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# L.T. Murray Wildlife Area Management Plan

Washington Department of FISH & WILDLIFE

# Acknowledgements


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| Bridget Wood | Mule Deer Foundation |

Cover photos: Sheds and clouds by Justin Haug, bull trout by Jim Cummins.

# Acknowledging the Indigenous People, Land & Culture of the Pacific Northwest

Since time immemorial, Indigenous People have graced the Pacific Northwest with rich traditions of many diverse cultures, languages, traditional knowledge expressed artistically and practically with intricate principles passed down throughout generations. As the first stewards of this land, Indigenous People from this part of the world are ancestrally engrained in the very fabric of this region that is known today as Washington State.

Washington Department of Fish and Wildlife (WDFW) acknowledges indigenous groups, including the fourteen bands and tribes of the Yakama Nation (YN), including the Kah-milt-pah, Klickitat, Klinquit, Kow-was-say-ee, Li-ay-was, Oche-chotes, Palouse, Pisquose, Se-ap-cat, Shyiks, Skinpah, Wenatshapam, Wishram, and Yakama. Their historic reliance to hunt, fish, and gather traditional foods defines their inherent responsibilities to protect and steward the precious resources on the waters and landscape shared today by all Washington residents.

The very survival of the fourteen bands and tribes of the Yakama Nation and other indigenous groups are a testament of resiliency of what they have endured and continue to endure throughout generations on this very landscape. Through scarred valor, many historical encounters of massacre, renunciation of religious freedom, systemic racism, cultural assimilation of native children through institutional residential schools, and the fight for their inherent rights and liberties, they have prevailed. Throughout this tormented history brought by colonization, abrogated treaties, infringement of civil rights, and the salmon protests of the 1960s, WDFW, the Yakama Nation and other indigenous peoples have founded a commitment of respect, unity, and alliance taught by the realities of the past.

Today tribal governments and WDFW work collaboratively to conserve and manage aquatic and terrestrial resources across the State and practice sound science to ensure successful resource management decisions. Tribal governments and WDFW work together to ensure the sustainability of fish, wildlife, ecosystems, and culture for the next seven generations and beyond.

Bitterroot bloom. Photo by WDFW.

Kelly Susewind, Director, Washington Department of Fish and Wildlife

# L.T. Murray Wildlife Area Management Plan

Washington Department of FISH & WILDLIFE

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## Acronyms

| | |
|---|---|
| ADA | Americans with Disabilities Act |
| BAS | Best Available Science |
| BLM | Bureau of Land Management |
| BOR | Bureau of Reclamation |
| BPA | Bonneville Power Administration |
| DNR | Washington State Department of Natural Resources |
| EIA | Ecological Integrity Assessment |
| EIM | Ecological Integrity Monitoring |
| ESA | Endangered Species Act |
| FRV | Future range of variability |
| HOC | Heart of Cascades (plan) |
| HRV | Historic range of variability |
| IPCC | International Panel on Climate Change |
| IPM | Integrated Pest Management |
| NSO | Northern spotted owl |
| OHV | Off Highway Vehicle |
| ORV | Off Road Vehicle |
| PHS | Priority Habitats and Species |
| RCW | Revised Code of Washington |
| RCO | Washington State Recreation and Conservation Office |
| RMZ | Riparian Management Zone |
| SEPA | State Environmental Policy Act |
| SGCN | Species of Greatest Conservation Need |
| SWAP | State Wildlife Action Plan |

| | |
|---|---|
| TCF | Teanaway Community Forest |
| USFS | United States Forest Service |
| USFWS | United States Fish and Wildlife Service |
| WAC | Washington Administrative Code |
| WAAC | Wildlife Area Advisory Committee |
| WDFW | Washington State Department of Fish and Wildlife |
| WHCWG | Washington Wildlife Habitat Connectivity Working Group |
| WLA | Wildlife Area |
| WSDOT | Washington Department of Transportation |
| WWRP | Washington Wildlife and Recreation Program |

# Executive Summary

The L.T. Murray Wildlife Area (WLA) is in Central Washington on the eastern side of the Cascade mountains. Its five units, totaling 119,395 acres are found north and south of Interstate 90 in Kittitas County, from approximately Easton to Vantage, and west of the Columbia River. The WLA exhibits a complex physical geography, characterized by diverse topographic features, climatic variations, and ecological dynamics, contributing to a diverse array of habitats across the wildlife area, including mixed conifer and ponderosa forests, aspen stands, shrubsteppe, meadows, and riparian corridors. Situated between the Cascade Mountain range to the west and the Columbia Plateau to the east, the wildlife area units encompass mountainous, valley, and arid steppe landscapes. The Yakima River and its tributaries flow through the western units, contributing to its unique geography, including the Teanaway river, Taneum, Manastash, and Cabin creeks. The eastern units of the wildlife area are situated on the Columbia Plateau, a large basaltic plateau that covers much of central and eastern Washington and are characterized by a semi-arid desert, shrubsteppe environment. Skookumchuck, Quilomene, and Whiskey Dick creeks flow through the eastern units to join the Columbia River.

The L.T. Murray Wildlife Area supports a broad range of game and non-game (diversity) species, including Rocky Mountain elk, mule deer, bighorn sheep, and a unique array of small mammals, reptiles, and amphibians. The wildlife area provides important habitats for both resident and migratory birds, including several species of waterfowl, neotropical songbirds, raptors, and upland game birds. The WLA is home to unique flora and fauna adapted to arid conditions, including the sagebrush sparrow, desert whip-snake, sagebrush lizard, and hedgehog cactus. The wildlife area provides critical habitat for populations of federally listed Chinook and Coho salmon, summer steelhead, bull trout, gray wolf, Greater Sage-grouse, and Northern spotted owl.

The L.T. Murray Wildlife Area is a popular recreational destination, due in part to its central location and proximity to the I-90 corridor. During the snow-free season, visitors enjoy hiking, horseback riding, cycling, wildlife viewing, picnicking, and OHV driving on the extensive Green Dot Road networks. The wildlife area is known for quality deer, elk, and upland game bird hunting. In winter, the wildlife area provides access to cross-country skiing, snowshoeing, and snowmobiling.

Fishing opportunities abound along the Yakima River and its tributaries. Seven water access areas are located on or near the wildlife area and provide ample water-based recreation opportunities: Robert and Anna Bell, Lavender Lake, Teanaway River, Kinghorn Slough, Teanaway Junction, Thorp, and Highway 10 Take-out. Boat launches are available at Kinghorn Slough, Thorp, and the Highway 10 Take-out (take-out only). The Teanaway Junction Boat Launch is the newest addition to the wildlife area and provides access to the upper Yakima River.

Management priorities in this plan include riparian and floodplain restoration, shrubsteppe conservation and restoration, recreation management, weed control, forest health, and recovery of federal and state-listed species. Signature conservation success stories include the Teanaway Valley unit land acquisition, restoration of the North Fork of Manastash Creek, the installation of new trailhead kiosks, and the removal of derelict fencing. The success of these projects was due to the participation and commitment of the following partners: Yakama Nation Fisheries, Mid-Columbia Fisheries Enhancement Group, Kittitas County, the Washington Department of Ecology, Washington State Parks, the Washington Department of Natural Resources, the Trust for Public Lands, U.S. Fish and Wildlife Service, Mountain to Sound Greenway Trust, the Boy Scouts of America, Conservation Northwest, Evergreen Mountain Bike Alliance, Kittitas County Field and Stream Club, the Mule Deer Foundation, Washington Conservation Corps, Puget Sound Energy, City of Ellensburg, Pheasants

Forever, Ruffed Grouse Society, Project Upland, Kittitas Audubon Society, Backcountry Horsemen, local volunteers, and Master Hunters. By actively managing lands, restoring habitats, and preserving wild places,

The WLA plan includes thirty goals addressing wildlife, fish, habitats, ecological integrity and monitoring, recreation, facilities and operations, education and outreach, and cultural resources:

**Table 1: WLA plan goals**

| Goals | |
|---|---|
| 1. | **Maintain and protect big game populations.** |
| 2. | **Improve and maintain bighorn sheep populations.** |
| 3. | **Protect golden eagle nest sites.** |
| 4. | **Manage for species diversity.** |
| 5. | **Restore and monitor fish populations.** |
| 6. | **Restore natural stream processes.** |
| 7. | **Protect and restore riparian and aquatic habitat.** |
| 8. | **Protect and restore meadow and wetland habitats.** |
| 9. | **Improve biodiversity areas, connectivity, and corridors (PHS).** |
| 10. | **Protect and restore native shrubsteppe habitat that supports a diversity of species.** |
| 11. | **Protect and restore native, rare, or endangered plant communities and culturally significant plants.** |
| 12. | **Protect and enhance pollinator habitat.** |
| 13. | **Maintain or improve the ecological integrity of priority ecological systems and sites by protecting, restoring, or maintaining the habitats.** |
| 14. | **Protect and restore forest habitat.** |
| 15. | **Develop and manage a sustainable system of recreational motorized travel that protects habitat, wildlife, and cultural resources.** |
| 16. | **Protect priority and sensitive habitats from the impacts of unauthorized motorized road and trail development and travel.** |
| 17. | **Provide information and education to protect cultural and natural resources.** |
| 18. | **Create outreach materials on Green Dot Road recreation.** |
| 19. | **Develop and manage a sustainable system of non-motorized travel that protects habitat, wildlife, and cultural resources.** |
| 20. | **Manage seasonal closures to reduce recreational impacts to overwintering, nesting, or rearing wildlife.** |
| 21. | **Manage recreation activities to reduce impacts to resources and improve user safety and experience.** |
| 22. | **Improve non-motorized access and provide recreational opportunities.** |
| 23. | **Maintain productive and positive working relationships with local community neighbors, lessees, and permittees.** |
| 24. | **Offer multiple and varied opportunities for stakeholder participation and engagement.** |
| 25. | **Hire, train, equip, and license, as necessary, WLA staff, to meet the operation and management needs of WLAs.** |
| 26. | **Maintain safe, highly functional, and cost-effect administration and operational facilities and equipment** |
| 27. | **Manage wildlife area lands with consideration to tribal history across the landscape.** |
| 28. | **Maintain communication between WDFW and affected tribes to ensure mutual interests are managed and protected.** |
| 29. | **Investigate and improve the cultural ecosystems represented by shrubsteppe and low elevation mesic forest types** |
| 30. | **Update and expand WDFW cultural resources site knowledge for the LT Murray WLA.** |

# Part I. Wildlife Area Management Planning Overview

The Washington Department of Fish and Wildlife (WDFW) provides adaptive management for more than one million acres of publicly owned land, most of which falls within 33 wildlife areas across the state (wdfw.wa.gov/about/wdfw-lands). These wildlife areas contain nearly all species and habitats present in Washington. With the loss of natural habitat posing the single greatest threat to native fish and wildlife, state wildlife areas play a critical conservation role. The L.T. Murray wildlife area management plan addresses all aspects of resource management, highlights areas for public access, education, and stewardship, and aligns with statewide conservation goals. Under state law, WDFW is charged with "preserving, protecting, and perpetuating" the state's fish and wildlife species, while also providing sustainable recreational opportunities that are compatible with fish and wildlife stewardship." In addition to protecting lands and water for habitat and people, WDFW manages lands to preserve Washington's natural and cultural heritage, provides access for hunting, fishing, and wildlife-related recreation, and fosters outdoor experiences and exploration throughout the state. The agency does this to support the species and habitats of Washington to maintain biodiversity and ensure wildlife populations are sustained into the future.

An interdisciplinary team of WDFW staff members, including fish, habitat, and wildlife biologists, as well as enforcement officers, lands agents, and GIS technicians, engaged local and regional stakeholders, the Yakama Nation, federal and state agencies, and local governments in a multi-year process to develop the L.T. Murray Wildlife Area Management Plan.

## Planning framework, plan purpose and public participation

Management of wildlife areas are guided by WDFW's mission and strategic plan, as well as by state and federal laws. Plans are constructed using the Wildlife Area Management Planning Framework, which summarizes the agency's mission, laws, policies, and approaches to managing fish and wildlife. To read the framework visit: wdfw.wa.gov/publications/01810.

The purpose of this management plan is to guide all human activities, including conservation and recreation, occurring in the L.T. Murray Wildlife Area for the next 10 years. The plan defines management goals, objectives, and performance measures consistent with WDFW's mission and requirements associated with the funds used to purchase the wildlife area. The plan provides a clear vision of how these lands are managed for WDFW and the public. Meeting plan objectives depends on available funding, so budget reductions made during the life of this plan may change how individual objectives are prioritized during the implementation phase, but the overarching vision for management remains constant.

