ranks that indicate hazards to Blue Mesa Reservoir.

There are also four watersheds in Cebolla Creek that are ranked as High Composite Wildfire Hazard. They are Fish Canyon-Cebolla Creek, Spring Creek, Mineral Creek-Cebolla Creek, and Rough Creek-Cebolla Creek. These watersheds have a high wildfire hazard combined with high debris flow, soil erodibility, and for some, road hazard ranks that indicate hazards to Blue Mesa Reservoir.

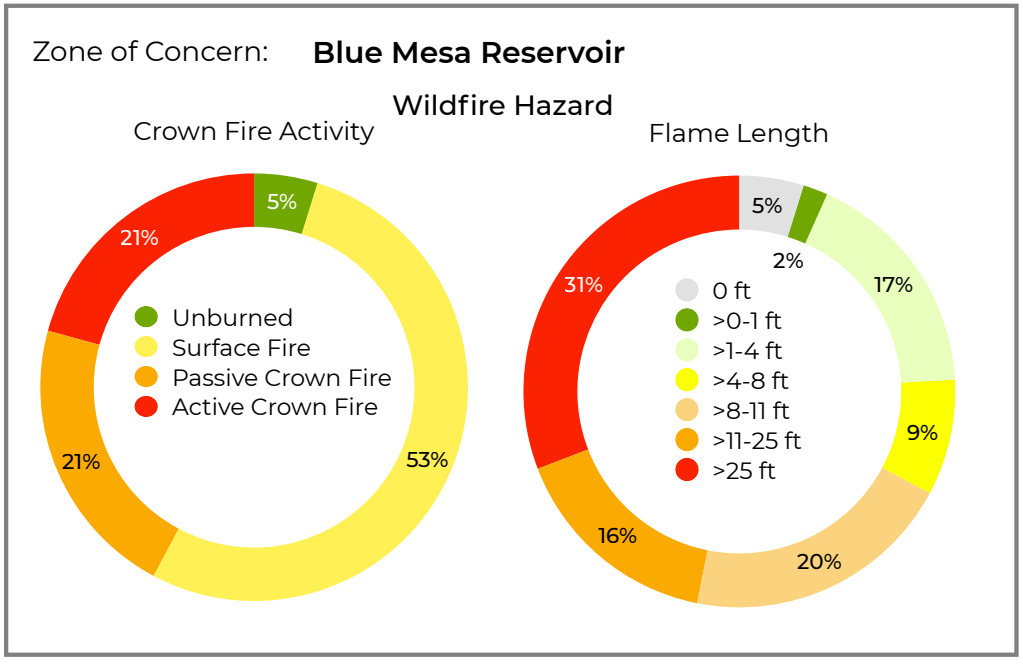
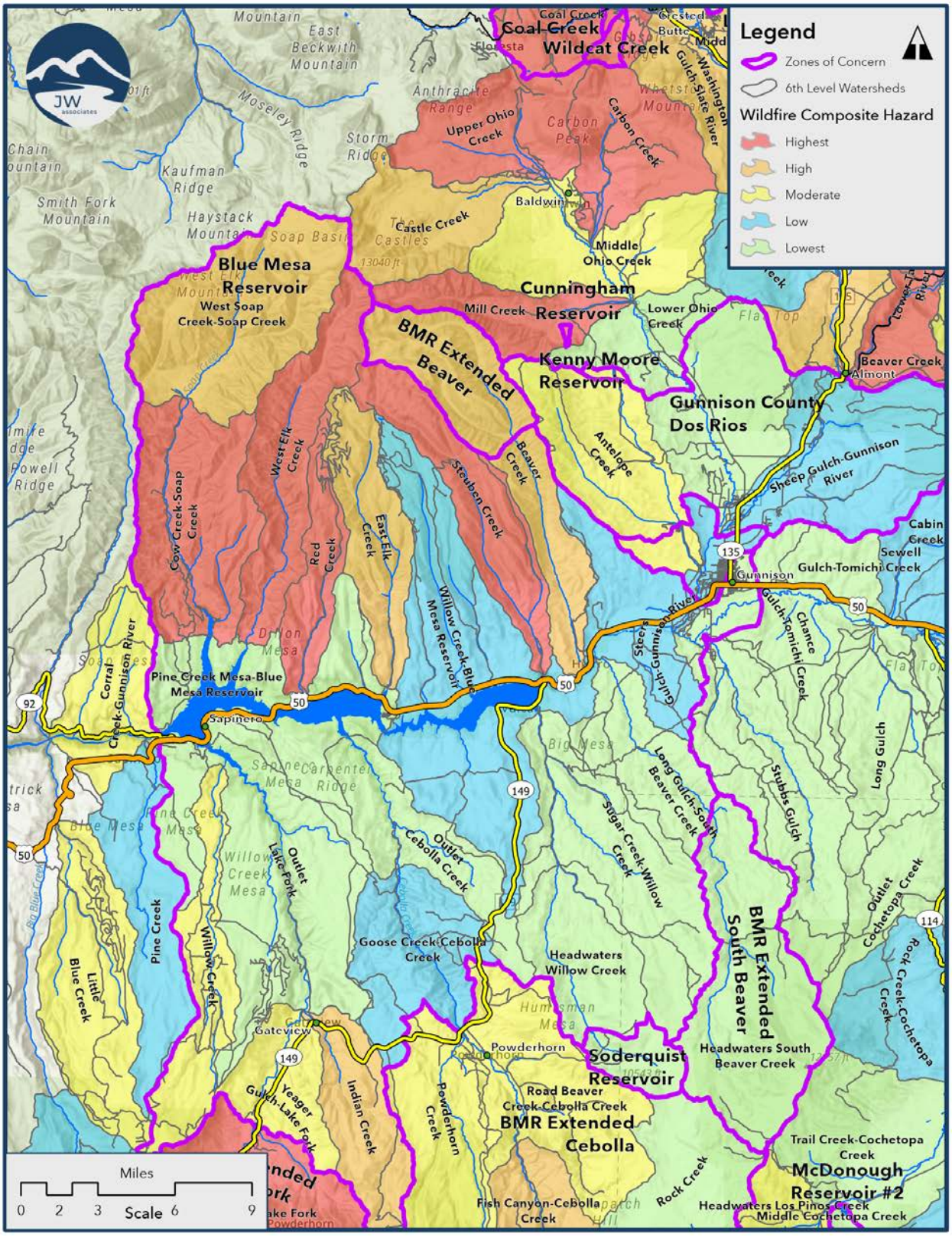
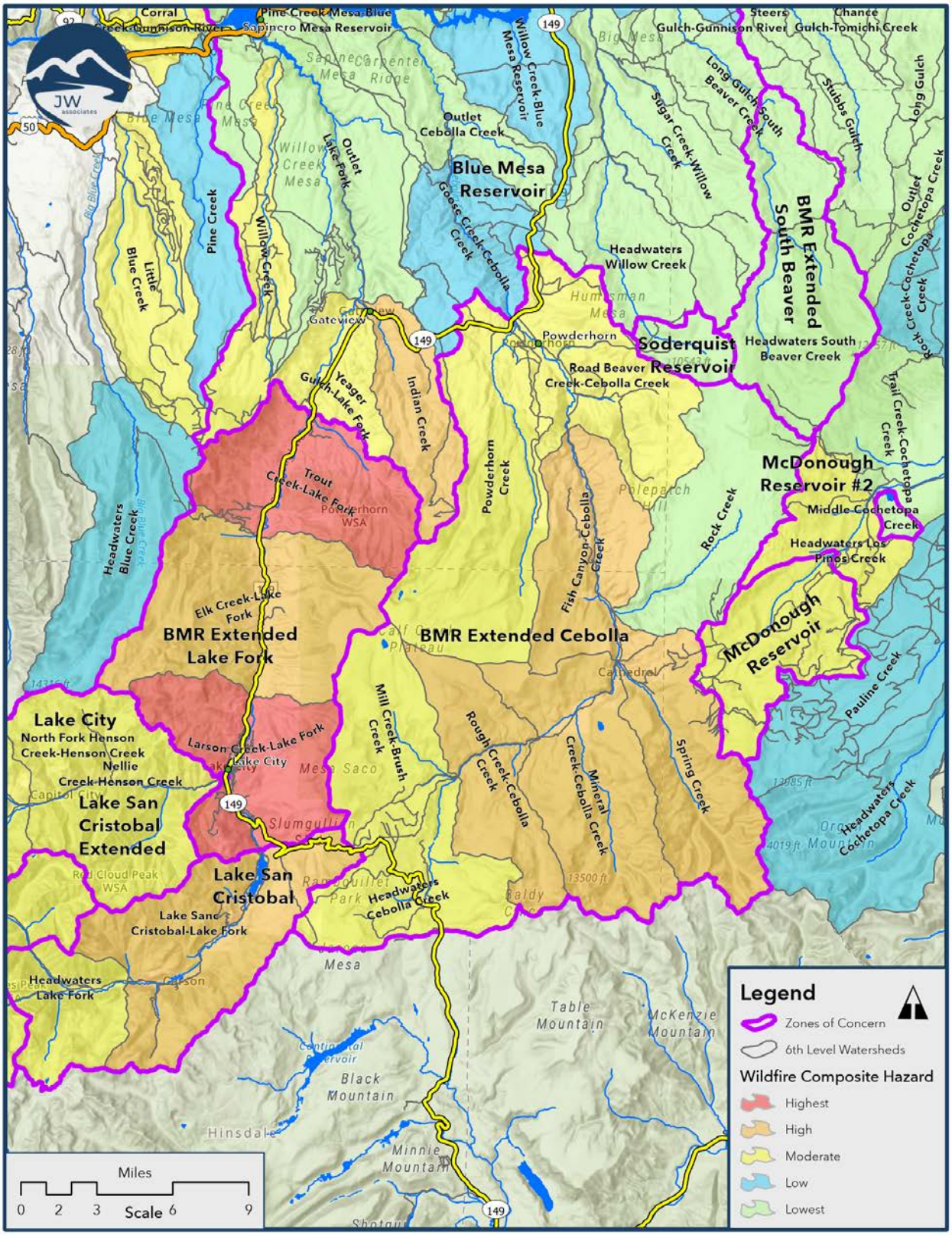


Table 2. Wildfire Composite Hazard Rankings for Blue Mesa Reservoir Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Headwaters South Beaver Creek	High	Low	Lowest	Lowest	Lowest
Long Gulch-South Beaver Creek	Lowest	Lowest	Low	Lowest	Lowest
Steers Gulch-Gunnison River	Lowest	Lowest	Highest	Low	Low
Headwaters Willow Creek	Low	Lowest	Low	Lowest	Lowest
Sugar Creek-Willow Creek	Lowest	Lowest	High	Lowest	Lowest
Beaver Creek	High	Highest	Lowest	Highest	High
Steuben Creek	High	Highest	High	Highest	Highest
Willow Creek-Blue Mesa Reservoir	Lowest	Lowest	High	Low	Low
Mill Creek-Brush Creek	High	Low	Low	Moderate	Moderate
Headwaters Cebolla Creek	High	Moderate	Moderate	Moderate	Moderate
Rough Creek-Cebolla Creek	High	Highest	Low	Moderate	High
Spring Creek	Highest	High	Lowest	Highest	High
Mineral Creek-Cebolla Creek	High	High	Low	High	High
Rock Creek	High	Lowest	Lowest	Lowest	Lowest
Fish Canyon-Cebolla Creek	Moderate	Low	High	High	High
Powderhorn Creek	Highest	Moderate	Lowest	Moderate	Moderate
Road Beaver Creek-Cebolla Creek	Moderate	Low	Moderate	High	Moderate
Goose Creek-Cebolla Creek	Low	Lowest	Moderate	Moderate	Low
Outlet Cebolla Creek	Lowest	Lowest	Low	Lowest	Lowest
Larson Creek-Lake Fork	High	Highest	High	High	Highest
Elk Creek-Lake Fork	Moderate	High	Moderate	Highest	High
Trout Creek-Lake Fork	High	High	Low	Highest	Highest
Yeager Gulch-Lake Fork	Moderate	Moderate	High	Moderate	Moderate
Indian Creek	Highest	High	Moderate	High	High
Willow Creek	Moderate	Moderate	Highest	Lowest	Moderate
Outlet Lake Fork	Low	Lowest	Moderate	Low	Lowest
East Elk Creek	Moderate	Highest	Low	Highest	High
Red Creek	Moderate	Highest	Highest	Highest	Highest
West Elk Creek	High	Highest	Lowest	Highest	Highest
West Soap Creek-Soap Creek	Highest	High	Lowest	Highest	High
Cow Creek-Soap Creek	High	High	Moderate	Highest	Highest
Pine Creek-Blue Mesa Reservoir	Lowest	Lowest	Low	Moderate	Lowest



Map 8. Blue Mesa Reservoir North Zone of Concern Wildfire Composite Hazard



Map 9. Blue Mesa Reservoir South Zone of Concern Wildfire Composite Hazard

Blue Mesa Reservoir Zone of Concern Access

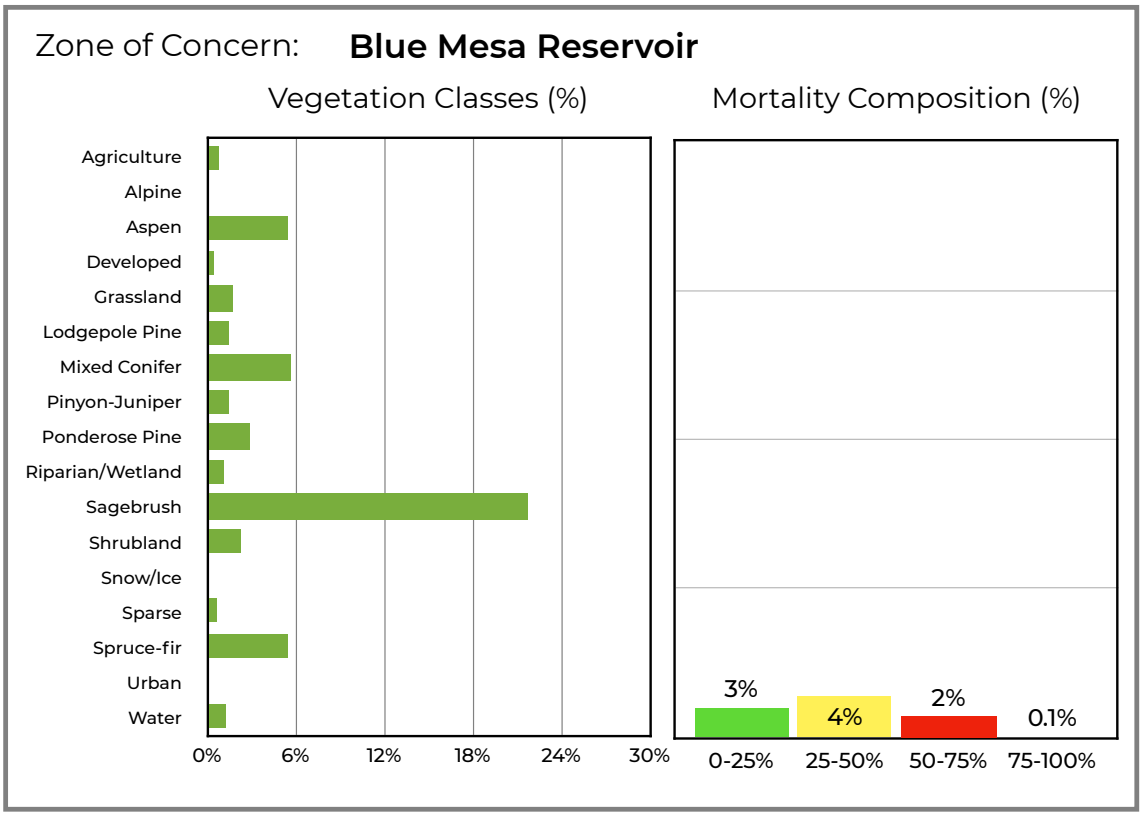
Road access is very limited in the watershed just north of Blue Mesa Reservoir, with most of the land area having designations of ACEC, Roadless, Upper Tier, or Wilderness. Access south of the reservoir is better but within the two groups of high composite wildfire hazard watershed, it is very limited.

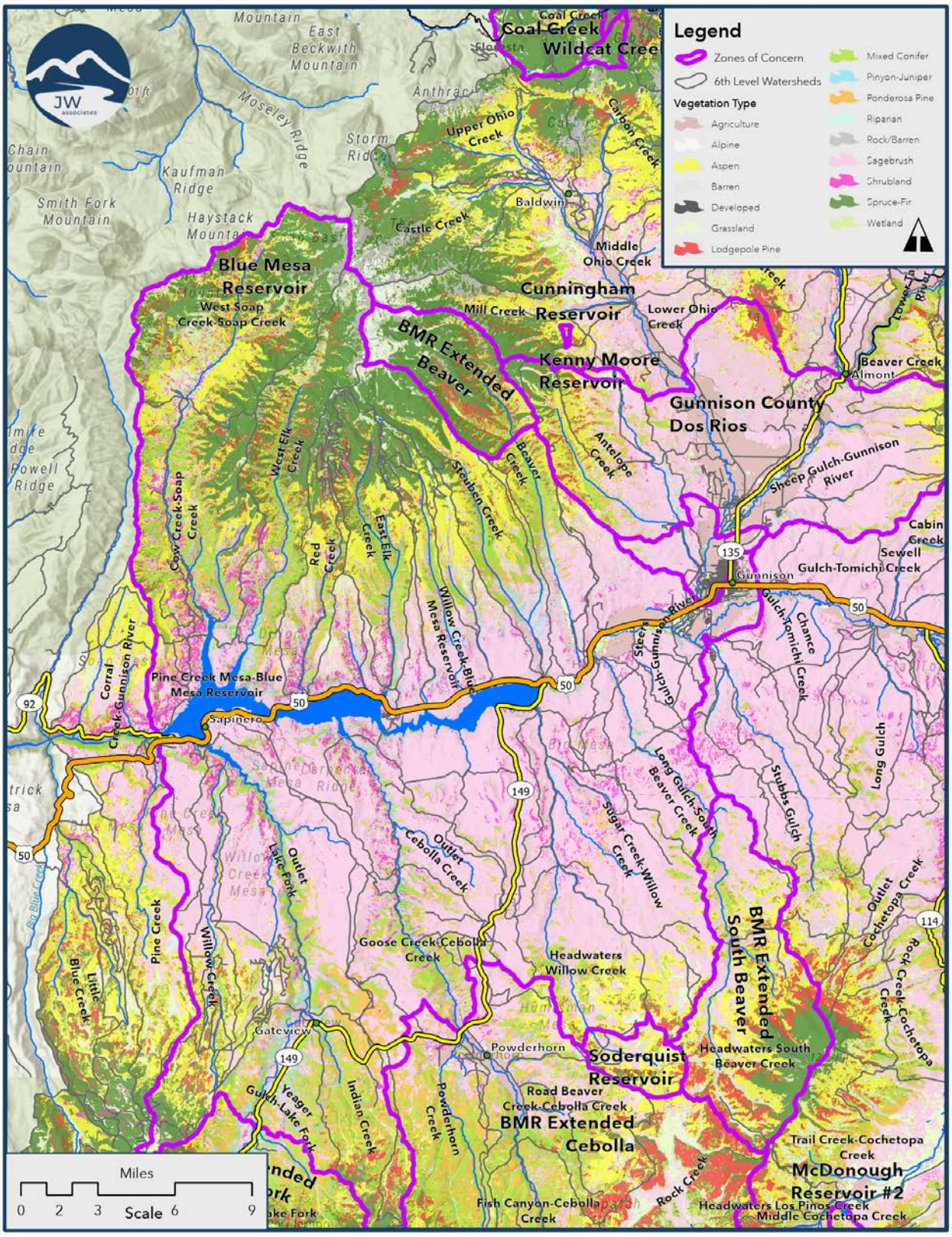
Blue Mesa Reservoir Zone of Concern Vegetation

The largest vegetation type in the Blue Mesa Zone of Concern is sagebrush, with aspen, mixed conifer and spruce-fir occupying smaller but similar percentages. The watersheds north of the reservoir are quite steep and the vegetation changes with elevation (Map 10). These watersheds generally start out close to the reservoir with sagebrush and shrublands, then transition to mixed conifer and aspen. Most of these watersheds have further transitions to lodgepole pine mixed with aspen before transitioning to spruce-fir and then alpine at the highest elevations.

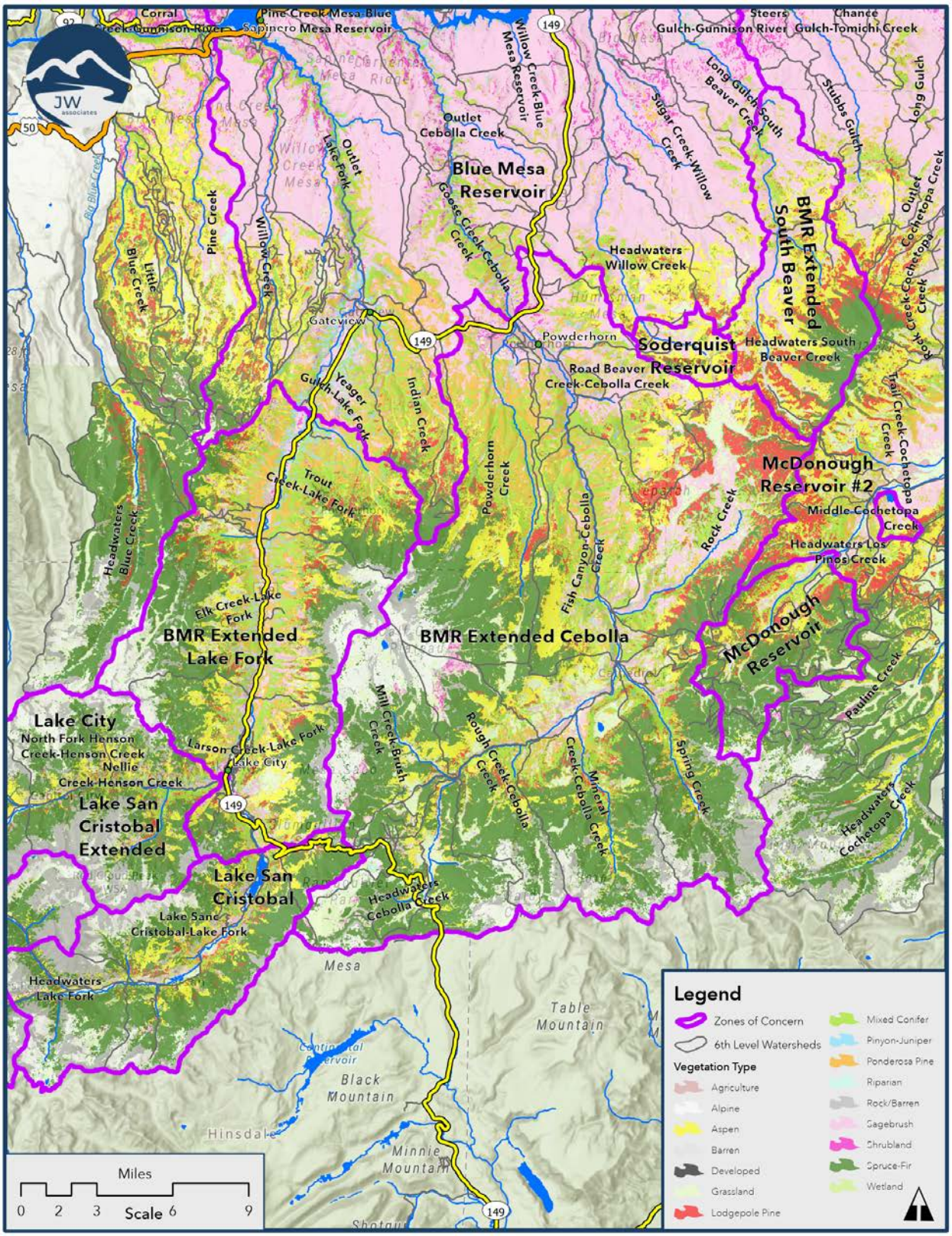
South of Blue Mesa Reservoir, the watersheds are not as steep initially and that is where large areas of sagebrush occur (Map 11). Lake Fork, Powderhorn, and Cebolla Creeks all transition to higher elevations, showing a similar pattern to the watershed north of the reservoir. Above the large areas of sagebrush, these watersheds transition to mixed conifer, then aspen with some areas of lodgepole pine, and finally spruce-fir with alpine at the highest elevations.

The mortality composition overall is not high, but there are areas that have more concentrated mortality. Two watersheds north of the reservoir have high mortality - West Soap Creek-Soap Creek and West Elk Creek. Mortality in several watersheds in Cebolla Creek are also high: Spring Creek, Mineral Creek-Cebolla Creek, and Rough Creek-Cebolla Creek.





Map 10. Blue Mesa Reservoir North Zone of Concern Vegetation



Map 11. Blue Mesa Reservoir South Zone of Concern Vegetation

Blue Mesa Reservoir Zone of Concern Climate Change Vulnerability

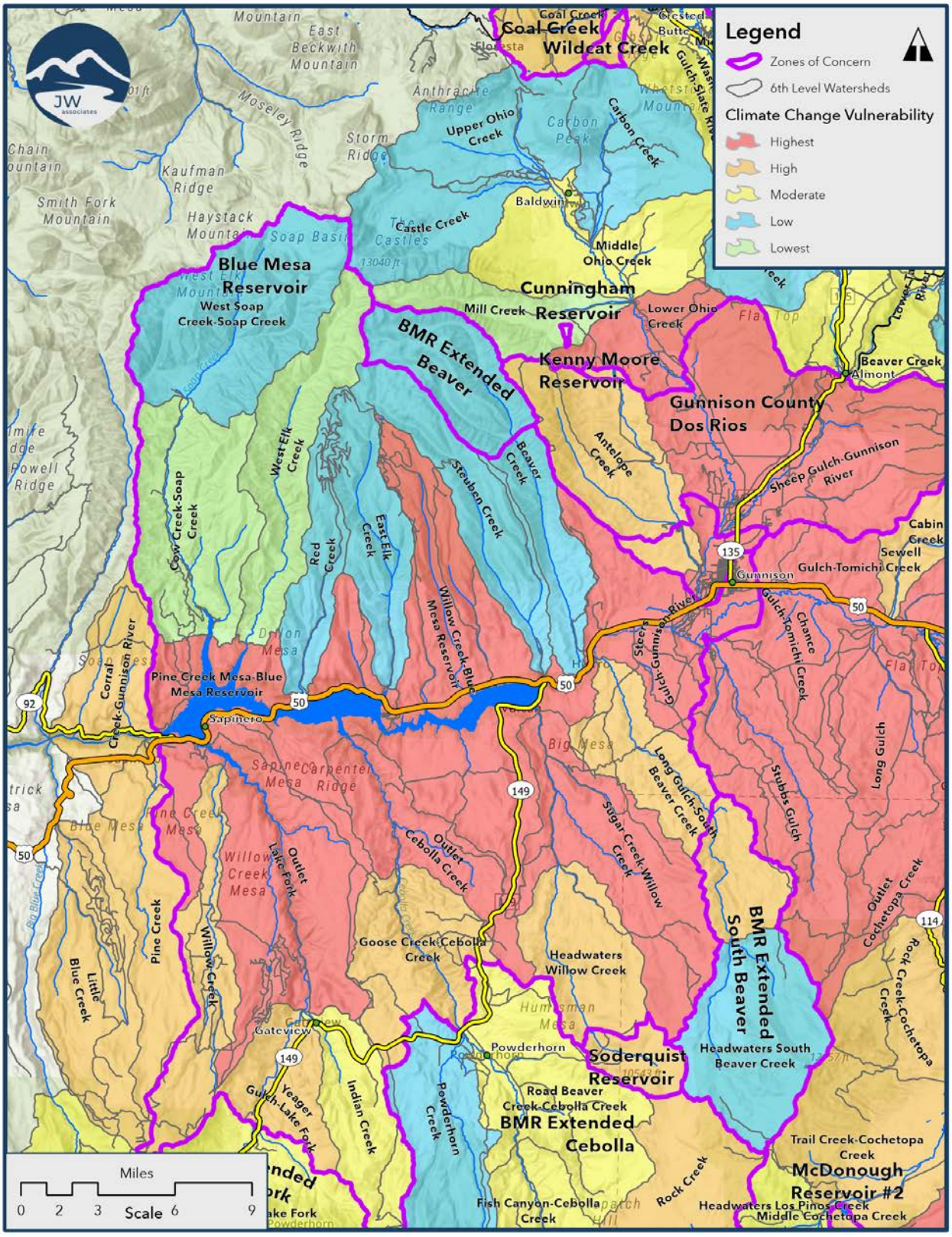
The Blue Mesa Zone of Concern has some concentrated areas around the reservoir that are ranked as Highest for Climate Change Vulnerability (Maps 12 and 13). There are six watersheds that rank as Highest hazard in Climate Change Vulnerability (Table 3), with another six ranked as High (Maps 12 and 13). These 12 watersheds are next to each other and focused at the lowest elevations surrounding Blue Mesa Reservoir.

The six watersheds that are ranked Highest are Steers Gulch-Gunnison River, Sugar Creek-Willow Creek, Willow Creek-Blue Mesa Reservoir, Outlet Cebolla Creek, Outlet Lake Fork, and Pine Creek Mesa-Blue Mesa Reservoir. These watersheds all have a combination of High or Highest Ecosystem Sensitivity and a High or Highest Lack of Adaptive Capacity (Table 3), except for Sugar Creek-Willow Creek.

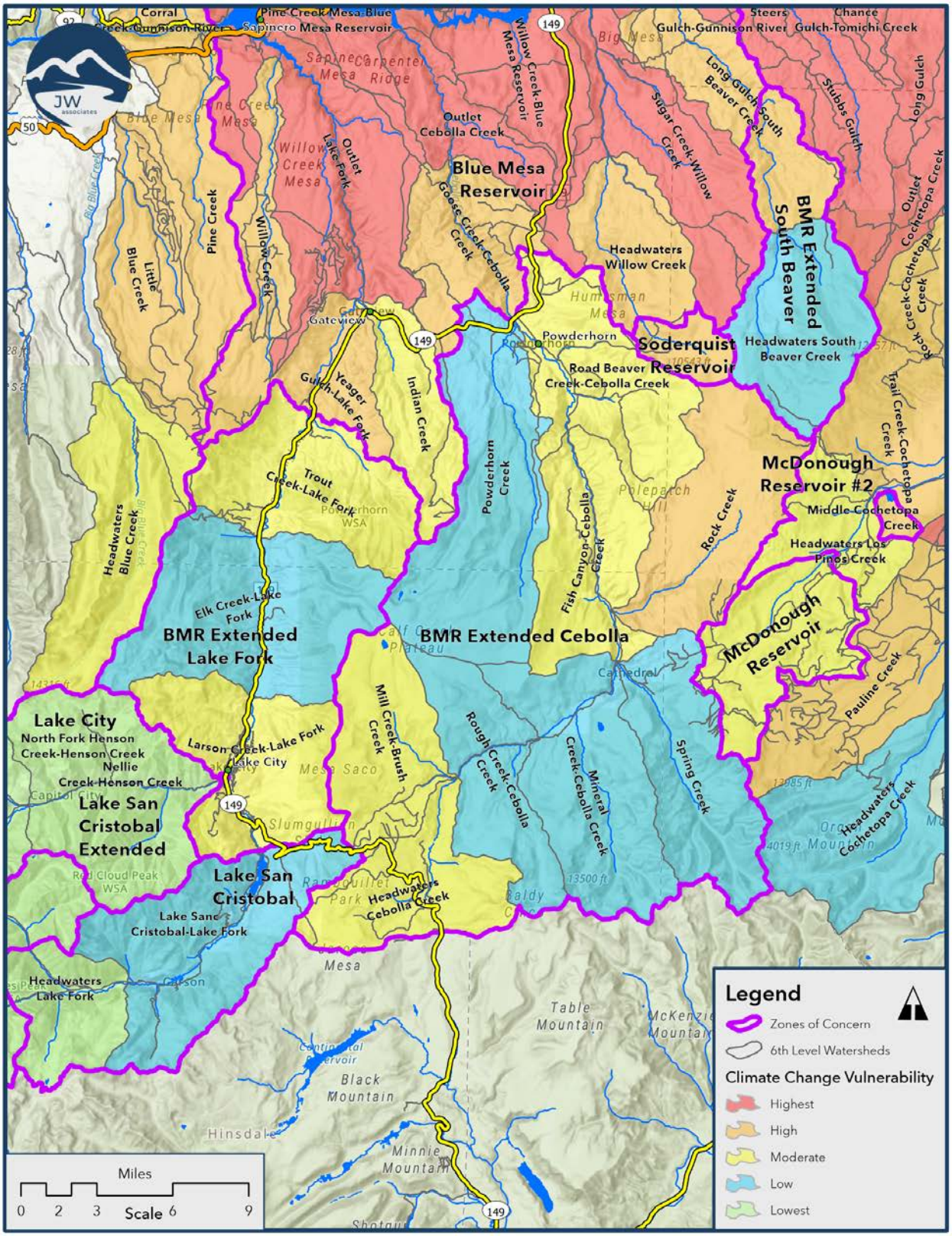
The six watersheds that are ranked High are Long Gulch-South Beaver Creek, Headwaters Willow Creek, Rock Creek, Goose Creek-Cebolla Creek, Yeager Gulch-Lake Fork and Willow Creek. These watersheds have a range of rankings for Ecosystem Sensitivity and Lack of Adaptive Capacity (Table 3), from Lowest to Highest.

The Ecosystem Sensitivity rank is a combination of three indicators (Table 4). The Highest and High ranked watershed for Ecosystem Sensitivity are generally ranked because they have a combination of high rankings in Landscape Condition and Fire Regime Departure, although a couple have high ranks in Insect and Disease.

The Lack of Adaptive Capacity rank is a combination of two indicators (Table 5). The Highest and High ranked watershed for Lack of Adaptive Capacity rank are mostly ranked because they have a High or Highest Lack of Diversity rank, although a couple have high ranks in Topo-climatic Variability.



Map 12. Blue Mesa Reservoir North Zone of Concern Climate Change Vulnerability



Map 13. Blue Mesa Reservoir South Zone of Concern Climate Change Vulnerability

Table 3. Climate Change Vulnerability Rankings for Blue Mesa Reservoir Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Headwaters South Beaver Creek	Low	Moderate	Low
Long Gulch-South Beaver Creek	Moderate	Highest	High
Steers Gulch-Gunnison River	High	Highest	Highest
Headwaters Willow Creek	Moderate	High	High
Sugar Creek-Willow Creek	Moderate	Highest	Highest
Beaver Creek	Moderate	Lowest	Low
Steuben Creek	Moderate	Lowest	Low
Willow Creek-Blue Mesa Reservoir	Highest	Highest	Highest
Mill Creek-Brush Creek	Low	High	Moderate
Headwaters Cebolla Creek	Moderate	High	Moderate
Rough Creek-Cebolla Creek	Low	Moderate	Low
Spring Creek	Moderate	Low	Low
Mineral Creek-Cebolla Creek	Moderate	Low	Low
Rock Creek	High	High	High
Fish Canyon-Cebolla Creek	Highest	Low	Moderate
Powderhorn Creek	Moderate	Low	Low
Road Beaver Creek-Cebolla Creek	Highest	Low	Moderate
Goose Creek-Cebolla Creek	High	High	High
Outlet Cebolla Creek	High	Highest	Highest
Larson Creek-Lake Fork	High	Lowest	Moderate
Elk Creek-Lake Fork	High	Lowest	Low
Trout Creek-Lake Fork	Highest	Lowest	Moderate
Yeager Gulch-Lake Fork	Highest	Low	High
Indian Creek	High	Low	Moderate
Willow Creek	High	High	High
Outlet Lake Fork	High	Highest	Highest
East Elk Creek	High	Lowest	Low
Red Creek	Moderate	Lowest	Low
West Elk Creek	Moderate	Lowest	Lowest
West Soap Creek-Soap Creek	Low	Low	Low
Cow Creek-Soap Creek	Moderate	Lowest	Lowest
Pine Creek Mesa-Blue Mesa Reservoir	Highest	Highest	Highest

Table 4. Ecosystem Sensitivity Rankings for Blue Mesa Reservoir Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Headwaters South Beaver Creek	Lowest	Moderate	Moderate	Low
Long Gulch-South Beaver Creek	Low	Highest	Lowest	Moderate
Steers Gulch-Gunnison River	Highest	High	Lowest	High
Headwaters Willow Creek	Low	Lowest	Highest	Moderate
Sugar Creek-Willow Creek	Moderate	Highest	Lowest	Moderate
Beaver Creek	Lowest	Lowest	High	Moderate
Steuben Creek	Low	Moderate	Moderate	Moderate
Willow Creek-Blue Mesa Reservoir	Highest	Highest	Lowest	Highest
Mill Creek-Brush Creek	Low	Lowest	High	Low
Headwaters Cebolla Creek	Moderate	Lowest	High	Moderate
Rough Creek-Cebolla Creek	Lowest	Low	Moderate	Low
Spring Creek	Lowest	Low	Highest	Moderate
Mineral Creek-Cebolla Creek	Lowest	Low	High	Moderate
Rock Creek	Low	Highest	Low	High
Fish Canyon-Cebolla Creek	High	High	Moderate	Highest
Powderhorn Creek	Low	Moderate	Moderate	Moderate
Road Beaver Creek-Cebolla Creek	Highest	High	Low	Highest
Goose Creek-Cebolla Creek	Highest	Highest	Lowest	High
Outlet Cebolla Creek	Highest	High	Lowest	High
Larson Creek-Lake Fork	High	Moderate	High	High
Elk Creek-Lake Fork	Low	Low	High	High
Trout Creek-Lake Fork	Moderate	High	Highest	Highest
Yeager Gulch-Lake Fork	Highest	Highest	Lowest	Highest
Indian Creek	High	High	Moderate	High
Willow Creek	Moderate	High	Moderate	High
Outlet Lake Fork	High	Highest	Lowest	High
East Elk Creek	Low	High	High	High
Red Creek	Moderate	High	Low	Moderate
West Elk Creek	Lowest	Moderate	High	Moderate
West Soap Creek-Soap Creek	Lowest	Low	High	Low
Cow Creek-Soap Creek	Low	High	Low	Moderate
Pine Creek Mesa-Blue Mesa Reservoir	Highest	Highest	Lowest	Highest

Table 5. Lack of Adaptive Capacity Rankings for Blue Mesa Reservoir Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Headwaters South Beaver Creek	Low	High	Moderate
Long Gulch-South Beaver Creek	Highest	High	Highest
Steers Gulch-Gunnison River	Highest	Highest	Highest
Headwaters Willow Creek	Highest	Low	High
Sugar Creek-Willow Creek	Highest	Highest	Highest
Beaver Creek	Lowest	Low	Low
Steuben Creek	Lowest	Low	Lowest
Willow Creek-Blue Mesa Reservoir	Highest	Moderate	Highest
Mill Creek-Brush Creek	Moderate	High	High
Headwaters Cebolla Creek	Moderate	High	High
Rough Creek-Cebolla Creek	Low	Moderate	Moderate
Spring Creek	Moderate	Lowest	Low
Mineral Creek-Cebolla Creek	Low	Low	Low
Rock Creek	Lowest	Highest	High
Fish Canyon-Cebolla Creek	Low	Low	Low
Powderhorn Creek	Lowest	Moderate	Low
Road Beaver Creek-Cebolla Creek	Low	Moderate	Low
Goose Creek-Cebolla Creek	High	Low	High
Outlet Cebolla Creek	Highest	Moderate	Highest
Larson Creek-Lake Fork	Low	Low	Lowest
Elk Creek-Lake Fork	Lowest	Lowest	Lowest
Trout Creek-Lake Fork	Lowest	Low	Lowest
Yeager Gulch-Lake Fork	Low	Moderate	Low
Indian Creek	Lowest	Low	Low
Willow Creek	Lowest	Highest	High
Outlet Lake Fork	High	High	Highest
East Elk Creek	Lowest	Lowest	Lowest
Red Creek	Lowest	Low	Lowest
West Elk Creek	Lowest	Lowest	Lowest
West Soap Creek-Soap Creek	Moderate	Lowest	Low
Cow Creek-Soap Creek	Lowest	Lowest	Lowest
Pine Creek Mesa-Blue Mesa Reservoir	Highest	Moderate	Highest

Blue Mesa Reservoir Zone of Concern Opportunities

There are opportunities to reduce wildfire hazard and climate change vulnerability in the Blue Mesa Reservoir Zone of Concern. There are also some significant constraints. The opportunities and constrains are presented in several groups of watersheds that have similar characteristics.

Watersheds North of Blue Mesa Reservoir

The group of watersheds just north of Blue Mesa Reservoir has been identified as having some of the highest Wildfire Composite Hazard rankings in the higher elevations. They are also identified as having some significant post-fire hazards.

These higher elevation watersheds are West Soap Creek-Soap Creek, Cow Creek-Soap Creek, West Elk Creek, Red Creek, East Elk Creek, Steuben Creek, and Beaver Creek watersheds. There are large areas of wilderness, roadless, upper tier roadless and ACECs in most of these watersheds. Only Red Creek and East Elk Creek have some opportunities for wildfire hazard reduction outside of those special areas. The other watersheds have no or limited areas that might be targets for wildfire hazard reduction actions. Pre- and post-fire planning and actions should be completed to identify opportunities and potential actions in this complex but hazardous area. Table 6 displays a summary of actions by watershed.

Table 6. Blue Mesa Reservoir Zone of Concern Actions - Northern Watersheds

Watersheds	Wildfire Composite Rank	Wildfire Hazard Reduction	Road analysis & planning	Address beetle mortality	Determine appropriate actions in roadless & ACECs	Riparian areas, floodplains, etc.	Pre- and post-fire planning
West Soap Creek-Soap Creek	High			✔	✔	✔	✔
Cow Creek-Soap Creek	Highest	✔	✔	✔	✔	✔	✔
West Elk Creek	Highest		✔	✔	✔	✔	✔
Red Creek	Highest	✔	✔	✔		✔	✔
East Elk Creek	High	✔		✔		✔	✔
Steuben Creek	Highest		✔	✔	✔	✔	✔
Beaver Creek	High			✔	✔	✔	✔

Watersheds Surrounding Blue Mesa Reservoir

The group of watersheds surrounding Blue Mesa Reservoir has been identified as having some of the highest Climate Change Vulnerability rankings, especially in the lowest elevations surrounding the reservoir. The six watersheds that are ranked Highest are Steers Gulch-Gunnison River, Sugar Creek-Willow Creek, Willow Creek-Blue Mesa Reservoir, Outlet Cebolla Creek, Outlet Lake Fork, and Pine Creek Mesa-Blue Mesa Reservoir. In addition, there are six watersheds that are ranked High: Long Gulch-South Beaver Creek, Headwaters Willow Creek, Rock Creek, Goose Creek-Cebolla Creek, Yeager Gulch-Lake Fork and Willow Creek.

These watersheds have high Climate Change Vulnerability hazard because of a combination of lack of diversity, landscape condition (roads), and fire regime departure. There is reasonable road access in most of these watersheds and basically no special areas that would limit actions. These watersheds are dominated by sagebrush, which would be the target of increasing diversity and fire regime restoration. Table 7 displays a summary of actions by watershed.

Table 7. Blue Mesa Reservoir Zone of Concern Actions - Surrounding Watersheds

Watersheds	CCVI Rank	Increase diversity	Fire regime restoration	Road Analysis & Planning	Riparian areas, floodplains, etc.
Steers Gulch-Gunnison River	Highest	✓	✓	✓	✓
Sugar Creek-Willow Creek	Highest	✓	✓		✓
Willow Creek-Blue Mesa Reservoir	Highest	✓	✓	✓	✓
Outlet Cebolla Creek	Highest	✓	✓	✓	✓
Outlet Lake Fork	Highest	✓	✓	✓	✓
Pine Creek Mesa-Blue Mesa Reservoir	Highest	✓	✓	✓	
Long Gulch-South Beaver Creek	High	✓	✓		✓
Headwaters Willow Creek	High	✓			✓
Rock Creek	High		✓		✓
Goose Creek-Cebolla Creek	High	✓	✓	✓	✓
Yeager Gulch-Lake Fork	High		✓	✓	✓
Willow Creek	High		✓		✓

Watersheds South of Blue Mesa Reservoir

There is a group of watersheds south of Blue Mesa Reservoir in the Lake Fork and Cebolla watersheds that has been identified as having high Wildfire Composite Hazard rankings (Map 9). They are also identified as having some high post-fire hazards.

These higher elevation watersheds are West Soap Creek-Soap Creek, Cow Creek-Soap Creek, West Elk Creek, Red Creek, East Elk Creek, Steuben Creek, and Beaver Creek watersheds. There are large areas of wilderness, roadless, and upper tier roadless in many of these watersheds. Only Red Creek and East Elk Creek have some opportunities for wildfire hazard reduction outside of those special areas.

There is a group of High and Highest watersheds in the Lake Fork and Cebolla Creek watersheds. These watersheds include Indian Creek, Trout Creek-Lake Fork, Elk Creek-Lake Fork, and Larson Creek-Lake Fork. There are also four watersheds in Cebolla Creek that are ranked as High Composite Wildfire Hazard. They are Fish Canyon-Cebolla Creek, Spring Creek, Mineral Creek-Cebolla Creek, and Rough Creek-Cebolla Creek.

Elk Creek-Lake Fork, Rough Creek-Cebolla Creek, and Mineral Creek-Cebolla Creek are almost entirely within wilderness or a variety of other special areas. These watersheds have no or limited areas that might be targets for wildfire hazard reduction actions. Pre- and post-fire planning and actions should be completed to identify opportunities and potential actions in this complex but hazardous area. Table 8 displays a summary of actions by watershed.

Table 8. Blue Mesa Reservoir Zone of Concern Actions - Southern Watersheds

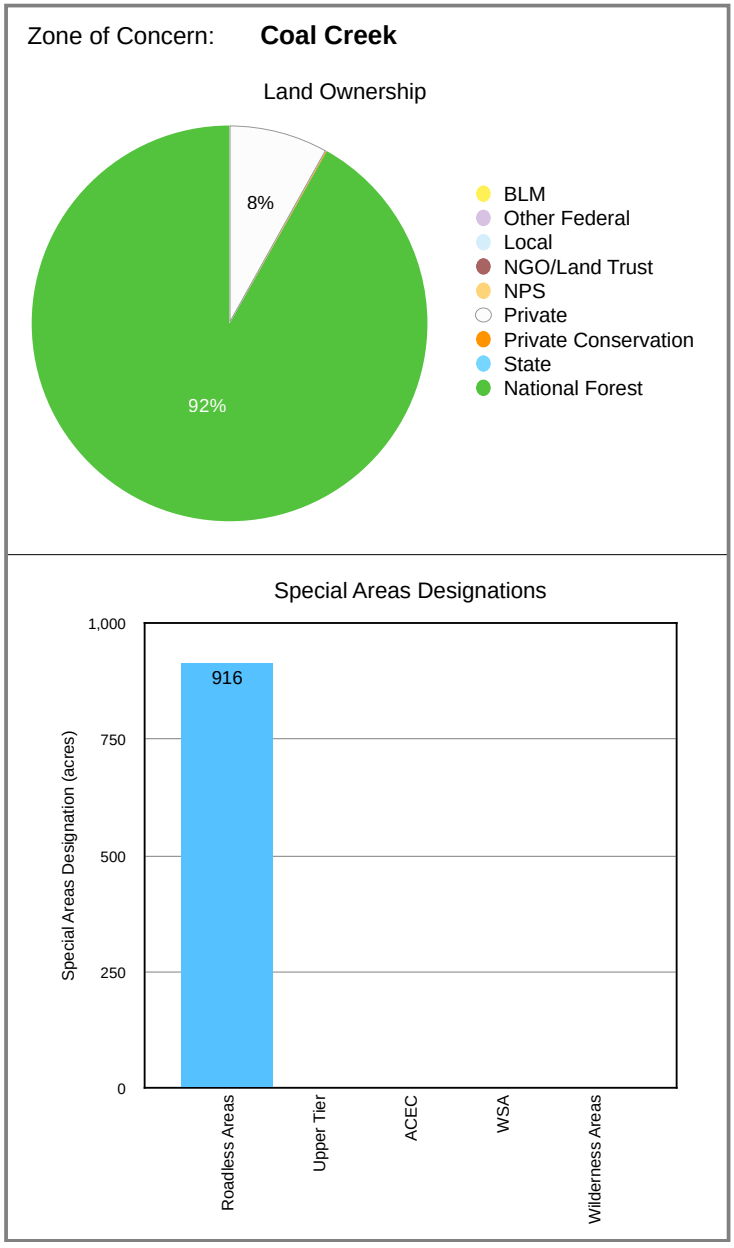
Watersheds	Wildfire Composite Rank	Wildfire Hazard Reduction	Road analysis & planning	Address beetle mortality	Determine appropriate actions in roadless & ACECs	Riparian areas, floodplains, etc.	Pre- and post-fire planning
Indian Creek	High	☑	☑			☑	☑
Trout Creek-Lake Fork	Highest	☑		☑	☑	☑	☑
Elk Creek-Lake Fork	High	☑	☑	☑	☑	☑	☑
Larson Creek-Lake Fork	Highest	☑	☑	☑	☑	☑	☑
Fish Canyon-Cebolla Creek	High		☑			☑	☑
Spring Creek	High	☑		☑	☑	☑	☑
Mineral Creek-Cebolla Creek	High	☑		☑		☑	☑
Rough Creek-Cebolla Creek	High			☑		☑	☑

Coal and Wildcat Creek Zones of Concern

The Coal Creek and Wildcat Creek Zones of Concern are adjacent to each other in the same 6th Level watershed (Coal Creek). Coal Creek Zone of Concern covers 8,596 acres and the Wildcat Creek Zone of Concern covers 1,160 acres (Table 1 and Map 14).

Coal Creek Zone of Concern Ownership

The majority (92%) of the Coal Creek Zone of Concern is National Forest lands (Map 14), with some smaller areas of private lands. The areas of private lands appear to be mostly mining claims.

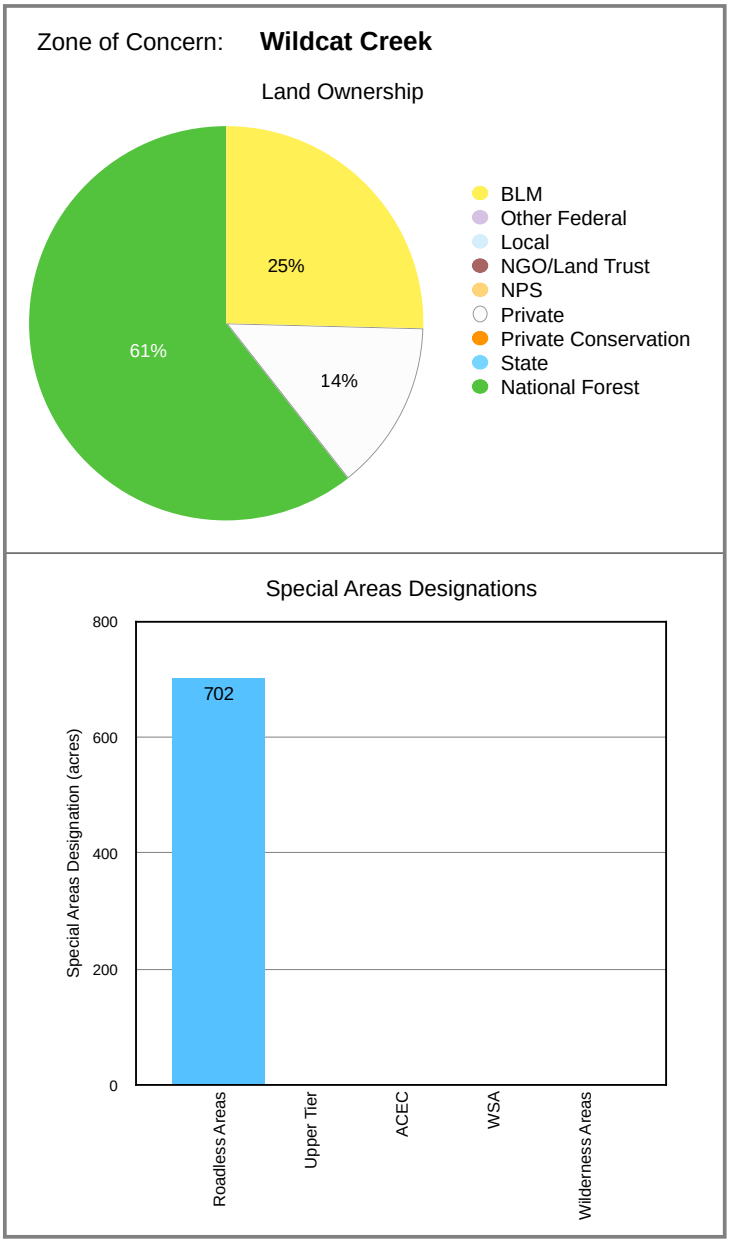


Coal Creek Zone of Concern Special Areas

There are slightly more than 900 acres of Whetstone Roadless Area which is approximately 10% of the Zone of Concern. There are no wilderness areas or upper tier roadless (Map 15).

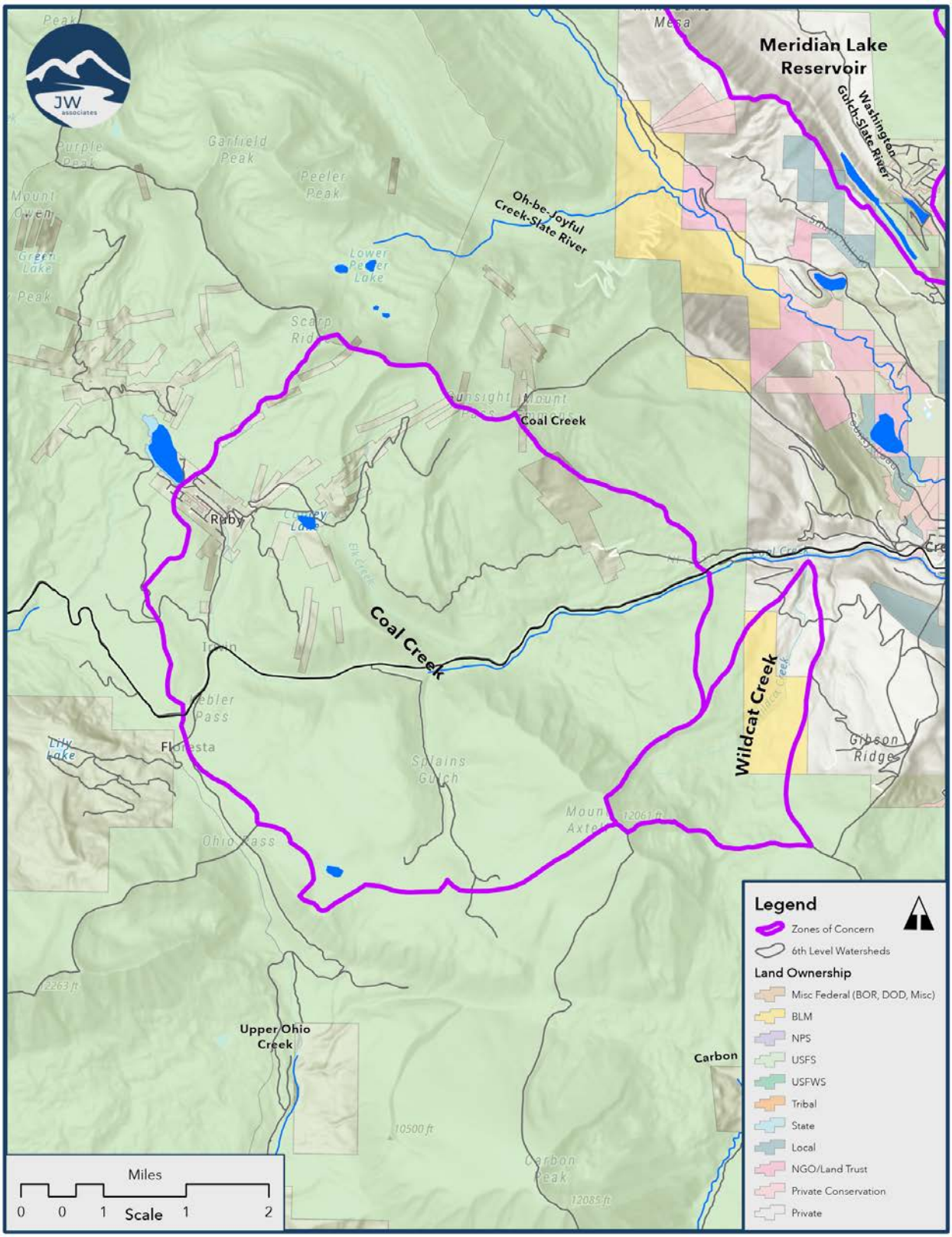
Wildcat Creek Zone of Concern Ownership

The majority (61%) of the Wildcat Creek Zone of Concern is National Forest lands (Map 14) which occupy the headwaters. BLM lands cover 25% and the remainder is private lands in the lowest elevations.

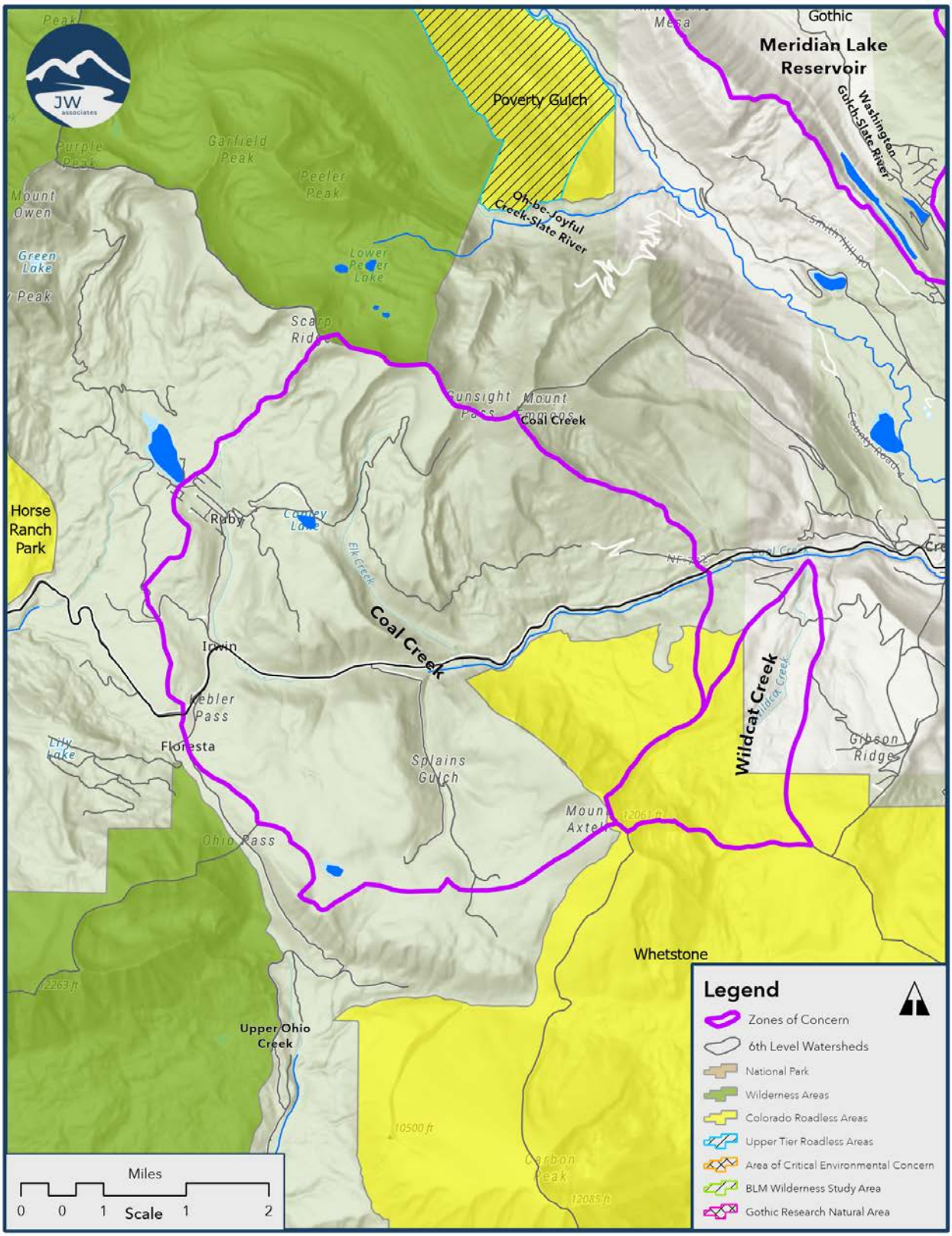


Wildcat Creek Zone of Concern Special Areas

There are slightly more than 700 acres of Whetstone Roadless Area which is more than 60% of the Zone of Concern (Map 15). There are no wilderness areas or upper tier roadless.



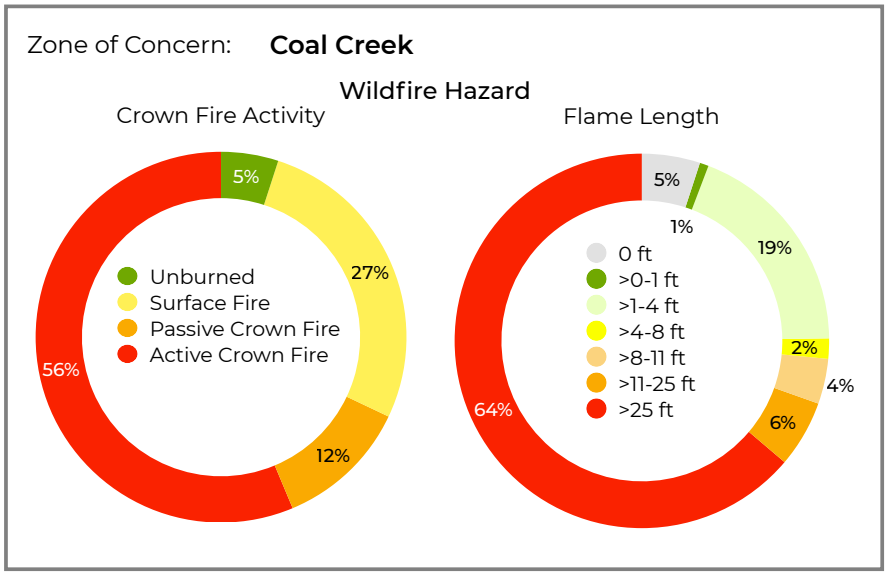
Map 14. Coal and Wildcat Creek Zones of Concern Ownership



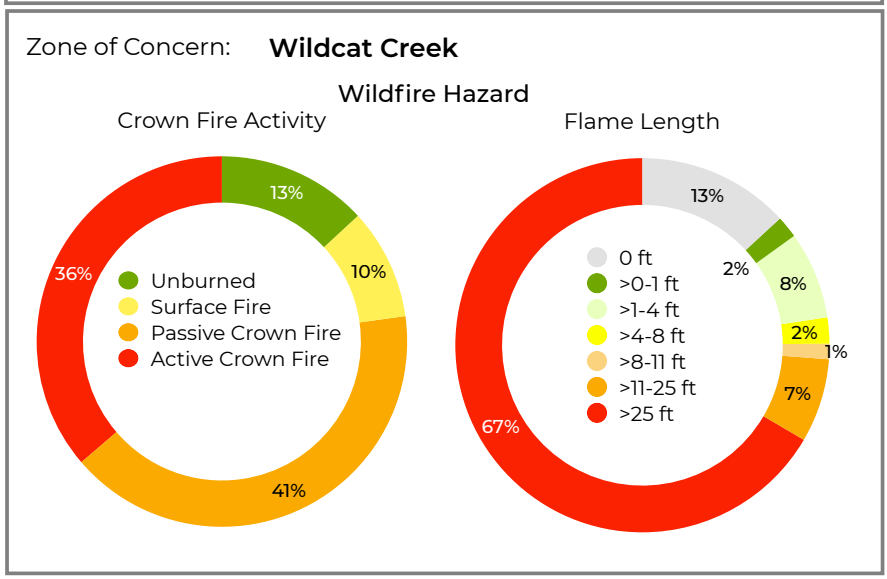
Map 15. Coal and Wildcat Creek Zones of Concern Special Areas

Coal and Wildcat Creek Zones of Concern Wildfire Composite

Wildfire hazard is high in most of the Coal Creek Zone of Concern. Modeled active and passive crown fire activity covers 68% of the Coal Creek Zone of Concern. Modeled flame lengths above 11 feet also cover 70% of the Coal Creek Zone of Concern.



