BEAR CREEK
NATURAL RESOURCE PLAN
April 2023

Photo Credit: Rogue River Watershed Council

Photo Credit: Rogue Riverkeeper

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Our Partners:

Jackson County Parks

RVCOG

Lomakatsi Restoration Project

Rogue Basin Partnership

Rogue Riverkeeper

United States Environmental Protection Agency

Jackson Soil & Water Conservation District
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Rogue River Watershed Council

The Freshwater Trust

U.S. Department of Homeland Security

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Table of Contents

Chapter 1 - Introduction

OVERVIEW

Bear Creek and its tributaries are located in Jackson County in Southern Oregon. The 29-mile creek is within an approximate 360-square mile watershed. Its headwaters begin near Emigrant Lake, then flow north and traverse the five municipalities of Ashland, Talent, Phoenix, Medford, and Central Point, before merging with the Rogue River in the northwestern part of the Rogue Valley (see **Figure 1**).

Historically, Bear Creek has been the most polluted tributary to the Rogue River due to irrigation returns, wastewater treatment outfall, storm water pollution, agricultural uses, and its proximity to the Interstate-5 (I-5) freeway corridor and surrounding urban development associated with the five municipalities. Bear Creek runs parallel to the Bear Creek Greenway, a 20-mile paved multi-use and continuous trail that links the cities of Ashland, Talent, Phoenix, Medford, and Central Point to the Dean Creek Frontage Road near Seven Oaks Interchange on I-5, north of Central Point. The Greenway provides Rogue Valley residents and visitors access to Bear Creek and surrounding recreational opportunities for bird watching and wildlife viewing; walking, cycling, and running; alternative modes of transportation; and access to various business and commercial centers along the Greenway corridor. An annual average of 250 trips per day are taken at any given point along the Greenway making it a popular alternative transportation corridor for the community (Bear Creek Greenway JPC 2017). The Bear Creek Greenway is also susceptible to a number of fire ignitions each year, and while many of these ignitions are quickly suppressed there is an increased risk along the heavily travelled Greenway corridor due to human-caused factors and an increase in ladder fuels.

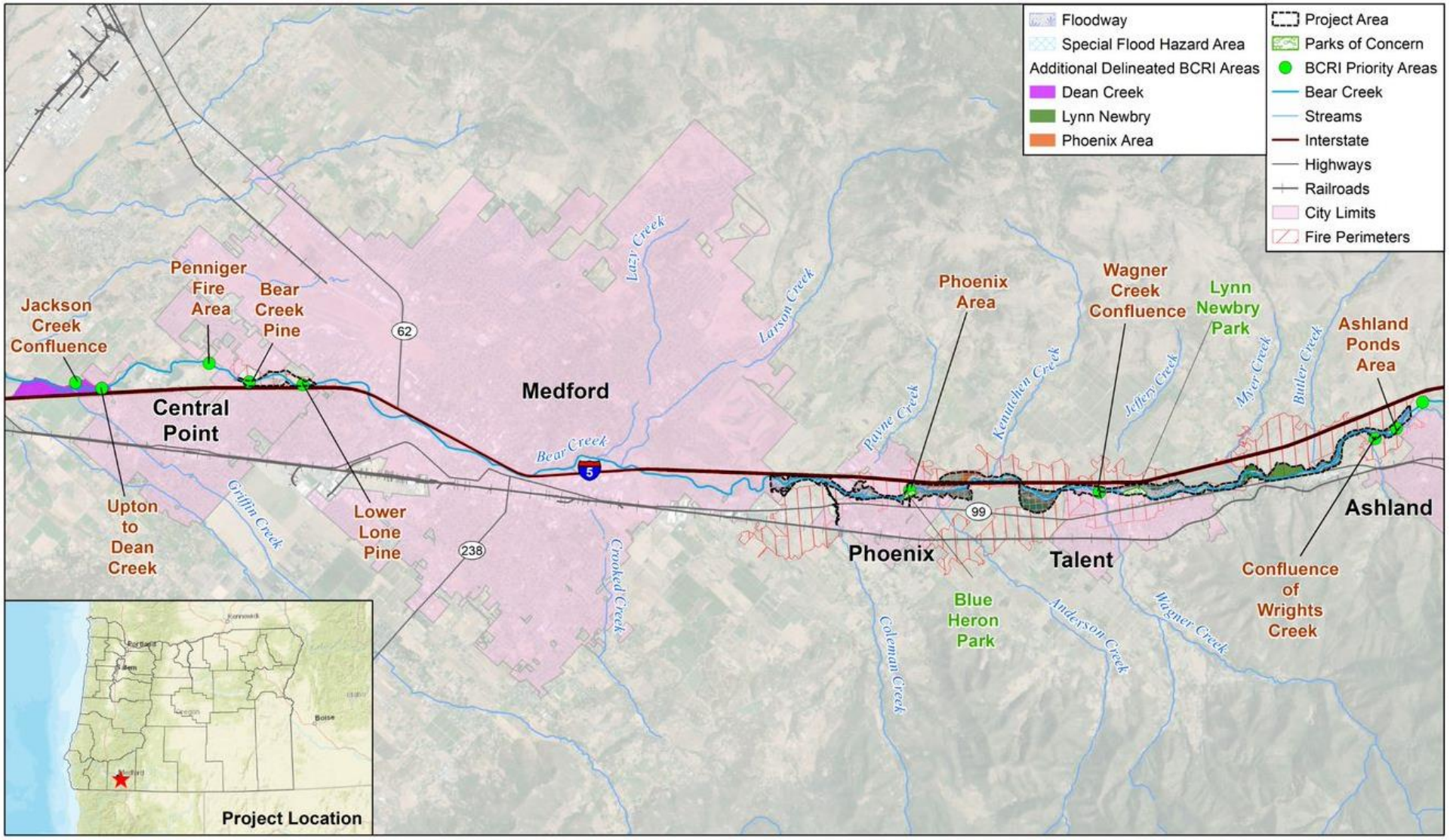
After the impacts from the 2020 Almeda and Table Rock Road (Central Point) fires in 2020, the Bear Creek Restoration Initiative (BCRI) came together as a voluntary group to support dialogue among multiple agencies and organizations and to develop a plan that includes restoration actions that shape the future natural resource management of Bear Creek. The BCRI was originally formed in 2019 following the Penninger Fire that burned over 120 acres along Bear Creek in Central Point. During this time, the BCRI implemented several restoration projects along the Bear Creek riparian corridor at Ashland Ponds, Wagner Creek, and Blue Heron Park. Each restoration project involved vegetation management, invasive species controls, and selective tree plantings. Following the 2020 Almeda fire it was evident that these restoration areas significantly changed the progression of the fire by slowing the spread and reducing the severity. This is visually most evident at the Wagner Creek restoration site. The recent fires made clear the immediate need to renew the effort to prepare a Natural Resource Plan (NRP) that sets a framework for restoration along the entire Bear Creek riparian corridor. This framework aims to balance a “wild” riparian area with abundant vegetation and a “heavily managed and manipulated” streamside area with sparse vegetation and infrastructure.

PURPOSE OF NATURAL RESOURCE PLAN

The purpose of the NRP is to provide information to local experts to support informed decisions that will help guide natural resource management activities focused on riparian habitat restoration, floodplain connectivity, public access and recreation enhancement, vegetation management and fire safety in a manner that promotes collaboration and leveraging of agency and organizational partnerships. The NRP includes information the BCRI can use for making informed decisions on managing and enhancing Bear Creek resources. The NRP also provides an understanding of existing hydrology and vegetation conditions and the impacts of flood, fire, drought, invasive species, and climate change on the Bear Creek riparian corridor.

The NRP builds on previous BCRI planning efforts and guiding documents including the BCRI Final Report (2020), Bear Creek Corridor Post-Almeda Fire Vegetation Assessment (2022), Bear Creek Long-Term Vegetation Management Plan (2017), Bear Creek Greenway Management Plan (2005), Bear Creek Master Plan (2003), the forthcoming Envision Bear Creek Plan, and several BCRI issue papers. The NRP brings together goals and objectives, key restoration projects, and an implementation and monitoring plan that will support successful riparian restoration and floodplain connectivity opportunities while also facilitating recreation, fire safety, and resiliency along Bear Creek. Given the management of Bear Creek is highly regulated and there are different management directives in place, the NRP is intended to be a guidance document to the BCRI and partners, and as such does not include directives or policies applicable to other agencies and organizations with jurisdiction over Bear Creek. However, because management of Bear Creek depends on collaborative efforts of many agencies and organizations, it incorporates recommendations that support continued partnerships that ensure the future success and resiliency of Bear Creek.

Figure 1. Bear Creek Project Area Location



BACKGROUND

In order to address the challenges associated with the management of Bear Creek, it is key to understand the important physical and community context of Bear Creek and the multiple jurisdictions it spans in the Rogue Valley. This section covers the impacts from the 2020 fires, potential future climate change effects, existing physical conditions and restoration needs, and key issues for managing natural resources along Bear Creek. This section also emphasizes the need to promote resiliency through all proposed restoration projects, public recreation and access improvements, and vegetation management and fire prevention activities in order to ensure the communities along Bear Creek are safe and able to withstand future natural disasters.

Wildfire History

A combination of factors, including unusually hot and dry weather, an abundance of dried vegetation, and increased lightning activity, resulted in the 2020 fire season being one of the most severe in Oregon state history. According to the Oregon Department of Forestry (2020), there were a total of 2,027 fires during the 2020 fire season, a significant increase over the prior 10-year average of 783 fires annually. The Almeda Fire and Table Rock Road Fire were two separate fires that burned assets along the Bear Creek corridor.

The Almeda Fire started on September 8, 2020, near Ashland, and rapidly spread due to strong winds and dry conditions. The fire burned nearly 3,000 acres as it progressed north along the Bear Creek Greenway, through the towns of Talent and Phoenix, before being contained in Southern Medford. Over 2,500 structures were destroyed, including a mobile home park along the Bear Creek corridor.

The Table Rock Road Fire also started on September 8, 2020, near the City of Central Point. While the fire was rapidly contained and no structures were lost, approximately 116 acres of land were burned, primarily along the Bear Creek Greenway. Oregon's 2020 wildfires have forced the Rogue Valley communities and the many agencies and organizations that are responsible for the public health and safety of the region to reprioritize, understand their vulnerabilities, and better prepare for future natural disruptions.

The 2020 fires also caused changes to the Bear Creek watershed that resulted in the loss of riparian vegetation, increased soil erosion and sedimentation, and water quality impacts. Managing restoration projects like those at Ashland Ponds, Wagner Creek, and Blue Heron Park that have been successful in recent years should continue to be designed, installed, and managed in prioritized locations on publicly owned lands in the Bear Creek corridor. These projects will also require ongoing ecological stewardship to increase the dominance of native species, restore tree canopy, and reduce the spread of invasive plant species (Siskiyou BioSurvey, LLC 2022). Photo Block 1 shows how the Wagner Creek restoration site slowed and reduced the severity of the 2020 Almeda Fire. The upstream side of Wagner Creek with restoration did not burn and the overstory trees were not damaged; whereas the downstream side of Wagner Creek without restoration did burn and the overstory trees were lost.

2020 Almeda and Table Rock Road Fires. On September 8, 2020, the Almeda Fire spread north from the edge of Ashland through the cities of Talent and Phoenix to Medford. The Table Rock Road Fire started the same day near the City of Central Point. Thousands of homes were destroyed in a few hours. The main corridor of the fire's spread was along Bear Creek, and large areas of the riparian corridor and Bear Creek Greenway burned. A dense undergrowth of invasive Himalayan blackberry along the creek provided fuel for the fire. Many Cottonwood and Oregon ash trees were left standing. The photograph above is a view from the Bear Creek bridge between Talent and Ashland in December 2020.

Photo Credit: Jefferson Public Radio/Pepper Trail 2020.

Photo Block 1. Wagner Creek Restoration Area

Photo. View of the restored portion of Wagner Creek looking upstream from W. Valley View Road in the City of Talent. Right Photo. View of a portion of Wagner Creek that was not restored looking downstream from W. Valley View Road. The comparison of these two photos shows how the restored riparian areas were not as impacted by the fire and the ladder fuels did not spread the fire into the overstory.

Photo Credits: WSP 2022, EPA 2022.

Climate Change

Climate change trends are already happening in the Rogue Basin in Oregon. Key climate impacts are exacerbating the severity and frequency of wildfires, decreasing snowpack levels, resulting in earlier snowmelt that affects water quality, increasing the severity of droughts and flooding, and resulting in higher stream temperatures (Meyers 2013). These impacts can be mitigated through community preparation and increased local resilience efforts. Collaboration has been crucial in promoting riparian health and resilience along Bear Creek, and the NRP provides an opportunity to incorporate climate adaptation measures into future planning efforts and restoration projects to assist the communities along Bear Creek in the acceleration of recovery activities and increased resilience to future disasters.

Existing Conditions

Restoration is underway to repair the damage done by the 2020 fires. The unburned portions of the riparian corridor consist of deciduous trees and large native shrubs. The canopy is dominated by Oregon ash (*Fraxinus latifolia*) and black cottonwood (*Populus balsamifera ssp. trichocarpa*). Dense shrubs, perennial grasses, ferns, and forbs are also common. Historically, the area was dominated by fire-adapted vegetation and experienced variable fire regimes. Fire suppression in the Rogue Valley has changed forest health, resulting in undesirable changes in vegetation and increased intensity of wildfires as a result of increased fuel loads. Invasive plant species, like Himalayan blackberry also provide fuel for wildland fires, and while the fires removed dense thickets of these invasive plants, continued invasive species management is necessary to maintain invasives and enhance native vegetation.

Waterflows in the Rogue Basin are dependent on snow with the majority of surface water used by the irrigation sector and over 70 percent of the Rogue Valley depending on groundwater for water supply (Meyers 2013). During drought years and during summer months, flows in waterways like Bear Creek can decline resulting in increasing stream temperatures. Climate change risks will result in more precipitation falling as rain instead of snow, more extreme precipitation events, high risk for flooding and soil and erosion, and increased wildfires that cause further sedimentation and erosion, debris, and ash to enter the waterway. These risks ultimately modify aquatic wildlife and habitat, impact the recreation and tourism industry, and alter Bear Creek's hydrology.

Restoration Needs

The BCRI and its partners have been working to develop a strategy and framework to identify riparian restoration needs and projects along Bear Creek. Natural disturbances, fires, and urban development along the corridor have led to the introduction of non-native and invasive plants, such as the Himalayan blackberry. These invasive species disrupt the corridor's ecological function while increasing hazardous fire conditions by increasing fuel loading that serves as ladder fuels that facilitate the spread of surface fires into the tree canopy. Riparian restoration along Bear Creek is not a new effort and has been part of regional Clean Water Act compliance under the Total Maximum Discharge Load (TMDL) program since 2003 (RVCOG 2020). There are also numerous plans, policies, and ordinances in place that direct where restoration activities should occur, which activities are allowed in the riparian area, and which activities are regulated or not allowed. As noted in the BCRI's Final Report, restoration activities have also been largely opportunistic rather than planned over the entire length of Bear Creek. As such, the main purpose of the NRP is to develop a plan that encourages working with other agencies, municipalities, and organizations in the Bear Creek watershed and identifying key restoration sites along Bear Creek in a coordinated manner.

BEAR CREEK RESTORATION INITIATIVE

History

The Bear Creek watershed is an important resource for fish and wildlife habitat, water supply, and recreational opportunities. However, the watershed has experienced degradation due to human activities, such as urban development, and natural factors, such as floods and the 2020 fires. In 2019, the Rogue River Watershed Council (RRWC) approached the Rogue Valley Council of Governments (RVCOG) to assist them in developing a prioritized list of riparian restoration projects along Bear Creek and its tributaries. The BCRI was created from this endeavor, becoming a collaborative voluntary group effort between local communities, government agencies, and non-profit organizations to implement projects that address issues such as water quality, riparian habitat restoration, and community engagement. The purpose of the BCRI is to improve and restore Bear Creek's riparian corridor while considering ecological and social factors. The BCRI's mission is to consider social issues while addressing environmental issues that come with managing urban stream restoration in the Bear Creek watershed.

To achieve these goals, the BCRI has implemented a range of projects, such as planting native vegetation along streams, removing and controlling invasive species, and monitoring water quality. The BCRI continues to be a collaborative effort with partners working together with ingenuity and new ideas to ensure the long-term sustainability of the Bear Creek watershed.

LONG-TERM VISION FOR BEAR CREEK

- *Bear Creek is the centerpiece of the Ashland, Talent, Phoenix, Medford, and Central Point communities such that commercial and residential development embrace the creek as an amenity.*
- *It is an inviting and safe place for people of all ages to recreate and experience nature.*
- *An urban forest with enough infrastructure along its length and occasional, irrigated, manicured park-like settings that allow emergency responders to combat and contain fires.*
- *A wide belt of native trees and shrubs, clean water, and complex habitat conditions that provide the necessary conditions for number of salmon, Pacific Lamprey, American beaver, and other fish and wildfire to thrive.*
- *A place of opportunity for employment and volunteer engagement to steward the Greenway and associated natural areas.*

PLANNING PROCESS

Project Need

In 2016, the U.S. Environmental Protection Agency (EPA) and Federal Emergency Management Agency (FEMA) collaborated to help communities impacted by disasters rebuild in ways that protect the environment, create long-term economic prosperity, and enhance neighborhoods and communities. The two federal agencies updated a memorandum of agreement to make it easier for them to work together and then help communities incorporate strategies that improve quality of life, direct development away from vulnerable areas, and provide assistance to communities on hazard mitigation and climate adaptation planning and post-disaster recovery. As part of this process, in early 2022 the RVCOG applied for Technical Assistance (TA) to help the BCRI accelerate recovery activities associated with the 2022 fires and enhance the resilience along their key natural resource asset – the Bear Creek corridor. The EPA solicited proposals under their Disaster Resilience Assistance contract for the RVCOG's Natural Resource Plan and selected the Logan Simpson and WSP Environment & Infrastructure (WSP) team to guide the planning process. The Logan Simpson and WSP team came together to support the EPA, FEMA, and the RVCOG and BCRI with TA that brought together an interdisciplinary team of restoration biologists, hydrologists, civil engineers, natural resource managers, landscape architects, and environmental planners to support the development of a tailored NRP that enhances the resiliency of Bear Creek through thoughtful management and restoration projects.

2022 Stakeholder Site Visit

The development of the NRP consisted of a multi-stakeholder planning process over an approximate 10-month period to prioritize restoration projects and capital improvements along Bear Creek. It involved developing a framework to document existing environmental and infrastructure conditions to address restoration priorities and developing an analysis using both existing studies and recent surveys and new hydrology and hydraulic (H&H) 1-D modelling to guide planning efforts. The NRP also includes maps, images, prioritization frameworks, and recommendations designed to be integrated and align with the Jackson County Bear Creek Revisioning Greenway Plan (Envision Bear Creek) and the Oregon Department of Transportation's Highway 99 / Bear Creek Corridor Revisioning. The Logan Simpson and WSP team facilitated this process in close coordination with the EPA, FEMA, the Oregon Department of Environmental Management (ODEM), and BCRI Working Group through a multi-day site visit and planning charette and a series of 10 monthly meetings with the BCRI to discuss key management issues, learn about the recent vegetation conditions survey, and develop and review early drafts of the Plan. The site visit was conducted in October 2022, to better understand the extent and impacts of the 2020 fires, the various opportunities and challenges involved with management of the Bear, and the current vegetation conditions of the Greenway and corridor. **Photo Block 2** shows the group at different locations along Bear Creek.

Photo Block 2. 2022 Bear Creek Site Visit

Top Left Photo. Taken from the ignition point near Ashland Ponds in the City of Ashland. Top Right Photo. Taken along the Bear Creek Greenway near Dean Creek Road in the northern portion of the extent of the Table Rock Road Fire outside the City of Central Point. Bottom Left Photo. View of the group in the Phoenix Area near Blue Heron Park. Bottom Right Photo. Group looking upstream at the Wagner Creek tributary to Bear Creek in the City of Talent.

Photo Credits: WSP 2022.

2022 Planning Charrette

A planning charette was also held in October 2022 to work with the BCRI Working Group, FEMA, EPA, and ODEM stakeholders to collaborate on the development of initial goals and objectives that would be used to shape the NRP. The goals and objectives that were initially developed in the charette integrated those already developed by the BCRI in their Final Report and the eight restoration values outlined in their guiding documents and issue papers and summarized in the following subsections. In addition to these goals and objectives, the concept of riparian condition zones (RCZs) was developed to identify the vision, goals, vegetation structure, key species, and access requirements for riparian areas within an approximate 12-mile project boundary defined by the public lands within the floodplain that were impacted by the 2020 fires. The RCZs provide management prescriptions that are specific to the diverse settings found along the Bear Creek riparian corridor. The four RCZs (RCZ1 through RCZ4) range from dense and diverse (RC1) to open and park like (RC4). The intent of the RCZs is to help land managers identify and manage the riparian areas along the Bear Creek to a riparian forest structure

that fits with the range of values and uses along the Greenway. The four RCZs are discussed in detail in the Vegetation Assessment section of this Plan. **Photo Block 3** shows the group during the planning charrette.

Photo Block 3: Planning Charrette with the BCRI Working Group, FEMA, EPA, and ODEM

The BCRI hosted a planning charrette that was facilitated by WSP in October 2022. The purpose of the planning charrette was to revisit the long-term vision and goals and objectives for the NRP. The BCRI, FEMA, EPA, and ODEM stakeholders also developed preliminary Riparian Condition Zone (RCZs) for various reaches along Bear Creek.

Photo Credit: WSP 2022.

Restoration Values

As part of the planning process and development of the NRP, the goals and objectives have been revisited and refined several times to consolidate common themes and focus restoration efforts. These goals and objectives were also aligned based on guidance in the EPA's Regional Resilience Toolkit (2019) developed by FEMA, EPA, and the Association of Bay Area Governments. Although these goals have been updated to reflect information and knowledge gathered during the planning process, the goals and objectives have remained in alignment with the original seven restoration values, long-term vision, and goals developed by the BCRI. The outcome was the six restoration values that are summarized below.

Habitat Protection & Ecological Values

Projects developed by BCRI stakeholders and land managers aim to establish and enhance native riparian vegetation, with an emphasis on invasive species plant management and allowing natural regeneration, while improving riparian habitat to benefit water quality and native aquatic and terrestrial wildlife.

Floodplain Connectivity & Restoration

The long-term sustainability of the riparian habitat depends on increased floodplain connectivity and improved water quality and natural stream function through strategically designed restoration projects and Nature-Based Solutions (NBS). Stakeholder analyses will inform locations along the corridor where connectivity can be increased without creating additional flood risk to adjacent communities or infrastructure.

Public Access and Recreation Uses

There is a need to create a Greenway that promotes safe public access and increased recreational opportunities while enhancing the ecological benefits of Bear Creek. The protection and management of the infrastructure elements located along the Bear Creek Greenway are essential to sustaining the area's transportation and economic prosperity.

Fuels Management and Fire Prevention

The Bear Creek NRP will integrate fire safety and vegetation management efforts to increase public safety and reduce fire risk along the Bear Creek Greenway and the adjacent riparian corridor.

Safety and Security

The BCRI will manage the environmental issues correlated with the restoration of the most urbanized creek in southwest Oregon, while addressing social and public safety concerns.

Collaboration and Partnerships

The BCRI will employ use of cross-sector partnerships to leverage limited available resources in the most efficient and successful manner possible. Efforts will be made to involve the community, volunteers, and advocacy groups in projects and plan reviews.

PLAN ORGANIZATION

The NRP integrates a robust planning process, beginning with the goals and objectives developed by the BCRI and its planning partners and is intended to be a comprehensive and high-level planning document. It details the regulatory requirements that guide and constrain natural resource management, existing physical and biological conditions that affect the ecological function and integrity of Bear Creek, and BCRI's management plan and projects to restore Bear Creek's natural resources. The NRP includes six components (chapters) that address these topics in a way that summarizes the mission of the BCRI. The six components include:

- Chapter 1. Introduction
- Chapter 2. Management Directives
- Chapter 3. Hydrology Component
- Chapter 4. Vegetation Component
- Chapter 5. Action Plan
- Chapter 6. Implementation and Monitoring Component

The introduction provides an overview of the purpose of the plan, existing setting, and planning process. The management directives assessment details the regulatory setting of the riparian buffer and prioritizes a list of management programs. The plan then looks at a comprehensive hydrology assessment of the regional watershed; the wetlands, ponds, and lakes contained therein; the floodplains; and the riparian corridor. It includes a vegetation assessment, examining the vegetation communities, sensitive habitats, riparian buffers, condition zones, and prescriptions. The Action Plan then details prioritized restoration projects and components including key management indicators, partner agencies, and management activities.

Finally, the implementation and monitoring scheme lays out a roadmap for the management of Bear Creek's natural resources and suggests methods and strategies for future monitoring protocols, best practices, and management actions.

Chapter 2 - Management Directive

INTRODUCTION

This section of the Bear Creek Natural Resource Plan (NRP) provides a discussion on the existing regulatory framework of the six jurisdictions along the Bear Creek Greenway (Ashland, Talent, Phoenix, Medford, Central Point, and Jackson County) and proposes recommendations for additions or updates to these regulations as well as optional approaches to support the protection and management of the Bear Creek natural resource area. Based on analysis of the hydrology and vegetation along Bear Creek, it is clear that this area is prime habitat to a number of plant and animal species. Following the 2020 Almeda and Table Rock fires, much of the plant habitat was disturbed or even eliminated, allowing for non-native species to invade the river banks. Prior to the fires, invasive species such as Himalayan blackberry had proliferated along the banks of Bear Creek and as discussed in the Vegetation Assessment portion of this report, provided ladder fuel for the fires. Furthermore, efforts to provide bank stabilization following the fire introduced new, non-native plant species. As the native vegetation typically present is considered an indicator of the types of animal habitats present, this degradation of the native plant environment has temporarily altered the Bear Creek ecosystem.

EXISTING REGULATIONS

There are numerous reports documenting the effects of the Almeda and Table Rock fires on the Bear Creek Greenway, along with assessments of the condition pre- and post- fire. Additionally, each of the six jurisdictions in the study area maintain policy documents describing the baseline for management of the Greenway. However, each of those resources are primarily focused on the recreation component of the Greenway. This section is focused on management of the plant and animal habitats within the 50-foot riparian buffer as described by Figure 2 of the Vegetation Assessment component of this report. One of the strongest tools to effective management of Bear Creek is the regulatory framework provided by the land use regulations of each jurisdiction. Land use regulations, by nature, are put in place to protect properties from negative impacts of development. Therefore, the adopted regulations tend to be more about restricting activity than promoting. This is evident in the existing regulations for each of the six jurisdictions as described in Table 1 below.

In order to better understand the regulations and standards in place in each of the jurisdictions, it was necessary to compare similar topics. Therefore, **Table 1** was divided into five separate categories based on typical topics that might hold regulations relative to the goals and recommendations of the Bear Creek NRP. Those categories include the following:

- Vegetation Standards: Reviewed for standards specific to required and prohibited species related to native plants and riparian areas
- Riparian and Wetland Buffers: Reviewed for specific buffer or setback requirements and allowances or management practices for natural resource protections
- Floodplain Regulations: Reviewed for any mention of vegetation management in the flood hazard areas
- Wildfire or Wildland Urban Interface (WUI) Standards: Reviewed for specific regulatory language in each jurisdiction regarding mitigation measures in natural areas to reduce major fire incidents
- Overlays: Reviewed for specific natural resource overlays or Bear Creek Greenway overlays and standards for vegetation management specific to the study area

Table 1 Comparison of Regulations and Standards for the Six Jurisdictions along Bear Creek

Jurisdiction	Vegetation Standards	Herbicide Use	Riparian and Wetland Buffers	Floodplain Regulations	Wildfire or WUI Standards	Overlays
Ashland Land Use Ordinance	Section 18.4.4 Landscaping, Lighting, and Screening Section 18.4.5 Tree Preservation and Protection	Only as a last resort per Section 9.28 Pesticide Policy	Section 18.3.11.040 Establishment of Water Resource Protection Zones	Section 13.2.10.080 Development Standards for Flood Plain Corridor Lands	18.3.10.100 Development Standards for Wildfire Lands	18.3.11 Water Resources Protection Zones (Overlays)
Talent Zoning Code	Chapter 18.105 Landscaping, Fencing, and Hedges Chapter 18.100 Tree Preservation and Protection	No information available	Section 18.85.030 Safe Harbor Protection of Wetland and Riparian Areas	Section 18.85.020 Floodplain – Parks – Greenway Overlay Zone	Not Present	Chapter 18.85 Natural Areas, Parks, and Floodplains Overlay Zone (OFPG)
Phoenix Land Development Code	Chapter 3.3 Landscaping, Street Trees, Fences, and Walls	No restrictions	Chapter 3.7 Environmental Constraints	Section 3.7.3 Flood Damage Prevention regulations	Not Present	Chapter 2.8 Bear Creek Greenway District
Medford Municipal Code	Section 10.780 Landscape and Irrigation Requirements	No restrictions	Section 10.920-10.928 Riparian Corridors	Section 13.025 Provisions for Flood Hazard Reduction	Not Present	Section 10.384 Greenways – Special Design and Development Standards, S-E
Central Point Zoning Code	Section 17.60.135 Landscaping Requirements	No restrictions	Section 17.60.090 Special Setback Requirements	Chapter 8.24 Flood Damage Prevention	Not Present	Chapter 17.54 BCG Bear Creek Greenway
Jackson County Land Development Ordinance	Chapter 9.2 Landscaping and Buffer Yards	No restrictions	Chapter 8.6 Stream Corridors and Riparian Habitat	Chapter 7.2 Floodplain Management and Development within a Special Flood Hazard Area	Chapter 8.7 Wildfire Safety	Chapter 7 Overlay Districts – Section 7.1 Environmental and Cultural Overlays Section12.1288 Bear Creek Greenway Plan

Ashland Land Use Ordinance

Ashland's Land Use Ordinance includes typical landscape regulations describing plant selection, standard on minimum plant quantities for urban developments, and water conserving landscape techniques. Additionally, both the landscape and the tree preservation sections require "existing healthy trees and shrubs shall be retained."

The Parks and Recreation District restricts herbicide use on Parks-managed land and Section 9.28 of the Municipal Code spells out noxious weed mitigation measures stating that mechanical and cultural methods are to be used to control noxious vegetation and pests with herbicides as a last resort. The city authorized a variance to this policy in for use at the restoration site at Ashland Ponds.