The plan is organized into four parts: Part I provides an overview of the wildlife area and success stories; Part II covers the goals, objectives, and performance measures for the wildlife area; Part III contains information on wildlife species and habitat management. Part IV is a compilation of appendices that includes species and habitat information, a weed management plan, a forest management plan, a fire management plan, research and studies conducted on the wildlife area, public comments received during the draft plan review period, and a table of projected climatic changes for the L.T. Murray Wildlife Area.

The public process included tribal and wildlife area advisory committee (WAAC) engagement in the drafting of the plan, and solicitation of public comments through meetings, email, social media, and

the WDFW website. Comments on the Final Draft Plan were solicited through the State Environmental Policy Act (SEPA) process. The Public Response Summary for this is included in Appendix D.

## Welcome to the L.T. Murray Wildlife Area

Sunrise on the L.T. Murray WLA. Photo by Justin Haug.

### Wildlife Area Vision

We envision a wildlife area with healthy and varied habitats – from the shrubsteppe of the Columbia Plateau to the forests of the East Cascades – that support a diversity of fish and wildlife, and where sustainable wildlife and nature-based recreational opportunities are enjoyed with respect for the natural and cultural resources of the land.

### Introduction to the Wildlife Area

The L.T. Murray Wildlife Area is located in Central Washington and covers approximately 119,395 acres across five units. The wildlife area includes important habitat for the state's wildlife, including conifer forests, shrubsteppe, meadows, riparian corridors, and fourteen ecological systems of concern. The wildlife area provides connectivity to the thousands of acres of Department of Natural Resources, Bureau of Land Management, and U.S. Forest Service lands. The first property acquired for the wildlife area was purchased in 1966, and the most recent addition, the Teanaway Valley Unit, was purchased in 2017.

The L.T. Murray Wildlife Area supports a broad range of game and non-game species. The wildlife area supports various wintering waterfowl concentrations (Quilomene and Whiskey Dick units), bighorn sheep (L.T. Murray, Whiskey Dick, and Quilomene units), mule deer, and one of the largest herds of Rocky Mountain elk in the state (all units). The wildlife area supports a number of shrubsteppe obligate species, or species that depend on shrubsteppe habitat for survival, including the sage thrasher, sagebrush sparrow, burrowing owl, northern Pacific rattlesnake, ferruginous

hawk, and pygmy short-horned lizard. The wildlife area provides habitat for several federally listed species, including the gray wolf, Northern spotted owl, Chinook, bull trout, and summer steelhead. Recent conservation efforts include returning federally listed anadromous salmon stocks to the Yakima River and its tributaries, restoring shrubsteppe habitat, and securing habitat for state and federally listed species.

Recreation opportunities on the wildlife area include wildlife viewing, hunting, camping, fishing, target shooting, berry and mushroom gathering, cross-country skiing, snowshoeing, and snowmobile riding. Miles of trails offer horseback riding, cycling, and hiking opportunities. The extensive Green Dot Road system supports a diverse array of OHV recreation opportunities.

This wildlife area management plan will address topics such habitat preservation and enhancement, maintaining big game populations, managing for species diversity, protecting and restoring native plant communities, controlling weeds, addressing illegal activities, and managing recreation.

Mules take a rest on the L.T. Murray. Photo by Alan Bauer.

# Success Stories

## Partners Improve Trout Habitat Through Floodplain Restoration

The North Fork of the Manastash Creek is a tributary to the upper Yakima River and provides prime habitat for endangered steelhead, so restoring the creek was a high priority. A survey conducted in 2015 showed that the creek channel was incised (deeply cut) and disconnected from its floodplain, likely due to an old road that ran for much of its length. The survey showed that the creek also lacked large woody debris to reduce the velocity of stream flow and reduce erosion. The North Fork Manastash Creek now has improved stream flow, habitat, and connection to its floodplain due to the placement of logs (large woody material or LWM) into the stream bed. The wood used in the project came from wood harvested from adjacent overstocked stands on the wildlife area as part of a forest health/habitat restoration project.

Restoration work on the Manastash.

In 2018 – 2019, WDFW partnered with the Yakama Nation and Mid-Columbia Fisheries Enhancement Group to restore the North Fork Manastash Creek and improve habitat for anadromous steelhead. A cost-effective technique of placing logs in the stream to reduce stream velocities at high flows, thereby trapping sediment to help reverse channel incision, was employed. Nearly 3,000 full length trees with and without root wads were placed into the channel and on the associated floodplains. Due to its remote location, a Chinook helicopter was used to place the logs. These logs were placed to increase channel roughness, promote channel aggradation, inundate the floodplain, recharge the groundwater, create side channels, and improve stream base flow. As a result of this partnership, nearly eight miles of the NF Manastash Creek have been restored.

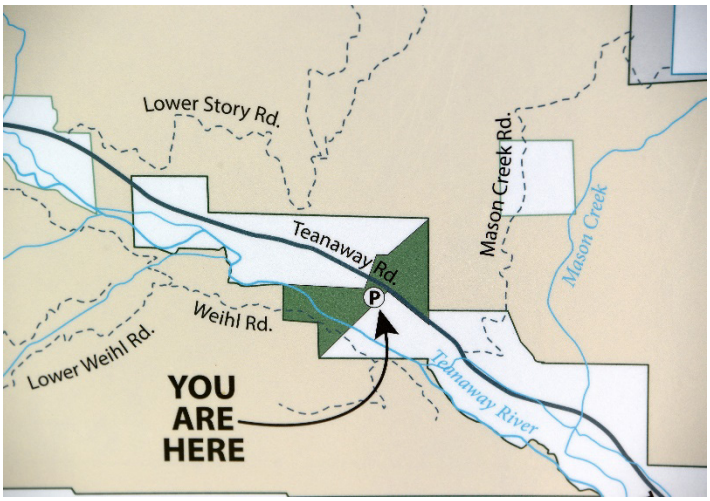
The vision to complete similar restoration projects in the future is reflected in the goals and objectives outlined in this plan, including goals “to protect and restore riparian and aquatic habitats” (Goal 7), “restore natural stream processes” (Goals 6) “restore and monitor fish populations” (Goal 5), and “maintain or improve the ecological integrity of priority ecological systems and sites by protecting, restoring, or maintaining habitats” (Goal 13).

## New Wildlife Area Unit Added in 2017

Teanaway River.

The Teanaway Valley Unit is the newest unit of the L.T. Murray Wildlife Area. The unit lies in a beautiful rural valley in upper Kittitas County dotted with small farms, ranches, agricultural fields, and forests. A former farm itself, the land was purchased in 2017 with funds from Kittitas County, the Department of Ecology, the Yakima Basin Integrated Plan, private donations from the Trust for Public Lands, and the U.S. Fish and Wildlife Service's Endangered Species Section 6 grant funds. The acquisition was part of the "Heart of Cascades" project (WDFW, 2020) to acquire lands in Central Washington to provide landscape connectivity and habitat to protect endangered species, specifically the Northern spotted owl, bull trout, and gray wolf.

Purchased from long-time valley residents, this 215-acre property straddles the Teanaway River and provides cross-valley habitat connectivity between two lobes of the Teanaway Community Forest (TCF), Washington's first community forest. The TCF is comprised of 50,241 acres of land in the Upper Yakima Basin and was purchased with funds from the State Legislature in 2013. The TCF is co-managed between the Department of Natural Resources and the WDFW under the terms of the Teanaway Conservation Easement and the Teanaway Community Forest Management Plan. For more information, visit: dnr.wa.gov/Teanaway.




The Teanaway Valley Unit complements a $100 million regional investment for watershed and fish. The unit contains 0.6 miles of mainstem Teanaway River and nearly a mile and a half of four tributary streams, two of which are fish-bearing. There are approximately 117 acres of intact, functioning riparian, wetland, floodplain, and wet meadow habitat. The Teanaway River provides a critical habitat for federally listed steelhead and bull trout and is a major focal watershed for Chinook salmon recovery efforts in the Upper Yakima Basin. The riparian and upland areas are also used by beavers, neo-tropical songbirds, deer, elk, Northern spotted owls, bear, cougar, and gray wolves, upland game birds, small mammals, and an array of amphibians and invertebrate species. The unit provides connectivity within the TCF to larger tracts of quality habitat.

As part of the funding agreement, the Teanaway Valley Unit will remain undeveloped and available for non-motorized recreation, including hiking, horseback riding, wildlife viewing, and hunting. The former farm buildings have been removed, and a parking area and interpretive kiosk has been installed for visitors to learn about the cultural and natural history of the Teanaway Valley.

## Partners Collaborate for Wildlife Protection

Wildlife can move about more safely now that L.T. Murray staff and volunteers have removed over 10 miles of derelict barbed wire fences in the last few years. Derelict fencing is old fencing, typically barbed wire, that poses a hazard to wildlife. Large mammals such as deer and elk can get entangled and die in derelict fences. Birds such as owls and grouse are known to fly headlong into fences that don't have sufficient markers making the wires visible. Fencing can act as a barrier to animal movement, so removing these derelict fences is an effective way to improve habitat connectivity for

wildlife and avoid lethal entanglements. Removal of "relic barbed wire fence that no longer serves a management purpose" (Objective 1e) is a priority in this plan.

This body of work was a great collaboration between WDFW staff, Conservation Northwest, the Mule Deer Foundation, Washington Conservation Corps, Pheasants Forever, Ruffed Grouse Society, Kittitas County Stream and Field Club, Project Upland, local volunteers, and Master Hunters.

## New Signs Welcome Visitors to the Wildlife Area

Kiosk display on the Quilomene unit.

Visitors to the L.T. Murray Wildlife Area now get the information they need from new welcoming interpretive signage at fourteen access points on the wildlife area. WDFW partnered with Mountain to Sound Greenway Trust, the Boy Scouts of America, Backcountry Hunters and Anglers, Conservation Northwest, and the Kittitas County Field and Stream Club to install the interpretive kiosks. Staff and local volunteers constructed the eye-catching kiosks at the major public access points on the L.T. Murray, Quilomene, Whiskey Dick, Upper Yakima, and Teanaway Valley units. The structures provide up-to-date information about seasonal restrictions, priority habitats, and species found in the wildlife area.

The interpretive informational kiosks provide key information to guests and encourage the protection of unique and fragile habitats. The sign at the Whiskey Dick entry provides information on elk feeding, while the kiosk at Teanaway provides some background about the pioneer families who settled there. At the Quilomene unit you can learn about shrubsteppe habitat and the animals who depend upon it for survival. Green Dot map information is posted to show permitted travel networks, as well as regulatory information regarding camping, allowed uses, and public conduct rules. A goal of this plan is to expand information and education to protect cultural and natural resources, (Goal 17), so visitors can learn about and appreciate the value of habitat and the rich cultural history of the area.