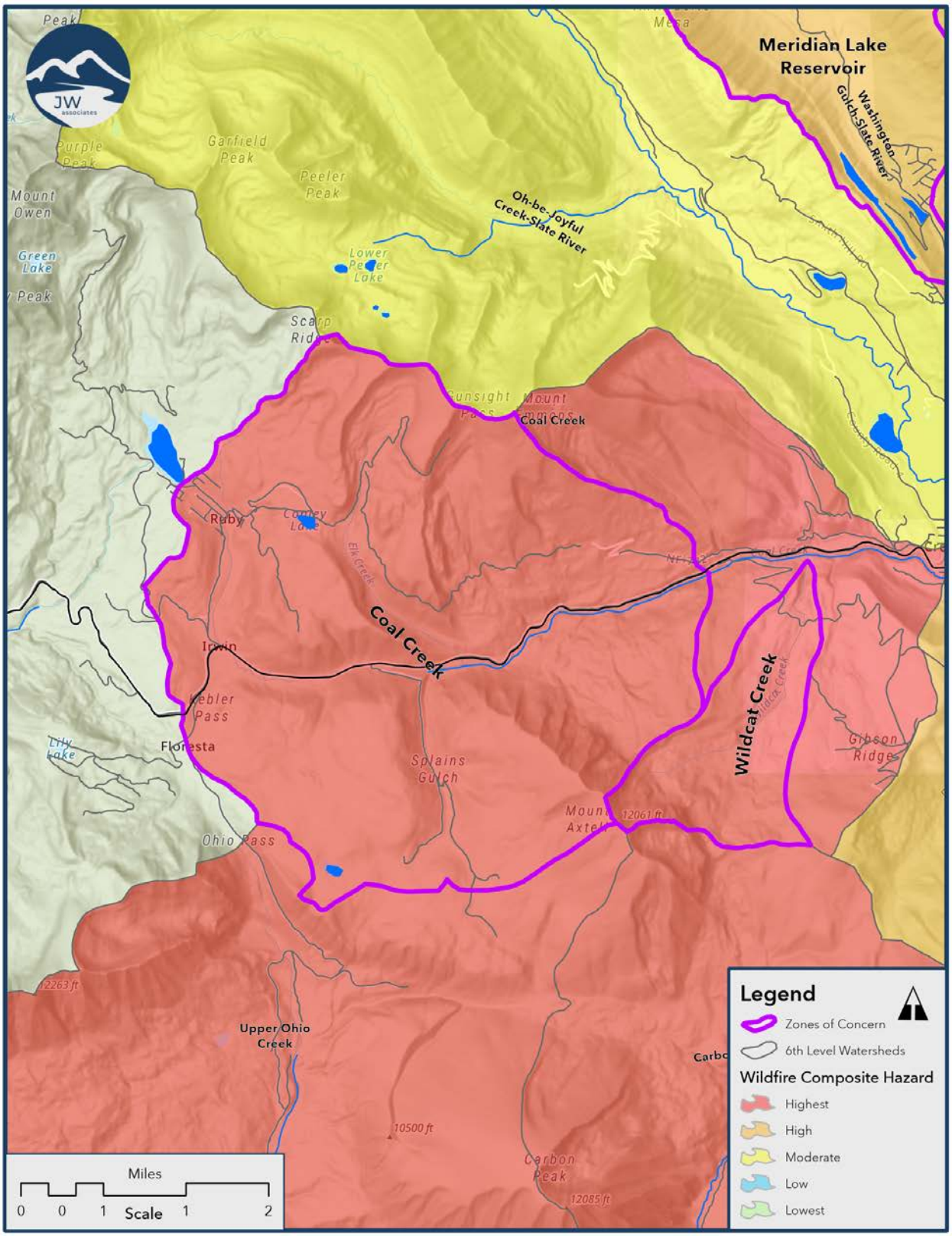
Wildfire hazard is high in most of the Wildcat Creek Zone of Concern. Modeled active and passive crown fire activity covers 77% of the Wildcat Creek Zone of Concern. Modeled flame lengths above 11 feet also cover 74% of the Wildcat Creek Zone of Concern.



The composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Coal Creek watershed ranks as Highest hazard in the Composite Wildfire Hazard ranking (Table 9 and Map 16). The Coal Creek watershed also ranks as Highest for Wildfire Hazard, Road Hazards, and Soil Erodibility. These hazard rankings apply to the Wildcat Creek Zone of Concern as well.

Table 9. Wildfire Composite Hazard Rankings for Coal & Wildcat Creek Zones of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Coal Creek	Highest	High	Highest	Highest	Highest



Map 16. Coal and Wildcat Creek Zones of Concern Wildfire Composite Hazard

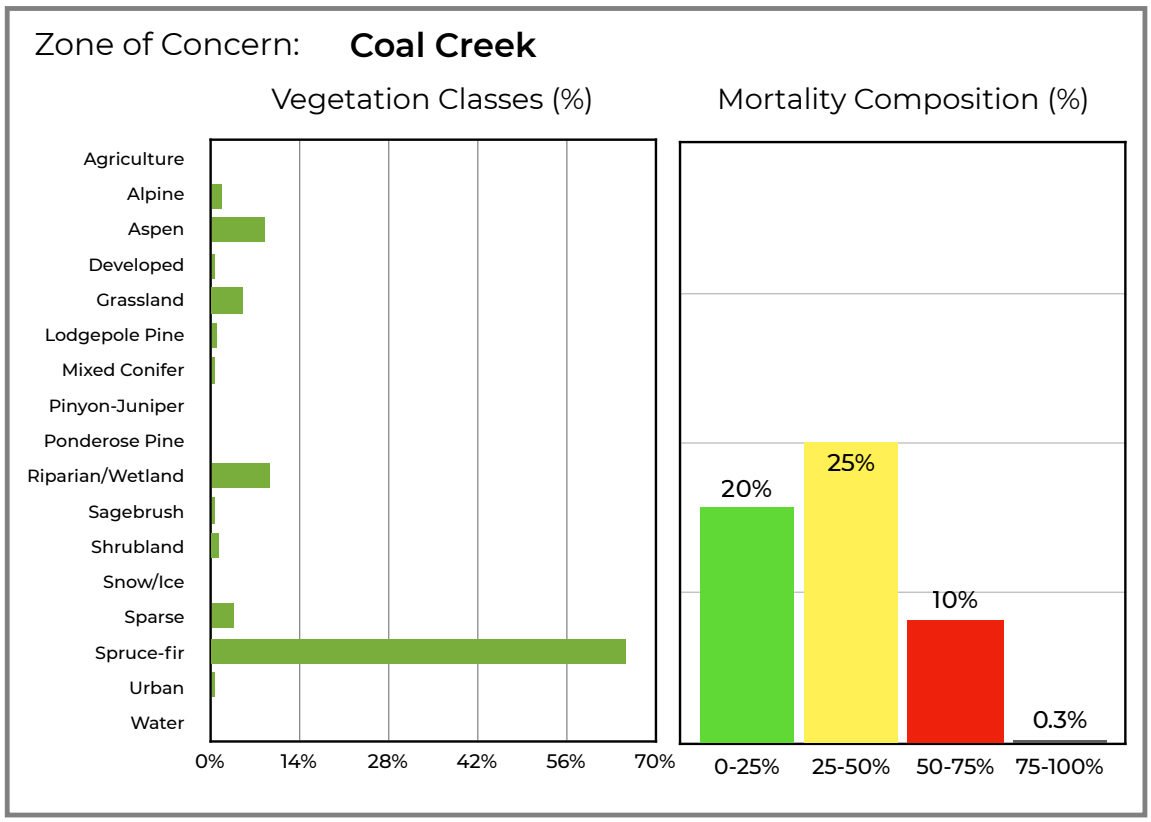
Coal and Wildcat Creek Zones of Concern Access

The Coal Creek Zone of Concern has a significant number of roads outside of the roadless area (Map 14). The county road up and over Kebler Pass and numerous other roads provide access throughout the Zone of Concern.

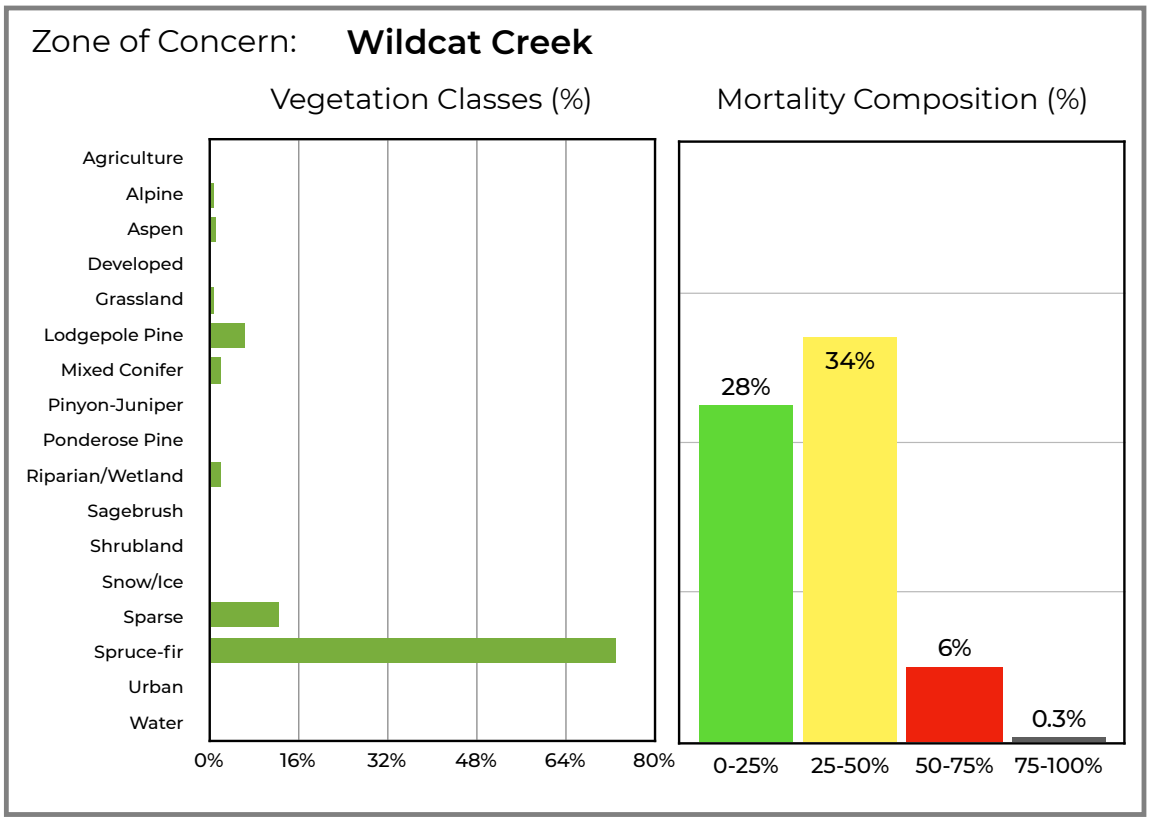
The Wildcat Creek Zone of Concern only has one road in the lowest portion of the Zone of Concern (Map 14). That access is on private lands. Access is somewhat limited because of the large area in roadless and only one private road.

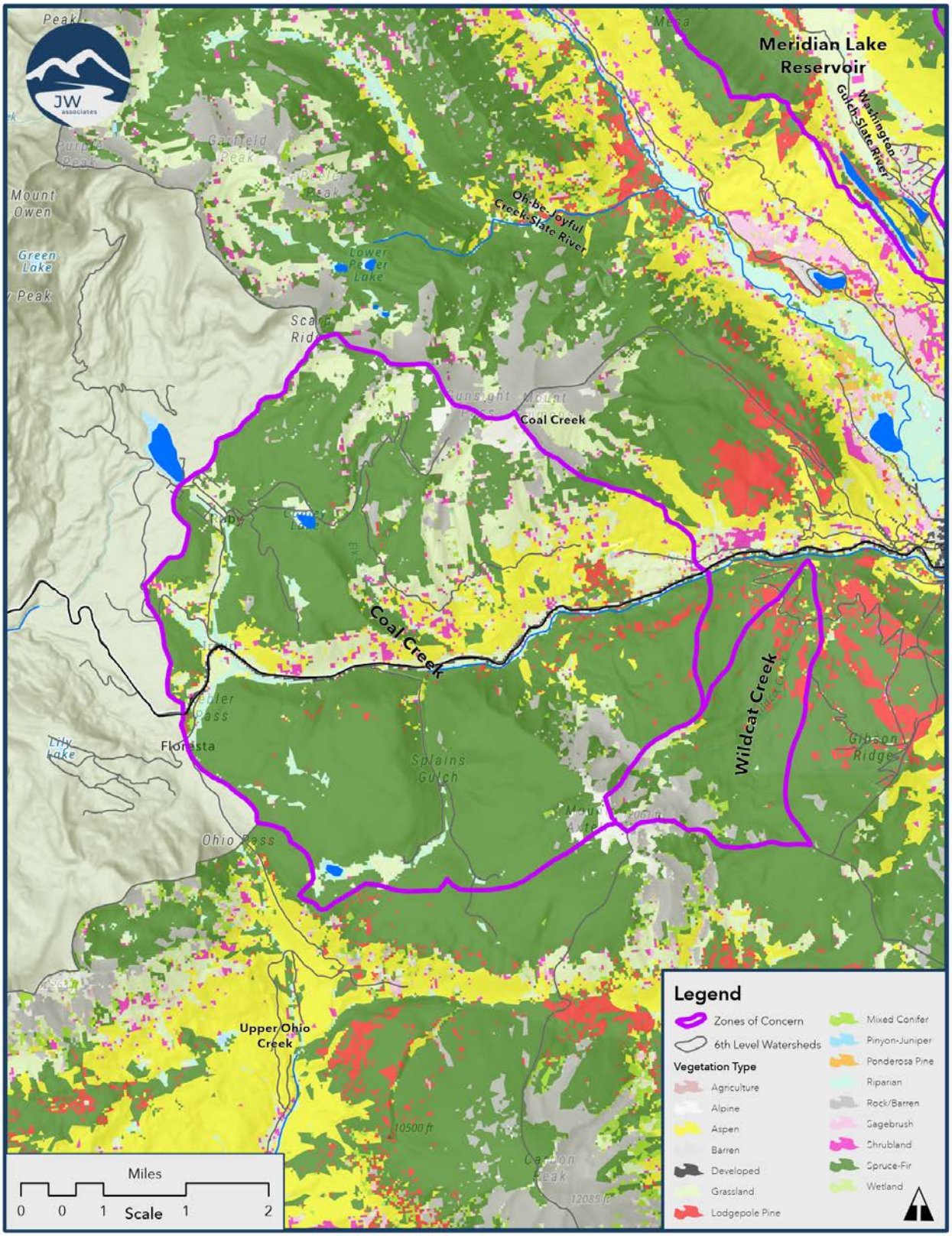
Coal and Wildcat Creek Zones of Concern Vegetation

The Coal Creek Zone of Concern is dominated by spruce-fir (Map 17). The south-facing slopes on the north side of Coal Creek have large areas of aspen mixed with shrublands and some meadows up to alpine on the east but are dominated by spruce-fir on the west end. The north-facing portions of the watershed, south of Coal Creek, are mostly dominated by spruce-fir with some small areas of lodgepole pine and aspen mixed in. Mortality is significant with over 35% of the forest experiencing 25-75% mortality.



The Wildcat Creek Zone of Concern is dominated by spruce-fir (Map 17). The lower elevations have some areas of lodgepole pine and the highest elevations have some alpine/rock. Mortality is significant with 40% of the forest experiencing 25-75% mortality.





Map 17. Coal and Wildcat Creek Zones of Concern Vegetation

Coal and Wildcat Creek Zones of Concern Climate Change Vulnerability

The Coal Creek watershed has a High Climate Change Vulnerability rank which is comprised of a High Ecosystem Sensitivity rank and a High Lack of Adaptive Capacity rank (Table 10). Both of the components of Climate Change Vulnerability are equally contributing to the High ranking.

Table 10. Climate Change Vulnerability Rankings for Coal & Wildcat Creek Zones of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Coal Creek	High	High	High

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape condition is ranked as Highest for Coal Creek and the other factors are ranked Low (Table 11). The amount and distribution of roads throughout the Coal Creek watershed is the reason for the Highest rank for Landscape Condition.

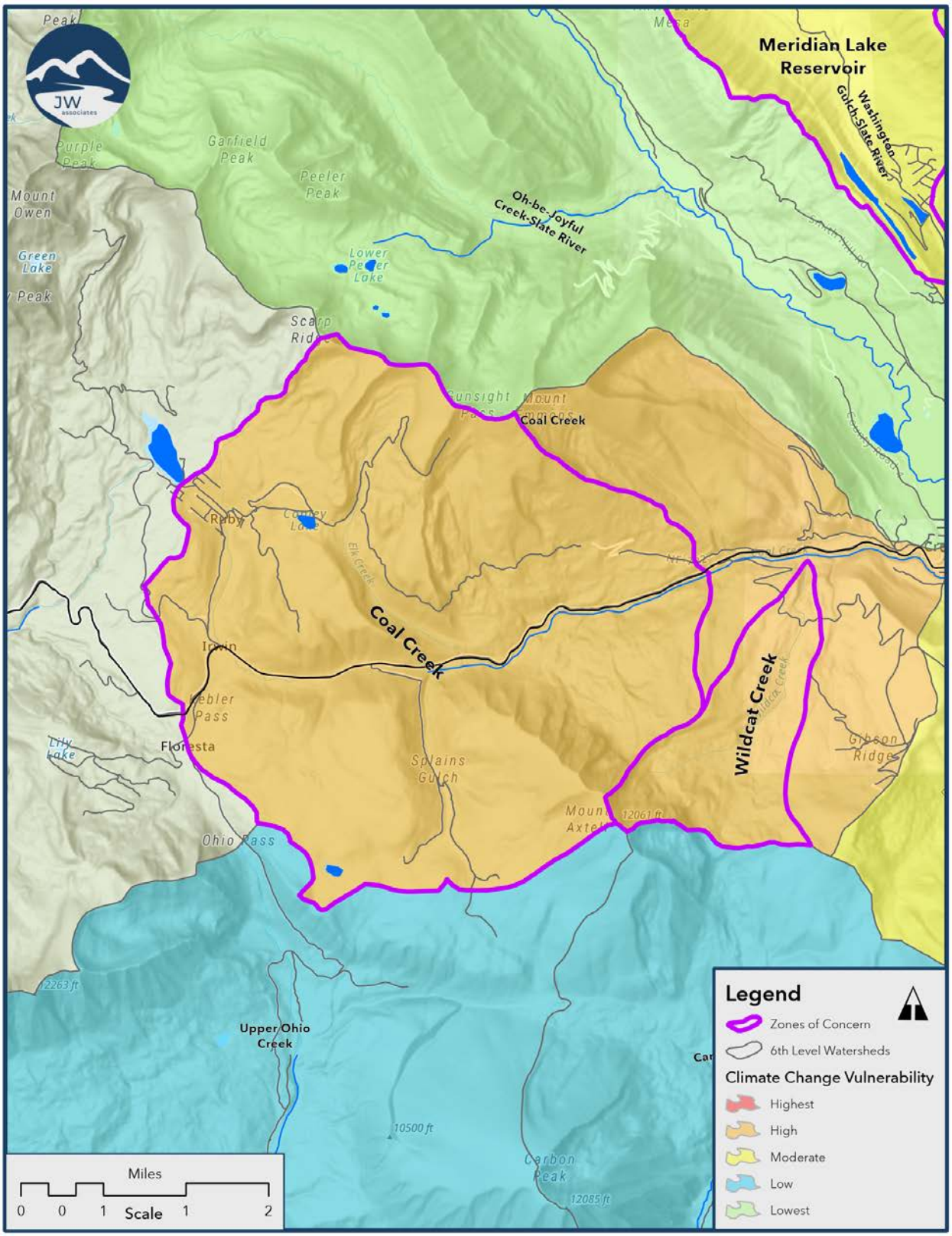
Table 11. Ecosystem Sensitivity Rankings for Coal & Wildcat Creek Zones of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Coal Creek	Highest	Low	Low	High

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as Highest for Coal Creek but Topo-climatic Variability is ranked as Low (Table 12). It appears that the dominance of the spruce-fir forest type throughout the watershed is the reason for the Highest Lack of Diversity rank.

Table 12. Lack of Adaptive Capacity Rankings for Coal & Wildcat Creek Zones of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Coal Creek	Highest	Low	High



Map 18. Coal and Wildcat Creek Zones of Concern Climate Change Vulnerability

Coal and Wildcat Creek Zones of Concern Opportunities

There are opportunities to reduce wildfire hazard and climate change vulnerability in the Coal and Wildcat Creeks Zones of Concern. Table 13 Identifies the actions that would be recommended in these Zones of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 13. Coal and Wildcat Creek Zones of Concern Actions

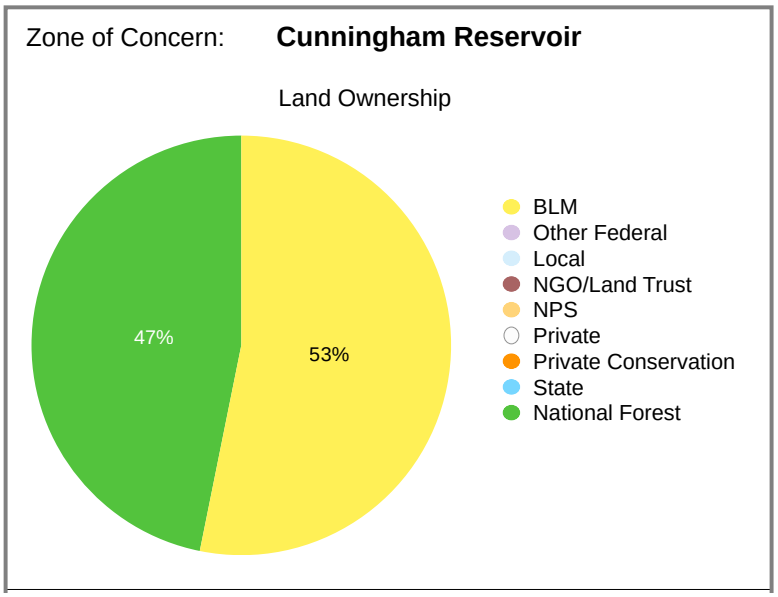
Actions	Coal Creek
Wildfire Hazard Reduction	☑
Road Analysis & Planning	☑
Address Beetle Mortality	☑
Determine appropriate actions in roadless & ACECs	☑
Riparian areas, floodplains, etc.	☑
Pre- and post-fire planning	☑
Increase Diversity	☑
Fire Regime Restoration	

Cunningham & Kenny Moore Reservoir

The Cunningham Reservoir and Kenny Moore Reservoir Zones of Concern are close to each other but in different 6th Level watersheds. The Cunningham Reservoir Zone of Concern is quite small at 124 acres (Table 1). The Kenny Moore Reservoir Zone of Concern is larger at 468 acres but still quite small (Table 1 and Map 19).

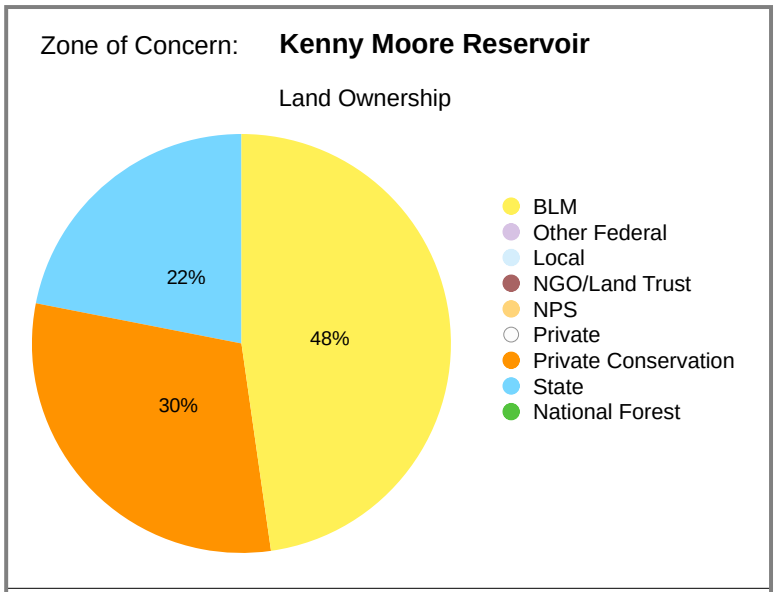
Cunningham and Kenny Moore Reservoir Zones of Concern Ownership

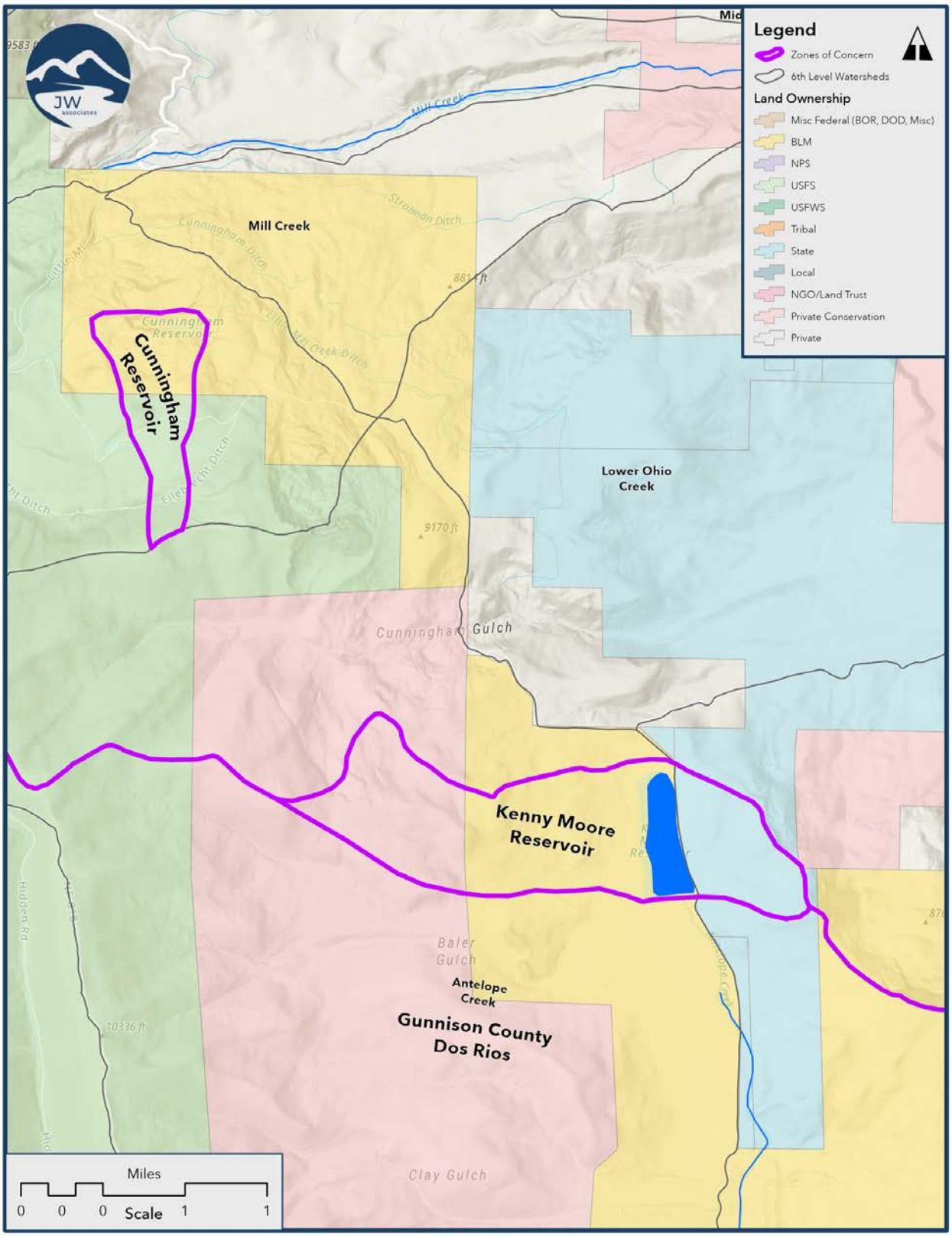
The Cunningham Reservoir Zone of Concern is basically half BLM and half National Forest lands (Map 19), with some smaller areas of private lands. The areas of private lands appear to be mostly mining claims. The Kenny Moore Reservoir Zone of Concern is half BLM, about 30% private conservation lands and 22% state owned lands, which are part the Miller Ranch SWA.



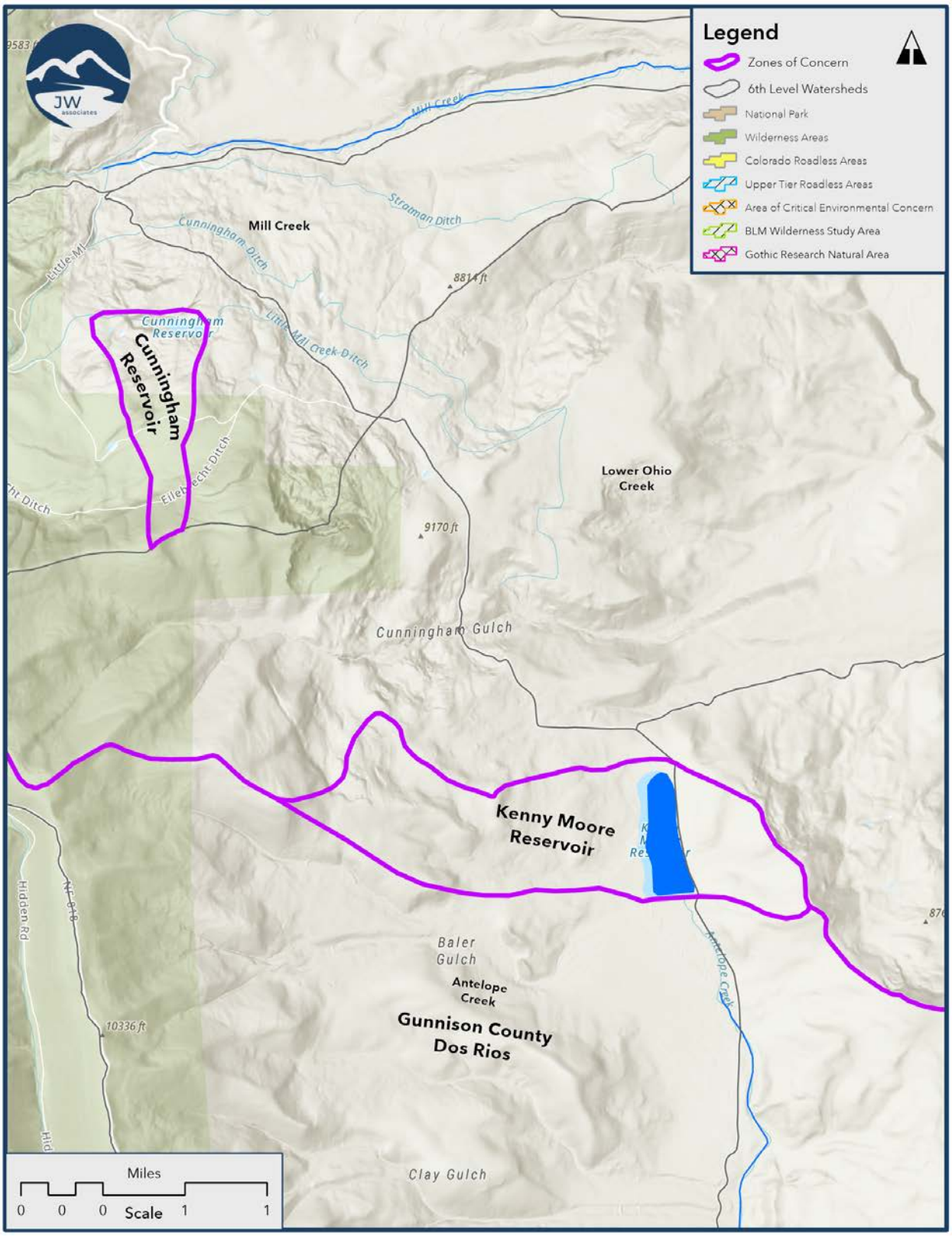
Cunningham and Kenny Moore Reservoir Zones of Special Areas

There are no wilderness, roadless, or ACEC lands in either Zone of Concern (Map 20).



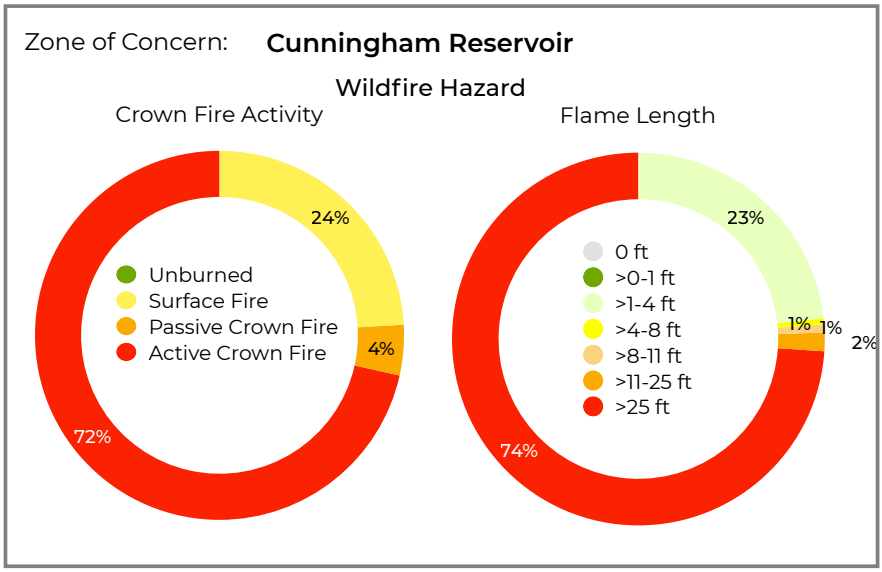


Map 19. Cunningham and Kenny Moore Reservoir Zones of Concern Ownership



Map 20. Cunningham & Kenny Moore Reservoir Creek Zones of Concern Special Areas

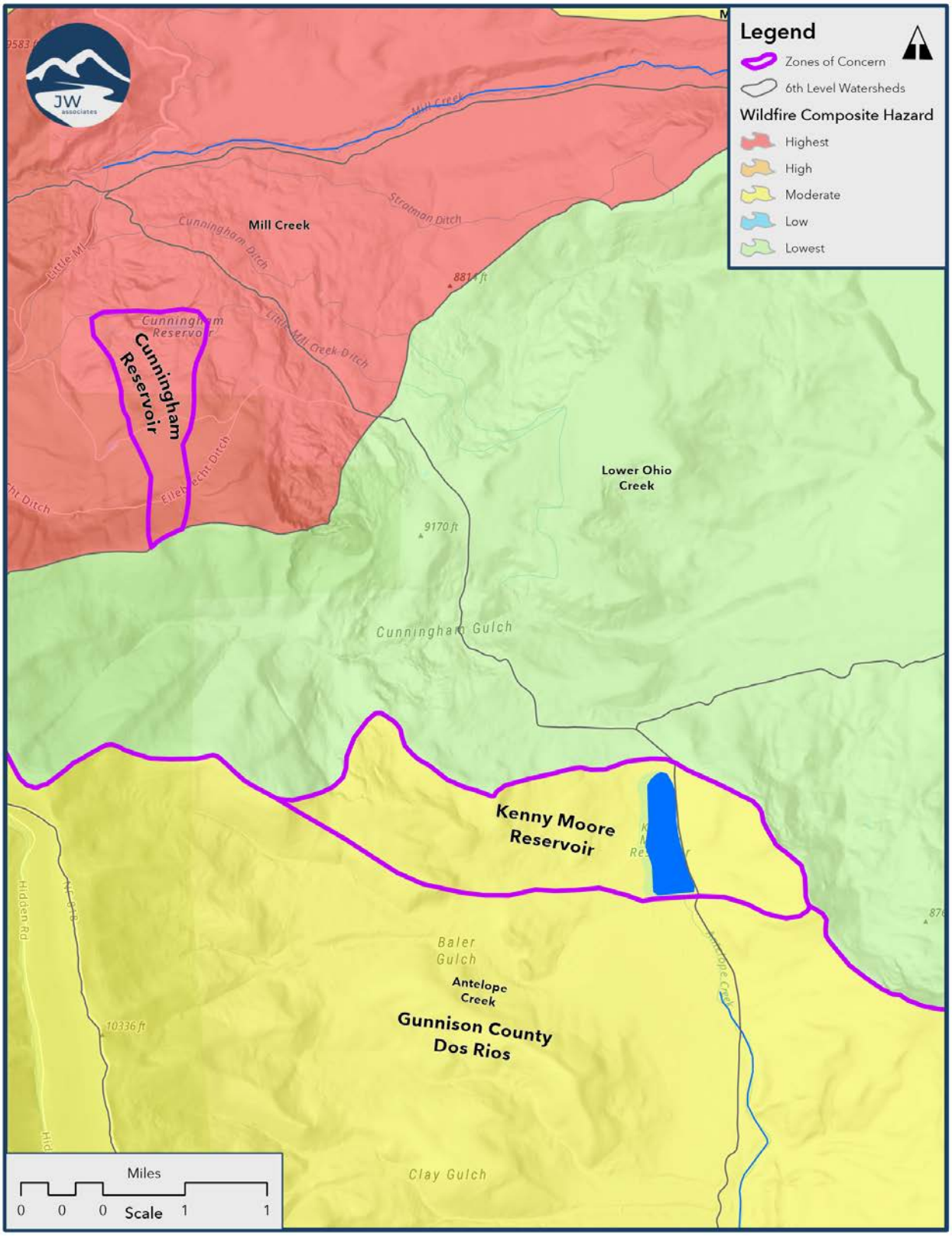
Cunningham and Kenny Moore Reservoir Zone of Concern Wildfire Composite



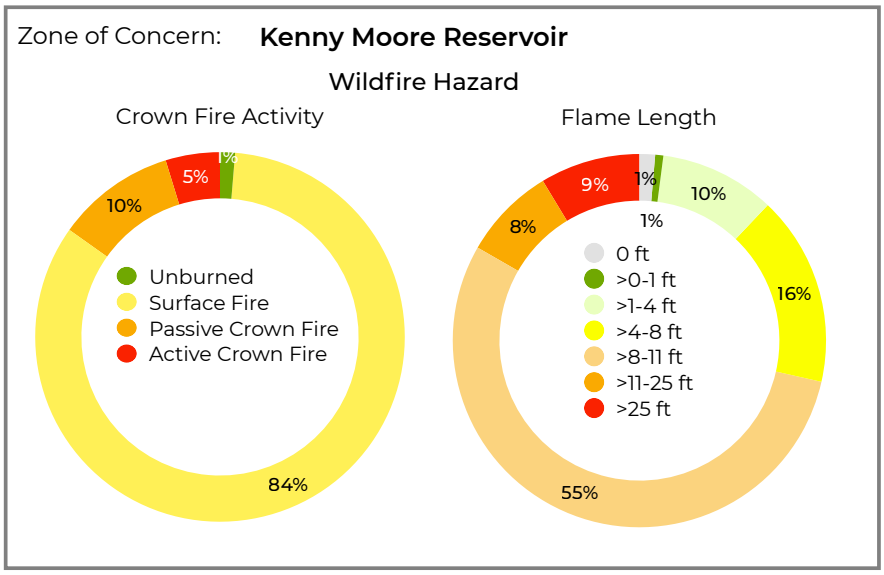
Wildfire hazard is high in most of the Cunningham Reservoir Zone of Concern. Modeled active and passive crown fire activity covers 76% of the Zone of Concern. Modeled flame lengths above 11 feet also cover 76% of the Zone of Concern. The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Wildfire Composite Hazard is ranked as Highest with Highest ranks for Debris Flow and Soil Erodibility (Table 14 and Map 21).

Table 14. Wildfire Composite Hazard for Cunningham & Kenny Moore Reservoir

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Mill Creek (Cunningham Reservoir)	High	Highest	Moderate	Highest	Highest
Antelope Creek (Kenny Moore Reservoir)	Low	Low	Moderate	Moderate	Moderate



Map 21. Cunningham & Kenny Moore Zone of Concern Wildfire Composite Hazard



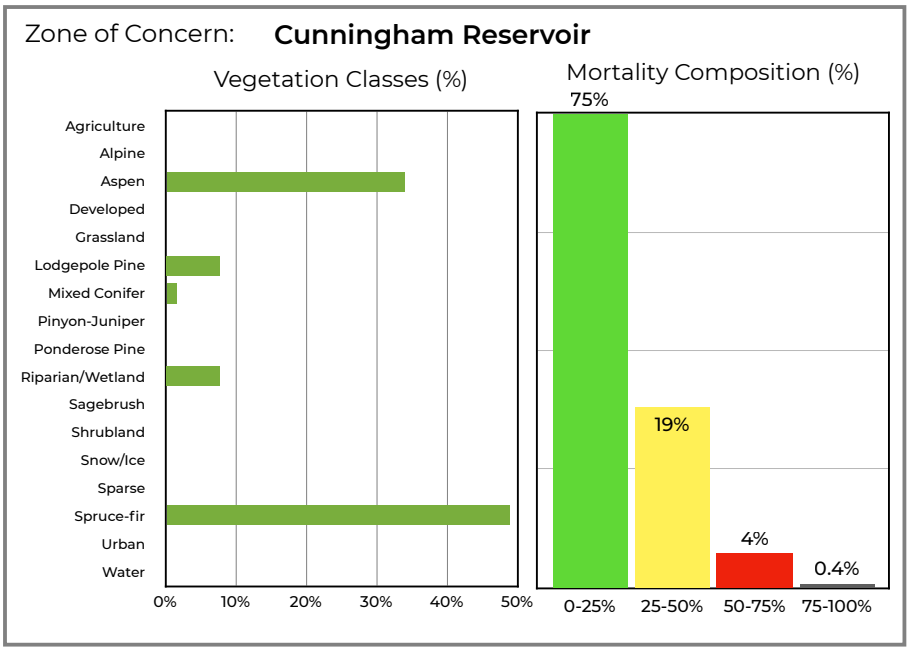
Wildfire hazard is low in most of the Cunningham Reservoir Zone of Concern. Modeled active and passive crown fire activity covers 15% of the Zone of Concern. Modeled flame lengths above 11 feet also cover only 17% of the Zone of Concern. The Wildfire Composite Hazard is ranked as Moderate with Low ranks for Debris Flow and Wildfire Hazard (Table 14 and Map 21). The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards.

Cunningham and Kenny Moore Reservoir Zone of Concern Access

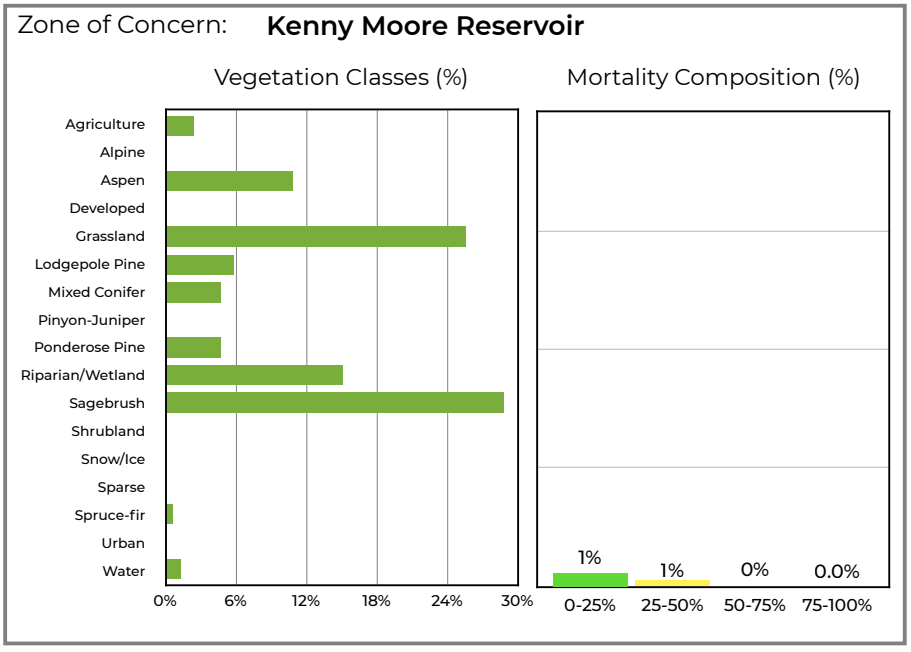
There is very limited road access into these Zones of Concern.

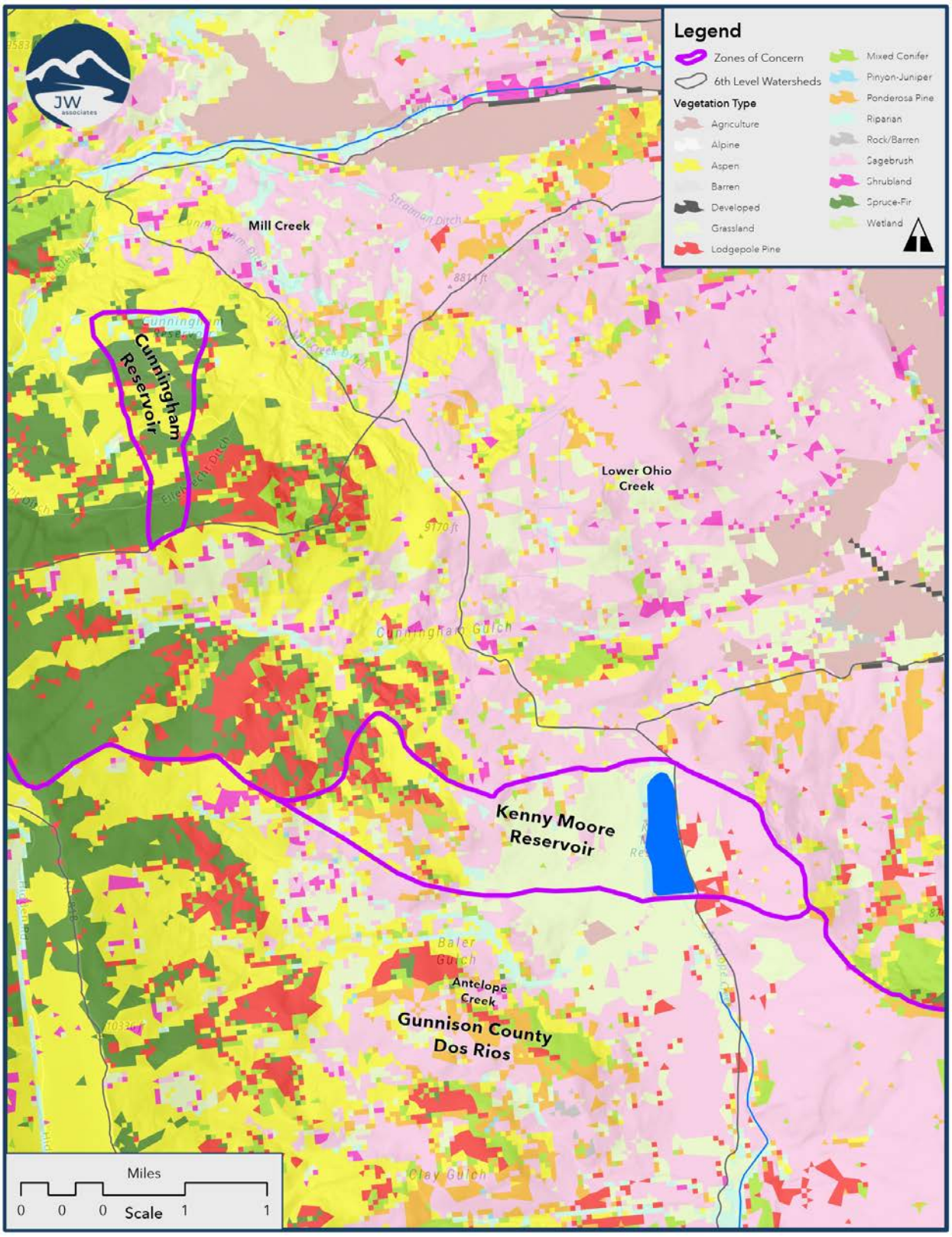
Cunningham and Kenny Moore Reservoir Zone of Concern Vegetation

The Cunningham Reservoir Zone of Concern is almost 50% spruce-fir with nearly 35% aspen. The rest of the vegetation types are all under 10% (Map 22). Less than 25% of the Zone of Concern has over 25% mortality, and 75% has 0-25% mortality.



The Kenny Moore Reservoir Zone of Concern has large areas of sagebrush and grasslands at the lower elevations around the reservoir (Map 22). The higher elevations are covered by diverse forest types including aspen, lodgepole pine, mixed conifer and ponderosa pine. There is virtually no beetle mortality in this Zone of Concern.





Map 22. Cunningham & Kenny Moore Reservoir Zone of Concern Vegetation

Cunningham and Kenny Moore Reservoir Zone of Concern Climate Change Vulnerability

The Mill Creek watershed has a Lowest Climate Change Vulnerability rank which is comprised of a Low Ecosystem Sensitivity rank and a Lowest Lack of Adaptive Capacity rank (Table 15 and Map 23). The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition and Fire Regime Departure are ranked Low but Insect & Disease is ranked as Moderate (Table 16). The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of diversity is ranked as Low for Mill Creek and Topo-climatic Variability is ranked as Lowest (Table 17).

The Antelope Creek watershed has a High Climate Change Vulnerability rank which is comprised of a High Ecosystem Sensitivity rank and a Moderate Lack of Adaptive Capacity rank (Table 15 and Map 23). The Ecosystem Sensitivity rank is a combination of three indicators. Fire Regime Departure is ranked Highest, with Landscape Condition ranked as Moderate and Insect & Disease ranked as Low (Table 16). The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of diversity is ranked as Low for Antelope Creek and Topo-climatic variability is ranked as Moderate (Table 17).

Table 15. Climate Change Vulnerability for Cunningham & Kenny Moore Reservoir

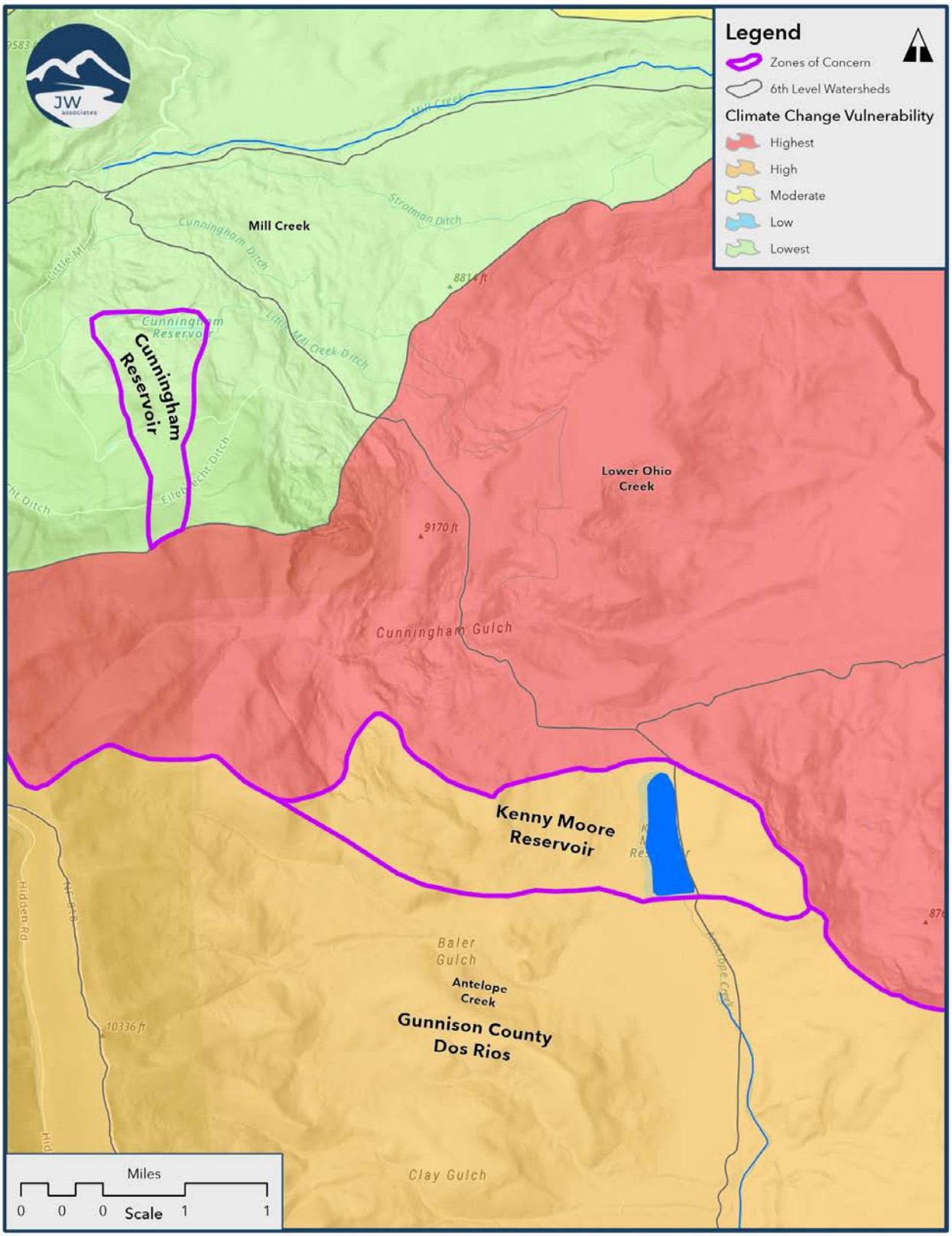
Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Mill Creek (Cunningham Reservoir)	Low	Lowest	Lowest
Antelope Creek (Kenny Moore Reservoir)	High	Moderate	High

Table 16. Ecosystem Sensitivity Rankings for Cunningham & Kenny Moore Reservoir

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Mill Creek (Cunningham Reservoir)	Low	Low	Moderate	Low
Antelope Creek (Kenny Moore Reservoir)	Moderate	Highest	Low	High

Table 17. Lack of Adaptive Capacity Ranking for Cunningham & Kenny Moore Reservoir

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Mill Creek (Cunningham Reservoir)	Low	Lowest	Lowest
Antelope Creek (Kenny Moore Reservoir)	Low	Moderate	Moderate



Map 23. Cunningham & Kenny Moore Zones of Concern Climate Change Vulnerability

Cunningham & Kenny Moore Reservoir Zone of Concern Opportunities

There are opportunities to reduce wildfire hazard in the Cunningham Reservoir Zone of Concern. There are opportunities to restore natural fire regimes in the Kenny Moore Zone of Concern. Table 18 Identifies the actions that would be recommended in these Zones of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 18. Cunningham & Kenny Moore Zones of Concern Actions

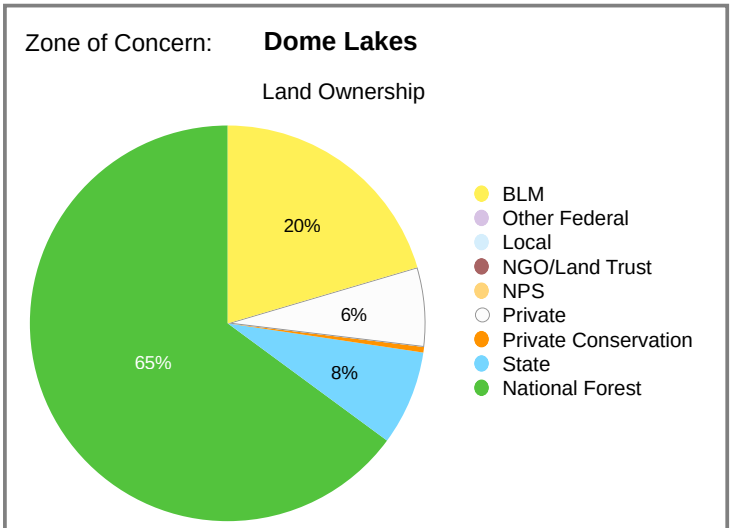
Actions	Cunningham Reservoir	Kenny Moore Reservoir
Wildfire Hazard Reduction	☑	
Road Analysis & Planning		
Address Beetle Mortality		
Determine appropriate actions in roadless & ACECs		
Riparian areas, floodplains, etc.	☑	☑
Pre- and post-fire planning	☑	☑
Increase Diversity		
Fire Regime Restoration		☑

Dome Lakes Zone of Concern

The Dome Lakes Zone of Concern covers 36,607 acres in one 6th Level watershed - Archuleta Creek.

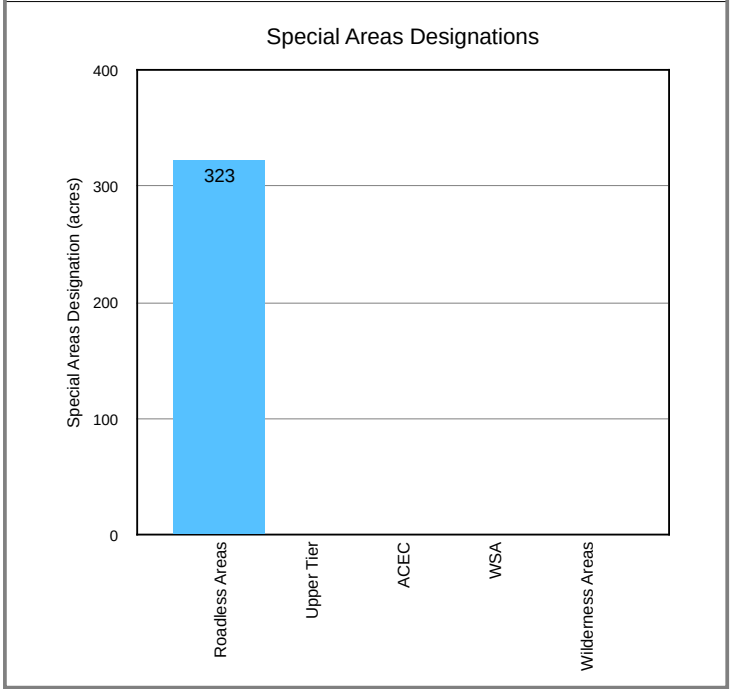
Dome Lakes Zone of Concern Ownership

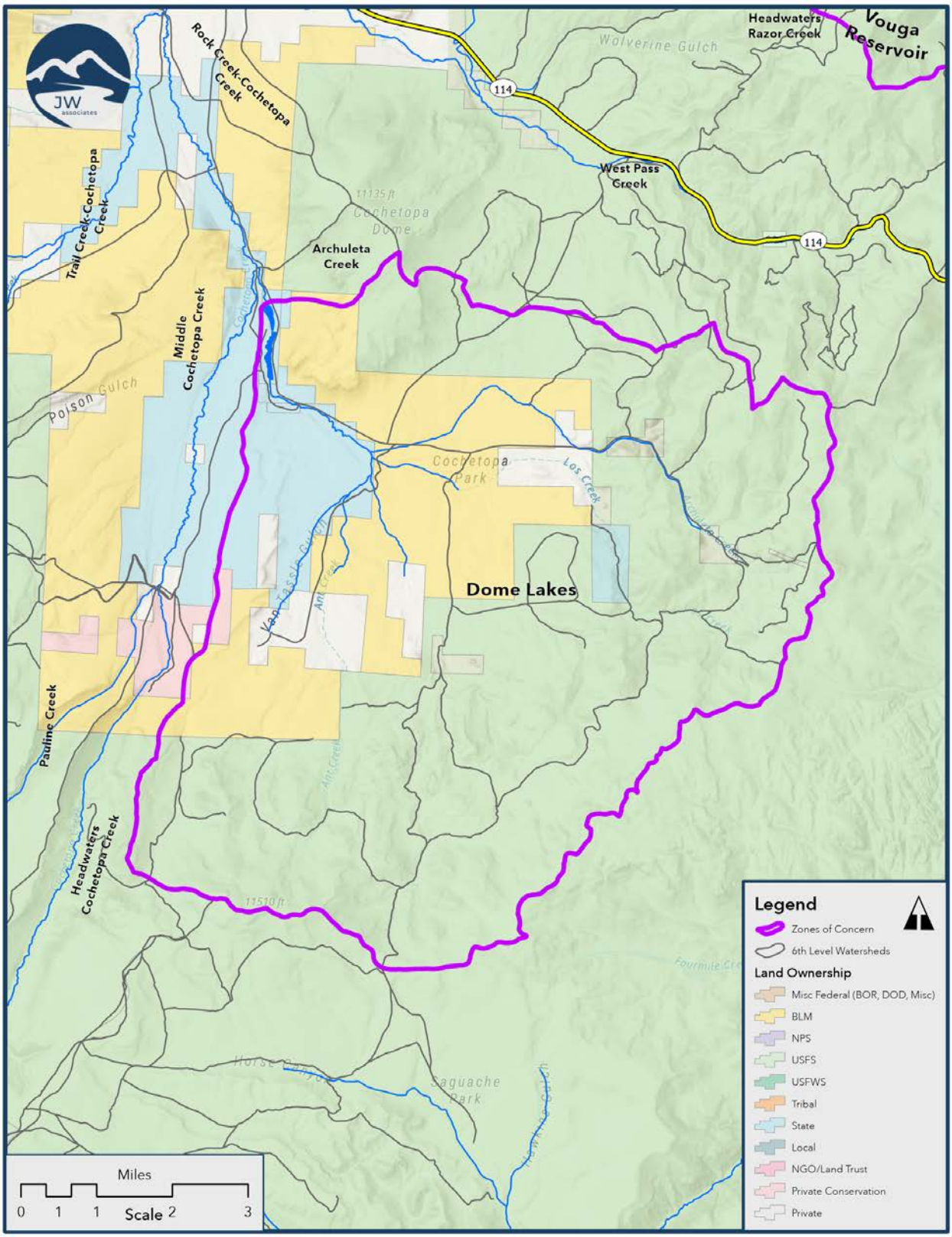
The majority (65%) of the Dome Lakes Zone of Concern is National Forest lands (Map 24), with 20% on BLM and some smaller areas of state and private lands. The state lands are part of the Cochetopa State Wildlife Area.