The section on Establishment of Water Resource Protection Zones spells out a stream bank protection zone with a 50-foot riparian buffer and allows for removal of invasive and hazardous vegetation in the buffer and stream channel. Additionally, there is a section allowing for fire hazard prevention and stream restoration and enhancement. Overall, this section of the Ashland code seems supportive of the Bear Creek natural resource management goals.

The Development Standards for Wildfire Lands are geared toward protection of structures but do include vegetation standards with regards to vertical clearance between understory vegetation and the tree canopy as well as specific fire resistant plant species requirements.

The Floodplain regulations in Ashland's Land Use Ordinance follow standard Federal Emergency Management Agency (FEMA) language for development in flood hazard areas and includes regulations on fill and excavation that are appropriate for resource management.

Talent Zoning Code

Talent's Municipal Code includes regulations on landscaping and tree preservation. The landscaping section includes standard regulations on minimum landscape area and screening and buffering as well as xeriscape standards. Section 18.105.040 describes prohibited trees yet allows for planting of said trees for city-authorized riparian restoration projects, which provides flexibility for natural resource management. The tree preservation section sets forth regulations for tree removal permits and standards for required mitigation of defined types of trees. The description and purpose in Section 18.100.010 states that "trees provide both shade and shelter in riparian areas which are essential for aquatic and land-going species". This statement is further supported by the various permit types that serve to protect the existing canopy and provide flexibility for removal of trees for management of the Bear Creek corridor.

The city of Talent does not specifically prohibit the use of herbicides to manage noxious vegetation. Section 8.05, Noxious Vegetation identifies noxious vegetation as a nuisance that shall be removed. Additionally, Section 13.18, Storm Drain System identifies herbicides as "contaminants."

Additionally, Talent's code includes a very comprehensive overlay district. Ultimately, the purpose of the overlay district is to "set minimum standards applicable to new development in or adjacent to areas designated as floodplain, greenways, wetlands, and riparian areas." In the description and purpose for parks and greenways, Bear Creek is mentioned but once again the target is the recreation component of the Greenway. That said, this chapter includes Safe Harbor Protections of Wetland and Riparian Areas that establishes wetland and riparian setback areas with associated standards of compliance. Within the defined 50-foot riparian or wetland setback, vegetation is required to remain unless it is non-native or invasive and permanent alteration of existing grades is prohibited.

Phoenix Land Development Code

The Phoenix Land Development Code includes a section in the Landscaping Chapter on landscape conservation, which serves to protect "removal of significant trees and other, including vegetation associated with streams,

wetlands and other protected natural resource areas". This section includes suggestions for use of native vegetation in landscapes and does provide flexibility with regards to hazardous vegetation and removal of vegetation for emergency purposes but is otherwise silent on specific standards for riparian or natural resources areas. The landscape section is very general and includes landscape area standards; landscape material standards that promote preservation of "natural vegetation"; and design standards or yard setbacks, parking areas and buffers. There is no mention of specific landscape requirements in riparian or wetland areas.

Section 8.04 of the Phoenix Municipal Code is dedicated to nuisance standards with a section on noxious vegetation. This section defines noxious vegetation as weeds more than twelve inches high that are going to seed, grass more than twelve inches high, blackberry bushes that extend into the public thoroughfare or across a property line, and a few other types of vegetation. The provisions state that noxious weeds shall not be allowed on the property or in the right-of-way of the public thoroughfare abutting the property but do not specify methods of removal.

Section 3.7.2 describes riparian setbacks with Class 1 streams, Bear Creek being one, requiring a minimum 50-foot riparian setback. Additionally, this section states vegetation retention requirements for overstory and tree cover versus understory that amount to 50 feet and 75 feet respectively or three times the width of the stream, whichever is greater. These regulations do allow for minor maintenance of understory vegetation to control invasive species. Section 3.7.3 describes standard FEMA flood damage prevention regulations and does not contain requirements specific to the Bear Creek Greenway yet does not create any barriers to natural resource management practices described herein.

Chapter 2.8 is dedicated to the Bear Creek Greenway District but is focused on permitted uses, dimensional standards, and general requirements for this district and does not include anything specific to management of the riparian corridor.

Medford Municipal Code

The City of Medford's Municipal Code includes basic landscape standards with a focus plan details for submittal and basic design standards for urban development. This section of the code is silent on specific riparian or wetland requirements or tree preservation standards.

Article 7 of the Medford Municipal Code includes standards for nuisance and abatement. Section 7.410 identifies uncontrolled weeds and grass and states that all weeds shall be disked, cut, or removed. There are specific references to removal of weeds in fire hazard areas and on properties more than once acre in size, a firebreak may be maintained as an alternative to clearing the entire parcel. The code is otherwise silent on the use of herbicides for weed abatement.

There is a section dedicated to Riparian Corridors which establishes a 50-foot riparian corridor on both sides of all qualifying waterways. Bear Creek meets the qualifications. This section describes that ornamental vegetation may be altered if native vegetation is not disturbed and requires permits for a host of activities that could disturb the waterway. This code section describes permitted, conditional, and prohibited uses associated with a riparian corridor as well as standards for conservation and maintenance stating that the area shall be protected by a conservation easement in perpetuity. There are no specific standards regarding maintenance of specific vegetation in the riparian corridors.

The Southeast (S-E) Overlay District includes a section on greenway standards, which establishes baseline regulations with regards to development of a defined greenway. Although the standards are again focused on the recreation component of the Greenway and less on habitat preservation with the waterways themselves, there is some good language to promote native plant species and allow for additional tree canopy for bank stabilization and natural landscape enhancements. There is a provision that allows removal of noxious weeds and non-native vegetation if replaced by native species which supports recommendations of this resource plan.

The flood Hazard Reduction section of the code contains standard FEMA language for development in flood hazard areas and is not specific to habitat creation or preservation.

Central Point Municipal Code

The City of Central Point includes one sentence on landscape requirements stating that all applications shall be approved by the Planning Commission.

The Central Point Municipal Code includes Chapter 8.08 dedicated to Weed Abatement and identifies weeds as a fire hazard, interference of enjoyment of properties, and a health hazard by providing area for breeding vermin and generating irritants. Similar to Medford, the standards require weeds to be disked, cut, or removed and allow for fire breaks in lieu of removal of weeds on an entire parcel for lots more than one acre. The code is otherwise silent on the use of herbicides for weed abatement.

The Flood Damage Prevention section consists primarily of standard FEMA language for development in the flood hazard zones but does include a short section on stream setback requirements referencing Section 17.60.090, which details out special setback requirements with specific development setback language for the Bear Creek Greenway District. Additionally, this section requires there to be a setback of 25 feet from the top of the creek bank, defined as "the center of the transition area lying above the bank which rises out of the lower plain of the creek trough which is usually at, or slightly above, the average high water level". There are no specific vegetation management actions provided.

Chapter 17.54 of the Central Point Zoning Code includes regulations specific to the portions of the Bear Creek Greenway that are within city limits. This chapter identifies uses permitted in the Greenway, as well as dimensional standards but is silent on any specific vegetation management actions.

Jackson County Land Development Ordinance

Jackson County's Land Development Ordinance includes a section on landscape standards, which is focused on buffering and screening standards along with xeriscape requirements. This section also includes specific development standards for steep slopes, landslide areas and expansive soil but does not include specific information on desired or prohibited plant species or vegetation management within riparian corridors.

Chapter 8.6 includes a section on stream corridors and riparian habitat stating that there shall be no structural development or grading within 50' of the top of bank of any Class 1 or Class 2 stream. There is a section on vegetation retention to protect stream corridors similar to the language found in the Phoenix Land Development Code. There are provisions to allow for non-native vegetation to be removed and for vegetation to be removed for forestry activities. However, there is also a provision that states, "no understory vegetation or tree canopy may be removed in order to comply with the fuel break requirements of Section 8.7.1(B), which are superseded by the requirements of this Section within the area in which the riparian setback applies". Chapter 8.7 details wildfire safety provisions primarily directed at protection of structures with no specific mention of vegetation management in open spaces or riparian areas with regards to wildfire mitigation.

Chapter 7.1 includes descriptions and standards for specific environmental and cultural overlays, listing the Bear Creek Greenway as an area of special concern and references the Bear Creek Greenway Plan: Management Policies and Guidelines (1982) and the Bear Creek Greenway Plan: Ashland to Central Point (1988) for guidance on uses. There are no specific standards or regulations included in this section with regards to riparian buffers or vegetation management. The general Jackson County Code of Ordinances includes a section on the Bear Creek Greenway that simply lists allowed and prohibited activities from a municipal management standpoint and again is silent on vegetation management.

As with the other codes assessed herein, the floodplain regulations consist primarily of standard FEMA language for development in the flood hazard zones and nothing specific to riparian areas or vegetation management.

Aside from the land use regulations discussed herein, Jackson County Soil and Water Conservation District, which operates as a special district, has an invasive and noxious weeds program associated with the Cooperative Weed Management Area (CWMA), which includes resources on how to identify noxious and invasive species and how to manage them. Himalayan Blackberry is at the top of the list. The CWMA provides education, coordination, and prevention by collaborating with other local, regional, and national agencies such as the Army Corp of Engineers, Bureau of Land Management, U.S. Forest Service, Oregon Department of Agriculture, and many more.

ANALYSIS AND RECOMMENDATIONS

Following are recommendations for enhancements to each of the categories of regulation described above.

Landscape and Tree Preservation Standards

Given that most of the landscape and tree preservation standards highlighted in the existing regulations are geared toward retention of plant species to mitigate impacts of development, they do not provide the specific regulatory framework to support the policy documents on management of natural resource areas, such as Bear Creek to prevent and mitigate devastation due to potential natural disasters. In reference to the 50 foot riparian area on which this report is focused, each of the jurisdictions could include an additional section on riparian vegetation management to support the policy recommendations within the Bear Creek NRP with regards to allowing for downed trees to remain for specific animal habitat (e.g., large woody debris) and require the control of non-native and invasive species such as Himalayan Blackberry that have proven to not only choke out native plant species but also fuel fires.

Riparian and Wetland Buffers

Each jurisdiction's regulations that were reviewed include similar dimensional standards for riparian buffers, requiring a buffer or setback of 50 feet from the top of bank. The City of Ashland's code included the most detail with regards to vegetation management and the other jurisdictions should adopt similar standards. The proposed riparian buffer would help retain stream shade and filter surface water runoff. Additional language that would help implement the Bear Creek NRP could include:

- Establish a riparian protection zone to be maintained at a distance of 120 feet from high water mark for perennial streams and 50 feet for intermittent streams and wetlands (Per NOAA Fisheries 2020 report). Within the riparian protection zone there could be two buffers with the following requirements (Per FEMA and USFWS Biological Opinion):
    - Inner Buffer (0-60'): Maintain a 60-foot inner buffer from the ordinary high water mark (OHWM) of perennial streams with native vegetation.
    - Outer Buffer (60-120'): Maintain an additional 60-foot buffer from the OHWM of perennial streams where a minimum 50 percent tree canopy or 60 trees per acre are maintained at all times (whichever is greater).
- Standards for maintenance of vegetation within the riparian protection zone:
    - Intermittent streams and wetlands shall maintain a minimum 50 percent tree canopy or 60 trees per acre are maintained at all times (whichever is greater) with tree mitigation standards for trees over eight in caliper in size proposed for removal. Maintain a tree canopy with native tree species per Chapter 2 - Vegetation Management of this NRP encourages shade fuel breaks for wildfire management. Prune lower branches and remove suckers to increase the crown base height.
    - Except to address erosion concerns, no slash or pile slashed material would be allowed to be located within the combined 120-foot buffer zones for perennial streams or the 50-foot vegetation management zone for intermittent streams/wetlands.

  - Understory vegetation that poses risk of becoming ladder fuels shall be removed including unhealthy or dying trees with the goal of maintaining denser vegetation within the inner buffer.
  - Nonnative invasive herbaceous plant species shall be removed in both he inner and outer buffer per practices identified in Chapter 4 – Vegetation Management.
- Language specific to management of the understory to decrease ladder fuels. This should include proper methods for eradicating Himalayan Blackberry per industry recommendations which could include controlled herbicide use or other more innovative forms of vegetation management such as goats and other non-chemical means.
- Language specific to maintaining native vegetation at a minimum percentage such as 90 percent to protect plant species that support the diverse animal population.
- Language requiring a specific minimum mix of species for diversity, such as no more than 20 percent of any one species shall be present in the designated riparian corridor.
- Language specifying ongoing maintenance that prioritizes routine planting, seeding, weed management, and monitoring.

Floodplain Regulations

Upon assessment of the existing codes, it appears that the floodplain regulations are appropriate to leave as is with regards to development in the special flood hazard areas and should not specifically include vegetation management requirements that can be placed in riparian and wetland specific sections.

Wildfire or Wildland Urban Interface (WUI) Standards

As evidenced by **Table 1**, only two of the six jurisdictions include regulations specific to Wildfire or WUI standards and they are both very specific to the protection of structures. This is common to codes across the nation as natural resource management with regards to wildfire are typically not contemplated. That said, the most devastating fires in the west in the last few years have involved natural areas overrun by highly flammable vegetation adjacent to residential development. This was the case in the Almeda and Table Rock Road Fires along Bear Creek, as well as the 2022 Marshal Fire outside of Boulder, Colorado. Therefore, it is recommended that each of the six jurisdictions adopt some form of WUI standards and incorporate vegetation management standards to ensure understory vegetation remains contained and fire resistant and that the tree canopy is maintained to WUI standards to prohibit canopy spread of wildfires. Additionally, fuel breaks should be required per local and regional standards.

Overlays

All jurisdictions except the City of Ashland included some form of overlay for protection of sensitive lands or the Bear Creek Greenway. However, none of them provided the framework for implementation of the recommendations within the Bear Creek NRP and associated components. Therefore, it is recommended that a standard ordinance be developed for management along Bear Creek that can be adopted by all six jurisdictions in the study area as well as any other jurisdiction that Bear Creek inhabits.

COMPONENTS OF A MODEL BEAR CREEK ORDINANCE

In order to provide management of the Bear Creek Greenway, it is recommended that a model code be developed that can be adopted by each of the six jurisdictions along with a memorandum of understanding between each community and Jackson County to ensure consistent management along the Greenway, specifically within 50 feet of the top of the Bear Creek bank. Components of the model code could include the following:

- A purpose statement
- A section on where the model code or overlay is applicable – specifically targeting the 50-foot buffer of Bear Creek with potential for an additional 50-foot fringe area
- Language similar to the previous section on vegetation in the riparian and wetland buffers
- Language similar to proposed recommendations in the WUI standards
- Reference to regional referral agencies that would be involved in management of the area
- Regulations on fuel breaks and how they should be implemented and maintained

Chapter 3 - Hydrology Assessment

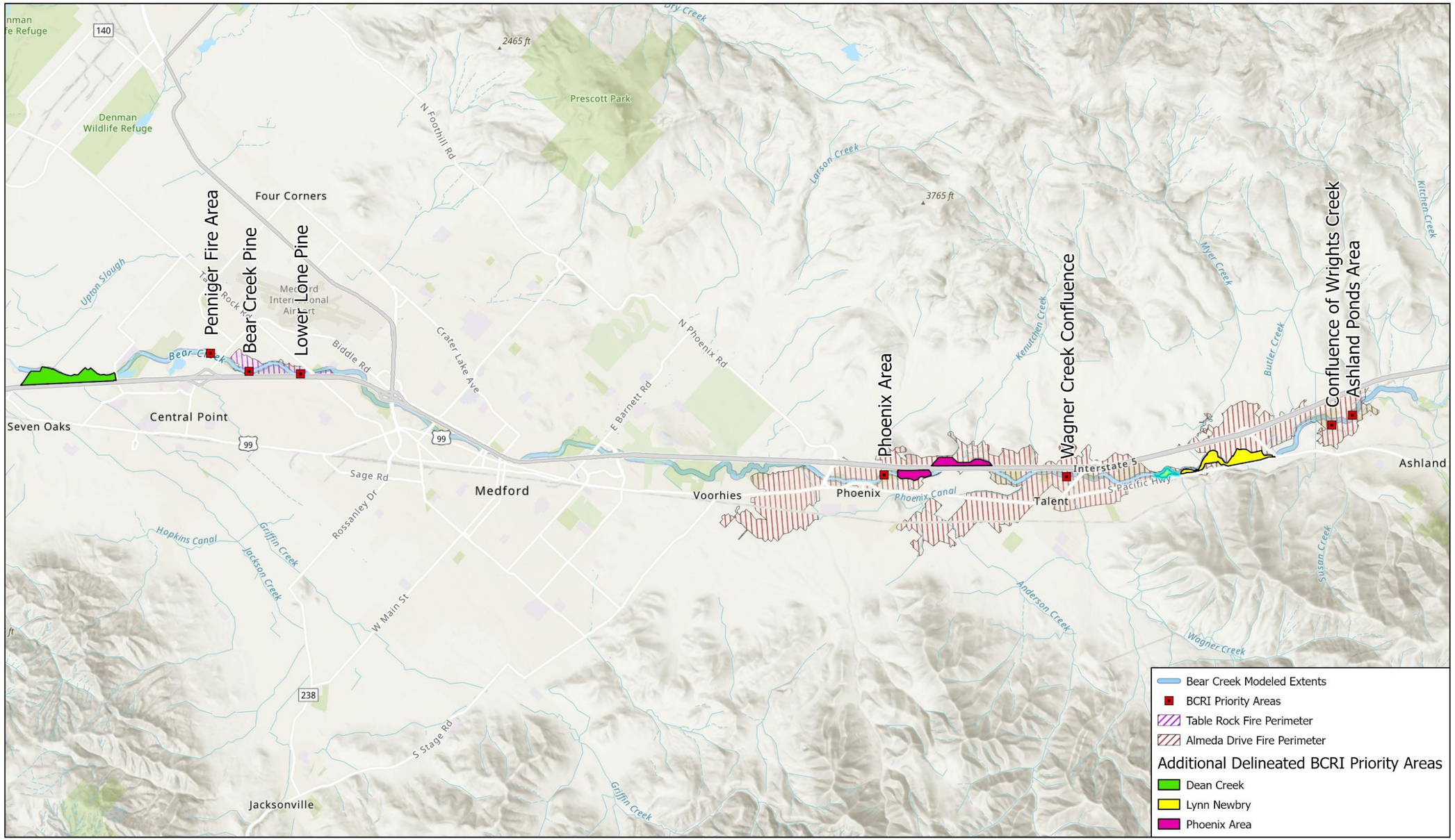
REGIONAL WATERSHED SETTING

Bear Creek flows from south to northwest into the Rogue River for approximately 29 miles within the approximate 360 square-mile Bear Creek Basin, a key watershed in Southern Oregon. The watershed encompasses the City of Medford and the cities of Ashland, Talent, Phoenix, and Central Point. The Bear Creek Watershed is regulated for water irrigation and domestic water supply which influence base and flood flows.

In 2020, the Almeda Fire and the Table Rock Road Fire both burned over 3,000 acres along the Bear Creek reach between the City of Ashland, Oregon and the City of Central Point, Oregon. The Bear Creek River Initiative (BCRI) has identified several priority restoration areas within the Bear Creek floodplain that have field-verified soil erosion and scour issues and impacted riparian vegetation resulting from the 2020 fires. The fires resulted in water quality concerns, the loss of vegetation, and fire-induced hydrophobic soil which have caused increased flow rates along Bear Creek in addition to health impacts to sensitive aquatic fish and wildlife species. The majority of these impacts occurred within the first two years after the wildfire and continue to occur today.

The extents of the Almeda Fire and Table Rock Road Fire are mapped in **Figure 2**. The Almeda Fire, which ignited on September 8, 2020, extends from the ignition point north of the City of Ashland to just south of Voorhies and the southern edge of the City of Medford. The Table Rock Road Fire, which ignited one day after the Almeda Fire in the afternoon on September 9, 2020, covered approximately 1.5 miles along Bear Creek beginning south of the City of Central Point. While the loss of vegetation and scoured stream banks resulted in downstream erosion impacts, the focus of the Hydrology Assessment is on the areas along Bear Creek directly impacted by the 2020 wildfires, including seven of the ten priority restoration areas within those fire perimeters (shown in **Figure 2)**

Figure 2 Basemap of Modeled Extents, Fire Perimeters, and BCRI Priority Areas



This section of the Bear Creek Natural Resource Plan (NRP) provides a discussion of the local hydrology within the identified project restoration limits, outlines the methods deployed by WSP to model the identified sections, and summarizes results obtained from modeling with respect to flood depths, velocities, and bed shear stress within BCRI priority areas. Understanding creek flows and depths and how they translate into inundation areas (flooding), velocities, and bed and shear stresses help inform restoration opportunities related to increased floodplain capacity (where feasible), enhanced riparian zones, target elevations and areas for native plant seeding projects, locations for bank protection installations, and in-stream habitat enhancement structures (e.g., large woody debris, cottonwood placement, etc.).

Flood depths identified through modeling help inform vegetation selection and to verify that the height will prevail above expected water depth. Areas with high water velocity are prone to experiencing erosion, scour, and sediment transport. Shear stress in open channels and rivers refers to the force of moving water against the bed of the channel (it can be thought of as friction force). Areas with high shear stresses are also likely to experience erosion, scour, and sediment transport. Oftentimes erosion control mats and vegetation commonly used for bank and stream restoration will include maximum permissible shear stresses to prevent mats and vegetation from blowing or pulling out.

MODEL DEVELOPMENT

A one-dimensional (1D) steady-state model of the Bear Creek reach extending approximately 21 miles from the City Ashland (ignition point of Almeda Fire) to extent of the Table Rock Road fire perimeter near the City of Central Point was developed to analyze the existing conditions and proposed restoration plans. The study area for the 1D steady state model was approximately 9 miles longer than the Project Area for the Chapter 4 – Vegetation Component in order to capture the flows through the area between the two fire perimeters. Analyses were conducted using the Army Corps of Engineers' HEC-RAS Version 6.3, the River Analysis System modeling software (USACE, 2022).

Methods

1D steady-state hydraulic model uses cross-sections strategically placed along a channel centerline to estimate water surface profiles and average flow velocities from one cross-section to the next using an iterative procedure called the standard step method. Cross-sections are placed at irregular intervals based on where model computations are necessary for accurate evaluation of floodplain hydraulics. Since computations are only performed at cross-sections, the placement of these cross-sections should account for changes in channel bathymetry, overbank roughness (e.g. vegetation), and floodplain width.

Data required to develop a HEC-RAS 1D model include elevation data, landcover roughness coefficients, and inflows. These data are arranged into 1D HEC-RAS geometry files comprised of river centerline delineation(s), cross-sections, channel bank points, and other components.

Data Sources

Several data sources were used to develop the 1D steady state model. A 1-meter resolution digital elevation model (DEM) was downloaded from the USDA Geospatial Data Gateway for the entire modeled area of interest (USDA NRCS, 2022). The National Hydrography Dataset (NHD) includes flowlines for most creeks and rivers within the United States and can provide useful starting points for river centerline delineation (USDA NRCS, 2022). The NHD flowline for Bear Creek was reviewed and revised as necessary against the 1-meter DEM and aerial imagery (Google Earth, 2020). The corrected Bear Creek centerline was then buffered 37-feet on each side of the centerline to generate bank lines, effectively separating the approximate 70 to 80-foot wide main channel from its overbanks.

At each cross-section, the main channel was assigned a Manning's n roughness value of 0.045. Overbank roughness values were estimated by associating data from the National Landcover Database (NLCD) with the n-values listed in **Table 2**.

Table 2 Roughness coefficients for each Landcover Type

Landcover Description	Assigned Manning's n Roughness Value
Open Water	0.025
Developed Open Space	0.06
Developed Low Intensity	0.07
Developed Medium Intensity	0.08
Developed High Intensity	0.1
Barren Land	0.03
Deciduous Forest	0.1
Evergreen Forest	0.12
Mixed Forest	0.1
Dwarf Shrub	0.08
Shrub/Scrub	0.08
Grassland/Herbaceous	0.05
Pasture/Hay	0.05
Cultivated Crops	0.055
Woody Wetlands	0.08
Emergent Herbaceous Wetlands	0.07

Source: Chow 1959

Bear Creek is within the Federal Emergency Management Agency (FEMA) Zone AE floodplain, which includes floodplains defined as a special flood hazard area (SFHA) subject to inundation by the one percent (1%) annual chance flood with base flood elevations (BFE) that have been identified with the FEMA effective models. Effective model cross-sections, digitized from the regulatory floodplain model, were downloaded from the FEMA Flood Hazard Layer and used as input to HEC-RAS to provide initial cross-sections for the existing conditions model. Because this is not a floodplain study for FEMA, no Duplicate Effective modeling was necessary.

Cross-sections within the Almeda and Table Rock Road fire perimeters were reviewed and extended as necessary to capture the extents of the 100-year floodplain generated by the model. Additional cross-sections were added around hydraulic structures, such as bridges and other transportation and utility-related infrastructure spanning Bear Creek. Detailed cross-sections were then placed across Blue Heron Park and Lynn Newbry Park to provide additional detail for the existing conditions through these proposed project sites. Future restoration efforts are anticipated within both parks.

Existing Conditions Analysis

Effective Flows for Bear Creek (Existing Flow Information)

A detailed hydrologic study was not included in the scope of this project; therefore, the Effective 10-year, 50-year, and 100-year discharges, obtained from FEMA's Flood Insurance Study (FIS) 41029V001C for Bear Creek, were modeled between the cities of Ashland and Medford (FEMA 2018a). These three recurrence intervals were modeled in the 1D steady state model to help the BCRI understand typical flow patterns and discharges along Bear Creek but should not be considered as representative of an updated regulatory floodplain. The results may be referenced to determine where certain restoration projects should be prioritized.

Floodplains and the wetlands and waterways that make them up can provide a range of natural functions that can mitigate soil and bank erosion, reduce flooding, enhance biological habitat and floodplain connectivity conditions, and reduce local water pollution, in this case exacerbated by the past fires.

The upper limits of the Bear Creek remediation model were not included in the FIS, so all peak flows at the upstream boundary condition were estimated using the USGS online StreamStats application, which

estimates peak flows using published regional regression equations. Additionally, 2-year peak flows were estimated at all flow change locations using StreamStats because FEMA does not typically publish such frequent recurrence intervals.

A summary of the flows used in modeling is summarized in **Table 3.**

Table 3 Flows used in Modeling Bear Creek (USGS, 2022) and (FEMA, 2018)

Location	2-year Peak Flow (cfs)	10-year Peak Flow (cfs)	50-year Peak Flow (cfs)	100-year Peak Flow (cfs)
Upstream Boundary Condition	1,230[a]	3,030[a]	4,910[a]	5,760[a]
Ashland	1,760[a]	4,460[b]	10,180[b]	13,510[b]
Talent	2.160[a]	5,450[b]	12,430[b]	16,510[b]
Near Coleman Creek	2,360[a]	6,090[b]	13,880[b]	18,430[b]
At Medford (USGS Gage)	2,550[a]	6,770[b]	15,440[b]	20,500[b]

a: Peak flows estimated using regression and the USGS StreamStats tool (USGS, 2022)
b: Effective peak flow published in Flood Insurance Study (FEMA, 2018)

WETLANDS, PONDS, AND LAKES

The areas adjacent to Bear Creek contain numerous forested riparian areas that range from undisturbed open space areas to sections with parks, agricultural land, ponds, wetlands, and other valuable ecological and recreational features. Based on input from the BCRI, three areas were specifically analyzed in-depth: Blue Heron Park, Lynn Newbry Park, and an approximate 117-acre area surrounding the burned Bear Creek Mobile Home Park.

Phoenix Area (Blue Heron Park/Anderson Creek confluence to Coleman Creek)

Blue Heron Park is an approximately 24-acre recreational park that is owned and managed by the City of Phoenix. Most of this area is maintained turfgrass with recreational structures such as playgrounds, sand volleyball courts, walking paths, and gazebos. Outside of the maintained recreational area of Blue Heron Park, forested riparian areas line the Bear Creek corridor. There are two freshwater emergent and freshwater forested/shrub wetlands north of Blue Heron Park towards Coleman Creek and another larger freshwater forested/shrub wetland south of the park near the confluence with Anderson Creek (USFWS 2023). With various partnerships, the preliminary activities proposed to occur in this area include the initial removal of invasive plant species such as Himalayan blackberry, English Ivy, and poison hemlock. Next, the area will be supplemented with native trees and shrubs. To maintain the improvements, a program will be implemented to control invasive species for an approximate 5-year period.

Lynn Newbry Park

Lynn Newbry Park is a two-acre recreational park owned by the City of Talent, Oregon. Immediately adjacent to the Bear Creek Greenway to the east is a large approximately 15-acre freshwater pond and shrub wetland area (USFWS 2023). The park area consists of maintained turfgrass and seating areas along the Bear Creek Greenway surrounded by trees. The corridor adjacent to Bear Creek is forested and largely inaccessible to bicyclists and pedestrians. Initial plans for this area show the grading of new side channels parallel to Bear Creek, bench grading, and bank stabilization using wooded structures.

Restoration Area near Bear Creek Mobile Home Park

This area is adjacent to the 117-acre Bear Creek Mobile Home Park in Jackson County between the cities of Ashland and Talent. The Bear Creek Mobile Home Park contains areas that do not appear to be burned alongside burned land that is proposed to be restored. Outside of the burned areas, the region is heavily forested; no

ponds or wetlands are apparent in the aerial imagery. Riparian areas will be restored with various trees and shrubs in addition to the implementation of a fire break.

MAPPED FLOODPLAINS

Each BCRI priority restoration area is in Zone AE floodplains based on the FEMA Flood Hazard Viewer. As previously stated, Zone AE floodplains are defined as a SFHA subject to inundation by the one percent (1%) annual chance flood with BFEs that have been identified with the FEMA effective models. Effective floodplain maps are shown in **Figure** which illustrates the floodplains within the Almeda Fire perimeter and **Figure 4** which illustrates the floodplain within the Table Rock Road Fire perimeter.

100-year Floodplain

The 100-year modeled floodplain showing Lynn Newbry Park within the extents of the conceptual plans is shown in **Figure 5**. Inundation mapping for the entire Bear Creek reach for the 10-, 50-, and 100-year event results are available digitally. The 100-year floodplain is included in this report to provide perspective of an extreme flood event. Review of the more frequent recurrence intervals (i.e. 50- and 10-year flood depth mapping) may provide useful information for channel and bank restoration projects.