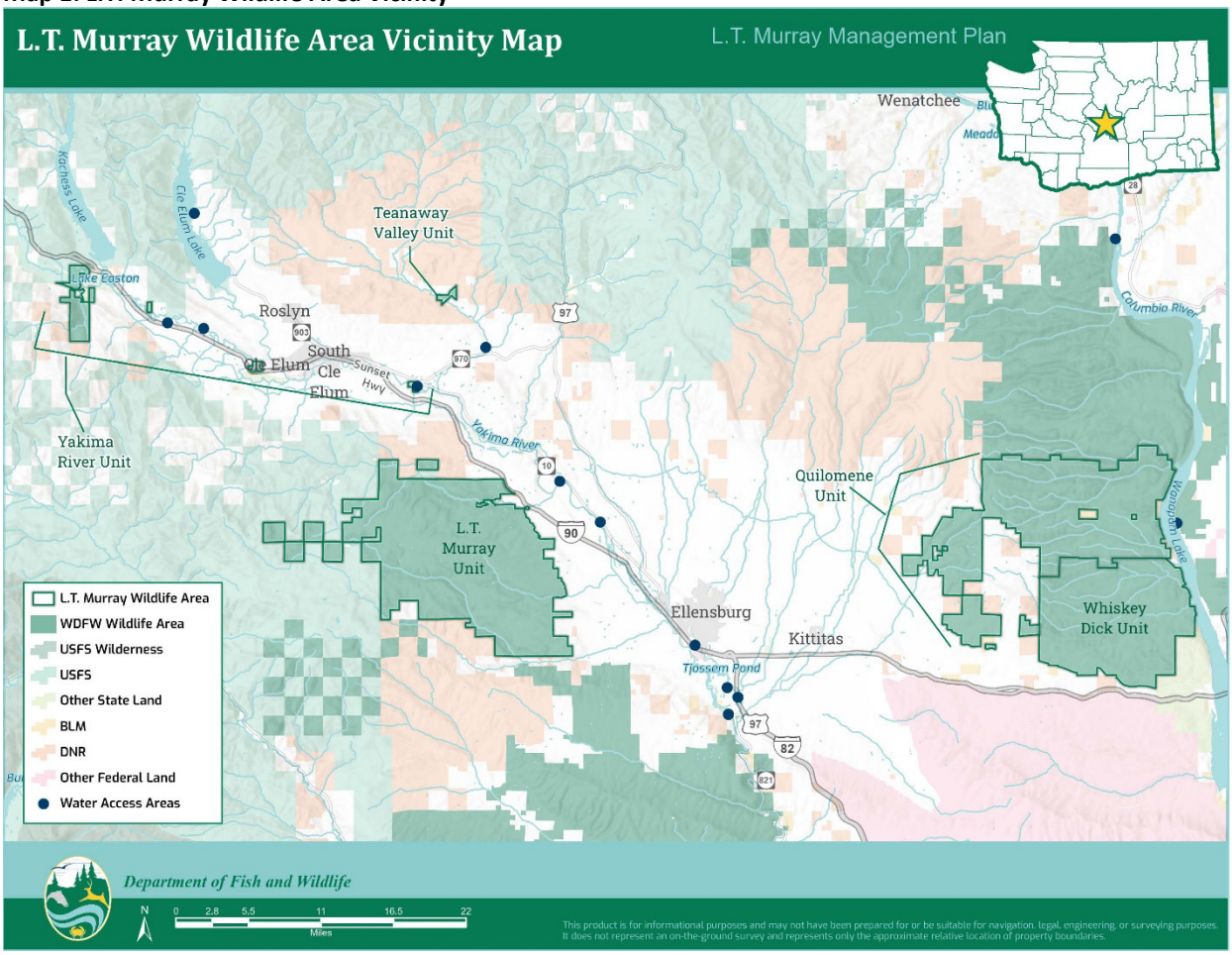
# Wildlife Area Description

The 119,395-acre wildlife area consists of five units: the L.T. Murray, Quilomene, Teanaway Valley, Whiskey Dick, and Yakima River units. The L.T. Murray unit is the largest unit with about 51,038 acres, and Teanaway Valley is the smallest unit at 215 acres. The wildlife area features a diversity of habitat types that wildlife species depend upon, from the large expanses of shrubsteppe in the Quilomene and Whiskey Dick units, to the riparian areas and high-elevation mixed conifer forests of the L.T. Murray and upper Yakima River units. The wildlife area supports both game and diversity (non-game) species while providing diverse recreational opportunities.

**Figure 1: L.T. Murray Wildlife Area Overview**

| **L.T. Murray Wildlife Area Overview** | |
|---|---|
| **Size** | 119,395 acres |
| **Acquisition and agreement dates** | 1966 – 2021 |
| **Acquisition funding and agreement** | Bonneville Power Administration: *Mitigation Funds*<br><br>Private Grantor: *Private Donations, Land Transfer*<br><br>WA Dept of Ecology<br><br>WA Dept. of Fish and Wildlife: *Wildlife Fund; State Migratory Waterfowl Fund*<br><br>WA Recreation and Conservation Office: *Aquatic Lands Enhancement Account, WA Wildlife and Recreation Program; Boating Facilities Program; Nonhighway and Off-Road Vehicle Activities Program; and State Bond Account*<br><br>WA State: *Appropriations*<br><br>U.S. Fish and Wildlife Service: *Endangered Species Act Section 6 Program; Pittman-Robertson Wildlife Restoration Program*<br><br>U.S. National Park Service*: Land and Water Conservation Fund*<br><br>Power, Dike, and Irrigation Districts: *Mitigation Funds* |
| **Elevation range** | 573 – 5,818 feet |
| **Recreational opportunities** | Big game, small game, upland birds, and pheasant hunting; resident and anadromous fishing; shed antler collecting; wildlife viewing and birding; camping; hiking, horseback riding, biking, skiing, snowmobiling, and OHV driving, dirt biking. |
| **Units** | L.T. Murray, Quilomene, Teanaway, Whiskey Dick, and Yakima River |
| **Counties** | Kittitas |

**Map 1: L.T. Murray Wildlife Area Vicinity**



# L.T. Murray Wildlife Area Unit Descriptions

**Figure 2: Quilomene Unit Description**

| Quilomene Unit | |
|---|---|
| **Size** | 38,493 acres |
| **Acquisition and agreement dates** | 1972 – 2020 |
| **Acquisition funding** | WA Dept. of Fish and Wildlife: *Wildlife Fund*<br>WA Recreation and Conservation Office: *WA Wildlife and Recreation Program* and *State Bond Account*<br>WA State: *Appropriations, Mitigation Funds*<br>U.S. Fish and Wildlife Service: *Pittman-Robertson Wildlife Restoration Program*<br>U.S. National Park Service*: Land and Water Conservation Fund*<br>Power, Dike, and Irrigation Districts: *Mitigation Funds* |
| **Purpose** | Deer and elk winter range, upland game bird habitat, recreation |
| **Elevation range** | 575 – 4,359 feet |
| **Recreational opportunities** | Camping, horseback riding, biking, hiking, shed antler collecting, hunting, OHV driving, wildlife viewing. A portion of this area is within the Green Dot Road Management area. Motorized vehicles must stay on Green Dot roads. |
| **County** | Kittitas |
| **Site access** | wdfw.wa.gov/places-to-go/wildlife-areas/quilomene-wildlife-area-unit |

Hedgehog Cactus bloom. Photo by Alan Bauer.

The Quilomene Unit is 15 miles northeast of Ellensburg and borders the Columbia River to the west. The unit lies in the Upper Yakima and Alkali-Squilchuck watersheds and includes the Quilomene, Skookumchuck, and Parke Creek drainages. The unit borders the Whiskey Dick unit and the Wild Horse Wind Farm, and a portion of the unit is grazed with cattle as part of the Wild Horse Coordinated Resources Management Area. The landscape is steep with rocky slopes, rolling ridges and canyons. Most of the unit is covered in shrubsteppe habitat, which includes sagebrush,

bitterbrush, and bunch grasses. Corridors of productive riparian habitat are interspersed throughout this arid landscape, providing critical water sources and cover, as well as feeding and breeding areas. With an estimated 80% of historic shrubsteppe lost or degraded as a result of land conversion since the arrival of non-native settlers, the Quilomene unit is an important conservation area for shrubsteppe habitat and obligate species.

Shrubsteppe obligates are species that require the shrubsteppe ecosystem for their survival. One might encounter bighorn sheep, jackrabbit, elk, deer, bats, ground squirrels, sagebrush lizard, or Co. Birdwatchers might witness golden eagles, dusky grouse, ferruginous hawks, sagebrush sparrows, or sage thrashers. Birdwatching is popular along the eastern edge of the unit. A migratory bird closure is located adjacent to the east boundary of the unit where no hunting of migratory waterfowl, coot, or snipe is permitted.

Fish documented on the unit include both resident and anadromous species, including rainbow trout and summer steelhead, as well as sculpin, suckers, and dace. State-sensitive plant species found on the unit include coyote tobacco, hedgehog cactus, Hoover's tauchia, and dwarf evening primrose. For a complete list of species on the wildlife area, see Tables 11 and 12.

High up on the Quilomene unit. Photo by Alan Bauer.

**Map 2: Quilomene Unit**

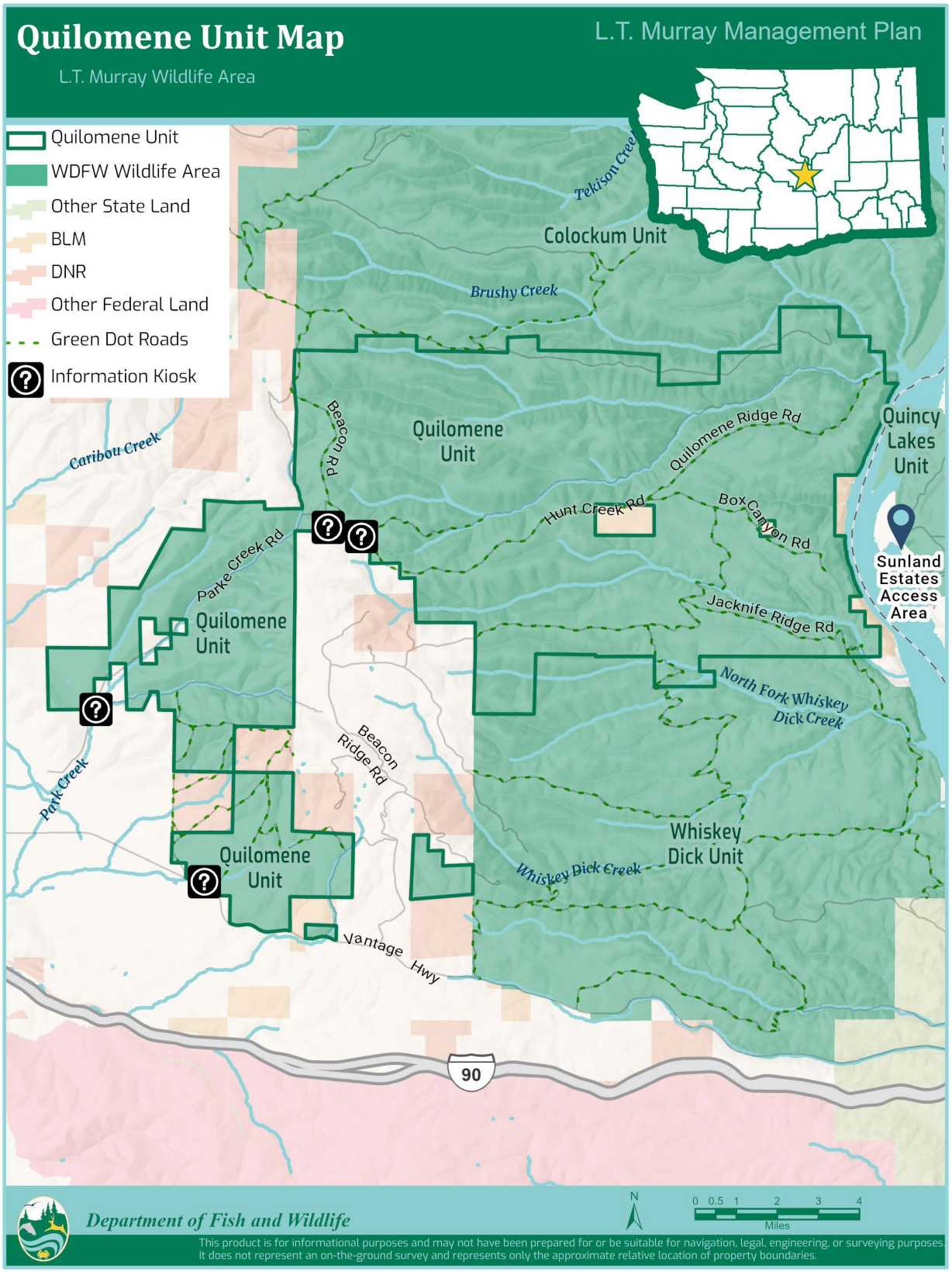


**Figure 3: L.T. Murray Unit**

| L.T. Murray Unit | |
|---|---|
| **Size** | 51,038 acres |
| **Acquisition and agreement dates** | 1970 – 2017 |
| **Acquisition funding** | Bonneville Power Administration: *Mitigation Funds*<br>WA Dept of Ecology<br>WA Dept. of Fish and Wildlife: *Wildlife Fund*<br>WA Recreation and Conservation Office: *WA Wildlife and Recreation Program* and *State Bond Account*<br>WA State: *Appropriations*<br>U.S. Fish and Wildlife Service: *Pittman-Robertson Wildlife Restoration Program*<br>U.S. National Park Service*: Land and Water Conservation Fund*<br>Power, Dike, and Irrigation Districts: *Mitigation Funds* |
| **Management** | Deer and elk winter range, upland game bird habitat, recreation |
| **Elevation range** | 1,854 – 5,818 |
| **Recreational opportunities** | Hunting, fishing, wildlife viewing, camping, horseback riding, biking, hiking, shed antler collecting, OHV driving, snowmobiling, cross-country skiing. Vehicles must stay on designated open Green Dot roads |
| **County** | Kittitas |
| **Site access** | wdfw.wa.gov/places-to-go/wildlife-areas/lt-murray-wildlife-area-unit |

Horseback riders on the L.T. Murray unit. Photo by Alan Bauer.

Elk gathering on the L.T. Murray unit. Photo by Alan Bauer.

The largest of the wildlife area units, the L.T. Murray Unit, is located about 15 miles west of Ellensburg and lies in the Upper Yakima watershed. Two major tributaries of the Yakima River, the Taneum Creek to the north and Manastash Creek to the south, are within the unit and flow to the Yakima River. The east side of the unit is in the rain shadow of the Cascades and gets about 16 inches of precipitation per year, while the higher elevations to the north can receive over 35 inches of snow at the top of Manastash Ridge. Habitat types are diverse on the unit, consisting of mixed conifer forests, including some late successional stands at higher elevations, with shrubsteppe, meadows, talus, and riparian corridors interspersed. The unit is very popular for recreation and is a Green Dot Road Management Area.