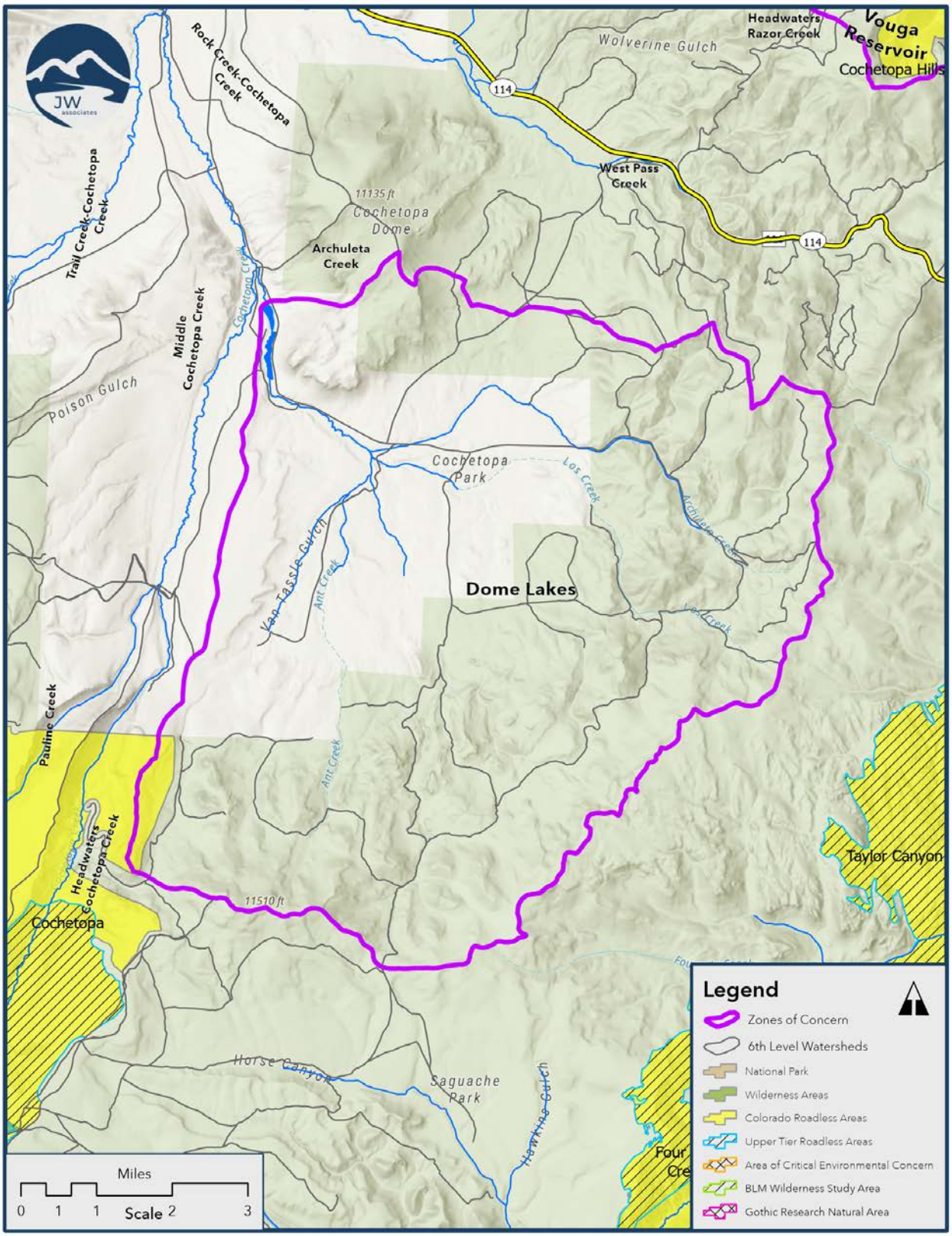
Dome Lakes Zone of Concern Special Areas

There are 323 acres of roadless area in the Zone of Concern (Map 25). The roadless area covers a very small portion of the Zone of Concern located in the southwestern corner.





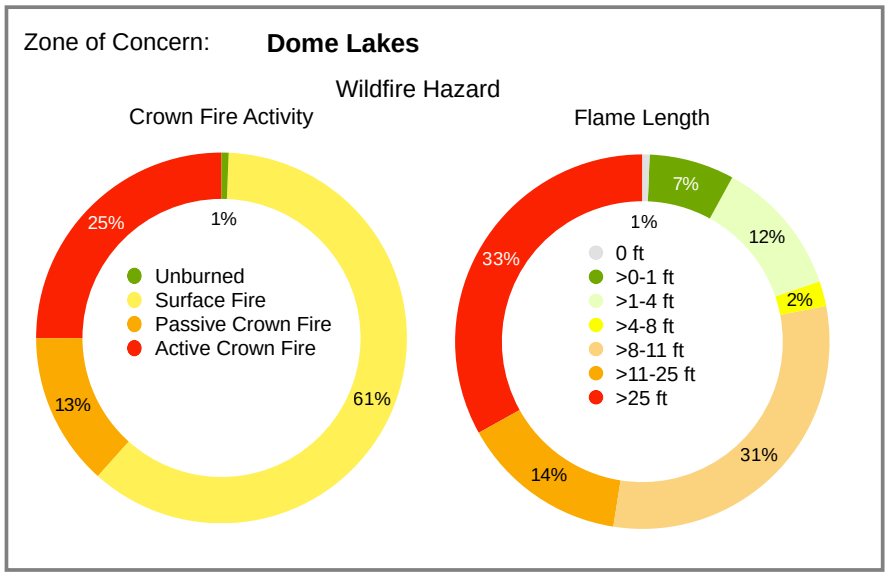
Map 24. Dome Lakes Zone of Concern Ownership



Map 25. Dome Lakes Zone of Concern Special Areas

Dome Lakes Reservoir Zone of Concern Wildfire Composite

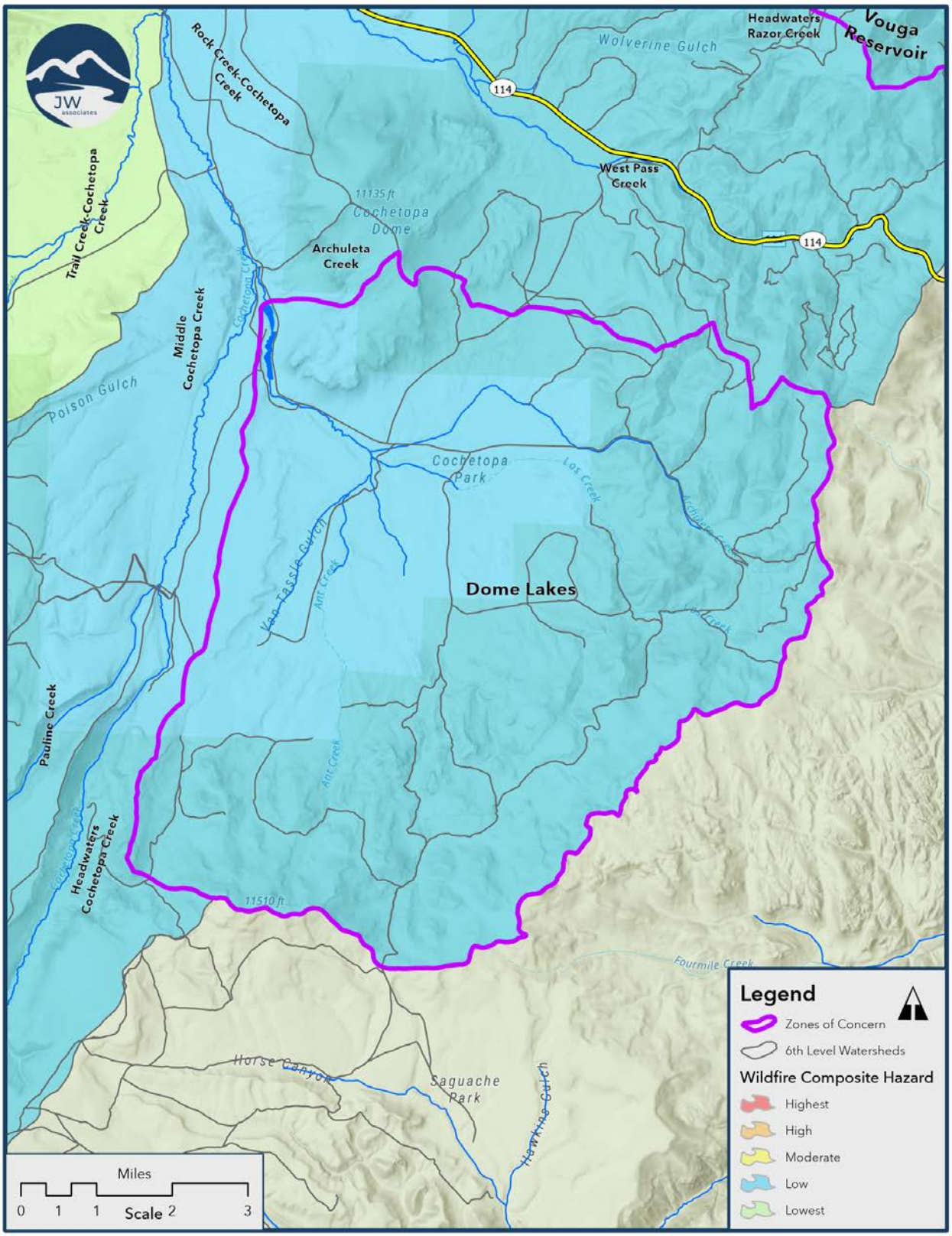
Wildfire hazard is moderate in the Dome Lakes Zone of Concern (Table 19). Modeled active and passive crown fire activity covers 38% of the Zone of Concern. Modeled flame lengths above 11 feet also cover more than 47% of the Zone of Concern. These wildfire hazard areas are found in the upper elevations that are forested.



The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. Archuleta Creek ranks Low for Wildfire Composite Hazard (Table 19). The roads ranking is High with Debris Flow and Soils Erodibility ranked as Lowest.

Table 19. Wildfire Composite Hazard Rankings for Dome Lakes Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Archuleta Creek	Moderate	Lowest	High	Lowest	Low



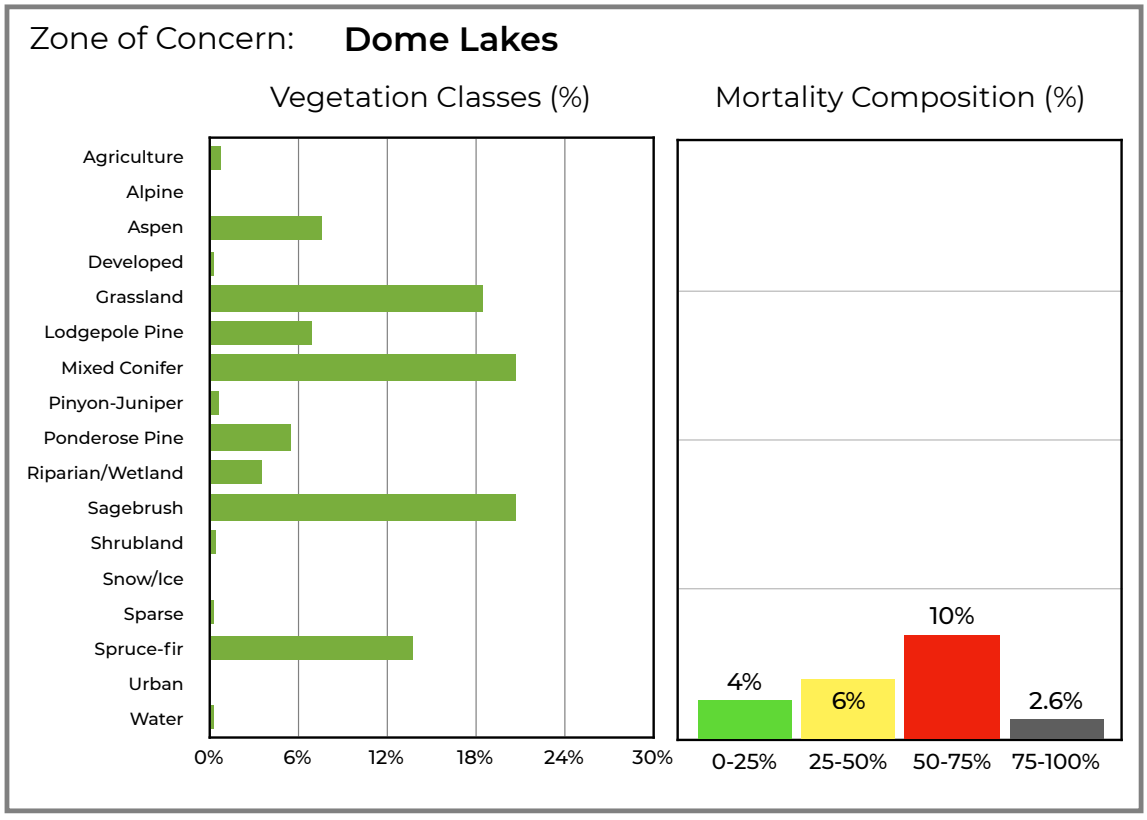
Map 26. Dome Lakes Zone of Concern Wildfire Composite Hazard

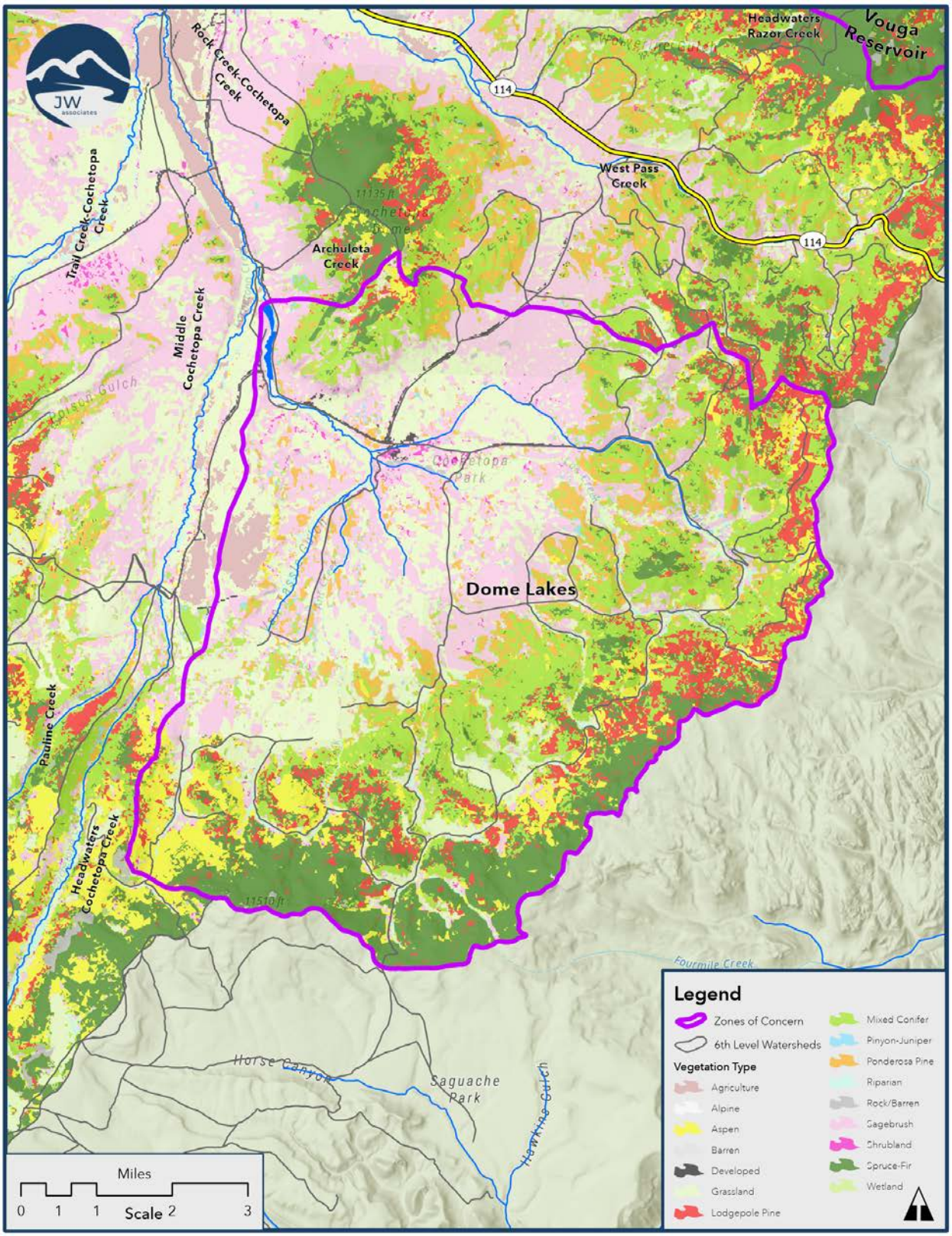
Dome Lakes Zone of Concern Access

There is good road access throughout the lower elevations of the Zone of Concern. A number of roads reach the upper forested elevations (Map 24).

Dome Lakes Zone of Concern Vegetation

The lower elevations of the Zone of Concern are dominated by sagebrush and grasslands (Map 27). Several different forest types cover the higher elevations which change with elevation and aspect. The lower elevation forest contains some ponderosa pine which changes to mixed conifer as elevations increase, then a combination of aspen and lodgepole pine are present above the mixed conifer. The highest elevations are occupied by spruce-fir. Approximately 19% of the Zone of Concern has mortality over 25%.





Map 27. Dome LakesZone of Concern Vegetation

Dome Lakes Zone of Concern Climate Change Vulnerability

The Archuleta Creek watershed has a High Climate Change Vulnerability rank which is comprised of a High Ecosystem Sensitivity rank and a High Lack of Adaptive Capacity rank (Table 20 and Map 28). Both of the components of Climate Change Vulnerability are equally contributing to the High ranking.

Table 20. Climate Change Vulnerability Rankings for Dome Lakes Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Archuleta Creek	High	High	High

The Ecosystem Sensitivity rank is a combination of three indicators. Fire Regime departure is ranked as Highest for Archuleta Creek (Table 21). Landscape Condition and Insect & Disease are ranked Low.

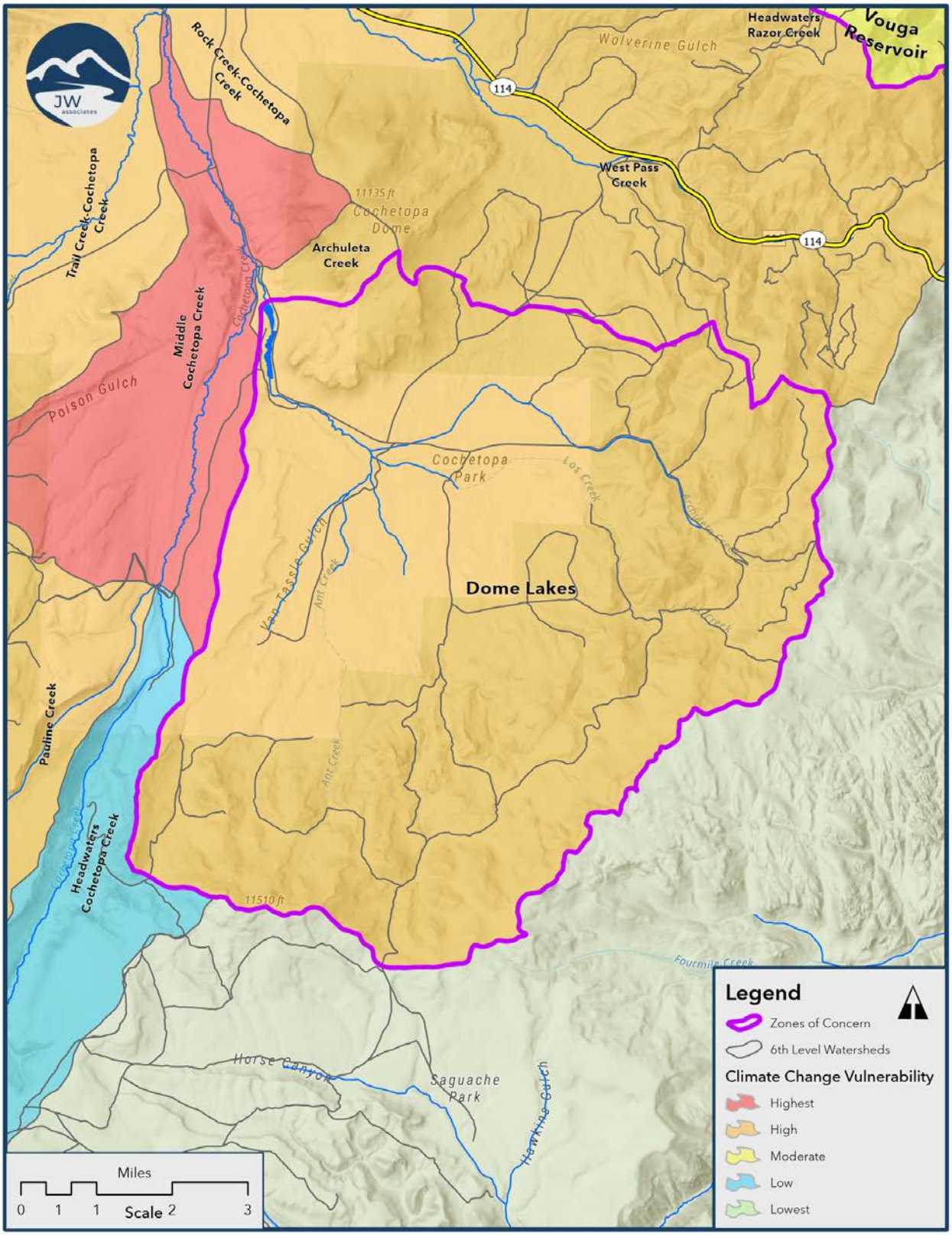
Table 21. Ecosystem Sensitivity Rankings for Dome Lakes Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Archuleta Creek	Low	Highest	Low	High

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as Lowest for Archuleta Creek (Table 22). Topo-climatic Variability is ranked as Highest.

Table 22. Lack of Adaptive Capacity Rankings for Dome Lakes Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Archuleta Creek	Lowest	Highest	High



Map 28. Dome Lakes Zone of Concern Climate Change Vulnerability

Dome Lakes Zone of Concern Opportunities

There are opportunities to reduce wildfire hazard in the Dome Lakes Zone of Concern. There are opportunities to restore natural fire regimes, focused within sagebrush. Table 23 Identifies the actions that would be recommended in this Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 23. Dome Lakes Zone of Concern Actions

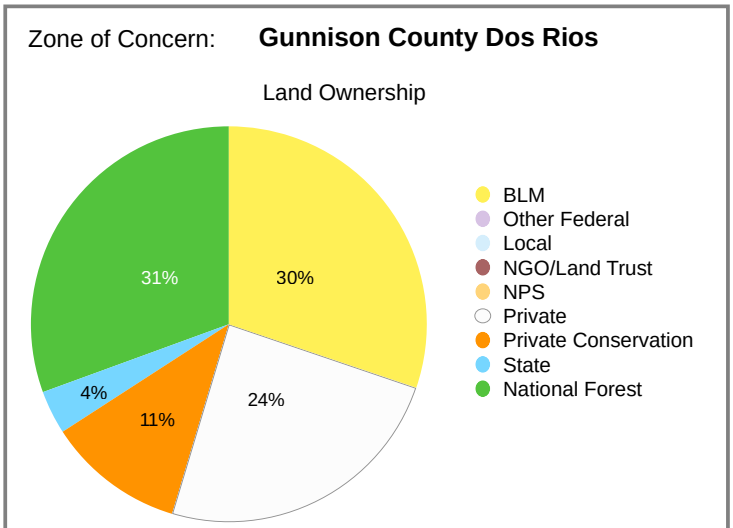
Actions	Archuleta Creek
Wildfire Hazard Reduction	☑
Road Analysis & Planning	☑
Address Beetle Mortality	☑
Determine appropriate actions in roadless & ACECs	
Riparian areas, floodplains, etc.	☑
Pre- and post-fire planning	☑
Increase Diversity	
Fire Regime Restoration	☑

Gunnison County Dos Rios Zone of Concern

The Gunnison County Dos Rios Zone of Concern covers 70,339 acres and contains three 6th Level watersheds (Table 1 and Map 29).

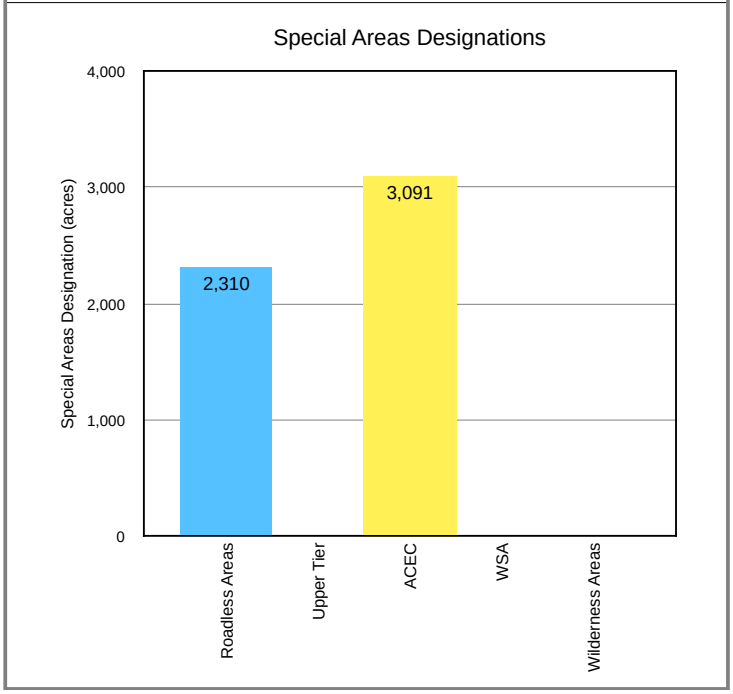
Gunnison County Dos Rios Zone of Concern Ownership

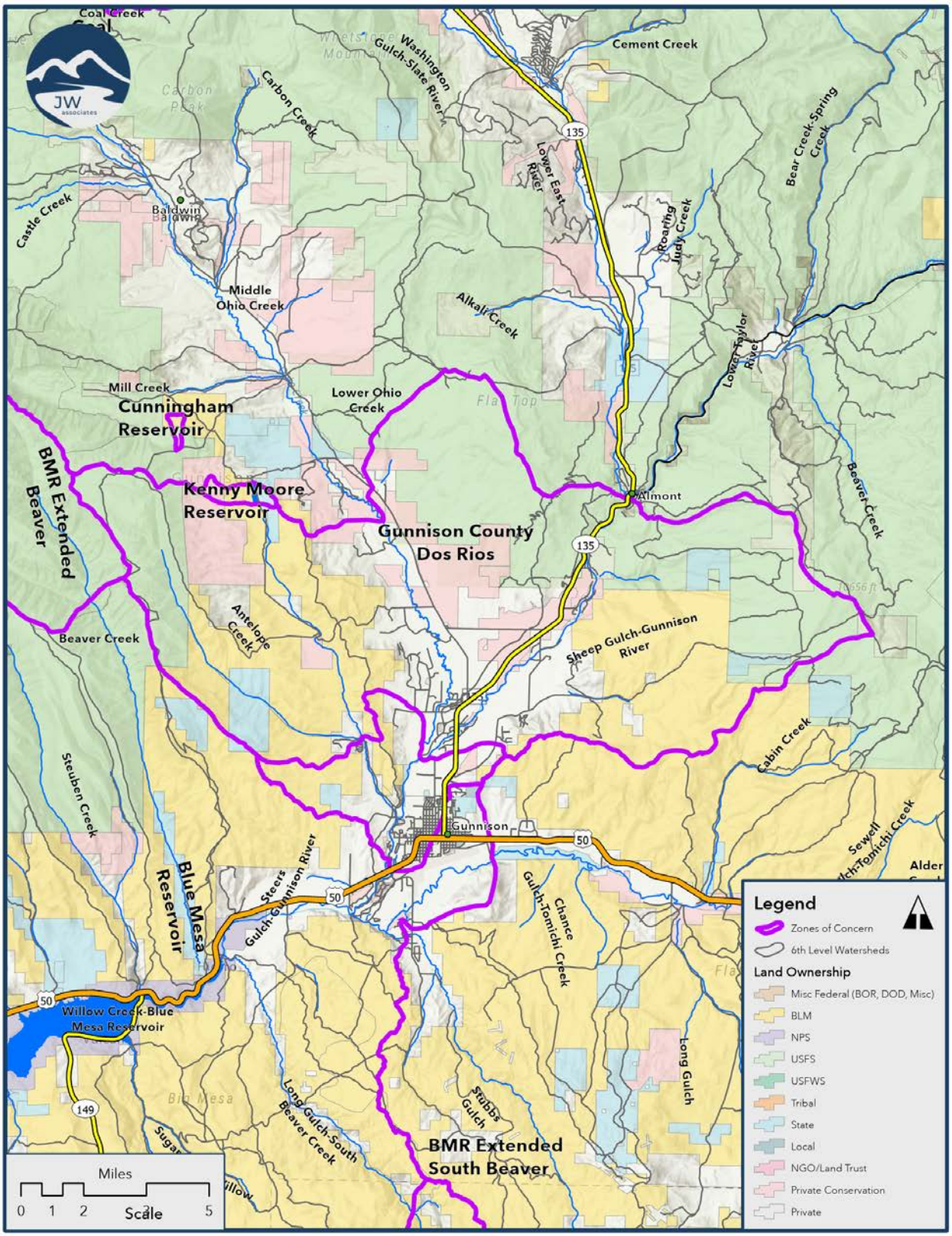
There are equal areas (~30%) of BLM and National Forest lands (Map 29), with 24% private lands. Another 11% of private lands are under conservation. There are several pieces of state lands covering 4% of the Zone of Concern.



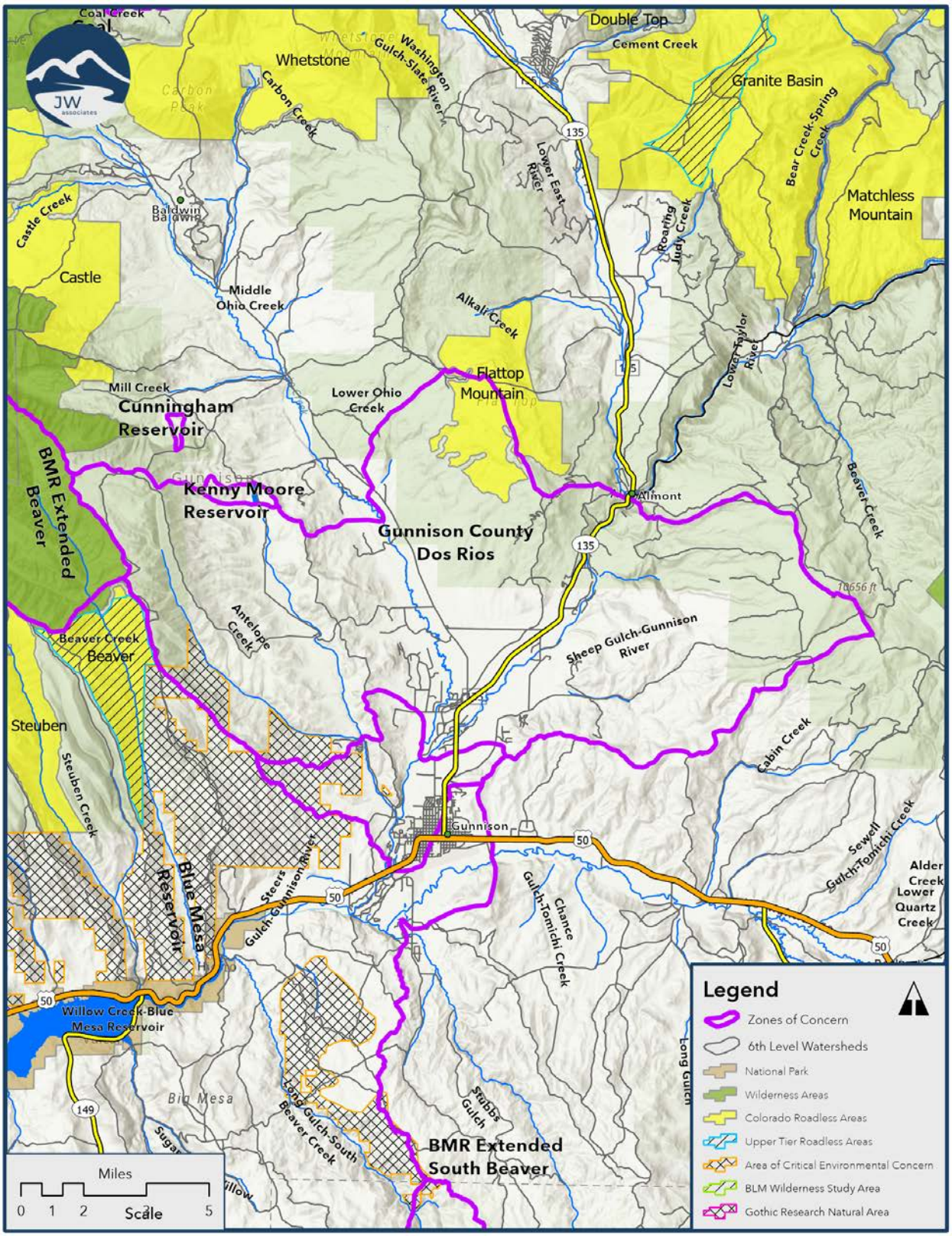
Gunnison County Dos Rios Zone of Concern Special Areas

There are 2,310 acres of roadless areas and 3,091 acres of ACECs in the Zone of Concern. They cover only a small percentage of the total Zone of Concern.





Map 29. Gunnison County Dos Rios Zone of Concern Ownership



Map 30. Gunnison County Dos Rios Zone of Concern Special Areas

Gunnison County Dos Rios Zone of Concern Wildfire Composite

Wildfire hazard is low in the Gunnison County Dos Rios Zone of Concern. Modeled active and passive crown fire activity covers more than 16% of the Zone of Concern. Modeled flame lengths above 11 feet cover 28% of the Zone of Concern.

The composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The three watersheds in this Zone of Concern all rank between Lowest to Moderate hazard in the Composite Wildfire Hazard rank (Table 24). The highest rankings for all three watersheds are for the Road Hazard ranking.

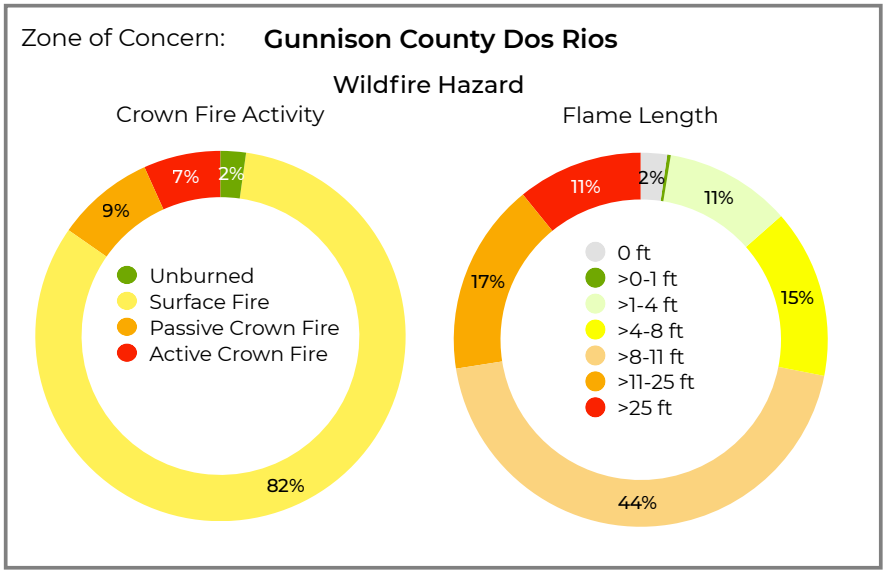
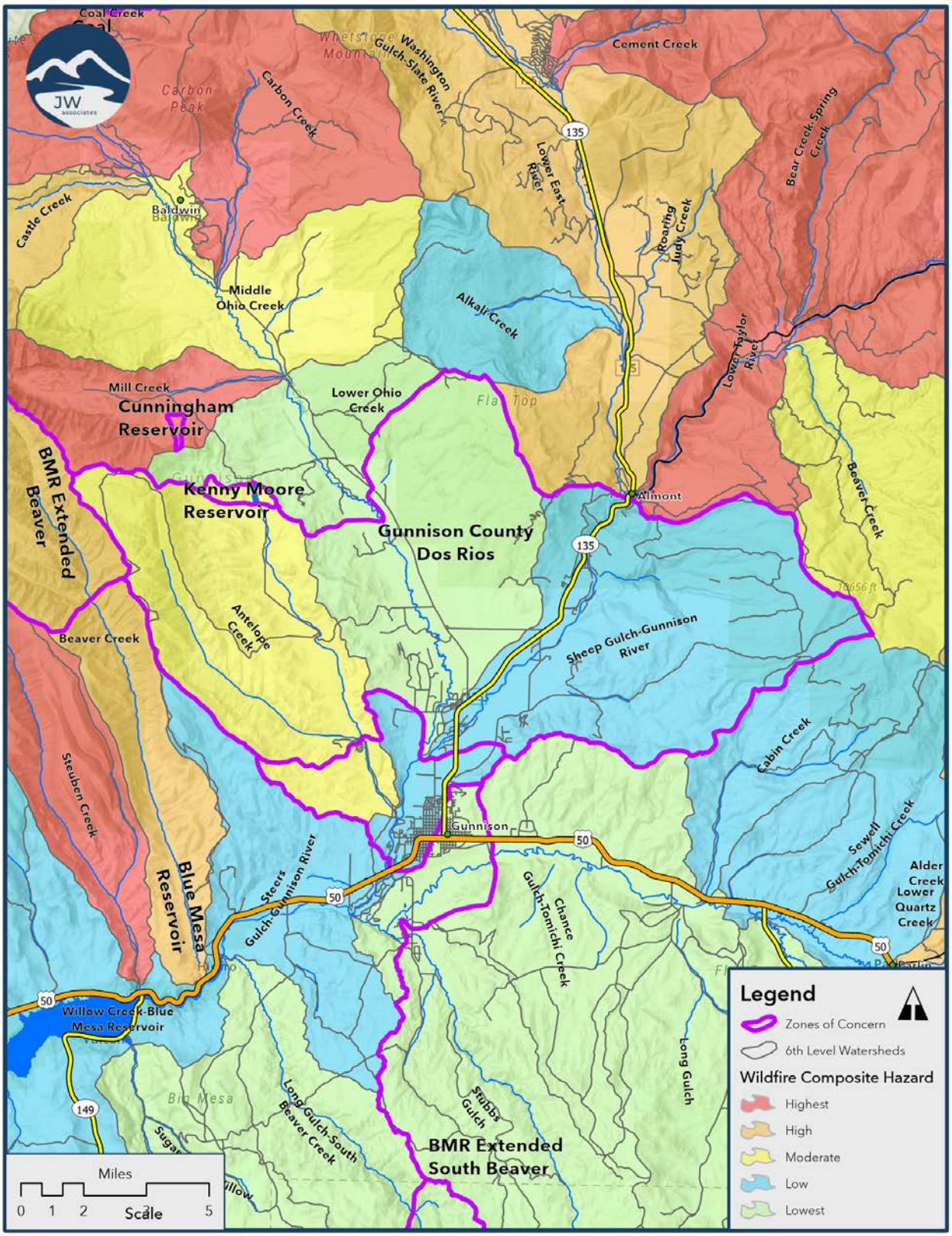


Table 24. Wildfire Composite Hazard for Gunnison County Dos Rios Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Lower Ohio Creek	Lowest	Lowest	High	Lowest	Lowest
Sheep Gulch-Gunnison River	Lowest	Lowest	Highest	Low	Low
Antelope Creek	Low	Low	Moderate	Moderate	Moderate



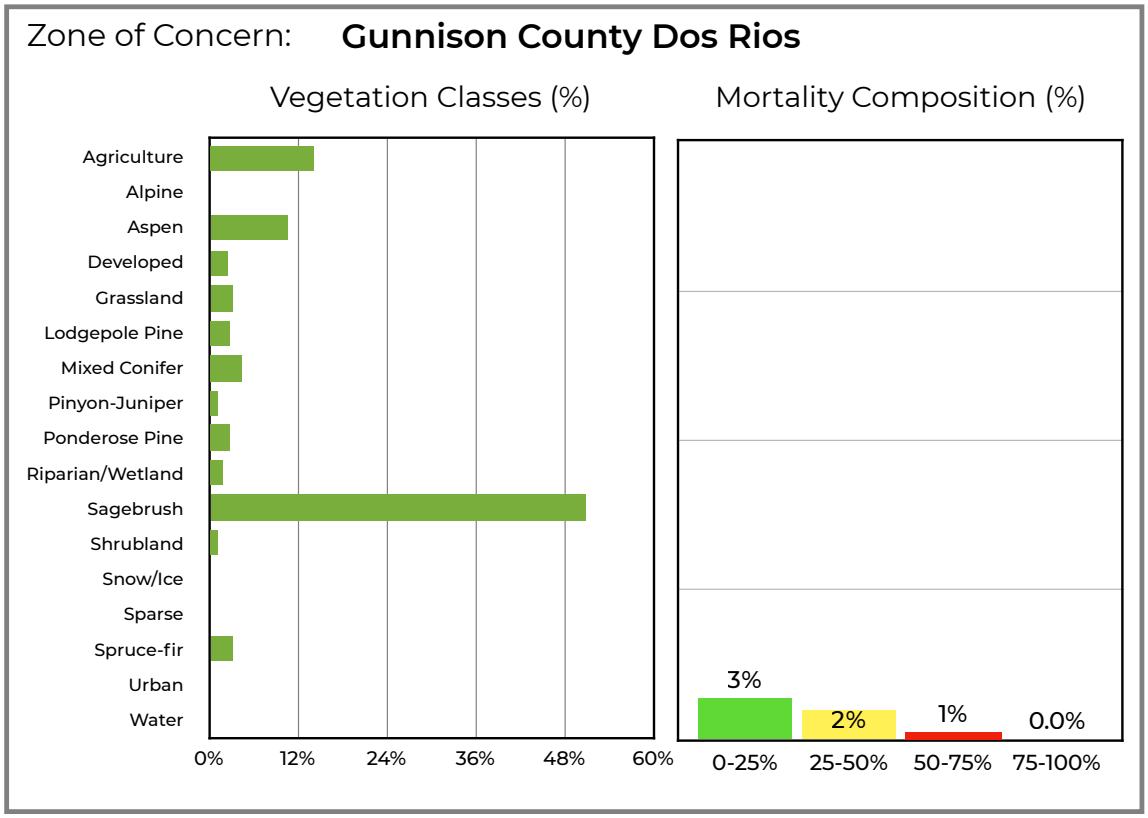
Map 31. Gunnison County Dos Rios Zone of Concern Wildfire Composite Hazard

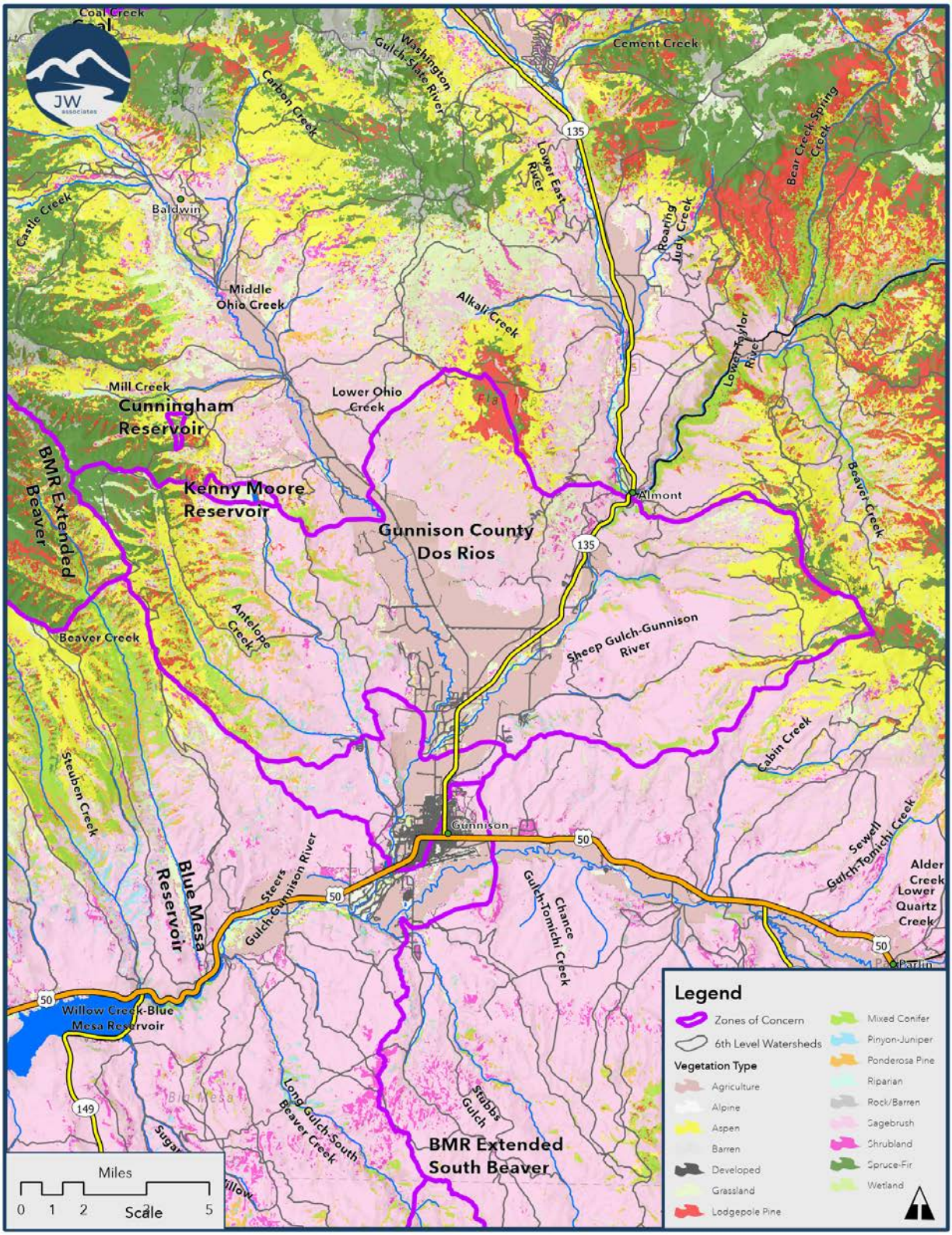
Gunnison County Dos Rios Zone of Concern Access

Road access appears to be good through out the Zone of Concern.

Gunnison County Dos Rios Zone of Concern Vegetation

The Gunnison County Dos Rios Zone of Concern is mostly covered with sagebrush (Map 32). The second most common vegetation cover is agriculture. There are also some areas of aspen. There is almost no beetle mortality in this Zone of Concern.





Map 32. Gunnison County Dos Rios Zone of Concern Vegetation

Gunnison County Dos Rios Zone of Concern Climate Change Vulnerability

The Lower Ohio Creek and Sheep Gulch-Gunnison River watersheds are ranked as Highest for Climate Change Vulnerability and the Antelope Creek watershed is ranked as High (Table 25 and Map 33). High Ecosystem Sensitivity ranks for Sheep Gulch-Gunnison River and Antelope Creek watersheds contribute to those rankings. The Highest Lack of Adaptive Capacity ranks for Lower Ohio Creek and Sheep Gulch-Gunnison River watersheds also contribute to those Highest Climate Change Vulnerability rankings.

Table 25. Climate Change Vulnerability for Gunnison County Dos Rios Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Lower Ohio Creek	Moderate	Highest	Highest
Sheep Gulch-Gunnison River	High	Highest	Highest
Antelope Creek	High	Moderate	High

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition is ranked as Highest for Lower Ohio Creek and Sheep Gulch-Gunnison River watersheds (Table 26). Fire Regime Departure is ranked as Highest for the Antelope Creek watershed. Insect & Disease is ranked as Low or Lowest for all watersheds.

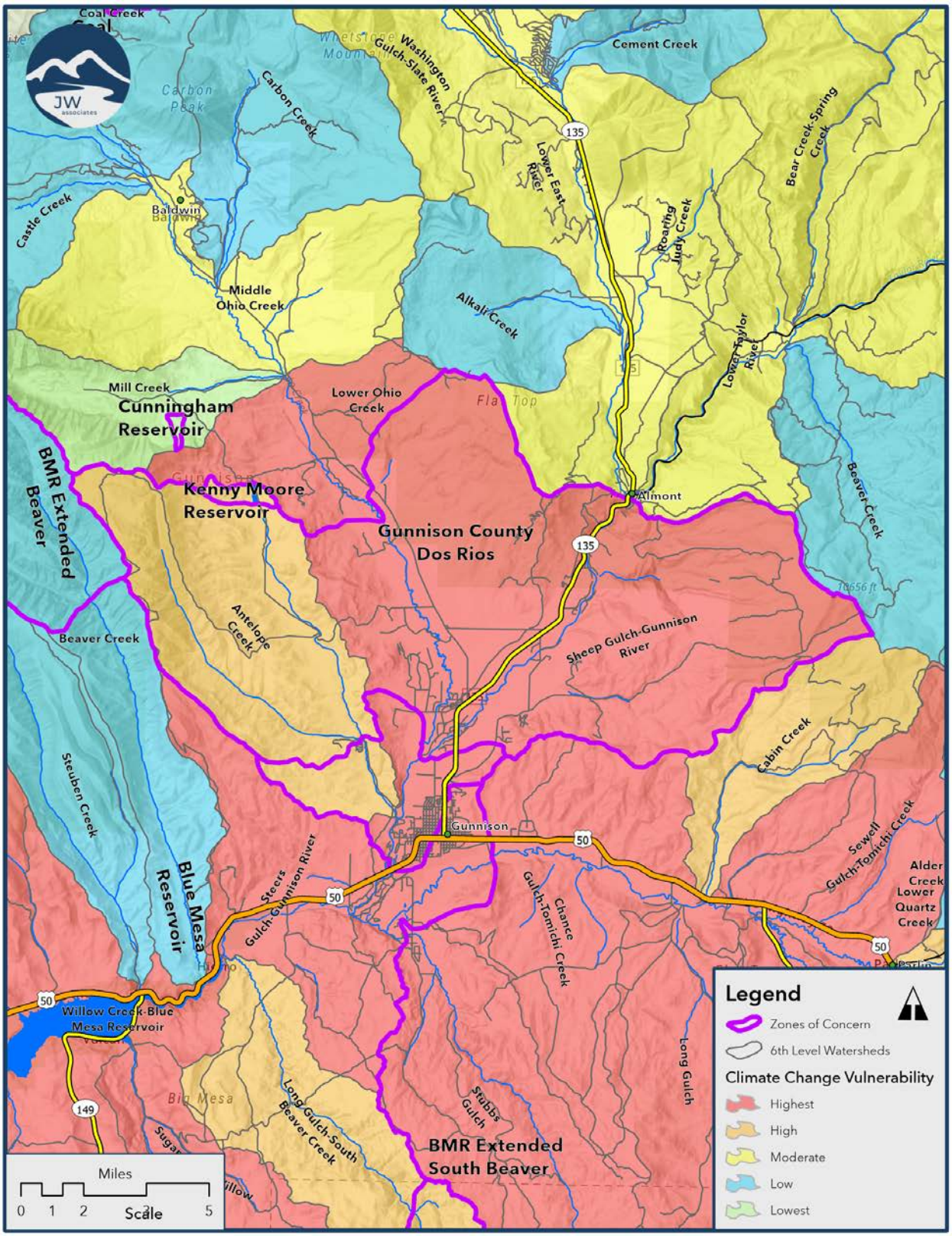
Table 26. Ecosystem Sensitivity for Gunnison County Dos Rios Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Antelope Creek	Moderate	Highest	Low	High
Lower Ohio Creek	Highest	Moderate	Lowest	Moderate
Steers Gulch-Gunnison River	Highest	High	Lowest	High

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as Highest for Lower Ohio Creek and Sheep Gulch-Gunnison River watersheds (Table 27). Topo-climatic Variability is ranked as Highest for those same two watersheds.

Table 27. Lack of Adaptive Capacity for Gunnison County Dos Rios Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Antelope Creek	Low	Moderate	Moderate
Lower Ohio Creek	Highest	Highest	Highest
Steers Gulch-Gunnison River	Highest	Highest	Highest



Map 33. Gunnison Dos Rios Zone of Concern Climate Change Vulnerability

Gunnison County Dos Rios Zone of Concern Opportunities

There are opportunities to reduce climate change vulnerability in the Gunnison County Dos Rios Zone of Concern. There are opportunities to restore natural fire regimes, focused within sagebrush, and reduce impacts from roads. Table 28 identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 28. Gunnison County Dos Rios Zone of Concern Actions

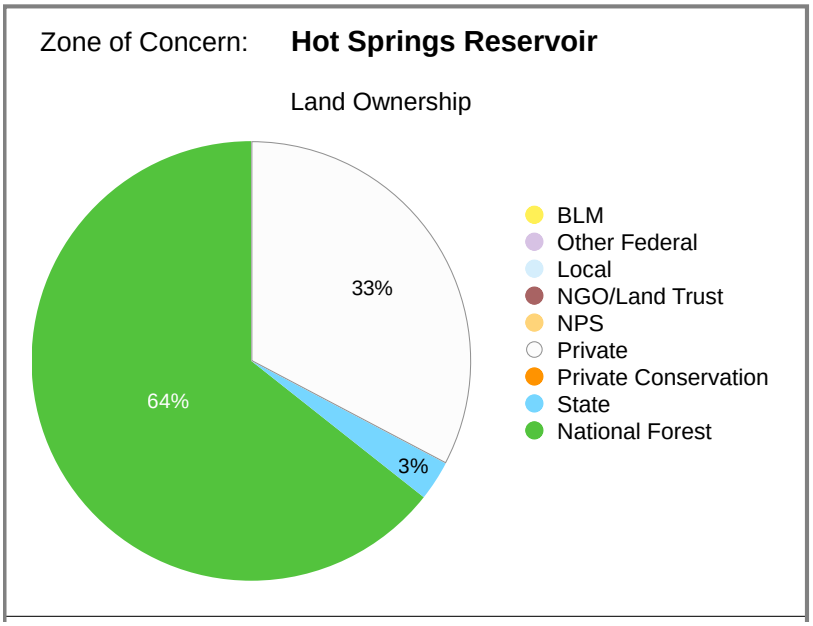
Actions	Steers Gulch-Gunnison River	Lower Ohio Creek	Antelope Creek
Wildfire Hazard Reduction			
Road Analysis & Planning	☑	☑	
Address Beetle Mortality			
Determine appropriate actions in roadless & ACECs			
Riparian areas, floodplains, etc.	☑	☑	☑
Pre- and post-fire planning			
Increase Diversity	☑	☑	
Fire Regime Restoration	☑		☑

Hot Springs Reservoir Zone of Concern

The Hot Springs Reservoir Zone of Concern covers 17,401 acres and includes one 6th Level watershed - Hot Springs Creek (Table 1 and Map 34).

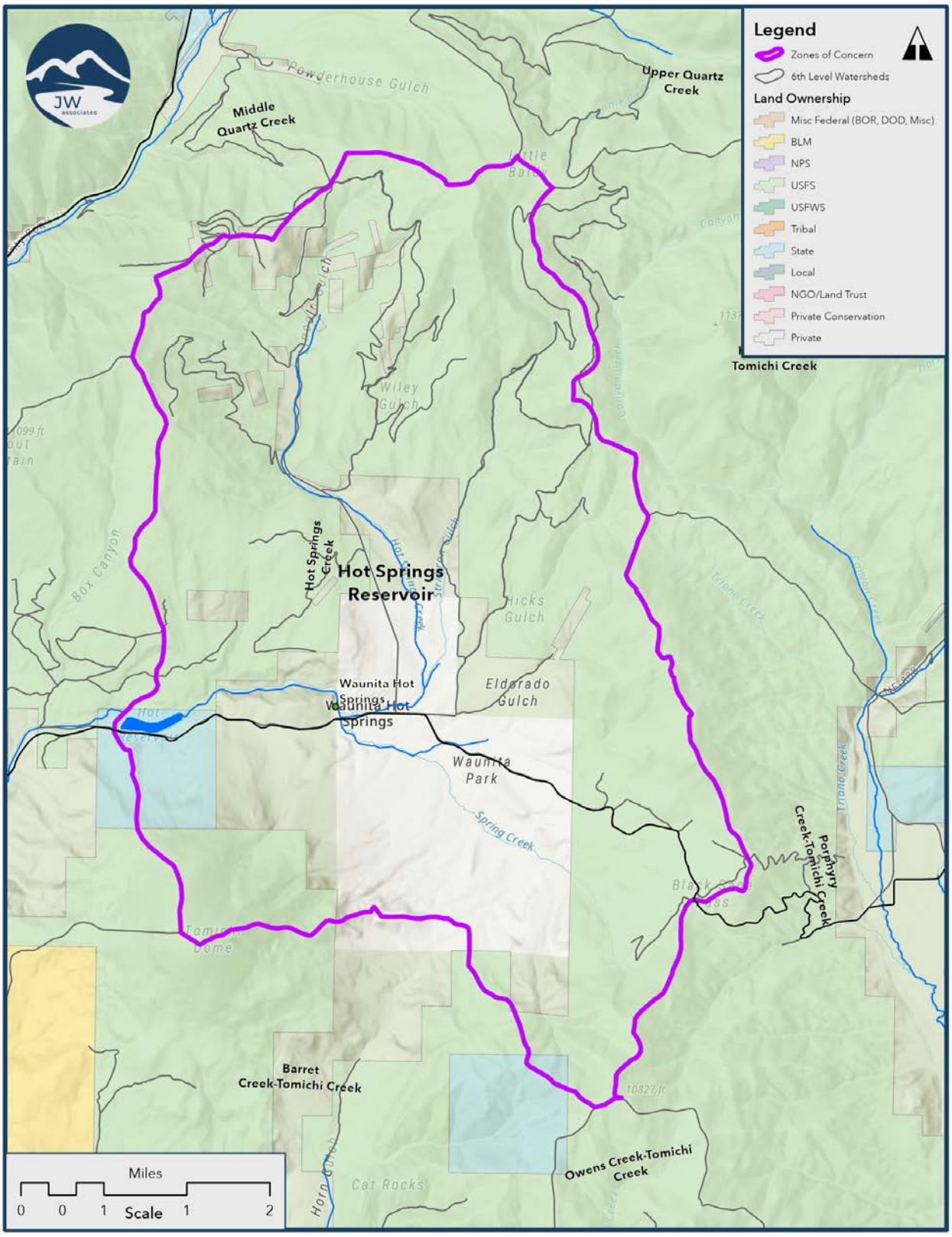
Hot Springs Reservoir Zone of Concern Ownership

The majority (64%) of the Zone of Concern is National Forest lands (Map 34). The lower elevations are mostly private lands. There is one small area of state land.

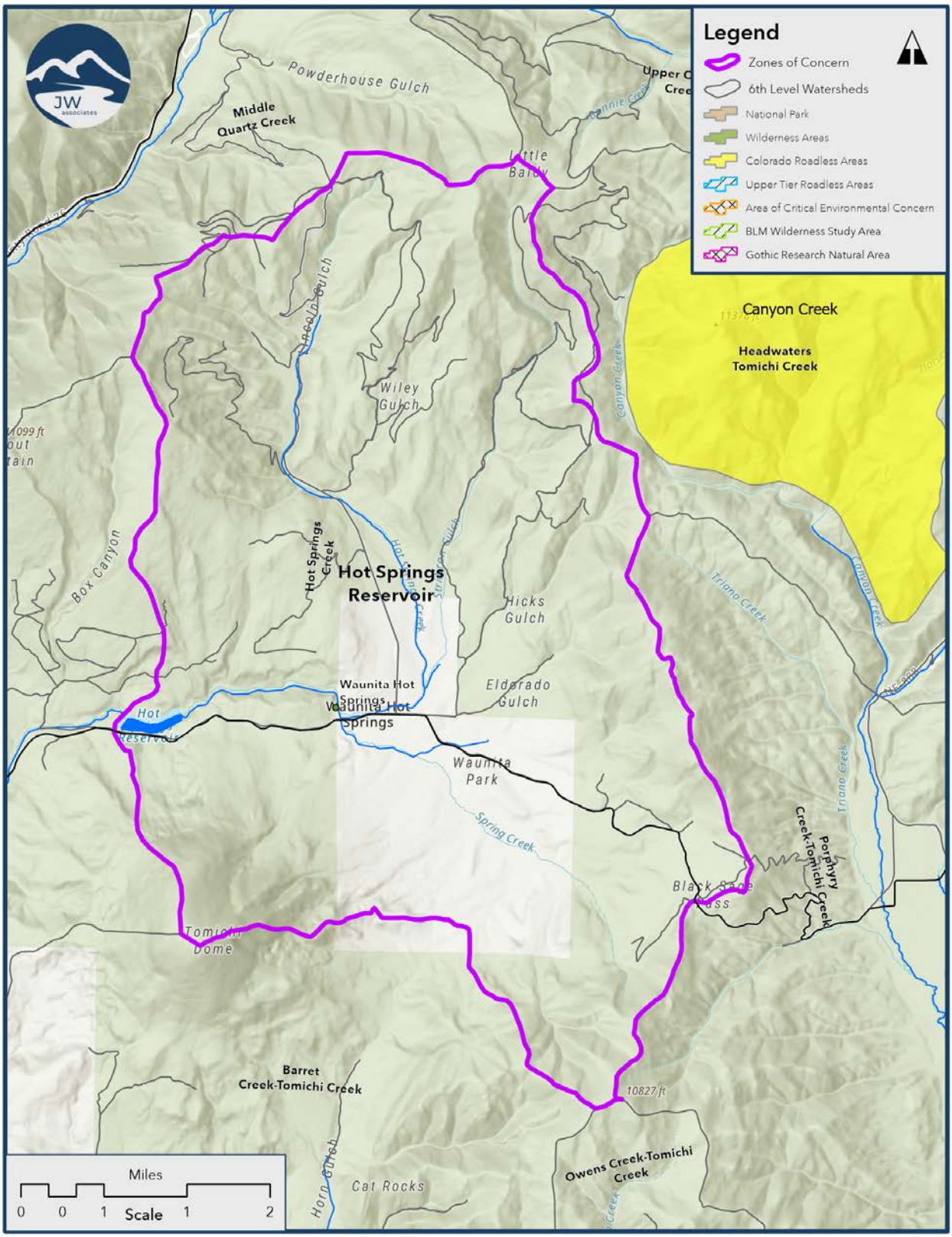


Hot Springs Reservoir Zone of Concern Special Areas

There are no wilderness, roadless or ACEC lands in the Zone of Concern (Map 35).