Figure 3 Effective Floodplain Zones for the Almeda Fire Perimeter

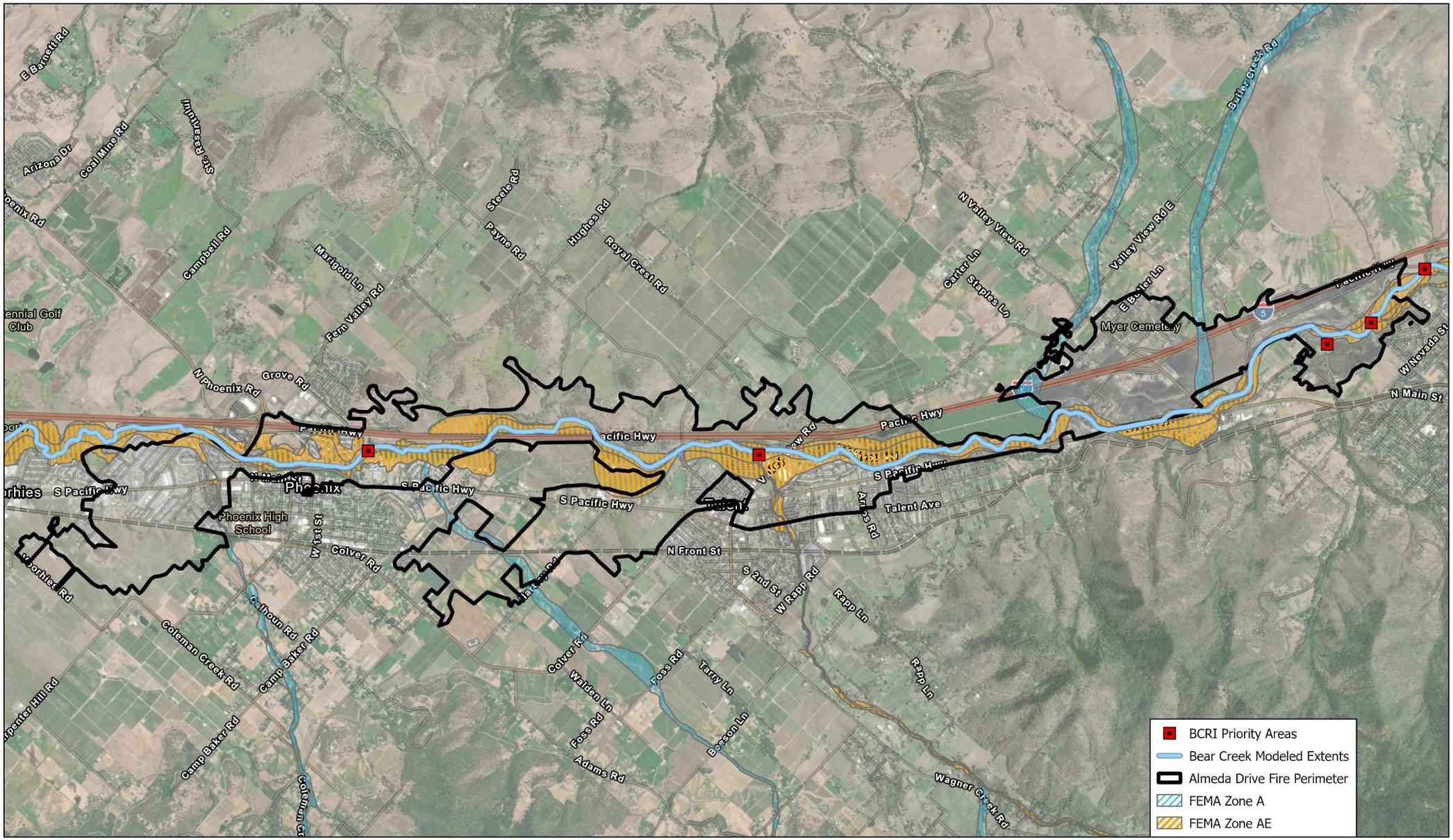


Figure 4 Effective Floodplain Zones for the Table Rock Fire Perimeter

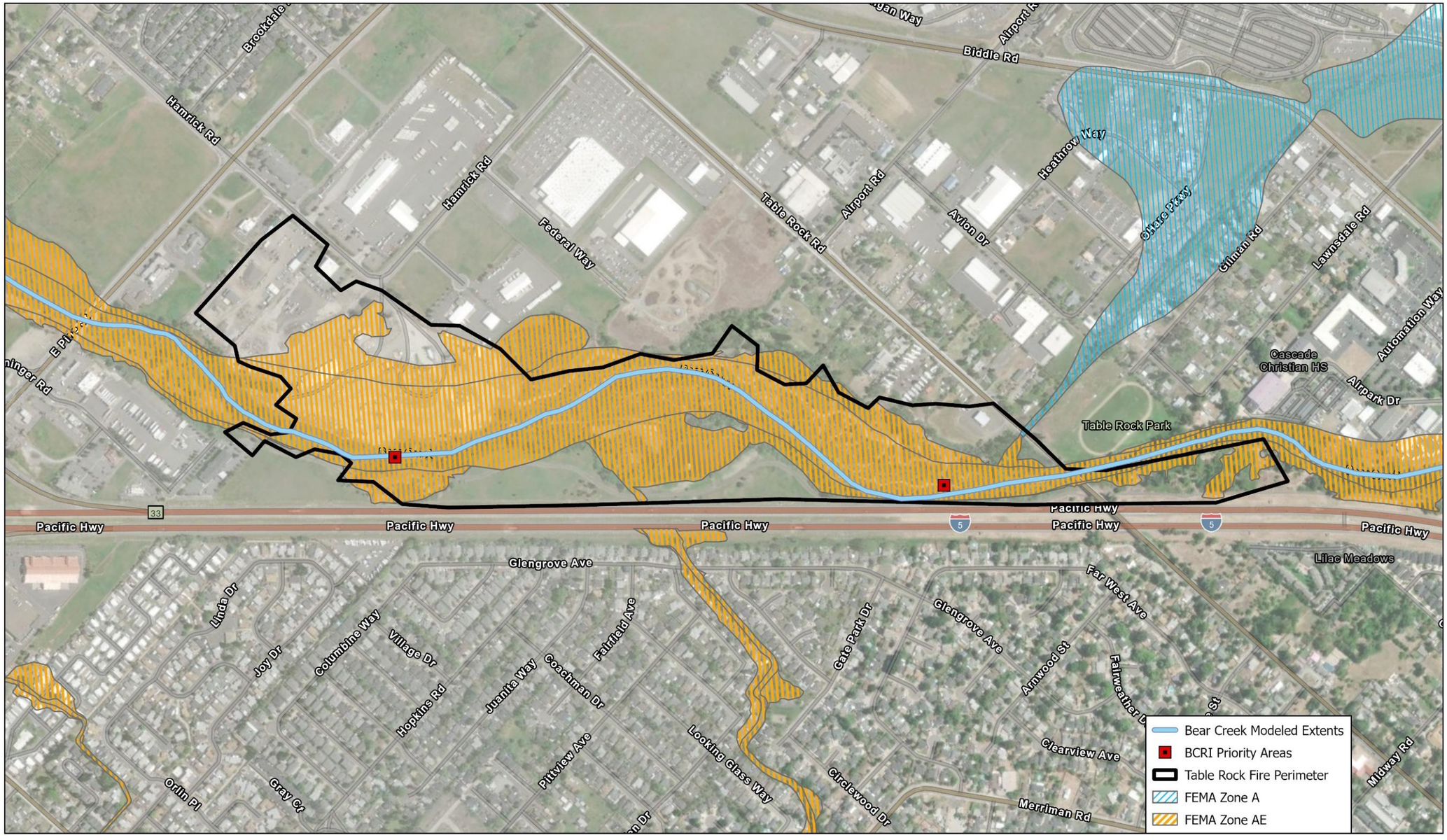


Figure 5 100-Year Flood Max Water Depth for the Lynn Newbry Park Area

RIPARIAN CONDITION ZONES AND PRESCRIPTIONS

This hydrology study complements three of the six management themes as highlighted below. These themes serve to highlight the opportunities and benefits of floodplain restoration along Bear Creek as they relate to the four riparian condition zones (RCZs) described in Chapter 4 – Vegetation Component, the metrics examined in the 1D steady state model, and the six BRCI priority areas.

Floodplain Connectivity

Floodplains support ecological health and diversity within the Bear Creek watershed and provide a range of benefits to sensitive aquatic fisheries species like federally-listed Coho (*Oncorhynchus kisutch*) by supporting critical habitat along the 50-foot riparian corridor. By storing and conveying floodwaters, floodplains reduce flood risk. Restoring floodplain functions and enhancing floodplain connectivity improves water quality by removing excess sediment and nutrients that degrade water quality. The RCZ1 zone provides the greatest opportunities for floodplain connectivity compared to the RCZ3 and RCZ4 zones, where high-use parks and nearby road and utility infrastructure are prone to heavily compacted banks, severe erosion. In most of the RCZ1 zones, the sinuosity of floodplain is intact. Where the floodplain is wide and expansive, such as the areas around Lynn Newbry Park, it may provide sufficient areas for improved floodplain connectivity that can complement vegetation restoration. However, RCZ3 and RCZ4 zones with high erosion potential due to frequent inundation, high flow velocities, and high shear stresses may also be areas where future restoration should be prioritized.

Park and Recreational Opportunities

Floodplains generally provide enhanced recreational opportunities. Such improvements along the Bear Creek riparian corridor, coupled with recreational activities along the Bear Creek Greenway, would dramatically enhance biking, walking, hiking, and wildlife viewing opportunities. The greatest park and recreational opportunities are located in the developed parks within each of the six municipalities dispersed along the Bear Creek Greenway, including Jackson County. Given that Bear Creek runs through a largely urban area, most of the channels and areas around the creek corridor are fixed with natural and artificially hardened banks, which makes it difficult to promote floodplain connectivity and recreation improvements. However, there are several site-specific and local opportunities noted in the recommendations that can highlight the proximity and connection to Bear Creek, particularly in the cities of Medford and Talent.

Safety and Security

Public safety and security focuses on the safety of persons travelling along the Bear Creek Greenway and the areas adjacent to Bear Creek, as well as safety hazards related to wildfire risk and fire prevention and fuels reduction. A large portion of the Bear Creek Greenway is within the Wildland Urban Interface (WUI), an area delineated for vegetation management treatment. The BCRI desires to restore balance between the natural riparian zones along the Bear Creek corridor and managed areas that accommodate public safety and routine fire management activities and fuel reduction projects. Wildfires can often be followed by severe flooding, soil loss, and water quality degradation; therefore, restoration projects that focus on mitigated post-fire flooding need to be integrated into the planning process to facilitate short-term emergency stabilization efforts and long-term projects that promote healthy regrowth of burned areas while also protecting the community from erosion and flooding.

PRIORITIZED LIST OF FLOODPLAIN IMPROVEMENTS

Process for Prioritization

This section refers to content that may be beneficial to material and species selection when performing restoration in areas where flood depth, velocity, and shear stress results can be referenced. Existing and proposed 50-year results for shear stress showing Lynn Newbry Park within the extents of the conceptual plans

is illustrated by **Figure** and **7.** Results for floodplain models of different recurrence intervals as well as for velocity and shear stresses are available digitally.

Channel bed shear stresses through the Lynn Newbry Park area are presented for the 50-year existing conditions event shown in **Figure 6.** Higher bed shear stress values indicate higher erosion potential, this is especially true near the first bend where shear stresses of up to 12.1 pounds per square foot are expected. **Figure 7** shows the proposed conditions 50-year shear stresses following the preliminary restoration implementation. In that same bend, a wooden structure (plans appear to show wooden logs) will be placed on the right bank. This structure reduces the shear stress immediately downstream thereby providing bank protection.

Bank instability and erosion has been noted in the 2020 Jackson County field assessment performed by the USACE (Jerry Christensen, 2020). It has been noted from the BCRI that bank failure has occurred at much lower flows than the 50-year peak flow. Modeling results for more frequent flood intervals (10- and 2-year discharges) are provided digitally. Flood modeling results along with geotechnical investigations would be beneficial when selecting sites for bank restoration and erosion countermeasures.

The Oregon Department of Transportation (ODOT) provides guidance for bank protection in Chapter 15 of their hydraulic manual. Vegetation for bank protection, including the regrowth of vegetation, placement of large woody debris, and other nature-based solutions (NBS) may increase the overall biotechnical stability and shear strength of the channel bank for the areas most susceptible to erosion in the following ways:

- The root system binds the soil together and increases the overall stability and shear strength of the bank.
- The exposed vegetation increases surface roughness and reduces local flow velocities, causing the flow to dissipate energy against the deforming plant rather than the soil. This also reduces the transport capacity and shear stress near the bank, thereby inducing sediment disposition.
- Vegetation deflects the high-velocity flow away from the bank and acts as a buffer against the abrasive effect of transported material (Google Earth, 2020).

It is recommended to use a natural or synthetic erosion control mat to reinforce the stream bank and to provide protection until vegetation is established. In addition, particular attention should be taken when performing bank protection and stabilization to ensure that there is sufficient toe protection. Additional information regarding biotechnical bank stabilization means, materials, and design can be found in the ODOT Hydraulics Manual Chapter 15 (Oregon Department of Transportation (ODOT), 2014).

Prioritized areas for floodplain improvement

Ashland Ponds Area

A priority restoration area identified by the BCRI that is particularly susceptible to bank and channel instabilities is the Ashland Ponds Area where 50-year bed shear stresses up to 4 pounds per square foot and flood depths up to 8.5 feet near the area could be expected.

Lower Lone Pine

Approximately 1000-feet upstream of the Lower Lone Pine BCRI priority area shows 50-year shear stresses up to 8 pounds per square feet and water depths up to 16 feet could be expected.

Figure 6 Existing Conditions 50-Year Shear Stress Results at Lynn Newbry Park

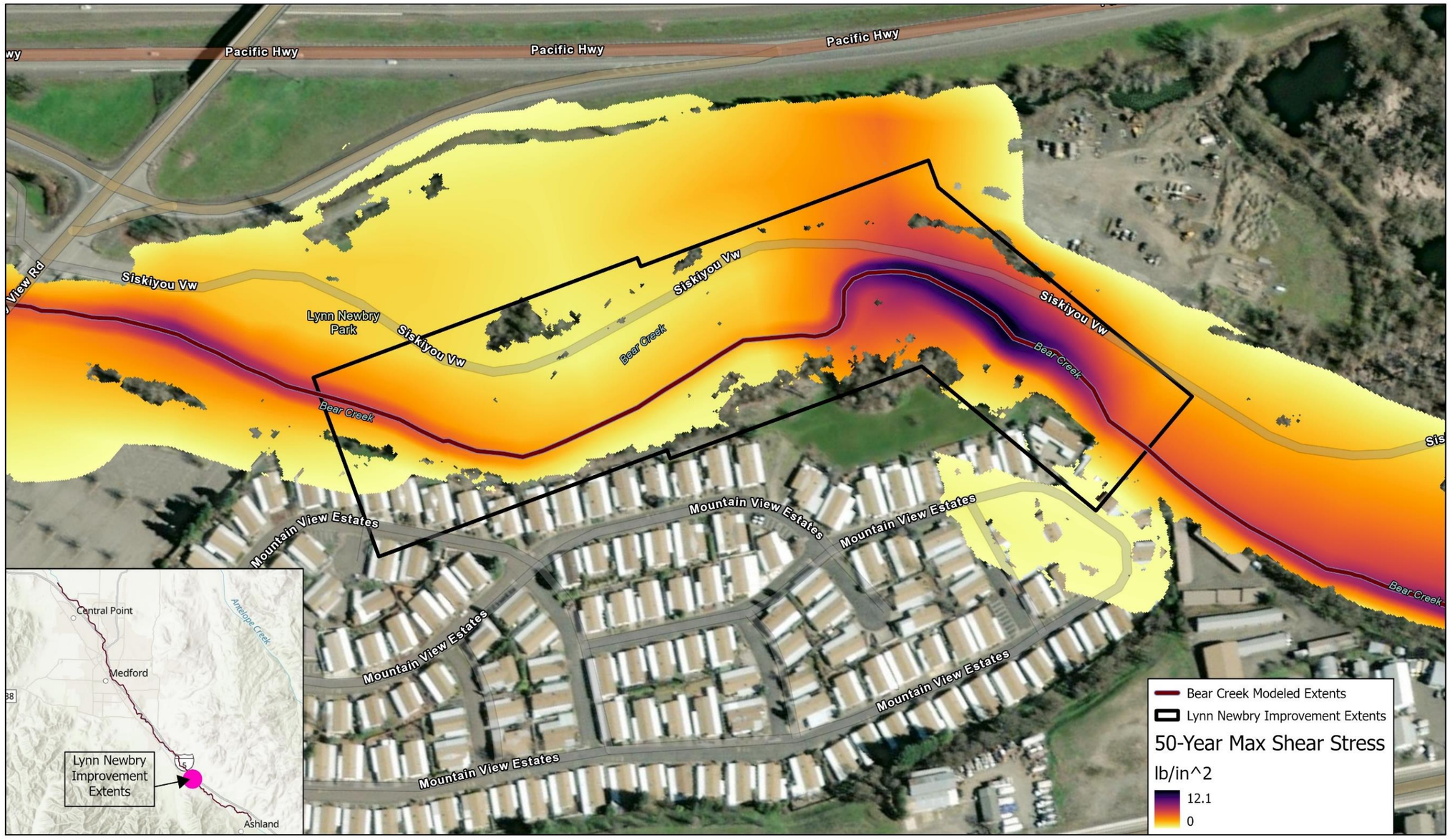
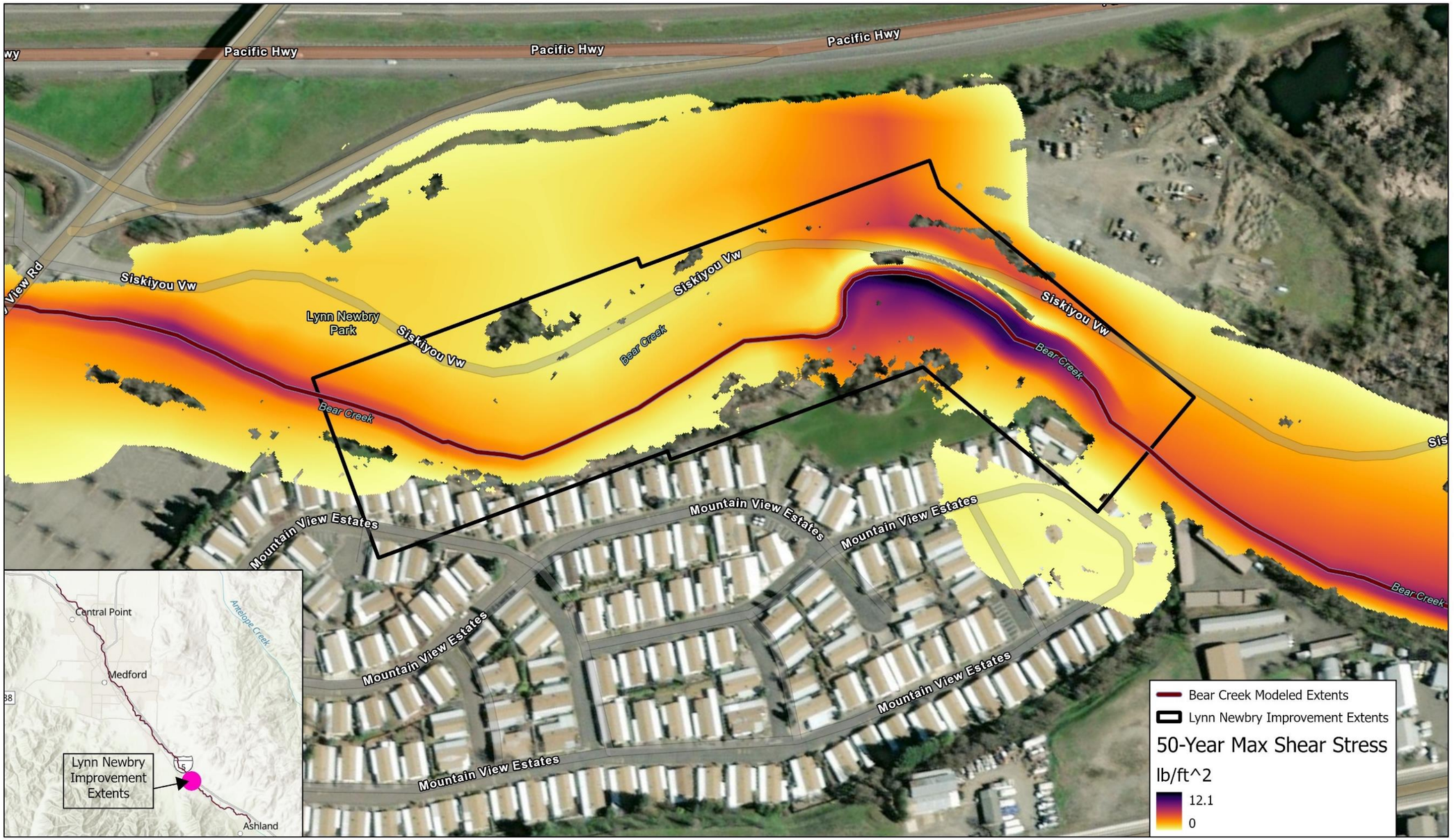


Figure 7 Proposed Conditions 50-Year Shear Stress Results at Lynn Newbry Park



Recommendations

Review of H&H modeling results (included digitally) should be conducted at each BCRI priority area. Areas where high flood depths, velocities, and bed shear stress are shown to occur should be prioritized. ODOT's drainage design manual and other federal, state, and local guidelines should be consulted before commencing bank stabilization or channel restoration efforts to determine a suitable path forward.

Since the majority of the modelled Bear Creek extents are within a mapped FEMA Zone AE, the BCRI should be aware of any federal, state, and local requirements prior to construction of any bank or channel improvements. H&H modeling of proposed improvements is also recommended to verify that the proposed improvements will be suitable and achieve the goal of bank and stream restoration.

CLIMATE CHANGE AND FUTURE IMPACTS TO BEAR CREEK

The impacts that climate change may have on Bear Creek within the Rogue Basin were not explicitly studied in this report. Other studies within the Rogue Basin that may provide information regarding Bear Creek and effects of climate change can be found in the reports titled *The Rogue Basin Action Plan for Resilient Watersheds and Forests in a Changing Climate* (Myer, 2013) and the *Rogue Restoration Action Plan* (Rogue Basin Partnership, 2015). Key climate impacts in the Rogue Basin include an increase in the severity and frequency of wildfires, decreased snowpack and earlier snowmelt, increased severity in drought and flooding, higher elevation shifts from snow to rain, increased stream temperatures, and biogeographic shifts in species' ranges (Myer 2013). While climate change is expected to continue to increase these stressors, as global average temperatures continue to rise, they are expected to rise in the Rogue Basin between 4.3 and 8.2°Farenheit by 2075 to 2085 (near end-of-the-century), making it imperative that the BCRI and partners prepare for climate changes and increased stressors and to further protect Bear Creek.

Chapter 4 - Vegetation Assessment

VEGETATION COMMUNITIES SETTING

Bear Creek is an approximate 30-mile riparian corridor with abundant vegetation and important spawning and rearing fish habitat that drains the large north-south valley extending from the crest of the Siskiyou Mountains in Southern Oregon northward through an urbanized watershed of residential and industrial areas within six municipalities before it joins the confluence with the Rogue River.

Vegetation along the Bear Creek corridor is influenced by fluvial processes such as flooding and sediment transport and consists of trees, shrubs, forbs, and grasses growing along the streambank and toward the upland environment. The riparian corridor runs through upstream agricultural lands, the urbanized areas of the cities of Ashland, Talent, Phoenix, Medford, and Central Point, and Jackson County; and runs parallel to Interstate 5. Over time, urban development has introduced non-native, invasive plant species, such as Himalayan blackberry (*Rubus armeniacus)* and other invasive species that have disrupted the native plant communities and increased the amount of vegetative fuel conditions, impairing the ecological function of the corridor. Much of the native riparian vegetation was severely burned during the 2020 Almeda and Table Rock Road fires (Labor Day Fires) and invasive species like Himalayan blackberry influenced the quick spread of the fire in the corridor by acting as ladder fuels that carried the surface fire into the tree canopy. The remaining vegetation in the unburned portions of the riparian corridor is dominated by deciduous trees and large native shrubs, planted and naturally seeded forbs, barley planted for erosion control, and abundant invasive species (ESA 2022, Siskiyou BioSurvey 2022). Much of the vegetation outside the riparian corridor but within the Bear Creek Greenway consists of a mix of upland vegetation communities heavily influenced by the surrounding urban land uses, including pastures and orchards, landscaped residential areas, golf courses and parks, roadside vegetation, and remnant oak savannah (ESA 2020).

Although there is abundant invasive species present, the Bear Creek riparian corridor provides a contiguous naturalized vegetation setting unique to southern Oregon with a variety of plants and wildlife native to the region. The biological resources are important not only for the ecological functions they provide, but also as a recreational and educational attraction to users of the Bear Creek Greenway. Recreation along the Bear Creek Greenway, interpretive science programs, and volunteer restoration opportunities all depend on the ecological and habitat integrity of Bear Creek.

Following the 2020 Almeda Fire, the Bear Creek Restoration Initiative (BCRI) and Rogue Valley Council of Governments (RVCOG) contracted with Siskiyou BioSurvey, LCC to conduct a post-fire assessment of the vegetation along Bear Creek that focused on publicly owned lands within the floodplain and the burn perimeter of the 2020 Almeda Fire. The existing vegetation conditions summarized below are based on the results of this survey and is organized by the diversity and distribution of native trees, shrubs, and herbaceous vegetation present along the Bear Creek corridor. The purpose of the assessment and this summary is to understand the existing vegetation conditions along Bear Creek and to use this information to select and prioritize ecological restoration priority areas and projects.

Native Trees

The most common species of native trees within the corridor includes black cottonwood (*Populus trichocarpa*) and Oregon ash (*Fraxinus latifolia*). Other native tree species with a significant presence include narrowleaf willow (*Salix exigua*), Pacific willow (*Salix lasiandra*), Scouler's willow (*Salix scouleriana*), white alder (*Alnus rhombifolia*), bigleaf maple (*Acer macrophyllum*), California black oak (*Quercus kelloggii*), and Oregon white oak (*Quercus garryana*) (Siskiyou BioSurvey 2022). The primary vegetation type for the unburned portions of the

riparian corridor based on the United States National Vegetation Classification System (USNVCS) was characterized by Oregon ash, black cottonwood, and alder species within the Riparian Forest Alliance. The Riparian Forest Alliance is described as a streamside riparian forest dominated by cottonwood or Oregon ash in the upper canopy with alder and big-leaf maple in the canopy (USNVC 2023).

Native Shrubs

The most common native shrub species include tall snowberry (*Symphoricarpos albus*), native rose (*Rosa* sp.), and chokecherry (*Prunus virginiana*). Other abundant native shrub species include blue elderberry (*Sambucus Mexicana*), white stem gooseberry (*Ribes inerme*), mock orange (*Philadelphus lewisii*), redtwig dogwood (*Cornus sericea*), Piper's Oregon grape (*Berberis piperiana*), bitter cherry (*Prunus emarginata*), Klamath plum (*Prunus subcordata*), Pacific ninebark (*Physocarpus capitatus*), and California hazel (*Corylus cornuta*) (Siskiyou BioSurvey 2022).

Herbaceous Vegetation

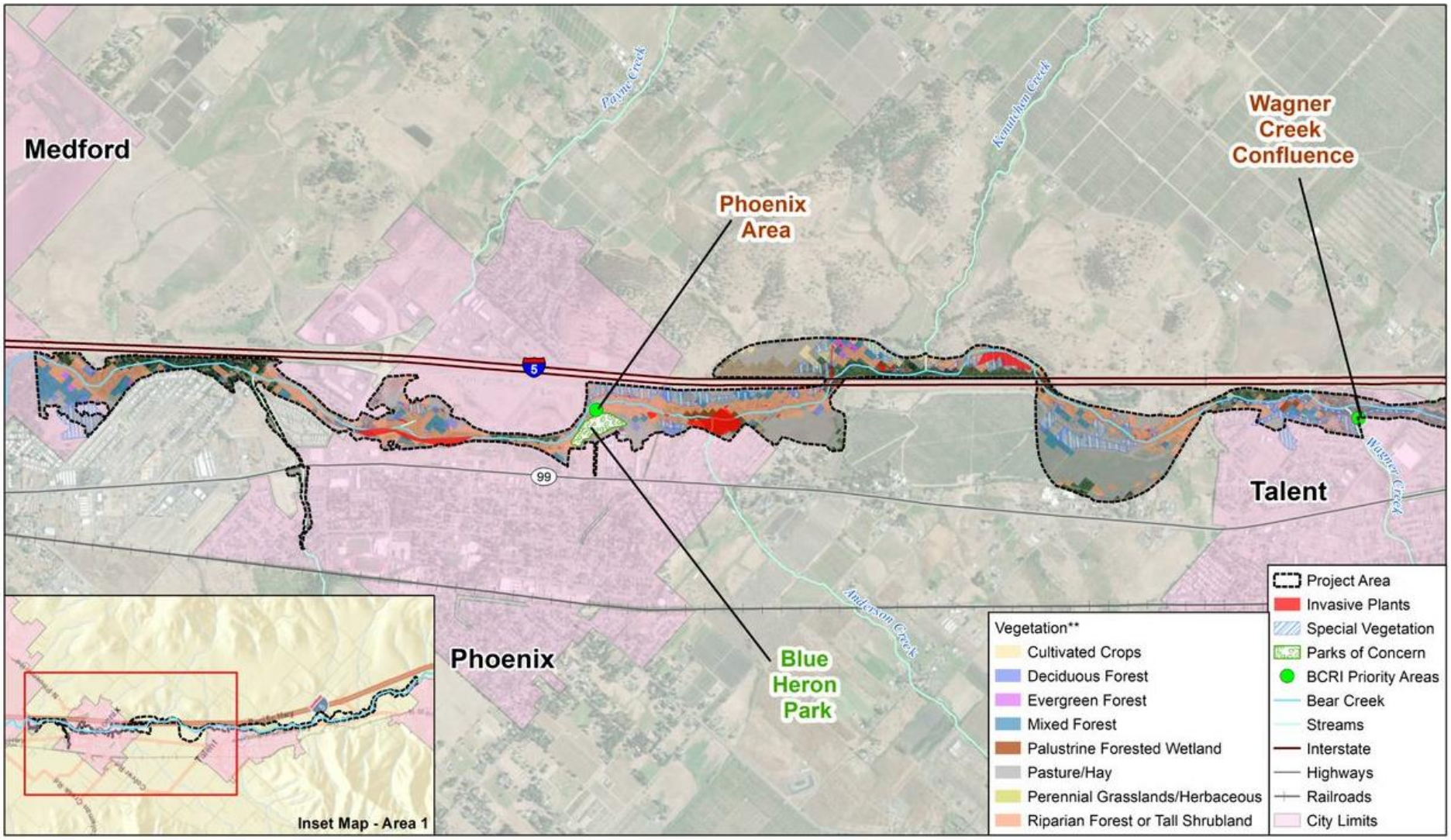
Herbaceous vegetation within the corridor is dominated almost entirely by non-native species (Siskiyou BioSurvey, LLC 2022). The most dominant herbaceous species in order are poison hemlock (*Conium maculatum*), Hoody barley (*Hordeium* sp.), and bur-chervil (*Anthriscus caucalis*). Of these, the second most dominant species, Hoody barley, comprised the majority of the seed mix that was widely broadcast following the fire to prevent soil erosion and sedimentation. Other herbaceous species with a significant presence include ripgut brome (*Bromus diandrus*), prickly lettuce (*Lactuca serriola*), catchweed bedstraw (G*alium aparine*), yarrow (*Achillea millefolium*), black mustard (*Brassica nigra*), Roemer's fescue (*Festuca roemeri*), and sweetclover (*Melilotus officinalis*) (Siskiyou BioSurvey, LCC 2022). Yarrow and Roemer's fescue are the only two dominant herbaceous species that are native. These two species are not associated with riparian plant communities; however, they were used in a seed mix for revegetation of burned areas. Also, none of the non-native herbaceous vegetation currently present is associated with the riparian plant communities.