The diversity of habitat contributes to the array of wildlife present on the unit, including, but not limited to: bighorn sheep, white-tailed jackrabbit, elk, deer, black bear, cougar, bats, badgers, sagebrush lizards, and bobcats. The L.T. Murray unit is rich with both resident and migratory avian species and is a destination for birders and photographers. Birdwatchers might spot ruffed grouse, rough-legged hawks, pileated woodpeckers, flammulated owls, mountain bluebirds, western meadowlarks, and lazuli buntings, wood ducks, and western meadowlarks. Both resident and anadromous fish species, including rainbow trout, eastern brook trout, western cutthroat trout, summer steelhead, and spring Chinook, occupy the unit's streams and rivers. Recent conservation efforts include recovering federally listed anadromous stocks to the Manastash and Taneum watersheds. For a complete list of state and federally listed species on the wildlife area, see Table 11.

**Map 3: L.T. Murray Unit**

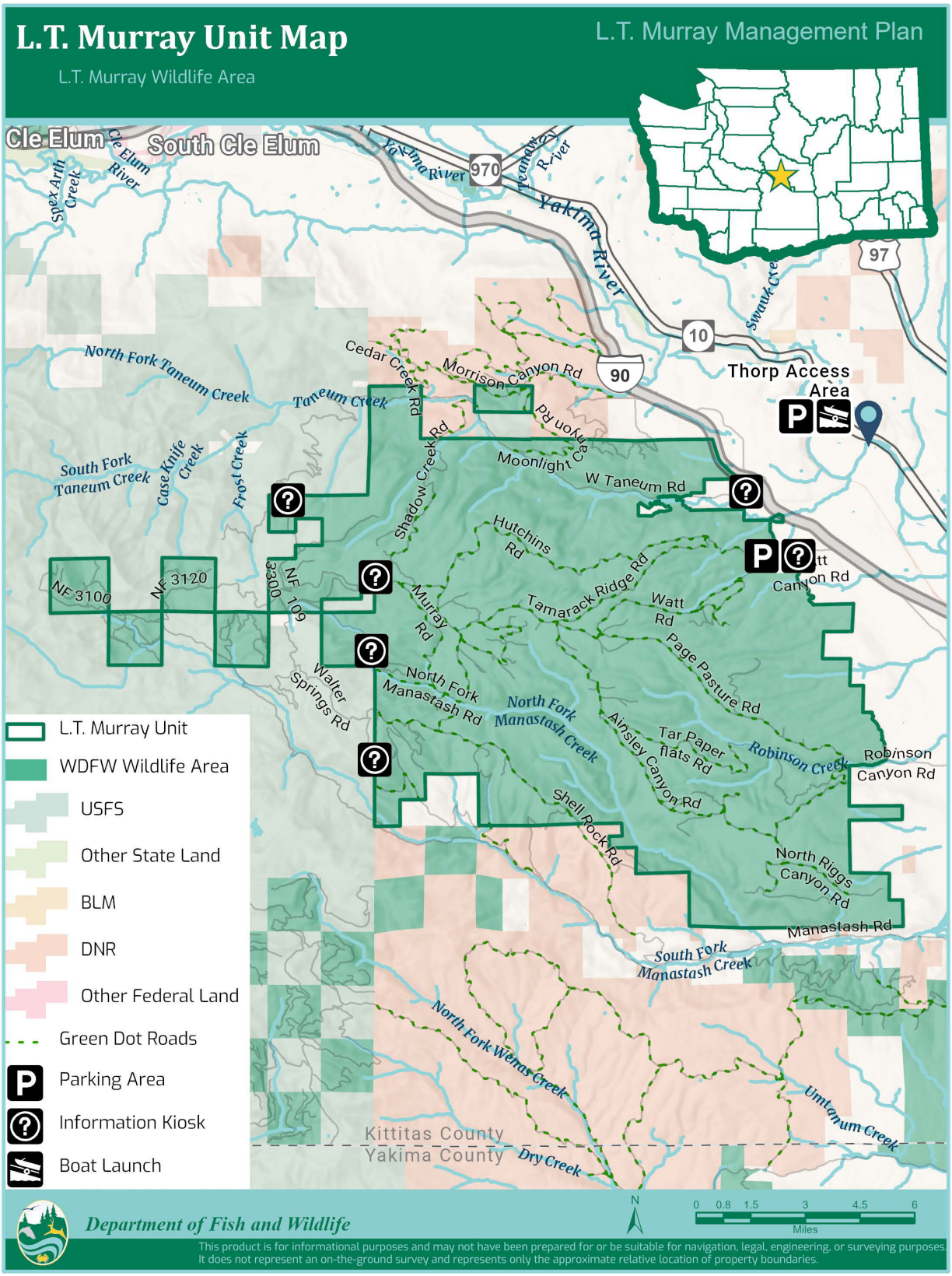


**Figure 4: Whiskey Dick Unit description**

| Whiskey Dick Unit | |
|---|---|
| **Size** | 20,569 acres |
| **Acquisition and agreement dates** | 1966 – 2010 |
| **Acquisition funding** | WA Dept. of Fish and Wildlife: *Wildlife Fund*<br>WA Recreation and Conservation Office: *State Bond Account*<br>U.S. Fish and Wildlife Service: *Pittman-Robertson Wildlife Restoration Program*<br>U.S. National Park Service*: Land and Water Conservation Fund* |
| **Management** | Big game, upland bird, endangered species, recreation |
| **Elevation range** | 573 – 3,152 feet |
| **Recreational opportunities** | Camping, horseback riding, biking, hiking, hunting, OHV driving, wildlife viewing |
| **County** | Kittitas |
| **Site access** | wdfw.wa.gov/places-to-go/wildlife-areas/lt-murray-wildlife-area |

The Whiskey Dick Unit is located roughly 15 miles east of Ellensburg in the Alkali-Squilchuck watershed, bordering the Columbia River to the east, and the Ginko Petrified Forest State Park and private lands to the south. The Quilomene Unit lies to the north and west. Many small streams run through the unit, which serve as critical water sources in an otherwise arid landscape. The landscape is steep with rocky slopes, rolling ridges, and canyons. Most of the land is classified as shrubsteppe habitat, which is dominated by shrubs, including sagebrush, rabbitbrush, and bitterbrush, and interspersed with native wildflowers and perennial bunch grasses. Narrow bands of productive riparian habitat exist along the creeks, providing critical cover, breeding, and rearing habitat. Sensitive plants can also be found on the Whiskey Dick unit, including the rare Hoover's tauschia and hedgehog cactus.

Visitors to the unit might encounter bighorn sheep, black-tailed jackrabbits, elk, deer, bats, ground squirrels, sagebrush lizards, Pacific rattlesnakes, golden eagles, burrowing owls, ferruginous hawks, and sage thrashers. Resident fish occupy tributaries of the Columbia River within the Whiskey Dick unit, including rainbow trout sculpin, dace, and suckers, as well as anadromous summer steelhead.

The Whiskey Dick unit is a Green Dot Road Management Area and vehicles must stay on designated open Green Dot roads. A motorized closure is in effect from February 1 through April 30 to protect wintering elk. The closure extends from the Vantage Highway north to the Quilomene Ridge Road (Jackknife Ridge Road and east to the river is open to motorized vehicles year-round), west to the Wild Horse Wind Project. The Wild Horse Wind Farm, owned and managed by Puget Sound Energy is adjacent to the boundary of the Whiskey Dick Unit, and spans from Quilomene Ridge Road south to Vantage Highway.

**Map 4: Whiskey Dick Unit**

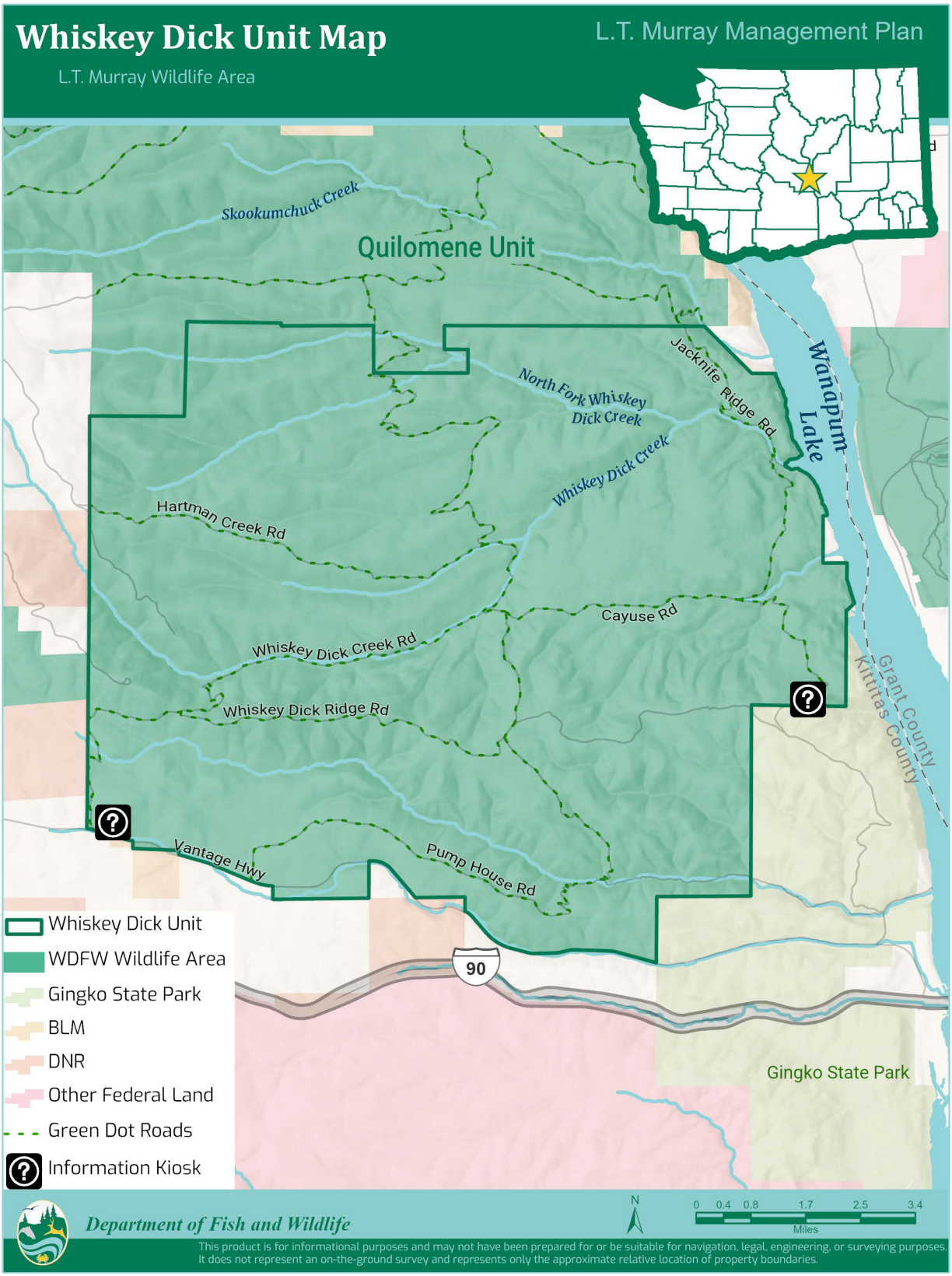


**Figure 5: Yakima River Unit description**

| Yakima River Unit | |
|---|---|
| **Size** | 2668 acres |
| **Acquisition and agreement dates** | 1968– 2013 |
| **Acquisition funding** | Private grantor: *Donation; Transfer of land*<br>WA State: *Transfer of land*<br>U.S. Fish and Wildlife Service: *Endangered Species Act Section 6 Program*<br>*Recreation and Conservation Office acquisition funds.* |
| **Management** | Primarily managed for water access, federal and state-listed species, and other species of concern |
| **Elevation range** | 1,998 – 4,101 |
| **Recreational opportunities** | Wildlife viewing, hunting, fishing, hiking, cross-country skiing, snowshoeing, snowmobiling, non-motorized boating. |
| **County** | Kittitas |
| **Site access** | wdfw.wa.gov/places-to-go/wildlife-areas/yakima-river-wildlife-area-unit |

The Yakima River Unit is made up of multiple WDFW properties along the Yakima River off Interstate 90 and includes river bottom lands, as well as upland conifer forests. Together, these lands are managed primarily for federal and state-listed species and other species of concern. The largest property is south of the river and I-90 and includes Cabin and Cole creeks, which borders Lake Easton State Park and the Palouse to Cascades state trail. The Cole Creek corridor is characterized by a small wetland and riparian area with mixed conifer and deciduous trees and shrubs along the stream bank.

Pacific tree frog. Photo by WDFW.