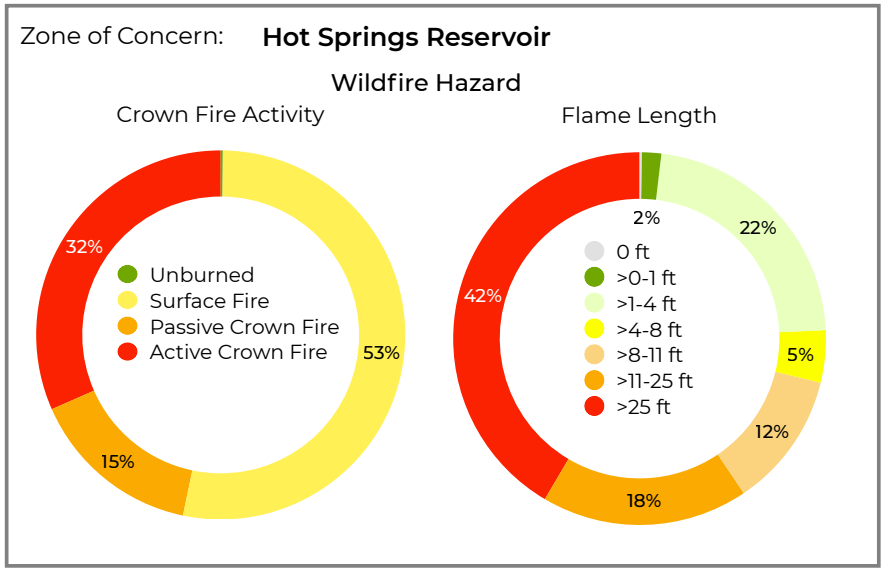
Map 34. Hot Springs Reservoir Zone of Concern Ownership



Map 35. Hot Springs Reservoir Zone of Concern Special Areas

Hot Springs Reservoir Zone of Concern Wildfire Composite

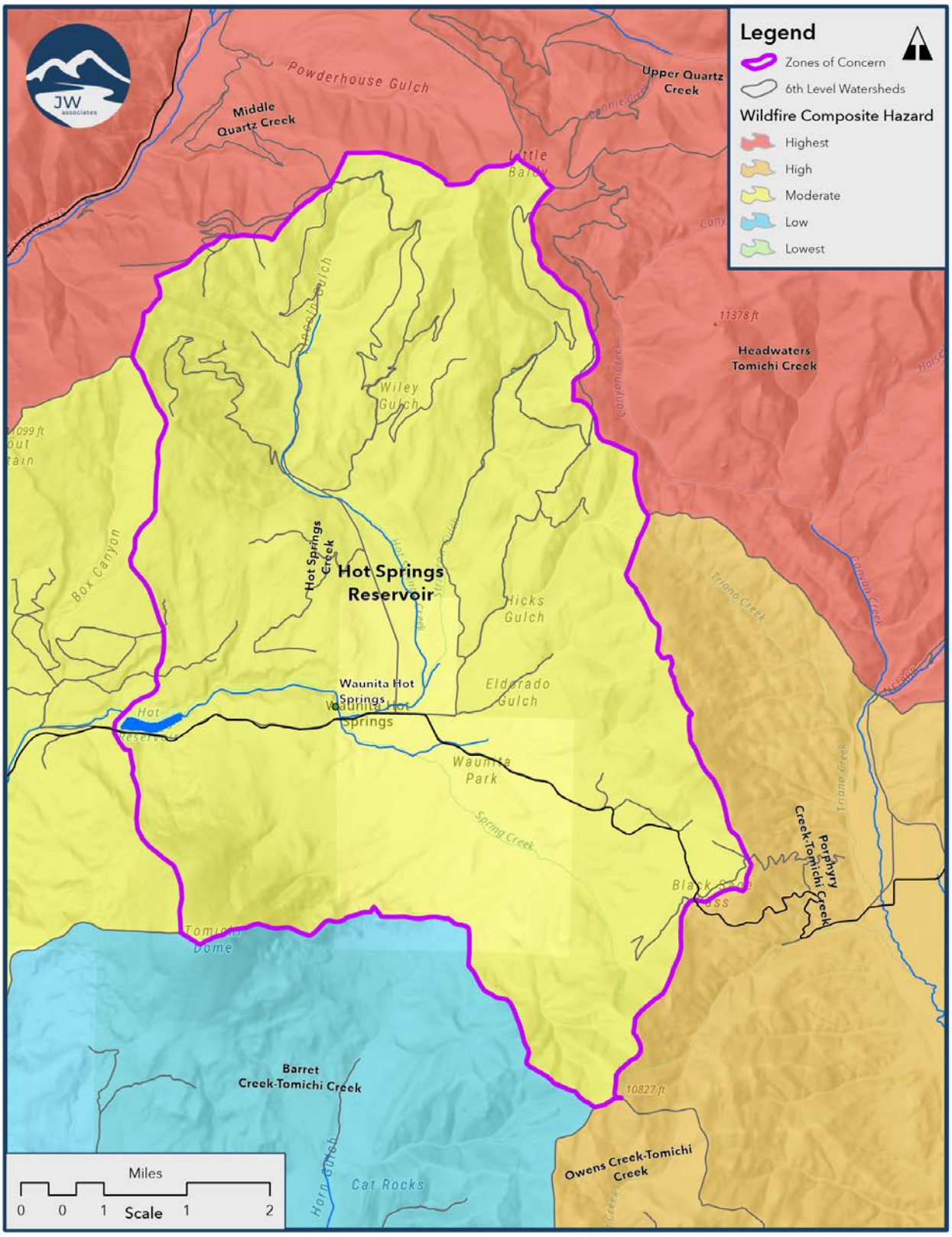
Wildfire hazard is high in some portions of the Hot Springs Reservoir Zone of Concern. Modeled active and passive crown fire activity covers more than 47% of the Zone of Concern. Modeled flame lengths above 11 feet also cover 60% of the Zone of Concern.



The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Hot Springs Creek watershed ranks Moderate in the Composite Wildfire Hazard rank (Table 29 and Map 36). The Road Hazard rank is Highest and the Wildfire Hazard is ranked as Moderate. Debris Flow and Soil Erodibility both rank as Low (Table 29).

Table 29. Wildfire Composite Hazard Rankings for Hot Springs Reservoir Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Hot Springs Creek	Moderate	Low	Highest	Low	Moderate



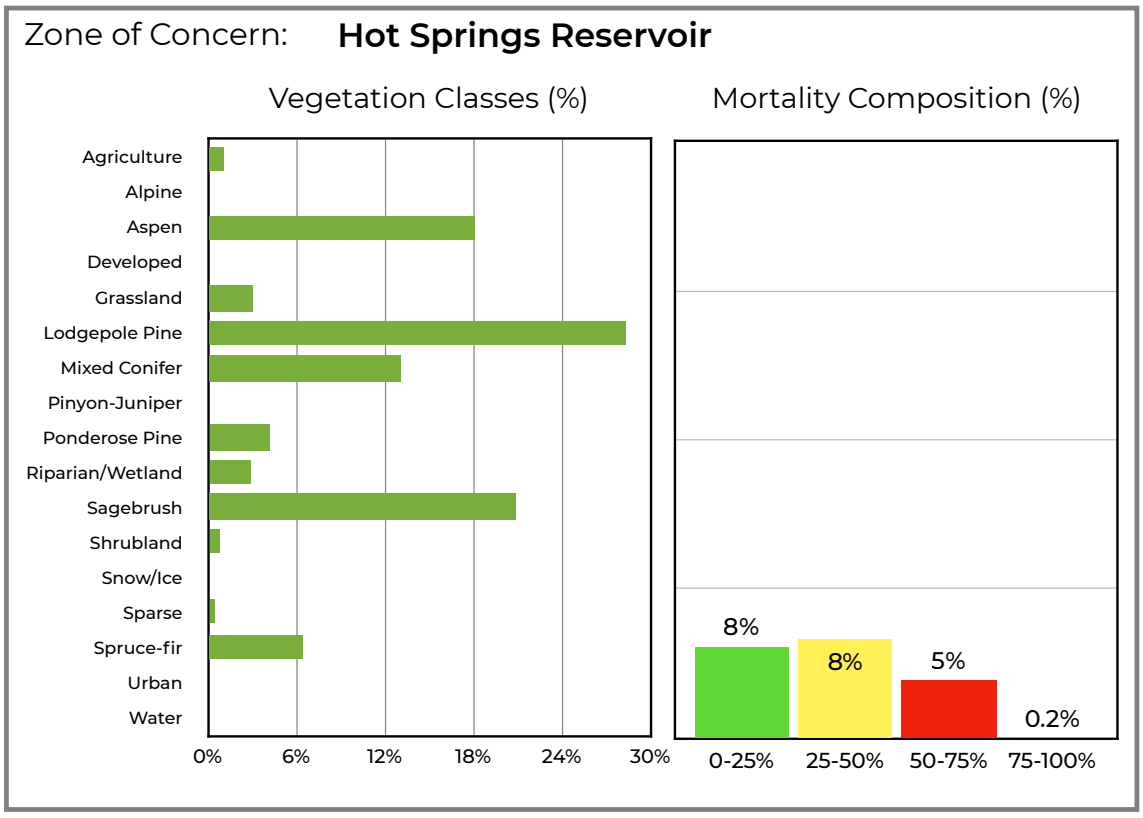
Map 36. Hot Springs Reservoir Zone of Concern Wildfire Composite Hazard

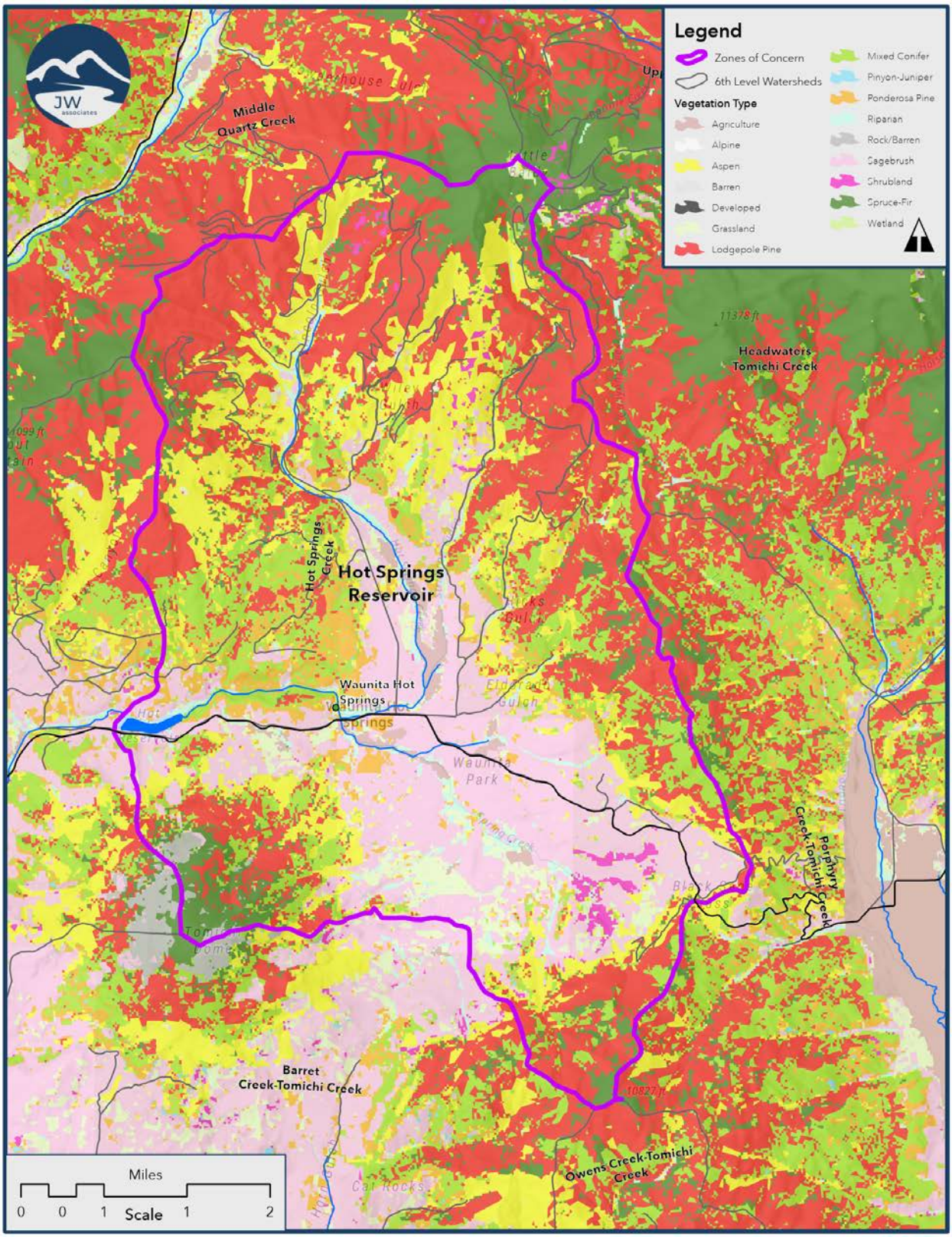
Hot Springs Reservoir Zone of Concern Access

There appears to be good road access throughout the Zone of Concern (Map 34).

Hot Springs Reservoir Zone of Concern Vegetation

Vegetation in the Hot Springs Reservoir Zone of Concern is dominated by lodgepole pine in the higher elevations and sagebrush in the lower elevations (Map 37). There are also some large areas of aspen and mixed conifer that occur below and mixed into the lodgepole pine areas. There are some small areas of beetle mortality in the Hot Springs Creek watershed.





Map 37. Hot Springs Reservoir Zone of Concern Vegetation

Hot Springs Reservoir Zone of Concern Climate Change Vulnerability

The Hot Springs Creek watershed has a Highest Climate Change Vulnerability rank which is comprised of a Highest Ecosystem Sensitivity rank and a Moderate Lack of Adaptive Capacity rank (Table 30).

Table 30. Climate Change Vulnerability for Hot Springs Reservoir Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Hot Springs Creek	Highest	Moderate	Highest

The Ecosystem Sensitivity rank is a combination of three indicators. Fire Regime Departure is ranked as Highest for Hot Springs Creek but the other factors are ranked Moderate (Table 31).

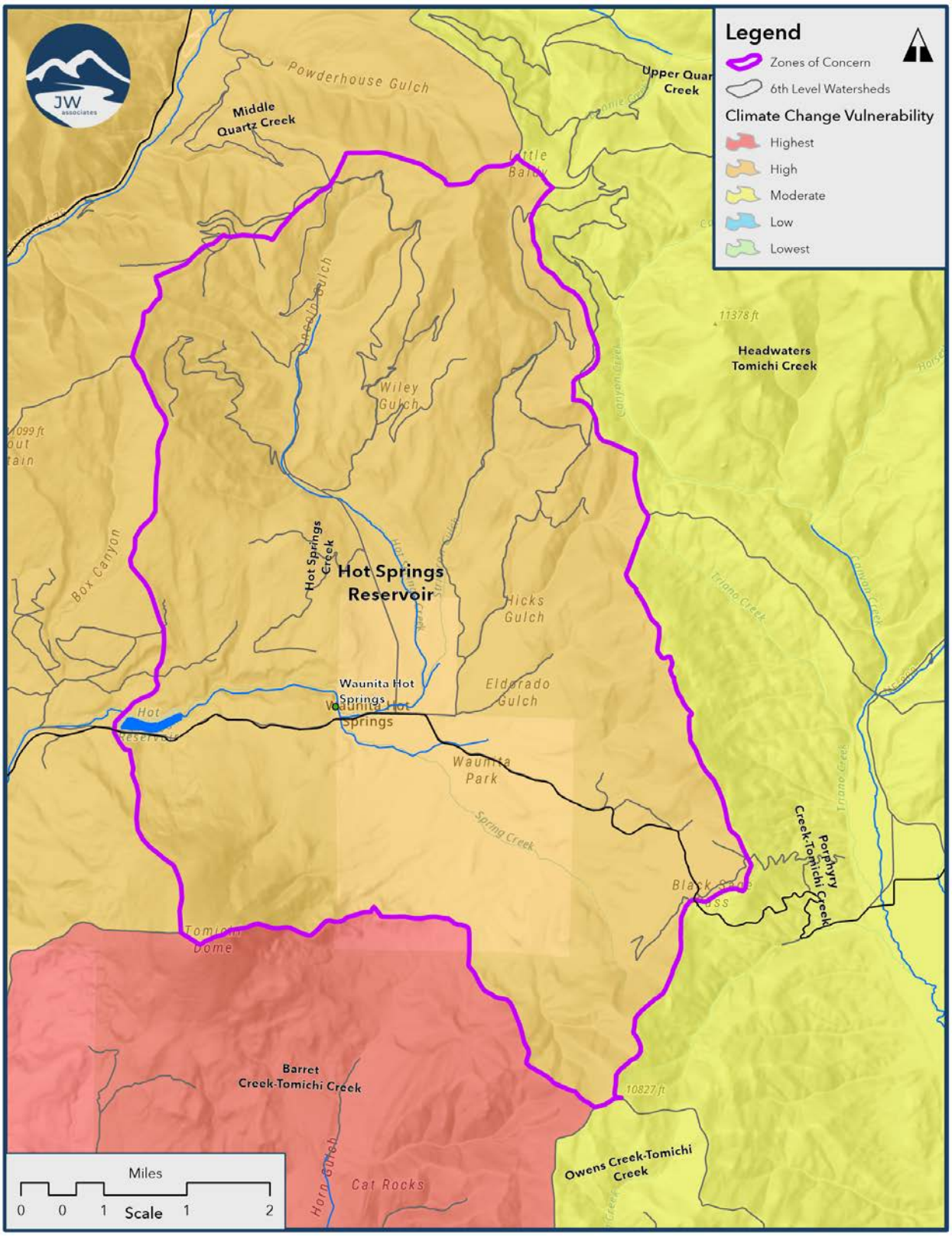
Table 31. Ecosystem Sensitivity for Hot Springs Reservoir Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Hot Springs Creek	Moderate	Highest	Moderate	Highest

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as Lowest for Hot Springs Creek watershed (Table 32). Topo-climatic Variability is ranked as High.

Table 32. Lack of Adaptive Capacity for Hot Springs Reservoir Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Upper Taylor River	Lowest	High	Moderate



Map 38. Hot Springs Reservoir Zone of Concern Climate Change Vulnerability

Hot Springs Reservoir Zone of Concern Opportunities

There are opportunities to reduce wildfire hazard in the Dome Lakes Zone of Concern. There are opportunities to restore natural fire regimes focused within sagebrush. Table 33 identifies the actions that would be recommended in this Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 33. Hot Springs Reservoir Zone of Concern Actions

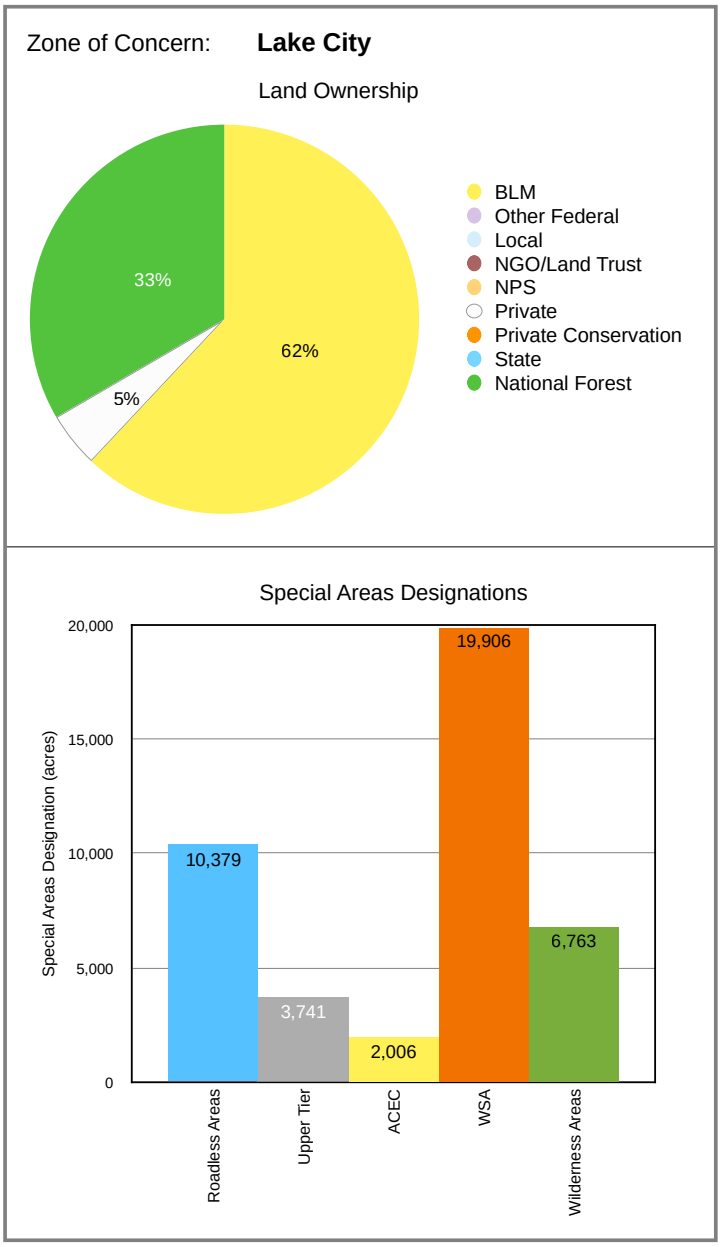
Actions	Hot Springs Creek
Wildfire Hazard Reduction	☑
Road Analysis & Planning	☑
Address Beetle Mortality	☑
Determine appropriate actions in roadless & ACECs	
Riparian areas, floodplains, etc.	☑
Pre- and post-fire planning	☑
Increase Diversity	
Fire Regime Restoration	☑

Lake City Zone of Concern

The Lake City Zone of Concern includes one extended area, covers a total of 53,484 acres and includes two 6th Level watersheds - North Fork Henson Creek-Henson Creek and Nellie Creek-Henson Creek (Table 1 and Map 39).

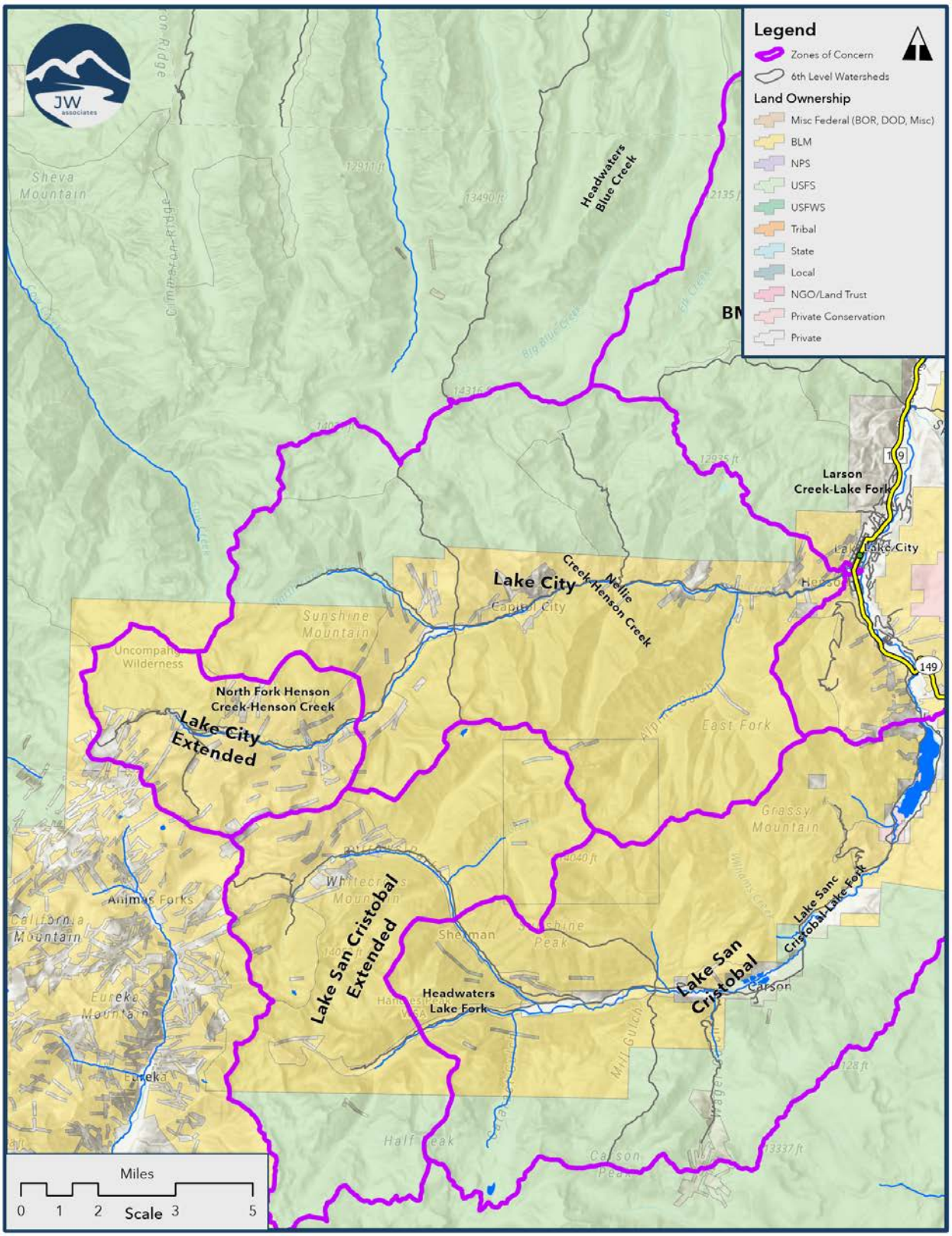
Lake City Zone of Concern Ownership

The majority (62%) of the Lake City Zone of Concern is BLM lands with 33% on National Forest lands (Map 39). There are some scattered areas of private lands that appear to be mining claims.

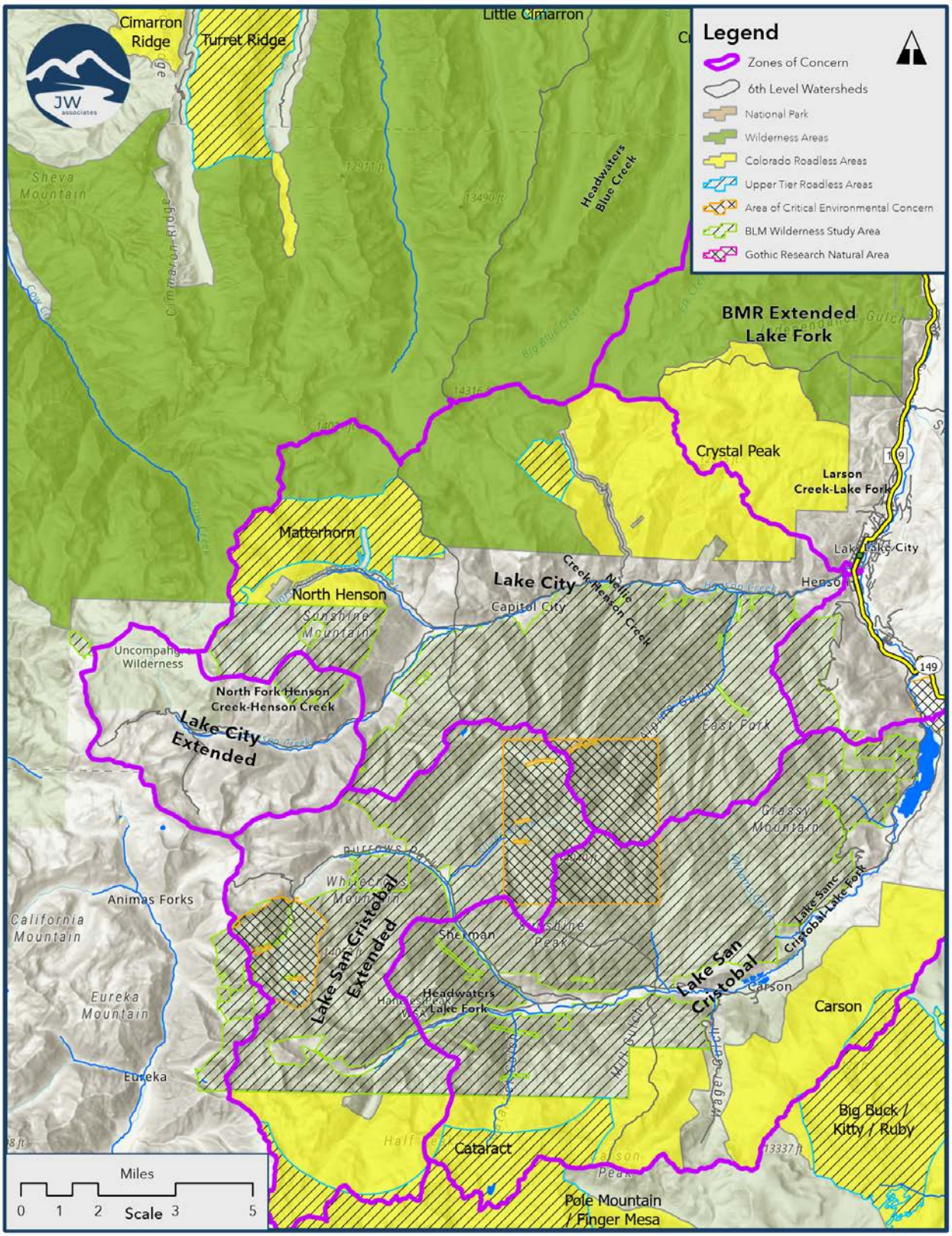


Lake City Zone of Concern Special Areas

All of the National Forest lands are covered by the Uncompahgre Wilderness, or surrounding roadless areas, some are also designated as Upper Tier (Map 40). The BLM lands are mostly Wilderness Study Areas or ACECs (Map 40). About 80% of the Zone of Concern is covered by a variety of special areas.



Map 39. Lake City Zone of Concern Ownership



Map 40. Lake City Zone of Concern Special Areas

Lake City Zone of Concern Wildfire Composite

Wildfire hazard is low to moderate in the Lake City Zone of Concern. Modeled active and passive crown fire activity covers more than 37% of the Zone of Concern. Modeled flame lengths above 11 feet also cover more than 33% of the Zone of Concern.

The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The two watersheds in this Zone of Concern rank Moderate in the Composite Wildfire Hazard rank (Table 34 and Map 41). The Road Hazard rank is High in the North Fork Henson Creek-Henson Creek watershed. The Debris Flow rank is Highest for the Nellie Creek-Henson Creek watershed.

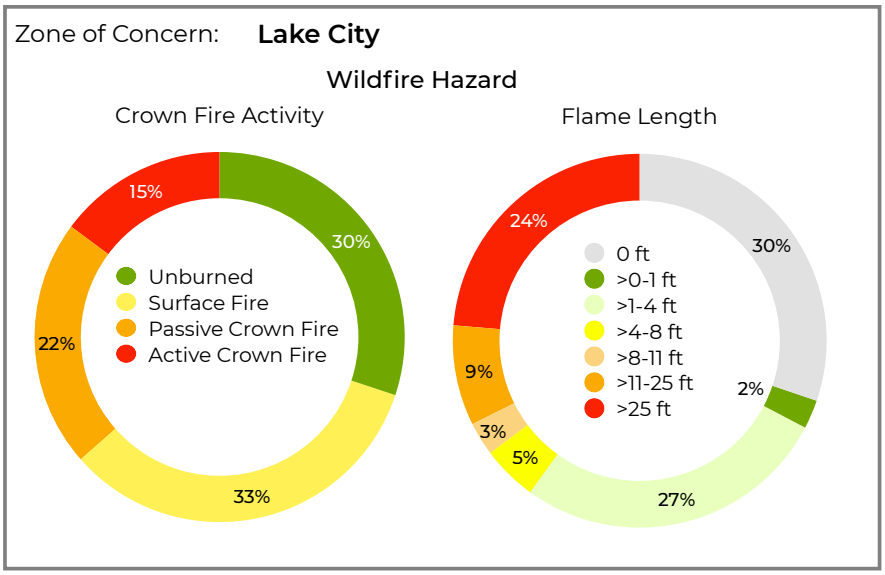
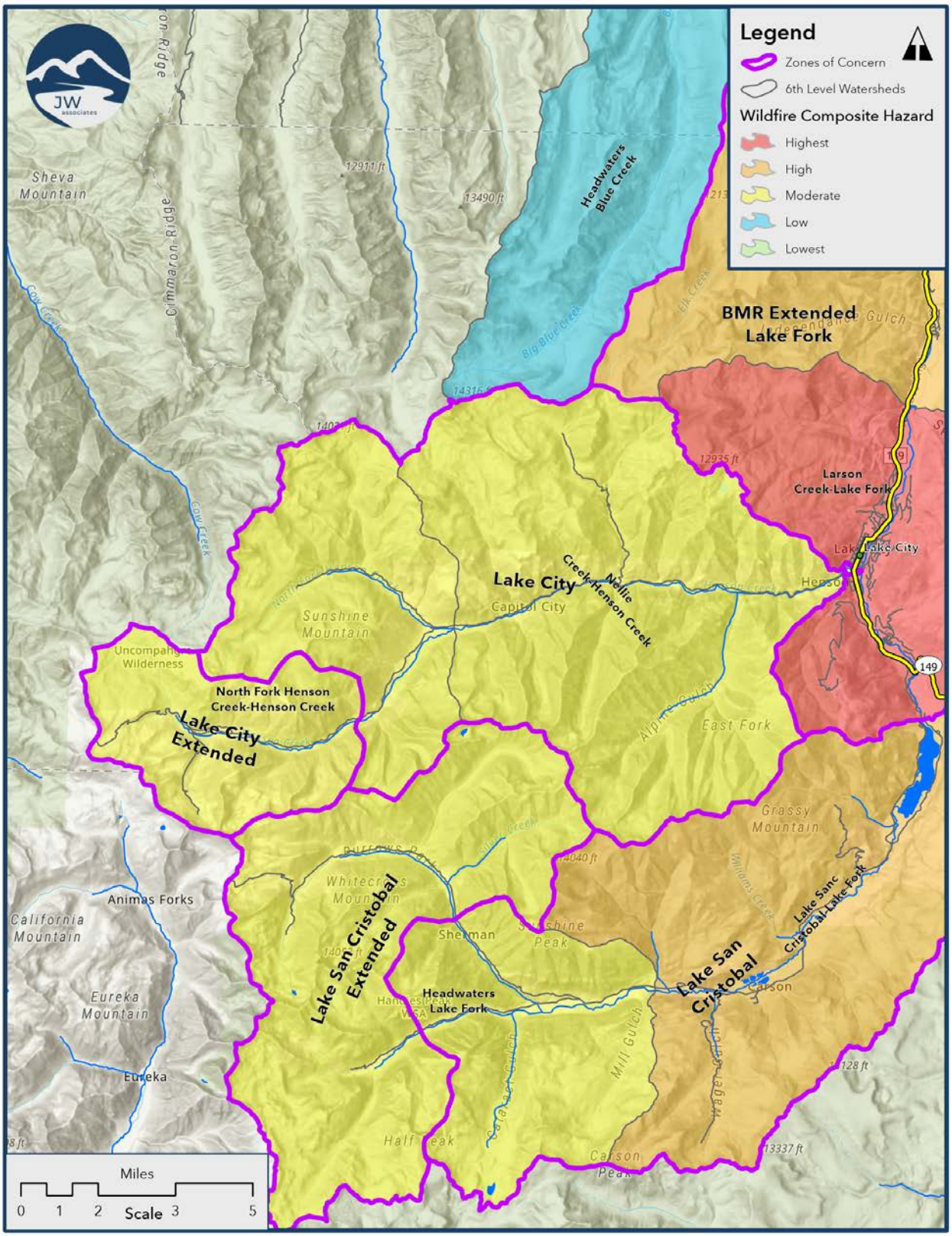


Table 34. Wildfire Composite Hazard Rankings for Lake City Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
North Fork Henson Creek-Henson Creek	Lowest	Moderate	High	Moderate	Moderate
Nellie Creek-Henson Creek	Moderate	Highest	Moderate	Low	Moderate



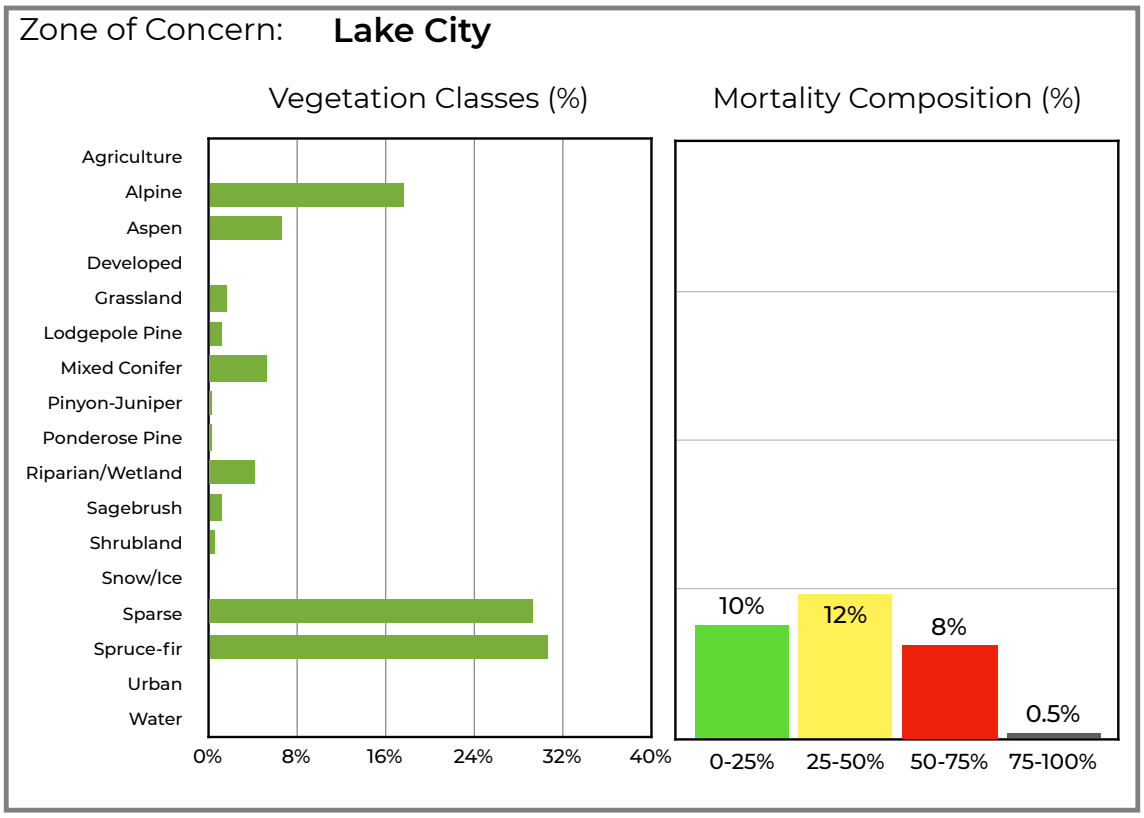
Map 41. Lake City Zone of Concern Wildfire Composite Hazard

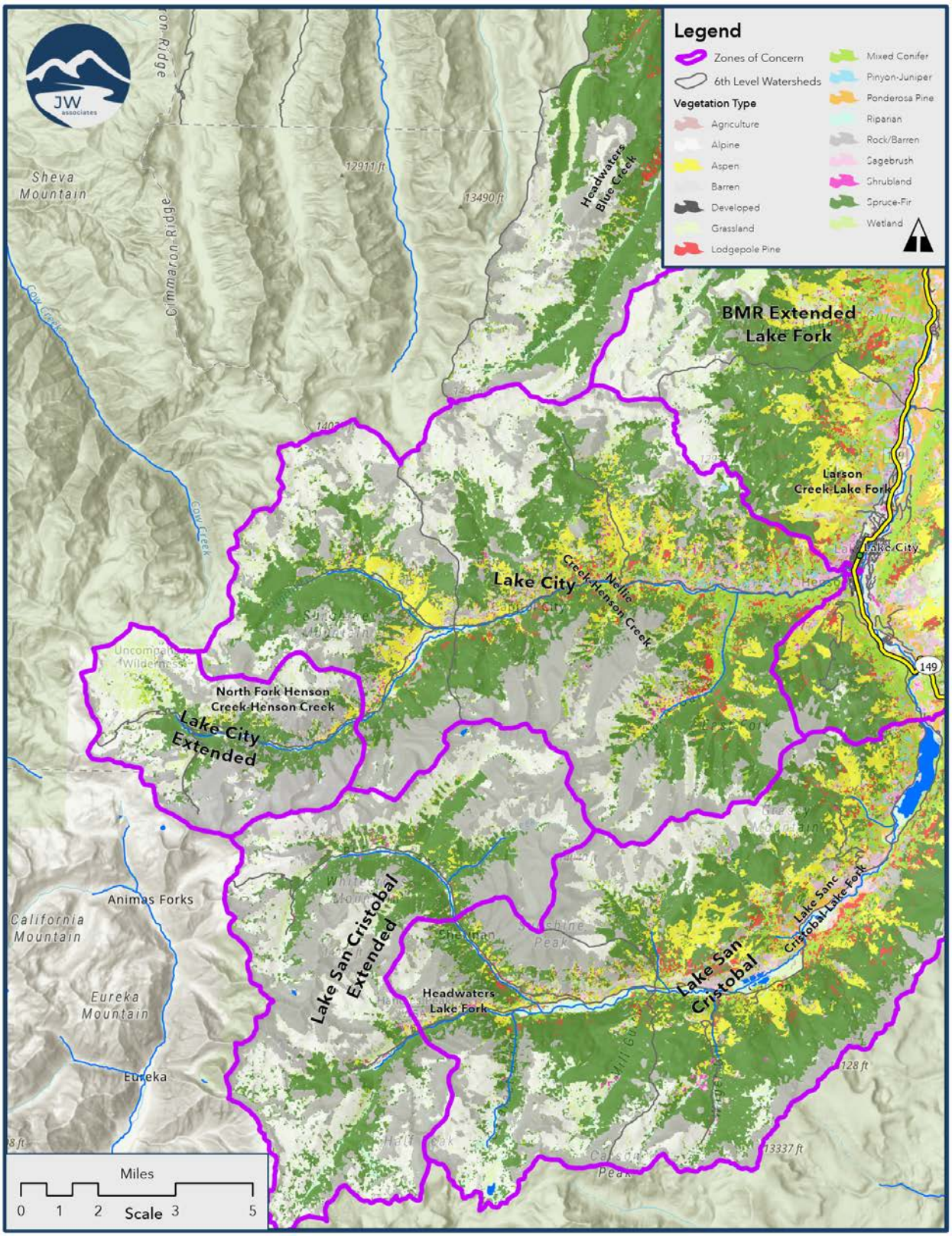
Lake City Zone of Concern Access

Road access appears to be limited to one road along Henson Creek and a few other spur roads (Map 39).

Lake City Zone of Concern Vegetation

The vegetation of the Lake City Zone of Concern is dominated by spruce-fir (Map 42). The combination of sparse and alpine is close to half of the Zone of Concern. There is beetle mortality between 25-75% in about 20% of the Zone of Concern, which is focused in the spruce-fir forest.





Map 42. Lake City Zone of Concern Vegetation

Lake City Zone of Concern Climate Change Vulnerability

The North Fork Henson Creek-Henson Creek and Nellie Creek-Henson Creek watersheds have a Lowest Climate Change Vulnerability rank which is comprised of Low to Lowest Ecosystem Sensitivity ranks and Low to Lowest Lack of Adaptive Capacity ranks (Table 35 and Map 43).

Table 35. Climate Change Vulnerability Rankings for Lake City Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
North Fork Henson Creek-Henson Creek	Lowest	Low	Lowest
Nellie Creek-Henson Creek	Low	Lowest	Lowest

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition and Fire Regime Departure are both ranked as Lowest for both watersheds (Table 36). Insect & Disease is ranked as High for the Nellie Creek-Henson Creek watershed.

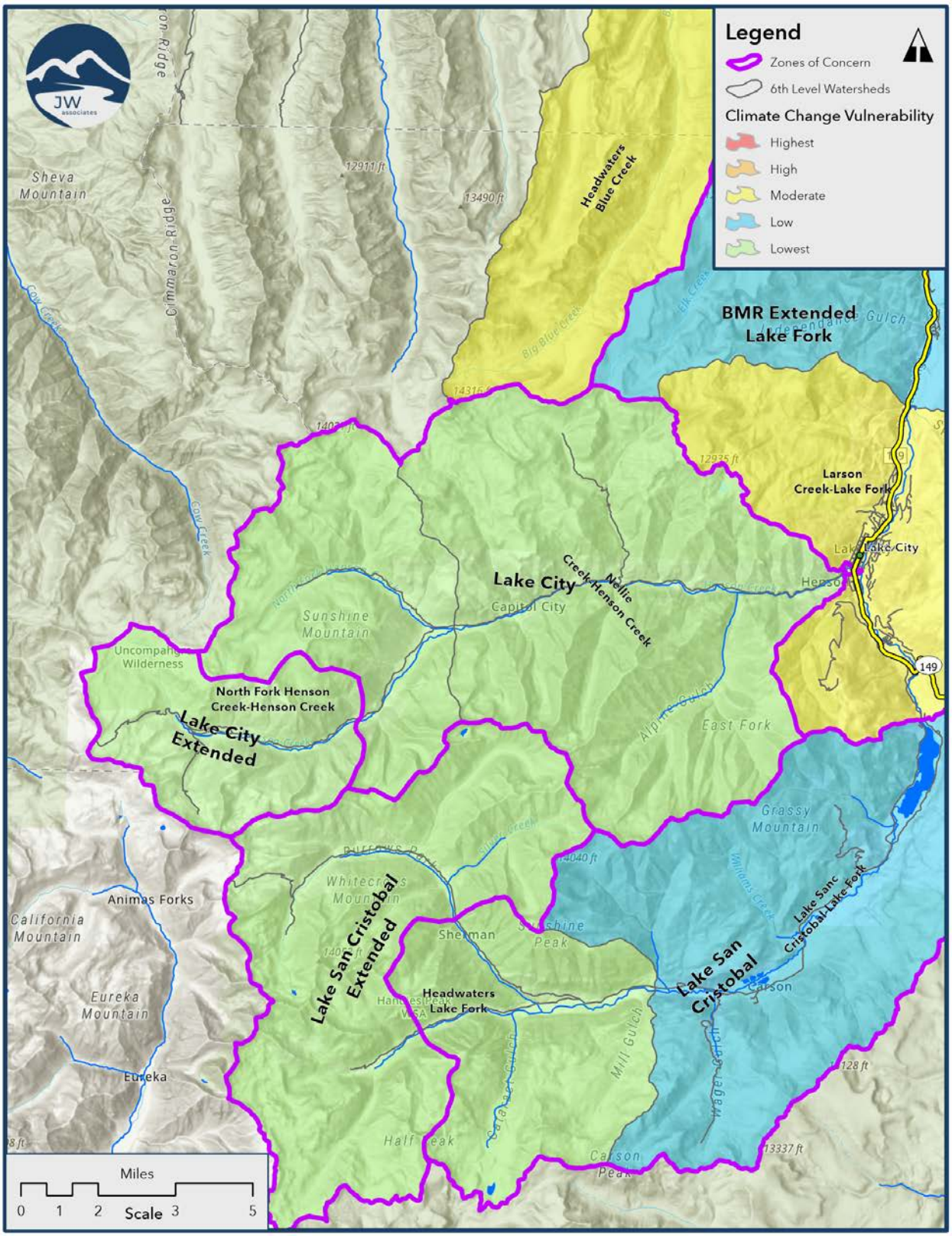
Table 36. Ecosystem Sensitivity Rankings for Lake City Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Nellie Creek-Henson Creek	Lowest	Lowest	High	Low
North Fork Henson Creek-Henson Creek	Lowest	Lowest	Low	Lowest

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as Moderate for the North Fork Henson Creek-Henson Creek watershed but that is likely because it is mostly composed of sparse and alpine (Table 37). Topo-climatic Variability is ranked as Lowest for both watersheds.

Table 37. Lack of Adaptive Capacity Rankings for Lake City Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Nellie Creek-Henson Creek	Low	Lowest	Lowest
North Fork Henson Creek-Henson Creek	Moderate	Lowest	Low



Map 43. Lake City Zone of Concern Climate Change Vulnerability

Lake City Zone of Concern Opportunities

There are many constraints in the Lake City Zone of Concern due to 80% of the area covered in special areas and the amount of high elevation area that is mostly in alpine and sparse. There are some limited opportunities to reduce wildfire hazard Nellie Creek-Henson Creek watershed. Table 38 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 38. Lake City Zone of Concern Actions

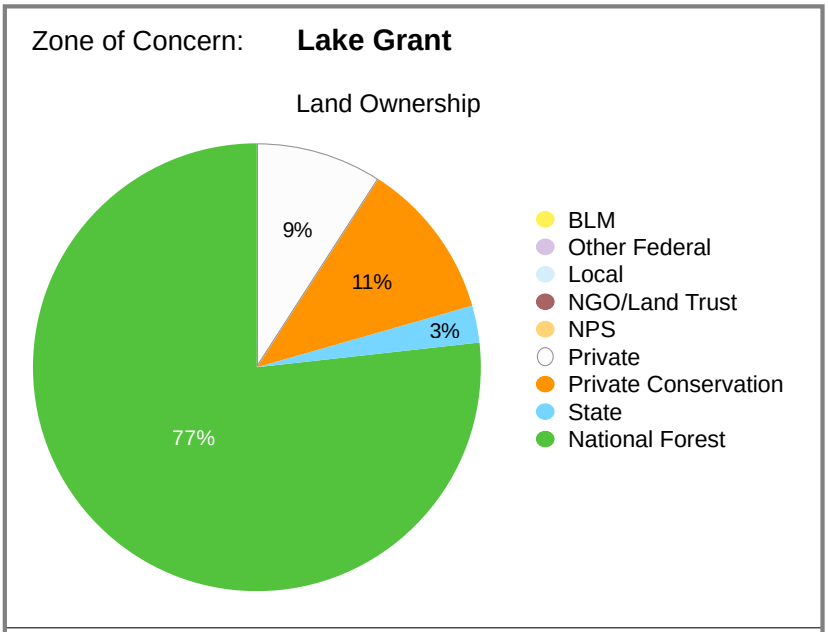
Actions	Nellie Creek-Henson Creek	North Fork Henson Creek-Henson Creek
Wildfire Hazard Reduction	☑	
Road Analysis & Planning	☑	
Address Beetle Mortality	☑	
Determine appropriate actions in roadless & ACECs	☑	☑
Riparian areas, floodplains, etc.	☑	☑
Pre- and post-fire planning	☑	☑
Increase Diversity		
Fire Regime Restoration		

Lake Grant Zone of Concern

The Lake Grant Zone of Concern covers 424 acres and includes one 6th Level watershed - Washington Gulch-Slate River (Table 1 and Map 44).

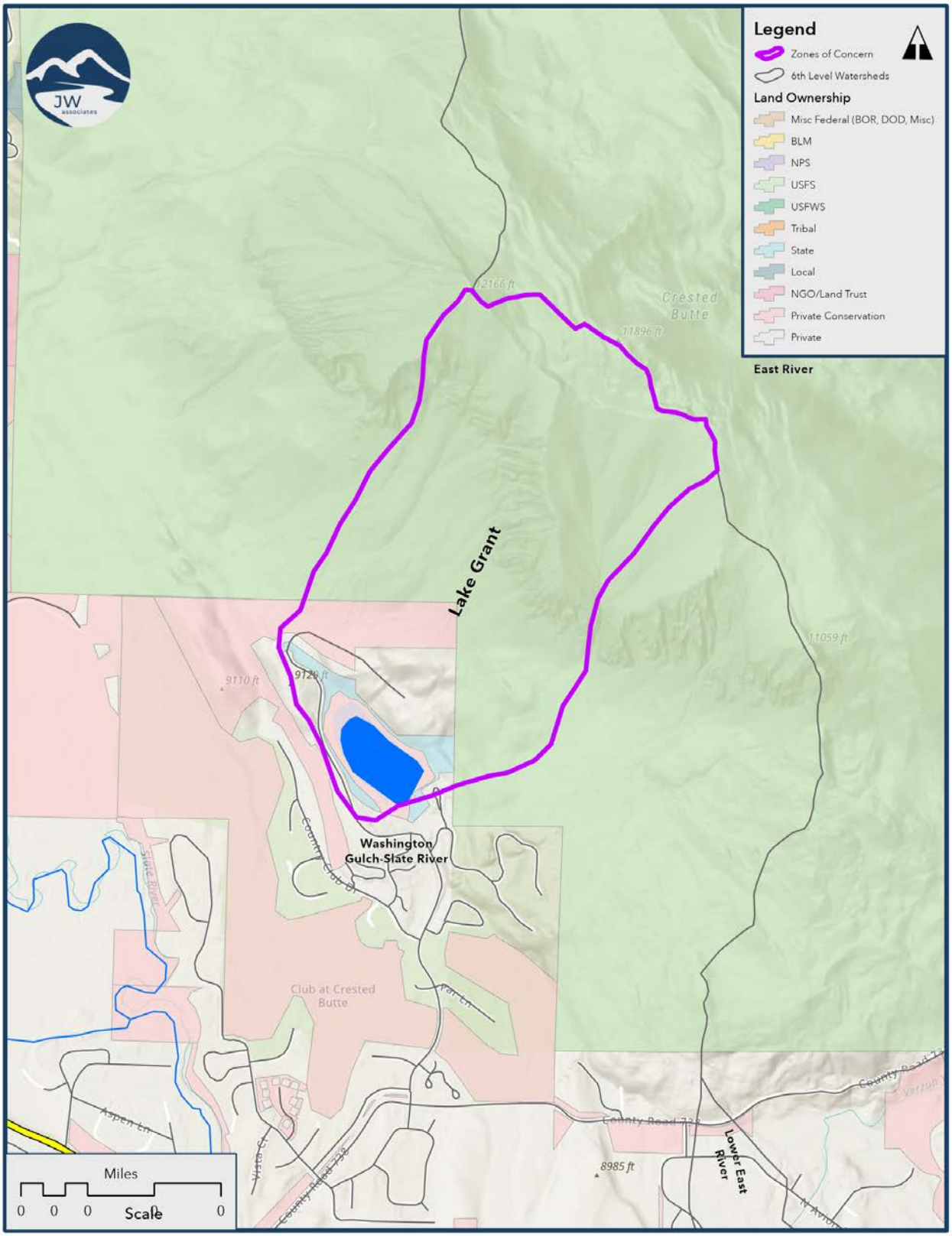
Lake Grant Zone of Concern Ownership

The majority (77%) of the Lake Grant Zone of Concern is National Forest lands (Map 44), which covers all of the higher elevations. There is an equal amount of private lands and private conservation lands surrounding the lake, with a few parcels of state land (3%) surrounding the lake as well.

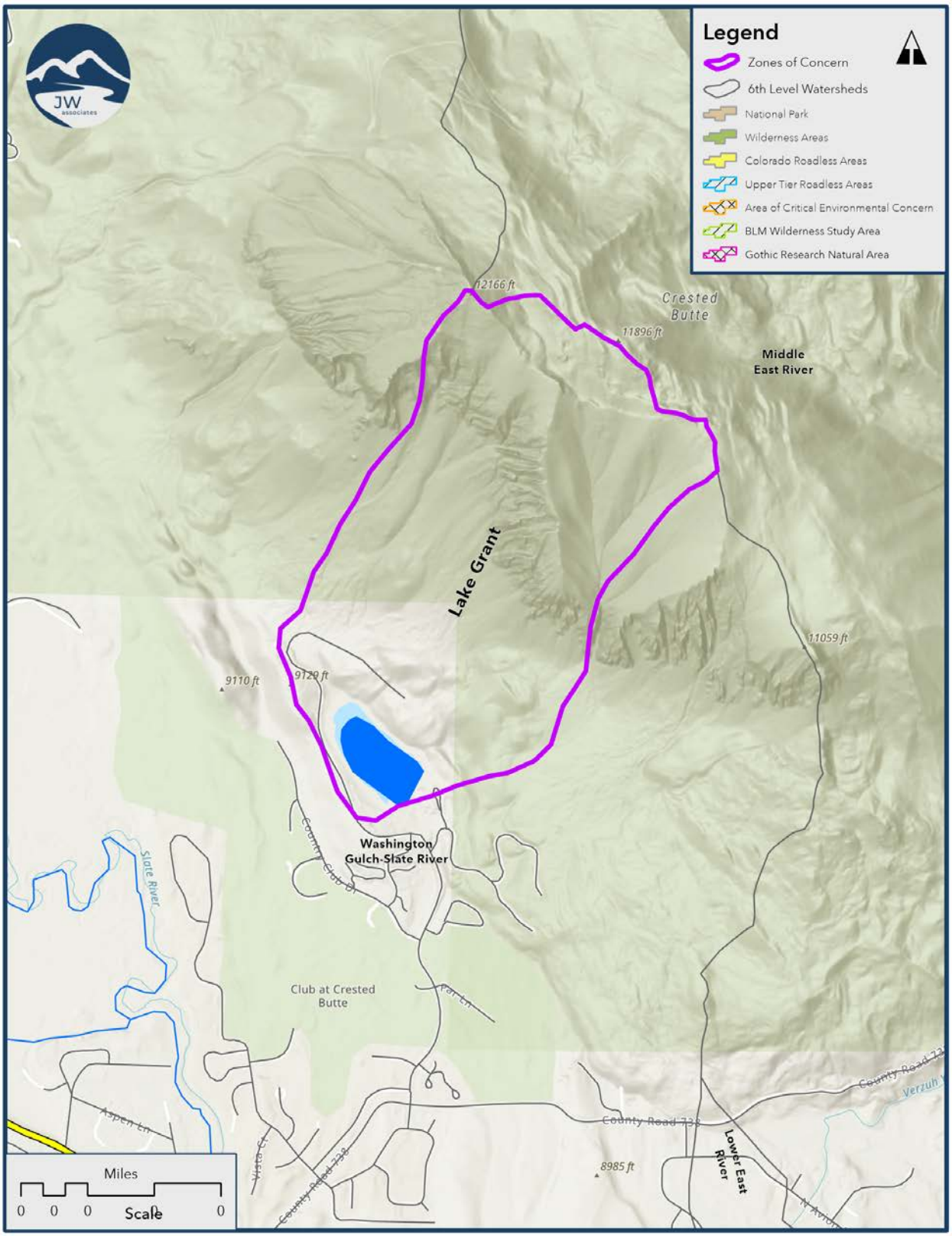


Lake Grant Zone of Concern Special Areas

There are no wilderness, roadless, ACECs or other special status lands in this Zone of Concern (Map 45).