Invasive Species

The Bear Creek riparian corridor is surrounded by a variety of developed areas. Additionally, many portions of the corridor are situated along Interstate 5 and Oregon Route 99. This road disturbance and adjacent development have resulted in the introduction of many invasive plant species. Invasive species have also been able to take advantage of ample light and nutrients created by the Almeda Fire (Siskiyou BioSurvey, LLC 2022). As a result, invasive plants dominate much of the riparian corridor.

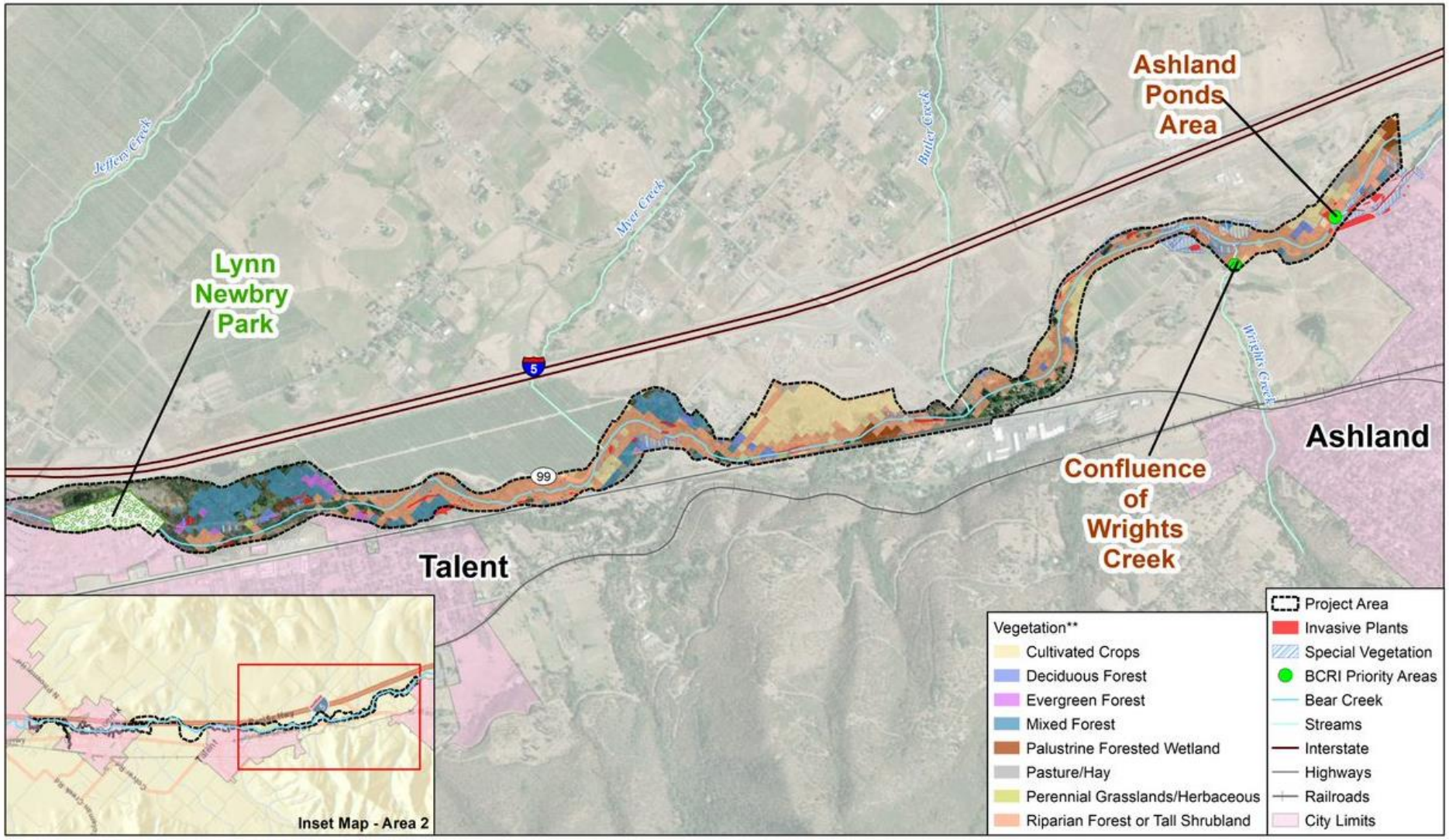
Himalayan blackberry (*Rubus armeniacus*) is the most prevalent invasive species and is located throughout nearly all areas of the corridor. Poison hemlock (*Conium maculatum*) and reed canarygrass (*Phalaris arundinacea*) are the next most abundant invasive species but are far less widespread than Himalayan blackberry. Himalayan blackberry and other invasive species not only disrupt the native plant communities and diminish populations of at-risk native species, thereby impairing the ecological function of the corridor, but increase fire fuel loading conditions and act as ladder fuels. **Figure 8** and **Figure 9** depict the existing vegetation communities in the northern and southern portions of the Project Area and the result of recent plant surveys completed by Siskiyou BioSurvey, LLC within the Almeda Fire perimeter and the 100-year floodplain along Bear Creek. These vegetation conditions represent current post-wildfire conditions approximately two years after the 2020 wildfires; they also represent a baseline from which the BCRI and other agencies and organizations can measure the successes of proposed revegetation restoration projects.

Figure 8. Existing Vegetation Conditions along the Bear Creek Corridor – North End



Map compiled 3/2023;
Intended for planning purposes only.
Data Source: Oregon Spatial Data Library, Logan Simpson, Rogue Valley Council of Governments, USGS, Jackson County
**Due to data limitation, vegetation data is from the year 2010.

Figure 9. Existing Vegetation Conditions along the Bear Creek Corridor – South End



Map compiled 3/2023;
Intended for planning purposes only.
Data Source: Oregon Spatial Data Library, Logan Simpson, Rogue Valley Council of Governments, USGS, Jackson County
**Due to data limitation, vegetation data is from the year 2010.

SENSITIVE SPECIES HABITAT

The Bear Creek riparian corridor in combination with numerous wetlands, adjacent natural areas, and the major tributaries, such as Jackson Creek, Lone Pine Creek, and Wagner Creek provide habitat for a range of federally listed threatened and endangered species, state-listed sensitive species, species of concern, and resident and migratory birds, mammals, amphibians, reptiles, and insects. The presence of these federal and state-listed sensitive species emphasizes the importance of careful natural resource management and habitation restoration along the riparian areas of Bear Creek. Bear Creek is used for spawning, rearing, and migration for adult Chinook and Coho salmon and Steelhead. It also includes habitat for species that may benefit from the goals included in the Bear Creek Natural Resource Plan (NRP). Aquatic species (fish, amphibians, turtles) will benefit from placement of large woody debris in the creek and adjacent banks associated with in-stream restoration, enhanced native riparian vegetation, and increased floodplain connectivity; some of these activities may be associated with selective hazard tree removal. Terrestrial species (especially woodpeckers and bats) will also benefit from the retainment of standing snag trees for nesting and roosting habitat. Removal of non-native plant species will benefit all sensitive species including plants, amphibians, birds, reptiles, mammals, and fish.

Federal and state listed species have protection under the federal and Oregon Endangered Species Acts (ESAs). State sensitive species focus on conservation needs and serve as an early warning system to prevent listing. These species should be considered for conservation actions in the NRP. **Table 4** includes the federal and state-listed endangered, threatened, and special status species that may occur along Bear Creek.

Table 4. Federal and State Endangered, Threatened and Special Status Species with the Potential to Occur along Bear Creek

Species	Federal Status	State Status	Habitat Requirements
Fish			
Coho salmon (*Oncorhynchus kisutch*)	Threatened	Sensitive	Require streams with clean gravel and complex habitat, cool temperatures for spawning and rearing. Access to the ocean for anadromous migration. Creek used for spawning and rearing. Bear Creek is designated Critical Habitat.
Steelhead (*Oncorhynchus mykiss*) Klamath Mountains Province ESU summer run	-	Sensitive	Require streams with clean gravel and complex habitat, cool temperatures for spawning and rearing. Access to the ocean for anadromous migration. Bear Creek is used for spawning and rearing.
Pacific lamprey (*Entosphenus tridentata*)	Species of Concern	Sensitive	Require fine gravel beds for spawning. Larvae hatch and burrow in fine sediment of slower pools. Access to ocean for juvenile life stage for parasitic feeding. Adults migrate back to freshwater to spawn.
Mammals			
Ringtail (*Bassariscus astutus*)	-	Sensitive	Use low elevation forests with snags and logs for dens. Sometimes in riparian and rocky areas. Documented occurrences near Ashland, OR.
Silver-haired bat (*Lasionycteris noctivagans*)	-	Sensitive	Forages over ponds and streams and often finds a day roost under loose bark, or in snags or hollow trees.
Hoary bat (*Lasiurus cinereus*)	-	Sensitive	Forages in riparian areas, roosts in both deciduous and coniferous forest. Documented occurrences near Ashland, OR.
California myotis (*Myotis californicus*)	-	Sensitive	Forages over open water, roosts in a variety of locations including cliff faces, trees, caves, under shingles and tarpaper on roofs.

Birds			
Grasshopper sparrow (*Ammodramus savannarum*)	-	Sensitive	Breeds in open grasslands, prairies, and pastures. Several occurrences between Talent and Ashland (eBird, 2023).
Common nighthawk (*Chordeiles minor*)	-	Sensitive	Nest in a wide range of rural and urban habitats including recently burned forest, clearings, open forests and rooftops. Several occurrences along Bear Creek (eBird, 2023).
White-headed woodpecker (*Dryobates albolarvatus*)	Species of Concern	Sensitive Critical	Nest in cavities of dead trees, and often found in older forests, but also recently burned areas. Several occurrences near Ashland (eBird, 2023).
Yellow-breasted chat (*Icteria virens*)	-	Sensitive Critical	Nests low to the ground in dense shrubs including fields, forest edges, stream edges. Common along Bear Creek (eBird, 2023).
Acorn woodpecker (*Melanerpes formicivorus*)	-	Sensitive	Occur year-round in oak and pine-oak woodlands, streamside forests, suburban and urban areas. Utilize multiple cavities in dead or living trees for nesting, roosting, and acorn storage. Common along Bear Creek (eBird, 2023).
Lewis's woodpecker (*Melanerpes lewis*)	-	Sensitive Critical	Breeds in open pine forests, burned areas, or near streams with high density of standing snag trees. Several occurrences along Bear Creek (eBird, 2023).
Oregon vesper sparrow (*Pooecetes gramineus affinis*)	Species of Concern	Sensitive Critical	Breed in open areas including grassland, pastures, and roadsides. Nests are placed in shallow depression on the ground. Several occurrences on Bear Creek near Talent (eBird, 2023).
Purple martin (*Progne subis*)	-	Sensitive Critical	Forage in a wide variety of habitats including urban areas, parks, and streams. Nest in existing woodpecker cavities. Several occurrences between Medford and Ashland (eBird, 2023).
Amphibians			
Western toad (*Anaxyrus boreas*)	-	Sensitive	Live in a variety of habitats from forests to meadows to desert. Use wetlands, ponds, and lakes for breeding. They use existing or dig their own burrows, logs or other woody debris and rocks for cover.
Clouded salamander (*Aneides ferreus*)	-	Sensitive	Prefer forest and burned areas. Found in debris and large decaying logs.
Foothill yellow-legged frog (*Rana boylii*)	Species of Concern	Sensitive Critical	Found in streams with coarse substrate, bedrock with holes, and lower-flow backwaters.
Reptiles			
Western pond turtle (*Actinemys marmorata*)	Species of Concern	Sensitive Critical	Found in marshes, streams rivers, ponds, and lakes. Utilize sparsely vegetated areas nearby for nests and forested areas for over-wintering. Sunny logs and vegetation are used for basking.
California mountain kingsnake (*Lampropeltis zonata*)	Species of Concern	Sensitive	Found in a variety of habitat types including woodlands and fragmented developed areas. Several occurrences near the NRP area.
Insects			
Franklin's Bumble Bee (*Bombus franklini*)	Endangered	-	Requires meadows and flowers like lupine or California poppy.
Monarch butterfly (*Danaus plexippus*)	Candidate	-	Breeding habitat must include milkweed (*Asclepias* spp.), foraging habitat can also include asters (*Aster* spp.) and goldenrods (Solidago spp.). Documented occurrences in area.

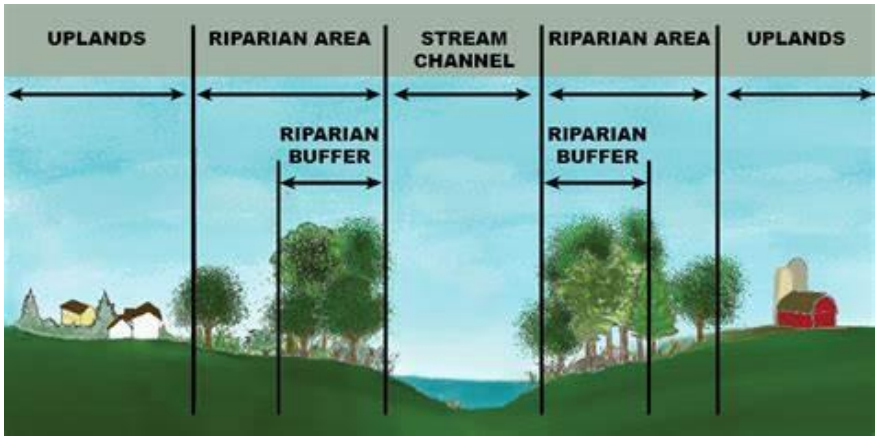
Plants			
Gentner's Fritillary (*Fritillaria gentneri*)	Endangered	Endangered	Occurs in a wide variety of habitats including shaded riparian areas to open grasslands and chaparrals. Prefers the ecotones between meadows and oak woodlands. Flowers from late March to early April. Several occurrences near the NRP area, and one occurrence in 2019 adjacent to Bear Creek near MP 18 (iNaturalist)
Southern Oregon buttercup (*Ranunculus austro-oreganus*)	-	Candidate	Endemic to Medford area, grows in grassy areas less than 500m in elevation. Blooms in April and May.

Sources: iNaturalist 2023, NOAA 2023, ORBIC 2019, ODA 2023, ODFW 2023, StreamNet 2021, USFWS 2023

RIPARIAN BUFFERS

The buffers surrounding Bear Creek are riparian areas, defined as narrow bands of flora, generally within 20 feet of waterways, consisting of a transition from aquatic to terrestrial landscapes. **Figure 10** illustrates the general location of a riparian buffer and riparian area in relation to a designated waterway. Ecosystem services provided by the native plants and wildlife of these areas include erosion control, streambank stabilization, temperature regulation, and water filtration and moderation. Additional benefits include providing corridors for wildlife to migrate through as seasons change, as well as aesthetic and recreational benefits. There are many microclimates throughout riparian areas, providing diverse habitat for a variety of wildlife. Riparian areas are also highly productive and provide more biomass than their surrounding upland habitats. The density and diversity of wildlife species in these regions are abundant, making their ecological health vital to the health of the surrounding environments. Base components of many food webs, such as freshwater, algae, and insects, thrive in riparian areas, which creates a strong foundation of support for the larger ecosystem.

Figure 10. Diagram of Riparian Buffer along a Creek Channel



Source: Chatham County Watershed Protection Ordinance 2022

50-foot Riparian Buffer

Each jurisdiction within the Bear Creek corridor (Ashland, Talent, Phoenix, Medford, Central Point, Jackson County, and the Oregon Department of Fish and Wildlife) has specific riparian buffer regulations that protect ecological function and existing vegetation within the protected buffers. The buffer regulations prohibit the active vegetation management or removal of native trees and shrubs within 50 feet of the top of bank on both sides of the creek. Vegetation management activities in the riparian buffer are therefore carefully considered in the NRP and limited to only allowed activities that protect the ecological function of existing vegetation in the riparian buffer. Allowed activities generally include invasive species removal and native plantings that must be scheduled outside of the migratory bird nesting season. **Table 5** summarizes the riparian buffer widths and permitted and prohibited activities by jurisdiction.

Table 5. Local Riparian Buffer Regulations

Jurisdiction	Code Section	Riparian Buffer	Wetland Buffer	Allowed Activities	Prohibited Activities
Ashland Land Use Ordinance	18.3.11 Water Resource Protection Zones	30'–50' from top of bank	20'–50' from edge of wetland	-Maintenance of existing landscapes -Tree pruning -Invasive removal -Hazard tree removal -Native Plant installation -Mechanical equipment use, with restrictions -Fire Hazard prevention	-Expanding ornamental landscaping -Review limitations on allowed activities
Talent Municipal Code	18.85.030 Safe Harbor Protection of Wetland and Riparian Areas	50' from top of bank	50' from edge of wetland	-Invasive removal -Hazard tree removal -Native plant installation -Mowing of weeds at the end of the growing season to prevent fire hazard	-Native vegetation removal
Phoenix Land Development Code	3.7.2 Riparian Setbacks	Class 1 Streams: 50' or 3x width of stream from top of bank for tree cover; 75' or 3x top of bank for understory vegetation Class 2 Streams: 50' from top of bank	Not listed	-Invasive removal -Native plant installation -Minor maintenance of understory vegetation	-Native vegetation removal
Medford Municipal Code	10.922–10.928 Riparian Corridors	50' from top of bank	50' from edge of wetland for locally significant wetland when located within or adjacent to riparian corridor	-Invasive removal -Native plant installation -Hazard tree removal -Perimeter mowing for hazard prevention	-Removal of vegetation, except for perimeter mowing for fire protection
Central Point Municipal Code	17.60.090 Special Setback Requirements	25' from top of bank or floodway boundary, whichever is farther	Not listed	-None listed	-None listed
Jackson County Land Development Ordinance	8.6 Stream Corridors and Riparian Habitat	50' from top of bank of Class 1 and 2 streams	Not listed	-Invasive removal -Native plant installation	-Removal of native understory vegetation or tree cover
Oregon Department of Fish and Wildlife (ODFW)		50' from top of bank	Not listed	-Any invasive plant that is removed needs to be replaced, preferably with native species. -Preferably a stem density per acre of 600 stems. -Removal of large patches of invasive plants such as blackberry by heavy equipment should be scheduled outside of the migratory bird nesting season (April through July).	-Removal of any vegetation (native or invasive) must be approved by the ODFW as part of a riparian planting plan.

Source: Adapted from Envision Bear Creek Existing Conditions Document, ESA 2022

RIPARIAN CONDITION ZONES AND PRESCRIPTIONS

BCRI Development of the Riparian Zone Concepts

Much of the Bear Creek riparian corridor was impacted by the high severity Almeda and Table Rock Road fires in 2020. The development of a long-term management plan for Bear Creek has been a goal of the BCRI before the devasting impacts of the 2020 wildfires. The early foundation of this plan was initiated by the BCRI and several of the managing agencies responsible for the maintenance of the Bear Creek Greenway. Efforts like the post-fire vegetation conditions assessment help inform the foundation of a long-term management plan for Bear Creek through mapping existing vegetation types, invasive plants, and vegetative fuel areas within the riparian corridor, further defining potential restoration opportunities.

A concept that was discussed during the Bear Creek October 2022 site visit and charrette was the idea of developing vegetation management zones along the Bear Creek corridor based on vegetation type, fuel breaks, jurisdiction, and locations that are associated with specific management prescriptions. These management zones and prescriptions provide a high-level approach to managing vegetation and restoration in the riparian corridor in a way that promotes ecological integrity, reduces fire risk, enhances recreation opportunities, and improves public safety.

During the October 2022 charette, the BCRI participated in brainstorming activities and mapping exercises focused on identifying and defining four riparian condition zones (RCZ) for the 12-mile portion of Bear Creek impacted by the 2020 fires. The BCRI outlined key themes according to their goals for the NRP to guide the development of specific vegetation management prescriptions for each zone. The concept to develop a Greenway Vegetation Management Plan (GVMP) was referenced in early BCRI planning documents, a 2020 Community Planning Assistance for Wildfires (CPAW) Report prepared for the City of Medford, and the 2022 Envision Bear Creek Greenway Existing Conditions Report developed by Alta Planning + Design and Environmental Science Associates. The four RCZs bring together the recent post-fire vegetation condition findings and desired riparian conditions with specific management direction and prescriptions. They provide a tool the BCRI can use to guide conversations with land managers and partners on the best riparian forest management prescriptions for restoration projects at various locations along Bear Creek. The four RCZs include the following: RCZ1 – Natural Riparian Zone; RCZ2 – Riparian Savannah Zone; RCZ3 – Open Savannah Zone; and RCZ4 – Park Zone.

Bear Creek Greenway Management Zones.
The management zones referenced in the 2018 Bear Creek Management Plan related to the Greenway are different from the vegetation RCZs developed in the NRP. The Bear Creek Management Plan defines three zones around the Bear Creek Greenway:

- Management Zone – Includes the paved trail and 10 feet on other side of the trail.
- Transition Zone – Includes 30 feet on either side of the Management Zones.
- Restoration Zone – Includes 50 feet on either side of the Transition Zone.

The Management Zone is actively managed. The Restoration Zone is an area that is actively restored and protected. The focus of the Restoration Zone is on habitat restoration and safety. It includes existing canopy cover that needs to be maintained to increase shade and provide temperature regulation, manage invasive species, and provide connectivity and habitat. The Transition Zone exists between the Management and Restoration Zones. The focus of this zone is understory vegetation management achieved through the removal of invasive species and repopulation with native species. Larger plant stock increases canopy diversity and provides greater habitat opportunities for wildlife.

Riparian Conditions Zones by Management Goals

The four RCZs and prescriptions are further organized by the six management themes for the NRP developed by the BCRI that are focused on 1) habitat protection and enhancing ecological function in the riparian corridor, 2) improving floodplain connectivity, 3) greater public access to recreation along Bear Creek, 4) vegetation management and fire protection, 5) safety and security, and 6) promoting collaboration and partnerships. It is also important to note that the RCZs and prescriptions are being developed and refined as part of an ongoing process. As such, the RCZs described in in Chapter 4 – Vegetation Component are a snapshot in time.

Habitat Protection and Ecological Function

The Oregon Department of Environmental Quality (ODEQ) ranks Bear Creek "poor" for water quality due to pollution concerns, low summer flows, high summer water temperatures, low dissolved oxygen levels, and high nutrient and bacteria loads (RCVOG 2018). The Total Daily Maximum Load (TMDL) for Bear Creek for water temperature is 64.4°F and during the summer water temperatures exceed 68°F (RVCOG 2018). Sensitive fish species, like Coho salmon and Steelhead are only able to survive during these hotter months with cool water temperatures. As such, the presence of vegetative canopy creates shade and is a critical factor in supporting a healthy stream ecosystem. In 2020, a ODEQ report determined that Bear Creek had approximately 15 percent shade cover, but the capacity for 54 percent shade cover. The 2020 fires reduced stream shading due to the loss and damage to much of the tree stands and shrubs. However, continued management actions aimed to maximize stream shading with native vegetation will result in lower water temperatures, which will help meet local TMDL goals and improve water quality in Bear Creek. A healthy riparian corridor includes native vegetation components that can filter stormwater pollutants, stabilize stream banks, reduce sedimentation, provide shade during summer months, and provide cover and foraging habitat for sensitive wildlife (BCRI 2019). Both active and passive restoration approaches must also be integrated into each RCZ. Active approaches should prioritize routine planting, seeding, weed management, and monitoring. Passive approaches should require less maintenance and monitoring over time following restoration.

Floodplain Connectivity

A functioning riparian habitat that provides food and shading for aquatic and terrestrial wildlife along Bear Creek relies on floodplain processes and can be enhanced in areas where the floodplain can be expanded without jeopardizing flooding risk to adjacent residential communities or commercial businesses. For example, floodplain restoration projects that promote beaver habitat and other wildlife habitat may also improve water quality.

Public Access and Recreation

Connections to Bear Creek from the Bear Creek Greenway provide access to recreation and educational opportunities. The Bear Creek Greenway Joint Powers Committee estimated that an average of 250 trips are taken via the Greenway daily, making it an important transportation corridor (Bear Green JPC 2017). For this reason, restoration projects that provide direct access and viewing opportunities of Bear Creek are important. These concepts are similar to recreational opportunities associated with the Envision Bear Creek project for the Greenway, in that improved and new corridor, pedestrian connections, and crossings between each of the six jurisdiction's communities to the Bear Creek Greenway will support further accessibility and connectivity to Bear Creek.

Vegetation and Fire Protection

Fire behavior is dependent on the characteristics of three factors: fuels, weather, and topography. Fuels are the combustible materials that allow for the ignition and spread of fire. Weather is the temporary atmospheric conditions like rain, wind, temperature, and humidity levels. Topography are the physical features of land, including slope, elevation, and aspect. A key component in wildfire prevention is the reduction of fuels, as large quantities of smaller dry fuels like grasses and certain shrubs can contribute to severe fires. The location of fuels also contributes to fires: groundcover fuels like grasses produce surface fires whereas fuels located in the mid-story (5 to 15 feet) act as ladder fuels that can allow the fire to spread into the crowns of trees in the overstory.

The ladder fuels along Bear Creek are largely invasive Himalayan blackberry and the fuels in the midstory that quickly spread the 2020 Almeda and Table Rock Road fires. **Photo Block 3** illustrates the existing vegetation conditions near several parks along Bear Creek where invasive Himalayan blackberry is present. **Photo Block 4** illustrates the existing vegetation conditions at several parks along Bear Creek approximately two years after the 2020 Almeda Fire.

Photo Block 3. Views of Invasive Himalayan blackberry along Bear Creek and Tributaries

Representative Photos of Invasive Himalayan Blackberry along the Bear Creek Corridor
Top Left Photo. Taken from the ignition point near Ashland Ponds in the City of Ashland; Himalayan blackberry is visible in the foreground. Top Right Photo. Taken along the Bear Creek Greenway in the City of Medford; thickets of Himalayan blackberry are visible adjacent to Bear Creek. Bottom Left Photo. View of Wagner Creek when there were extensive thickets of Himalayan blackberries present; this was taken before invasive removal. Bottom Right Photo. View after the thickets of Himalayan blackberry were removed along an approximate 0.6-mile reach of Wagner Creek; restoration included seeding with annual grasses, native trees and shrub planting, and stabilizing creek banks.