The unit is popular for recreation in both summer and winter. Recreational opportunities in this area include wildlife viewing, hunting, fishing, hiking, snowshoeing, and cross-country skiing. A groomed portion of the State Parks Palouse-to-Cascades trail runs through the unit and is groomed

in winter. Addressing recreation impacts on this unit is a goal of this plan (Goal 15). The Teanaway Junction Boat launch is the latest parcel addition to the unit and provides access to the Yakima River for fishing and boating. A primitive boat launch, parking lot, and vault toilet are located on the property. Improved river access and facility improvements to the Teanaway Junction boat launch are priority objectives in this plan (Objective 26c). The Yakima River unit is also part of the I-90 Wildlife Corridor. I-90 acts as a dispersion barrier to wildlife movement (a feature that impedes animal movement). A series of acquisitions helped to prevent development, protect habitat for listed species, and create wildlife connectivity in concert with WSDOT and other partners through the construction of new wildlife crossing structures on I-90. The structures are designed to reduce wildlife mortality on the highway and reconnect core habitats between the north and south Cascade Mountains. At least one wildlife crossing structure is adjacent to the Yakima River Unit.

**Map 5: Yakima River Unit**

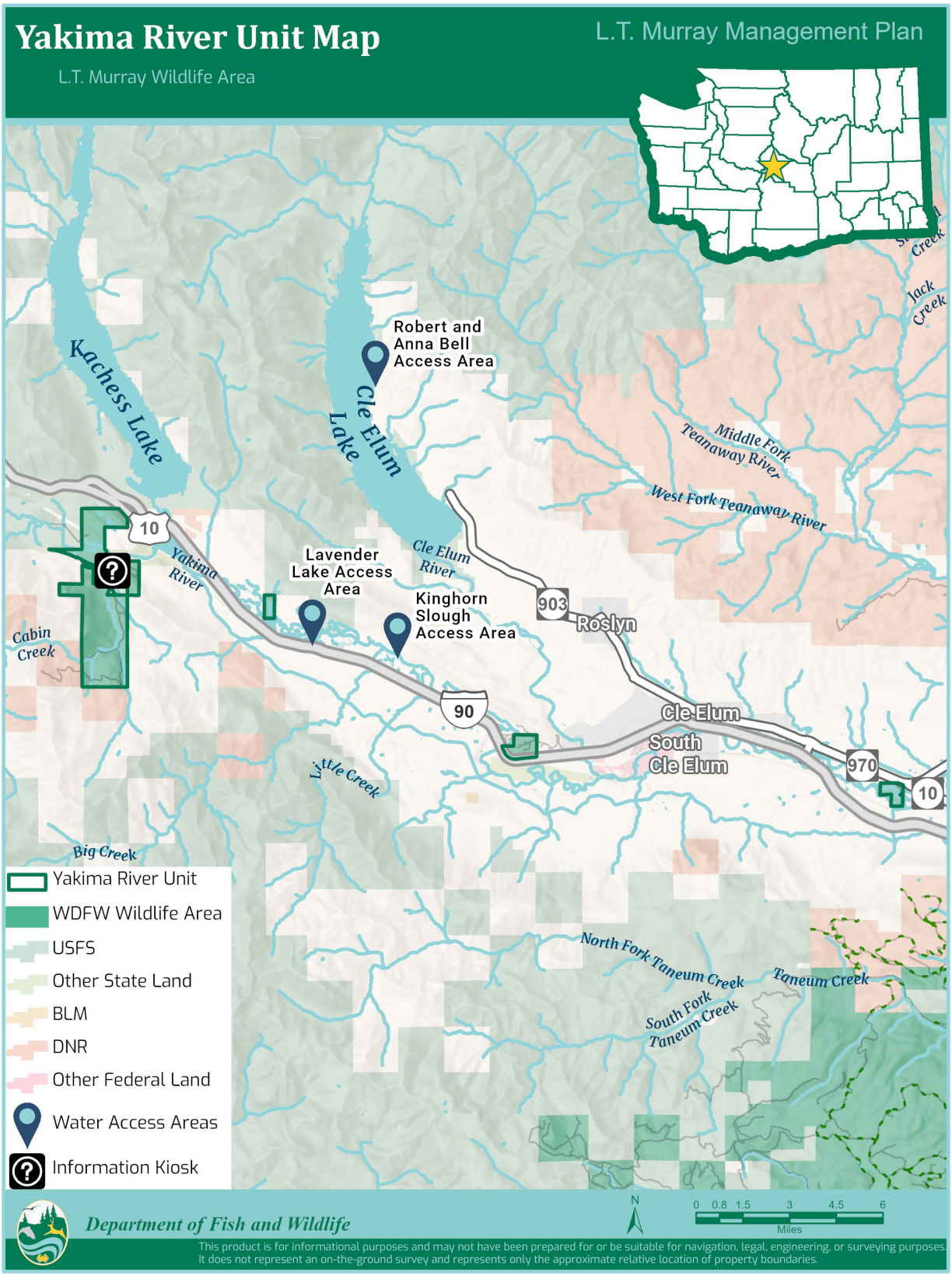


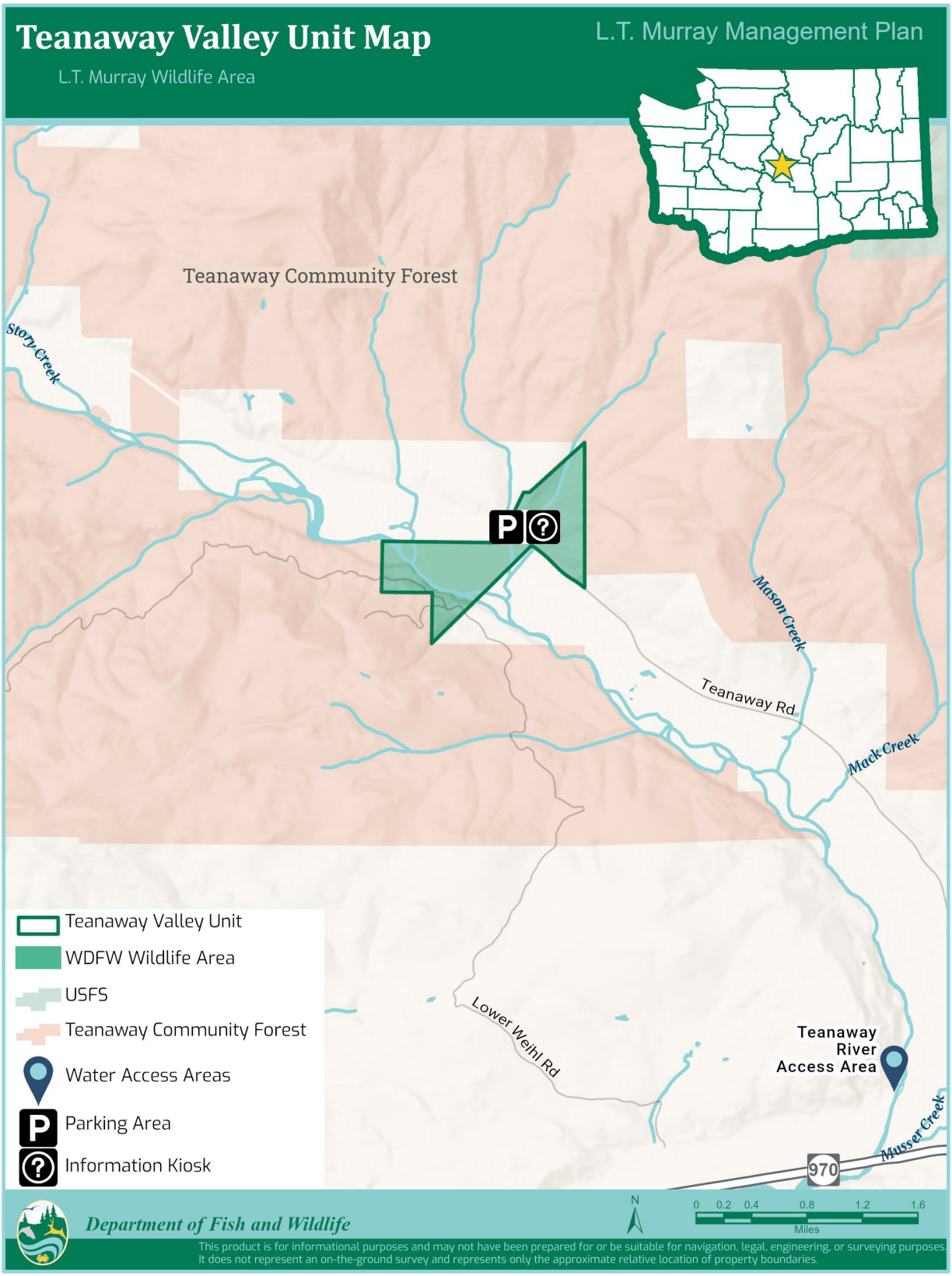
**Figure 6: Teanaway River Unit**

| Teanaway Valley Unit | |
|---|---|
| **Size:** | 215 acres |
| **Acquisition and agreement dates** | 2017 |
| **Acquisition funding** | U.S. Fish and Wildlife: *Endangered Species Act Section 6 Program*<br>WA State Department of Ecology |
| **Management** | Endangered species, recreation |
| **Elevation range** | 2,083 – 2,420 feet |
| **Recreational highlights** | Wildlife viewing, hunting, fishing, hiking, horseback riding |
| **County** | Kittitas |
| **Site access** | wdfw.wa.gov/places-to-go/wildlife-areas/teanaway-valley-wildlife-area-unit |

The Teanaway Valley Unit is in the Teanaway River valley approximately 13 miles northeast of Cle Elum. About 0.6 miles of the main stem of the Teanaway River runs through the unit, which borders private property and the Teanaway Community Forest (TCF). The TCF is a 50,000+ acre forest co-managed by WDFW and the Department of Natural Resources. The property was acquired with public and private funding to protect endangered species (northern spotted owl, gray wolf, and bull trout) and provide cross-valley habitat connectivity for terrestrial species, and upstream and downstream connectivity for aquatic species. The acquisition also complements a $100M investment in watershed health. See the Success Story on page 15.

A former homestead, the unit includes an historic agricultural field, conifer forests, meadows, wetlands, and riparian corridors. A diverse array wildlife are present on the unit, including elk, deer, black bear, cougar, turkey, grouse, quail, many small mammals, neo-tropical/upland birds, raptors, and a variety of amphibians, invertebrates, and reptiles. The river hosts both resident and anadromous fish stocks. Since the unit was purchased to protect endangered species, recreation opportunities are limited, with only non-motorized uses permitted. WDFW removed the former farmhouse and buildings as required under Section 6 federal funding and installed a parking area and interpretive kiosk. Hunting, fishing, wildlife viewing hiking, and horseback riding are all popular here.

**Map 6: Teanaway Valley Unit**



# Part II. Wildlife area management and planning

## Land Ownership and Management

The L.T. Murray wildlife area covers roughly 119,395 acres, with approximately 30,000 acres of Department of Natural Resources (DNR) and Bureau of Land Management (BLM) lands interspersed throughout. Acquisition details for each unit are found in the unit pages of this document. WDFW manages land under a variety of instruments, including agreements, deeds, leases, and easements.

### Acquisition History, Funding, and Purpose

This section describes major acquisitions that comprise the L.T. Murray Wildlife Area. Parcels that make up the five units were purchased between 1966 and 2021. The first parcels were acquired in 1966 when WDFW (formerly the Department of Game) purchased 5,049 acres in the Whiskey Dick area from Ellensburg Distributors. All funding was provided by the Interagency Committee for Outdoor Recreation (IAC). The 119-acre Teanaway Junction boat launch was acquired in 1968 using IAC funding to provide water access to the upper Yakima River for fishing and boating and is managed as part of the Yakima River Unit. Subsequent purchases included 11,978 acres in the Whiskey Dick area in 1966, and 11,522 acres of rangeland along the Quilomene drainage from the Quilomene Cattle Company between 1972-1974. Additional funds from the federal Land and Water Conservation, USFWS, IAC, and WDFW secured the acquisition. In 1968, 103,461 acres were purchased from Kittitas County rancher and logger Lowell T. Murray. Both the wildlife area and the L.T. Murray unit are dedicated in his name. The High Valley Ranch purchase as it was known, protected critical winter range for deer and elk and upland game bird habitat. Funding for this purchase was provided by both federal dollars from the Land and Water Conservation Fund, and IAC funds. As a condition of the sale, all timber was reserved for 25 years and a 10-year grazing lease returning annual income to the Game Department was retained by the West Fork Timber Company.