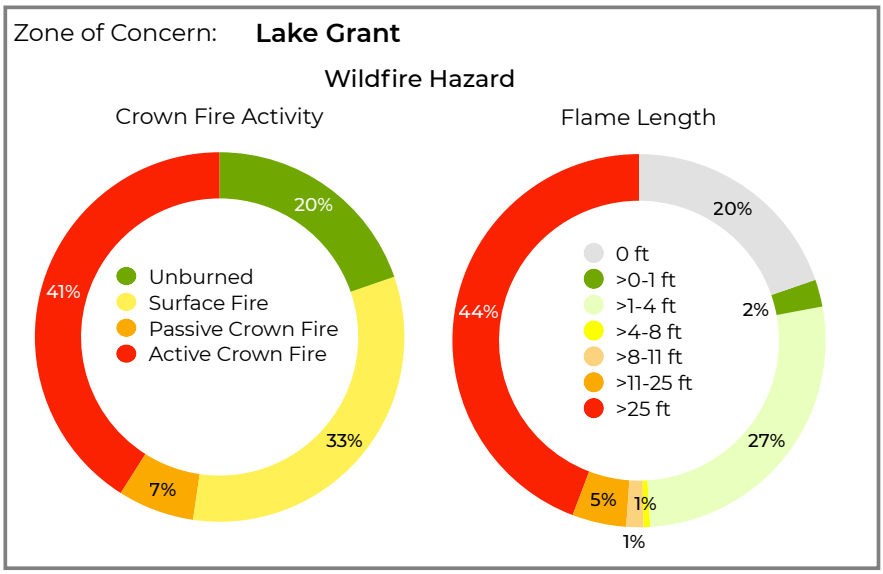
Map 44. Lake Grant Zone of Concern Ownership



Map 45. Lake Grant Zone of Concern Special Areas

Lake Grant Zone of Concern Wildfire Composite

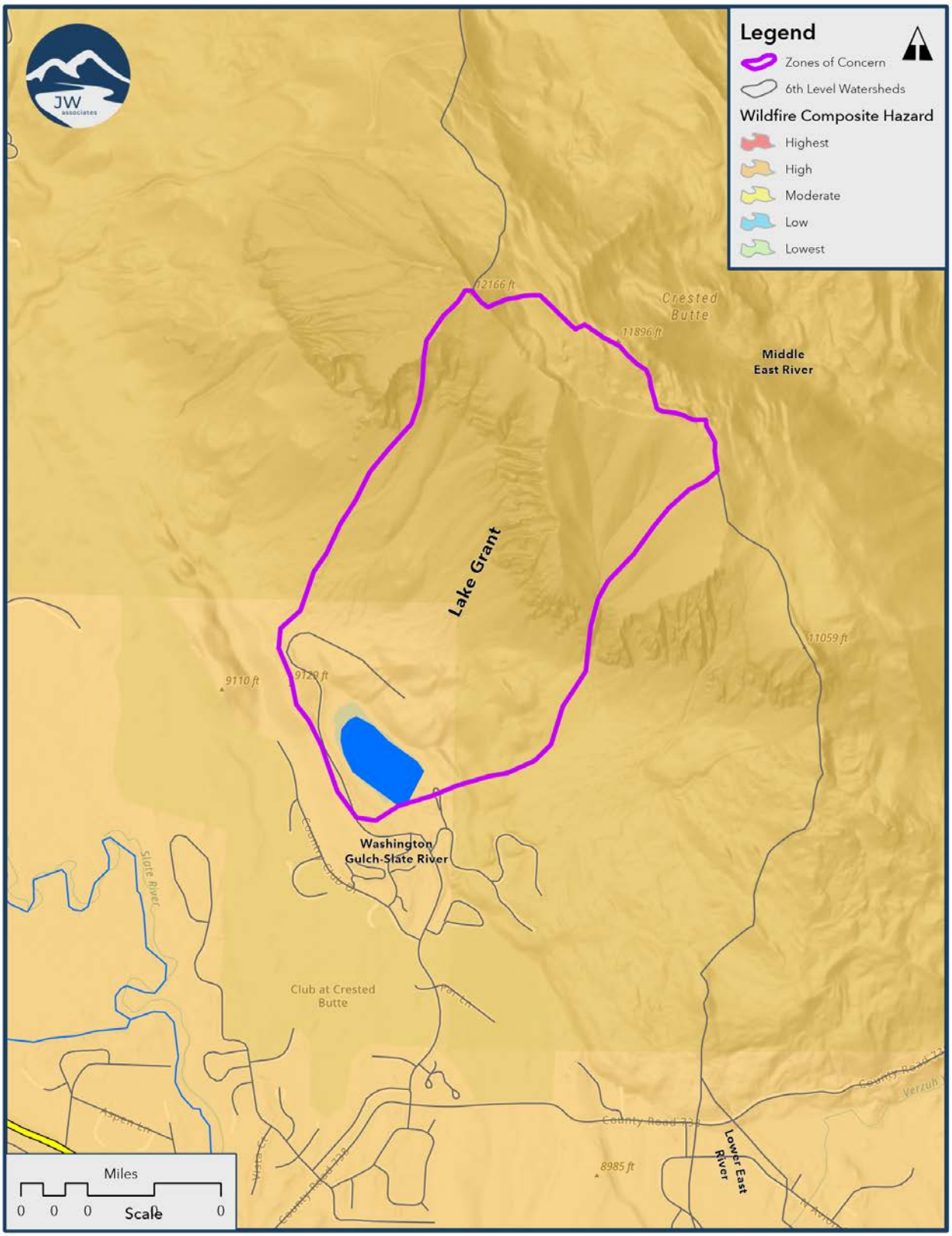
Wildfire hazard is moderate in the Lake Grant Zone of Concern. Modeled active and passive crown fire activity covers 48% of the Zone of Concern. Modeled flame lengths above 11 feet covers 49% of the Zone of Concern.



The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Washington Gulch-Slate River watershed ranks as High in the Composite Wildfire Hazard rank (Table 39 and Map 46). The Composite Wildfire Hazard rank is a combination of four categories of wildfire and post-wildfire hazards (Table 39). The Washington Gulch-Slate River watershed ranks Highest for Road Hazard, High for Debris Flow and Soil Erodibility and Moderate for Wildfire Hazard. This watershed ranks High because of the post-fire hazards combined with wildfire hazard.

Table 39. Wildfire Composite Hazard Rankings for Lake Grant Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Washington Gulch-Slate River	Moderate	High	Highest	High	High



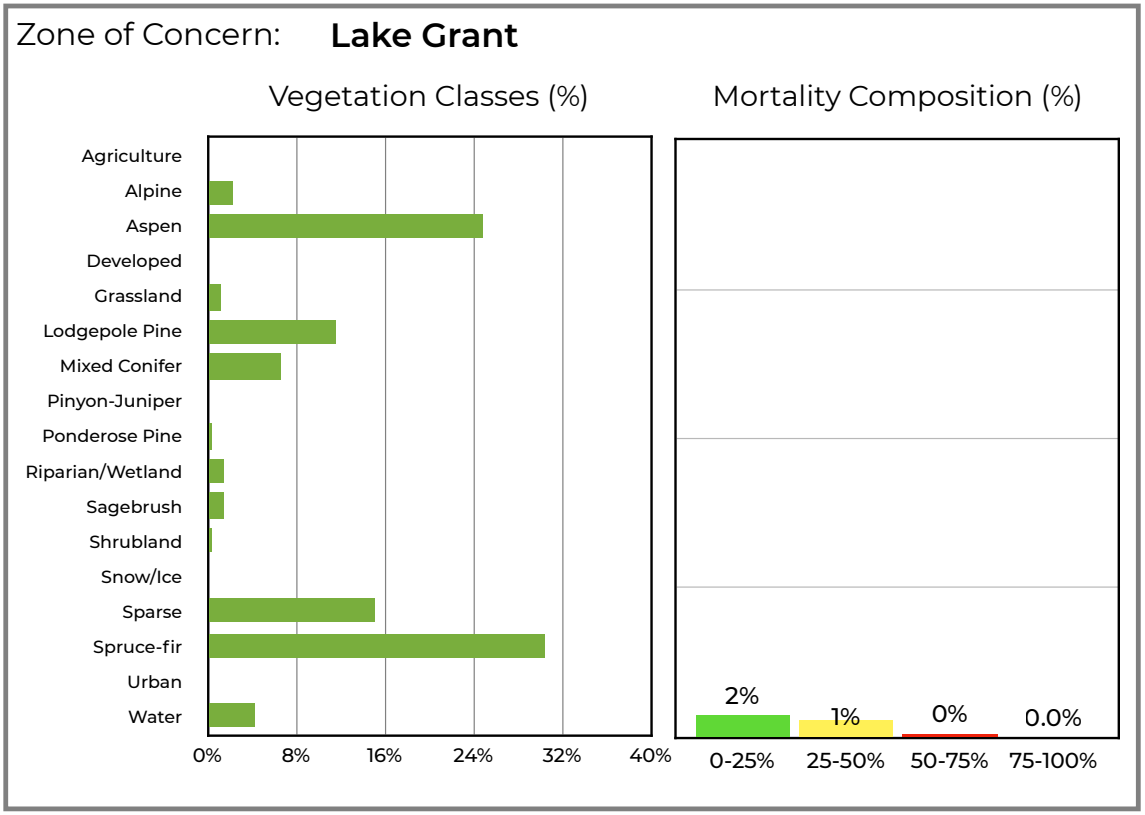
Map 46. Lake Grant Zone of Concern Wildfire Composite Hazard

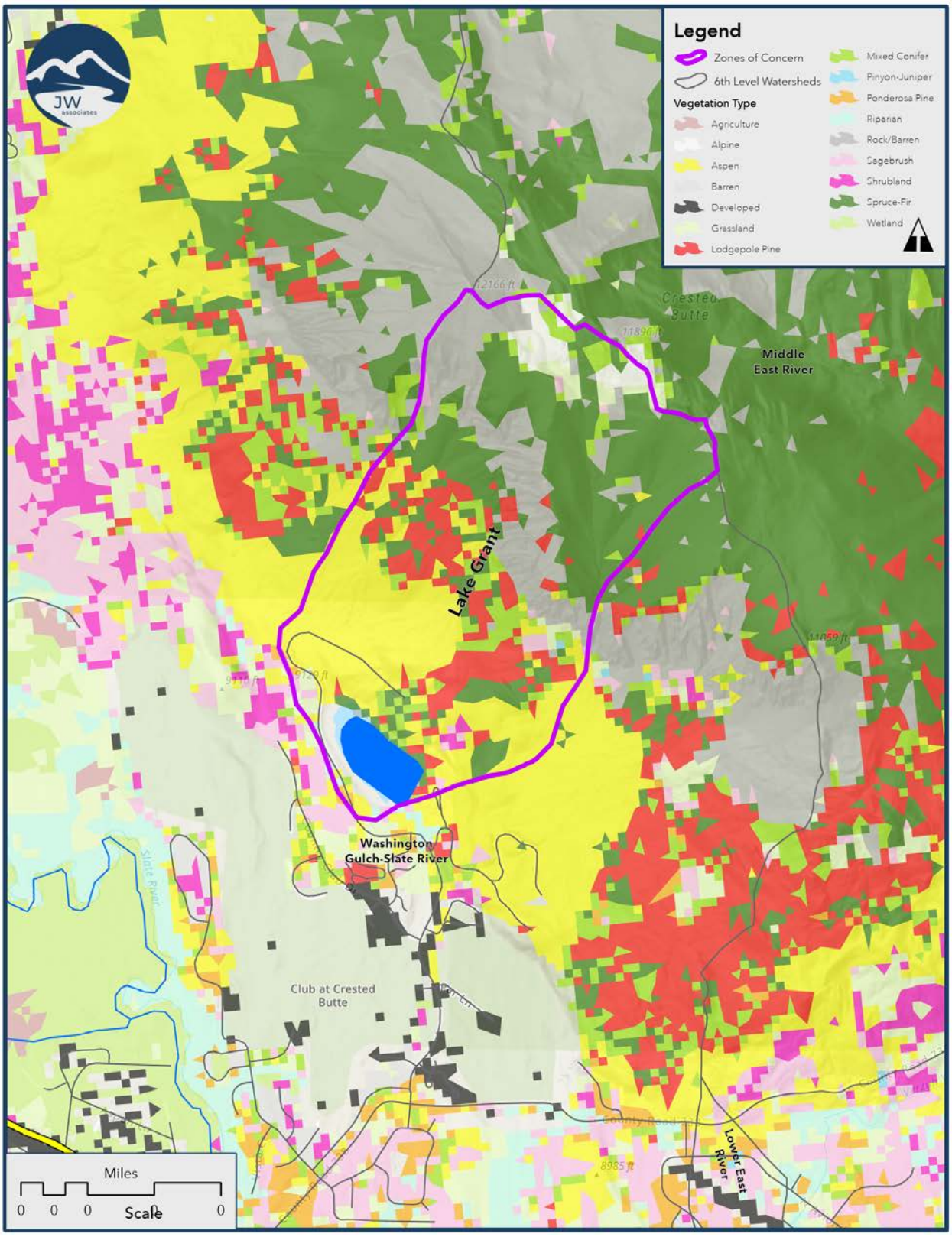
Lake Grant Zone of Concern Access

Road access only exists around the lake at the bottom of the Zone of Concern (Map 44).

Lake Grant Zone of Concern Vegetation

The lower elevations of the Zone of Concern are covered by aspen and lodgepole pine with some mixed conifer (Map 47). The higher elevations are mostly spruce-fir with some sparse and alpine at the highest elevations. There is little tree mortality measured in this watershed.





Map 47. Lake Grant Zone of Concern Vegetation

Lake Grant Zone of Concern Climate Change Vulnerability

The Washington Gulch-Slate River watershed has a Lowest Climate Change Vulnerability rank which is comprised of High Ecosystem Sensitivity rank and Low Lack of Adaptive Capacity rank (Table 40 and Map 48).

Table 40. Climate Change Vulnerability Rankings for Lake Grant Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Washington Gulch-Slate River	High	Low	Lowest

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition is ranked Highest for the Washington Gulch-Slate River watershed and Fire Regime Departure and Insect & Disease are ranked Low (Table 41).

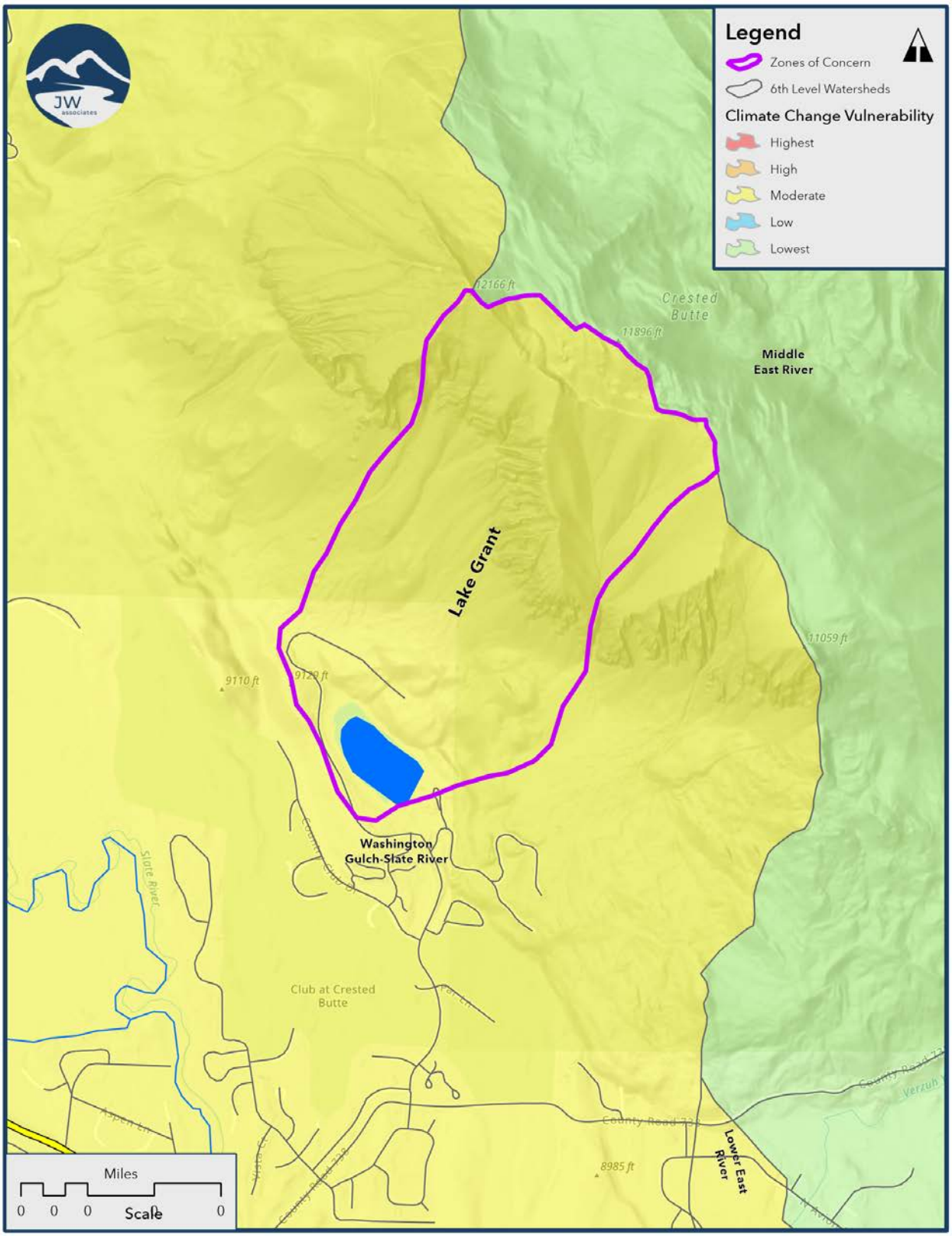
Table 41. Ecosystem Sensitivity Rankings for Lake Grant Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Washington Gulch-Slate River	Highest	Low	Low	High

The Lack of Adaptive Capacity rank is a combination of two indicators. Both of the components are ranked Low for the Washington Gulch-Slate River watershed (Table 42).

Table 42. Lack of Adaptive Capacity Rankings for Lake Grant Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Washington Gulch-Slate River	Low	Low	Low



Map 48. Lake Grant Zone of Concern Climate Change Vulnerability

Lake Grant Zone of Concern Opportunities

The main constraint in the Lake Grant Zone of Concern is lack of road access and the steepness of the watershed above the lake. There are some limited opportunities to reduce wildfire hazard in the Washington Gulch-Slate River watershed. Table 43 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 43. Lake Grant Zone of Concern Actions

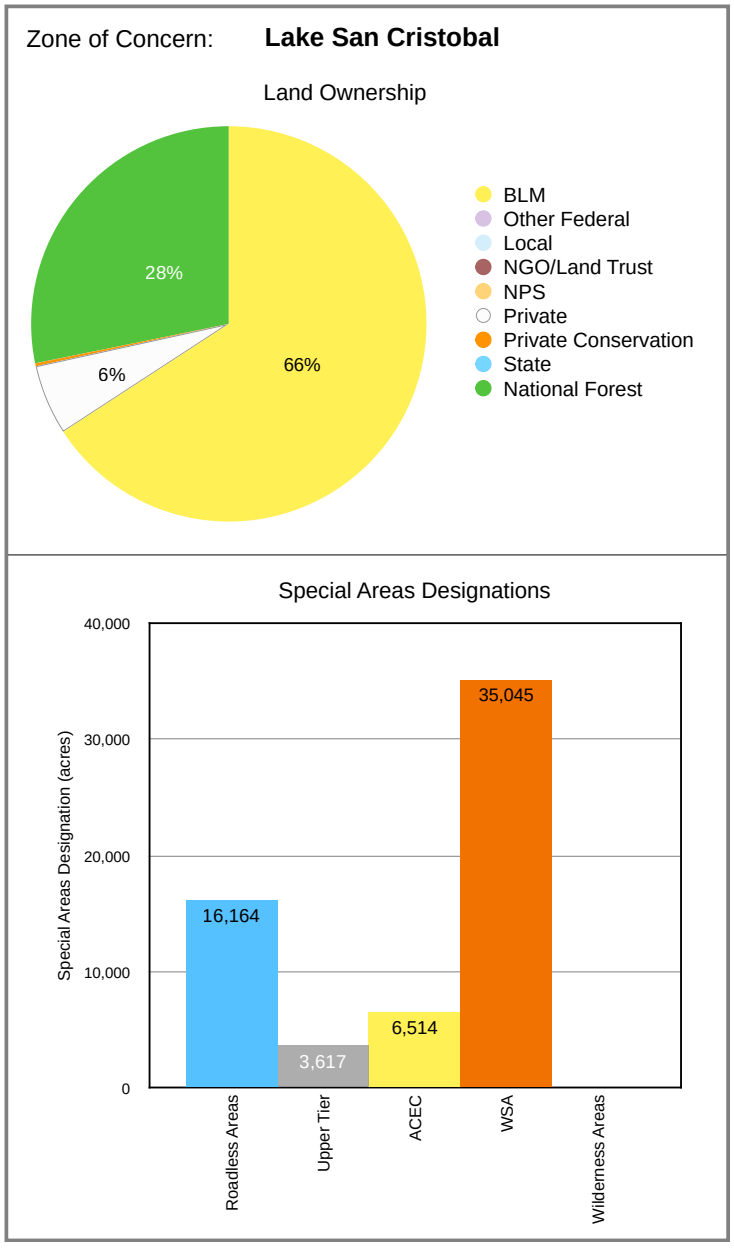
Actions	Washington Gulch-Slate River
Wildfire Hazard Reduction	☑
Road Analysis & Planning	☑
Address Beetle Mortality	
Determine appropriate actions in roadless & ACECs	
Riparian areas, floodplains, etc.	☑
Pre- and post-fire planning	☑
Increase Diversity	
Fire Regime Restoration	

Lake San Cristobal Zone of Concern

The Lake San Cristobal Zone of Concern, including one extended area, covers a total of 68,144 acres and includes two 6th Level watersheds - Headwaters Lake Fork and Lake San Cristobal-Lake Fork (Table 1 and Map 39).

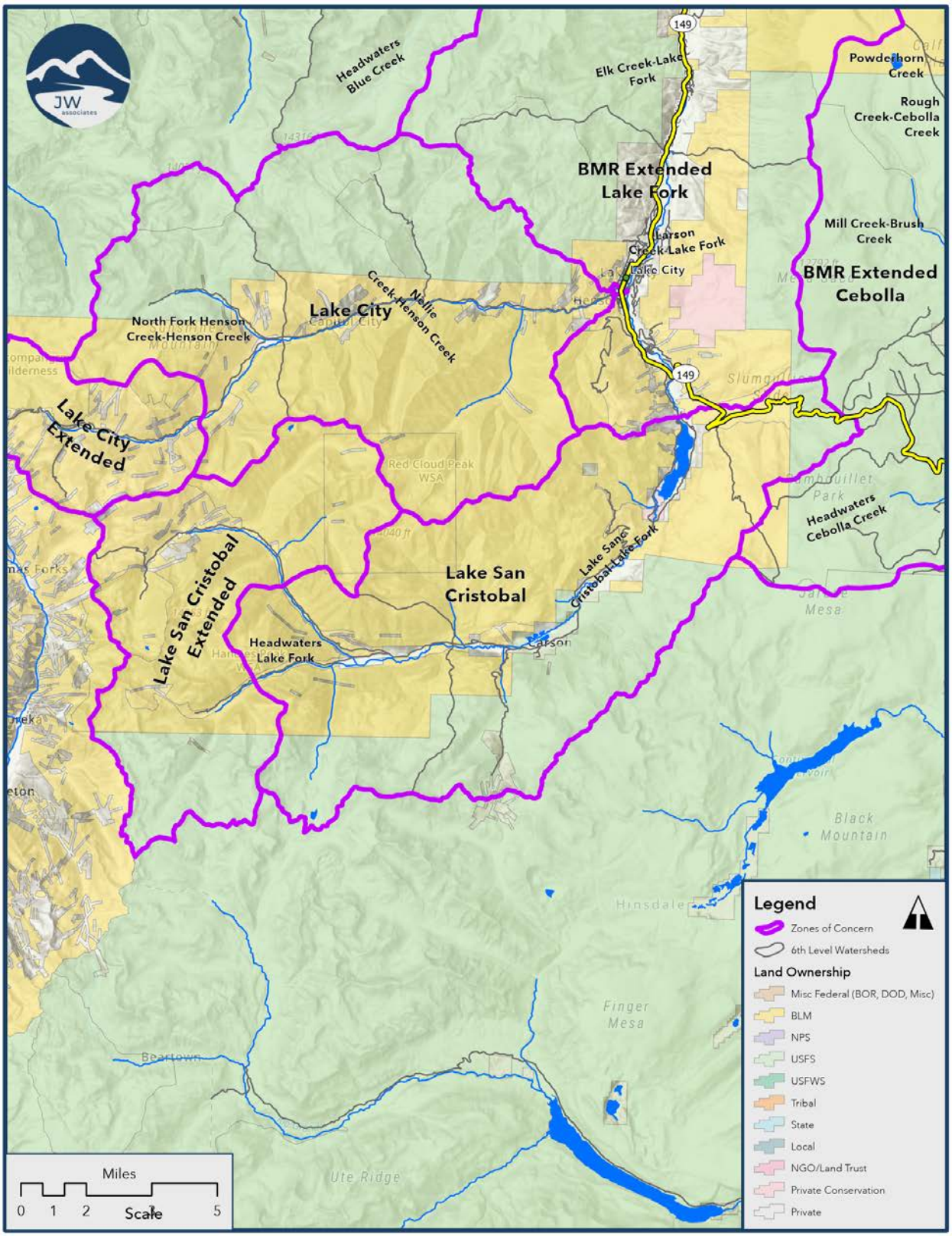
Lake San Cristobal Zone of Concern Ownership

The majority (66%) of the Lake San Cristobal Zone of Concern is BLM lands with 28% on National Forest lands (Map 49). There are some scattered areas of private lands that appear to be mining claims.

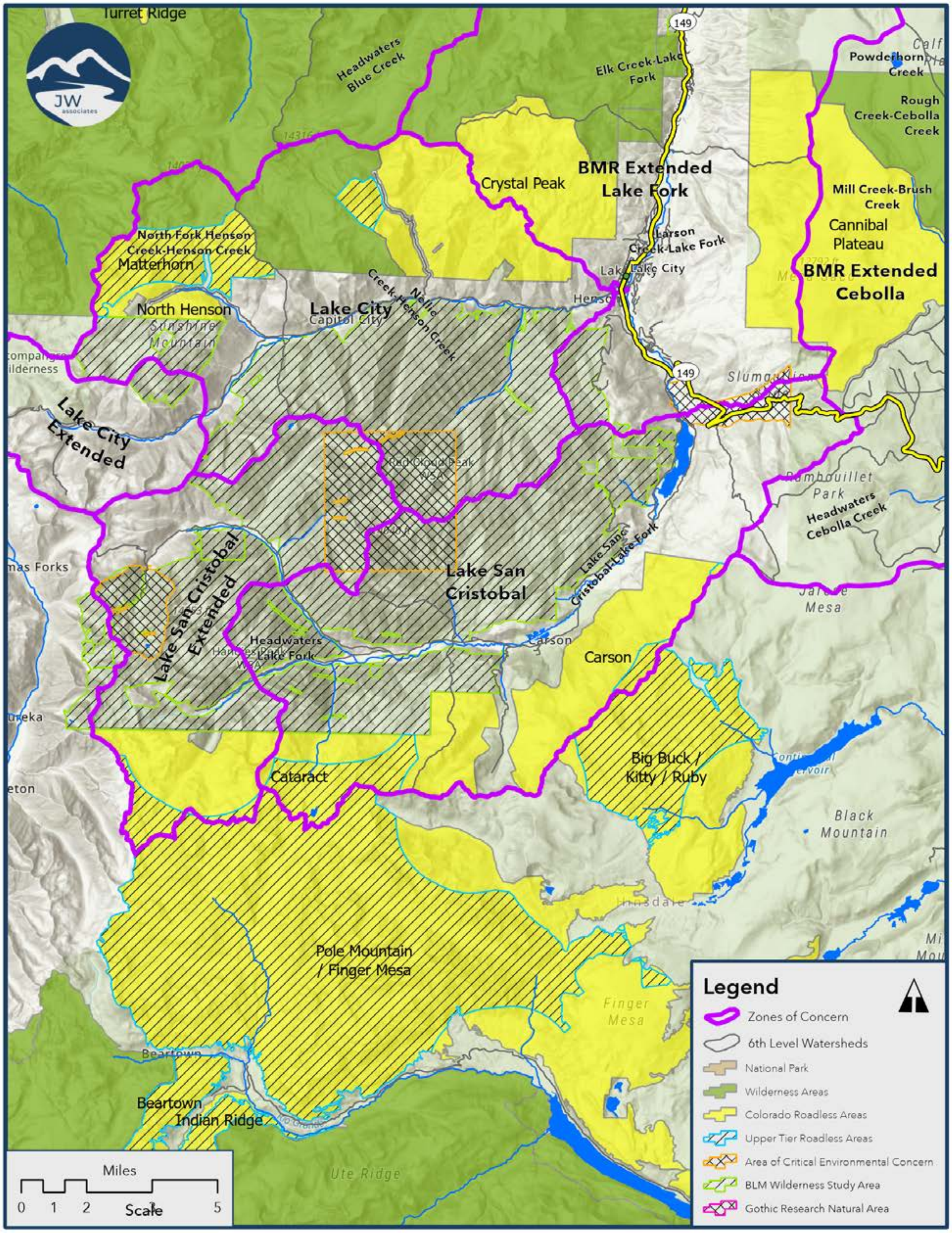


Lake San Cristobal Zone of Concern Special Areas

Most of the National Forest lands are covered by roadless areas, some are also designated as Upper Tier (Map 50). The BLM lands are mostly Wilderness Study Areas or ACECs (Map 50). About 90% of the Zone of Concern is covered by a variety of special areas.



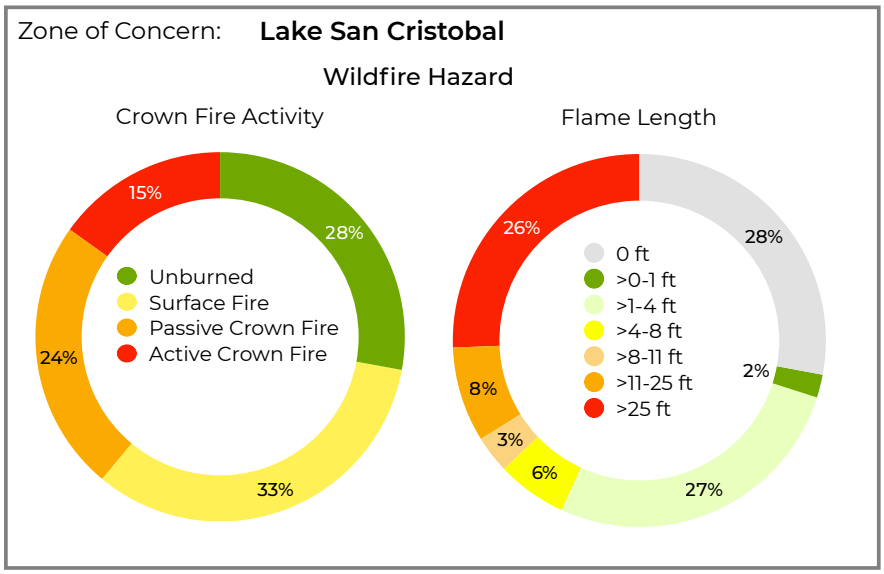
Map 49. Lake San Cristobal Zone of Concern Ownership



Map 50. Lake San Cristobal Zone of Concern Special Areas

Lake San Cristobal Zone of Concern Wildfire Composite

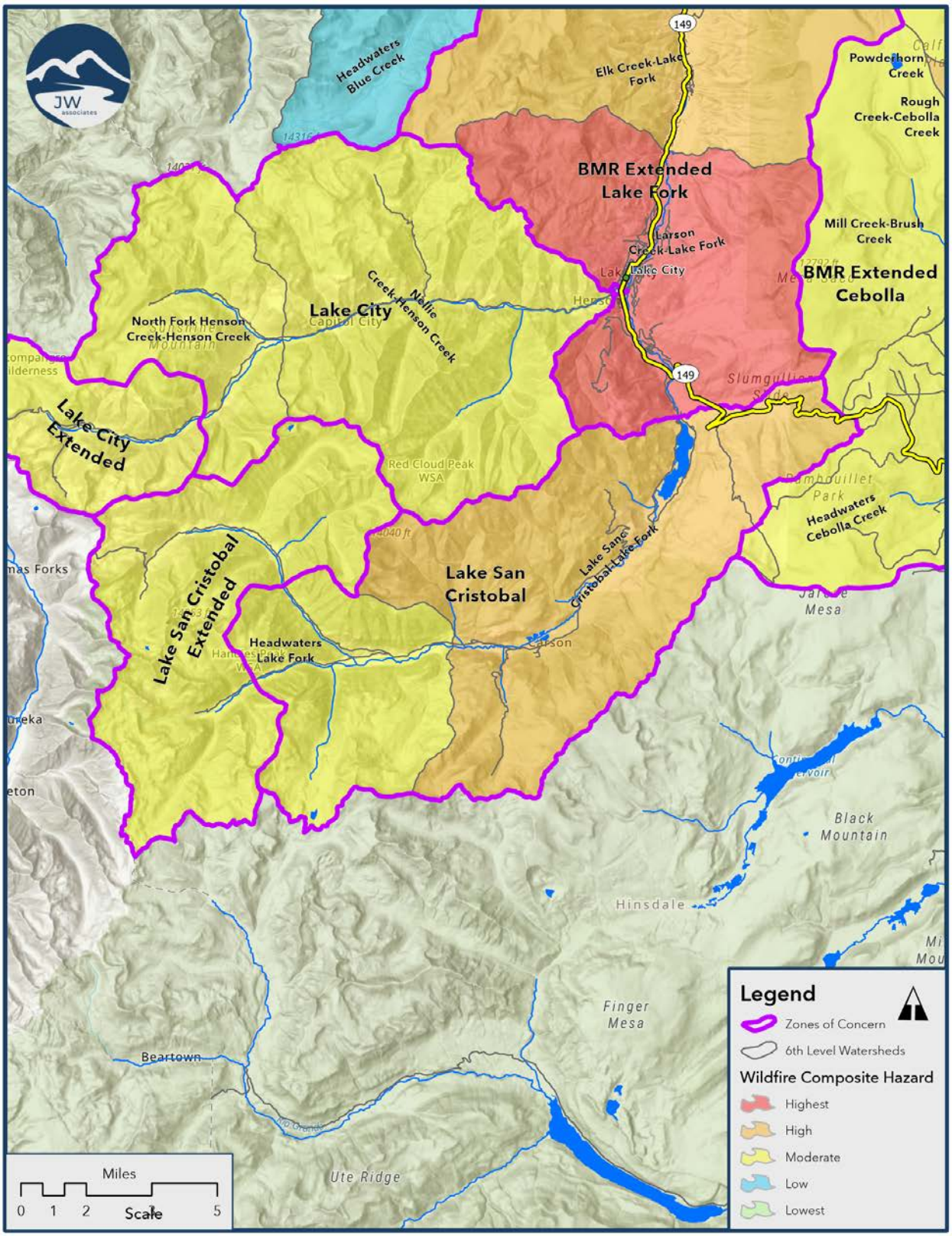
Wildfire hazard is high in some portions of the Lake San Cristobal Zone of Concern. Modeled active and passive crown fire activity covers 39% of the Zone of Concern. Modeled flame lengths above 11 feet cover 34% of the Zone of Concern.



The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The two watersheds in this Zone of Concern rank Moderate and High hazard in the Composite Wildfire Hazard rank (Table 44 and Map 51). The Composite Wildfire Hazard rank is a combination of four categories of wildfire and post-wildfire hazards (Table 44). Lake San Cristobal-Lake Fork watershed ranks Highest for Debris Flow and High for both Wildfire Hazard and Road Hazards.

Table 44. Wildfire Composite Hazard Rankings for Lake San Cristobal Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Headwaters Lake Fork	Low	Moderate	Moderate	Moderate	Moderate
Lake San Cristobal-Lake Fork	High	Highest	High	Low	High



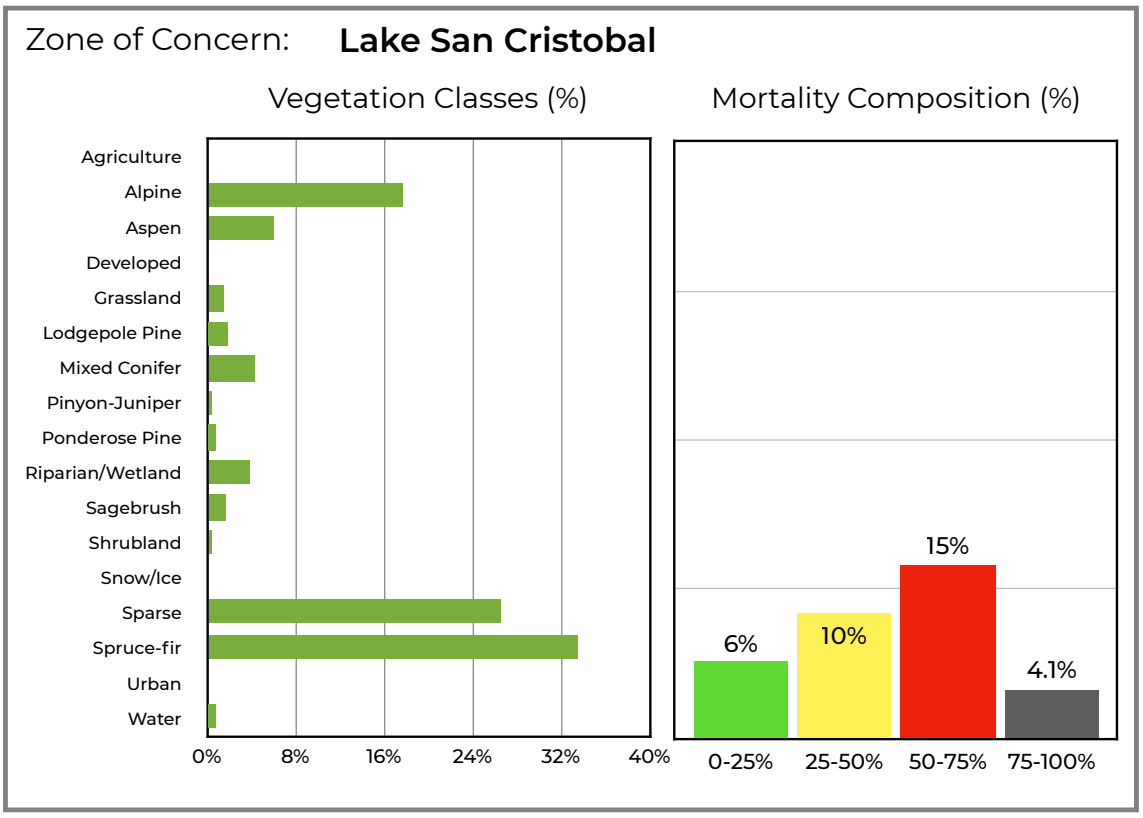
Map 51. Lake San Cristobal Zone of Concern Wildfire Composite Hazard

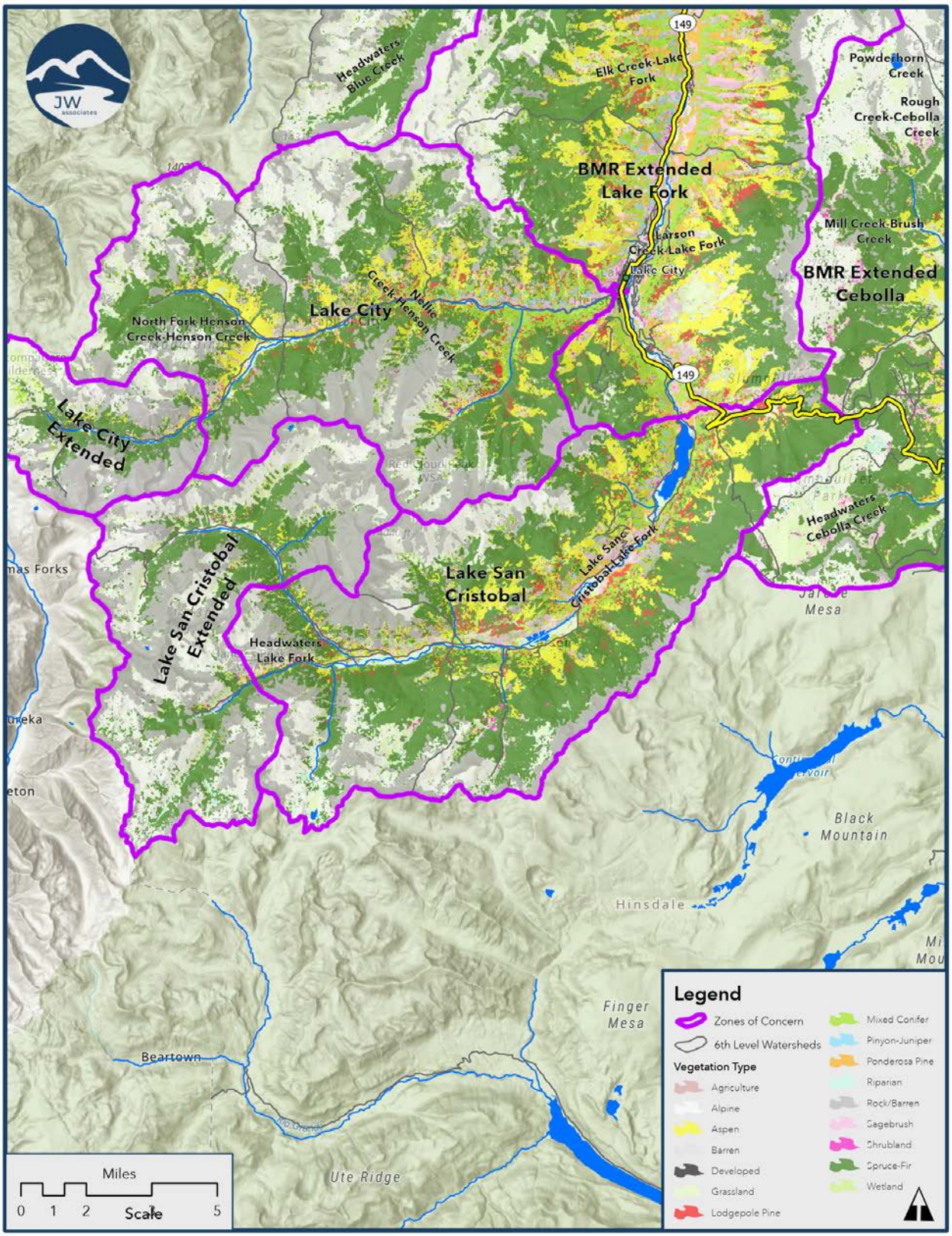
Lake San Cristobal Zone of Concern Access

Road access appears to be limited to one road along Lake Fork Creek and a few other spur roads (Map 49).

Lake San Cristobal Zone of Concern Vegetation

The vegetation of the Lake San Cristobal Zone of Concern is dominated by spruce-fir (Map 52). The combination of sparse and alpine is close to half of the Zone of Concern. There is about 30% of the Zone of Concern with beetle mortality between 25-75% which is focused in the spruce-fir forest.





Map 52. Lake San Cristobal Zone of Concern Vegetation

Lake San Cristobal Zone of Concern Climate Change Vulnerability

The Headwaters Lake Fork and Lake San Cristobal-Lake Fork watersheds have a Lowest and Low Climate Change Vulnerability ranks which is comprised of Low to Lowest Ecosystem Sensitivity ranks and Low Lack of Adaptive Capacity ranks (Table 45 and Map 53).

Table 45. Climate Change Vulnerability Rankings for Lake San Cristobal Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Headwaters Lake Fork	Lowest	Low	Lowest
Lake San Cristobal-Lake Fork	Low	Low	Low

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition and Fire Regime Departure are both ranked as Low or Lowest for both watersheds (Table 46). Insect & Disease is ranked as Moderate for the Lake San Cristobal-Lake Fork watershed.

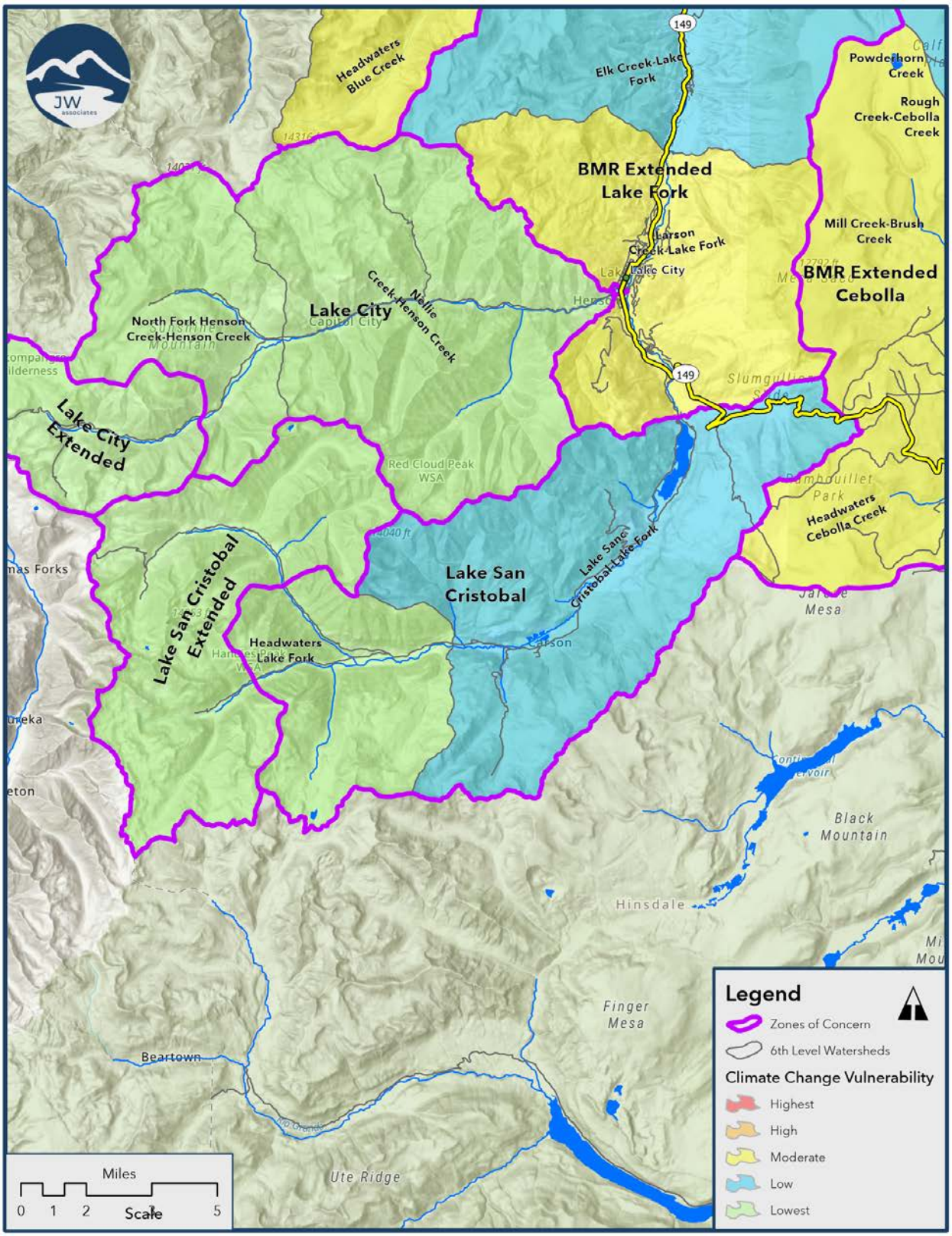
Table 46. Ecosystem Sensitivity Rankings for Lake San Cristobal Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Headwaters Lake Fork	Lowest	Lowest	Low	Lowest
Lake San Cristobal-Lake Fork	Low	Lowest	Moderate	Low

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as Moderate for both watersheds but that is likely because it is mostly composed of sparse and alpine (Table 47). Topo-climatic Variability is ranked as Lowest for both watersheds.

Table 47. Lack of Adaptive Capacity Rankings for Lake San Cristobal Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Headwaters Lake Fork	Moderate	Lowest	Low
Lake San Cristobal-Lake Fork	Moderate	Lowest	Low



Map 53. Lake San Cristobal Zone of Concern Climate Change Vulnerability

Lake San Cristobal Zone of Concern Opportunities

There are many constraints in the Lake City Zone of Concern due to 90% of the area being covered in special areas and the amount of high elevation area that is mostly in alpine and sparse. There are some limited opportunities to reduce wildfire hazard the Lake San Cristobal-Lake Fork watershed. Table 48 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 48. Lake San Cristobal Zone of Concern Actions

Actions	Headwaters Lake Fork	Lake San Cristobal-Lake Fork
Wildfire Hazard Reduction		☑
Road Analysis & Planning	☑	☑
Address Beetle Mortality		☑
Determine appropriate actions in roadless & ACECs	☑	☑
Riparian areas, floodplains, etc.	☑	☑
Pre- and post-fire planning	☑	☑
Increase Diversity		
Fire Regime Restoration		

McDonough Reservoir Zones of Concern

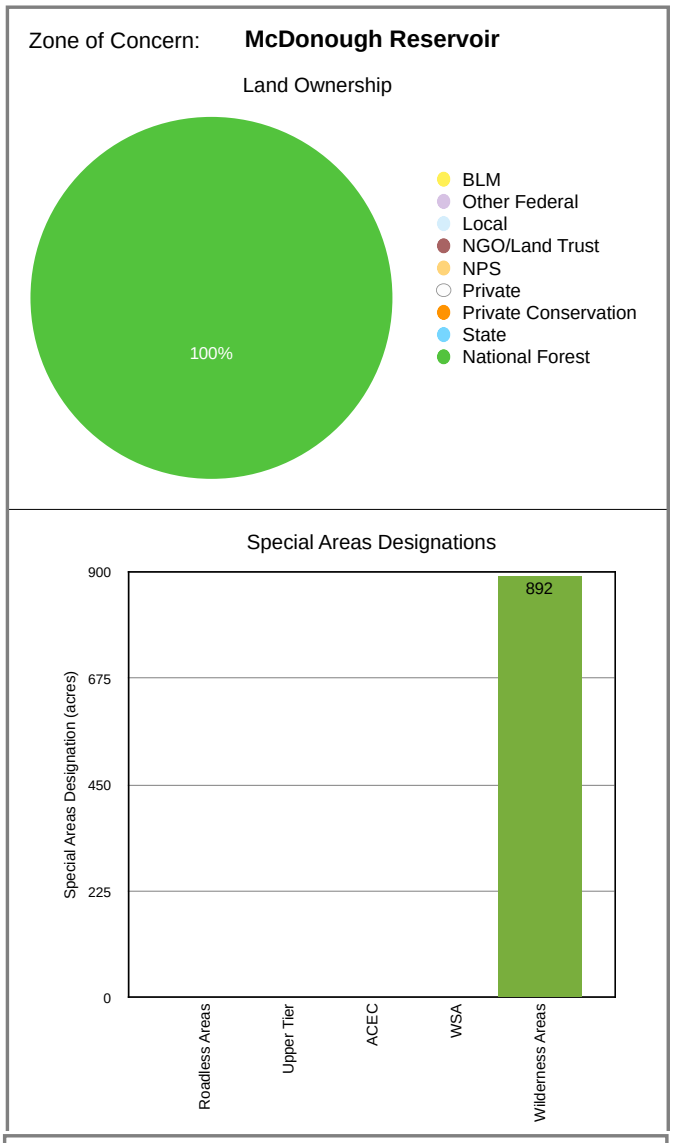
The McDonough Reservoir and McDonough Reservoir #2 Zones of Concern are close together (Table 1 and Map 54). McDonough Reservoir Zone of Concern is 19,567 acres in size. McDonough Reservoir #2 is much smaller at 1,349 acres. They both cover part of one 6th Level watershed.

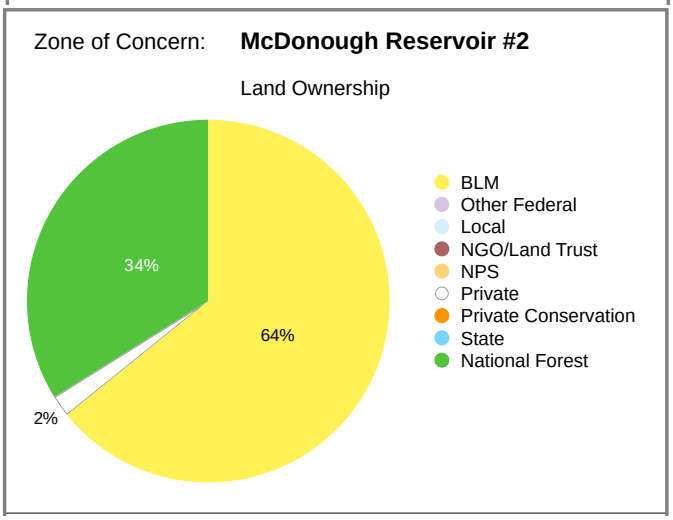
McDonough & McDonough #2 Reservoir Zone of Concern Ownership

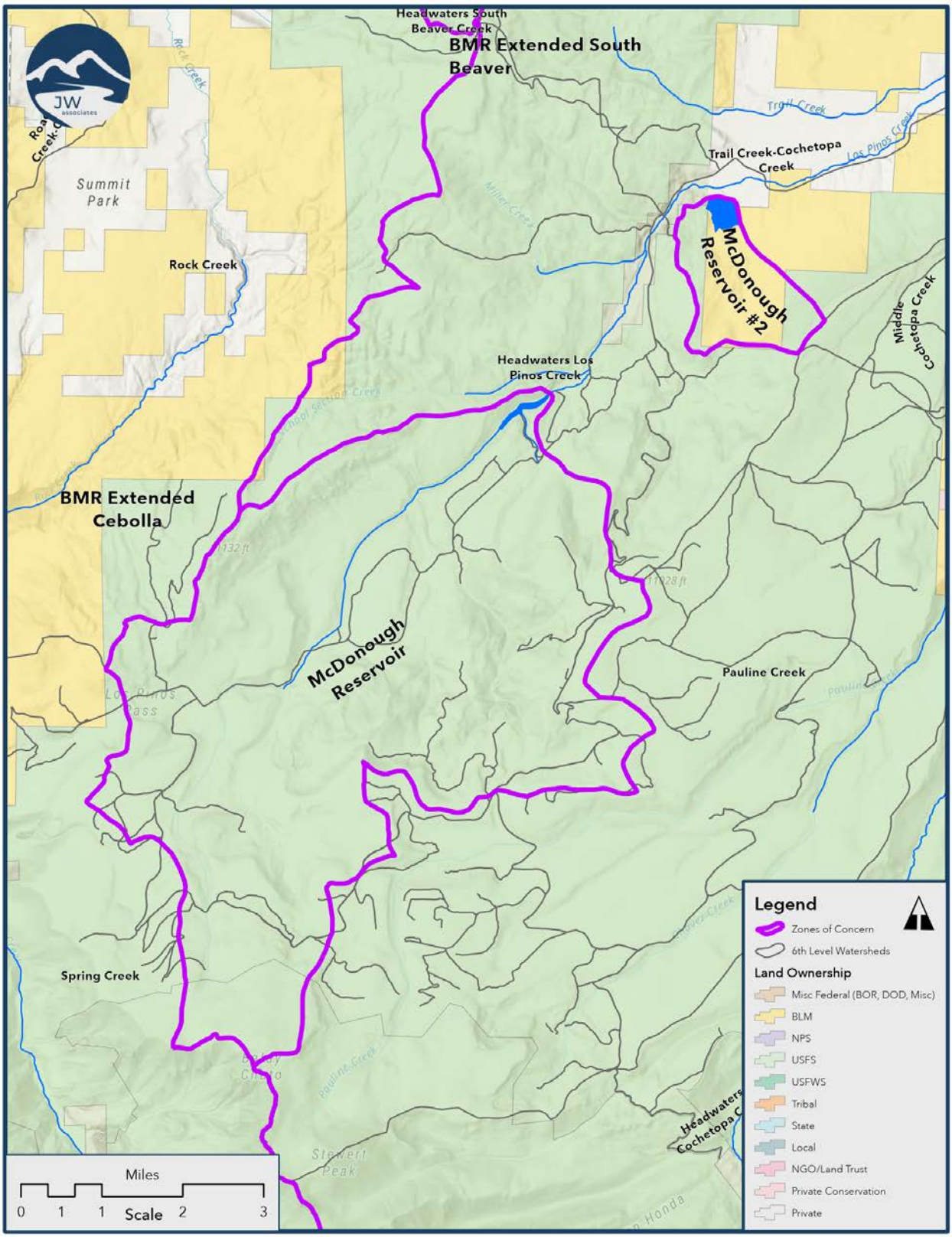
McDonough Reservoir Zone of Concern is 100% on National Forest lands (Map 54). McDonough Reservoir #2 is mostly BLM land (64%) with a large portion on National Forest lands (34%), and a small portion on private lands.

McDonough & McDonough #2 Reservoir Zone of Concern Special Areas

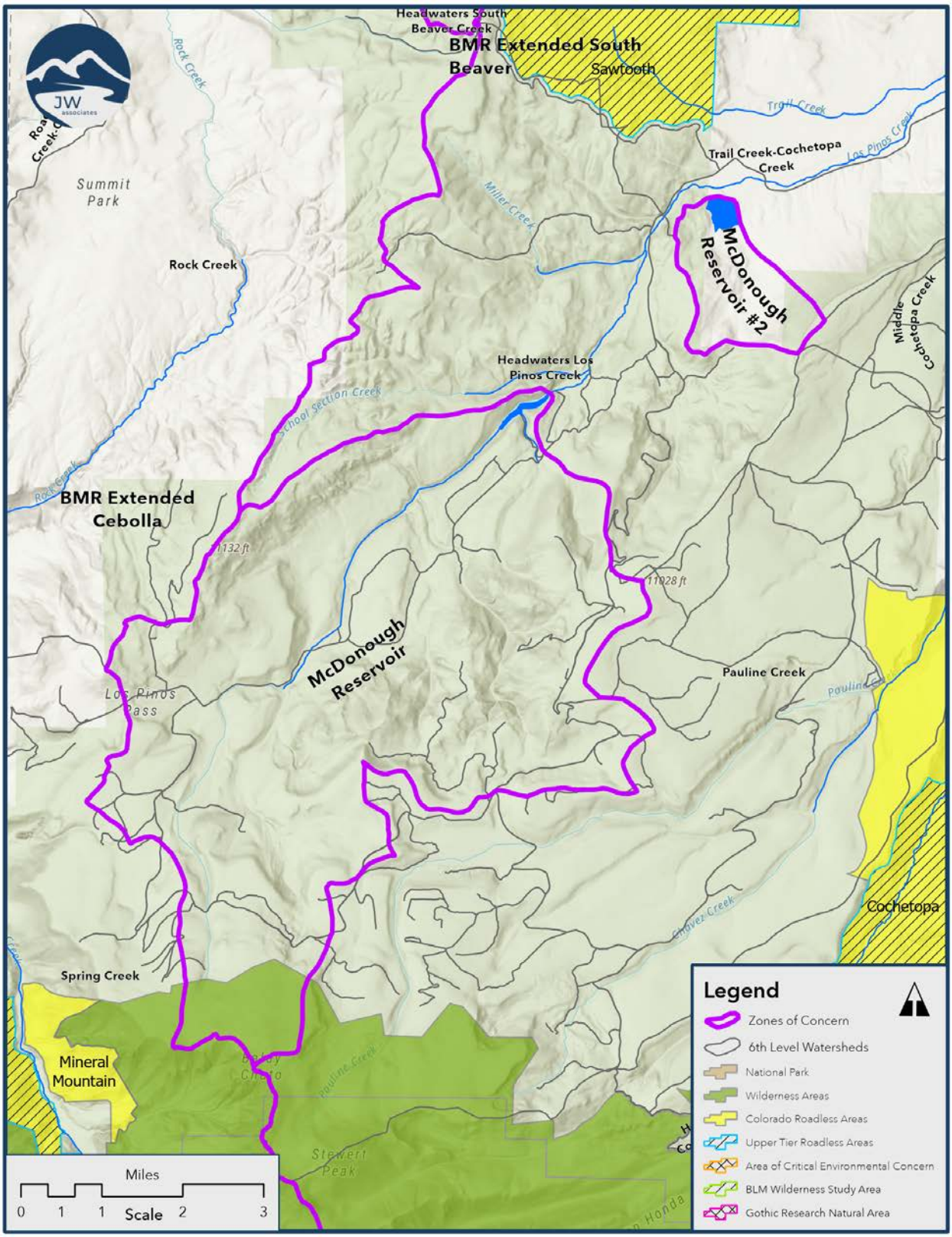
The McDonough Reservoir Zone of Concern covers 892 acres of the La Garita Wilderness Area at the highest elevations (Map 55). The McDonough Reservoir #2 Zone of Concern has no wilderness areas, roadless areas ACECs or other special status areas.







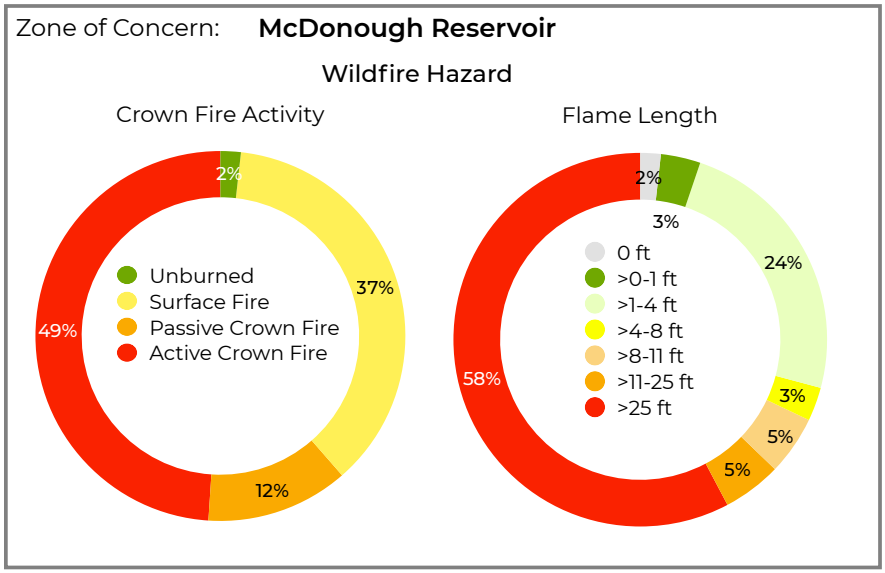
Map 54. McDonough & McDonough #2 Reservoir Zone of Concern Ownership



Map 55. McDonough & McDonough #2 Reservoir Zone of Concern Special Areas

McDonough & McDonough #2 Reservoir Zone of Concern Wildfire Composite

Wildfire hazard is high in many portions of the McDonough Reservoir Zone of Concern. Modeled active and passive crown fire activity covers 61% of the Zone of Concern. Modeled flame lengths above 11 feet cover 63% of the Zone of Concern.

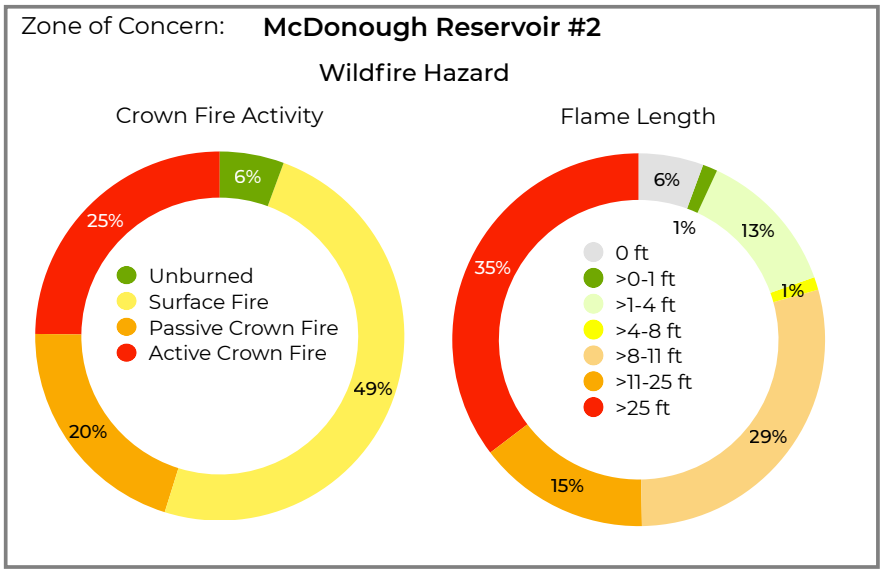


The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Headwaters Los Pinos Creek watershed ranks Moderate in the Composite Wildfire Hazard rank (Table 49). The Composite Wildfire Hazard rank is a combination of four categories of wildfire and post-wildfire hazards. The Headwaters Los Pinos Creek watershed ranks Highest in Wildfire Hazard, Moderate in Roads Hazard and Low and Lowest in the other ranks (Table 49).