Sources: WSP 2022; Rogue River Watershed Council (Wagner Creek Water Quality Improvement Project)

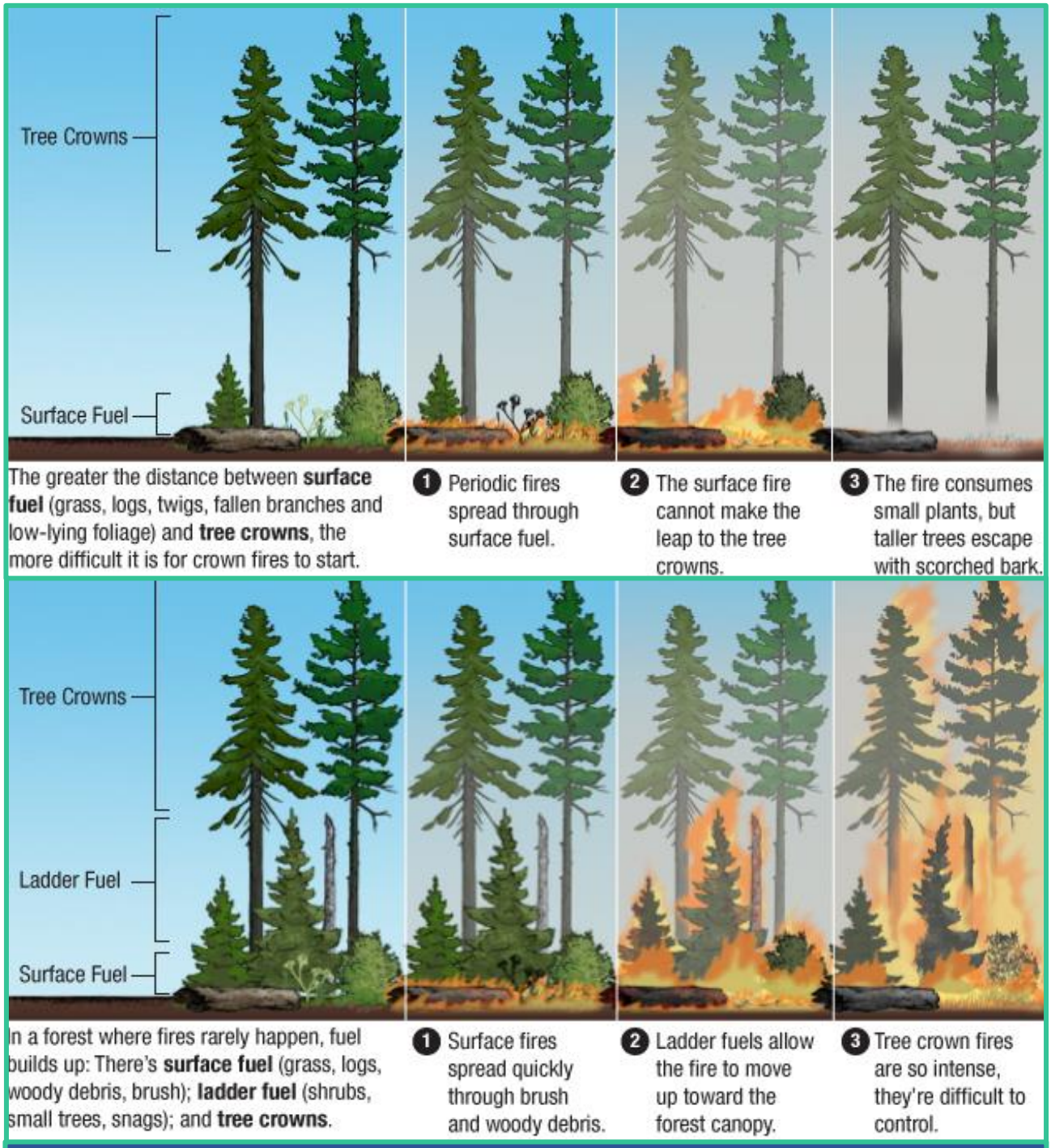
Photo Block 4. Views of and along Bear Creek Two Years After the 2020 Almeda Fire

Representative Photos of Four Different Parks and Restoration Areas along the Bear Creek Corridor
Top Left Photo. Taken south of the ignition point near Ashland Ponds in the City of Ashland; recent restoration area is visible in the background. Top Right Photo. Taken along the Wagner Creek tributary to Bear Creek in the City of Talent; represents another recent BCRI restoration project. Bottom Left Photo. View to the north from Blue Heron Park in the City of Phoenix; visible mowing is visible in the foreground. Bottom Right Photo. View of Bear Creek from the Bear Creek Park in the City of Medford; this area was not impacted by the 2020 Almeda wildfire.

Source: WSP 2022

Figure 11 illustrates the fuel profile of a fire suppressed forest with an accumulation of groundcover and surface and ladder fuels compared to a forest with regular fuel maintenance and routine fire intervals.

Figure 11. Fuel Profiles of a Fire-Suppressed Forest versus a Forest where Fires are Frequent



Fire-Suppressed Forest versus Forest Where Fires are Frequent

The two graphics above illustrate the location of the surface and ladder fuels in a forest compared to the tree crown. Vegetation management recommended in the RC1 through RC2 zones each include some level of active and passive fuel reduction and fire management prescriptions to minimize surface and ladder fuels through routine mowing, brush removal, tree pruning, and selective tree removal. This approach promotes a resilient forest riparian zone along the Bear Creek corridor.

Source: U.S. Forest Service

In 2020 CPAW supported the City of Medford in wildfire management and identified key fire risk factors that occur within the Bear Creek corridor: the presence of Himalayan blackberry as a ladder fuel, restrictions on tree and vegetation removals in the regulated riparian buffers, and the need for comprehensive and regularly funded long-term fuel management (herein referred to as vegetation management). Of the three key risk factors, a long-term vegetation management directive will complement the BCRI's habitat protection and ecological function goals, as fuels will contribute to future fire risk, spread, and severity if not properly and regularly managed.

Regular low-intensity fires can effectively reduce fuel loading in stands of fire-resistant trees like Oregon white oak. The Bear Creek corridor is comprised of mostly non-fire-resistant black cottonwood, Oregon ash, and alder trees. Therefore, active vegetation removal that reduces surface fuels, increases the distance to the base of tree crowns and the spacing between tree crowns, and keeps fire-resistant tree species in the riparian buffers can reduce the risk of fire in the Bear Creek corridor. In summary, vegetation management that minimizes surface and ladder fuels (tree pruning and brush removal), invasive plant species control (Himalayan blackberry removal), and routine mowing and brush removal of seasonal fuels, such as grasses and groundcover each promote fire protection and ecosystem resiliency. These fire prevention activities are therefore integrated as regular prescriptions in the RCZ1 through RCZ4 zones.

Key fire management activities that can occur in the Bear Creek corridor include vegetation management projects, fuel breaks, and defensible space maintenance. Vegetation management projects should also occur to some level in all the RC zones, depending on the overall goal of the treatment activity but would differ by zone with fuel reduction efforts for certain projects focused on ecosystem resiliency and habitat health for more natural areas (RCZ1) where fuel reduction is achieved through a combination of habitat enhancements (seeding and planting) and wildland fire risk reduction. Whereas other zones (RCZ2 and RCZ3) prescriptions would aid vegetation management and involve routine maintenance projects. Specific fuels activities are intended to be completed and be consistent with Fire Management Plans (FMPs), like the City of Medford Bear Creek Greenway Fire Management Plan. The majority of fuel reduction work proposed in current FMPs is accomplished through mechanical treatments, such as mowing, tree removal outside of riparian buffers and then chipping in place. Other manual treatments such as hand crews for brush thinning and pruning are also used. Current treatments, methods, and application intervals that can be employed within the Bear Creek corridor are listed in **Table 6.**

Table 6. Fuel Reduction Treatment Types and Methods

Treatment	Type	Method	Locations by Zone	Maintenance Interval
Annual Mowing and Clearing of Vegetation Debris	• Manual (Hand Crew Removal) • Mechanical	• Mowing and Cutting Grass 10 inches or less • Rubber Tracked Skid Steers and Mini-Excavators	• Fuel Breaks; 30-foot Defensible Space around Structures and Greenway; Minimum 10-foot Clearance near Roads	• Annual
Brush Thinning and Increasing Spacing between Shrubs	• Manual (Hand Crew Removal) • Mechanical	• Discing and Cutting by Hand Crews • Chipping in Place (brush piles would be set back from Creek)	• Around Critical Infrastructure along Greenway, Pedestrian Crossings, Trail Connections, and other Utility Features	• Annual, Replating with Native Species
Limb Removal and Pruning on Trees up to 8 to 10 feet from ground; Shrub	• Manual (Hand Crew Removal)	• Discing and Cutting by Hand Crews • Maintaining Shrubs with Climbing Vines	• Defensible Space, Fuel Breaks • Herbicide treatment should occur outside of	• Bi-Annually • Herbicide Applications in Spring and Fall

and Selective Brush Thinning		• Herbicide Treatment (Glyphosate / Round-Up for Spot Treatments)	major pollination windows	
Tree and Snag Removal	• Hand Crew Removal in Riparian Buffer • Mechanical Removal outside Riparian Buffer	• Hand Cutting • Mechanical Equipment Removal for Large Trees	• Riparian Buffers • Riparian Area (outside 50-foot regulatory buffers) • Preferably outside Migratory Nesting Bird Season (April through July)	• Every Two Years

Source: WSP 2023; Note that prescribed burns are a common fuel reduction treatment, but not recommended along Bear Creek for public safety purposes.

The use of herbicides (e.g., aquatic glyphosate) is also recommended as part of an integrated approach to weed control and vegetation management along the Bear Creek corridor when used properly and applied by certified, licensed, and experienced applicators with experience identifying invasive species in riparian habitats. However, the use of herbicides to control invasive species varies by jurisdiction and is not allowed in all areas (i.e., City of Ashland). Areas with widespread invasive plants like Himalayan blackberry and poison hemlock cannot reasonably be controlled without multiple rounds of herbicide applications often over several seasons (Spring and Fall months), followed by native plantings after successful interval herbicide treatments, and routine spot removal treatments to maintain desired vegetation conditions with adequate fire safety. In addition, the large presence of star thistle, puncturevine, blackberry, and other thorny invasive weeds are too abundant to keep in check without herbicide use. Spot spraying noxious weeds in public areas, like parks is also different from applying it to entire fields with plants for human consumption. The BCRI has considered using non-chemical methods, such as a goat grazing management program that utilizes goat herds to assist in blackberry removal by grazing and ultimately removing the entirety of the plant. Similar programs have been implemented in the Rogue Valley (Pollinator Project Rogue Valley 2023). However, given Bear Creek's proximity to urban development this method may be limited to larger controlled areas away from urban uses.

All herbicides used along the Bear Creek corridor must be approved by the National Oceanic and Atmospheric Administration (NOAA), the Oregon Department of Agriculture (ODOA), and the six municipalities with jurisdiction along the corridor. Herbicide use should comply with the Endangered Species Act and Section 7 for federal activities and funded actions and adhere to the measures outlined in FEMA's Endangered Species Programmatic (FESP) (FEMA 2018b). Herbicide applications should also involve only "spot" treatments, targeting specific invasive plants during specific season(s) of the year when the target species are most vulnerable to the treatment (usually this means treatment in the Spring and Fall months). Spot treatments should also be proposed above the Bear Creek ordinary high water mark. Additionally, it is recommended that signs are installed in areas that will be treated with herbicides 24 hours prior to treatment and that the signs stay in treatment areas for a minimum of 24 hours after treatment (RVCOG 2018).

Safety and Security

Fire regimes have been disrupted for the last 100 years across the Mediterranean forests and woodlands of the Rogue Basin (McNeil and Zobel 1980, Agee 1991, Colombaroli and Gavin 2010, Sensenig et al. 2013), including lowland and mixed conifer riparian forests. Invasive, non-native plants may be responsible for serious, long-term ecological impacts, including altering fire behavior and fire regimes. Invasive plants also affect fire behavior and fire regimes, often because they readily ignite and by increasing fuel bed flammability, which increases fire frequency. Therefore, knowing how to successfully manage invasive plants and their impacts on natural resources is crucial (Erickson and White 2007).

While the Bear Creek Greenway planning mechanisms focus on transportation and public safety related to lighting, visibility, and user experiences while travelling along the Greenway, safety and security along Bear Creek should also focus on fuel reduction combined with the management of invasive vegetation. These goals can be achieved through regular fuels treatment and selective and routine invasive species control.

The Bear Creek corridor area is also a well-known location for the unsheltered population, adding frequent response from law enforcement and fire agencies for illegal occupancy, prohibited camping and warming fires, pollution, and numerous other illegal activities. Invasive plants, like Himalayan blackberry provide a dense monoculture of vegetation that provides hiding areas for criminal activities, such as theft and assault. These dense patches can deter law enforcement from protecting lawful users of the area and the public from using these open areas for recreational endeavors such as walking, hiking, bird watching, and biking. For example, dense patches of invasive plants such as blackberry limit access by Jackson County Vector Control when attempting to remove or reduce areas where vectors (mammals, birds, insects, or other arthropods which transmit disease pathogens) can easily breed. Therefore, routine invasive species control coupled with vegetation management will improve the public safety and security along Bear Creek.

Partnerships and Collaboration

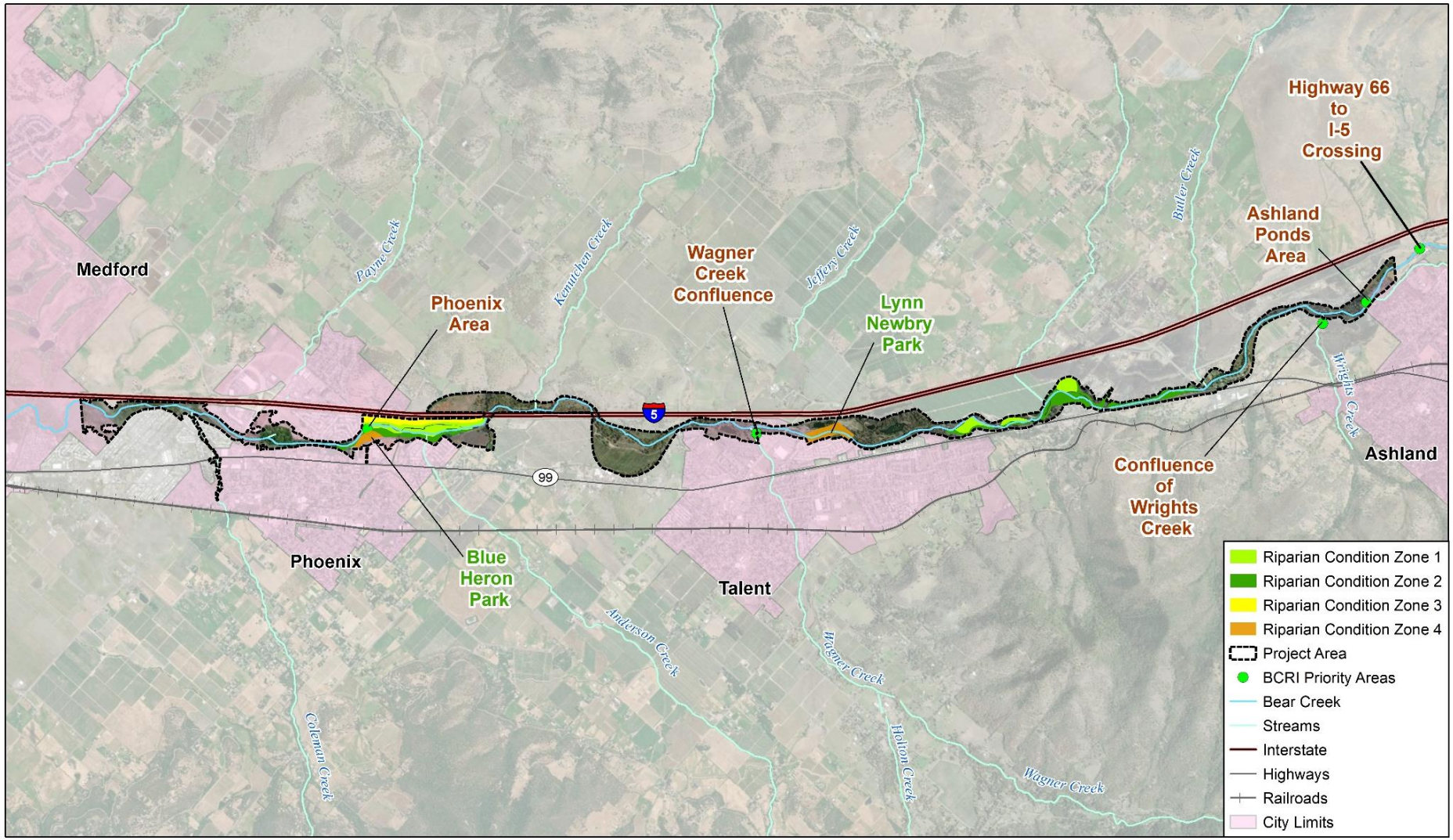
Like the Greenway, the management of Bear Creek is guided by the plans, policies, and regulations of six different municipalities, which range from comprehensive plans to management agreements to FMPs to applicable codes and ordinances. There are also numerous other interested stakeholders beyond the BCRI working group, and many interested members of the public. These different stakeholder partners and public entities mean collaboration and new partnerships across Jackson County are key to furthering the BCRI's floodplain and restoration goals associated with the NRP.

Vegetation and Tree Zones by Canopy

The four riparian condition zones (RCZ1 through RCZ4) have been developed to identify the vision, goals, vegetation structure, key species, and access requirements for riparian areas located within the project boundary. The riparian condition zones provide management prescriptions that are specific to the diverse settings found along the Bear Creek riparian corridor. The four RCZs described range from dense and diverse (RC1) to open and park like (RC4). The intent of the RCZs is to help land managers identify and manage the riparian areas along the Bear Creek to a riparian forest structure that fits with the range of values and uses along the Greenway.

The following sections describe the four RCZs in detail, followed by a summary of other management categories like fuel breaks and emergency response access areas. Within each prescription there is guidance on density, species diversity, structure, and access needs. In addition, the BCRI included considerations related to managed fire breaks, access to water sources for fire suppression, and spill/disaster response that should be taken into consideration and applied strategically during vegetation management activities. The RCZs are meant to provide guidance rather than rigid prescriptions and should be revisited and updated annually as new information and practices are developed. The goal is to have a consistent Bear Creek corridor-wide vegetation management approach that can be mapped, prioritized, budgeted and implemented for the benefit of the communities of the Bear Creek valley. **Figure 12** illustrates the preliminary zones along the Bear Creek corridor that were drafted by the BCRI working group. Other RCZs were mapped for the Upton Road to Dean Creek area that were outside the primary project area, and not shown in this plan.

Figure 12. Preliminary Riparian Condition Zones



Map compiled 1/2023;
Intended for planning purposes only.
Data Source: Oregon Spatial Data Library, Logan Simpson, Rogue Valley Council of Governments, USGS, Jackson County

0 1.5 3 Miles

Riparian Condition Zone 1

Vision


Riparian Condition Zone 1

The vision of RCZ1 includes dense vegetation with multiple species. The tree canopy would be multi-story, dense, contiguous, and composed of a minimum of five native tree species and five native shrub species. Riparian forests in this category should be planted with, or managed such, that in locations where solar load to the stream is a concern the species mix contains roughly one quarter (~200 stems per acre) of evergreen species to help reduce shoulder season thermal loading. This condition would be promoted in locations that are least visited by the public (e.g., immediately adjacent to streams and relatively distant from high concentrations of the built environment). Snags would be retained, wherever possible, and the ground surface would remain rough as mowing and/or vehicle access is not anticipated. RCZ1 represents the most natural or "wild" condition of the four RCZs.

Goal

The goal of RCZ1 is to increase or maintain plant density and encourage native species diversity and provide contiguous canopy cover for wildlife habitat and a cool and moist microclimate (cool and moist).

Canopy

The canopy layer would be dense and contiguous.

Shrubs

The shrub layer of RCZ1 would be composed of dense, mid-story vegetation with small trees and low-growing shrubs.

Ground Cover

Native grasses and forbs would comprise the ground cover of RCZ1.

Recreation, Utility, or Maintenance Access

Access to RCZ1s would be none or limited to foot traffic by way of natural surface walking paths.

Key Species

Trees/Large Shrubs

Key tree species include Incense cedar (*Calocedrus decurrens*), black cottonwood (*Populus trichocarpa*), white alder (*Alnus rhombifolia*), Oregon ash (*Fraxinus latifolia*), bigleaf maple (*Acer macrophyllum*), chokecherry (*Prunus virginiana*), and black hawthorn (*Craaegus douglasii*).

Shrubs

Key shrub species would include mock orange (*Philadelphus lewisii*), Pacific nine bark (*Physocarpus capitatus*), redosier dogwood (*Cornus sericea*), snowberry (*Symphoricarpos albus*), and horsetail (*Equisetum* spp.).

Riparian Condition Zone 2

Vision


Riparian Condition Zone 2

The vision of RCZ2 includes a tall, dense overstory with a minimum of four native species with an open mid-story. Riparian forests in this category should be planted with, or managed such, that in locations where solar load to the stream is a concern the species mix contains roughly one quarter (~200 stems per acre) of evergreen species to help reduce shoulder season thermal loading. A contiguous overstory canopy is the desired future condition. The understory would be relatively dense, low-growing shrubs. This vegetation condition could include patches of mid-story vegetation so long as there are plenty of open areas between patches. This vegetation condition should be pursued in areas where wildlife habitat values are important and more visibility and access are needed for management/ public safety. The ground surface should retain as much roughness as possible but smooth enough to allow access for periodic thinning of the mid-story vegetation. Access corridors would be established to allow pedestrian access by way of single-track natural surface trails. Access paths would be allowed within 50 feet of the stream.

Goal

The goal of RCZ2 is to achieve a contiguous canopy of native overstory, an open mid-story, and relatively dense, low shrubs and forbs allowing for visibility and access.

Shrubs

The shrub layer of RCZ2 would include an open mid-story (potentially with well-spaced patches of mid-story vegetation allowing for visibility) and dense low shrubs.

Ground Cover

The ground cover of RCZ2 would be composed of low-growing shrubs, native grasses, and forbs.

Recreation, Utility, or Maintenance Access

Access to RCZ2s would include light pedestrian use by way of single-track natural surface trails within 50 feet of the stream, primarily for maintenance related activities.

Key Species

Trees

Key tree species of RCZ2 include Incense cedar, ponderosa pine (*Pinus ponderosa*), black cottonwood, California black oak, Oregon ash, bigleaf maple, chokecherry (*Prunus virginiana*), and black hawthorn (*Craaegus douglasii*).

Shrubs

Key shrub species of RCZ2 would include Oregon grape (*Berberis* spp.*)* snowberry (*Symphoricarpos albus*), Douglas spirea (*Spiraea douglasii*), and horsetail (*Equisetum* spp.).

Riparian Condition Zone 3

Vision


Riparian Condition Zone 3

The vision of RCZ3 includes a tall, sparse overstory with a minimum of four native species and a mix of approximately 50 percent evergreen species and 50 percent deciduous species. This condition would include an open understory that includes sparse, scattered patches of low-growing shrubs, forbs, and grasses. This zone would be savannah-like with canopy trees but not necessarily closed canopy, open areas that can be mowed, patches of shrubs as appropriate with the primary goal being safety for public use and ease of management. This vegetation condition would be implemented in the park interface, such as areas close to parks and major public use locations. The land surface would be smoothed to facilitate efficient mowing. Mowing should be done such that at least six inches of thatch are left on the surface to reduce late season weeds like star thistle (*Centaurea melitensis*) and puncture vine (*Tribulus terrestris*), avoid damage to mower blades, and help retain soil moisture. Access corridors would be designed to handle larger vehicles such as tractor mowers and may be integrated with fire breaks and known drafting (access to water for fire suppression) locations.

Goal

The goal of RCZ3 is to achieve a savannah-like structure with canopy trees but not necessarily a closed canopy, open areas that can be mowed, and patches of shrubs, as appropriate, with the primary goal being safety for public use and ease of management.

Shrubs

The shrub layer of RCZ3 would include scattered sparse patches of low-growing shrubs.

Ground Cover

The ground cover of RCZ3 would be composed primarily of non-irrigated grasses (native and non-native) and forbs with the potential for garden-like pollinator patches.

Recreation, Utility, or Maintenance Access

This condition would include access corridors sufficient for larger vehicles such as tractor mowers and be integrated with fire breaks and drafting locations.

Key Species

Trees

Key tree species include Incense cedar, ponderosa pine, California black oak, bigleaf maple, and Oregon white oak.

Riparian Condition Zone 4

Vision

The vision of RCZ4 includes a sparse overstory of trees and patches of shrubs set within a managed landscape where parks or other facilities are located within or near the 100-year floodplain. This condition would include native overstory trees for seed sources and wildlife benefits within a highly managed site where public safety, recreation, and aesthetics are the primary goals. The ground surface would be smooth to facilitate mowing and access for public use. Irrigated landscape may be interspersed with patches of natural vegetation but visibility at eye level should be clear. Vegetation will be managed to a higher degree than in the other condition zones. The RCZ4 areas will fade into RCZ3 or RCZ2 conditions, which will interface with RCZ1 (most natural) to create a gradient of vegetation density that increases as you move away from the highly managed areas of RCZ4.

Riparian Condition Zone 4

Goal

The goal of this condition is to achieve a native overstory to provide seed sources and wildlife benefits while also being designed to fit within a highly managed site where public safety and recreation are the primary goal.

Shrubs

The shrub layer of RCZ4 would include sparse patches of low-growing shrubs with no mid-story vegetation.

Ground Cover

The ground cover of RCZ4 would be composed primarily of irrigated grasses and possibly pollinator patches.

Recreation, Utility, or Maintenance Access

RCZ4 would include a smooth landform to facilitate mowing and access for public use. Irrigated landscape may be interspersed with patches of natural vegetation but visibility at eye level would be important for recreation and public safety and vegetation would be managed to a higher degree than other locations.

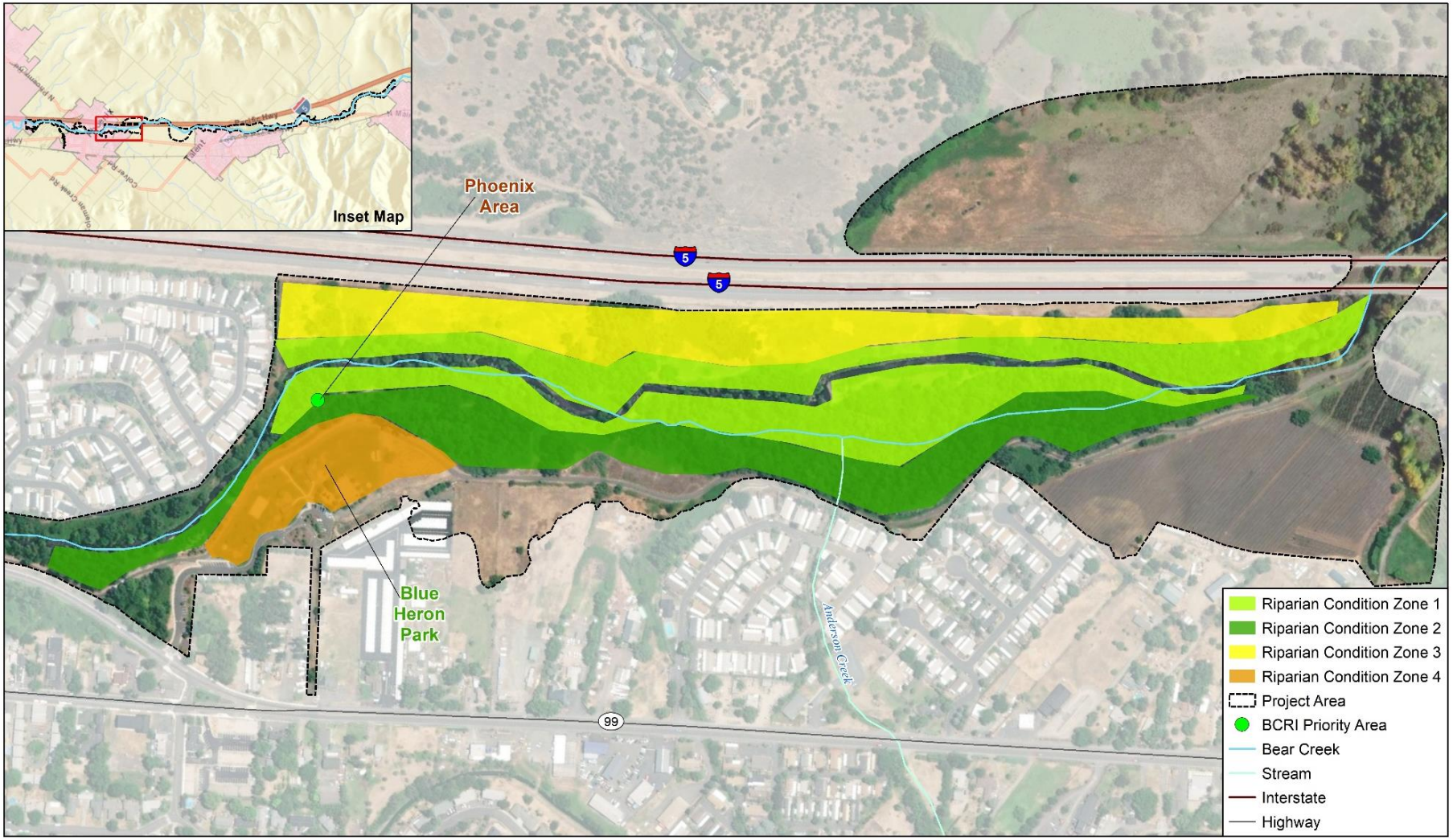
Key Species

Trees

Key tree species of RCZ4 include Incense cedar, ponderosa pine, California black oak, Oregon white oak, bigleaf maple, dogwood (*Cornus* sp.), and potentially landscape varieties of ash (*Fraxinus* sp.), maple (*Acer* sp.), and elm (*Ulmus* sp.).

Figure 13 illustrates the four zones for Blue Heron Park and **Figure 14** illustrates three zones, a proposed fuel break, the County mapped floodway and the Special Flood Hazard Area (SFHA) for Wranglers Arena area near Myers Creek and Butler Creek and south of Lynn Newbry Park. **Table 7** provides a summary of the RCZs, prescriptions, and cross references the applicable management directives.