Between 2004 and 2007, WDFW acquired the 17,581-acre Skookumchuck purchase from the Trust for Public Land, which is managed as part of the Quilomene unit. The property was acquired to provide connectivity between the Whiskey Dick and Quilomene Wildlife Areas and protect habitat for Greater sage-grouse, wintering elk, and endangered steelhead fisheries. Funding for the Skookumchuck purchase was provided by the Washington State legislature, Hanford mitigation funds, Grant County Public Utility District (PUD) and the Recreation and Conservation Office (formerly IAC). An additional 120 acres in the Quilomene area was donated by Puget Sound Energy in 2010 for mitigation for lost habitat due to construction of the Wild Horse Wind Farm.

In 2013 and 2014, 4,791 acres were added to the L.T. Murray unit within the Taneum Creek drainage through an acquisition from the Nature Conservancy using a combination of USFWS Section 6 funds and state RCO dollars. In 2013, an additional 640 acres were added to the Yakima Unit, after purchase from Forterra, a Seattle-based land trust, using USFWS Section 6 funds. In 2017, a historic farm in the Teanaway valley, totaling 215 acres was purchased, creating the newest unit on the wildlife area: the Teanaway Valley unit. The parcel was purchased with funds from Kittitas County, the Department of Ecology, the Yakima Basin Integrated Plan, private donations from the Trust for Public Lands, and the U.S. Fish and Wildlife Service's Endangered Species Section

6 grant funds. The acquisition was part of the "Heart of Cascades" project to acquire lands in Central Washington to provide landscape connectivity and habitat to protect federally listed species. In June of 2021, the purchase of the Brain property added another 318 acres to the L.T. Murray Unit. The acquisition was funded through a Washington Wildlife and Recreation Program (WWRP) grant from RCO for riparian protection and to protect critical habitat for endangered fish.

At the time of the writing of this plan, WDFW and partners are in negotiations to potentially purchase a portion of the historic Springwood Ranch, located in Thorp near the confluence of Taneum Creek and the Yakima River. The ranch was owned by Stuart Anderson of Black Angus Steakhouses fame. The 26,000-acre property was subsequently sold over time to different owners. The ranch was used primarily to raise cattle and hay. Alongside vast agricultural fields are a diversity of important habitats, including aquatic and riparian habitat along Taneum Creek and the Yakima River, upland forested habitat, shrubsteppe, meadows, talus slopes, and cliffs. WDFW will amend this plan to direct future conservation and management activities for any purchased lands.

## Agreements

WDFW has agreements with the U.S. Bureau of Land Management, Burlington Northern Railroad, Kittitas County, and the Department of Natural Resources to address the development, maintenance, and management of the natural resources on public lands and to develop programs for lands that are important to wildlife, wildlife-related recreational use, and public access.

## Leases

About 19,682 acres of the wildlife area are leased, mainly from the Department of Natural Resources, with approximately 4,413 acres leased from private parties. WDFW leases 80 acres of the Whiskey Dick WLA to Puget Sound Energy for the operation of nine wind turbines. The land was leased to Puget Sound Energy (PSE) in 2005 and is operated as part of the Wild Horse Wind Farm.

A 5-year agricultural lease of water is approved for crop production on private property adjacent to the wildlife area. The lessee is required to offset the loss of habitat, manage weeds, and maintain pollinator habitat.

**Table 2: Wildlife area land instruments**

| Instrument | Acres |
|---|---|
| **Deeded acres (owned by WDFW)** | 97,640 |
| **Acres managed under agreements** | 2,073 |
| **Acres leased from other agencies and private parties** | 19,682 |
| **TOTAL** | 119,395 |

## Easements

WDFW has been granted several conservation easements within or adjacent to the wildlife area. In 2009, Puget Sound Energy granted a 6,500-acre easement to WDFW, which includes 649 acres of the Quilomene Unit, as mitigation for habitat loss due to development of the Wild Horse wind facility. The easement is managed for conservation of habitat and wildlife, notably for big game and shrubsteppe-obligate species.

In 2013, the Department of Natural Resources granted a conservation easement to WDFW on 50, 272 acres at the headwaters of the Yakima River watershed. The state purchased the land in 2013 with funding provided by the legislature to establish the Teanaway Community Forest, Washington's first state-owned community forest. The forest contains nearly 400 miles of streams

and prime habitat for fish and wildlife and offers a variety of recreation opportunities. The Department of Natural Resources (DNR) jointly manages the TCF with WDFW under the stipulations set forth in the Teanaway Conservation Easement and the Teanaway Community Forest Management Plan. Approximately 430 acres under the Teanaway Conservation Easement are located adjacent to the Yakima River unit along Cabin Creek. The easement was conveyed for the purposes of conserving forest, riparian, wetland and aquatic habitat for fish and other wildlife species.

### Water Rights

Several types of water rights, including water allotments, are managed in coordination with the Washington State Department of Ecology, Kittitas Reclamation and Cascade Water Districts, and the U.S. Bureau of Reclamation. Types of water rights include surface and groundwater rights, stock water rights, claims, and domestic wells that were acquired with WDFW properties over time. Many of these rights are associated with properties purchased for the upland restoration program and maintained to preserve property value and future potential habitat. In addition, The Yakama Adjudication reserved federal water rights for the USDA Forest Service. Some of the water diversions for the federal reserved water rights may be located within WDFW lands in the L.T. Murray WLA adjacent to the Wenatchee National Forest. The federal reserved water rights can be used for fire protection, dust abatement, road construction, and road maintenance.

### Grazing

Domestic livestock grazing is permitted on WDFW-managed lands in accordance with WDFW rules and policies, and subject to specific grazing management plans. Grazing serves several functions, including managing vegetation for wildlife, enhancing recreation opportunities, encouraging conservation through coordinated resource management, and protecting community character. One cattle grazing permit totaling 9,966 acres is managed on the Quilomene Unit, and one temporary sheep grazing permit totaling 960 acres is managed on the L.T. Murray Unit. There is also a temporary sheep crossing permit on the L.T. Murray totaling 317 acres for the purpose of moving stock to other ownerships. A series of adjustments to the timing and duration of the sheep crossing permit have been made to reduce any possible risk of exposure between domestic and wild sheep. In 2021-2022, the permit was changed into a type of crossing permit such that only 3 days of use were permitted on WDFW lands. The purpose of this change was to further minimize the risk of interaction while affording the operator logistical flexibility to access other ownerships. This permit prohibited bedding on WDFW lands, required continual herding, and included wolf-livestock sanitation measures.

The Fish and Wildlife Commission *Policy C-6003, Domestic Livestock Grazing on Department Lands*, states domestic livestock grazing may be permitted if consistent with WDFW's conservation mission and WAC 220-500- 200, and further stipulates that where grazing is permitted, ecological integrity will be maintained. In accordance with WAC 220-500-200, grazing permits will be consistent with the desired ecological conditions and management objectives of the land. WDFW 's Grazing Guidance and Grazing Management Tools (2021) wdfw.wa.gov/about/wdfw-lands/working-lands/grazing/guidelines-tools provides more context and information on how WDFW manages livestock grazing as a part of its mission.

### Temporary use permits

Non-commercial group activities of 30 participants or more must have a permit to operate on the L.T. Murray Wildlife Area. Commercial operators, such as touring, hunting, and fishing guides, or those organizing a commercial sporting event, must also have a permit to operate on the wildlife area. About 15 temporary use permits are issued annually in the L.T. Murray Wildlife Area. Non-

commercial permits include permits for sporting events, scientific research, educational activities, and search and rescue training. Commercial permits approved on the wildlife area include commercial rafting, a shuttle service for fishing, and filming.

# Management Setting

## Administration and Staffing

The L.T. Murray Wildlife Areas is in Region 3 headquartered in Yakima. Day-to-day management of the wildlife area is the responsibility of staff based out of the offices and shop located in Ellensburg. Management personnel include a full-time Wildlife Area Manager, an Assistant Wildlife Area Manager, one Natural Resources Specialist and one Natural Resource Technician. Wildlife area staff coordinate with other agency staff and experts on management actions such as wildlife surveys and development of species, habitat, wetlands, and floodplain recovery plans.

## Operating funds

Operating funds to manage the wildlife area come from four main sources: federal USFWS Pittman Robertson Act funds, WDFW state funds, private local windfarm lease revenues, and Discover Pass funds. WDFW also expends funds on property management, including expenditures for leases, assessments, and fire protection services.

**Table 3: Operating Funds**

| Revenue | | Amount |
|---|---|---|
| **Private Local Windfarm Lease Revenue** | | $ 86,000 |
| **USFWS Wildlife Restoration (Pittman-Robinson (PR) federal funds** | | $ 93,000 |
| **Recreation Access Pass Account-Discover Pass** | | $ 31,000 |
| **Fish & Wildlife Conservation Account** | | $ 105,000 |
| | TOTAL: | $ 315,000 |
| **Agency Obligations for Property Management** | | **Amount** |
| **Leases, Assessments, Fire Protection Services** | | |
| | TOTAL: | $ 51,000 |

Lease revenue is received from Puget Sound Energy to lease WDFW property for placement of wind turbines that generate power/revenue. WDFW receives a portion of the wind power revenue as well as the rent payment from the lease of the land. Additionally, WDFW receives 8% of the revenue collected annually by the state from Discover Pass sales.

Grant dollars provide a large portion of operation and maintenance funds on eighteen wildlife areas, providing funding for habitat and recreational hunting opportunities for the public. Grant dollars also contribute to winter-feeding costs for big game and upland birds, equipment, planning and outreach efforts, the development of a facilities inventory, recreation management, and payment of statewide leases and assessments. WDFW expends funds on property management, including expenditures for leases, assessments, and fire protection services.

## Facilities and Maintenance

Routine facilities management activities on WDFW lands include maintaining fences, roads, trails, signs, camping areas, vault toilets, and conducting weed control. Annual maintenance is conducted to ensure wildlife area facilities and infrastructure are safe and functional over time.

The wildlife area has only two non-administrative structures – an historic cabin and haybarn. There are about 65-miles of stock fence on the wildlife area and 13 miles of elk fence. Fencing is repaired, replaced, or removed to meet wildlife area management objectives. Derelict fencing is fencing that poses a hazard to wildlife and is removed by staff and volunteers as capacity allows.

## Road and trail management

The wildlife area has both administrative and recreational roads. Within Yakima and Kittitas counties, WDFW cooperatively manages the Green Dot system with the state Department of Natural Resources and private landowners. Roads are generally primitive in nature, offering scenic and sometimes challenging opportunities for both motorized and non-motorized users. To access the online Green Dot map, visit: wdfw.wa.gov/about/wdfw-lands/green-dot.

**Table 4: Green Dot Road mileage**

| Unit | Miles of Road | Miles of Green Dot Road | Unit Size (square miles) | Density |
|---|---|---|---|---|
| **L.T. Murray** | 139.62 | 24.54 | 75.88 | 1.84 |
| **Quilomene** | 62.42 | 32.69 | 61.01 | 1.02 |
| **Teanaway Valley** | 0.68 | 0 | 0.34 | 2.01 |
| **Whiskey Dick** | 49.38 | 40.53 | 43.65 | 1.13 |
| **Yakima River** | 1.52 | 0 | 3.98 | 0.38 |

Road maintenance activities typically occur when associated with a timber sale, or when roads, culverts, or other road infrastructure pose impacts to fish-bearing streams. Several goals in this plan address roads to improve the user experience and ensure that recreational activities are occurring on sustainable routes that minimize impacts to habitat, fish, and wildlife (see Roads and Recreation Goals 15-18).

Trails on the wildlife area include single and double-track natural surface trails. These trails occur on all units of the wildlife area, providing access for wildlife viewing, as well as hiking, hunting, fishing, cycling, and horseback riding, The Shoestring trail offers dirt bike enthusiasts a connector route across the L.T. Murray unit to neighboring Forest Service land. Many of the trails on the wildlife area are old ranch roads, game, or livestock trails that pre-date the wildlife area, or trails that developed informally over time through repeated use (social trails). Under this plan, WDFW will identify and designate routes that meet sustainability standards. In accord with the *10-year Recreation Strategy for WDFW-managed Lands* adopted in 2022, inventories of existing roads and trails, condition surveys, and recreation impact monitoring will be conducted to improve the quality of recreational experiences, plan routine maintenance and improvements to roads and trails, protect sensitive habitats, increase ADA access, and minimize the impacts of recreational activities to habitat, fish, and wildlife (see Goals 19-22).

## Local Land Use Compliance

All five units of the L.T. Murray Wildlife Area fall under the jurisdiction of Kittitas County. Therefore, all land use in the wildlife area must be consistent with Kittitas County's Comprehensive Plan, Natural Resource Ordinance, Critical Areas Ordinance, and the Kittitas County Shoreline Master Program (2016). Kittitas County's comprehensive plan establishes policies for community growth and development. For more information, visit the Kittitas County webpage at: co.kittitas.wa.us/cds/comp-plan/default.aspx.