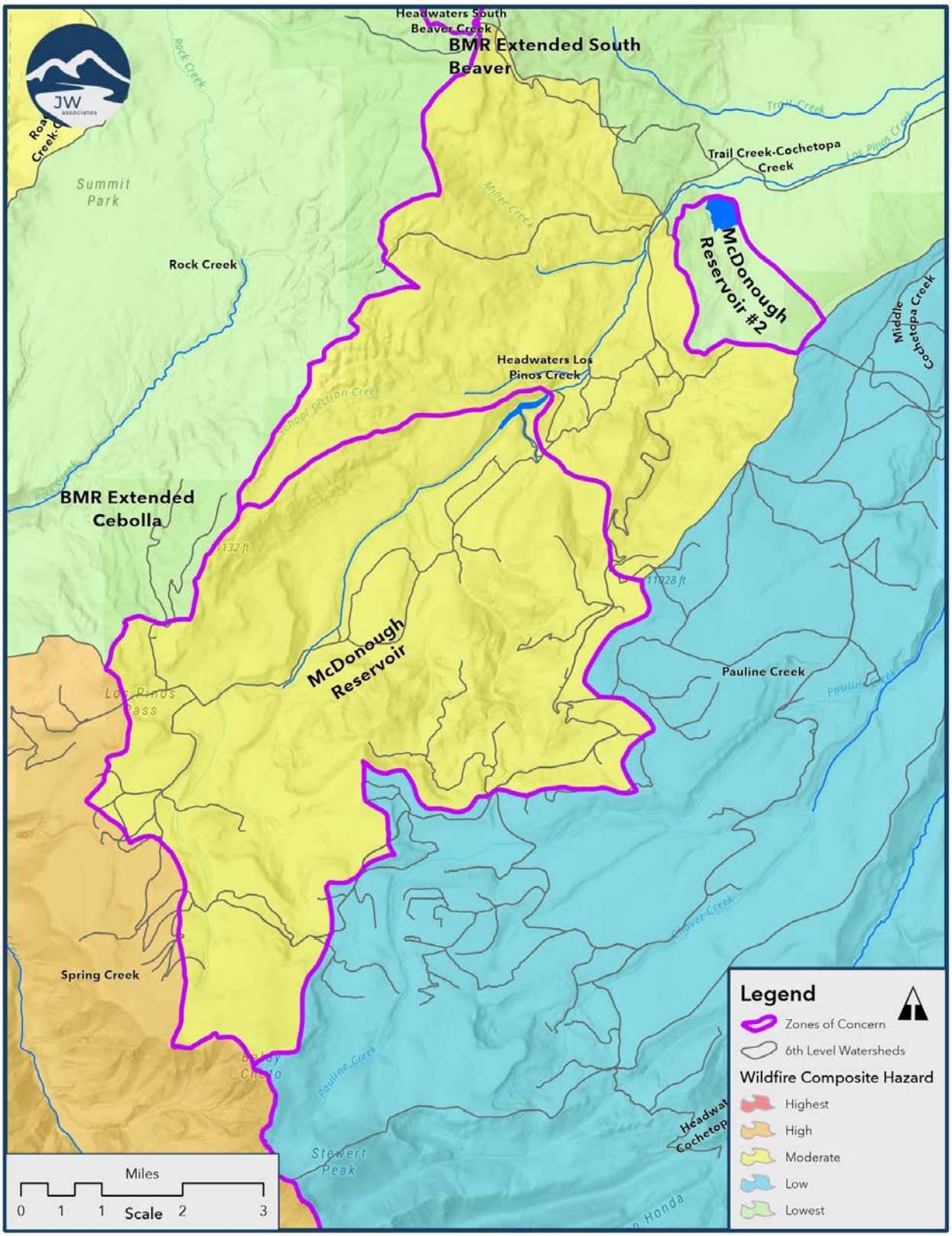
Table 49. Wildfire Composite Hazard Rankings for McDonough Reservoirs

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Headwaters Los Pinos Creek (McDonough Reservoir)	Highest	Low	Moderate	Lowest	Moderate
Trail Creek-Cochetopa Creek (McDonough Reservoir #2)	Low	Low	Low	Lowest	Lowest

Wildfire hazard is low to moderate in many portions of the McDonough Reservoir #2 Zone of Concern. Modeled active and passive crown fire activity covers 45% of the Zone of Concern. Modeled flame lengths above 11 feet cover 50% of the Zone of Concern.



The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Trail Creek-Cochetopa Creek watershed ranks Lowest in the Composite Wildfire Hazard rank (Table 49). The Composite Wildfire Hazard rank is a combination of four categories of wildfire and post-wildfire hazards. The Trail Creek-Cochetopa Creek watershed ranks Low or Lowest for all rankings (Table 49).



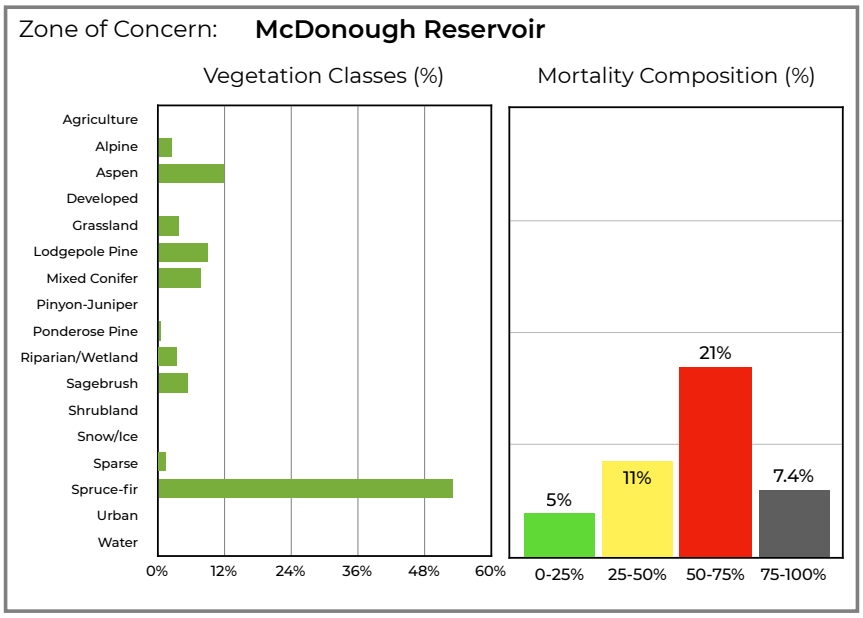
Map 56. McDonough & McDonough #2 Reservoir Wildfire Composite Hazard

McDonough & McDonough #2 Reservoir Zone of Concern Access

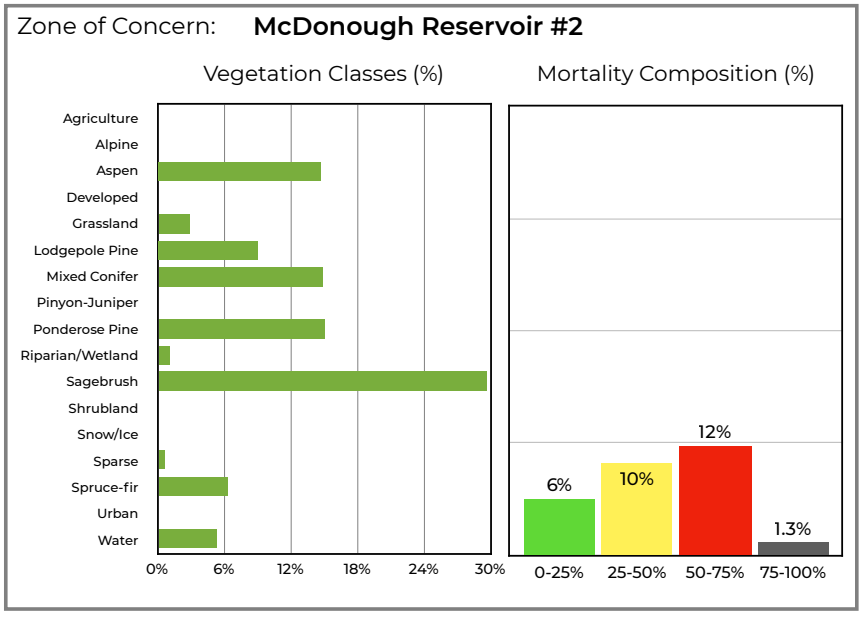
The McDonough Reservoir Zone of Concern appears to have good road access throughout (Map 54). The McDonough Reservoir #2 Zone of Concern appears to have few if any road access (Map 54).

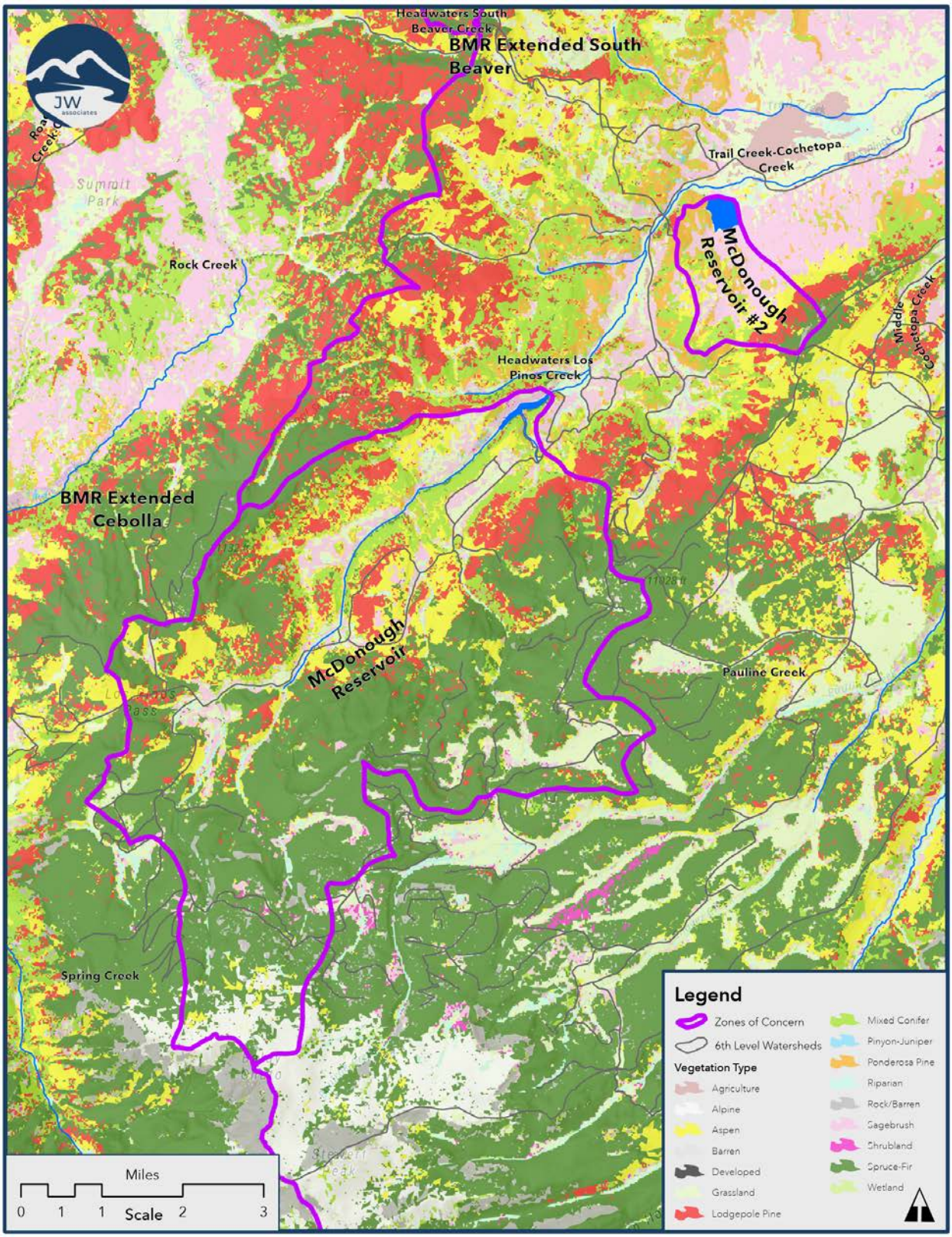
McDonough & McDonough #2 Reservoir Zone of Concern Vegetation

The McDonough Reservoir Zone of Concern is dominated by spruce-fir especially at higher elevations (Map 57). The vegetation in the lower elevations is a combination of aspen, mixed conifer, lodgepole pine and sagebrush. Tree mortality from beetles in this Zone of Concern is high with nearly 40% of the area covered by 25-100% mortality.



The McDonough Reservoir #2 Zone of Concern is dominated by sagebrush, especially at lower elevations (Map 57). The vegetation in the higher elevations is a combination of aspen, mixed conifer, lodgepole pine and ponderosa pine. Tree mortality from beetles in this Zone of Concern is about 23% of the area covered by 25-100% mortality.





Map 57. McDonough & McDonough #2 Reservoir Zone of Concern Vegetation

McDonough & McDonough #2 Reservoir Zone of Concern Climate Change Vulnerability

The Headwaters Los Pinos Creek watershed has a Moderate Climate Change Vulnerability rank which is comprised of a High Ecosystem Sensitivity rank and a Moderate Lack of Adaptive Capacity rank (Table 50 and Map 58). The Trail Creek-Cochetopa Creek watershed has a High Climate Change Vulnerability rank which is comprised of a High Ecosystem Sensitivity rank and a High Lack of Adaptive Capacity rank (Table 50 and Map 58).

Table 50. Climate Change Vulnerability Rankings for McDonough Reservoir Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Headwaters Los Pinos Creek (McDonough Reservoir)	High	Moderate	Moderate
Trail Creek-Cochetopa Creek (McDonough Reservoir #2)	High	High	High

The Ecosystem Sensitivity rank is a combination of three indicators. The Headwaters Los Pinos Creek watershed has a Moderate Fire Regime Departure rank and a Highest Insect & Disease rank (Table 51). The Trail Creek-Cochetopa Creek watershed has a High Fire Regime Departure rank (Table 51).

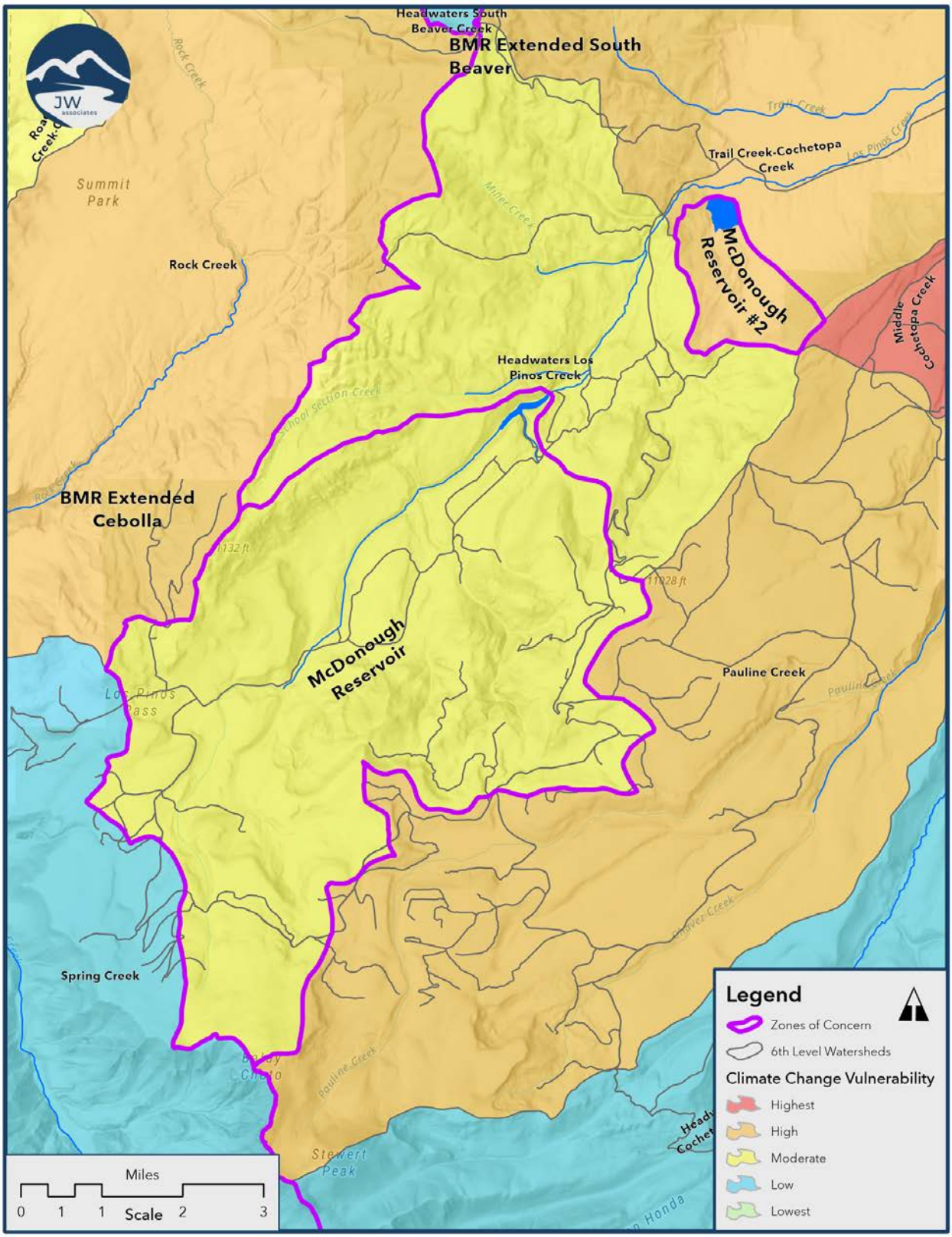
Table 51. Ecosystem Sensitivity Rankings for McDonough Reservoir Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Headwaters Los Pinos Creek (McDonough Reservoir)	Low	Moderate	Highest	High
Trail Creek-Cochetopa Creek (McDonough Reservoir #2)	Low	High	Low	High

The Lack of Adaptive Capacity rank is a combination of two indicators. The Headwaters Los Pinos Creek watershed has a High Topo-Climatic Variability rank and a Low Lack of Diversity rank (Table 52). The Trail Creek-Cochetopa Creek watershed has a Highest Topo-Climatic Variability rank and a Lowest Lack of Diversity rank (Table 52).

Table 52. Lack of Adaptive Capacity Rankings for McDonough Reservoir Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Headwaters Los Pinos Creek (McDonough Reservoir)	Low	High	Moderate
Trail Creek-Cochetopa Creek (McDonough Reservoir #2)	Lowest	Highest	High



Map 58. McDonough & McDonough #2 Reservoir Climate Change Vulnerability

McDonough & McDonough #2 Reservoir Zone of Concern Opportunities

There are some opportunities to reduce wildfire hazard in the Headwaters Los Pinos Creek watershed. The are some opportunities to restore fire regimes in the Trail Creek-Cochetopa Creek watershed. Table 53 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 53. McDonough & McDonough #2 Reservoir Zones of Concern Actions

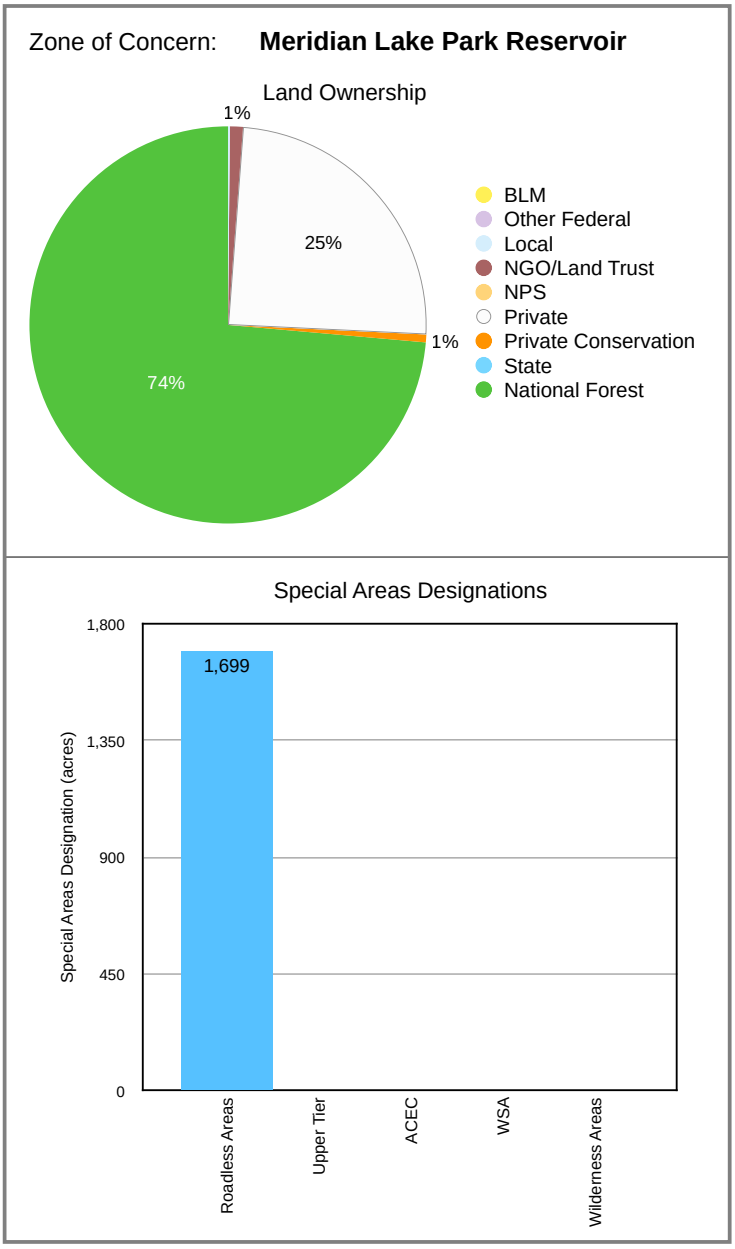
Actions	Headwaters Los Pinos Creek	Trail Creek-Cochetopa Creek
Wildfire Hazard Reduction	☑	
Road Analysis & Planning	☑	
Address Beetle Mortality	☑	☑
Determine appropriate actions in roadless & ACECs	☑	
Riparian areas, floodplains, etc.	☑	☑
Pre- and post-fire planning	☑	☑
Increase Diversity		
Fire Regime Restoration		☑

Meridian Lake Reservoir & Mt. Crested Butte Zones of Concern

The Meridian Lake Reservoir and Mt. Crested Butte W&SD Zones of Concern are adjacent in the headwaters of the East River (Map 59). The Meridian Lake Reservoir Zone of Concern covers 5,044 acres and one 6th Level watershed - Washington Gulch-Slate River (Table 1 and Map 59). The Meridian Lake Reservoir Zone of Concern also contains Long Lake which is a water supply reservoir filled by diverting water from Washington Gulch. The Mt. Crested Butte Zone of Concern covers 20,792 acres and two 6th Level watersheds - Upper East River and Middle East River (Table 1 and Map 59).

Meridian Lake Reservoir Zone of Concern Ownership

The majority (74%) of the Meridian Lake Park Reservoir Zone of Concern is National Forest lands (Map 59), with the rest in private lands except for a few small parcels.

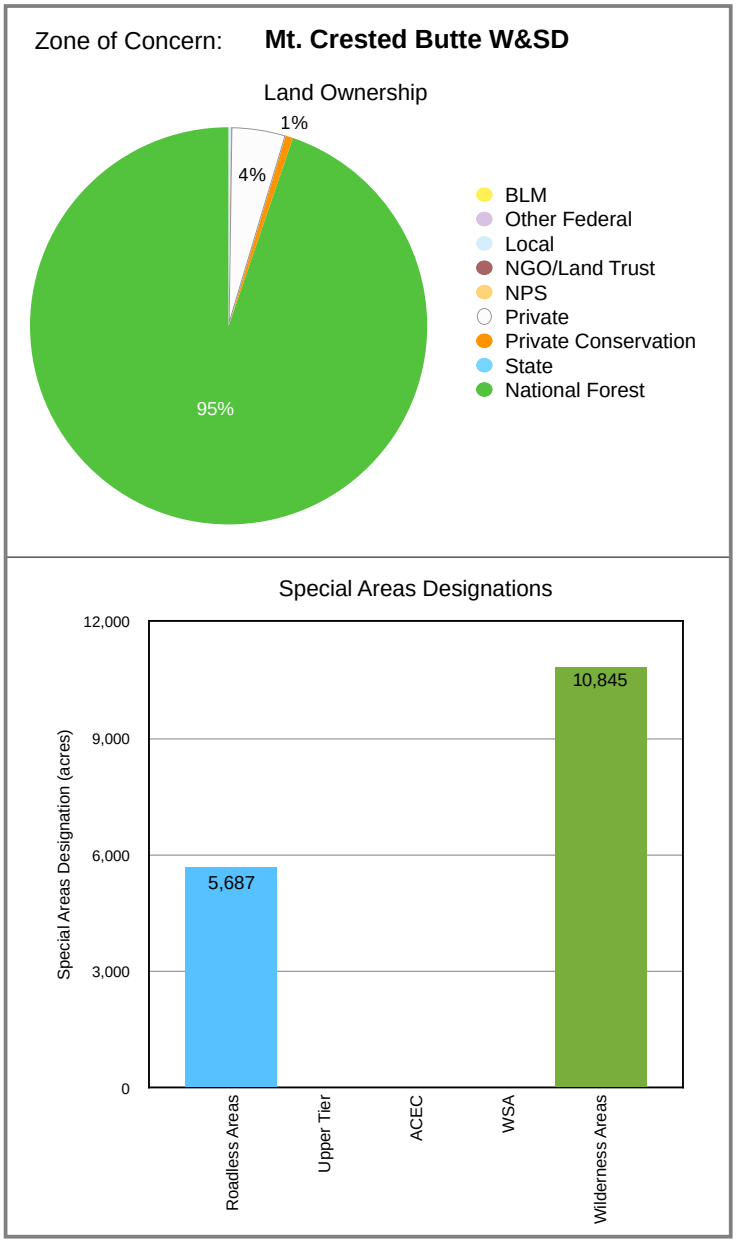


Meridian Lake Reservoir Zone of Concern Special Areas

There are 1,699 acres of roadless area in the Meridian Lake Park Reservoir Zone of Concern. The roadless area occupies a large portion in the upper watershed east of Washington Gulch.

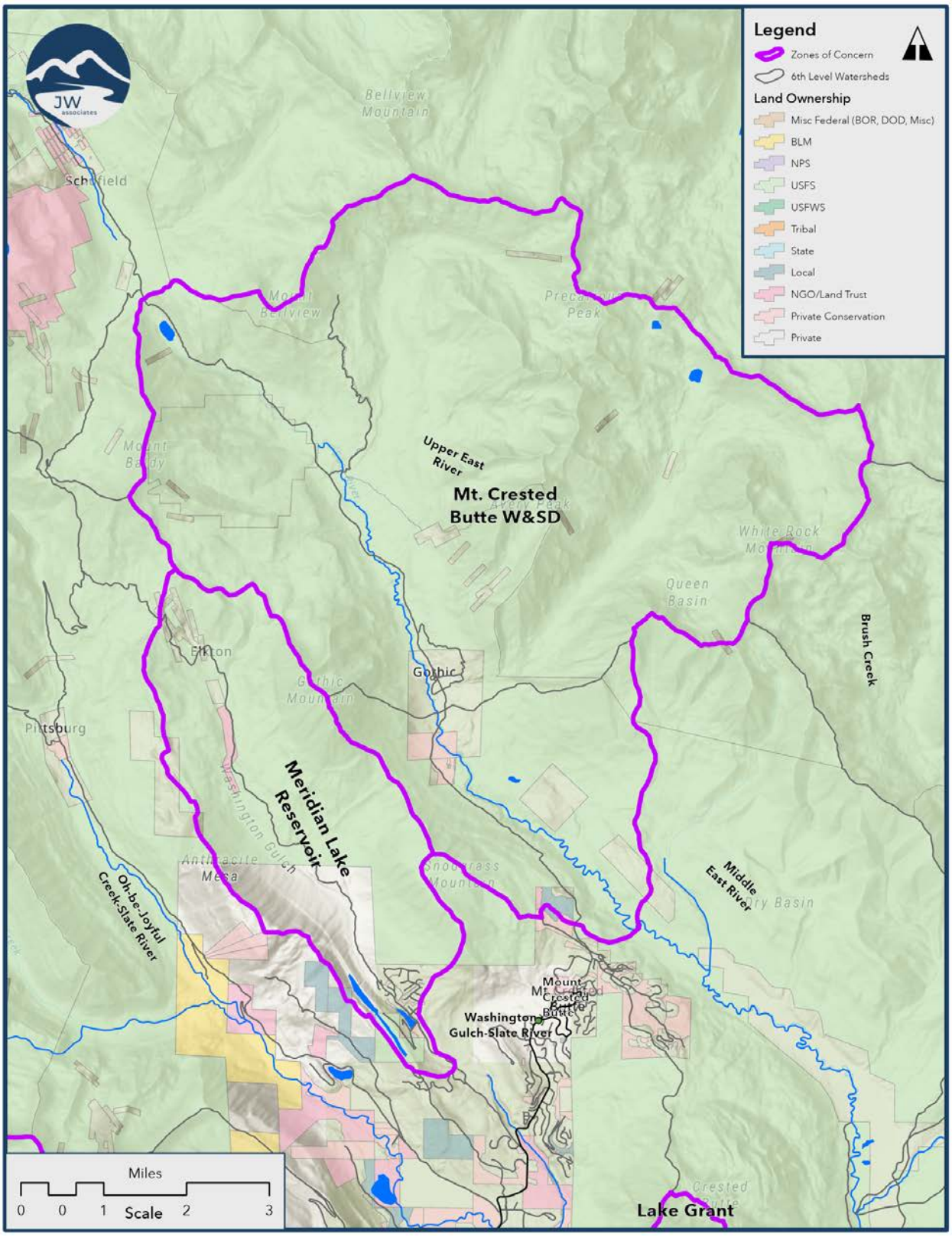
Mt. Crested Butte Zones of Concern Ownership

The majority (95%) of the Mt. Crested Butte Zone of Concern is National Forest lands (Map 59), with some small areas of private lands and one small area of private conservation lands.

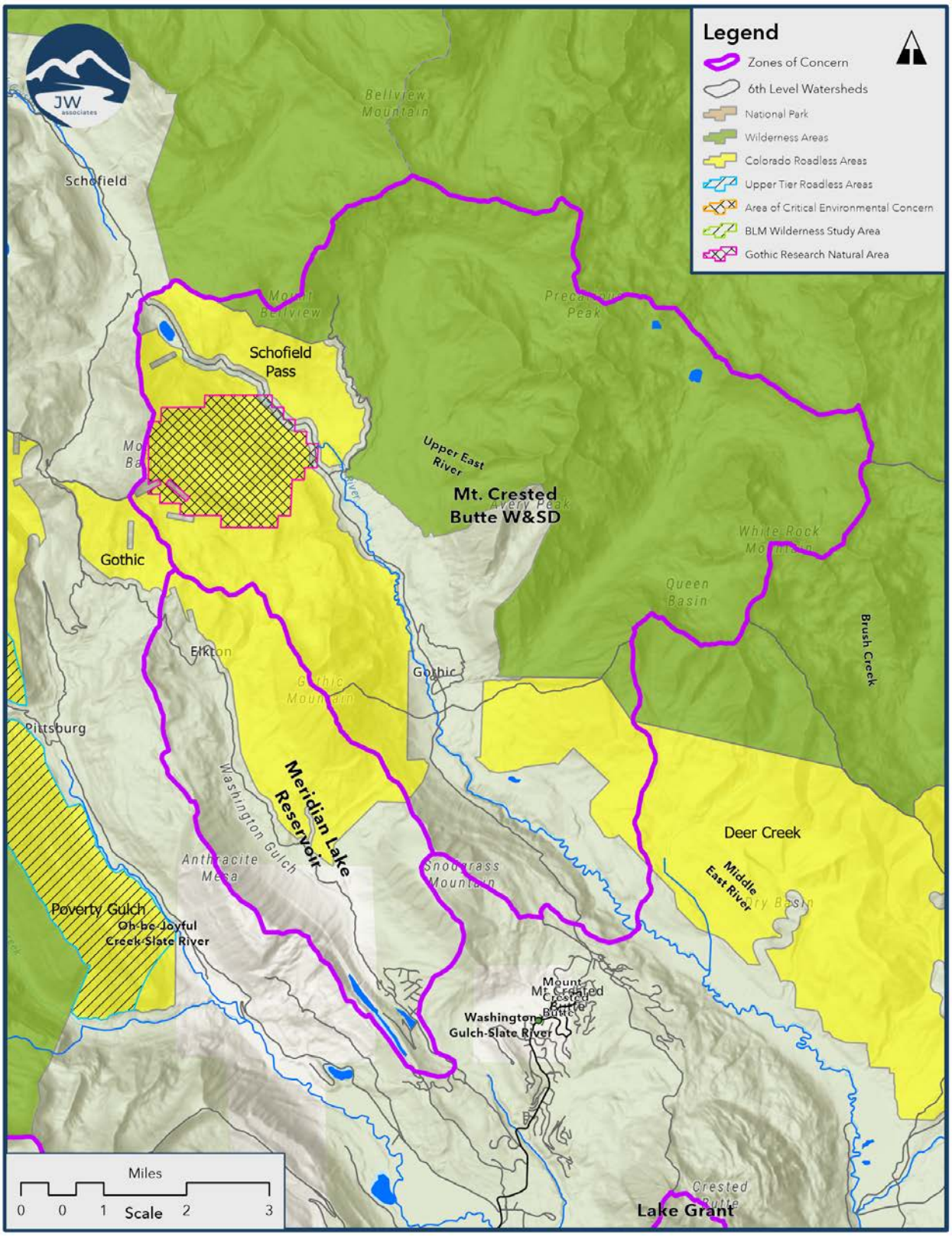


Mt. Crested Butte Zones of Concern Special Areas

There are 5,687 acres of roadless area and 10,845 acres of wilderness area in the Mt. Crested Butte Zone of Concern. The Maroon Bells Snowmass Wilderness Area occupies a large area north and east of the East River in this Zone of Concern. In addition, the Gothic Research Natural Area is in the upper portion of this Zone of Concern, which overlaps Roadless Areas.



Map 59. Meridian Lake Park Reservoir & Mt. Crested Butte Ownership



Map 60. Meridian Lake Reservoir & Mt. Crested Butte Special Areas

Meridian Lake Reservoir and Mt. Crested Butte W&SD Zone of Concern Wildfire Composite

Wildfire hazard is moderate to high in many portions of the Meridian Park Reservoir Zone of Concern. Modeled active and passive crown fire activity covers 45% of the Zone of Concern. Modeled flame lengths above 11 feet cover 47% of the Zone of Concern.

The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Washington Gulch-Slate River watershed in the Meridian Park Reservoir Zone of Concern ranks High in the Composite Wildfire Hazard rank (Table 54 and Map 61). That watershed ranks Moderate for Wildfire Hazard, High for Debris Flow and Soil Erodibility and Highest for Road Hazard (Table 54).

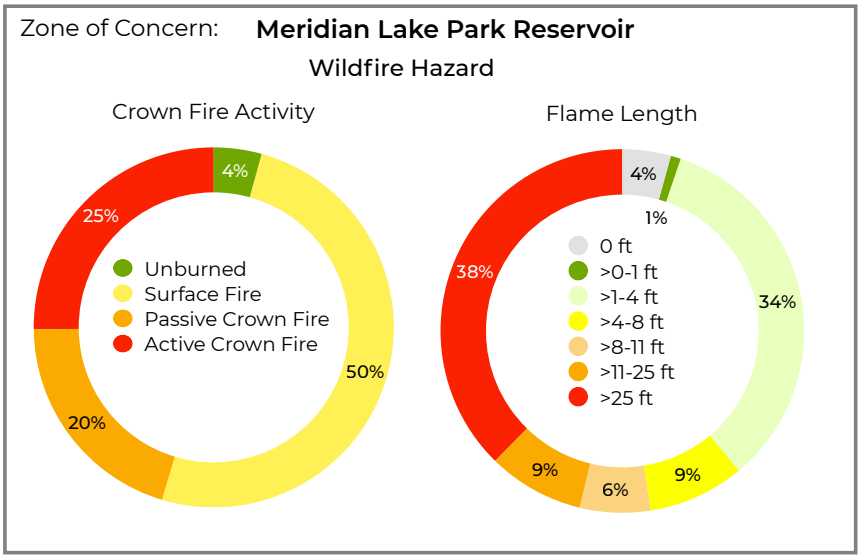
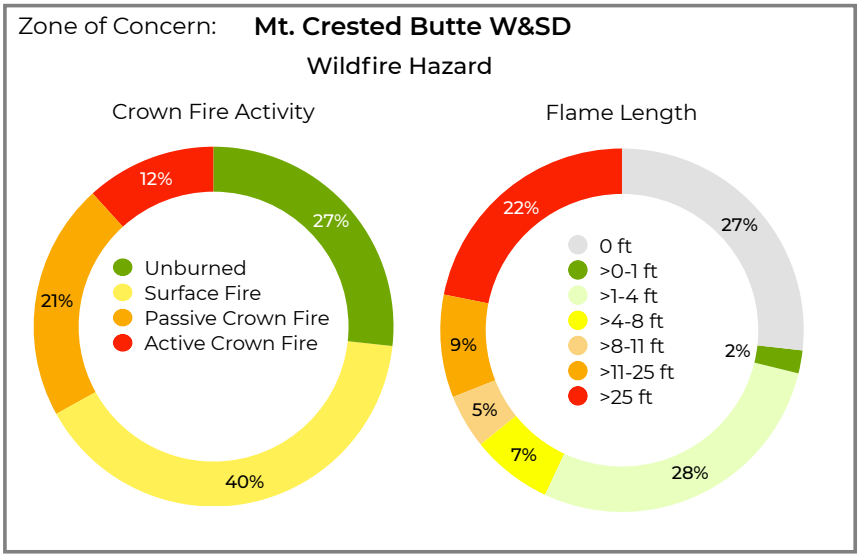


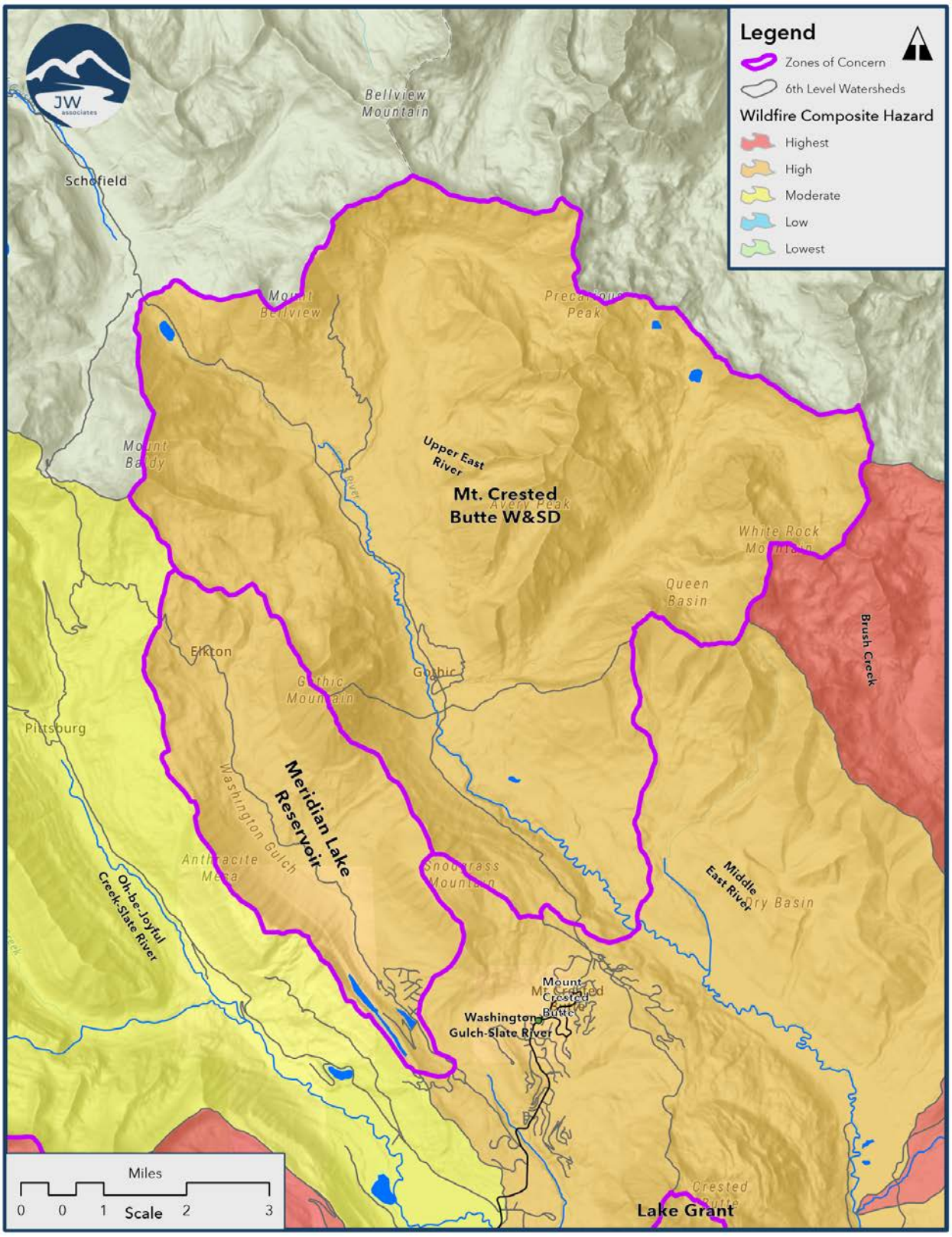
Table 54. Wildfire Composite Hazard Rankings for Meridian Lake Reservoir & Mt. Crested Butte Zones of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Upper East River	Low	High	Moderate	Highest	High
Middle East River	Low	Highest	Moderate	Highest	High
Washington Gulch-Slate River	Moderate	High	Highest	High	High

Wildfire hazard is moderate in many portions of the Mt. Crested Butte Zone of Concern. Modeled active and passive crown fire activity covers 33% of the Zone of Concern. Modeled flame lengths above 11 feet cover 31% of the Zone of Concern.

The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Upper East River and Middle East River watersheds in the Mt. Crested Butte Zone of Concern both rank High in the Composite Wildfire Hazard rank (Table 54 and Map 61). The Wildfire Hazard for those watersheds are ranked Low and Roads Hazards are ranked Moderate. The other post-fire rankings, Debris flow and Soil Erodibility rank High and Highest (Table 54).





Map 61. Meridian Lake Reservoir & Mt. Crested Butte Wildfire Composite Hazard

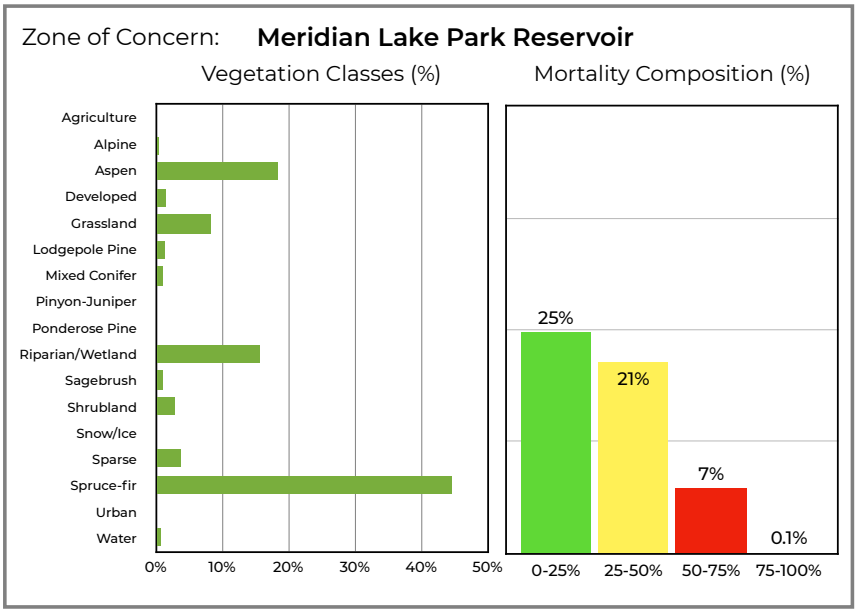
Meridian Lake Reservoir and Mt. Crested Butte W&SD Zone of Concern Access

There is limited road access in the Meridian Park Reservoir Zone of Concern (Map 59). The main access road runs next to Washington Gulch.

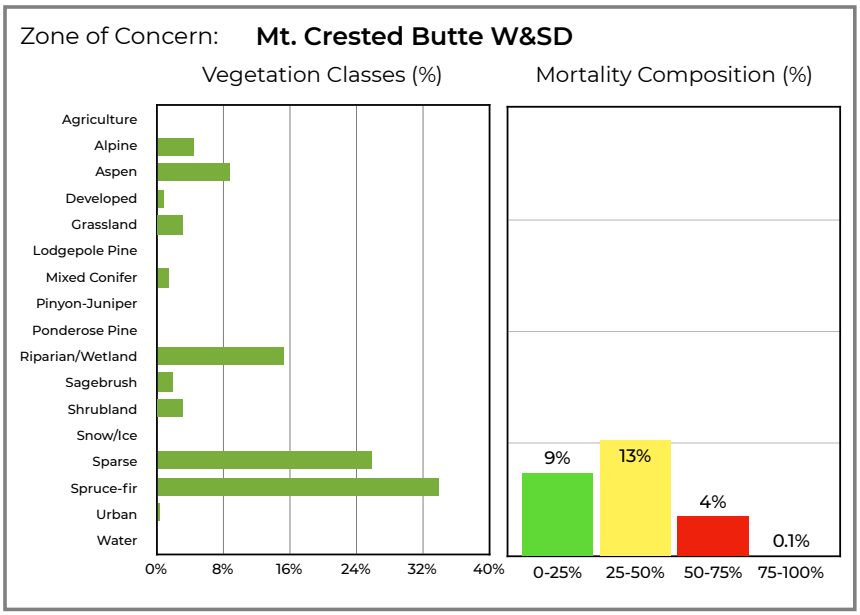
There is limited road access in the Mt. Crested Butte Zone of Concern (Map 59). There is one road that runs up the East River with two spur roads.

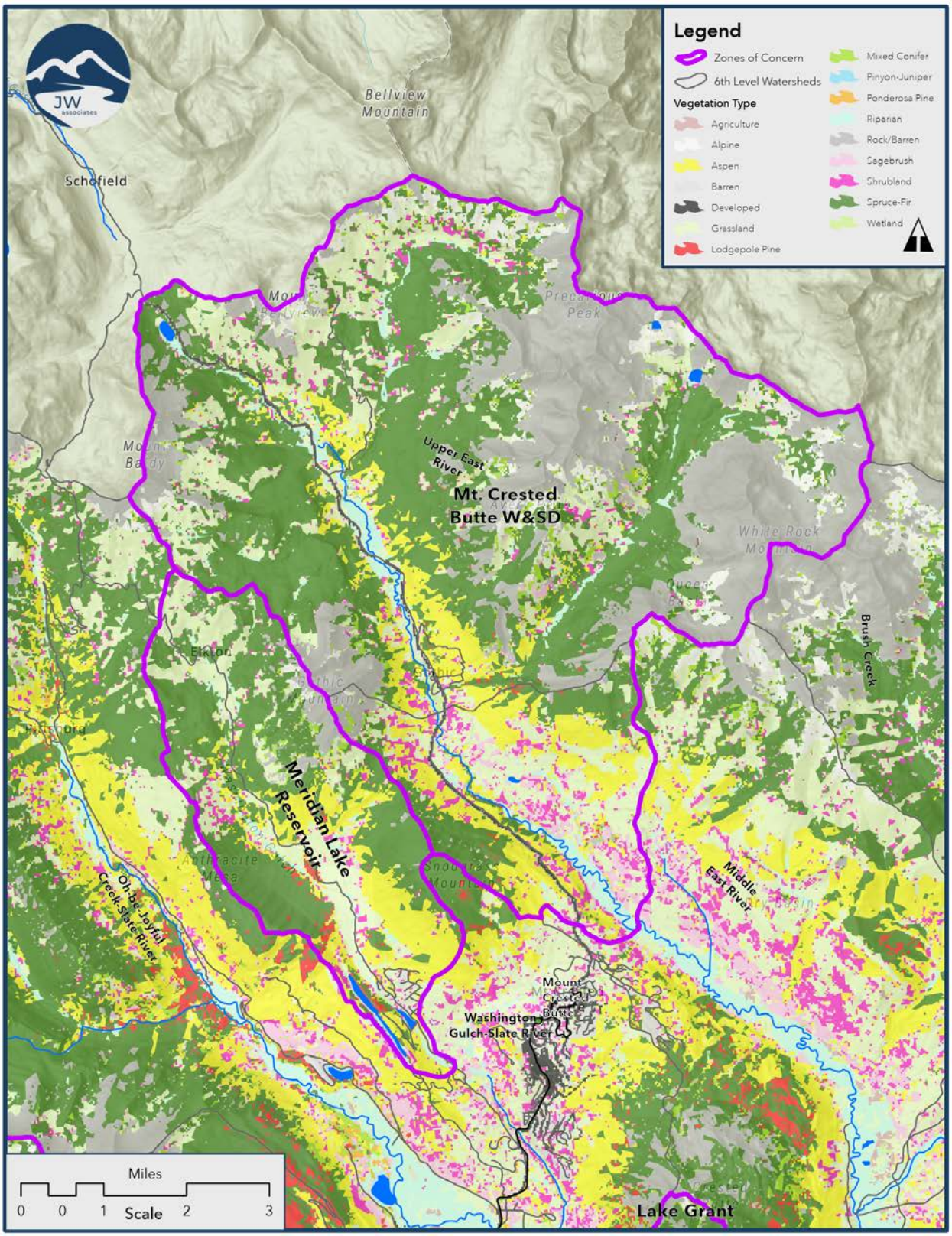
Meridian Lake Reservoir and Mt. Crested Butte W&SD Zone of Concern Vegetation

The Meridian Park Reservoir Zone of Concern is dominated by spruce-fir covering nearly half of the area (Map 62). Aspen covers a large area of the lower forested areas. Riparian/ wetland covers a large area in the floodplains. 27% of the area has tree mortality between 25-75%.



The Mt. Crested Butte Zone of Concern is also dominated by spruce-fir covering nearly one-third of the area (Map 62). There is a considerable amount of sparse cover that appears to be high elevation above tree line. Aspen covers a large area of the lower forested areas. Riparian/ wetland covers a large area in the floodplains. 17% of the area has tree mortality between 25-75%.





Map 62. Meridian Lake Reservoir & Mt. Crested Butte Vegetation

Meridian Lake Reservoir Zone of Concern Climate Change Vulnerability

The Washington Gulch-Slate River watershed has a Lowest Climate Change Vulnerability rank which is comprised of High Ecosystem Sensitivity rank and a Low Lack of Adaptive Capacity rank (Table 55 and Map 63).

Table 55. Climate Change Vulnerability for Meridian Lake Reservoir Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Washington Gulch-Slate River	High	Low	Lowest

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition is ranked Highest for the Washington Gulch-Slate River watershed (Table 56). That watershed is ranked Low for Fire Regime Departure and Insect & Disease.

Table 56. Ecosystem Sensitivity for Meridian Lake Reservoir Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Washington Gulch-Slate River	Highest	Low	Low	High

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity and Topo-climatic Variability are ranked as Low for the Washington Gulch-Slate River watershed (Table 37).

Table 57. Lack of Adaptive Capacity for Meridian Lake Reservoir Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Washington Gulch-Slate River	Low	Low	Low

Mt. Crested Butte W&SD Zone of Concern Climate Change Vulnerability

The Upper East River and Middle East River watersheds have a Lowest Climate Change Vulnerability rank which is comprised of Low Ecosystem Sensitivity ranks and Low to Lowest Lack of Adaptive Capacity ranks (Table 58 and Map 63).

Table 58. Climate Change Vulnerability Rankings for Mt. Crested Butte Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Upper East River	Low	Low	Lowest
Middle East River	Low	Lowest	Lowest

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition ranks Moderate for both the Upper and Middle East River watersheds (Table 59). Those two watersheds are ranked Low and Lowest for Fire Regime Departure and Insect & Disease.

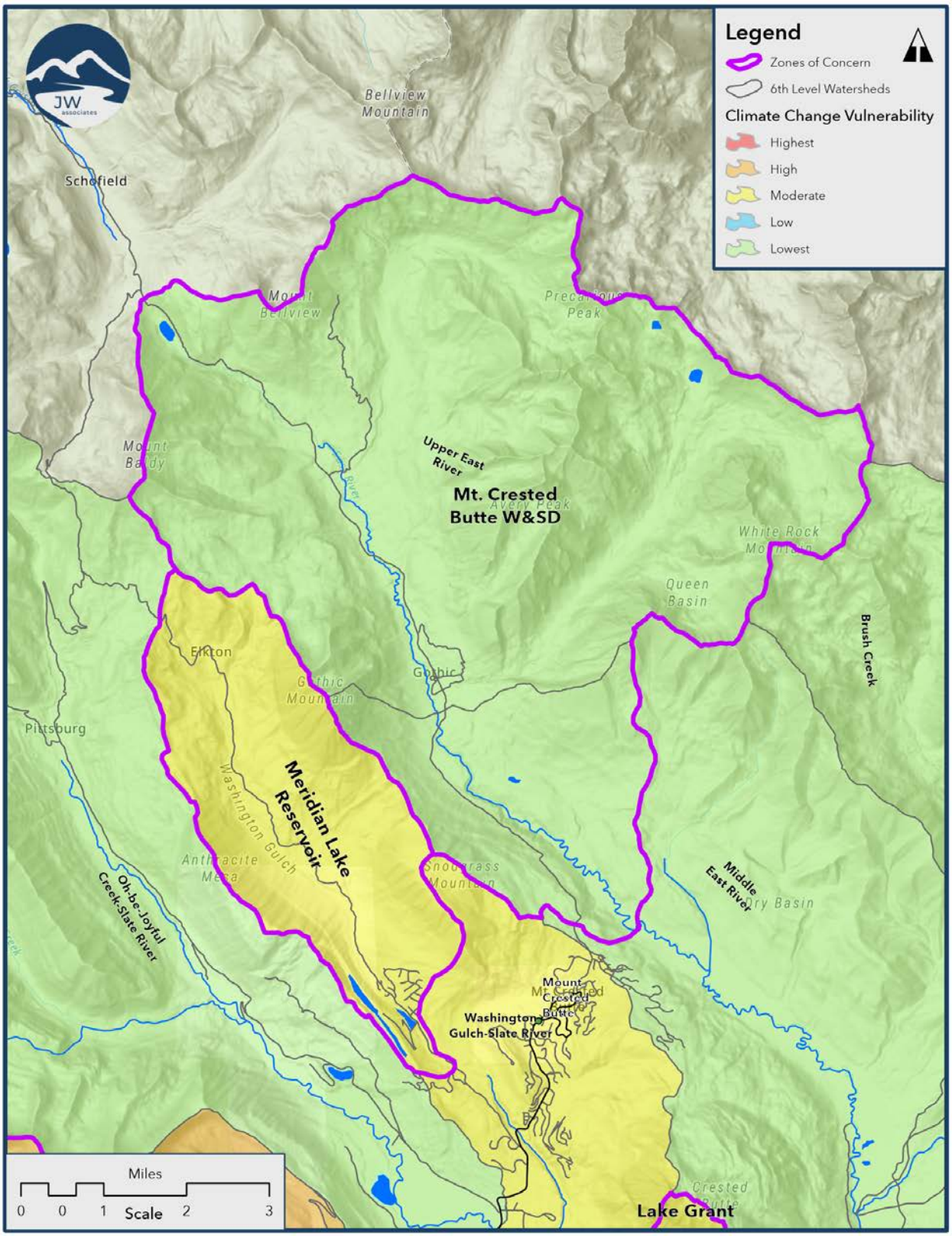
Table 59. Ecosystem Sensitivity Rankings for Mt. Crested Butte Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Middle East River	Moderate	Low	Lowest	Low
Upper East River	Moderate	Lowest	Lowest	Low

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as High for the Upper East River watershed but that is likely because it is mostly composed of sparse and alpine (Table 60). Topo-climatic Variability is ranked as Low to Lowest for both watersheds.

Table 60. Lack of Adaptive Capacity Rankings for Mt. Crested Butte Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Middle East River	Lowest	Low	Lowest
Upper East River	High	Lowest	Low



Map 63. Meridian Lake Reservoir & Mt. Crested Butte W&SD Climate Change Vulnerability

Meridian Lake Reservoir & Mt. Crested Butte Zone of Concern Opportunities

The constraints in Meridian Lake Park Reservoir Zone of Concern are mostly lack of access. There are some limited opportunities to reduce wildfire hazard. Table 61 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 61. Meridian Lake Reservoir Zone of Concern Actions

Actions	Washington Gulch-Slate River
Wildfire Hazard Reduction	☑
Road Analysis & Planning	☑
Address Beetle Mortality	☑
Determine appropriate actions in roadless & ACECs	☑
Riparian areas, floodplains, etc.	☑
Pre- and post-fire planning	☑
Increase Diversity	
Fire Regime Restoration	

The constraints in Mt. Crested Butte Zone of Concern are mostly lack of access. There are some opportunities to reduce post-fire hazards. Table 62 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 62. Mt. Crested Butte Zone of Concern Actions

Actions	Middle East River	Upper East River
Wildfire Hazard Reduction		
Road Analysis & Planning	☑	
Address Beetle Mortality	☑	☑
Determine appropriate actions in roadless & ACECs	☑	☑
Riparian areas, floodplains, etc.	☑	☑
Pre- and post-fire planning	☑	☑
Increase Diversity		
Fire Regime Restoration		

Needle Creek and Vouga Reservoir Zone of Concern

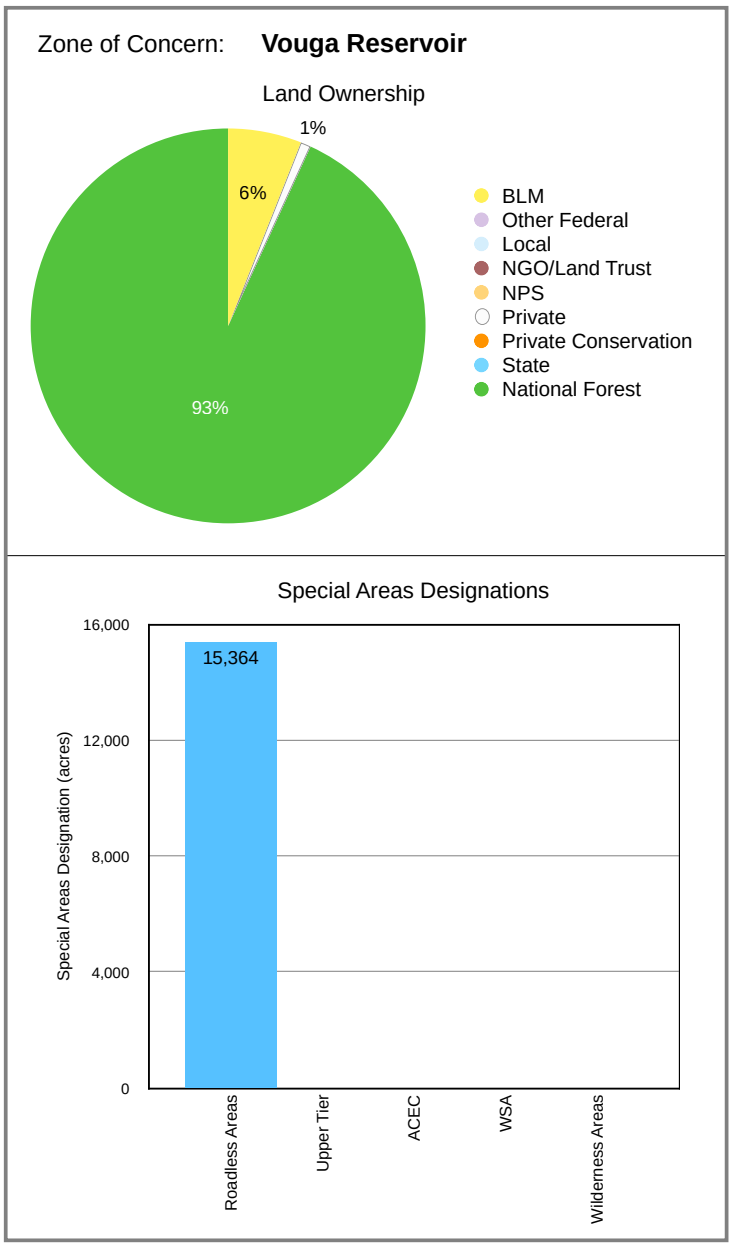
The Needle Creek and Vouga Reservoir Zones of Concern are adjacent in the Tomichi Creek watershed (Map 64). The Needle Creek Reservoir Zone of Concern covers 6,974 acres and one 6th Level watershed - Needle Creek (Table 1 and Map 64). The Vouga Reservoir Zone of Concern covers 23,789 acres and one 6th Level watershed - Headwaters Razor Creek (Table 1 and Map 64).

Needle Creek Reservoir Zone of Concern Ownership

The Needle Creek Reservoir Zone of Concern is all on National Forest lands (Map 64).

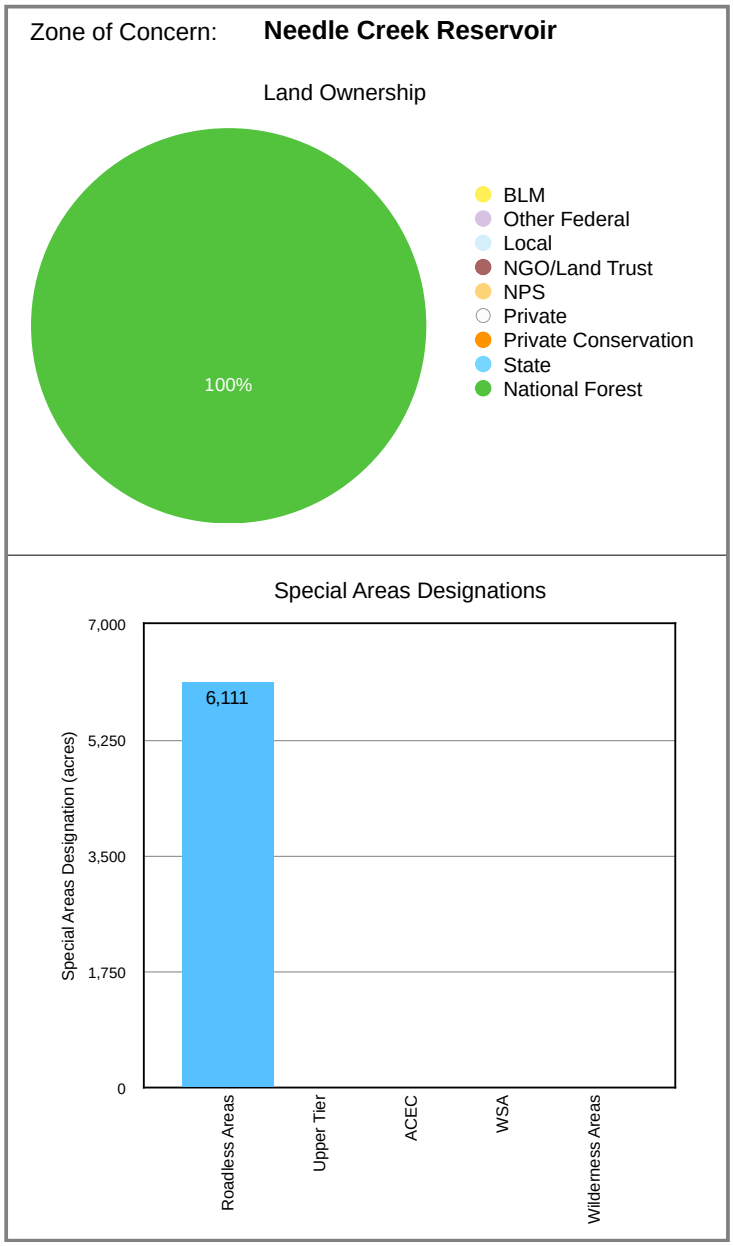
Needle Creek Reservoir Zone of Concern Special Areas

There are 6,111 acres of roadless areas in the Needle Creek Reservoir Zone of Concern (Map 65). The roadless area covers nearly the entire Zone of Concern.