Figure 13. Riparian Condition Zones at the Phoenix BCRI Priority Area



Map compiled 1/2023;
Intended for planning purposes only.
Data Source: Oregon Spatial Data Library, Logan Simpson, Rogue Valley Council of Governments, USGS, Jackson County

Figure 14. Riparian Condition Zones near Lynn Newbry Park

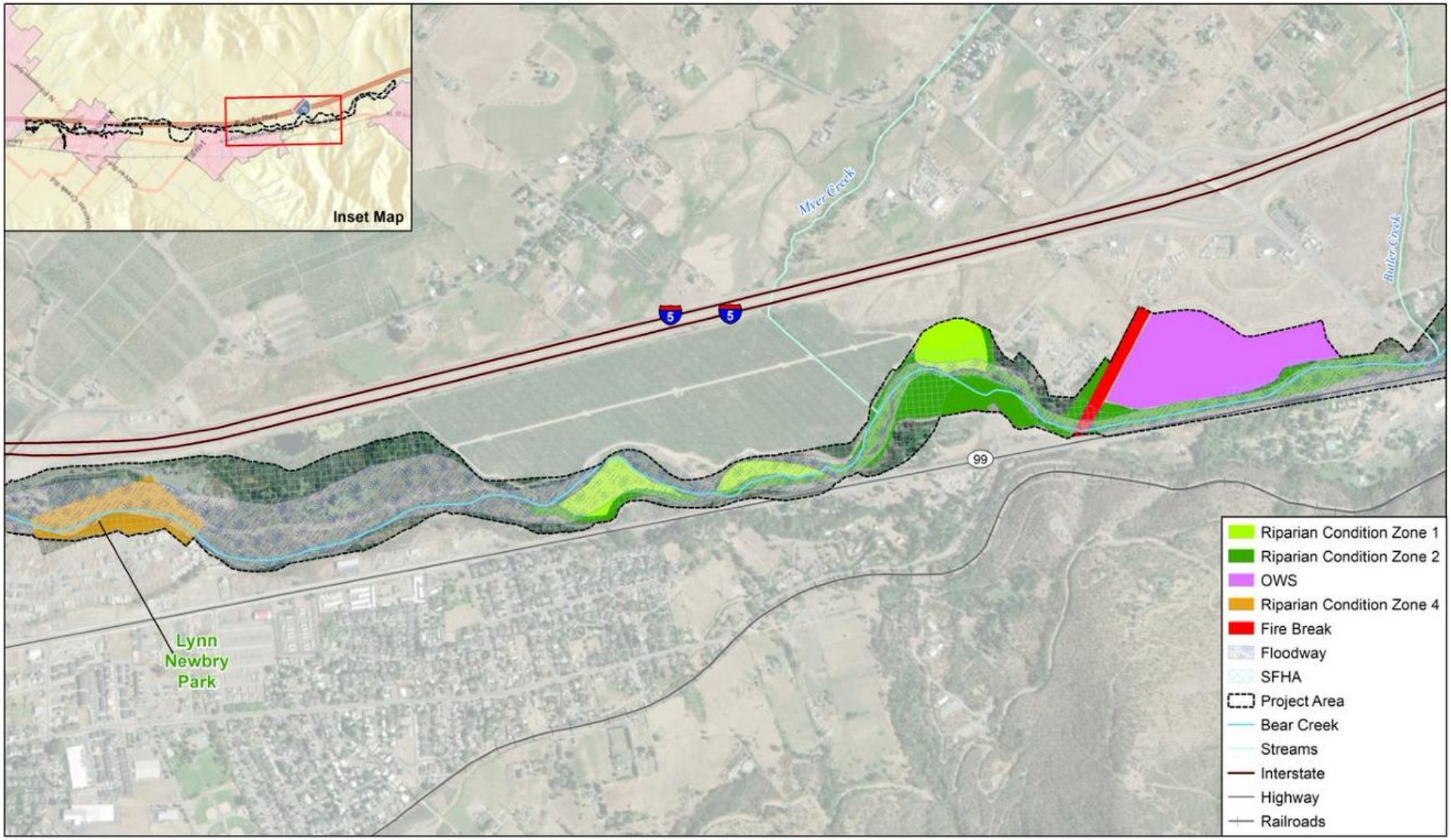
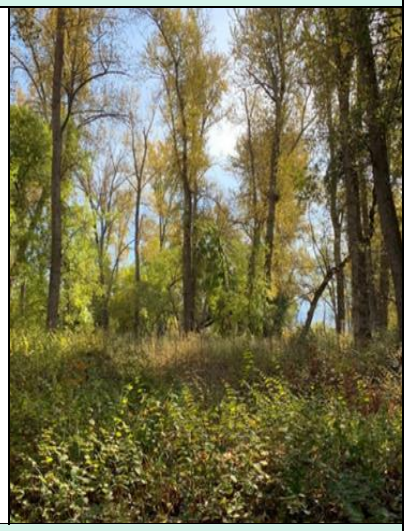
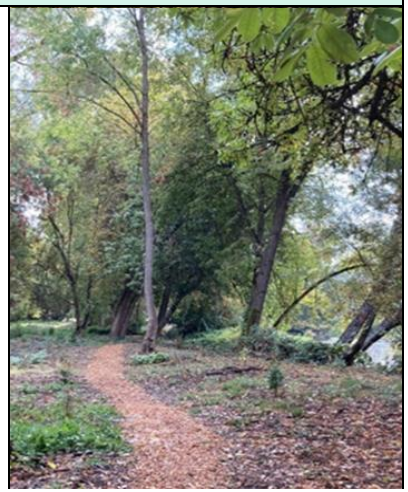


Table 7. Riparian Condition Zones and Management Strategies by Resource Values

Riparian Condition Zone	Management Strategies by Resource Value					Representative Photo
	Vegetation	Hydrology	Recreation	Fuels Management	Management Limitations	
	Natural Riparian Zone					
RCZ1	• Dense native riparian vegetation • Multi-story canopy • High diversity • High habitat quality • High invasive species control • Promoted in locations least visited by public • Most natural/wild condition	• Sinuosity of floodplain is intact • High opportunities for increased / improved floodplain connectivity	• Least public access • Limited to natural foot paths • Restoration success stories • Opportunities for trail connectivity • Opportunities for observing wildlife (from outside or edges of habitat)	• Least fuels management • Focus on removal of invasive species, ladder fuels in particular • Native habitat provides some level of protection from rapid spread of fire • Dense, healthy, native vegetation and increased floodplain connectivity provides protection against floods	• Limited access- foot paths only • Use of herbicides not allowed in some areas • Approval/mitigation required for removal of any vegetation within 50-foot riparian buffer	
	Riparian Savannah Zone					
RCZ2	• Tall, dense overstory with closed canopy • Mid-story vegetation would include patches spaced with generous open areas in between • Understory of dense, low-growing native shrubs • Areas where more visibility and access are needed for management / public safety	• Moderate Floodplain connectivity with limited opportunities for improvement • Nature-based restoration opportunities	• Public uses areas • Salmon viewing platforms • Wildlife viewing from outside and within habitat	• Fuel breaks along utility corridors to ensure accessibility and to promote resiliency • Control of invasive species provides protection from rapid spread of fire • Low / open understory provides increased visibility toward creek and access in support of public safety	• Limited access- foot paths only • Use of herbicides not allowed in some areas • Approval/mitigation required for removal of any vegetation within 50-foot riparian buffer	

RCZ3	**Open Savannah Zone**					
	• Tall, sparse overstory • Open understory with sparse, patches of low-growing shrubs, forbs, and grasses • Open areas that can be mowed • Access corridors for larger vehicles	• Limited floodplain connectivity • Engineered solutions for flood protection near critical facilities	• Moderately managed public use area • Wildlife viewing from outside and within habitat	• Routine fuels management • Fire breaks and access points at strategic locations • Control of invasive species provides protection from rapid spread of fire • Low / sparse understory provides increased visibility toward creek and access in support of public safety • Removal or maintenance of hazard trees	• Limited access- foot paths only • Use of herbicides not allowed in some areas • Approval/mitigation required for removal of any vegetation within 50-foot riparian buffer	
RCZ4	**Park Zone**					
	• Sparse native overstory trees for seed sources • No mid-story vegetation • Sparse patches of shrubs within managed landscaped • Highly managed vegetation • Main goals of public safety, recreation, and aesthetics	• Floodplain is channelized due to development and transportation infrastructure	• Developed active park and open space areas • Park facilities and adjacent uses such as highways and infrastructure • High human use/houseless population	• Routine fuels management • Control of invasive species provides protection from rapid spread of fire • Routine irrigation and mowing of grasses • Routine trimming, pruning, and thinning of vegetation • Removal or maintenance of hazard trees	• Potential for large houseless presence • Large presence of trash / debris • Sparse vegetation and adjacent landscape species encourage infestations of invasive species • Use of herbicides not allowed in some areas • Approval/mitigation required for removal of vegetation within 50-foot riparian buffer	

Source: WSP 2023, BCRI 2023

Other Categories

Fire Breaks

Fire breaks would measure 100 feet wide and not contain any ladder fuels. Fire breaks are ideally sited under an existing utility corridor to reduce canopy reduction in more natural areas. Taller surrounding vegetation would require wider fire breaks to be to account for wind-blown embers. The goal is to establish one managed fire break between each community along Bear Creek (and one upstream of Ashland and another downstream of Central Point). Fire breaks need to be smooth enough and hard enough to allow large fire vehicle access. Turn arounds or multiple points of exit/entry are essential.

Drafting Locations

Drafting locations are proposed where a pump truck could access water for suppression activities. The truck needs to park on a hardened surface suitable for heavy vehicles within 25 feet of the water source. There needs to be adequate turnaround space. Ideally, drafting locations are in or near managed fire breaks.

Management and Emergency Response Access

Management and emergency response areas may include trails or small vehicle tracks that allow access into wide floodplain areas. These access corridors allow foot or small vehicle access for vegetation management, emergency response, law enforcement, and off-trail recreation. The prescription for these areas involves removing overhanging vegetation and thinning mid-story vegetation for approximately 25 feet either side of access corridors. The trails or tracks would need at least two access points (to avoid dead ends and provide alternative exits in the event of being flanked by a fire or a vehicle turnaround.

PRIORITIZED LIST OF RESTORATION PROJECTS

The six BCRI priority areas as well as the restoration project areas at Blue Heron Park and Lynn Newbry Park described in the NRP were selected based on previous BCRI planning efforts and recent restoration successes at other locations like Wagner Creek and the Ashland Pond area. For full descriptions of the six BCRI priority areas refer to the Action Plan Component. Recommendations were also given to projects that meet the intent of the six management themes for the NRP, which will form the basis for the ecological restoration projects selected and prioritized for implementation. The four RCZs also add a long-term natural resource management framework that ties into common conservation, restoration, naturalization, and rehabilitation types that are applicable to the BCRI's goals. The summaries below highlight how these concepts apply to prioritizing projects at Lynn Newbry Park, Blue Heron Park, and the six BCRI priority areas.

Lynn Newbry Park

Projects proposed in RCZ1 once complete may involve the lowest level of management intensity over time, but still include maintenance and restoration activities that will require protection in perpetuity. Examples are existing and completed restoration sites or natural park areas, like the areas around Lynn Newbry Park that currently provide high quality habitat and meet the desired conditions outlined in the NRP. However, taking into account the effects of climate change and the dynamic nature of ecosystems, new restoration projects may be suitable in the RCZ1 zone in the future given all areas will require some level of monitoring and maintenance. In comparison, projects proposed in RCZ2 and RCZ3 may involve the greatest level of management intensity commensurate with larger-scale naturalization efforts, like the preliminary design concepts proposed at Lynn Newbry Park. In the case of Lynn Newbry Park, naturalization may include converting areas that have not been greatly altered by human disturbances in order to heighten or improve ecological functions and values.

Blue Heron Park

Naturalization projects can also apply to areas previously altered that have outcomes for more native habitat types expected along Bear Creek, particularly at parks that are easily accessible where there are recreation and educational opportunities. Blue Heron Park, which is adjacent to the Phoenix BCRI Priority Area, is one example of a large park that is not only accessible along the Bear Creek Greenway, but also through existing pedestrian

connections near areas with new businesses and commercial areas (e.g., Clyde's Corner) that front the Greenway amenities along Bear Creek. Restoration activities have already started at the Phoenix BCRI Priority Area, in addition to the Mile Marker 16.6 area at Blue Heron Park proposed for implementation in 2024. Rehabilitation projects may also occur in these areas, if they are projects associated with degradation or damage due to the fires; these areas also occur in the areas around Blue Heron Park.

Six BCRI Priority Projects in the Two Fire Perimeters

Sequencing restoration projects should also consider the immediate vegetation management and fuel reduction needs of the municipalities and fire districts and matching restoration efforts with fuel reduction projects proposed in the same areas along Bear Creek. Examples may include ecological restoration projects in the cities of Medford and Talent where fuel reduction efforts are currently proposed along Bear Creek, as outlined in their respective FMPs. Other related vegetation and flood protection projects and mitigation activities may be outlined in the Jackson County Multi-Jurisdictional Hazard Mitigation Plan and single-jurisdiction hazard mitigation plans. Ongoing collaboration with the planning, public works, and fire departments within the six cities would allow the BCRI to continue to build partnerships and support grant funding opportunities for projects that have similar goals. This collaboration would encourage all of the involved partners to achieve their various implementation targets whether those are related to ecological restoration, fuels reduction, or flood protection. Prioritizing projects in conjunction with fuel reduction projects that may have funding in place may mean that some BCRI priority areas are not selected in the short term, but at a minimum undergo interim restoration (slope stabilization, passive approaches, etc.), particularly to address any post-wildfire restoration needs.

Ashland Ponds Restoration Success Story

The Ashland Ponds restoration site is a riparian planting project on 2.25 acres. It included the removal and control of invasive species and weeds and the planting of 2,000 native trees and shrubs per acre on both burned and unburned sections of Ashland Creek, a tributary to Bear Creek. Temporary plant protection cages and an irrigation system was installed during the first two years to help plants get established. Native trees planted included big leaf maple, Oregon ash, white alder, Ponderosa pine, Douglas fire, incense cedar, and willow. Shrubs planted included mock orange, chokecherry, Pacific ninebark, Oregon grape, red flowering currant, and blue elderberry. The Freshwater Trust, an Oregon-based non-profit organization and BCRI partner has been working with the City of Ashland to develop and implement a water quality trading program for the City. As part of this program, the Freshwater Trust managed the restoration project at Ashland Ponds to help the City comply with its Clean Water Act wastewater permit.

Photo Credit: Freshwater Trust 2022

Chapter 5 - Action Plan

The Action Plan Component describes the goals and objectives the BCRI defined for the purpose of guiding the priority restoration projects along Bear Creek. The BCRI originally developed the goals and objectives in their 2019 Final Report. These goals and objectives were then refined during an October 2022 site visit and charrette process that included participants from the Federal Emergency Management Agency (FEMA), the U.S. Environmental Protection Agency (EPA), Oregon Department of Emergency Management (ODEM), and the key BCRI partners with guidance from WSP Environment & Infrastructure (WSP). When the BCRI and stakeholder revisited the goals and objectives in 2022 the focused on the management issues discussed during the site visit that focused on ecological restoration, floodplain connectivity, recreational opportunities, fire management and public safety, and collaboration and partnerships.

2022 Post-Fire Planning Process

In 2022 the BCRI Working Group applied for and was awarded a Technical Assistance grant from the U.S. EPA that was funded by FEMA. In October the BCRI Working Group lead staff from the EPA, FEMA, ODEM, and the WSP Consultant team on a field visit of restoration sites along Bear Creek. During the field visit the group discussed key management issues specific to the various restoration sites. Following the site visit, the WSP Consultant team facilitated a planning charrette to revisit the BCRI's goals and objectives and project actions. The group also developed preliminary Riparian Condition Zones (RCZs) and prescriptions for various pilot areas along Bear Creek to support the NRP's Vegetation Component (Chapter 4).

Photo Source: WSP 2022

GOALS AND OBJECTIVES

Goals were defined for the purpose of this plan as broad-based policy statement that represents the restoration conditions of the BCRI and the Rogue Valley community. The BCRI was provided the list of the existing BCRI vision statement and goals during the charrette and asked to write new or revised goals keeping in mind the management issues, improving climate resiliency, and the 11 themes focused on hazard tree removal, invasive plant species management, riparian vegetation restoration, reseeding, stream habitation and floodplain connectivity, infrastructure protection, soil stability and erosion control, GIS-data sharing, annual planning, and community involvement. Goal statements were then reviewed and grouped into the theme categories and discussed during the charrette. They were slightly modified during the 2022 charrette to be non-specific and future-oriented statements that focus on resiliency. Based on the goal development and revision process, the BCRI identified the following 15 goals and corresponding objectives:

Hazard Trees

- **Goal 1.** Remove trees that were damaged or killed by wildfire that pose a risk to people, animals, personal property, utilities, and other structures, while protecting those that provide valuable habitat and food resources for wildlife, as well as nutrition to soil.
    - **Objective 1.1** Reassess tree conditions on a yearly basis.

Invasive Plant Species Management

- **Goal 2.** Employ an Integrated Pest Management (IPM) Strategy to prevent invasive species from outcompeting native plants for resources such as water, nutrients, and space.

- **Objective 2.1** Utilize herbicides only after monitoring indicates they are needed according to established guidelines, and treatments are made to remove only the target organism.

Riparian Vegetation

- **Goal 3.** Enhance and establish native riparian vegetation with an emphasis on allowing natural regeneration.
  - **Objective 3.1** Acknowledge that tree and shrub planting and/or seeding may be needed in certain conditions or situations to enhance riparian habitat.
- **Goal 4.** Improve riparian habitat to benefit water quality and native aquatic and terrestrial wildlife and identify locations along Bear Creek where native plant rehabilitation is needed for post-fire recovery.
  - **Objective 4.1** Ensure riparian habitat provides shade cover.
  - **Objective 4.2** Annually assess new locations along Bear Creek for future restoration opportunities.
- **Goal 5.** Implement projects that improve access to the riparian area for ongoing vegetation management, public safety, and recreation.
  - **Objective 5.1.** Collaborate with cities, County, and other landowners to track recreation access improvements.

Reseeding

- **Goal 6.** Use ecologically minded approaches to restoring native vegetation.
  - **Objective 6.1** Explore alternative native restoration techniques through at least one pilot study every other year.

Stream Habitat and Flood Connectivity

- **Goal 7.** Use data and stakeholder-driven analyses to identify locations along the Bear Creek corridor where floodplain connectivity can be increased without adding risk to adjacent communities or infrastructure.
  - **Objective 7.1** Strategically design and implement riparian, instream, and floodplain projects that promote food sources and habitat for beavers, whose activities improve water and nutrient retention on the floodplain and increase habitat for a host of fish and wildlife.

Infrastructure Protection

- **Goal 8.** Design and implement strategies that provide ecosystem services and promote natural stream and floodplain processes while protecting key infrastructure elements.
  - **Objective 8.1** Perform analyses to identify and prioritize infrastructure protection needs that may result from current and improved natural stream processes.
- **Goal 9.** Utilize instream habitat improvement and floodplain reconnection projects to reduce stream velocity while redirecting the stream away from sensitive infrastructure.
  - **Objective 9.1** Design and implement restoration projects that reduce stream velocity and avoid sensitive infrastructure.
- **Goal 10.** Work with stakeholders and land managers along the Bear Creek corridor to identify, prioritize, and develop stormwater treatment at storm drain outfalls and road drainages.
  - **Objective 10.1** Improve stormwater treatment at storm drain outfall and road drainages.
- **Goal 11.** Protect key infrastructure elements such as bridge abutments, culverts, roads, trails, municipal sewer, water, gas, and power lines, and recreation facilities.

- **Objective 11.1** Provide technical and material assistance with design, permitting, and implementation of projects that aim to protect municipal sewer, water, gas, and electric infrastructure where it intersects with the Bear Creek floodplain.

Soil Stability and Erosion Control

- **Goal 12.** Have stable soil that is not experiencing excessive erosion, particularly in burned areas.
  - **Objective 12.1** Ensure soil is stable and has adequate properties and nutrients to support native riparian vegetation

GIS-Data Sharing and Annual Planning

- **Goal 13.** Promote data sharing, annual planning workshops, and collaboration among the BCRI Working Group and partners to review and update the list of restoration projects.
  - **Objective 13.1** Create a GIS-based restoration data set for the Bear Creek Corridor to map past, present, and planned restoration actions on BRCI's Online ArcGIS Map for the six priority areas within the burn perimeters, plus the four priority areas outside the burn perimeter.
  - **Objective 13.2** Schedule an Annual Visioning Workshop with the BCRI Working Group and partner agencies and organizations to collaborate on planned and future restoration actions.

Community Involvement

- **Goal 14.** Educate and engage the community to promote awareness on the ecological values and recreational opportunities along Bear Creek.
  - **Objective 14.1** Hold an Annual Public Open House event with partners to educate the community about the Bear Creek restoration efforts and promote the event through other ongoing forums related to water quality, fire safety, economic development, and transportation planning.

Fire Safety Coordination

- **Goal 15.** Increase public safety and reduce fire risk along the Bear Creek Greenway and the adjacent riparian corridor through cross-sector partnerships to leverage limited available resources.
  - **Objective 15.1** Participate in Annual Reviews with fire and land managers with the six different jurisdictions along Bear Creek to understand fuel reduction efforts, share ideas about complementary restoration projects, and support grant funding opportunities
  - **Objective 15.2** Meet with existing and new partners on a biannual basis to review the statuses of existing projects and to identify new project opportunities.

ACTION PLAN

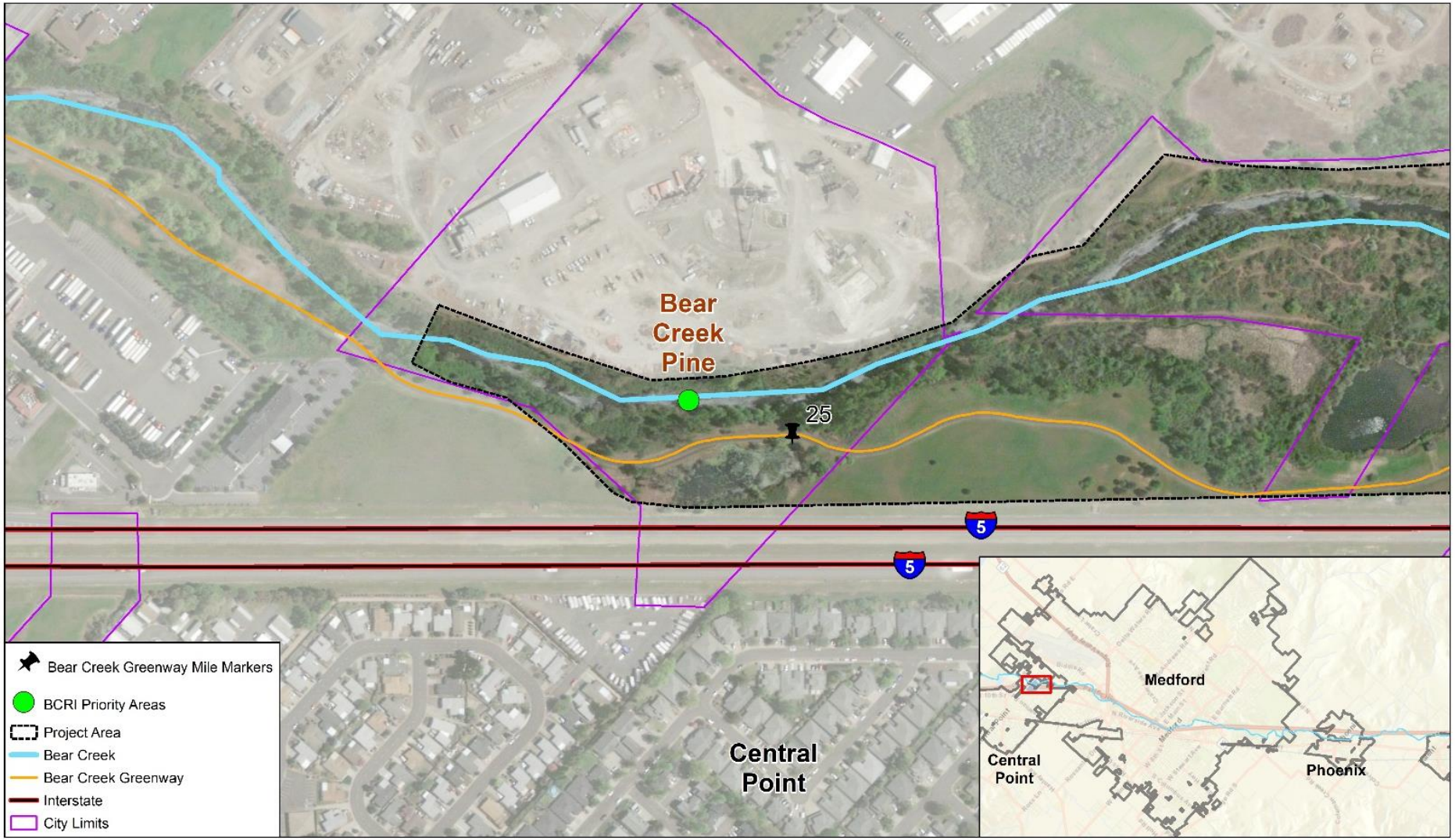
The BCRI developed a list of prioritized riparian restoration projects in 2019. This list was based on ongoing projects and existing partnerships, new projects and partnerships, projects associated with an existing plan (e.g., master plan), and projects that address restoration needs and public safety concerns. The six BCRI projects listed in the Action Plan are those projects that occur within the public lands within the floodplain and the burn perimeter associated with the 2020 Almeda and Table Rock Road fires. The BCRI project summarize the project location, existing conditions versus desired conditions, key management indicators and the goals the project helps achieve, lead agency or organizations, partners, priority level, potential funding sources, cost estimates, management activities, and the timeline for each project. The Action Plan is comprised of the six prioritized riparian restoration projects, as well as the recommendations described in Chapter 2 – Management Directives, Chapter 3 – Hydrology Component, and Chapter 4 – Vegetation Component. The recommendations are summarized in Section C. Recommended Actions.

Bear Creek Pine Street Bridge Priority Area

Project Location	60 acres of riparian corridor at Bear Creek Pine Street Bridge in Central Point. The length of stream reach consists of approximately one mile along Bear Creek
Existing Conditions	No information available at the time of this report
Desired Conditions	RCZ 1 and RCZ2
Key Management Indicators	• Tracking improved riparian conditions and wetland habitat • Water quality improvement, Creek shading, stormwater treatment • Reduce fuels and fire risk
Related Goals	No information available at the time of this report
Lead Agency and Partners	• City of Central Point, • City of Medford • Jackson County, • Knife River TFT • Lomakatsi Restoration Project • RVCOG
Priority Level	No information available at the time of this report
Funding Sources	No information available at the time of this report
Cost Estimate	• $250,000
Management Activities	• Removal of invasive plants • Supplemental planting with native trees and shrubs • Control of invasive plants for 5 years • Instream habitat work
Timeline	• 3-5 years

Figure 15 shows the location of the Bear Creek Pine Street Bridge Priority Area.

Figure 15. Bear Creek Pine Street Bridge Priority Area

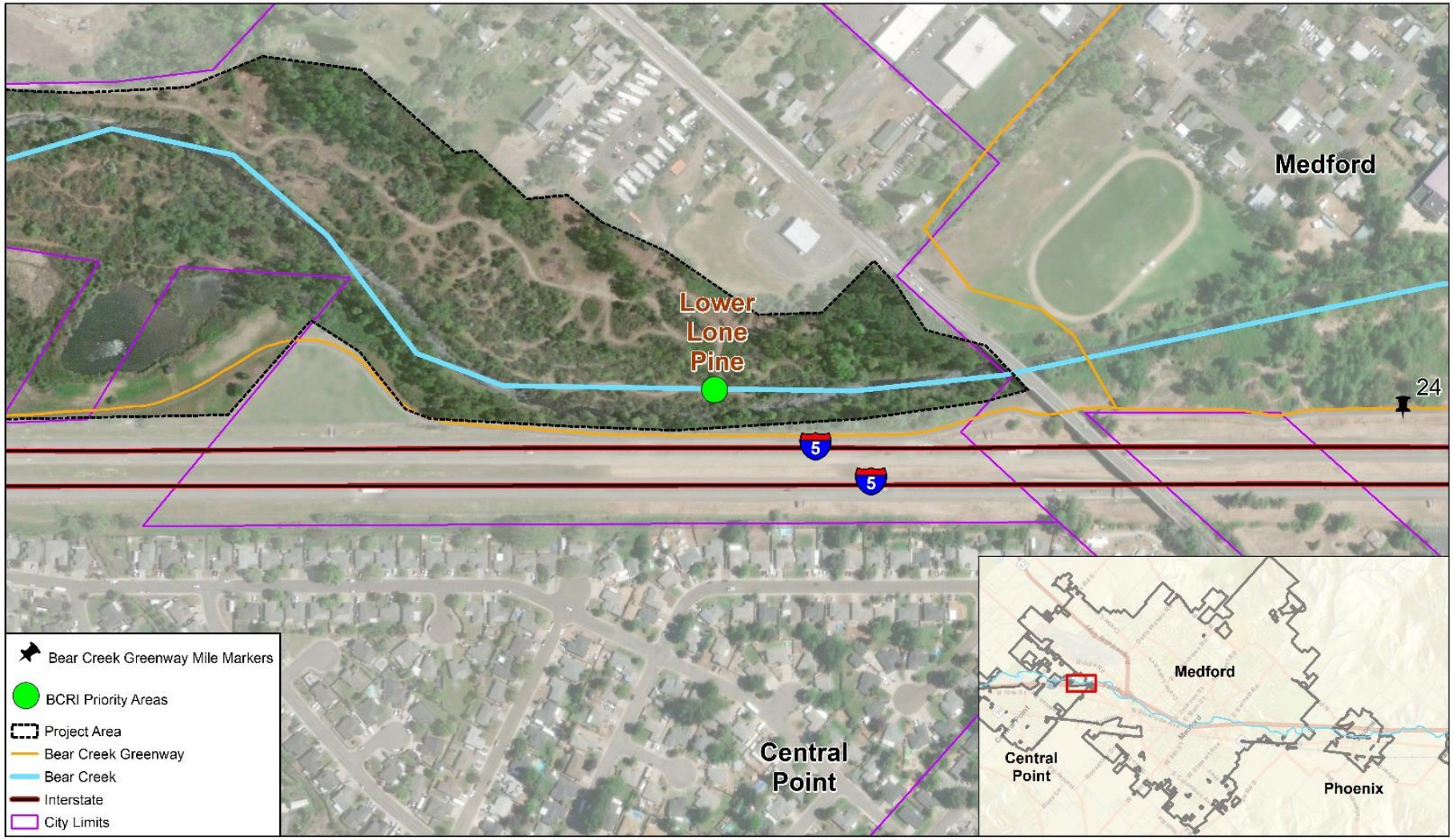


Lower Lone Pine Priority Area

Project Location	60 acres of riparian corridor at Bear Creek Pine Street Bridge in Central Point. The length of stream reach consists of approximately one mile along Bear Creek.
Existing Conditions	No information available at the time of this report
Desired Conditions	RCZ 1, 2, and 3
Key Management Indicators	• Tracking improved riparian conditions and wetland habitat • Water quality improvement, Creek shading, stormwater treatment • Reduce fuels and fire risk
Related Goals	No information available at the time of this report
Lead Agencies and Partners	• City of Central Point, • City of Medford • Jackson County, Knife River TFT • Lomakatsi Restoration Project
Priority Level	No information available at the time of this report
Funding Sources	No information available at the time of this report
Cost Estimate	• $250,000
Management Activities	• Removal of invasive plants • Supplemental planting with native trees and shrubs • Control of invasive plants for 5 years • Instream habitat work
Timeline	• 3-5 years

Figure 16 shows the location of Lower Lone Pine Priority Area.