**Table 5: Summary of local government land use instruments**

| Wildlife Area Unit | Zoning Designation (s) | Land Use Designation | Contains Shorelines per Shoreline Master Plan (SMP) | SMP Designation |
|---|---|---|---|---|
| **L.T. Murray Unit** | Commercial Agriculture; Commercial Forest; Forest and Range | Rural working land use; Commercial agriculture land use; Commercial Forest land use | YES – Taneum Creek | Natural; Rural Conservancy; Aquatic |
| **Quilomene Unit** | Forest and Range; Commercial Forest | Rural working land use; Commercial Forest land use | YES – Columbia River | Natural; Aquatic |
| **Teanaway Valley Unit** | Agriculture 20; Forest and Range; Commercial Forest | Rural working land use; Commercial Forest land use | YES – Teanaway River | Rural Conservancy; Aquatic |
| **Whiskey Dick Unit** | Commercial Agriculture; Forest and Range | Commercial Agriculture land use; Rural working land use | YES – Columbia River | Natural; Aquatic |
| **Yakima River Unit** | Forest and Range; Commercial Forest | Rural working land use; Commercial Forest Land use | YES – Cabin Creek, Yakima River, Lake Easton | Rural Conservancy; Aquatic |

# Cultural Resources

## What are cultural resources?

In addition to stewarding fish, wildlife, and habitats, WDFW is responsible for protecting cultural resources on WDFW-managed lands. Cultural resources provide evidence of pre-contact Native Americans or historic activities. Cultural resources can include archaeological materials and sites, structures, landscapes, and objects of importance to a culture or community for scientific, traditional, religious, or other reasons.

## Management guidance

Cultural resources management is governed by agency policy, and state and federal laws. WDFW's cultural resources specialists have developed guidelines for meeting policy and regulatory requirements and ensuring appropriate management of cultural resources. WDFW communicates, coordinates, and consults with the tribes when WDFW actions and decisions may affect tribal interests. WDFW coordinates and consults with a broad array of interested parties, promotes heritage education, and provides cultural resources management expertise to external partners. WDFW's tribal consultation procedures are guided by internal policy (Policy 5007 Consultation and Coordination with Tribes), Washington Governor's Centennial Accord and Millennium Agreement (goia.wa.gov/relations), the Governor's Executive Order 21-02 (formerly 05-05) https://dahp.wa.gov/2102, and specific processes determined via consultation to meet the needs and practices of tribes with reserved interests within Washington state.

### Staffing

WDFW has a team of in-house specialists, but also employs cultural resources management consulting firms to manage the volume of review needed to remain in compliance with cultural resources management regulations. Cultural resource specialists evaluate and implement practices to protect and preserve cultural resources on WDFW lands. They lead or guide consultation with the Department of Archaeology and Historic Preservation (DAHP) and affected tribes. WDFW's Cultural resource specialists also work with wildlife area and program managers to provide relevant historical information and recommendations for appropriate management practices around cultural resources.

Vehicle damage on the Quilomene unit.

## Enforcement

The mission of the WDFW Enforcement Program is to protect natural resources and the public in state and federal waters, parks, and forest lands throughout the state. WDFW officers enforce laws and regulations related to human-wildlife conflict, hunting and fishing, and the protection of fish, wildlife, and habitats. Other duties include education, community involvement, and assisting other law enforcement agencies. Law enforcement officers work closely with emergency management agencies and play an important role in emergency management statewide.

WDFW officers enforce all general authority laws, including fish, wildlife, and habitat laws under Title 77 RCW, the Fish and Wildlife Code. WDFW officers provide education on allowed uses and enforce boating, off-road vehicles, littering, and dumping regulations. The L.T. Murray WLA falls within Kittitas County and Enforcement Detachment 31, which includes 3 officers and 1 sergeant. Detachment 17 is responsible for patrolling and enforcing all Title 77 and other state laws as described above and respond to any emergency within three of the largest wildlife areas in the state – the L.T. Murray, Colockum, and Wenas Wildlife Areas. In addition, about 60-70% of the county is open and accessible public land where officers regularly patrol for compliance of hunting, fishing, and habitat rule compliance protection. Officers also are responsible for a large stretch of the Columbia River from Priest to Rock Island Dams for sustainable fisheries and protection of species under the ESA.

All state wildlife areas are governed by the agency's Public Conduct Rules (wdfw.wa.gov/about/wdfw-lands/public-conduct). The wildlife area may also have local requirements tailored to the area and its natural features, habitats, and species. Some public conduct issues on this wildlife area include illegal off-road driving, vandalism, littering, and unauthorized target shooting. Several goals and objectives in this plan will address activities that damage natural and cultural resources through education, signage, and enforcement. Signs posted in the wildlife areas are very specific about what activities are and are not acceptable. As in all wildlife areas, more enforcement presence is needed to handle all the issues that occur. As part of this plan, WDFW will take actions to improve safety and security, explore ways to increase citizen involvement in reporting illegal activities, and better manage travel in the wildlife area. The wildlife area staff will continue to encourage hunters and all other users to report suspicious or illegal behavior and things that the managers should know about.

## Recreation

### Statewide overview of recreation management

State wildlife areas provide fishing, hunting, and other outdoor recreation opportunities, consistent with the agency's mission and funding sources for each property. This section describes recreation trends in Washington state, the agency's strategy for managing recreation on WDFW lands, and the goals and strategic initiatives that will guide recreation management on WDFW lands and the L.T. Murray WLA.

Washington's population grew by nearly a million residents in the last decade, bringing the total to 7.7 million with most of the growth concentrated in larger cities. A million more residents are predicted by 2040 with most growth coming from migration (Office of Financial Management 2020). Increased visitation to public lands has also been documented. A recent study conducted by Earth Economics documented a 12% increase is visitation to state lands between January of 2019 to May of 2021, with an increase of 7% to WDFW lands. The L.T. Murray WLA had the 4th highest visitation rate compared to other state wildlife areas, with over 1 million visitors documented during the study period between 2019 and 2021 (Earth Economics, 2022). Studies also show an increase in participation in outdoor activities. States around the U.S., including Washington, (Outdoor Foundation, 2021) documented record outdoor recreation rates in 2020 with 53% for Americans ages 6 and over reporting participation in outdoor recreation.

As the number of recreationists has grown, the ways Washingtonians and visitors to our state recreate outside also has shifted. WDFW lands have seen a steady increase in recreational target shooting and trail-related activities, including hiking, biking, walking, trail running, horseback riding, motorized recreation, and water-based activities, such as boating, paddling, and swimming Hunting and angling have declined over the last decade (WDFW, 2022).

Hunting remains a vital way of life for many residents and non-residents in Washington and contributes to statewide conservation efforts. Annual revenues from the sale of hunting permits contribute approximately $105,000 annually to the operating budget of the wildlife area. The sale of hunting and fishing equipment is subjected to a federal excise tax (also known as Pittman-Robertson act or PR funds). PR funds contribute around $93,000 to the annual operation of the wildlife area. WDFW has long relied on revenue from hunting and angling to protect species and habitats, and the agency remains deeply committed to supporting hunting and angling sports. WDFW partners with conservation organizations such as the Rocky Mountain Elk Foundation, Mule Deer Foundation, the Wild Sheep Foundation, and the local Kittitas County Field and Stream Club to protect important habitat, species, and promote evidence-based wildlife management through the support of research. Wildlife program staff developed a statewide recruitment, retention, and

reactivation (R3) plan in 2022 to increase participation and public awareness for hunting activities. For more information, visit: wdfw.wa.gov/publications/02323.

In response to changing trends, WDFW adopted the 10-Year Recreation Strategy in July 2022 (wdfw.wa.gov/publications/02293). The goals of the strategy are to offer quality recreation opportunities on WDFW-managed lands, increase protections for natural, cultural, and tribal resources, and strengthen relationships with tribal, state, federal and local governments, nonprofit and local organization partners, local communities, and diverse stakeholders.

Hiking on the Whiskey Dick. Photo by Alan Bauer.

To achieve these goals, WDFW will pursue six strategic initiatives:

1. **Recreation Planning:** Plan to accommodate outdoor recreation, including hunting and fishing, where it is compatible with conservation goals and other management priorities.
2. **Education and Engagement:** Engage diverse Washingtonians in planning and managing recreation and encourage the development of a stewardship ethic in all visitors to WDFW-managed lands.
3. **Use and Impact Monitoring:** Develop and manage data systems that support recreation planning and management decisions.
4. **Rulemaking:** Regulate recreation uses of WDFW-managed lands to protect the health and safety of fish, wildlife, habitat, department personnel, neighbors, and other visitors.

5. **Travel Management:** Develop a sustainable multimodal travel management program that addresses the designation, development, decommissioning, maintenance, and monitoring of roads and trails on WDFW-managed lands.

6. **Capacity and Funding:** Develop the tools, workforce, and sustainable funding to deliver on the vision of the 10- year Recreation Strategy for WDFW-managed Lands.

Through the 10-year Recreation Strategy, the agency will embark on recreation planning efforts on the L.T. Murray and other wildlife areas over the next decade, together with government partners and community stakeholders.

## Recreation Opportunities on the L.T. Murray WLA

Biking in Joe Watt Canyon, L.T. Murray unit. Photo by Alan Bauer.

A diverse array of recreational opportunities awaits visitors to the wildlife area. Hunting (waterfowl, pheasant, upland bird, small game, mule deer) and stream and lake fishing are popular, along with camping, wildlife viewing, shed antler hunting, hiking, horseback riding, motor and mountain biking, and OHV riding. With elevations up to 5,818 feet, winter recreation opportunities include cross-country skiing, snowshoeing, sledding, and snowmobiling. With multiple water access areas along the Yakima River and its tributaries, water sports such as rafting, paddling, tubing, picnicking, and swimming are also popular.

## Education and Outreach

WDFW works to educate and inform visitors on wildlife and habitats, as well as the rules and regulations to follow when visiting the wildlife area. This includes providing accurate and up-to-date signage and information on the agency website, indicating what recreation activities are permissible, and if any local restrictions apply. WDFW developed new signage standards in 2023, which will create a new look at trailheads and water access areas. A goal of this plan is to "provide information and education to protect cultural and natural resources (see Goal 17), and to "create

outreach materials on Green Dot Road recreation" (see Goal 18). WDFW will engage stakeholders in outreach and education efforts as part of this plan, including opportunities to volunteer on the wildlife area and assist in the development of outreach materials and events (See Goal 24).

OHV riding on the Whiskey Dick unit. Photo by Alan Bauer.

**Table 6: Recreational use on the L.T. Murray WLA**

| Wildlife Area Unit | Hunting and Fishing Opportunities | Other Recreational Activities | Restrictions | Parking and other facilities *See unit maps for a list of kiosks and access points for each unit. |
|---|---|---|---|---|
| **L.T. Murray** | **Hunting:**<br>Big game<br>Upland birds, including California quail, turkey, mourning dove, and forest grouse.<br>**Fishing:**<br>Resident fish | Camping<br>Horseback riding<br>Mountain biking<br>Hiking<br>Shed antler collecting<br>OHV driving<br>Wildlife viewing<br>Snowmobiling<br>Cross-country skiing<br>Snowshoeing<br>Llama/goat packing | Green Dot Road Management Area restrictions:<br>-Motorized vehicles must stay on Green Dot roads.<br>-Vehicle camping is prohibited beyond 100 feet of open roads.<br>-Campfires are prohibited April 15-Oct. 15.<br>Other: areas surrounding elk feeding sites are closed to all public entry from Dec. 15 to May 1. | Parking: gravel flat at Joe Watt Canyon area<br>Reader boards with regulations and map at entry points<br>Several interpretive kiosks at main entry points<br>No restroom<br>Winter access: visit WA State Parks winter recreation map: Winter recreation map \| Washington State Parks and Recreation Commission |
| **Quilomene** | **Hunting:**<br>Big game<br>Upland birds, including chukar, California quail, turkey, mourning dove, partridge, forest grouse and ring-necked pheasant<br>Pheasant release site<br>**Fishing:**<br>Streamside fishing for resident fish only (see Table 7) | Camping<br>Horseback riding<br>Mountain biking<br>Hiking<br>Shed antler collecting<br>OHV driving<br>Wildlife viewing | Green Dot Road Management area restrictions:<br>-Motorized vehicles must stay on Green Dot roads.<br>-Vehicle camping is prohibited beyond 100 feet of open roads.<br>-Campfires are prohibited April 15-Oct. 15<br>Other: waterfowl closure adjacent to east boundary. No hunting of migratory waterfowl, coot, and snipe is allowed. | Parking: gravel flat at Green Gate area with interpretive kiosk<br>Reader boards with regulations and map at entry points<br>No restroom<br>Winter access: visit WA State Parks winter recreation map: Winter recreation map \| Washington State Parks and Recreation Commission |
| **Teanaway Valley** | **Hunting:**<br>Big game<br>Upland birds including California quail, turkey, mourning dove, and forest grouse | Horseback riding<br>Hiking<br>Wildlife viewing<br>Cross-country skiing | No motorized use.<br>A SAFETY ZONE has been established near the parking area and neighboring infrastructure. No | Developed parking area with interpretive kiosk<br>No restroom |