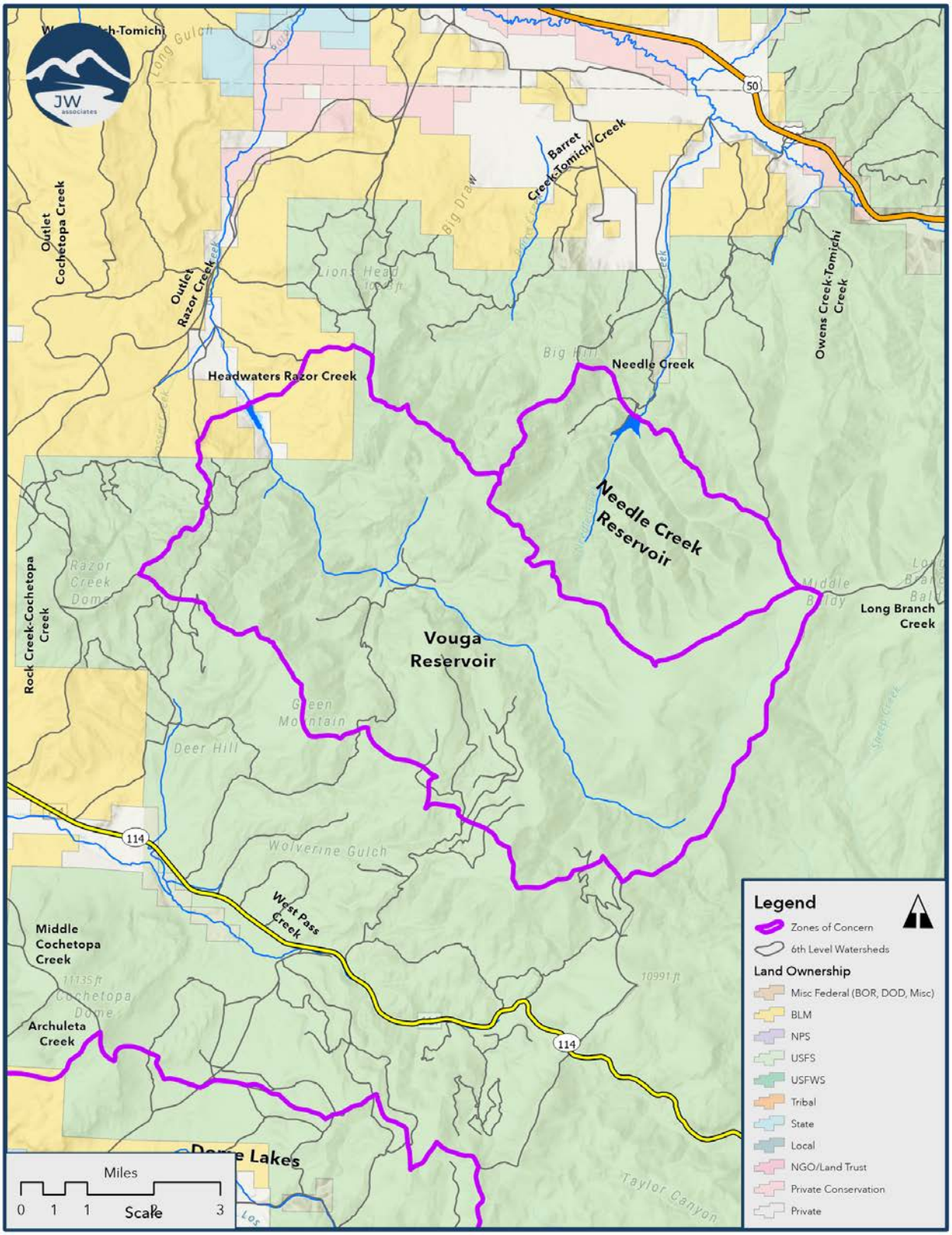
Vouga Reservoir Zone of Concern Ownership

The majority (93%) of the Vouga Reservoir Zone of Concern is on National Forest lands (Map 64), with some smaller areas of BLM and private lands. The private and BLM lands are at the bottom of the watershed.

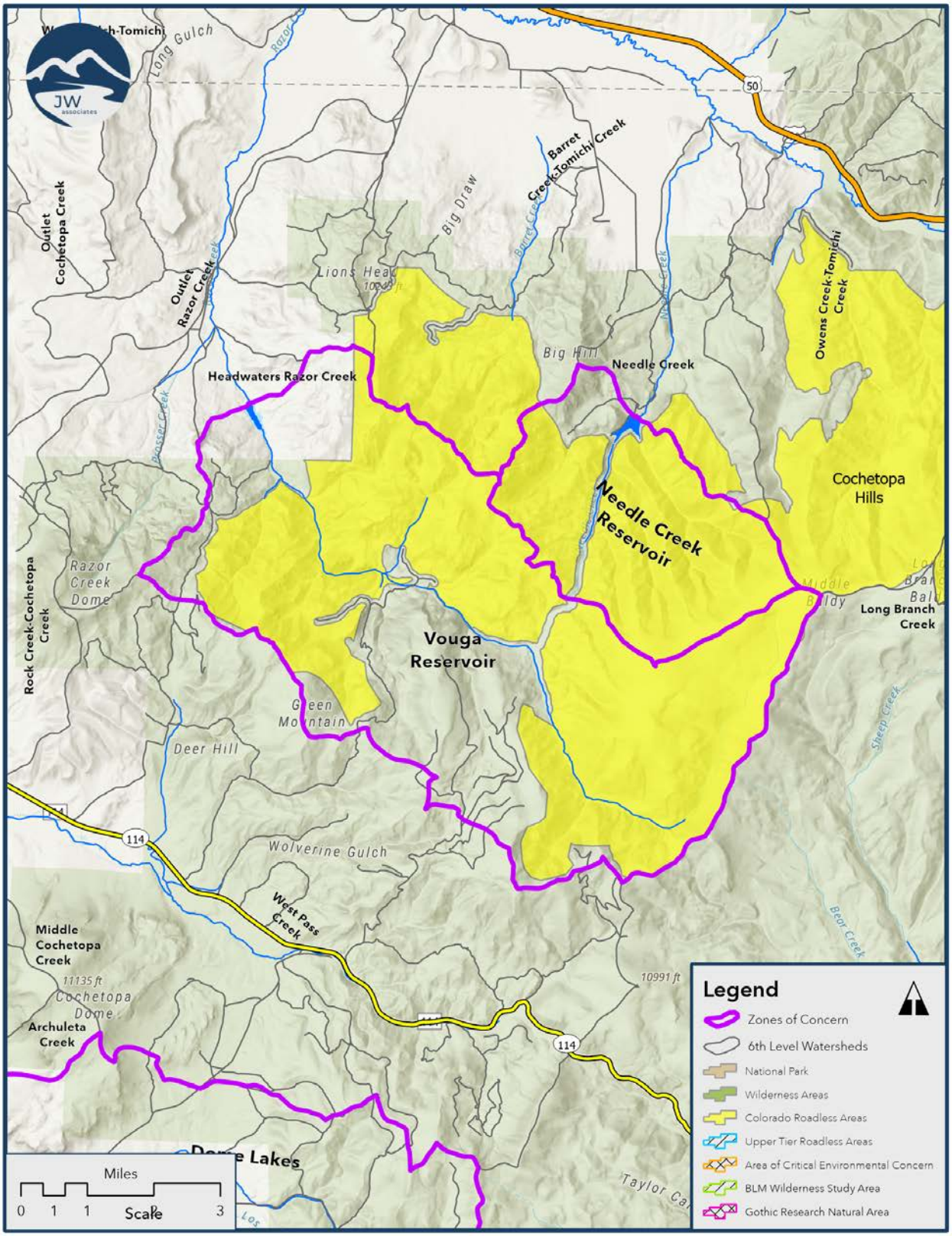


Vouga Reservoir Zone of Concern Special Areas

There are 15,364 acres of roadless areas in the Vouga Reservoir Zone of Concern (Map 65). The roadless area covers much of the Zone of Concern with just a portion in the middle not in roadless.



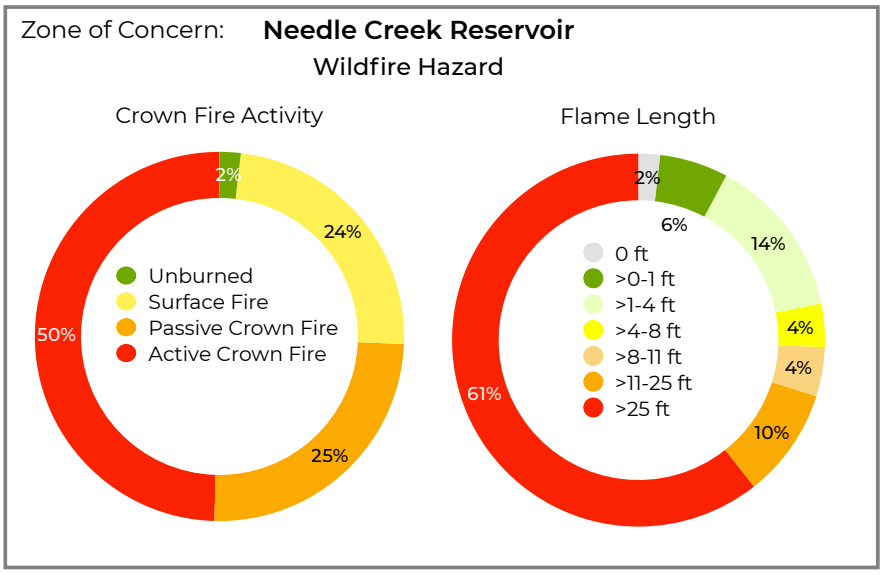
Map 64. Needle Creek & Vouga Reservoir Zone of Concern Ownership



Map 65. Needle Creek & Vouga Reservoir Zone of Concern Special Areas

Needle Creek Reservoir Zone of Concern Wildfire Composite

Wildfire hazard is high in many portions of the Needle Creek Reservoir Zone of Concern. Modeled active and passive crown fire activity covers more than 75% of the Zone of Concern. Modeled flame lengths above 11 feet also cover more than 71% of the Zone of Concern.



The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Needle Creek watershed ranks Moderate in the Composite Wildfire Hazard rank (Table 63). The Composite Wildfire Hazard rank is a combination of four categories of wildfire and post-wildfire hazards. The Needle Creek watershed ranks High for Wildfire Hazard and Debris Flow and Low for Roads Hazard and Soil Erodibility (Table 63).

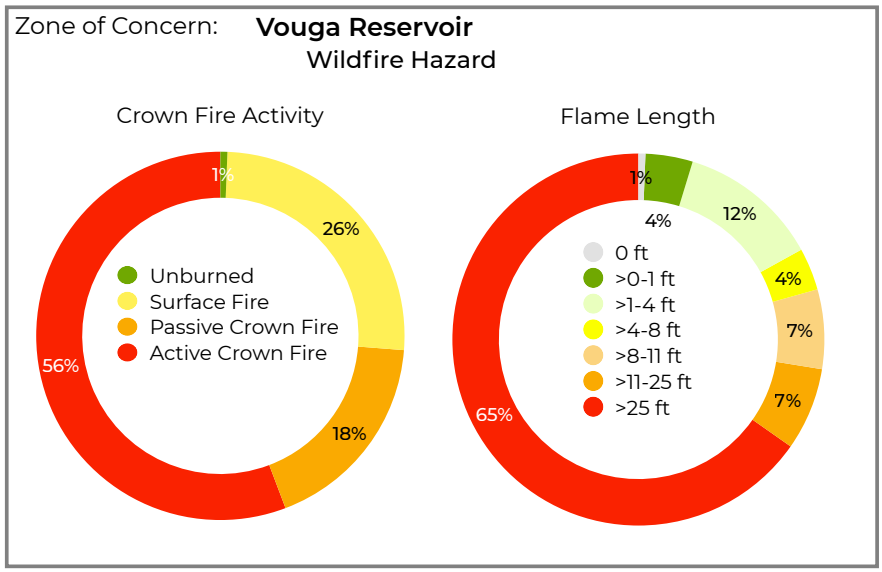
Table 63. Wildfire Composite Hazard Rankings for Needle Creek and Vouga Reservoir Zone of Concern

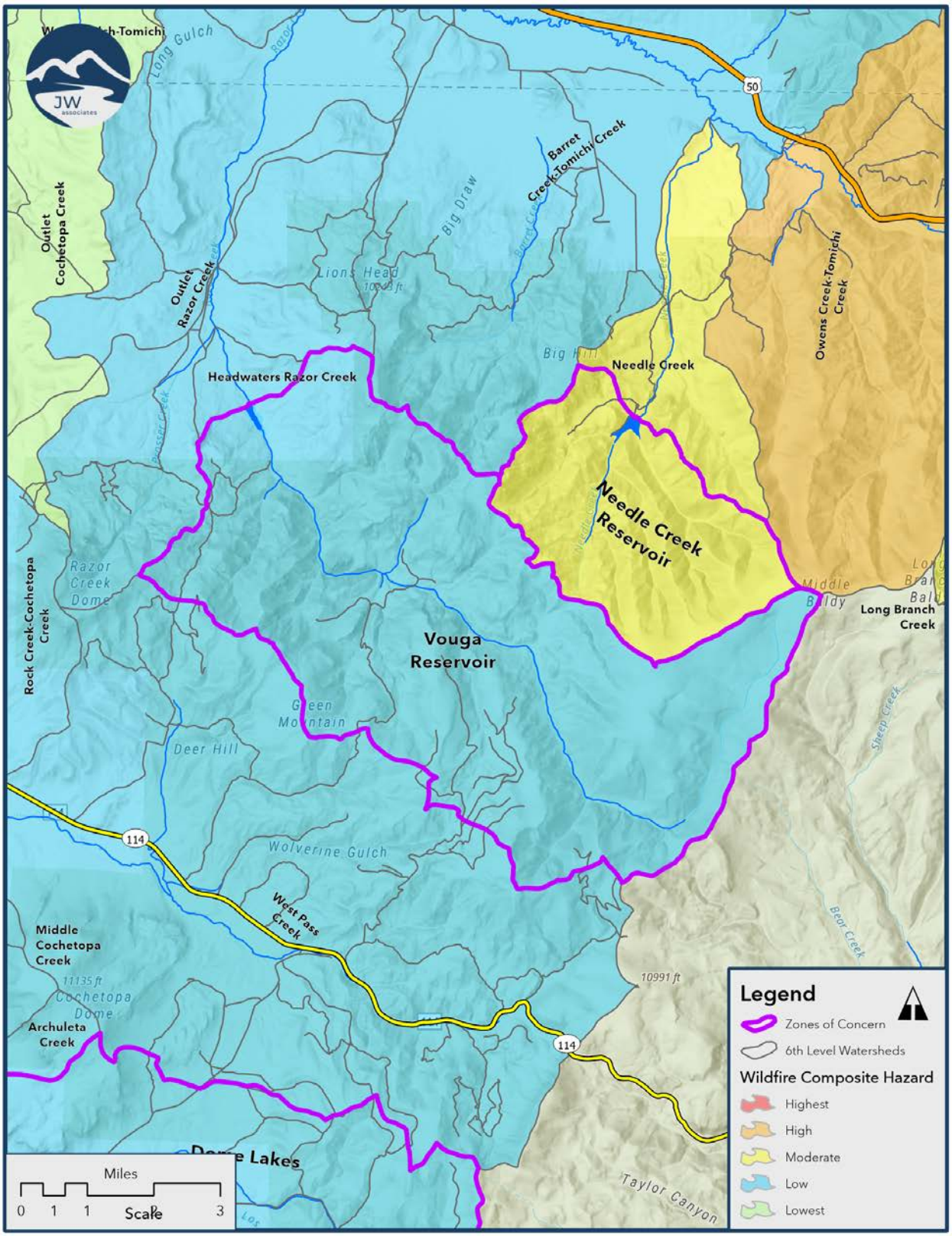
Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Headwaters Razor Creek (Vouga Reservoir)	Highest	Low	Low	Lowest	Low
Needle Creek (Needle Creek Reservoir)	High	High	Low	Low	Moderate

Vouga Reservoir Zone of Concern Wildfire Composite

Wildfire hazard is high in many portions of the Vouga Creek Reservoir Zone of Concern. Modeled active and passive crown fire activity covers more than 74% of the Zone of Concern. Modeled flame lengths above 11 feet also cover more than 72% of the Zone of Concern.

The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Headwaters Razor Creek watershed ranks Low in the Composite Wildfire Hazard rank (Table 63). The Composite Wildfire Hazard rank is a combination of four categories of wildfire and post-wildfire hazards. The Headwaters Razor Creek watershed ranks Highest for Wildfire Hazard and Low or Lowest for Debris Flow, Roads Hazard and Soil Erodibility (Table 63).





Map 66. Needle Creek & Vouga Reservoir Zone of Concern Wildfire Composite Hazard

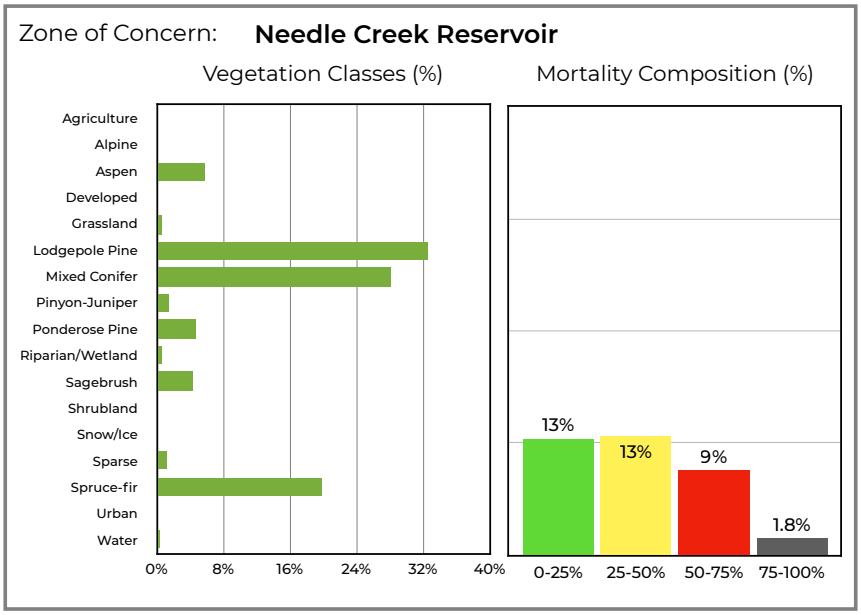
Needle Creek and Vouga Reservoir Zone of Concern Access

The Needle Creek Reservoir Zone of Concern has very limited access with only one small road in the north end of the Zone of Concern (Map 64).

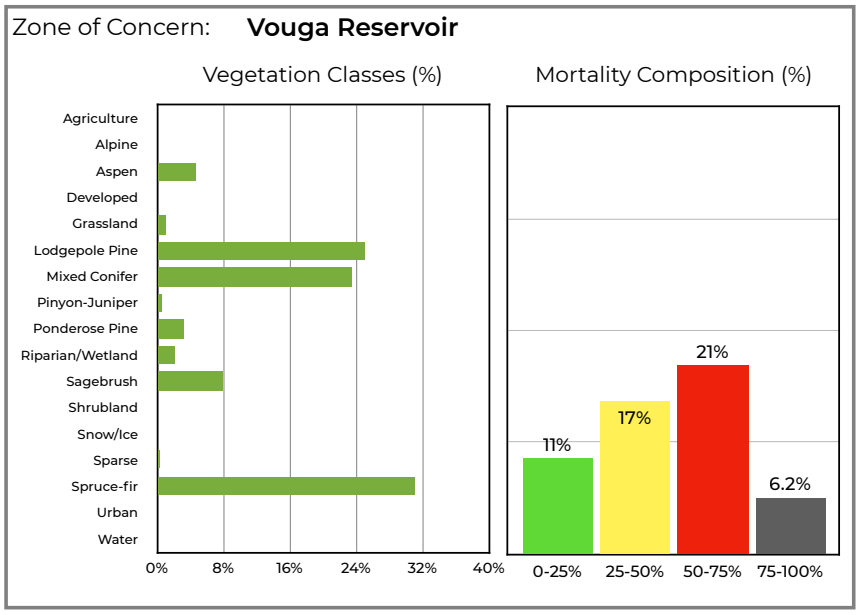
The Vouga Reservoir Zone of Concern has some road access in the middle of the Zone of Concern from the south (Map 64). The rest of the area has very limited access.

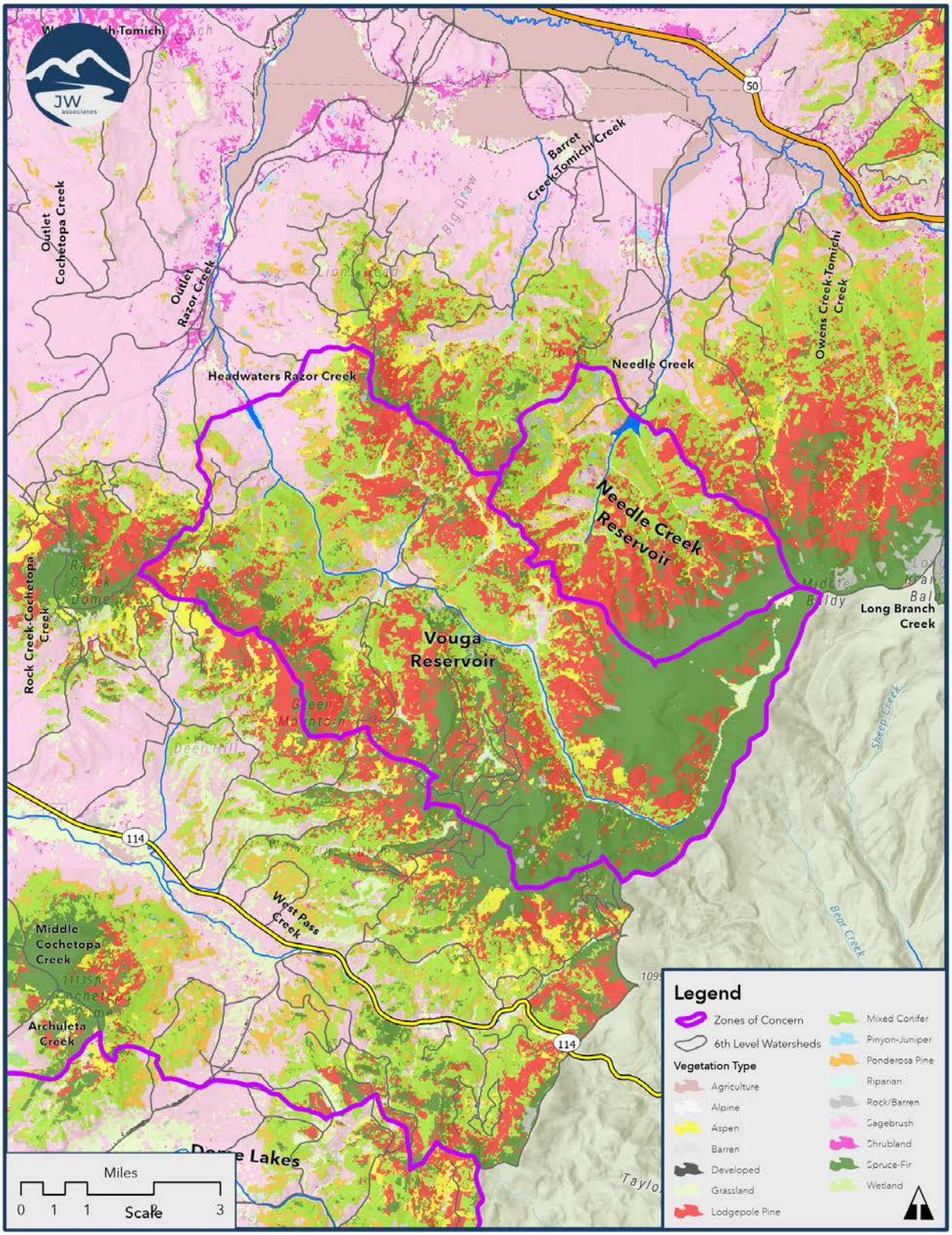
Needle Creek and Vouga Reservoir Zone of Concern Vegetation

The Needle Creek Reservoir Zone of Concern has a large area of mixed conifer and lodgepole pine with spruce-fir at higher elevations (Map 67). Beetle mortality covers about 24% of the area in 25-100% mortality.



The Vouga Reservoir Zone of Concern has some small areas of sagebrush around the reservoir. The majority of the area has mixed conifer and lodgepole pine with spruce-fir at the highest elevations (Map 67). Beetle mortality covers about 44% of the area in the 25-100% mortality.





Map 67. Needle Creek and Vouga Reservoir Zone of Concern Vegetation

Needle Creek and Vouga Reservoir Zone of Concern Climate Change Vulnerability

The Needle Creek watershed has a Moderate Climate Change Vulnerability rank which is comprised of a High Ecosystem Sensitivity rank and a Lowest Lack of Adaptive Capacity rank (Table 64 and Map 68). The Headwaters Razor Creek watershed has a Moderate Climate Change Vulnerability rank which is comprised of a High Ecosystem Sensitivity rank and a Low Lack of Adaptive Capacity rank (Table 64 and Map 68).

Table 64. Climate Change Vulnerability for Needle Creek & Vouga Reservoir Zones of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Needle Creek (Needle Creek Reservoir)	High	Lowest	Moderate
Headwaters Razor Creek (Vouga Reservoir)	High	Low	Moderate

The Ecosystem Sensitivity rank is a combination of three indicators. The Needle Creek watershed has a High Fire Regime Departure and Insect & Disease rank (Table 65). The Headwaters Razor Creek watershed has a High Fire Regime Departure and Highest Insect & Disease rank (Table 65).

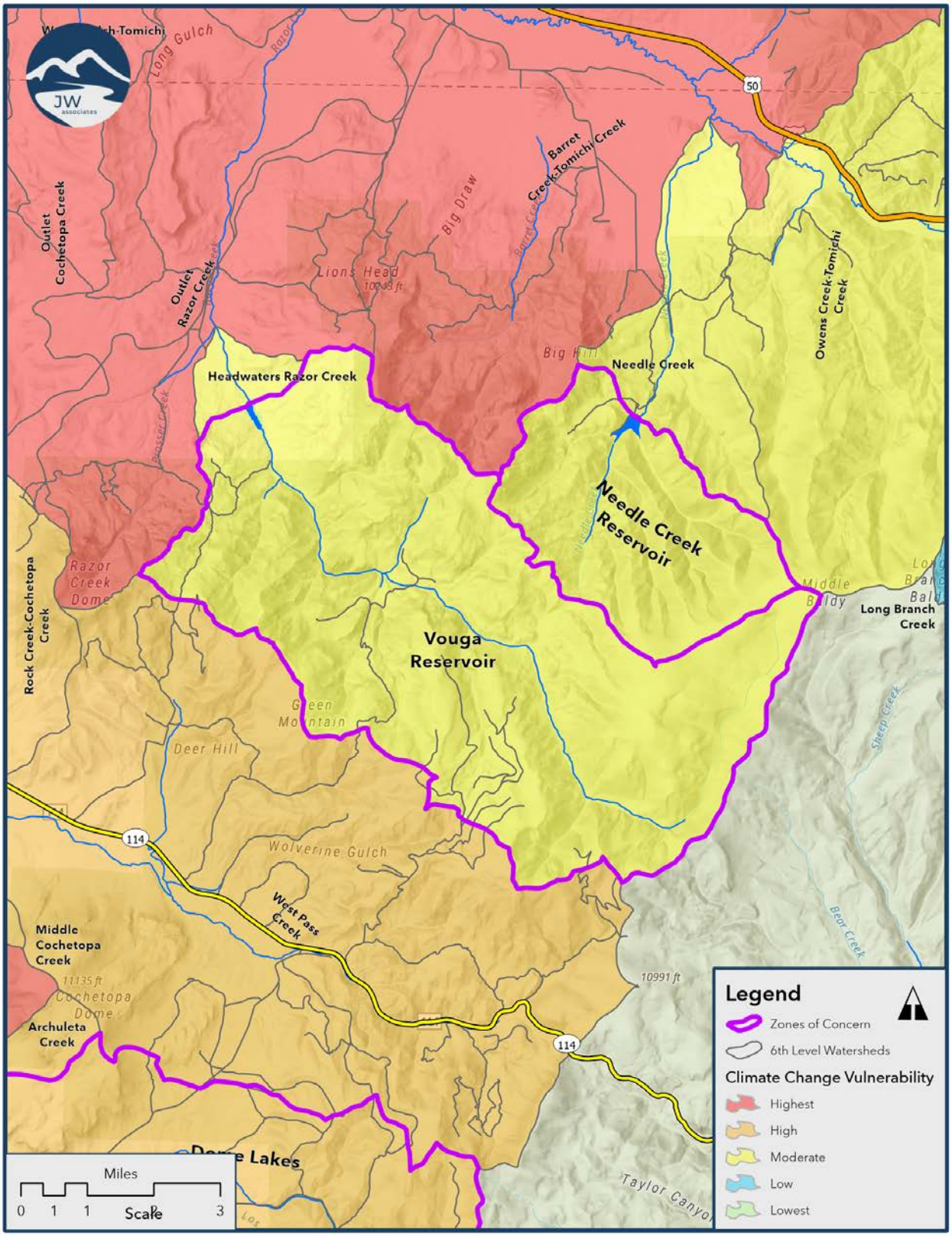
Table 65. Ecosystem Sensitivity for Needle Creek & Vouga Reservoir Zones of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Needle Creek (Needle Creek Reservoir)	Lowest	High	High	High
Headwaters Razor Creek (Vouga Reservoir)	Lowest	High	Highest	High

The Lack of Adaptive Capacity rank is a combination of two indicators. The Needle Creek watershed has a Lowest Lack of Diversity and Low Topo-climatic Variability rank (Table 66). The Headwaters Razor Creek watershed has Low ranks for both components (Table 65).

Table 66. Lack of Adaptive Capacity for Needle Creek & Vouga Reservoir Zones of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Needle Creek (Needle Creek Reservoir)	Lowest	Low	Lowest
Headwaters Razor Creek (Vouga Reservoir)	Low	Low	Low



Map 68. Needle Creek and Vouga Reservoir Climate Change Vulnerability

Needle Creek and Vouga Reservoir Zone of Concern Opportunities

The constraints in both of these Zones of Concern are due to lack of access and the presence of large roadless areas. There are some opportunities to reduce post-fire hazards. Table 67 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 67. Needle Creek and Vouga Reservoir Zone of Concern Actions

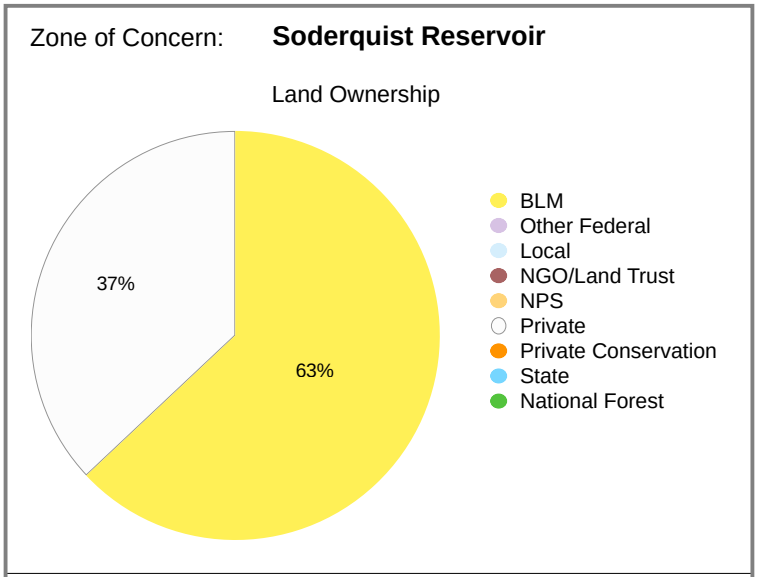
Actions	Needle Creek	Headwaters Razor Creek
Wildfire Hazard Reduction	☑	☑
Road Analysis & Planning		☑
Address Beetle Mortality	☑	☑
Determine appropriate actions in roadless & ACECs	☑	☑
Riparian areas, floodplains, etc.	☑	☑
Pre- and post-fire planning	☑	☑
Increase Diversity		
Fire Regime Restoration	☑	☑

Soderquist Reservoir Zone of Concern

The Soderquist Reservoir Zone of Concern covers 4,996 acres and covers one 6th level watersheds - Headwaters Willow Creek (Table 1 and Map 69).

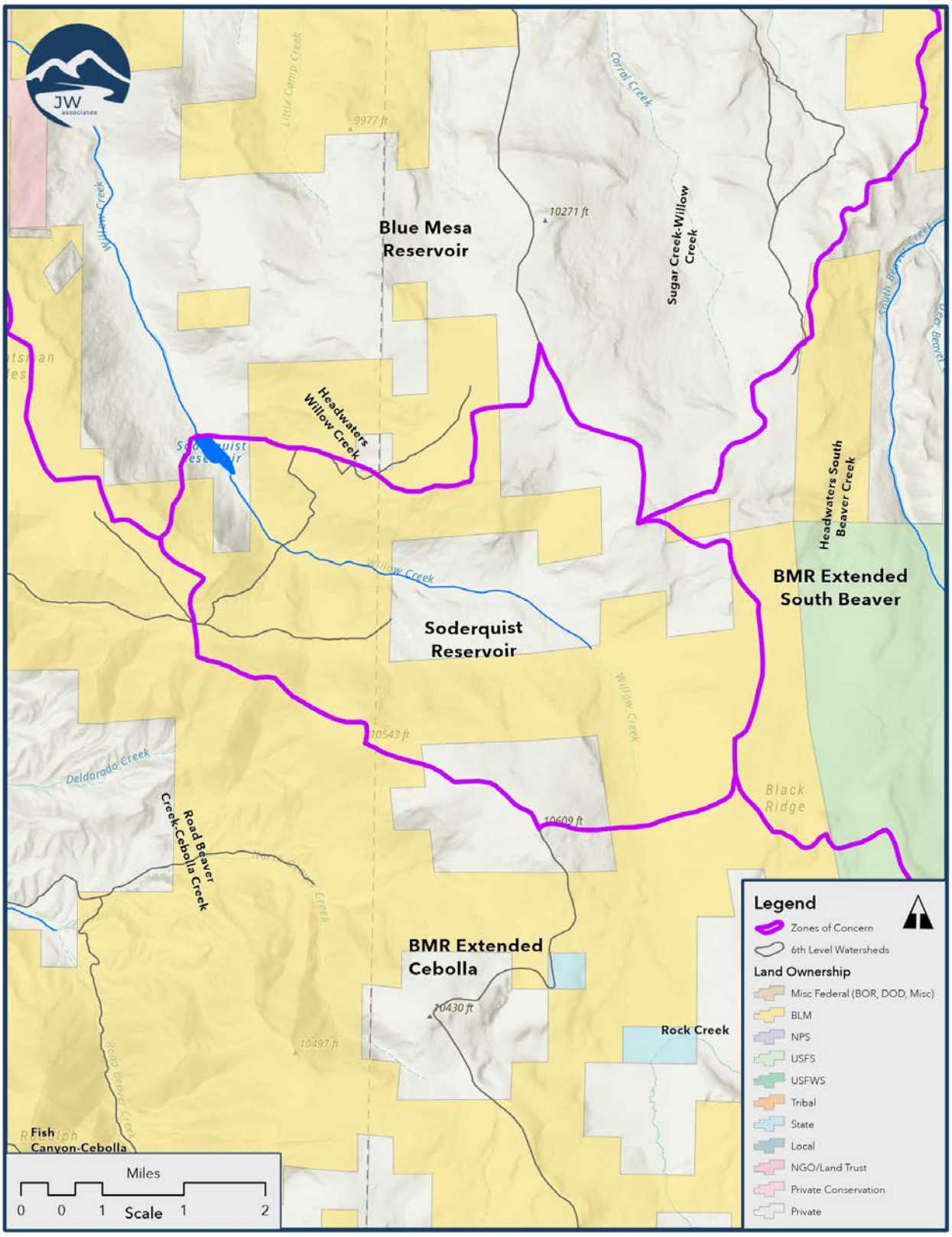
Soderquist Reservoir Zone of Concern Ownership

The majority (63%) of the Soderquist Reservoir Zone of Concern is BLM lands (Map 69), with a large portion of private lands (37%). The areas of private lands are mostly mixed in with the BLM lands.

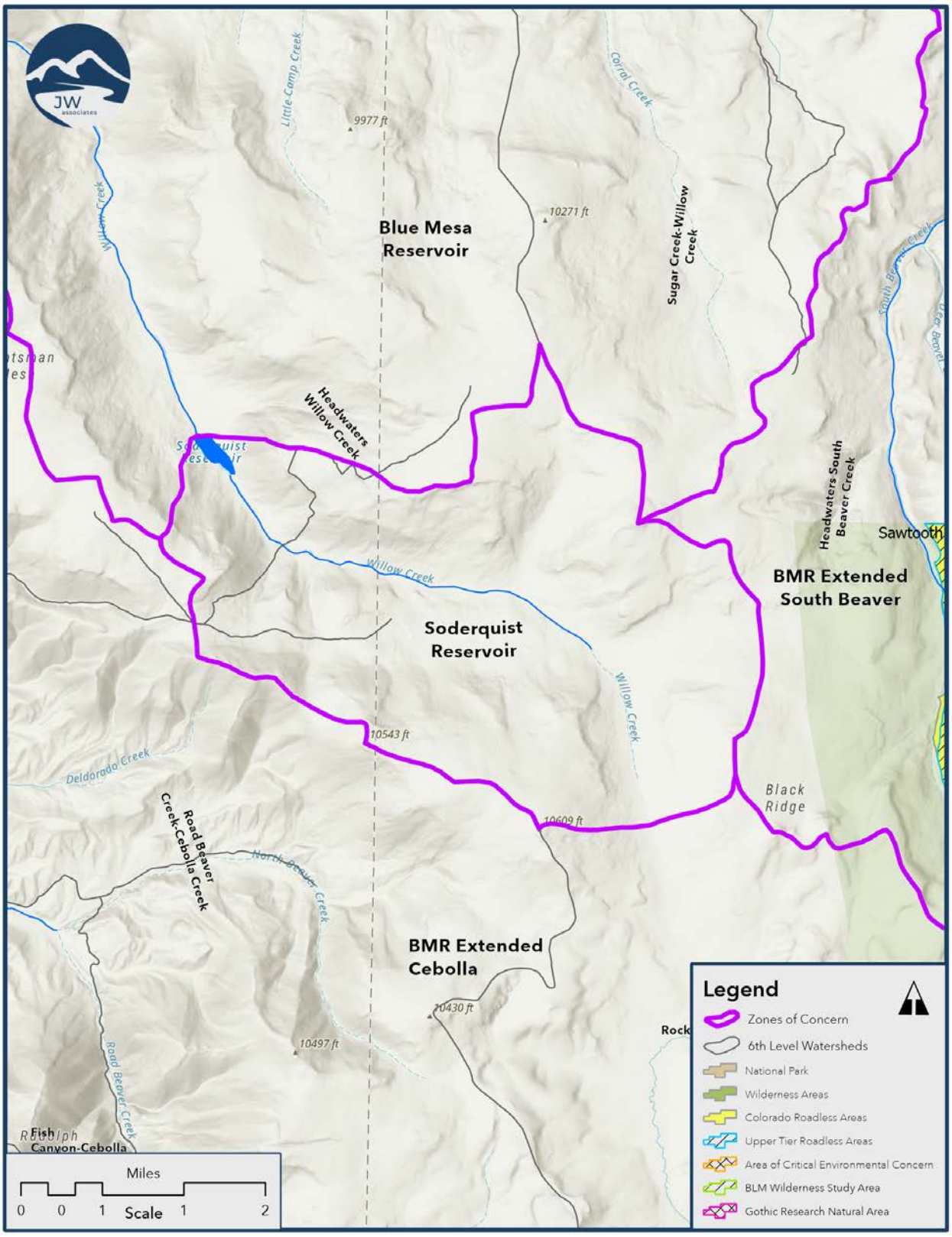


Soderquist Reservoir Zone of Concern Special Areas

There are no wilderness, roadless or ACECs, or other special land designations (Map 70).



Map 69. Soderquist Reservoir Zone of Concern Ownership



Map 70. Soderquist Reservoir Zone of Concern Special Areas

Soderquist Reservoir Zone of Concern Wildfire Composite

Wildfire hazard is low in the Soderquist Reservoir Zone of Concern. Modeled active and passive crown fire activity covers 19% of the Zone of Concern. Modeled flame lengths above 11 feet also cover 30% of the Zone of Concern.

The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Headwaters Willow Creek watershed ranks Lowest in the Composite Wildfire Hazard rank (Table 68). All four of the components are ranked as Low or Lowest (Table 68).

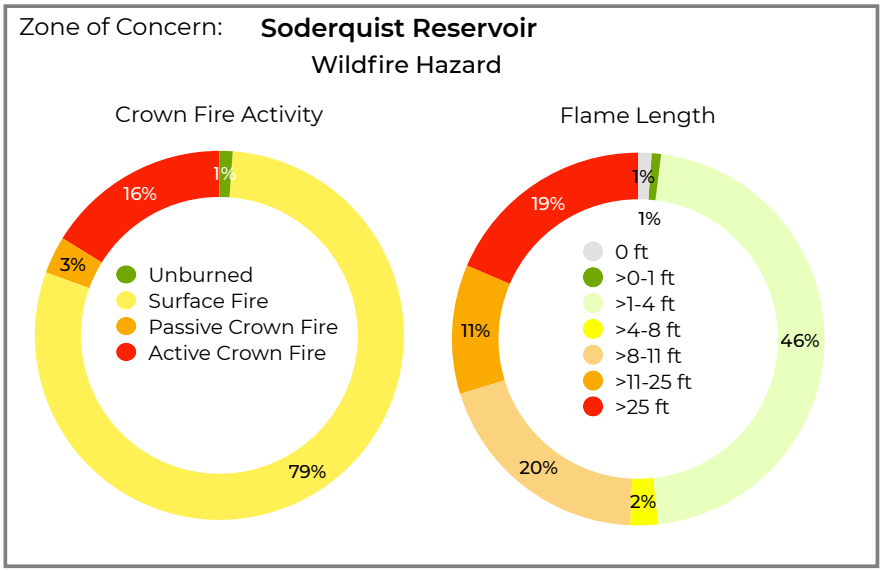
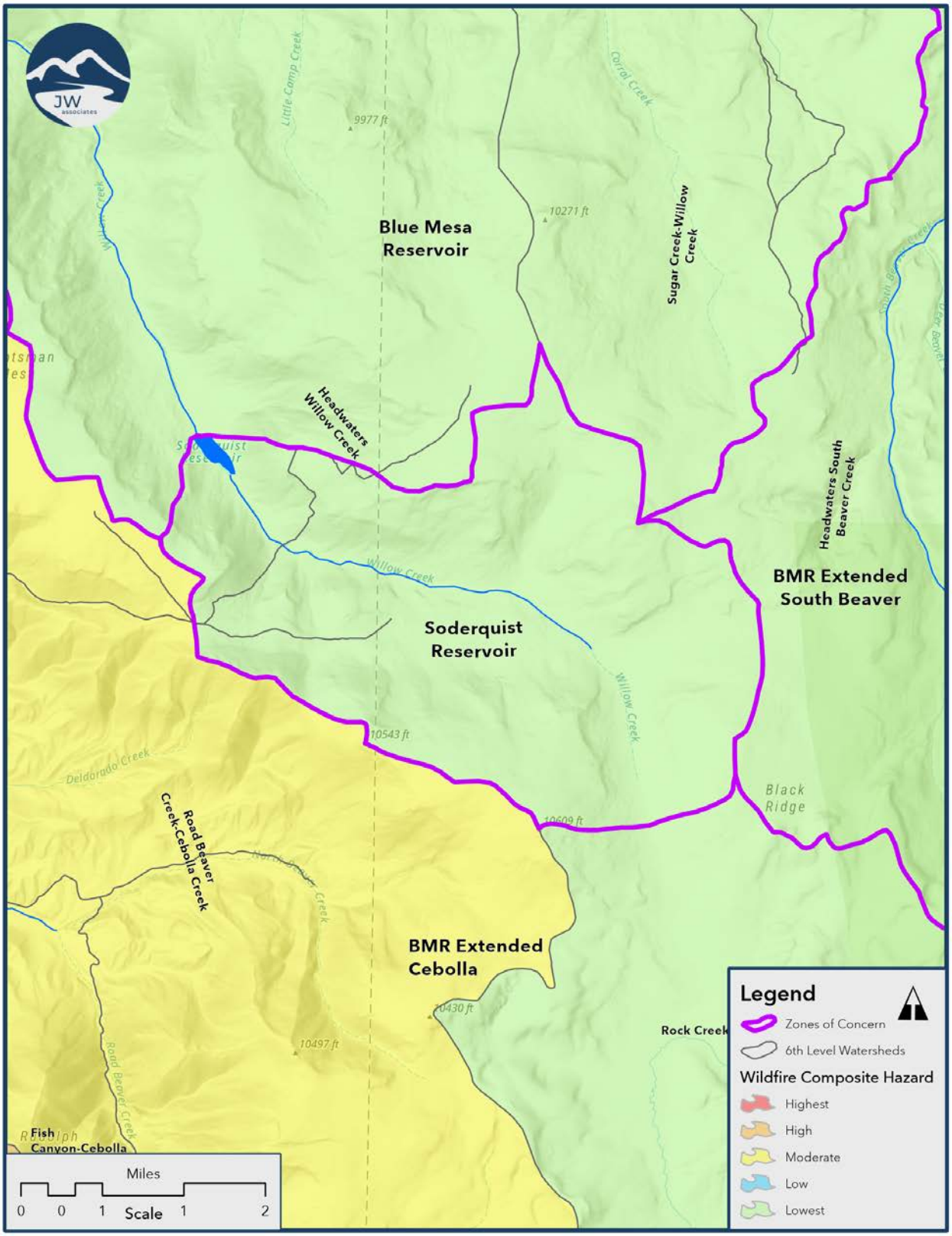


Table 68. Wildfire Composite Hazard Rankings for Soderquist Reservoir Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Headwaters Willow Creek	Low	Lowest	Low	Lowest	Lowest



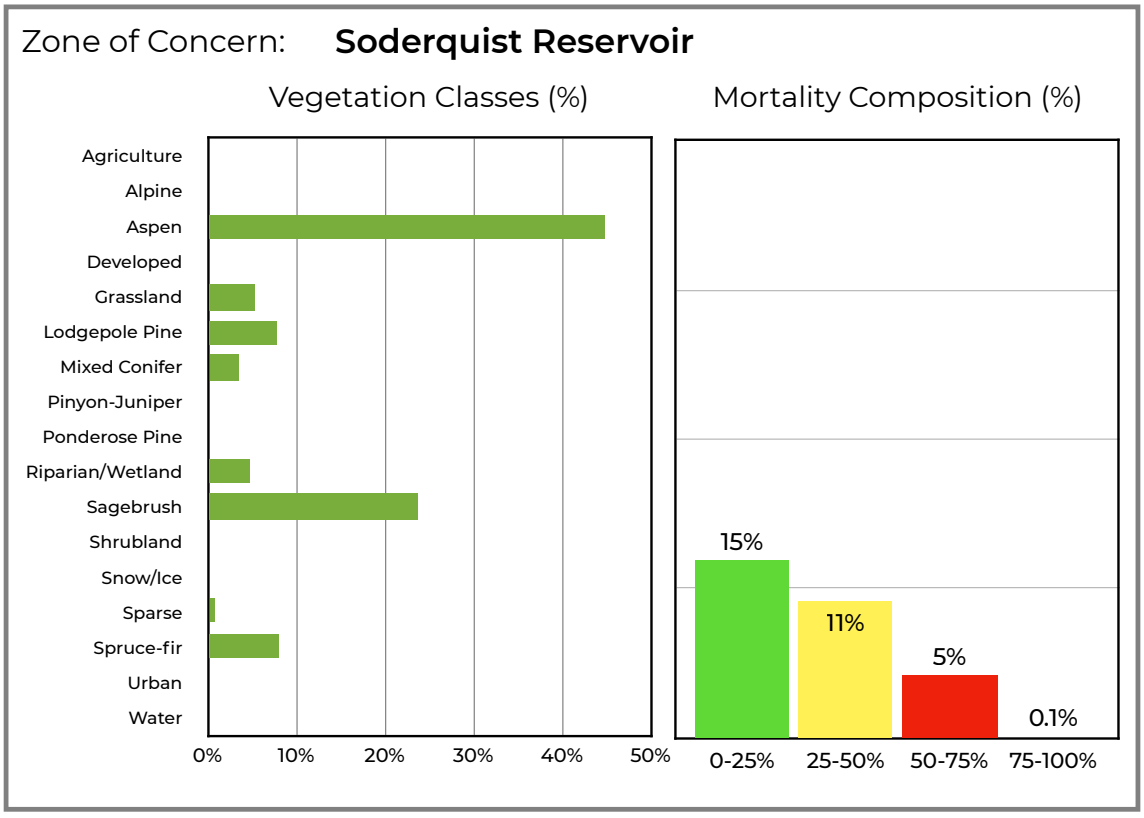
Map 71. Soderquist Reservoir Zone of Concern Wildfire Composite Hazard

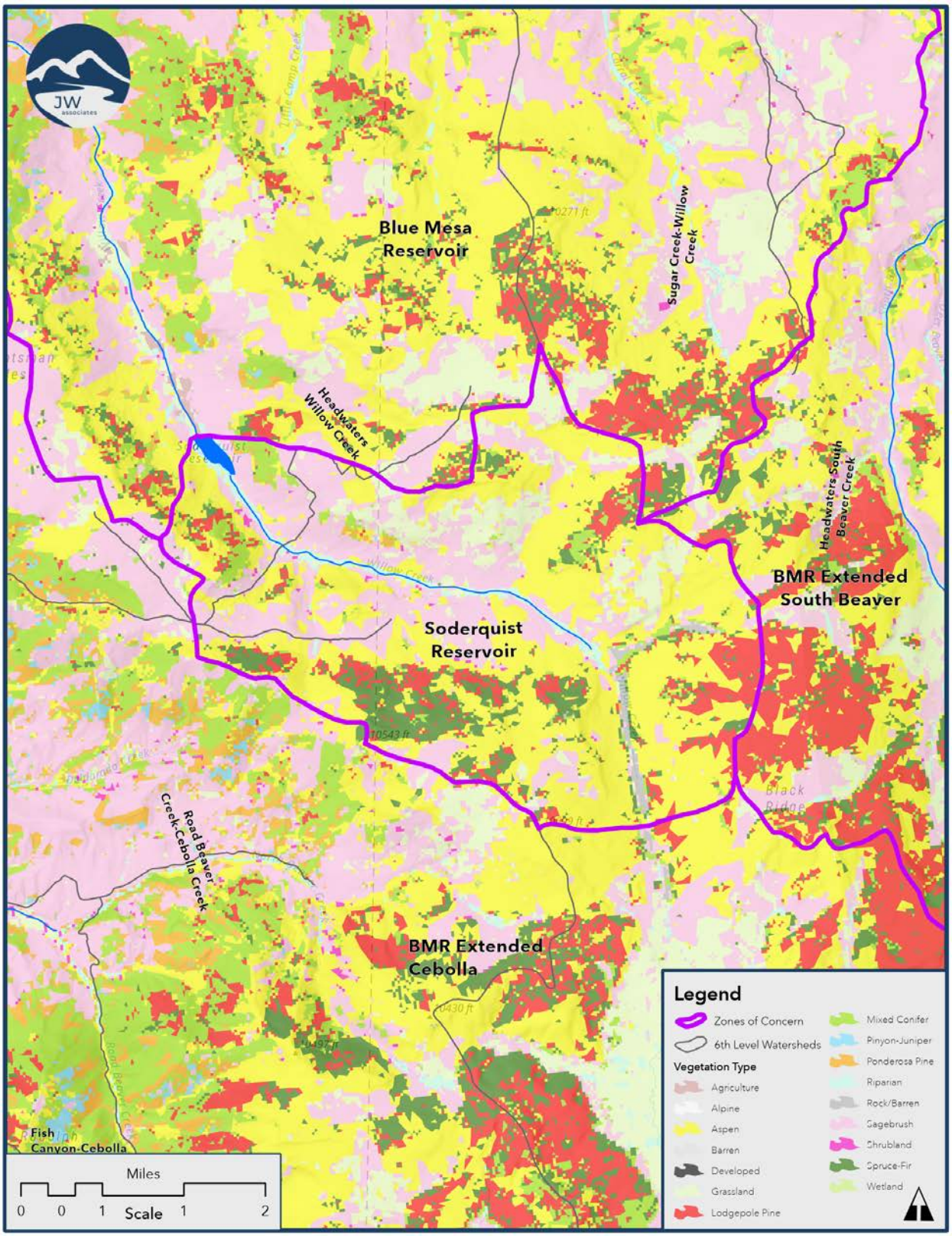
Soderquist Reservoir Zone of Concern Access

The Soderquist Reservoir Zone of Concern has some existing road access in the lower portion of the watershed (Map 69). However, most of the upper watershed appears to have no access.

Soderquist Reservoir Zone of Concern Vegetation

The Soderquist Reservoir Zone of Concern has a large area of sagebrush at the lower elevations above the reservoir (Map 72). Aspen dominates the vegetation in the Zone of Concern with some areas of mixed conifer and lodgepole pine. Beetle mortality totals about 16% of the area in 25-75% mortality.





Map 72. Soderquist Reservoir Zone of Concern Vegetation

Soderquist Reservoir Zone of Concern Climate Change Vulnerability

The Headwaters Willow Creek watershed has a High Climate Change Vulnerability rank which is comprised of a Moderate Ecosystem Sensitivity rank and High Lack of Adaptive Capacity rank (Table 69 and Map 73).

Table 69. Climate Change Vulnerability Rankings for Soderquist Reservoir Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Headwaters Willow Creek	Moderate	High	High

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition and Fire Regime Departure are ranked as Low and Lowest (Table 36). Insect & Disease is ranked as Highest for the Headwaters Willow Creek watershed.

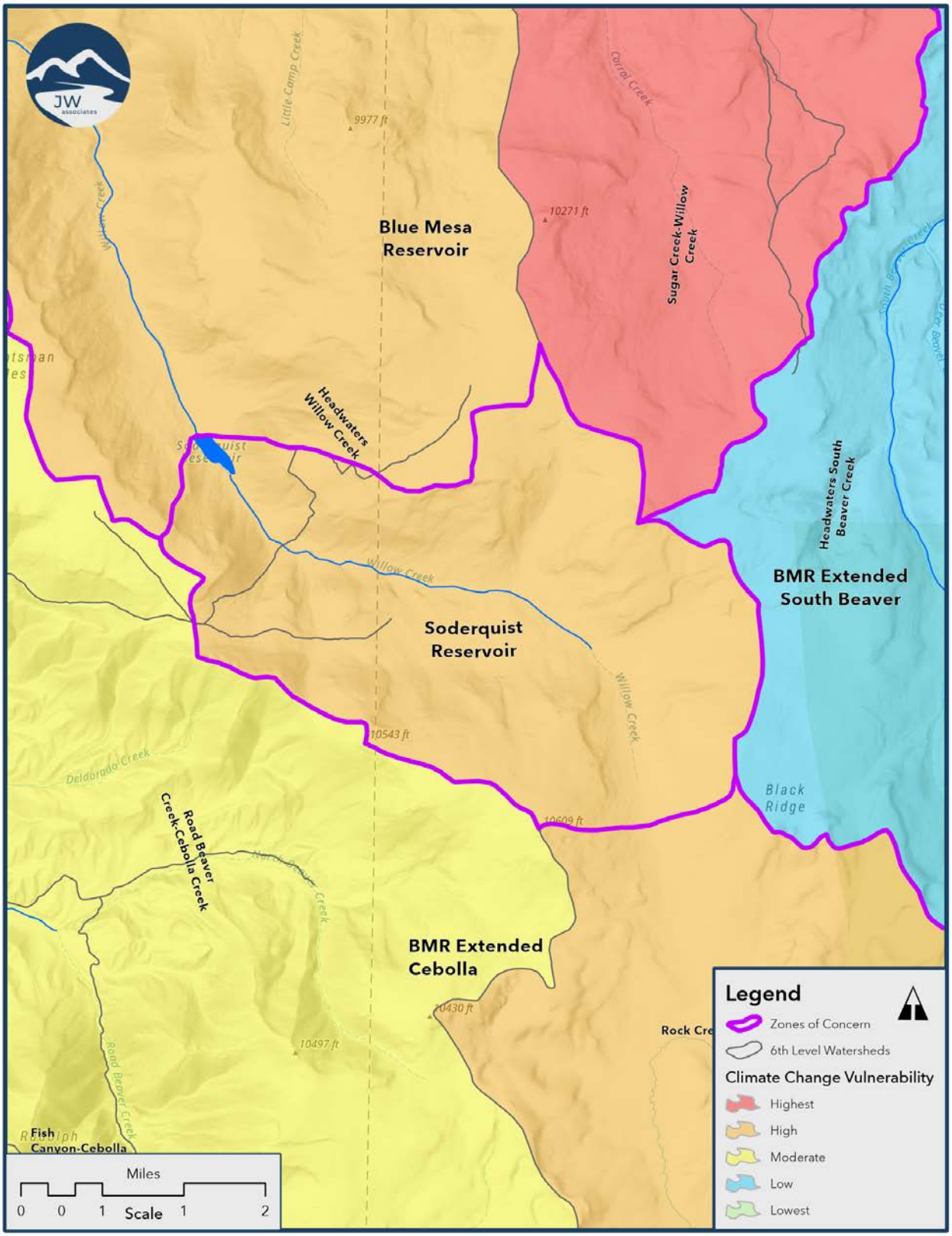
Table 70. Ecosystem Sensitivity Rankings for Soderquist Reservoir Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Headwaters Willow Creek	Low	Lowest	Highest	Moderate

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as Highest for the Headwaters Willow Creek watershed (Table 71). Topo-climatic Variability is ranked as Low.

Table 71. Lack of Adaptive Capacity Rankings for Taylor Park Reservoir Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Headwaters Willow Creek	Highest	Low	High



Map 73. Soderquist Reservoir Zone of Concern Climate Change Vulnerability

Soderquist Reservoir Zone of Concern Opportunities

The constraints in the Soderquist Reservoir Zone of Concern are due to lack of access. There are some opportunities to increase diversity. Table 72 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 72. Soderquist Reservoir Zone of Concern Actions

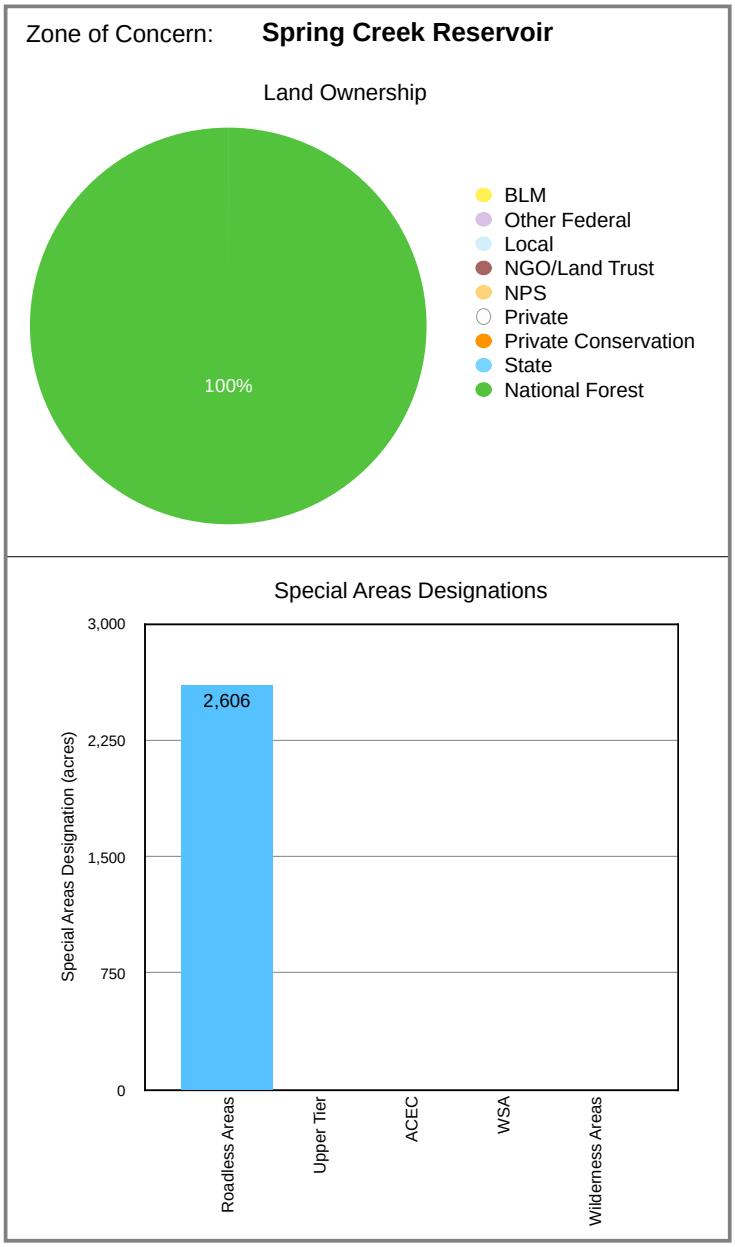
Actions	Headwaters Willow Creek
Wildfire Hazard Reduction	
Road Analysis & Planning	
Address Beetle Mortality	☑
Determine appropriate actions in roadless & ACECs	
Riparian areas, floodplains, etc.	☑
Pre- and post-fire planning	
Increase Diversity	☑
Fire Regime Restoration	

Spring Creek Reservoir Zone of Concern

The Spring Creek Reservoir Zone of Concern covers 12,486 acres in the headwaters of Spring Creek (Table 1 and Map 74). There is one 6th level watersheds in this Zone of Concern - Rocky Brook-Spring Creek.