Figure 16. Lower Lone Pine Priority Area

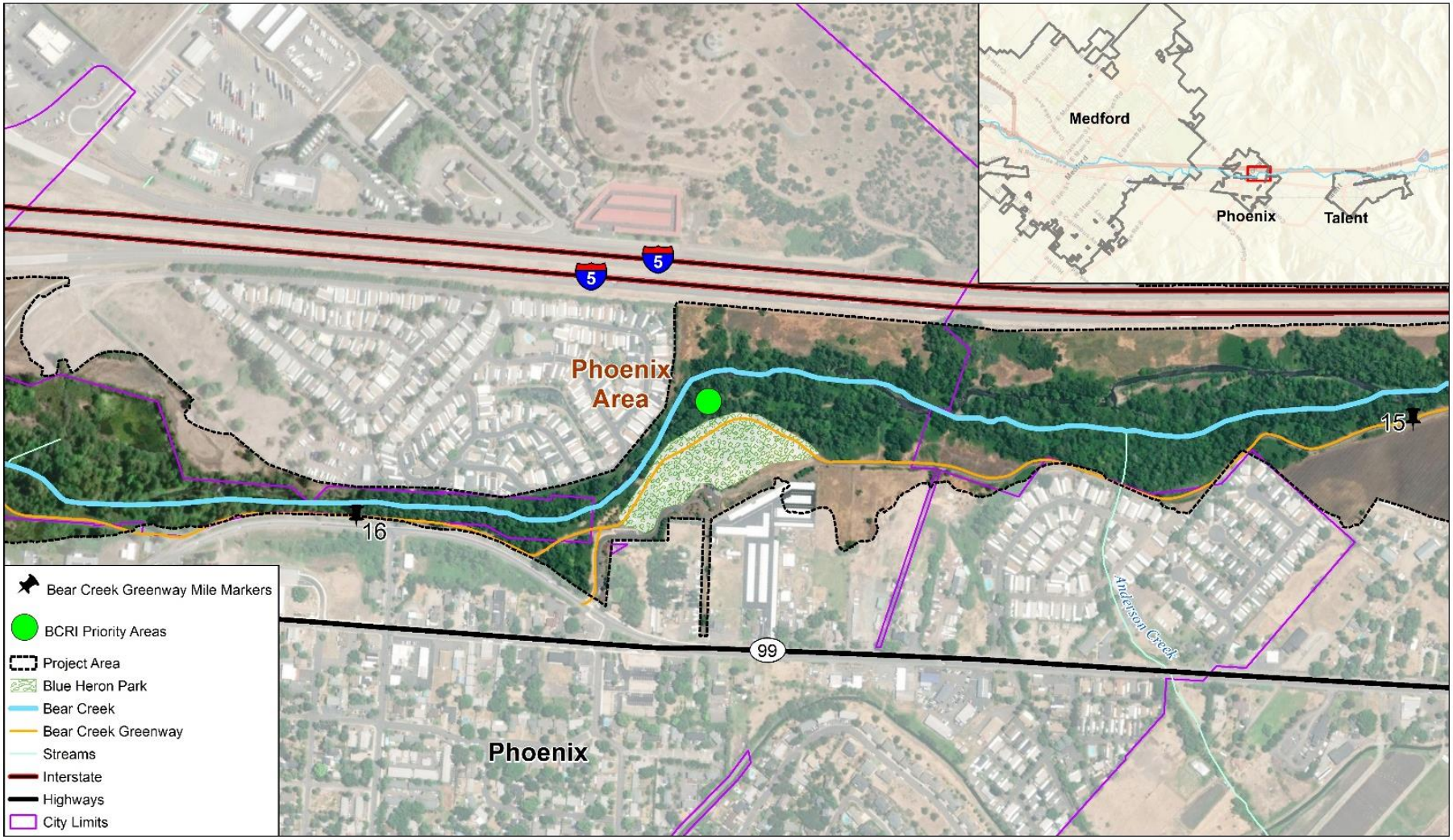


Phoenix Priority Area

Project Location	19 acres that includes Blue Heron Park, Anderson Creek confluence to Coleman Creek. The length of stream reach is approximately 1.5 miles along Bear Creek.
Existing Conditions	 
Desired Conditions	RCZ 1, 2, and 3
Key Management Indicators	• Tracking improved riparian conditions and wetland habitat • Water quality improvement, Creek shading, stormwater treatment • Reduce fuels and fire risk • Remove public safety hazards and infrastructure
Related Goals	No information available at the time of this report
Lead Agencies and Partners	• City of Phoenix • Jackson County • Jackson County Fire District 5 • Jackson County Social Services • ODFW • RRWC • RVCOG • RVSS
Priority Level	No information available at the time of this report
Funding Sources	No information available at the time of this report
Cost Estimate	• $150,000 for Phase 1, $170,000 for Phase 2
Management Activities	• Removal of invasive plants • Supplemental planting with native trees and shrubs • Control of invasive plants for 5 years • 1.3 acres of wetland enhancement within Blue Heron Park proposed as a multi-year project

Figure 17 shows the location of the Phoenix Priority Area.

Figure 17. Phoenix Priority Area



Map compiled 2/2023;
Intended for planning purposes only.
Data Source: Oregon Spatial Data Library, Logan Simpson, Rogue Valley Council of Governments, USGS, Jackson County

0 500 1,000 Feet

Wagner Creek Confluence Priority Area

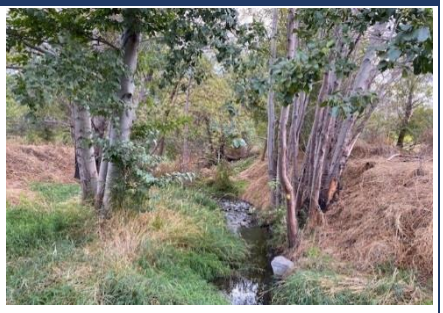
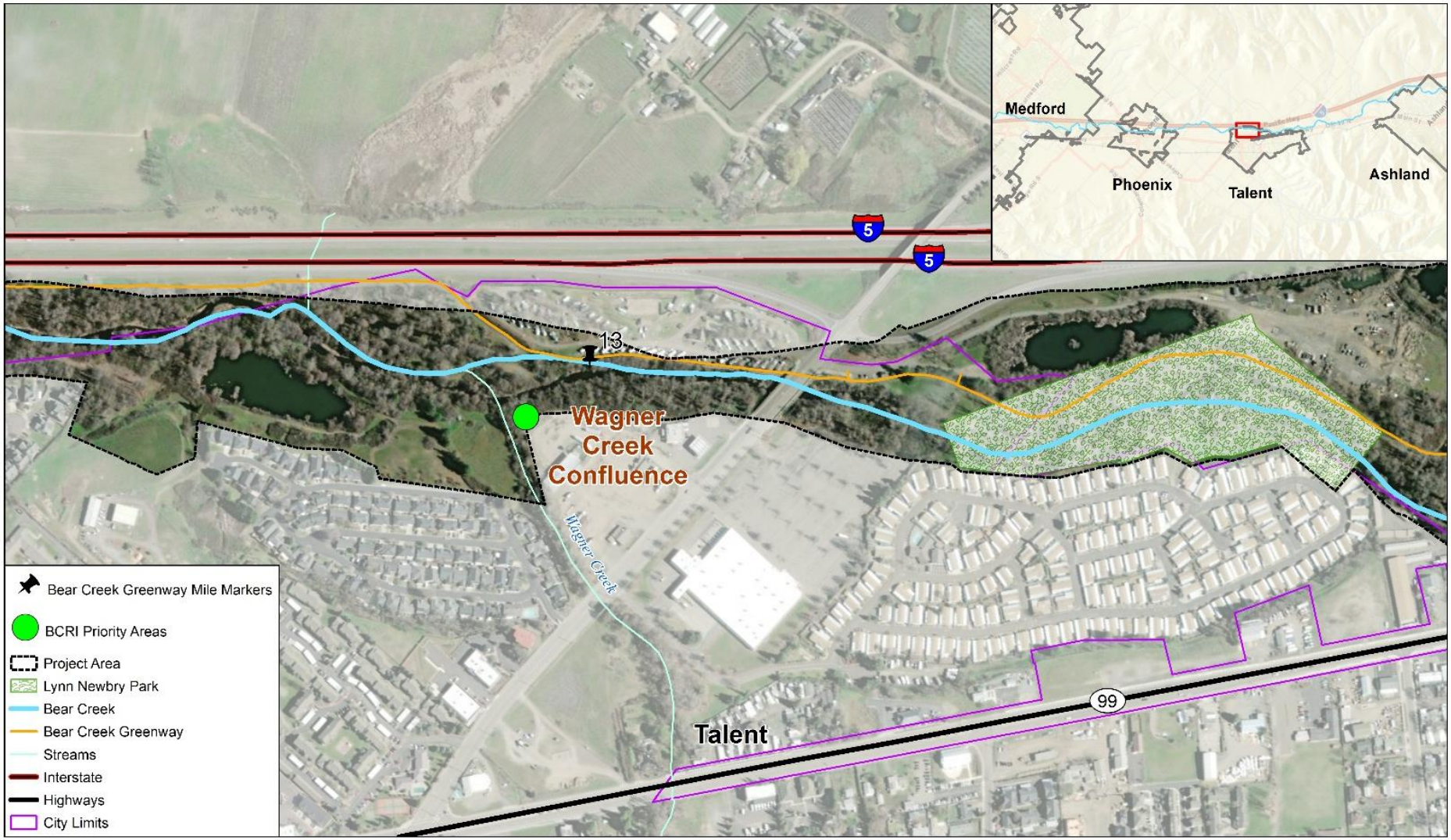
Project Location	12 acres of riparian corridor along Bear Creek and lower Wagner Creek to west Valley View Road
Existing Conditions	 
Desired Conditions	RCZ1 and RCZ2
Key Management Indicators	• Enhanced riparian habitat • Improved water quality • Reduced fire risk
Lead Agencies and Partners	• TFT • City of Talent • Jackson County • JSWCD • Private Landowners
Priority Level	No information available at the time of this report
Funding Sources	No information available at the time of this report
Cost Estimate	• $200,000
Management Activities	• Removal of invasive plants • Supplemental planting with native trees and shrubs • Control of invasive plants for 5 years • Fish passage improvement (sewer line constraint for juvenile Steelhead)
Timeline	No information available at the time of this report

Figure 18 shows the location of the Wagner Creek Priority Area.

Figure 18. Wagner Creek Confluence Priority Area

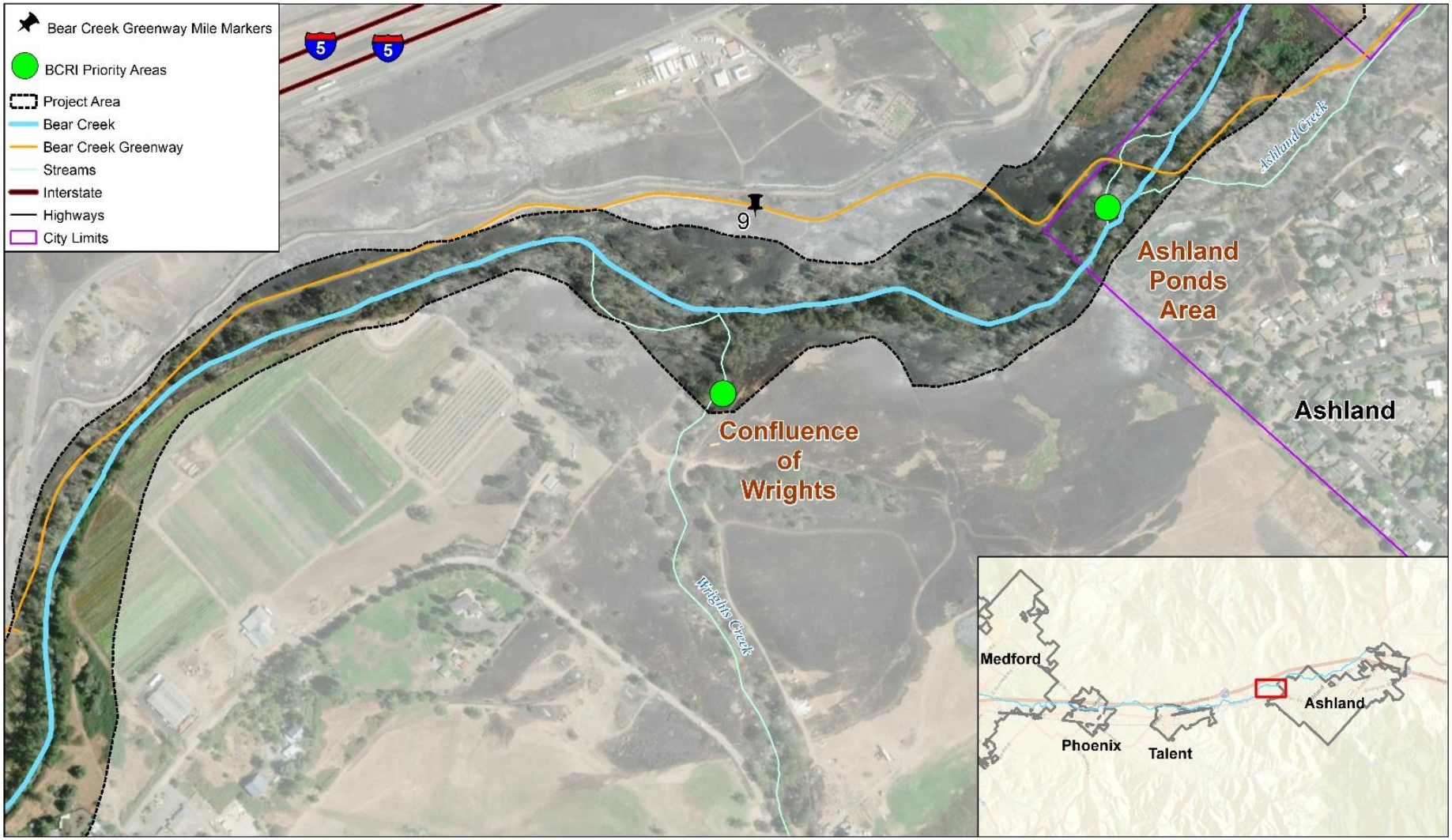


Confluence of Wrights Creek Priority Area

Project Location	18 acres composed of riparian corridor of lower reach of Wrights Creek and approximately 0.5 miles of Bear Creek, length of stream reach 1 mile (0.5 miles on Wrights Creek and 0.5 miles on Bear Creek)
Existing Conditions	
Desired Conditions	RC 1 and RCZ2
Key Management Indicators	• Removal of invasive plants • Supplemental planting with native trees and shrubs • Control of invasive plants for 5 years
Related Goals	No information available at the time of this report
Lead Agencies and Partners	• RRWC • Talent Irrigation District • TFT • Lomakatsi Restoration Project • Jackson County
Priority Level	No information available at the time of this report
Funding Sources	No information available at the time of this report
Cost Estimate	• $250,000
Management Activities	• Removal of invasive plants • Supplemental planting with native trees and shrubs • Control of invasive plants for 5 years • Instream habitat work
Timeline	No information available at the time of this report

Figure 19 shows the location of the Wrights Creek Priority Area.

Figure 19. Confluence of Wrights Creek Priority Area

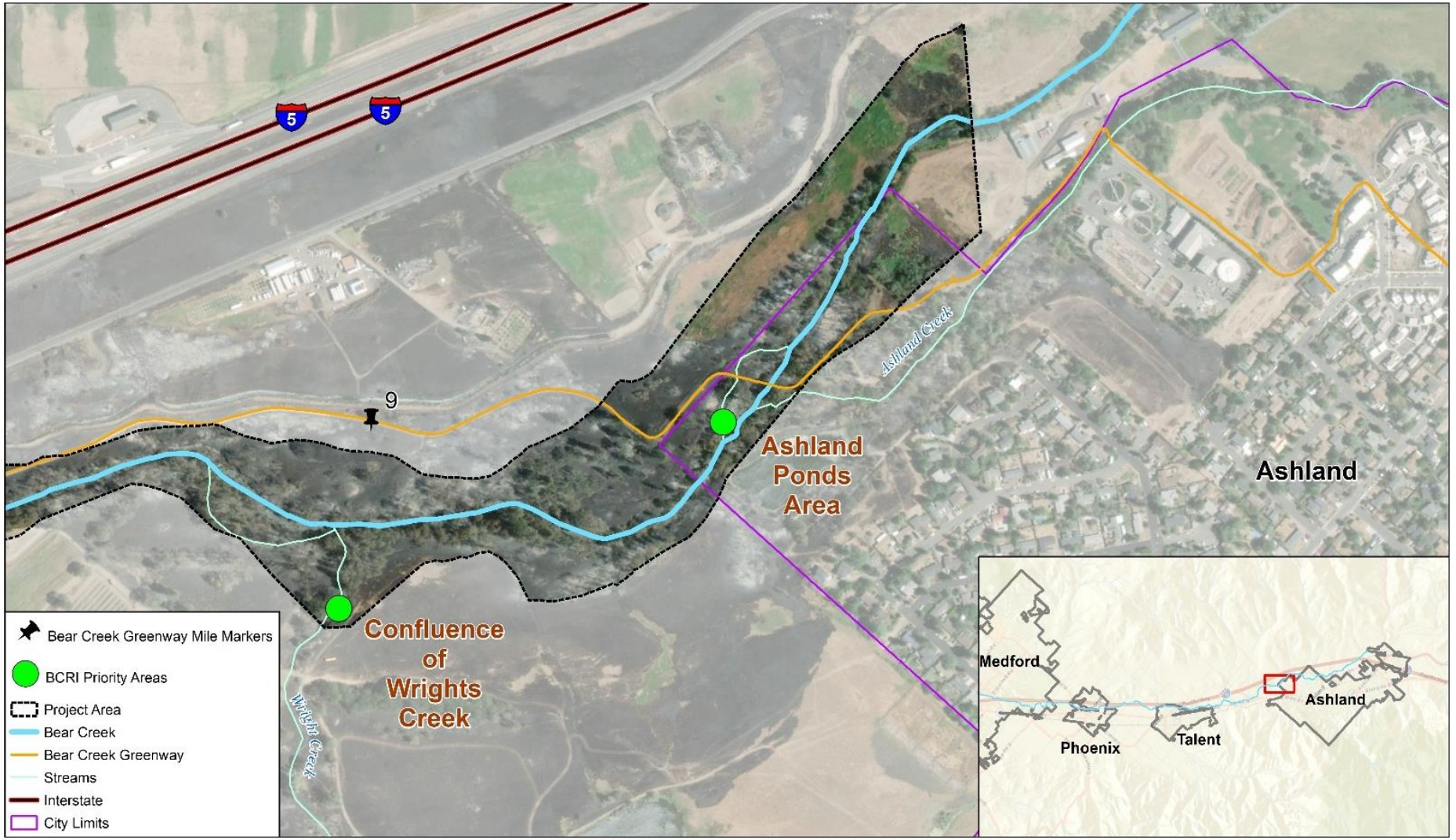


Ashland Ponds Priority Area

Project Location	45 acres of riparian corridor on lower reach of Ashland Creek (Stream Reach is 1 mile: 0.5 miles on Ashland Creek, 0.5 miles on Bear Creek)
Existing Conditions	
Desired Conditions	RCZ1
Key Management Indicators	• Need to track improved riparian conditions and wetland habitat • Water quality improvement, Creek shading • Reduce fuels and fire risk
Related Goals	No information available at the time of this report
Lead Agencies and Partners	• City of Ashland • Talent Irrigation District • TFT • Lomakatsi Restoration Project
Priority Level	No information available at the time of this report
Funding Sources	No information available at the time of this report
Cost Estimate	• $250,000
Management Activities	• Removal of invasive plants (Himalayan blackberry, English ivy, Poison hemlock) • Supplemental planting with native trees and shrubs • Control of invasive plants for 5 years • Fish Passage Improvement component
Timeline	No information available at the time of this report

Figure 20 shows the location of the Bear Creek Pine Street Bridge Priority Area.

Figure 20. Ashland Ponds Priority



RECOMMENDED ACTIONS

During the planning charrette with the BCRI and development of this NRP, several actions and projects were discussed as potential future additions to the Action Plan of the Bear Creek NRP. Each action and project idea aligns with the goals and objectives outlined in Section A. Goals and Objectives. These recommended actions are listed below:

- **Local WUI Standards.** Each of the six jurisdictions should adopt WUI and vegetation management standards and fuel break requirements to ensure understory vegetation remains contained and fire resistant, that the tree canopy is maintained to prohibit canopy spread of wildfires.
- **Model Bear Creek Ordinance.** A model regulatory code or overlay ordinance should be developed that can be adopted by each of the six jurisdictions along with a MOU between each community and Jackson County to ensure consistent management along the 50 feet of the top of the bank of Bear Creek.
- **Riparian Protection Zone.** Establish a riparian protection zone to be maintained at a distance of 120 feet from the OHWM for perennial streams and 50 feet for intermittent streams and wetlands. The riparian protection zone should include an inner buffer (0-60') from the OHWM of the perennial streams where there is no vegetation management and an outer buffer (60-120') for an additional 60 feet from the OHWM to maintain native riparian conditions.
- **H&H Modeling Review.** The BRCI should review the digital H&H modeling results for each BCRI priority area. Areas where high flood depths, velocities, and bed shear stress are shown to occur should be prioritized. ODOT's drainage design manual and other federal, state, and local guidelines should be consulted before commencing bank stabilization or channel restoration efforts.
- **Riparian Condition Zones.** The BCRI should develop RCZs for additional reaches of Bear Creek to provide management prescriptions that are specific to the diverse settings found along the riparian corridor.
- **Blue Heron Park Restoration.** Restoration activities have already started near the Mile Marker 16.6 area at Blue Heron Park and near-term efforts are proposed in 2024. Additional rehabilitation and restoration should continue to be planned around Blue Heron Park in future years.
- **Sequencing Restoration Projects with Vegetation Management.** Sequencing restoration projects with vegetation management and fuel reduction treatments overseen by the six municipalities and various fire districts should align restoration efforts proposed in the same areas along Bear Creek and ensure plan integration with related FMPs and the Jackson County MJHMP.
- **Partnerships and Collaboration.** Ongoing collaboration with the planning, public works, and fire departments within the six municipalities would allow the BCRI to continue to build partnerships that support grant funding opportunities for projects that have similar goals related to ecological restoration, fuels reduction, and flood protection.
- **Rapid Assessment Method.** The BCRI should consider establishing a rapid assessment protocol to cost-effectively monitor riparian areas along Bear Creek. These protocols should be useful for monitoring the entire corridor or a specific restoration site.
- **Dashboard Tracker.** A digital dashboard tool that tracks the progress of riparian restoration and allows the BCRI to visualize the current progress of projects should be integrated into the BCRI's Webpage.

- **Restoration Portfolio.** The BCRI should develop a portfolio of restoration projects that highlights key efforts and annual implementation successes to showcase projects that support building resiliency along Bear Creek. This information can then be shared with stakeholders, partners, and the community.

SELECTION AND PRIORITIZATION OF RESTORATION PROJECTS

Six priority projects are proposed along Bear Creek with future projects anticipated at Lynn Newbry Park and south of Blue Heron Park (e.g., near River Mile Marker 16.6). Other recommended actions and projects are listed in Section C. Recommended Actions. Selection and prioritization criteria will assist the BCRI in project prioritization. The BCRI will use social, technical, administrative, political, legal, economic, and environmental criteria to prioritize, evaluate, and document project implementation.

Criteria includes social factors that consider the effects of a project on the community and whether there may be disproportionate effects associated with implementation. Technical factors consider the feasibility of the project and asks whether the project benefits exceed the costs. Administrative factors consider whether the BCRI and its partners have the capacity to administer and manage the project. Political factors consider land ownership and management responsibilities. Legal factors address jurisdictional laws and regulations that differ along the Bear Creek corridor. Economic factors address costs. Environmental factors consider ecosystem functions and services and compliance with environmental regulations.

The process of identifying and prioritizing restoration projects will allow the BCRI to come to consensus to collectively track and implement projects over time. This process also recognizes the limitations in prioritizing projects from multiple agencies and organizations in the Rogue Valley and the regulatory requirements that must be met. This process will also later support cost-effectiveness and project development activities should the BCRI seek grant funding opportunities associated with the NRP.

Chapter 6 - Implementation and Monitoring Component

The 2020 fires caused changes to the Bear Creek watershed that resulted in the loss of riparian vegetation, increased soil erosion and sedimentation, and water quality impacts. Recovery efforts include key restoration projects to improve aquatic and riparian habitat and ecological function, increase flood resilience, and restore the long-term health and stability of Bear Creek. But getting restoration projects on the ground is not enough. To build resiliency in the Bear Creek watershed, a monitoring framework is needed that, when implemented, will ensure that these restoration projects meet planning goals over time so Bear Creek will be able to reduce impacts from, quickly recover from, and adapt to disturbances and climate change stressors like flooding, wildfire, and prolonged droughts into the future.

The Implementation and Monitoring Component outlines a 10 to 15-year long-term implementation and monitoring program to track and evaluate vegetation conditions, hydrological function, vegetation management, and public safety projects along Bear Creek and its tributaries. The Implementation and Monitoring Component consists of goals and objectives, metrics and monitoring methodology, and a process for evaluating results and refining and adjusting methods. The component also outlines monitoring and assessment protocols and references field techniques and dashboard tools that can help the Bear Creek Restoration Initiative (BCRI) establish, evaluate, and report on the conditions and restoration project efforts along Bear Creek. The Implementation and Monitoring Component applies an iterative approach that will allow the BCRI partners to assess progress of revegetation efforts, floodplain connectivity improvements, soil and erosion control efforts, vegetation management, and strategic partnerships.

STUDY AREA AND SETTING

Project Location

Bear Creek consists of 28.8 miles within an approximate 360-square mile watershed in the Rogue Valley in Jackson County, Oregon. It begins near Emigrant Lake and travels through five municipalities, including the cities of Ashland, Talent, Phoenix, Medford, and Central Point until it reaches the confluence with the Rogue River in the northwestern part of the valley. The Project Area for purposes of this monitoring plan is defined as a 12-mile segment of public lands within the floodplain that were impacted during the 2020 Almeda and Table Rock Road Fires. Given watersheds and ecosystems are dynamic systems and there is uncertainty regarding climate change, the BCRI's future restoration priority projects will change over time, resulting in modified project areas for monitoring efforts.

Key Restoration and Management Issues along Bear Creek

Several issues impact the management of the riparian area along Bear Creek and its tributaries. These management issues were identified in the Final Report for the BCRI submitted by the Rogue Valley Council of Governments (RVCOG) in 2019. While the 2020 fires removed large areas of non-native invasive plants along Bear Creek, after two years since the wildfire, many of these non-native invasive plant species are returning to the riparian corridor. The impacts from the wildfires emphasized the importance of vegetation management and the need for multi-jurisdictional coordination to promote public safety. Therefore, the management issues remain key concerns for the BCRI and communities in the Rogue Valley. They are summarized below and in more detail in Chapter 4 – Vegetation Component.

- **Non-Native Invasive Plants:** There are invasive plant species within the riparian corridor of Bear Creek. When these plants are within their native range pests and diseases and competitors regulate their reproduction and spread, but in new environments, these factors may not be present, and the introduced plants can outcompete the native plants. Invasive plants such as Himalayan blackberry form dense patches that exclude other vegetation and provide fuel for wildland fires (RVCOG 2019). Known invasive plants found along the riparian corridor include Himalayan blackberry, poison hemlock, English ivy, puncture vine (goat head), tamarisk, purple loosestrife, and reed canary grass.
- **Herbicide Use to Control Invasive Plants:** As noted in Chapter 2 – Management Directives, the use of herbicide to control invasive plants varies by jurisdiction and is not permitted in all cities. It is, however, an effective tool used to control invasive plants when used properly and through "spot" treatments that target specific invasive plants during specific seasons. Herbicide use has been found useful in controlling the high amounts of star thistle, punctureVine, and Himalayan blackberry along Bear Creek.
- **Fish and Wildlife Concerns:** Riparian corridors like Bear Creek are productive habitats for species diversity and wildlife density in southwest Oregon. Some of the key species occurring in this area are Coho and Chinook salmon, Steelhead, Monarch butterflies, Pacific lamprey, beaver, and bald eagles. Riparian areas also provide shaded in-stream habitat, control erosion, increase streambed stability, and support unique invertebrate communities.
- **Vegetation Management and Public Safety:** Urban development, unhoused populations, and the introduction of invasive and non-native plants have altered the fire behavior and regimes in the Rogue Valley by increasing fuel flammability, which increases the frequency of fires. Vegetation management combined with a focus on improving public safety by enhancing recreational experiences and removing vectors that transmit disease and other pathogens is crucial.
- **Recreation Management:** Vegetation restoration projects provide opportunities to engage the community in creek clean-up events, planting efforts, and educational and interpretive activities. The projects also provide other partner organizations an opportunity to share similar riparian restoration efforts along the Bear Creek Greenway.
- **Multi-Jurisdictional Ownership:** Management challenges also involve complying with the various jurisdictional requirements that apply to the 50-foot riparian corridor of Bear Creek and its tributaries, such as the Jackson County Riparian Ordinance and the Oregon Department of Fish and Wildlife (ODFW) vegetation removal and replacement requirements.

PARTNER ORGANIZATIONS

As previously mentioned, the BCRI is a voluntary working group dedicated to restoring Bear Creek's riparian corridor. Their mission is to tackle both environmental and social issues that arise with managing the urban restoration of the Bear Creek watershed. The BCRI working group and their partner organizations are those primarily responsible for implementing the Bear Creek Natural Resource Plan (NRP) Implementation and Monitoring Component.

Core BCRI Working Group

The core BCRI working group consists of individuals from the RVCOG, the Freshwater Trust, the Rogue River Watershed Council, Jackson County, Jackson Soil & Water Conservation District, Western Monarch Advocates, Rogue Basin Partnership, Rogue Riverkeeper, and Lomakatsi Restoration Project.

Partner Agencies, Municipalities, and Organizations

Other members of BCRI include local communities and landowners, agencies, watershed groups, and tribes. Some of these members include the U.S. Fish and Wildlife Service, Oregon Department of Transportation and

the Oregon Department of Forestry; cities of Ashland, Talent, Phoenix, Medford, and Central Point, Fire District 3; and local organizations, such as Stream Smart and Oregon Stewardship.

MONITORING APPROACH

Monitoring the Bear Creek corridor restoration efforts will rely on the participation of partner agencies and organizations (stakeholders). The stakeholders will be encouraged to collect basic data that the BCRI can document in their database and use for reporting on implementation progress. Basic data collection may consist of visual assessments, photo documentation, field surveys, water temperature monitoring, and data collection using GIS tools, like Survey 1-2-3. Data to be collected is discussed in the Implementation and Monitoring goals and objectives and monitoring methods sections of this component of the NRP. The intent of this monitoring approach is to have simple, cost-effective, and uniform methods to track metrics associated with implemented restoration efforts including the number of trees and/or shrubs planted, the number of hazard trees (i.e., dead or damaged) removed, acreage of invasive species treated, acreage of annual vegetation management treatments, water temperature, and the addition of recreation improvements along the Bear Creek Greenway.

IMPLEMENTATION AND MONITORING GOALS AND OBJECTIVES

The purpose of the implementation and monitoring framework is to allow BCRI partners to track the status of restoration projects based on a set of simple selected metrics. The framework will encourage the BCRI partners to compare trends documented through the monitoring methods to desired conditions outlined in the Riparian Condition Zones (RCZs) summarized in Chapter 4 – Vegetation Component. The BCRI can then learn how project restoration efforts make Bear Creek more resilient, so they can communicate these observations and project efforts to other restoration partners, volunteers, and the local community.

Table 1 summarizes the BCRI's restoration values and goals and objectives and links them with monitoring metrics to measure progress towards the goals and objectives. In this case, the monitoring metrics are measurable indicators of the composition and function of the riparian ecosystem along Bear Creek. Monitoring metrics were selected to assess changes associated with vegetation, physical water resources, recreation opportunities, and fire safety and resiliency. The metrics were selected to be simple and high-level standards that can be easily transferable to different project types by category (e.g., floodplain restoration versus recreation improvements). These monitoring metrics will also help the BCRI assess biological and watershed function and floodplain connectivity. The metrics are listed below.

Vegetation Indicators

The following are common vegetation indicators being tracked at some level by the partner organizations in the Rogue Valley for efforts along Bear Creek.

- Number of trees and/or shrubs planted (% coverage, or % survival)
- Acreage of invasive species removed/treated (blackberry in particular)
- Photo documentation (visual observations)

Physical Water Resource Indicators

The following are hydrology indicators tracked by the State, RCVOG, and other partners, and additional indicators that can be considered in the future to track areas for restoration activities that have an in-stream component. These include water quality metrics related to temperature and turbidity levels (i.e., Total Maximum Discharge Loads [TMDL] program) and surveying for the presence of benthic macroinvertebrates as an indicator of the biological condition of the creek. They also include metrics related to creek flow measurements and the frequency and duration of flood inundation (e.g., flood recurrence intervals for 2-year, 10-year, and 25-year flooding). Creek flows and water marks indicating high or low flood stage are also important. For example, high water marks show potential erosion and bank stability areas and low water marks are important for tracking fish habitat conditions.

- Water quality (pH, dissolved oxygen, temperature, turbidity)
- Creek Flows and water marks indicating high or low flood stage
- Presence of benthic macroinvertebrates

Recreation Indicators

Recreation indicators can be tracked based on coordinating riparian restoration efforts with recreation improvements along the same reach of Bear Creek. Recreational improvements can be targeted in areas where the project protects wildlife habitat or includes recreational amenities, such as salmon viewing platforms that enhance recreational experiences for the public and provide designated areas for educational events.

- Recreation Improvements (proposed, ongoing, completed projects/year)

Fire Safety and Resiliency Indicators

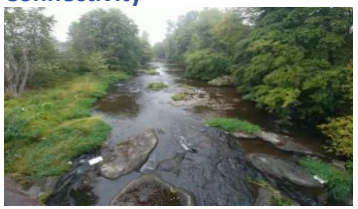
Vegetation management projects can occur year-round and include the removal or reduction of fuel vegetation; tree thinning; pruning, chipping, and utility clearances; and fuel break maintenance. As the pace and scale of fuels reduction increases in the Rogue Valley through need and more funding opportunities, the BCRI can track the projects applicable to Bear Creek by the number of acres treated on an annual basis. Other tools that can enhance visualizing this indicator may be vegetation management viewers (GIS tools) that show the work in progress by year and by program and the completed projects in previous years.

- Acres treated per/year for vegetation management

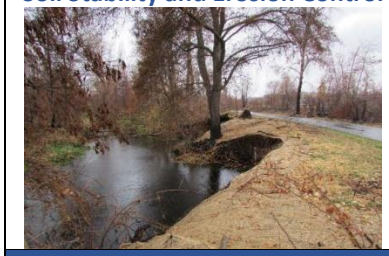
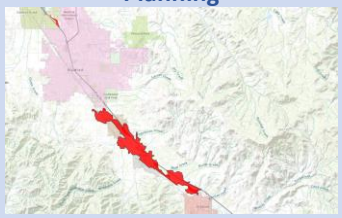
Table 8 summarizes the goals, objectives, monitoring metrics, methods, and monitoring frequencies presented in the implementation and monitoring framework.

Table 8. Implementation and Monitoring Framework

Restoration Values	Goal	Objective	Monitoring Metric	Monitoring Method	Monitoring Frequency
	Vegetation				
Hazard Trees 	Remove trees that were damaged or killed by wildfire that pose a risk to people, animals, personal property, utilities, and other structures, while protecting those that provide valuable habitat and food resources for wildlife, as well as nutrition to soil.	Reassess tree conditions on a yearly basis.	• Selective hazard tree removal for public safety while retaining tree snags for wildlife habitat	• Visual assessment of the corridor and surrounding vegetation • Photo documentation • Biological Field Survey (to determine what trees to retain) • Mapping Tool/Survey 1-2-3	Annually
Invasive Plant Species Management 	Employ an Integrated Pest Management (IPM) Strategy to prevent invasive species from outcompeting native plants for resources such as water, nutrients, and space.	Utilize herbicides only after monitoring indicates they are needed according to established guidelines, and treatments are made to remove only the target organism.	• Acreage of invasive species removed/treated • Mapping invasive species areas that require treatment	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects • Review of aerial photographs (every few years) to document change over time	Quarterly. Should be timed such that treatment of invasive species can be implemented before weeds produce seed.
Riparian Vegetation 	Enhance and establish native riparian vegetation with an emphasis on allowing natural regeneration.	Acknowledge that tree and shrub planting and/or seeding may be needed in certain conditions or situations to enhance riparian habitat.	• Field survey plots to measure natural regeneration of native riparian vegetation	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects • Review of aerial photographs (every few years) to document change over time • Conduct annual wildlife surveys to track use of the riparian habitat	Quarterly – Annually. Monitoring of native vegetation should be timed to occur when the most amount of species are in bloom.

	Improve riparian habitat to benefit water quality and native aquatic and terrestrial wildlife and identify locations along Bear Creek where native plant rehabilitation is needed for post-fire recovery.	Ensure riparian habitat provides shade cover and annually assess new locations for future restoration opportunities.	• Solar Pathfinder Tool or densiometer to measure stream shade (Southern Oregon University student post-fire baseline stream shade measurement project) • Areas of Bear Creek with high summer water temperatures • Presence of an abundance of invasive plant species • Forest-survey field data collection plot placement to describe presence/absence of native plant diversity (e.g., frequency, cover, density, production, structure, and composition)	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects • Water temperature monitoring • Visual assessment of the corridor • Existing data/reports (e.g., Bear Creek Corridor Post-Almeda Fire Vegetation Assessment)	Quarterly – Annually
	Implement projects that improve access to the riparian area for ongoing vegetation management, public safety, and recreation.	Collaborate with cities, County, and other landowners to track recreation access improvements.	• Improved access for safety and recreation while maintaining ecological functions	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects • Visual assessment of the corridor	As needed/ coordinated with initial design phase of new restoration projects
Reseeding 	Use ecologically minded approaches to restoring native vegetation.	Explore alternative native restoration techniques through at least one pilot study every other year.	• Varies, depending on goals of pilot study	• To be determined, based on pilot study	To be determined, based on pilot study
• Hydrology					
Stream Habitat and Floodplain Connectivity 	Use data and stakeholder-driven analyses to identify locations along the Bear Creek corridor where floodplain connectivity can be increased without adding risk to adjacent	Strategically design and implement riparian, instream, and floodplain projects that promote food sources and habitat for beavers, whose activities improve	• Increased connection of floodplain • Improved riparian habitat	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects • Visual assessment of the corridor	Annually or as stakeholder-driven analyses become available

	communities or infrastructure.	water and nutrient retention on the floodplain and increase habitat for a host of other wildlife.			
Infrastructure Protection 	Design and implement strategies that provide ecosystem services and promote natural stream and floodplain processes while protecting key infrastructure elements.	Perform analyses to identify and prioritize infrastructure protection needs that may result from current and improved natural stream processes.	• Implementation of strategies that provide ecosystem services and promote natural stream and floodplain processes while protecting infrastructure elements	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects • Visual assessment of the corridor/floodplain	As needed/ should be coordinated with initial design of new restoration projects and during implementation phase
	Utilize instream habitat improvement and floodplain reconnection projects to reduce stream velocity while redirecting the stream away from sensitive infrastructure.	Design and implement restoration projects that reduce stream velocity and avoid sensitive infrastructure.	• Reduced stream velocities and avoidance of sensitive infrastructure	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects • Measurement of stream velocities • Visual assessment of the corridor/floodplain	As needed/ should be coordinated with initial design of new restoration projects and during implementation phase
	Work with stakeholders and land managers along the Bear Creek corridor to identify, prioritize, and develop stormwater treatment at storm drain outfalls and road drainages.	Improve stormwater treatment at storm drain outfall and road drainages.	• Design and installation of stormwater treatment equipment	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects • Measurement of stream velocities • Visual assessment of the corridor/floodplain	As needed/ should be coordinated with initial design of new restoration projects
	Protect key infrastructure elements such as bridge abutments, culverts, roads, trails, municipal	Provide technical and material assistance with design, permitting, and implementation	• Assistance with protection of key infrastructure elements	• Photo documentation • Data can potentially be extracted from monitoring efforts conducted during or upon completion of restoration projects	As needed/ should be coordinated with initial design and during

	sewer, water, gas, and power lines, and recreation facilities.	of projects that aim to protect municipal sewer, water, gas, and electric infrastructure where it intersects with the Bear Creek floodplain.		• Visual assessment of the corridor/key infrastructure elements	implementation of new restoration projects
Soil					
Soil Stability and Erosion Control 	Sustain stable soil that is not experiencing excessive erosion, particularly in burned areas.	Ensure soil is stable and has adequate properties and nutrients to support native riparian vegetation.	• Physical and chemical soil properties • Noticeable erosional features (rills, gullies, etc.) • Establishment of native riparian vegetation	• Soil analysis • Visual assessment • Photo documentation • Assessment of plant growth	As needed/ coordinated with initial design phase of new restoration projects
Management Directives					
GIS-Data Sharing and Annual Planning 	Promote data sharing, convening annual planning workshops, and collaborating among the BCRI Working Group and partners to review and update the list of restoration projects.	Create a GIS-based restoration data set for the Bear Creek Corridor to map past, present, and planned restoration actions on BRCI's Online ArcGIS Map for the six priority areas within the burn perimeters, plus the four priority areas outside the burn perimeters.	• Online GIS-Based Tool	• Routine updates and uploads of new validated GIS data layers • Cross sharing of GIS data with other partners agencies and organizations	Annually
		Schedule an Annual Visioning Workshop with the BCRI Working Group and partner agencies	• Annual BCRI workshop to review status of active restoration projects and prioritize new projects	• Planning Workshop	Annually

		and organizations to collaborate on planned and future restoration actions.			
Community Involvement 	Educate and engage community to promote awareness on the ecological values and recreational opportunities along Bear Creek.	Hold an Annual Public Open House event with partners to educate the community about the Bear Creek restoration efforts and promote the event through other ongoing forums related to water quality, fire safety, economic development, and transportation planning.	• Open House or Workshop event to educate and engage the community on biological values at Bear Creek and about restoration efforts	• Regularly scheduled community Creek clean-up days, field events, and other activities • Educate community on the value of nature-based solutions on the BCRI webpage and through community outreach meetings	Quarterly
Fire Safety Coordination 	Increase public safety and reduce fire risk along the Bear Creek Greenway and the adjacent riparian corridor.	Participate in Annual Reviews with fire and land managers with the six different jurisdictions along Bear Creek to understand fuel reduction efforts, share ideas about complementary restoration projects, and support grant funding opportunities.	• Integration of fire safety and fuel management efforts into the Bear Creek NRP to ensure Plan alignment • Fuel break management • Actions taken to develop new partnerships • Outreach/public relations events	• Attendance at Fire District 3 and City Fire Department meetings and briefings • Document meetings with new/existing partners • Follow up with potential partners	Bi-Annually

NOTES: The goal statements and objectives in this table have been modified from the goals included in the BCRI issue papers and 2019 Final Report and from input and focused goal themes developed during the October 2022 planning charrette. Also, where goal statements referred to specific and measurable actions, those were re-worded as objectives in order to tie them together with monitoring metrics for the vegetation, hydrology, and management directives category.

MONITORING METHODS

The following monitoring methods will be used to measure the success of planned, ongoing, and proposed restoration projects. The methods promote using publicly available data already gathered as part of related state and local monitoring efforts. There are many restoration efforts already occurring along Bear Creek, therefore, the methods focus on tracking whether a project was completed according to other work that is currently being completed by the BCRI's network of local partners and using the monitoring data available from these other project efforts.

Photo Documentation Monitoring

Photo documentation or photo point monitoring is a simple yet effective tool for monitoring and documenting vegetation and ecosystem change over time. This type of monitoring is a useful method for documenting visual changes resulting from a restoration project when photos are taken before, during, and immediately following completion of the restoration effort. Photo point monitoring allows for comparisons among photographs and can also be used to support conclusions typically gained through more rigorous monitoring techniques. Photos can be replicated over time at specified intervals to document the long-term success of a restoration project. No special skill or training is required, and this method does not require any highly specialized equipment. BCRI could also consider setting up a grant funded or volunteer program to take aerial photos using drones in order to get more detail for large-scale GIS mapping of the whole Project Area.

Photo point monitoring includes the use of camera points and photo points. Camera point refers to the location of the camera while the photo point refers to the picture's center of focus. Camera points should be representative of the areas to be monitored and protected from disturbance (i.e., not within the stream's active channel or at the immediate edge of a streambank). See Appendix A for detailed instructions on GPS and camera point naming conventions and a sample data sheet.

Use of Existing Monitoring Data

As restoration projects are implemented along the Bear Creek corridor, those efforts will have their own set of requirements for monitoring and reporting and will be maintained and monitored by entities other than BCRI. However, the reports and data generated for those projects will contain valuable information that would be useful to BCRI for tracking and assessing the overall condition of the riparian corridor. The BCRI should receive and document (in a database, if possible) the results of annual summary reports, along with the associated data. This data can be used to generate reports or statistics that summarize restoration efforts that have been implemented throughout the Bear Creek corridor.

Visual Assessment

Visual assessment is a qualitative monitoring method that involves viewing either particular reaches of the corridor or its entire length. This method may be used to see if a particular goal, objective, or metric has been met, to identify areas of the corridor with opportunities for new restoration projects, to inspect the corridor for safety issues such as hazard trees, or to identify locations that need improved access or recreation opportunities, among others. Visual assessments can be conducted with the naked eye, but binoculars are helpful as they assist in a greater range of sight and enable the assessor to identify sights, such as stream features, wildlife, and plants that might not be identifiable without them.

MAINTENANCE AND MONITORING

Maintenance Schedule

The Implementation and Monitoring and Action Plan Components will be reviewed and revised at regular intervals. Updates to the Action Plan Component will consider the following questions related to specific restoration projects and the overall health and resiliency of Bear Creek:

- Does Bear Creek and riparian area provide an improved and more diverse habitat to support fish and aquatic wildlife (improving (+), declining (-), and no change (0)?
- Are there sources of sediment coming from the streambanks for in-stream flood restoration projects?
- Do the identified goals and actions still address current and desired conditions?
- Have actions been implemented or completed?
- Has the implementation of identified actions related to the RCZs resulted in desired outcomes?
- Are current resources adequate to implement the plan?
- Should additional resources be committed to address identified hazards?

The minimum task of each BCRI planning partner will be the evaluation of the progress of its restoration projects included in the Action Plan Component during a 12-month performance period. Contributing towards the completion of the annual progress report is the responsibility of each planning partner, not solely the responsibility of the BCRI. Feedback and status updates from planning partners will help the BCRI advance timely annual progress report updates. This evaluation will include the following:

- Summary of any major flood, drought, storm, severe weather, or wildfire events that occurred during the performance period and the impact these events had on the planning area
- Review of success stories
- Review of continuing volunteer, advocacy, and public involvement
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the Action Plan to evaluate whether the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or initiatives

Maintenance and Evaluation Process

Monitoring refers to tracking the implementation of the plan over time. The BCRI will be responsible for reaching out to lead and supporting agencies identified in the Action Plan for status on the restoration projects, activities, and outreach and education opportunities. Members of the BCRI will also coordinate with partners at least annually to identify and track any significant changes in their agency or organization's restoration efforts. The BCRI will use the following process to track progress, note changes, and consider changes in priorities as a result of project implementation:

- A representative from the responsible entity identified for each BCRI priority project will be responsible for tracking and reporting to the BCRI when project status changes. The representative will provide input on whether the project as implemented meets the defined goals and objectives and is likely to be successful in enhancing overall biological conditions along Bear Creek.
- If the project does not meet identified goals and objectives, the BCRI may suggest modification of the project design or select alternative restoration projects for implementation.
- Projects that were not ranked high priority but were identified as potential opportunities will be reviewed periodically to determine feasibility of future implementation.
- New projects identified will require a partner organization to be responsible for defining the project scope, implementing the project, and monitoring success of the project.

Evaluating refers to assessing the effectiveness of the Action Plan at achieving its stated purpose and goals. Learning and adjusting is a key component to adaptive management because it recognizes that projects evolve and new information (e.g., climate change science) will become available. This is especially important when management decisions need to account for uncertainty. The process allows for adjustments to the management

strategies. Evaluation of progress is critical for adaptive management to be effective. It can be achieved by monitoring changes identified in the Action Plan, such as:

- Is there a diverse composition of vegetative communities along Bear Creek that supports ecological function?
- Does the combination of streambank vegetation and in-stream structures like large woody debris along Bear Creek provide shade, decreased water temperatures, and improved aquatic habitat?
- Are the non-native and invasive species under control so that wildfire risk is minimized?
- Is the in-stream channel and the floodplain better connected so that flows and inundation spill onto the floodplain?
- Is there decreased vulnerability because of implementing recommended restoration projects, and/or increased vulnerability because of failed or ineffective restoration efforts?

The BCRI will meet annually to evaluate the implementation of the plan and consider any changes in priorities that may be warranted. The annual evaluation will not only include an investigation of whether restoration projects were completed, but also an assessment of how effective those projects and efforts were at their stated objectives. A review of the qualitative and quantitative benefits of activities will support this assessment. Results of the evaluation will then be compared to the goals and objectives established in the NRP and decisions will be made regarding whether projects should be discontinued or modified in any way in light of new developments.

The BCRI will coordinate with all participating jurisdictions and other partners to facilitate an effective maintenance and implementation process. Completed projects will be evaluated to determine how they have improved resiliency. Changes will be made to the NRP to accommodate projects that are not considered feasible after a review of their consistency with established metrics, the time frame, priorities, and/or funding resources.

Plan Incorporation

The comprehensive plans, zoning and subdivision regulations, and ordinances that apply to the Bear Creek Greenway and the partner cities/towns are integral parts of this NRP. The plan development process provides jurisdictions with the opportunity to review and expand on programs and policies contained within these planning mechanisms. The planning partners use their comprehensive plans and hazard mitigation plans as complementary documents that work together to achieve the goal of improving the health and safety of the Bear Creek Greenway.

- **Envision Bear Creek** – Envision Bear Creek's ongoing public education and outreach efforts should reflect the goals described in the Bear Creek NRP and therefore complement the recreational improvement goals outlined in this plan. Furthermore, restoration projects and success stories should be communicated to the public to show the benefits of effective planning.
- **Jackson County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP)** – During the next scheduled update of the Jackson County MJHMP, the BCRI should use the hazards and capability information in the MJHMP to inform and update the fire safety and wildfire risk information in the NRP.
- **Fire Management Plans** – The information on hazards, risk, and vegetation management projects contained in these plans is based on the best science and technology available at the time this plan was prepared. Future restoration projects should inform and influence updates to local fire management plans and vice versa. The Bear Creek NRP should also integrate vegetation management efforts that occur at BCRI priority project areas.

Volunteer and Community Involvement

Continued community involvement is imperative to the overall success of the plan's implementation. Efforts will be made to involve the community, volunteer, and watershed advocacy groups in the plan maintenance,

evaluation, and review process. The BCRI and partners can also support environmental education through school field trips and other educational events.

Involvement includes maintaining a digital version of the NRP on the BCRI webpage for public review. This site will house the final NRP, as well as information regarding the Action Plan, the partnership, and plan implementation. Upon initiation of future update processes, a new volunteer involvement strategy will be initiated based on guidance and input from the BCRI. This strategy will be based on the needs and capabilities of the planning partnership at the time of the update. Efforts should be made to tie in volunteer organizations with coordinating objectives to assist with aspects of the plan such as watershed management, environmental advocacy, or riparian conservation.

ADAPTIVE MANAGEMENT RECOMMENDATIONS

Rapid Assessment Methods

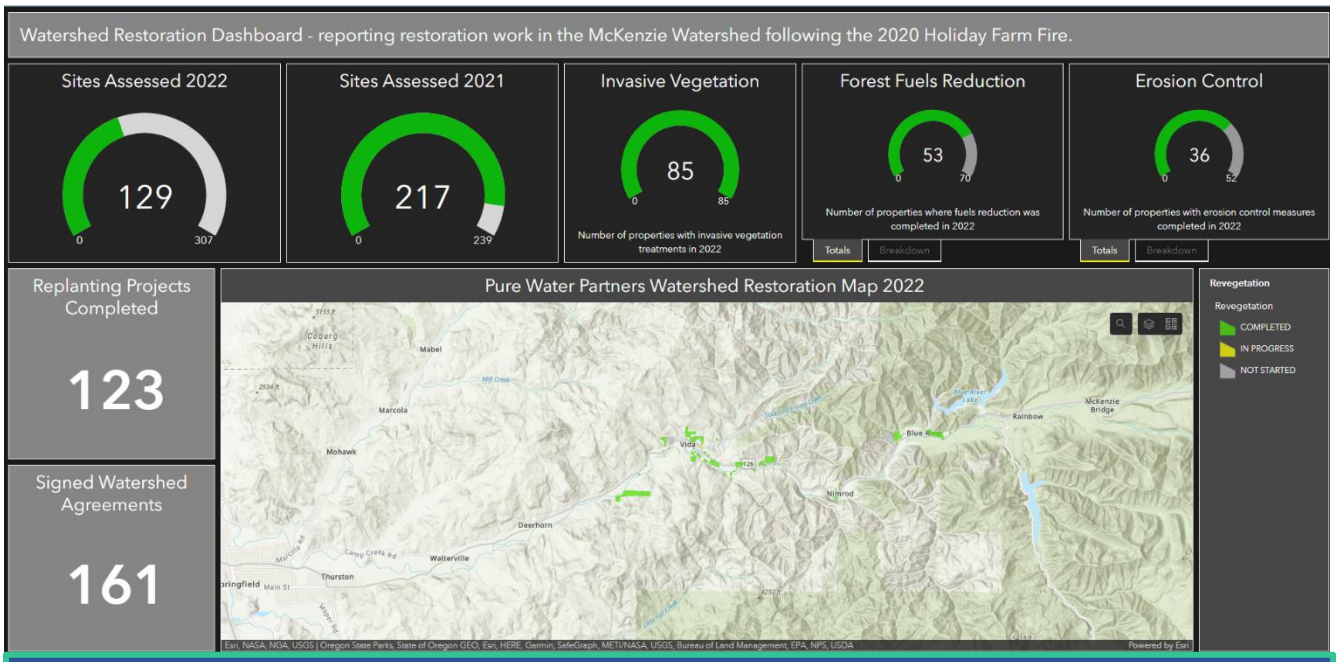
There are a number of established rapid assessment protocols designed to monitor wetland areas that are designed to be cost effective and relatively quick to implement. These protocols, or perhaps some portion of them, may be useful for monitoring the Bear Creek corridor. These protocols can be used on the entire corridor, a particular portion of it, or even specifically for a restoration site. The protocols include two examples from Oregon and one from California, all of which could be applicable to the Bear Creek corridor.

The Oregon Rapid Wetland Assessment Protocol (ORWAP) is a standardized protocol for rapidly assessing wetland functions and values. ORWAP is applicable to wetlands of any type in any part of Oregon. The Oregon Stream Function Assessment Method (SFAM) is a rapid, science-based approach to assessing the ecological functions and values of a stream reach. Both office work (data collection from maps, online resources and other sources) and field work (onsite measurements and observations) are required to assess measures and calculate SFAM scores.

The California Rapid Assessment Method (CRAM) is another cost-effective and scientifically defensible rapid assessment method for monitoring and assessing the ecological conditions of wetlands. It takes less than half a day to assess a wetland area and is designed to evaluate the wetland condition based on its landscape setting, hydrology, and physical and biological structure. Because the methodology is standardized for over seven types of wetlands, ecological condition scores can be compared at the local, regional, and statewide landscape scales.

Dashboard Tracking

The Pure Water Partners created the dashboard shown below to track Holiday Farm Fire recovery and water quality and restoration activities in the McKenzie Watershed in Oregon. It contains progress charts that track the number of sites assessed by year, as well as the number of properties with invasive vegetation treatments, where vegetation management was completed, and erosion control measures completed by year. A separate panel of the dashboard shows the number of replanting projects completed. This dashboard also includes a watershed restoration map, which shows the locations of revegetation projects that have been completed, are in progress, and have not started. The dashboard tracks the progress of watershed restoration and allows users to visualize the current progress by displaying where some of these projects are located. A similar dashboard tracking tool could be integrated into the BCRI's Webpage.



Dashboard Tracking. *Pure Water Partners created the dashboard tool shown above to track recovery, water quality, and restoration activities in the McKenzie Watershed.*

Restoration Portfolio

The Lomakatsi Restoration Project (see example below) shares information on projects and key annual efforts in their 2022 Highlights Report to showcase the projects that they have been working on across Oregon and Northern California for heathier forests and watersheds and resilient communities. The report depicts the details of ongoing forest and watershed restoration projects and expands on the youth training and employment program offered by Lomakatsi. The report also discusses Lomakatsi's partnerships with multiple tribes and ends with a blueprint on Lomakatsi's future leadership in post-fire restoration and community resilience.

Lomakatsi Restoration Project is a nonprofit organization that develops and implements forest and watershed restoration initiatives throughout Oregon and Northern California

BUILDING COMMUNITY & ECOSYSTEM RESILIENCE

It's been a watershed year for Lomakatsi, as we build our capacity and hire new staff, continuing to work in partnership with our agency, tribal, municipal, and nonprofit partners and provide leadership in collaborative forest restoration. Together, we're building and expanding projects across Oregon and northern California, as we work toward healthier forests and watersheds, and more resilient communities—supporting hundreds of jobs in the process. As communities continue to recover from the impacts of wildfire over the past several years, the growing investment in ecological fuels reduction, combined with the recognition that stewardship of our forests and streams is perpetual, brings comfort. We are grateful to our 50+ restoration crew members and technicians, and the thousands of other skilled workers who put their hands on the land every day to make forests healthier and communities safer.

THIS YEAR BY THE NUMBERS

12,000+ native trees and shrubs planted along streams to enhance habitat for salmon and other wildlife

14,400+ acres of forest restoration through ecological thinning, prescribed burning and restoration planning across federal, tribal and private lands

172,000+ acres under active restoration across two states, five watersheds, and 10 counties

50 youth trained & employed through hands-on, resume-boosting paid learning experiences

415+ jobs supported from ecological restoration crew members to local contractors

(541) 488-0208 | 645 Washington Street, Ashland, Oregon 97520 | lomakatsi.org

FOREST & WATERSHED RESTORATION

Across federal, state, tribal trust, municipal, and private lands, we reduce the risk of severe wildfire, enhance wildlife habitat, and protect valuable ecosystem services such as drinking water

West Bear All-Lands Restoration Project...

Through a collaborative application process, our partnership was awarded nearly $3.5 million for West Bear through Senate Bill 762, bringing the total project funding to just over $11 million. With additional investment, partners plan to implement hazardous fuels reduction and forest restoration on a total of 10,800 acres of the 27,000-acre project footprint. This focus area spans the wildland urban interface west of Bear Creek and the I-5 corridor from Talent to Jacksonville, and connects to the edge of the Ashland Forest Resiliency project to the south. Lomakatsi also received federal funding for the Jacksonville Community Wildfire Protection Project, within the greater West Bear footprint, through the efforts of Oregon Senators Jeff Merkley and Ron Wyden on an omnibus congressional appropriations bill. This will support over 700 acres of fuels reduction

...and Working Across the Rogue Basin

work around the town of Jacksonville in partnership with City of Jacksonville and others. Through Rogue Forest Partners, which is planning and implementing five additional landscape-scale restoration projects across the Rogue Basin, Lomakatsi continues ecological thinning and prescribed burning in the Upper Applegate Watershed and Williams areas. All these projects build on the model of Ashland Forest Resiliency with the goal of achieving healthier forests and a substantial reduction in the risk of severe wildfire to communities and the ecosystem. Lomakatsi is a key partner involved in all aspects of planning and implementation, from landowner engagement, project layout, ecological monitoring, administration and community outreach to ecological thinning and prescribed fire.

Chiloquin Trust Lands

Ecological thinning continues at this 580-acre community site in partnership with Klamath, Modoc, and Yahooskin tribal community members and the Fremont-Winema National Forest. Goals are to reduce wildfire risk to the community of Chiloquin, enhance old forest conditions, and promote culturally beneficial plants. A Lomakatsi tribal crew is also assisting the community in rebuilding earth lodges using small trees thinned during restoration.

Karuk Stewardship Agreement

We continued our partnership with the Karuk Tribe and partners, supporting 300 acres of ecological commercial thinning on the Six Rivers National Forest to reduce wildfire risk and prepare for reintroducing cultural fire.

Lomakatsi Restoration Project Portfolio. *An annual newsletter or report is a useful way to reach a larger audience in a community for sharing information and engaging the public on restoration efforts along Bear Creek. The Lomakatsi 2022 Highlights Report shown above is an example of a local partner organization's annual report on restoration projects, youth training and employment program, and Tribal efforts in place to build resilience in the region.*

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