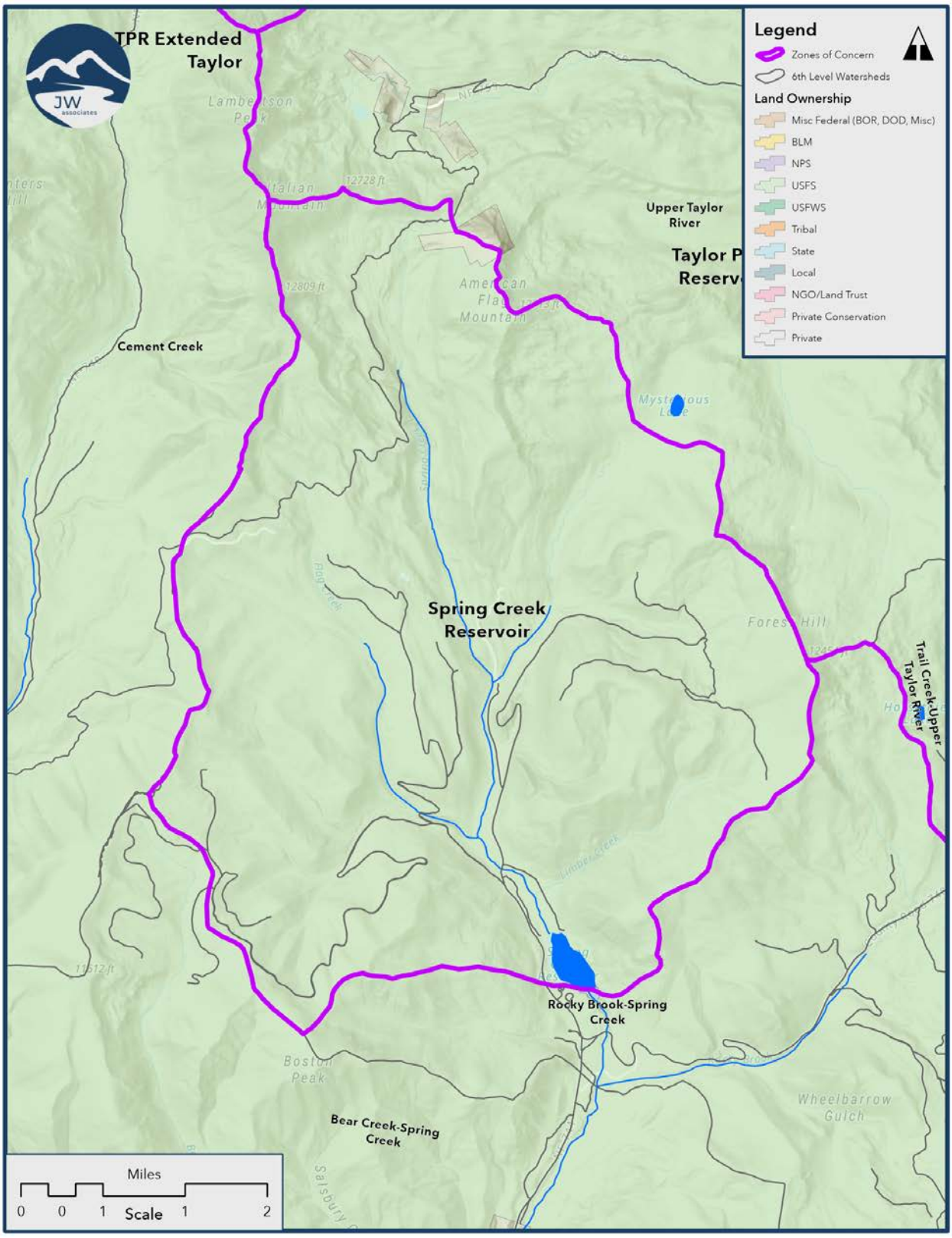
Spring Creek Reservoir Zone of Concern Ownership

All of the Spring Creek Reservoir Zone of Concern is on National Forest lands (Map 74).

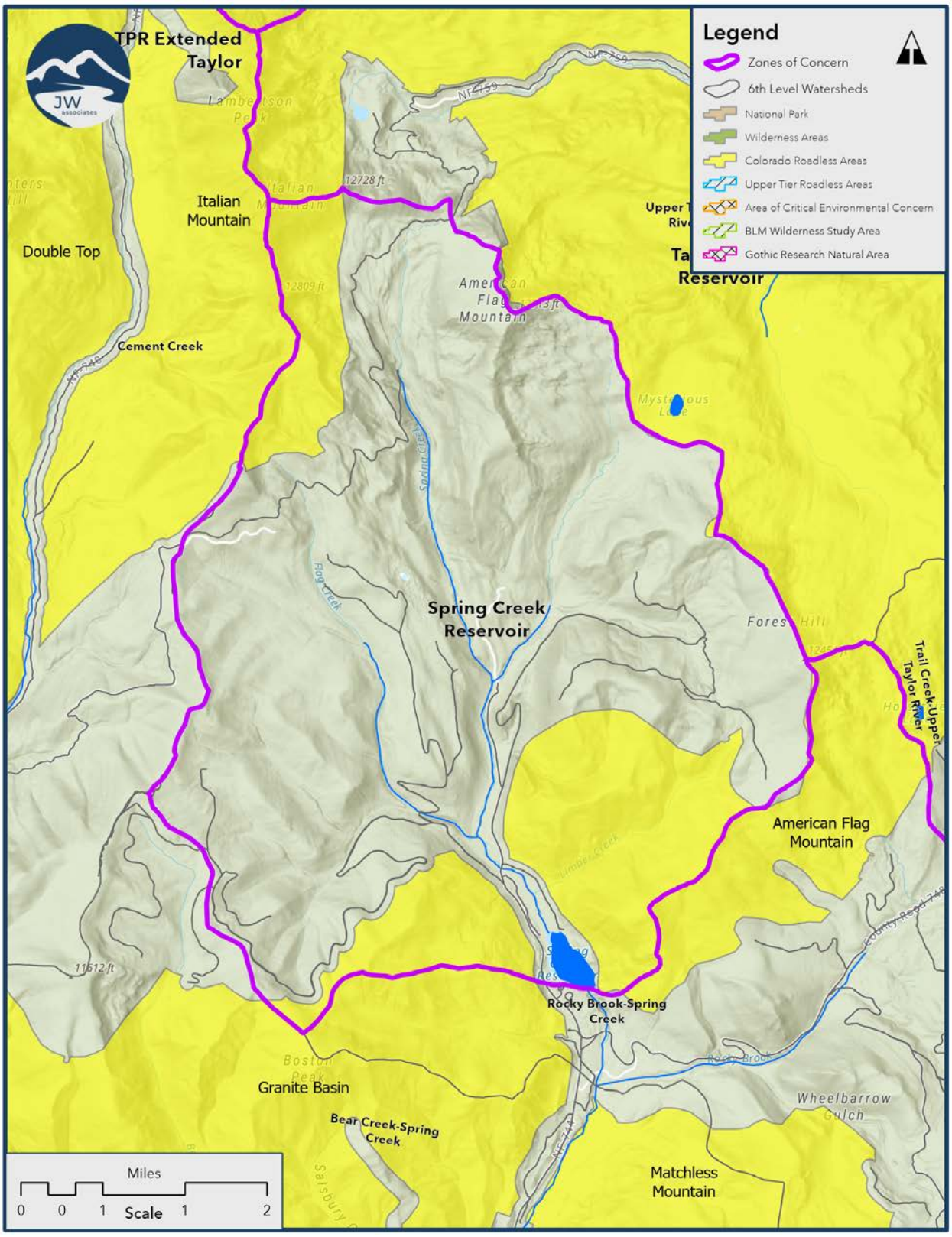


Spring Creek Reservoir Zone of Concern Special Areas

There are 2,606 acres of roadless areas in the Spring Creek Reservoir Zone of Concern (Map 75). The are roadless areas on both sides of the watershed just above the reservoir and one small area in the headwaters, but the middle part of the reservoir has no special areas.



Map 74. Spring Creek Reservoir Zone of Concern Ownership



Map 75. Spring Creek Reservoir Zone of Concern Special Areas

Spring Creek Reservoir Zone of Concern Wildfire Composite

Wildfire hazard is high in many portions of the Spring Creek Reservoir Zone of Concern. Modeled active and passive crown fire activity covers 71% of the Zone of Concern. Modeled flame lengths above 11 feet also cover 71% of the Zone of Concern.

The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The Rocky Brook-Spring Creek watershed ranks Highest in the Composite Wildfire Hazard rank (Table 73 and Map 76). The Rocky Brook-Spring Creek watershed ranks highest for Wildfire Hazard and Road Hazard (Table 73). It also ranks High for Soil Erodibility and Moderate for Debris Flow Hazard.

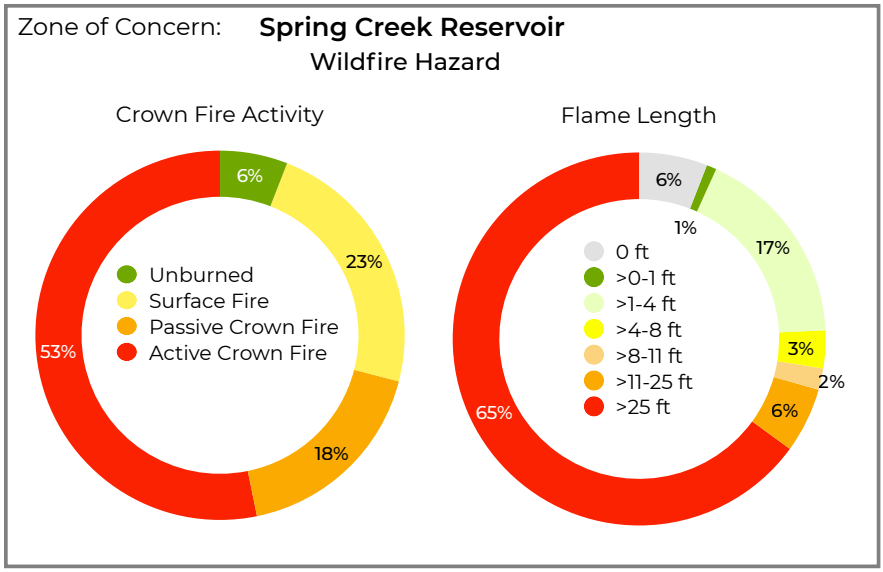
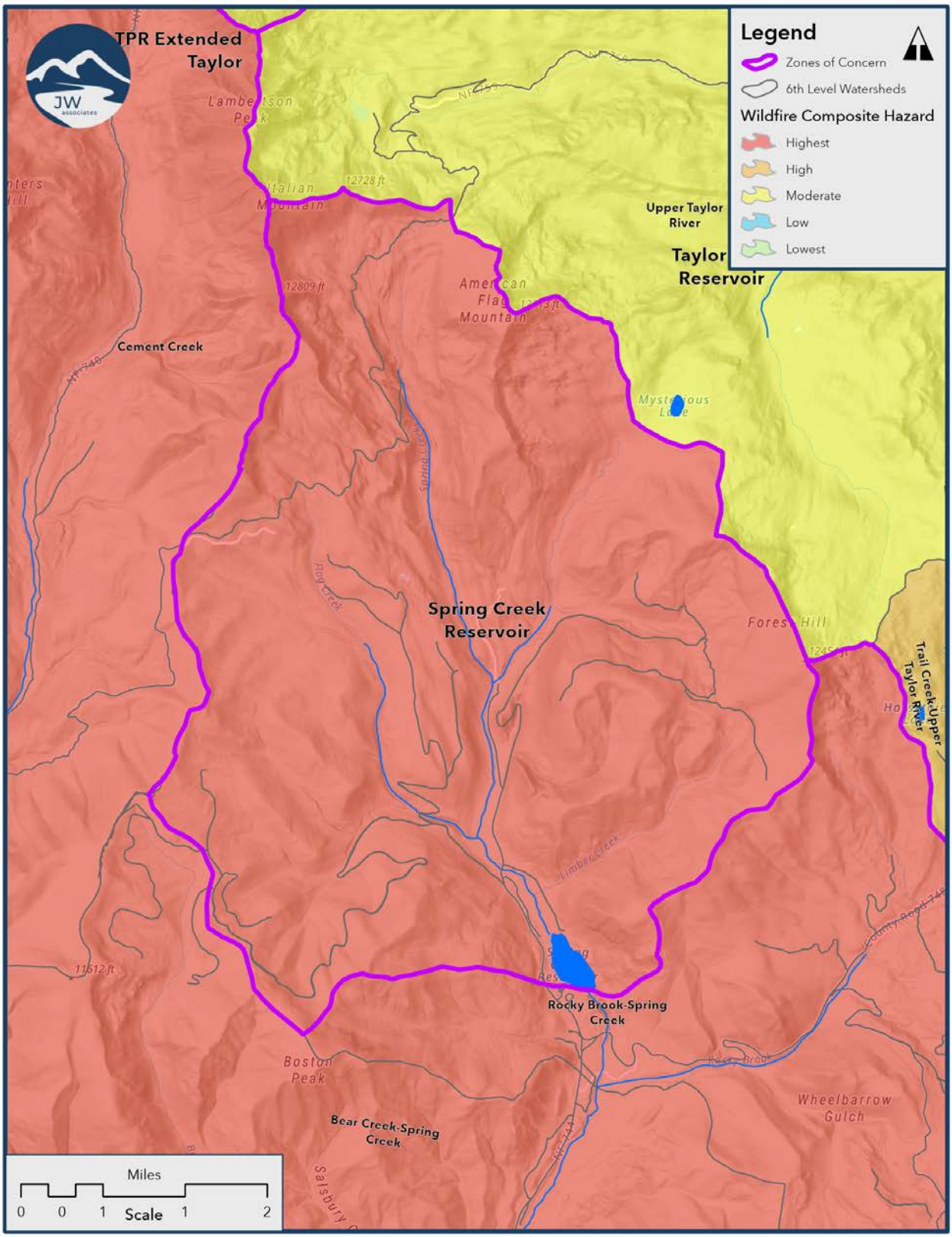


Table 73. Wildfire Composite Hazard for Spring Creek Reservoir Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Rocky Brook-Spring Creek	Highest	Moderate	Highest	High	Highest



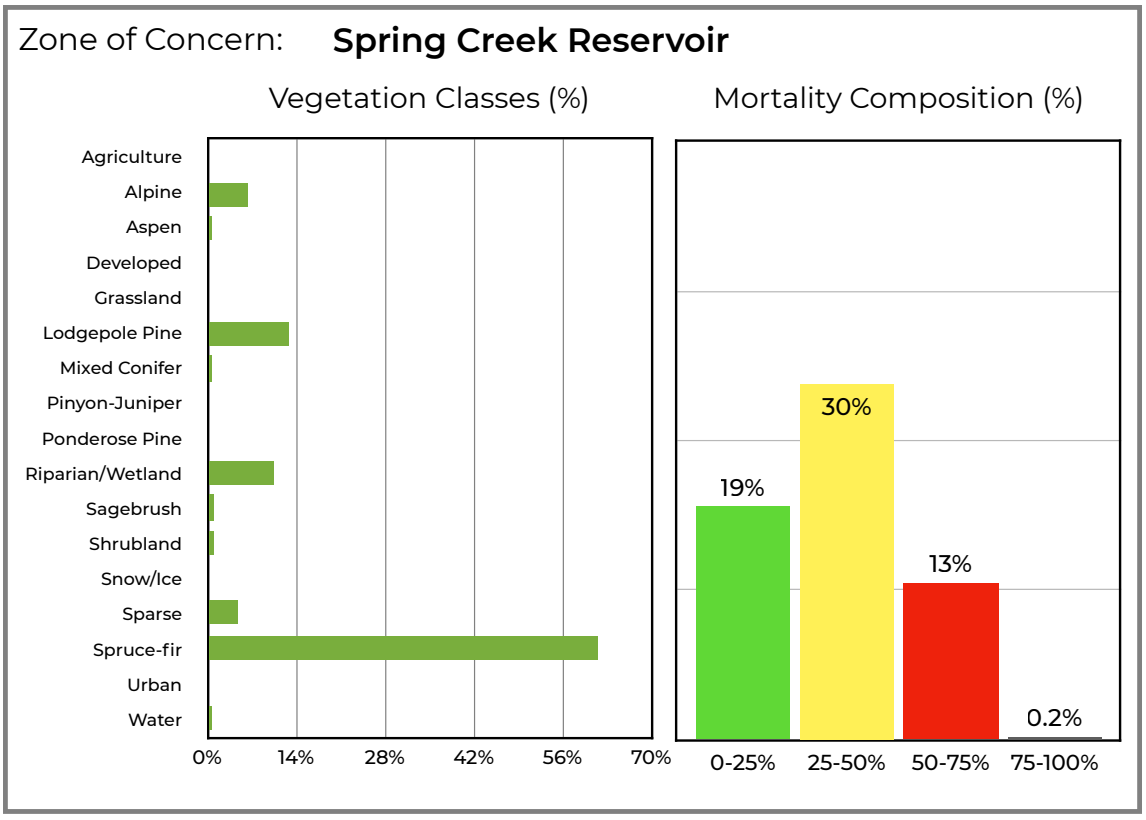
Map 76. Spring Creek Reservoir Zone of Concern Wildfire Composite Hazard

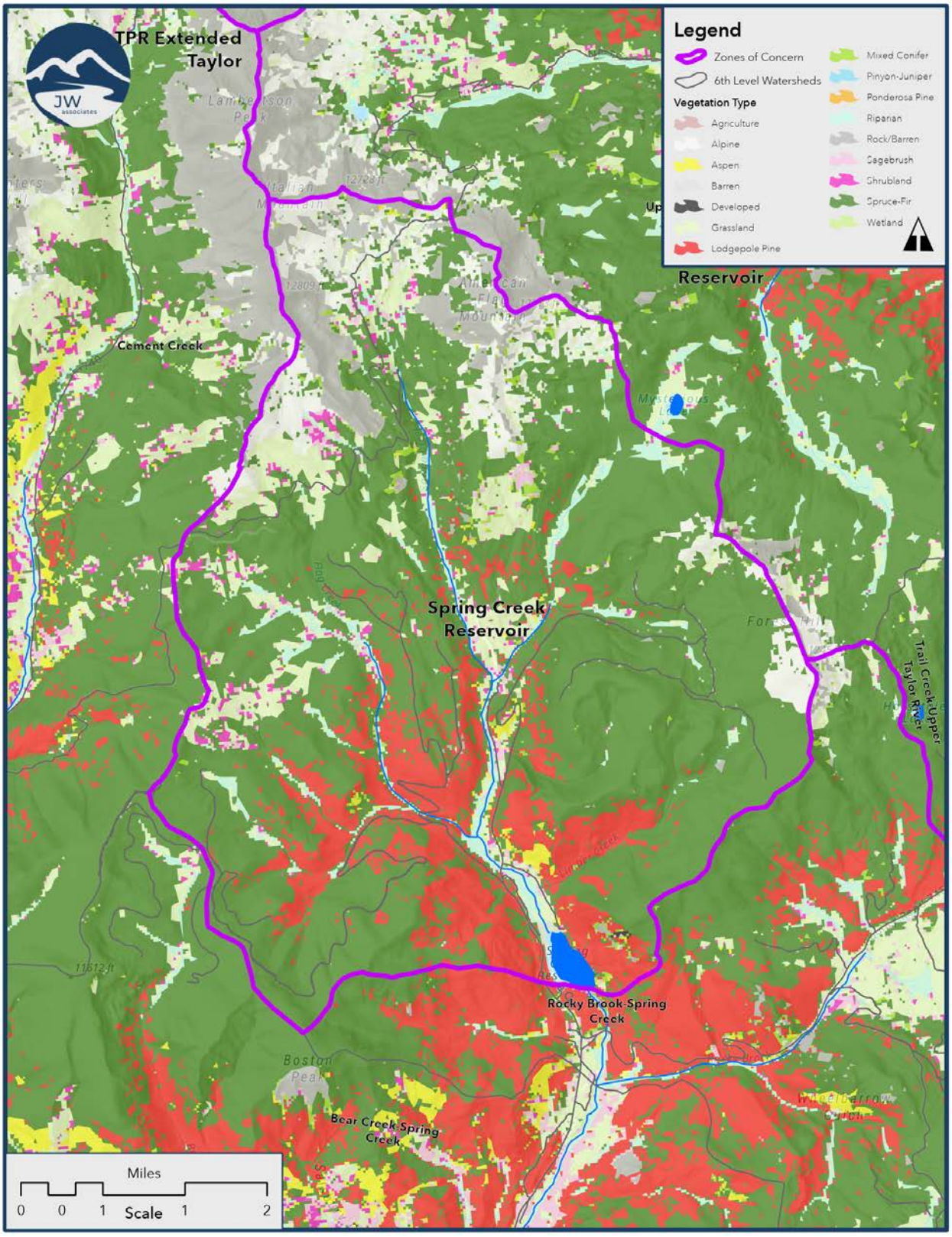
Spring Creek Reservoir Zone of Concern Access

The Spring Creek Reservoir Zone of Concern has some existing road access through much of the watershed (Map 75).

Spring Creek Reservoir Zone of Concern Vegetation

The vegetation in the Spring Creek Reservoir Zone of Concern in dominated by spruce-fir with some areas of lodgepole pine lower in the watershed and alpine at the highest elevations (Map 77). The tree mortality within the Zone of Concern is high at 43% in the 25-75% mortality categories.





Map 77. Spring Creek Reservoir Zone of Concern Vegetation

Spring Creek Reservoir Zone of Concern Climate Change Vulnerability

The Rocky Brook-Spring Creek watershed has a High Climate Change Vulnerability rank which is comprised of a Moderate Ecosystem Sensitivity rank and High Lack of Adaptive Capacity rank (Table 74 and Map 78).

Table 74. Climate Change Vulnerability for Spring Creek Reservoir Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Rocky Brook-Spring Creek	Moderate	High	High

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape Condition and Fire Regime Departure are ranked as Low to Lowest (Table 75). Insect & Disease is ranked as Highest for the Rocky Brook-Spring Creek watershed.

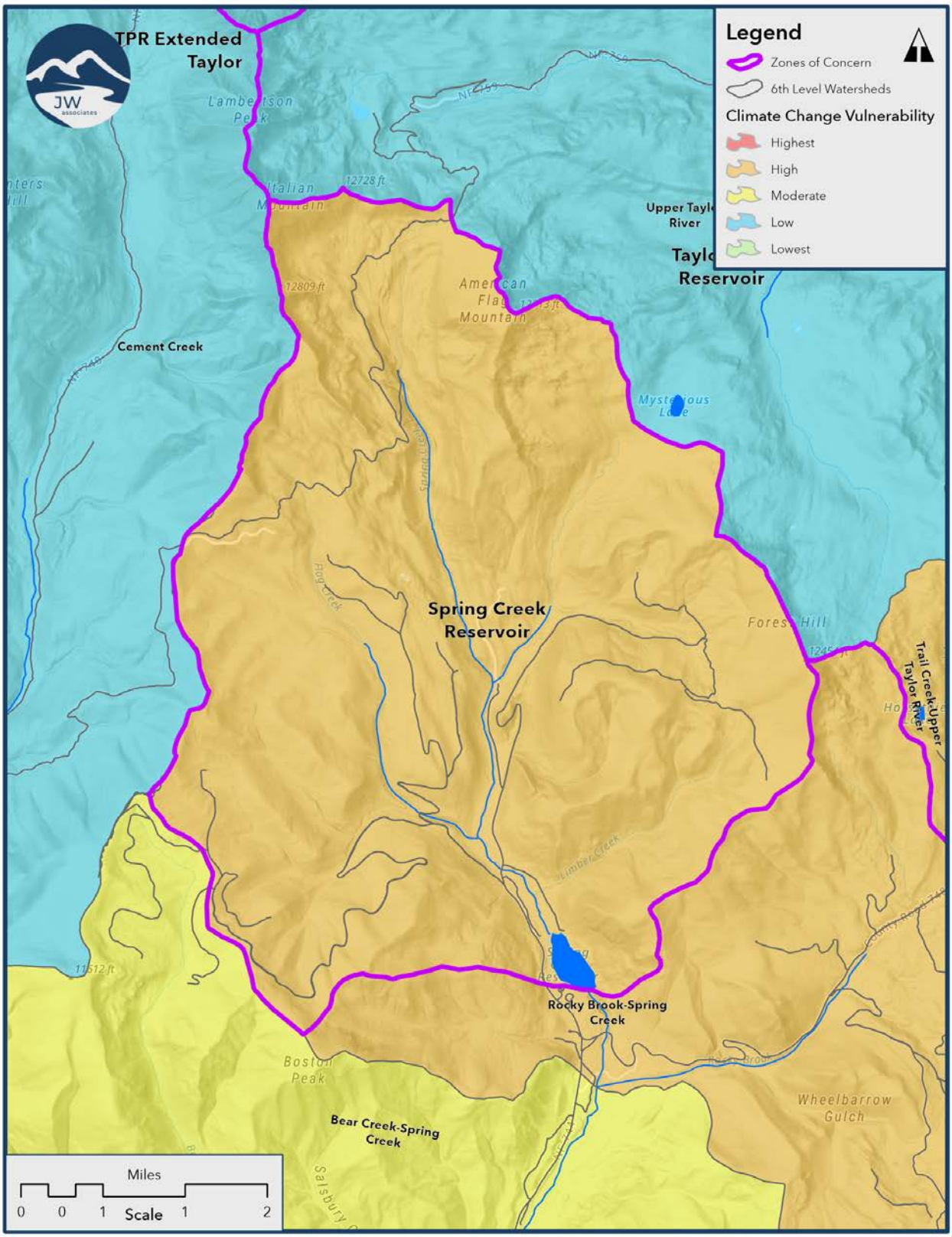
Table 75. Ecosystem Sensitivity for Spring Creek Reservoir Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Rocky Brook-Spring Creek	Low	Lowest	Highest	Moderate

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as Highest for the Rocky Brook-Spring Creek watershed but that is likely because it is mostly composed of spruce-fir (Table 76). Topo-climatic Variability is ranked as Low for the watershed.

Table 76. Lack of Adaptive Capacity for Spring Creek Reservoir Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Rocky Brook-Spring Creek	Highest	Low	High



Map 78. Spring Creek Reservoir Zone of Concern Climate Change Vulnerability

Spring Creek Reservoir Zone of Concern Opportunities

There are opportunities to reduce wildfire hazard in the Spring Creek Reservoir Zone of Concern. There are some opportunities to increase diversity. Table 77 Identifies the actions that would be recommended in the Zone of Concern. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 77. Spring Creek Reservoir Zone of Concern Actions

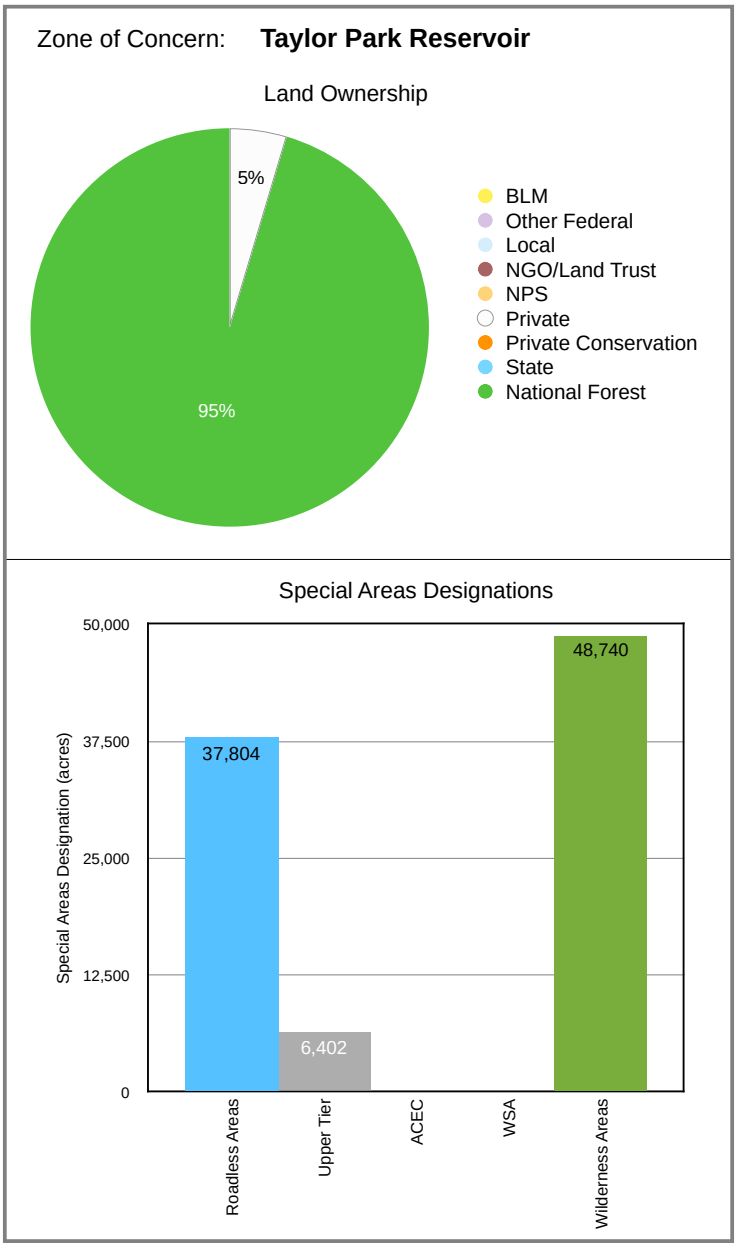
Actions	Rocky Brook-Spring Creek
Wildfire Hazard Reduction	☑
Road Analysis & Planning	☑
Address Beetle Mortality	☑
Determine appropriate actions in roadless & ACECs	☑
Riparian areas, floodplains, etc.	☑
Pre- and post-fire planning	☑
Increase Diversity	☑
Fire Regime Restoration	

Taylor Park Reservoir Zone of Concern

Taylor Park Reservoir Zone of Concern includes three extended areas (Table 1 and Map 79). There are seven 6th level watersheds in this Zone of Concern that covers over 162,000 acres.

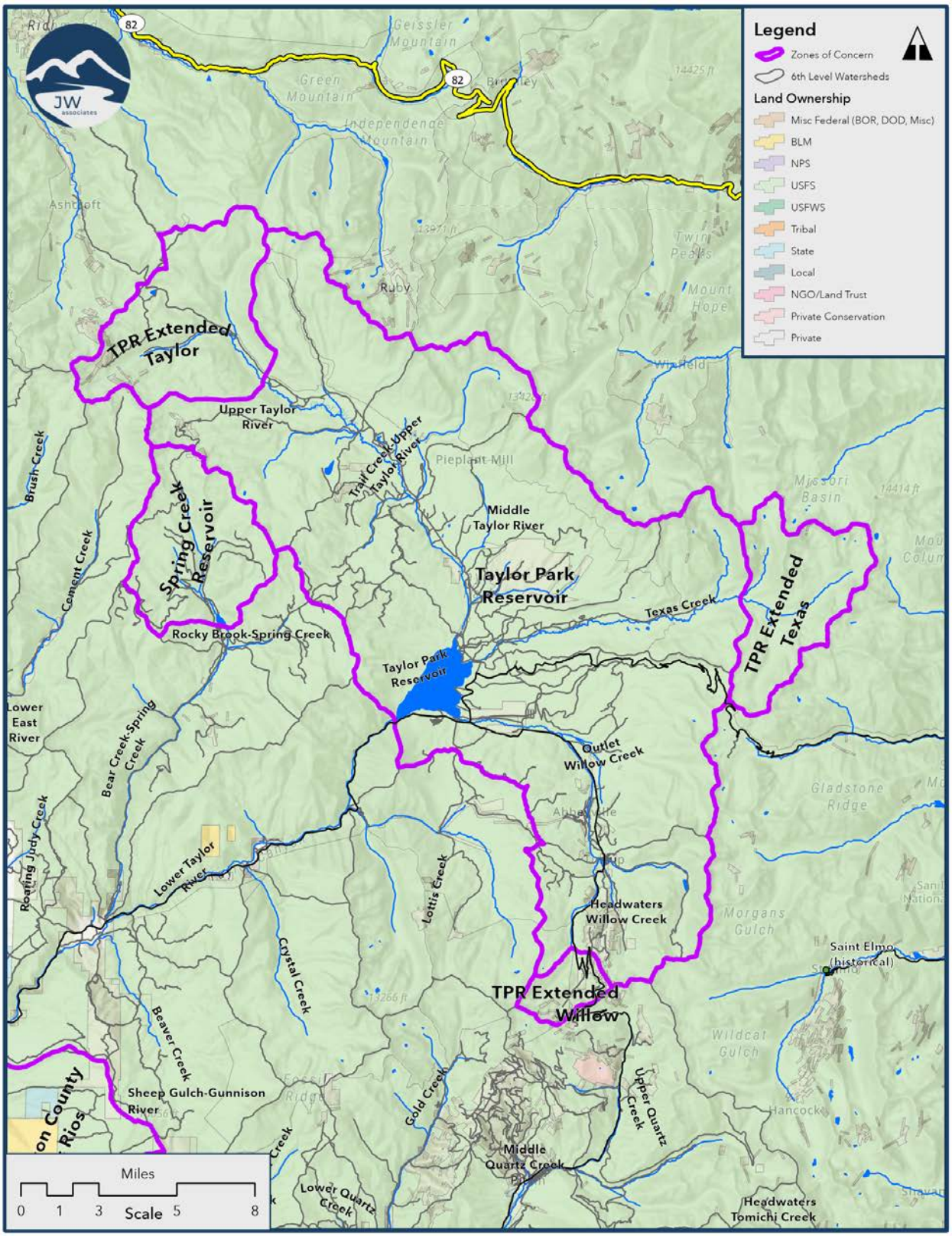
Taylor Park Reservoir Zone of Concern Ownership

The majority (95%) of the Taylor Park Reservoir Zone of Concern is National Forest lands (Map 79), with some smaller areas of private lands. The areas of private lands are mostly east of Taylor Park Reservoir, and in the Middle Taylor River and Headwaters Willow Creek watersheds.

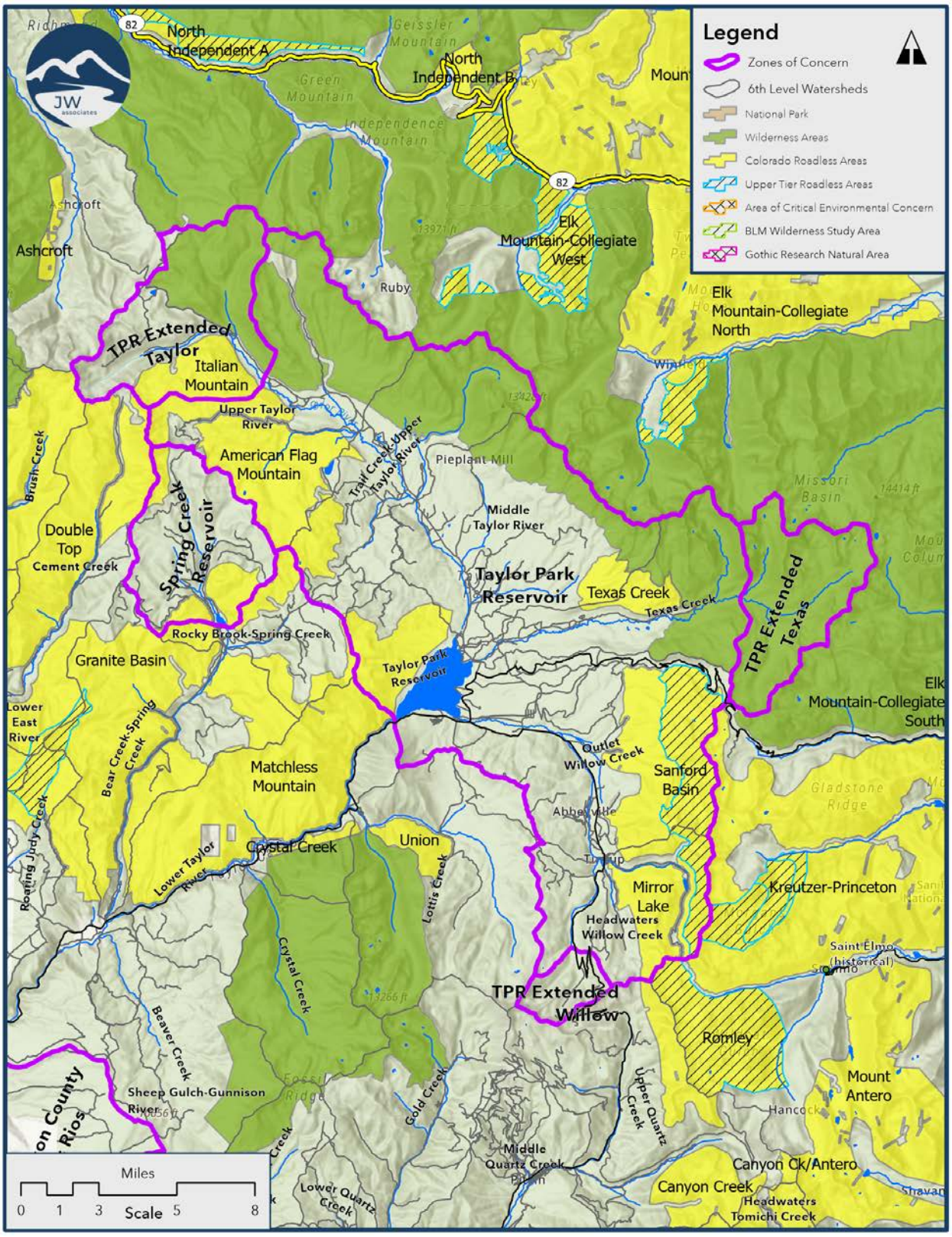


Taylor Park Reservoir Zone of Concern Special Areas

There are nearly 50,000 acres of wilderness and nearly 38,000 acres of roadless areas in the Taylor Park Reservoir Zone of Concern, with an additional 6,400 acres of Upper Tier. The Collegiate Peaks Wilderness Area runs through the northeastern portion of four watersheds from Upper Taylor River to Texas Creek (Map 80). There are roadless areas in every watershed but the largest area is in Outlet and Upper Willow Creek which also includes the only locations of Upper Tier roadless.



Map 79. Taylor Park Reservoir Zone of Concern Ownership



Map 80. Taylor Park Reservoir Zone of Concern Special Areas

Taylor Park Reservoir Zone of Concern Wildfire Composite

Wildfire hazard is high in many portions of the Taylor Park Reservoir Zone of Concern. Modeled active and passive crown fire activity covers 53% of the Zone of Concern. Modeled flame lengths above 11 feet also cover more than 52% of the Zone of Concern.

The watershed composite wildfire hazard analysis results in a combination of wildfire hazard and post-fire hazards. The seven watersheds in this Zone of Concern all rank between Moderate to Highest hazard in the Composite Wildfire Hazard rank (Table 78 and Map 81). For this same ranking, Headwaters Willow Creek is ranked as one of the highest hazard watersheds in the Upper Gunnison Sub-Basin. Three other watersheds are ranked as High. The Composite Wildfire Hazard rank is a combination of four categories of wildfire and post-wildfire hazards (Table 78). Of the four components, four watersheds rank High or Highest for Wildfire Hazard, four watersheds rank High or Highest for Debris Flow, five of the watersheds rank High or Highest for Roads, and one watershed ranks High for Soil Erodibility.

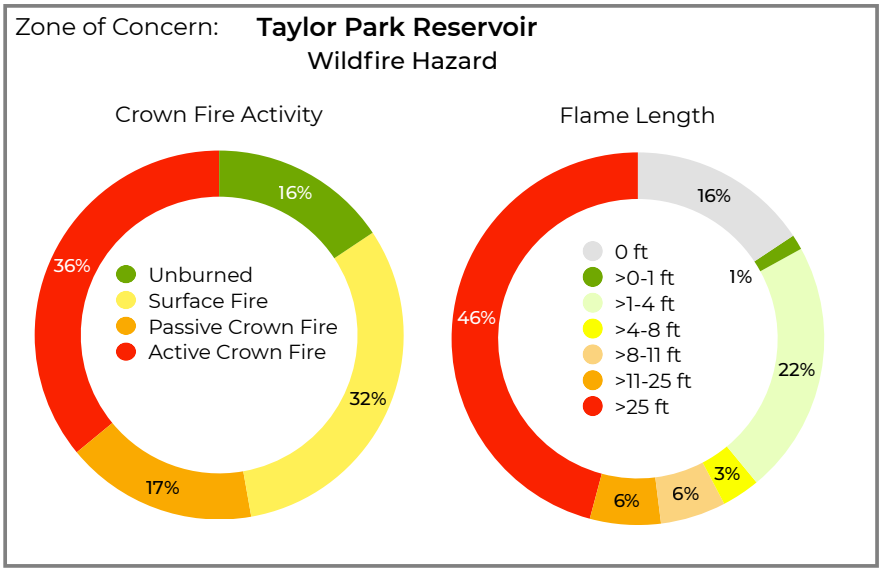
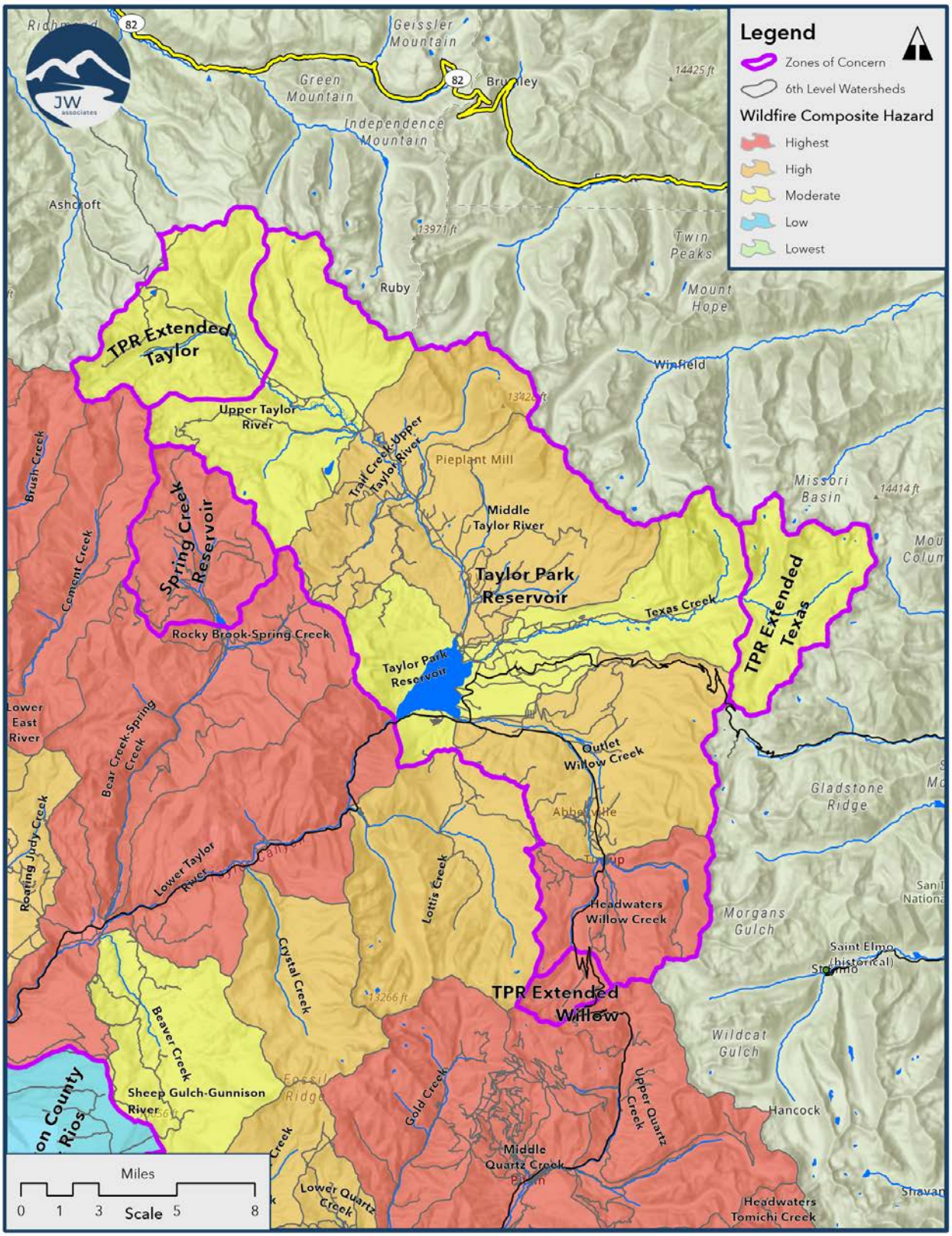


Table 78. Wildfire Composite Hazard Rankings for Taylor Park Reservoir Zone of Concern

Watershed Name	Wildfire Hazard Rank	Debris Flow Rank	Road Hazard Rank	Soil Erodibility Rank	Composite Wildfire Hazard Rank
Upper Taylor River	High	Low	Low	Moderate	Moderate
Trail Creek-Upper Taylor River	Moderate	Highest	High	Moderate	High
Middle Taylor River	Moderate	High	Highest	Low	High
Texas Creek	High	High	Low	High	Moderate
Headwaters Willow Creek	High	Moderate	Highest	Moderate	Highest
Outlet Willow Creek	Highest	High	Highest	Low	High
Taylor Park Reservoir	Moderate	Moderate	High	Low	Moderate



Map 81. Taylor Park Reservoir Zone of Concern Wildfire Composite Hazard

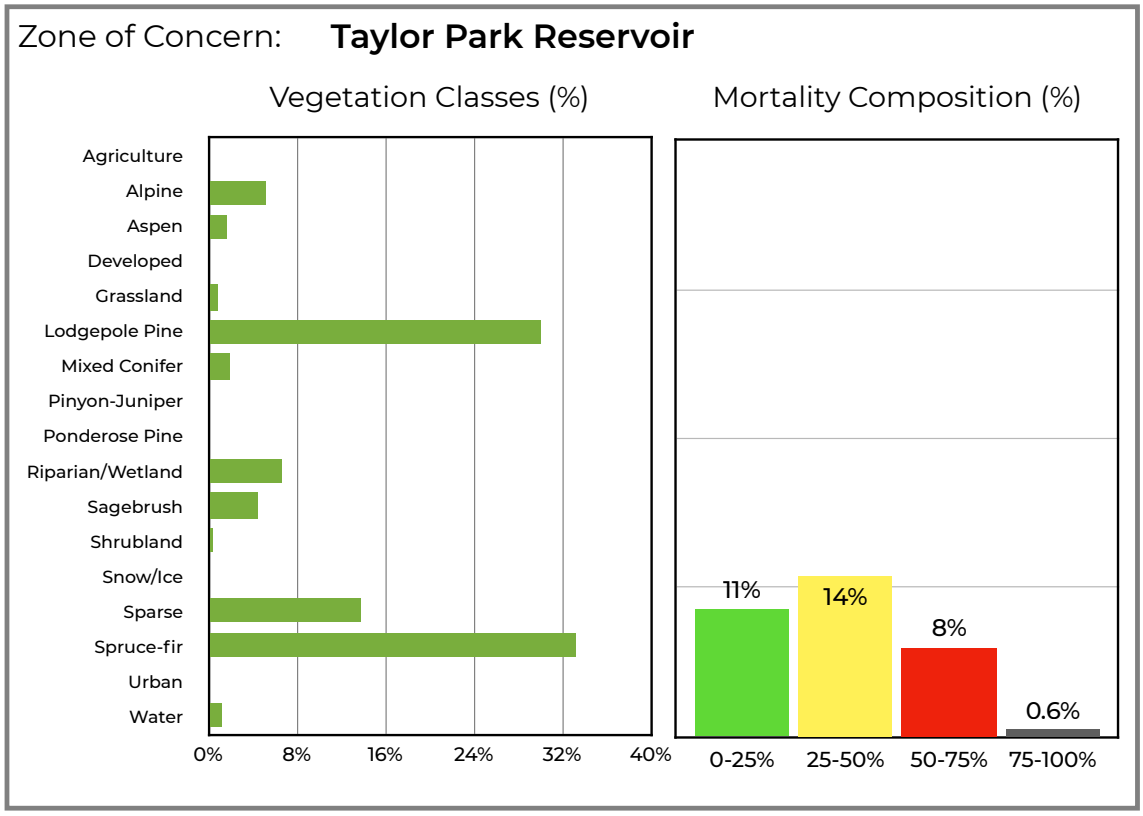
Taylor Park Reservoir Zone of Concern Access

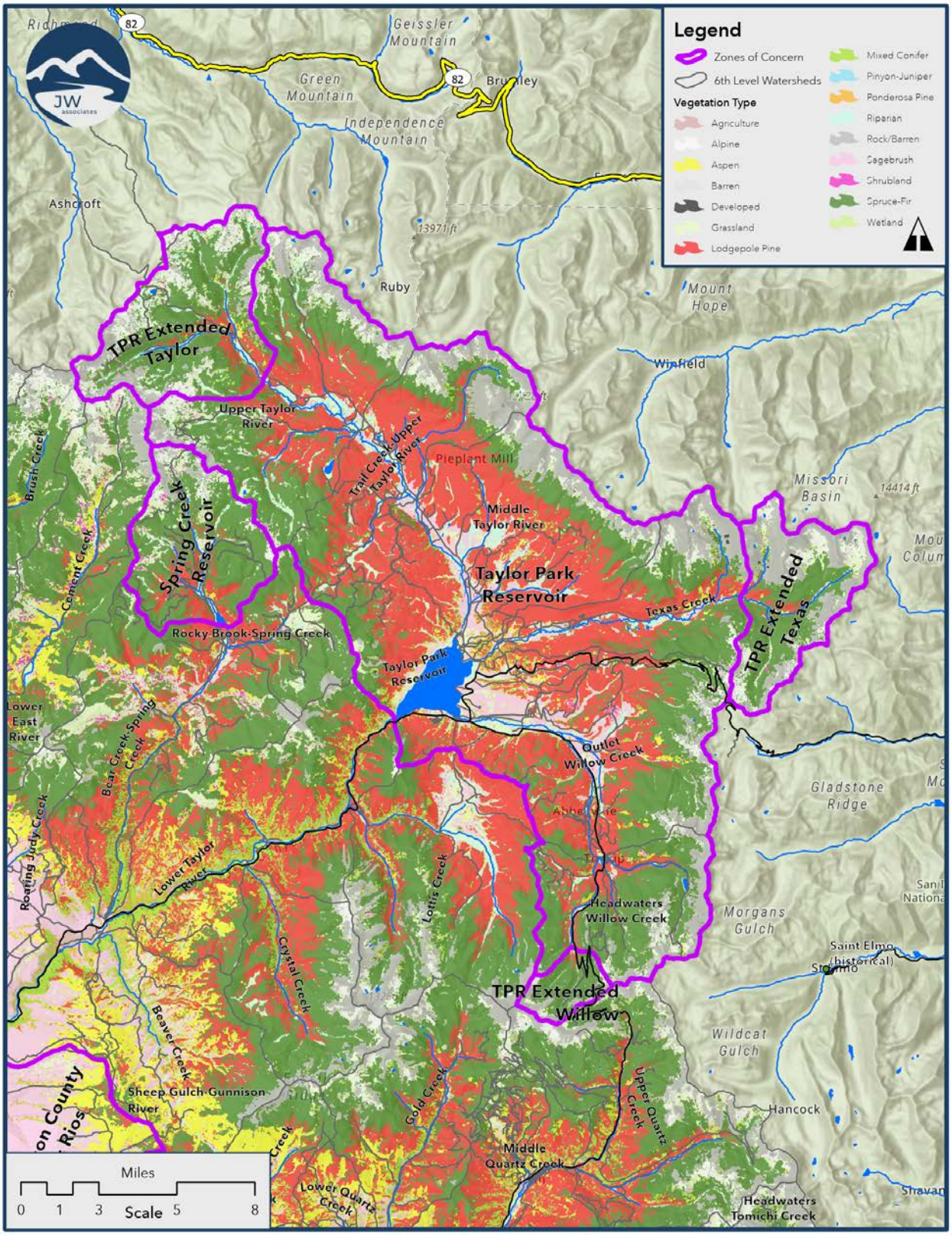
The Taylor Park Reservoir Zone of Concern has some existing road access outside of wilderness and roadless areas (Map 79). The Taylor Park Reservoir Zone of Concern has some existing road access and it is likely that there are more roads than those shown on Map 79. The Taylor River has existing road access up the stream corridor; however, in the Upper Taylor River watershed either side of the stream/road is entirely Wilderness to the North and Roadless to the South.

Taylor Park Reservoir Zone of Concern Vegetation

The Taylor Park Reservoir Zone of Concern has a large swaths of lodgepole pine and spruce-fir (Map 82). Together, these two vegetation types cover more than 60% of the Zone of Concern area. Lodgepole pine extends down to the flanks of the reservoir on the North and South edges. Aspen is intermixed between the lodgepole and spruce-fir in Outlet and Headwaters Willow Creek and Upper Taylor River. Aspen is also intermixed between the lodgepole and sagebrush in the other watersheds. There are zones of sagebrush at the lower elevations, mostly in Middle Taylor River and Outlet Willow Creek. Riparian/Wetlands cover about 7% of the total Zone of Concern. This mostly exists in Middle Taylor River and Outlet Willow Creek watersheds and along the river in Upper Taylor River.

The tree mortality within the Taylor Park Reservoir Zone of Concern is mostly in the spruce-fir vegetation type, but also occurs in the lodgepole pine. The majority of the 25-50% and 50-75% mortality exists in Texas Creek, Taylor Park Reservoir, Outlet and Headwaters Willow Creek watersheds. There is tree mortality in all seven watersheds, totaling over 52,000 acres which is about 32% of the Zone of Concern area.





Map 82. Taylor Park Reservoir Zone of Concern Vegetation

Taylor Park Reservoir Zone of Concern Climate Change Vulnerability

The Climate Change Vulnerability rank combines the Ecosystem Sensitivity rank with the Lack of Adaptive Capacity rank, each of which are a combination of factors that influence or measure these key indicators of climate change vulnerability. Five of the seven watersheds in the Taylor Park Reservoir Zone of Concern rank High or Highest for Climate Change Vulnerability (Map 83). Four watersheds rank High or Highest for Ecosystem Sensitivity and four watersheds rank High for Lack of Adaptive Capacity (Table 79).

Table 79. Climate Change Vulnerability for Taylor Park Reservoir Zone of Concern

Sixth-Level Watershed	Ecosystem Sensitivity	Lack of Adaptive Capacity	Climate Change Vulnerability Rank
Upper Taylor River	Low	Moderate	Low
Trail Creek-Upper Taylor River	High	High	High
Middle Taylor River	Highest	High	Highest
Texas Creek	Moderate	Low	Low
Headwaters Willow Creek	Moderate	High	High
Outlet Willow Creek	Highest	Moderate	Highest
Taylor Park Reservoir	Highest	High	Highest

The Ecosystem Sensitivity rank is a combination of three indicators. Landscape condition is ranked as Highest for Taylor Park Reservoir and Moderate for Outlet Willow Creek. Fire Regime Departure is ranked as High or Highest for three watersheds (Table 80), and Insect and Disease is ranked as Highest for 6 of the seven watersheds, with the seventh being ranked as High. The high risk of insect and disease is a significant contributor to the overall high rankings for Ecosystem Sensitivity.

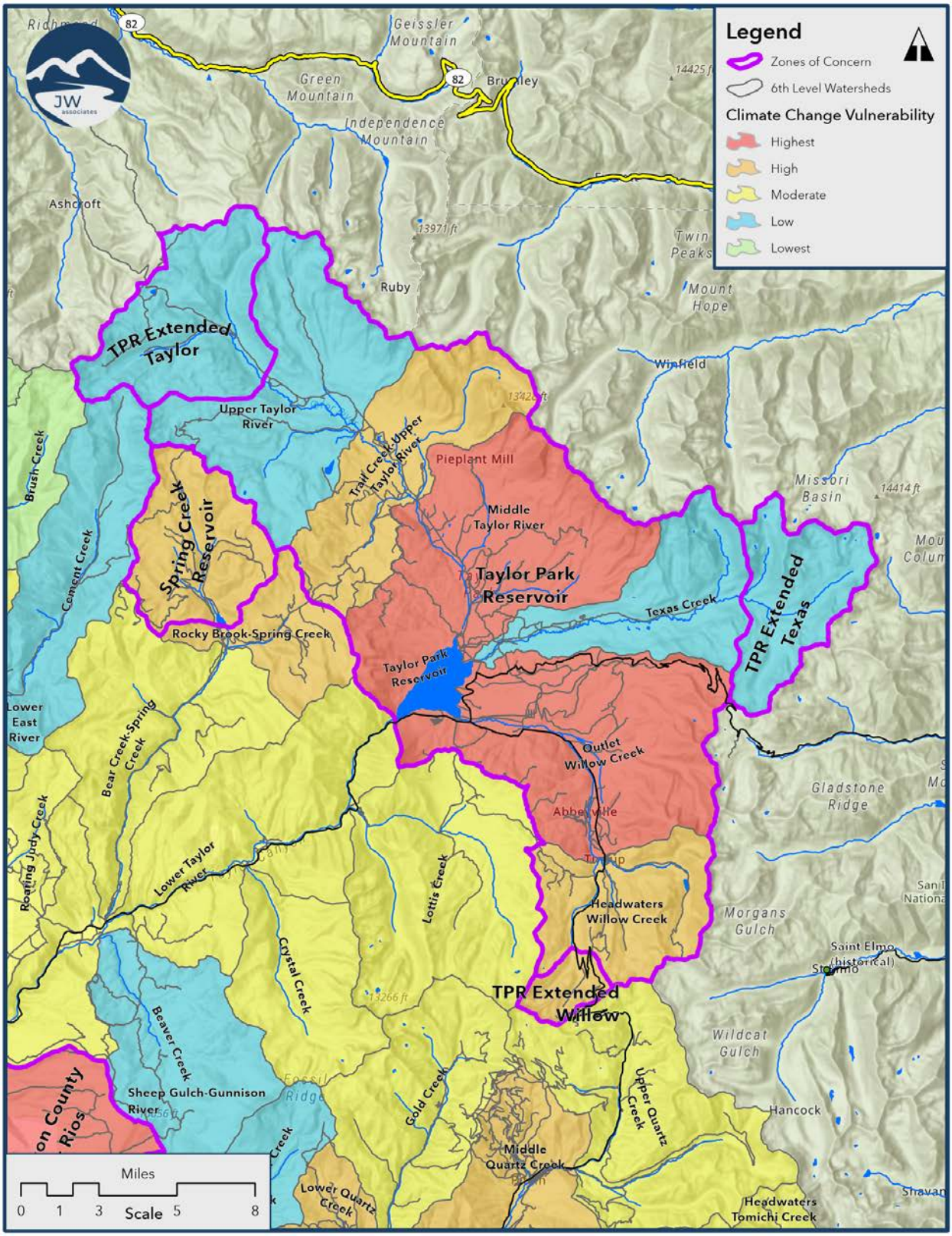
Table 80. Ecosystem Sensitivity for Taylor Park Reservoir Zone of Concern

Sixth-Level Watershed	Landscape Condition	Fire Regime Departure	Insect & Disease	Ecosystem Sensitivity Rank
Upper Taylor River	Lowest	Lowest	High	Low
Trail Creek-Upper Taylor River	Low	Moderate	Highest	High
Middle Taylor River	Low	High	Highest	Highest
Texas Creek	Lowest	Low	Highest	Moderate
Headwaters Willow Creek	Low	Lowest	Highest	Moderate
Outlet Willow Creek	Moderate	High	Highest	Highest
Taylor Park Reservoir	Highest	Highest	Highest	Highest

The Lack of Adaptive Capacity rank is a combination of two indicators. Lack of Diversity is ranked as High or Highest for three watersheds (Table 81). Topo-climatic Variability is ranked as High for one watershed, Taylor Park Reservoir.

Table 81. Lack of Adaptive Capacity for Taylor Park Reservoir Zone of Concern

Sixth-Level Watershed	Lack of Diversity	Topo-Climatic Variability	Lack of Adaptive Capacity
Upper Taylor River	Moderate	Low	Moderate
Trail Creek-Upper Taylor River	High	Low	High
Middle Taylor River	High	Moderate	High
Texas Creek	Moderate	Lowest	Low
Headwaters Willow Creek	Highest	Low	High
Outlet Willow Creek	Moderate	Moderate	Moderate
Taylor Park Reservoir	Moderate	High	High



Map 83. Taylor Park Reservoir Zone of Concern Climate Change Vulnerability

Taylor Park Reservoir Zone of Concern Opportunities

There are opportunities to reduce wildfire hazard and climate change vulnerability in the Taylor Park Reservoir Zone of Concern. Table 83 identifies the actions that would be recommended in the Zone of Concern for Climate Change Vulnerability and Table 84 identifies action for wildfire hazard reduction. Further details for each action are presented above under the Recommendations for Wildfire Hazard Reduction and General Opportunities and Constraints sections.

Table 83. Taylor Park Reservoir Zone of Concern Actions - Climate Change Vulnerability

Watersheds	CCVI Rank	Increase diversity	Fire regime restoration	Road Analysis & Planning
Upper Taylor River	Low			
Trail Creek-Upper Taylor River	High	☑		
Middle Taylor River	Highest	☑	☑	
Texas Creek	Low			
Headwaters Willow Creek	High	☑		
Outlet Willow Creek	Highest		☑	☑
Taylor Park Reservoir	Highest		☑	☑

Table 84. Taylor Park Reservoir Zone of Concern Actions for Wildfire Hazard

Watersheds	Wildfire Composite Rank	Wildfire Hazard Reduction	Road analysis & planning	Address beetle mortality	Determine appropriate actions in roadless & ACECs	Riparian areas, floodplains, etc.	Pre- and post-fire planning
Upper Taylor River	Moderate	☑		☑	☑	☑	☑
Trail Creek-Upper Taylor River	High	☑	☑	☑	☑	☑	☑
Middle Taylor River	High	☑	☑	☑	☑	☑	☑
Texas Creek	Moderate	☑		☑	☑	☑	☑
Headwaters Willow Creek	Highest	☑	☑	☑	☑	☑	☑
Outlet Willow Creek	High	☑	☑	☑	☑	☑	☑
Taylor Park Reservoir	Moderate		☑	☑	☑	☑	☑

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