| Wildlife Area Unit | Hunting and Fishing Opportunities | Other Recreational Activities | Restrictions | Parking and other facilities *See unit maps for a list of kiosks and access points for each unit. |
|---|---|---|---|---|
| | **Fishing:**<br>Streamside fishing for resident fish only | Snowshoeing | weapons may be discharged within this zone. | No winter plowed parking provided. For winter access in the Teanaway Community Forest visit Teanaway Community Forest \| WA - DNR |
| **Whiskey Dick** | **Hunting:**<br>Big game<br>Upland birds, including chukar, California quail, turkey, mourning dove, partridge, forest grouse and ring-necked pheasant<br>**Fishing:**<br>Streamside fishing for resident fish only | Camping<br>Horseback riding<br>Mountain biking<br>Hiking<br>Shed Hunting<br>OHV driving<br>Wildlife viewing<br>Cross-country skiing<br>Snowshoeing | Green Dot Road Management area restrictions:<br>-Motorized vehicles must stay on Green Dot roads.<br>-Vehicle camping is prohibited beyond 100 feet of open roads.<br>-Campfires are prohibited April 15-Oct 15.<br>-A motorized closure is in effect from Feb. 1 to May 1 to protect wintering elk. | 2 undeveloped parking sites<br>Reader boards with regulations and map at entry points<br>(Several interpretive kiosks at main entry points planned)<br>No restroom<br>Winter access: visit WA State Parks winter recreation map: Winter recreation map \| Washington State Parks and Recreation Commission |
| **Yakima River** | **Hunting:**<br>Big game<br>Small game<br>Upland birds, including Band-tailed pigeon, Eurasian collared dove, ducks, geese, turkey, forest grouse, and quail<br>**Fishing:**<br>Streamside fishing for resident fish only<br>Boat launch | | This unit has limited access due to no available WDFW parking.<br>Winter access: at Easton Reload access site. All unit properties are located off U.S. Interstate 90 in Kittitas County. U.S. Forest Service Road 41 accesses the Cabin Creek property. | Parking and restroom available at Teanaway Junction Boat Launch<br>Visit WA State Parks winter recreation map: Winter recreation map \| Washington State Parks and Recreation Commission |

## Recreational Fishing

Recreational fishing opportunities on the wildlife area are primarily stream bank fishing for rainbow, cutthroat, and brook trout along the mainstem and tributaries of the Yakima River. Lake fishing is available at nearby WDFW water access areas, described in the next section. Due to their protected status under the ESA, no fishing for salmon, steelhead or bull trout is permitted on the L.T. Murray Wildlife Area. All recreational fishing is managed under statewide fishing regulations. For more information, visit: wdfw.wa.gov/fishing/regulations.

## Water access areas

The department manages thirty-four water access areas in the South-Central region. The primary management emphasis is recreational fishing and boating. The water access planning area for the L.T. Murray Wildlife Area encompasses the Yakima River basin above Ellensburg and the Quilomene and Whiskey Dick units on the west bank of the Columbia River.

Seven water access areas lie in the planning area, all in the Yakima River basin. Four are on the Yakima River, one is on the Teanaway River, and two are on lakes.

The Teanaway Junction Boat Launch on the Yakima River (River Mile 38) is the newest addition to the wildlife area. This former stand-alone 120-acre water access area was added to the Yakima River Unit during this management planning process. The launch includes an unimproved ramp, single stall vault toilet, and large gravel parking lot. It is a popular launch for various forms of floating and drifting in the upper canyon. Other portions of the Teanaway Junction tract are suitable for shore fishing and river wading.

Four other river access areas are found in the planning area. Kinghorn Slough Access Area (RM 21) above Cle Elum contains a gravel ramp and vault toilet. Below Teanaway Junction are Thorp Access Area (RM 50) and Highway 10 Take-Out Access Area (RM 53). Both serve as reliable take-outs when launching at Teanaway Junction. Lastly, Teanaway River Access Area, which consists of only a small parking lot, is located on the namesake river roughly four miles above Teanaway Junction.

At the upper end of the planning area are two lake access areas, Robert & Anna Bell Access Area on Cle Elum Lake, and Lavender Lake Access Area. Both support lake fishing, non-motorized boating, and other forms of water recreation.

The only water access area near the Quilomene or Whiskey Dick units is the Sunland Estates Boat Launch on the Quincy Lakes Unit of the Columbia Basin Wildlife Area. It is located on the east bank of the Columbia River opposite the Quilomene Unit and is not addressed in this plan.

The unassigned 120-acre Klocke Road property, acquired in 1974 for public fishing and waterfowl habitat on the Yakima River three miles above Ellensburg, is accessible only by boat and is not addressed in this plan. It is instead deferred to future regional water access management planning. For a list of Water Access Areas, opportunities, and facilities, see Appendix H.

**Table 7: Water Access Areas**

| Kittitas County Waterbody | Water Access Area | Wildlife Area Unit | Public Fishing Easement | Fishing and Boating Opportunities | | | Access Area Facilities | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | |  Fishing* |  Hand launch |  Trailered boat launch | Boat Ramp Surface | Toilet (^ = ADA) | Parking (^ = ADA) |
| **Cle Elum Lake** | Robert & Anna Bell | | | • | | | | • | • |
| **Lavender Lake** | Lavender Lake | | | • | • | | | • | • |
| **Teanaway River** | Teanaway River | | | • | | | | | • |
| **Yakima River** | Kinghorn Slough (RM 21) | | • | • | | • | Gravel | •^ | •^ |
| **Yakima River** | Teanaway Junction (RM 38) | Yakima River | | • | | • | Unimproved | •^ | • |
| **Yakima River** | Thorp (RM 50) | | | • | | • | Gravel | | • |
| **Yakima River** | Highway 10 Take-out (RM 53) | | | • | | • | Concrete | •^ | •^ |

A volunteer assists with winter elk feeding on the L.T. Murray unit.

## Stewardship and volunteerism

The L.T. Murray Wildlife Area has benefited from volunteer stewardship by several groups and individuals who support the agency's conservation mission. Volunteer stewardship projects have included improving habitat, such as removing fence or reseeding after a fire, clearing trails, replanting native vegetation along streams, providing education to visitors, donating materials, constructing kiosks at trailheads, and assisting with general maintenance on the wildlife area. An objective of this plan (see objective 24b) is to provide more opportunities for interested parties to engage with the wildlife area through volunteerism.

**Table 8: Volunteer opportunities**

| Volunteer Activity | Units | Time of Year |
|---|---|---|
| Derelict fence removal | All | All |
| Native plantings - in burn areas, finished forestry project areas, and restoration project areas | All | All |
| Litter pick-up - at dispersed campgrounds and along roads/trails and trailheads | All | All |
| Kiosk construction | All | All |
| Facility maintenance | Headquarters | Headquarters |
| Education and outreach - with CWU, Kittitas school district, non-profit groups, and at local events | All | All |
| Bluebird and kestrel box cleaning and maintenance | Whiskey Dick and Quilomene | Whiskey Dick and Quilomene |
| Annual trail maintenance event - remove winter downfall, trim brush, and perform general maintenance | All | All |
| Elk feeding - education, feeding, clearing snow from feeding area access roads, and removal of old feed | LTM | LTM |

# Wildlife area goals, objectives, and monitoring

WDFW employee Brenda Nass scans the elk herd.

The following section describes 31 goals and corresponding performance measures for the wildlife area. Objectives and performance measures were developed for each goal, and objectives were prioritized using a rating system based on a set of metrics: benefit, risk, level of effort, and urgency. Objectives were then prioritized by the planning team as either high, medium, or low. Objectives prioritized as high are expressed in this plan as "near term" priorities. Goals with objectives ranked as "near term" are outlined in Table 9 below. Objectives prioritized as medium or low are expressed as "long term" priorities. Within this framework, the management plan outlines specific goals, objectives, and performance measures, which are implemented on a timeline and reported on to the public every two years.

## Goals, Objectives, and Performance Measures

The wildlife area plan sets management priorities for the L.T. Murray Wildlife Area for the next 10 years. The goals, objectives, and performance measures in the plan were developed by an interdisciplinary team of regional and district staff in consultation with the Yakama Nation and the L.T. Murray Wildlife Area Advisory Committee.

Table 9 lists the goals, objectives, and performance measures of the plan. Objectives are described as either "near term" or "long term" priorities, or "regular management activities". The planning team prioritized each objective based on a set of criteria: the benefit to public, natural, cultural, and

tribal resources, the level of effort to accomplish the objective, the urgency of the objective for minimizing risk to the public health and safety of staff, visitors, and the natural and cultural resources, and the level of urgency influenced by regulatory, treaty, and contractual obligations. A near term objective was determined to be more urgent, have high potential benefit and require less coordination and effort to complete the objective. Objectives ranked "near term" will be completed in the first three years of the plan's implementation. Objectives ranked as "long term" may have a high benefit but take longer to implement due to funding requirements or the level of effort required to coordinate resources. Objectives ranked "long term" will be accomplished in years 4 through 9 of the 10-year plan. Objectives that are year-to-year are essential management activities that did not need to be prioritized because they are regular management activities that are conducted each year.

The wildlife area manager and staff develop an implementation plan with a schedule for completing each objective and provide updates on the completion of objectives and relevant performance measures every two years. Such reporting informs the public and serves as a progress report. The manager, staff, and the regional office also may adapt the plan in light of new scientific information, funding availability, staffing, and unforeseen events, such as a wildfire.

Big- headed clover, Whiskey Dick unit. Photo by Alan Bauer.

**Table 9: Goals, objectives, and performance measures**

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| **1** | **Maintain and protect big game populations.** | 1. Miles of fence inspected.<br>2. Miles of fence repaired removed or replaced.<br>3. Number of seasonal closures inspected. | | | | | |
| | | | a. Evaluate the Whiskey Dick winter closure to reduce impacts to wildlife and reduce human/wildlife conflicts. | Whiskey Dick | District Biologist<br>WLA Manager | – Establish project parameters.<br>– Gather data to assess current closure.<br>– Coordinate with the Yakama Nation | Near term |
| | | | b. Evaluate the need for a future Quilomene winter closure to reduce impacts to wildlife and reduce human/wildlife conflicts. | Quilomene | District Biologist<br>WLA Manager | – Establish project parameters.<br>– Gather data to assess future closure.<br>– Coordinate with Yakama Nation | Near term |
| | | | c. Protect big game populations on winter range annually. | Whiskey Dick<br>LT Murray | WLA Manager<br>Enforcement | – Signage maintained (Y/N)<br>– Gates closed seasonally (Y/N)<br>– Public notified of closure (Y/N)<br>– Coordination with Enforcement occurred (Y/N) | Regular Mgmt. activity |
| | | | d. Annually maintain elk fence. | LT Murray | WLA Manager | – Conduct inspections.<br>– Repair and replace as needed as funding allow.<br>– Replace wood-posts with steel pipe fenceposts that are better able to withstand wildfire. | Regular Mgmt. activity |
| | | | e. Remove relic barbed wire fence that no longer serves a management purpose where necessary and able. | All | WLA Manager<br>Partnership Coordinator | – Coordinate with volunteers on removal.<br>– Build partnerships (Conservation NW, Master Hunters, etc.)<br>– Replace wood posts with steel pipe fenceposts that are better able to withstand wildfire.<br>– Coordinate with landowners and lessees in mapping and inventorying fences. | Long term |
| | | | f. Monitor for treponeme-associated hoof disease (TAHD) on the feed sites annually. | LT Murray | WLA Manager | – Convey findings to WSU and WDFW wildlife management.<br>– Notify and inform public of findings. | Long term |
| | | | g. Maintain wintering feeding operations annually. | LT Murray | WLA Manager | – Feeding operations maintained (Y/N) | Regular Mgmt. activity |
| **2** | **Improve and maintain bighorn sheep populations.** | 1. Number of grazing permits evaluated.<br>2. Number of tests and monitoring opportunities conducted. | | | | | |
| | | | a. Reduce/eliminate the probability of disease transmission risk to bighorn sheep from domestic goats and sheep annually. | Quilomene<br>LT Murray | WLA Manager<br>District Biologist | – Address interactions with domestic livestock and bighorn sheep as needed. | Regular Mgmt. activity |
| | | | b. Ensure monitoring and permitting for the Manastash allotment annually. | LT Murray | | – Coordinate with USFS on Manastash allotment. | Regular Mgmt. activity |
| **3** | **Protect golden eagle nest sites** | 1. Number of seasonal closures inspected.<br>2. Number of areas surveyed. | | | | | |
| | | | a. Maintain golden eagle nest site closures annually. | LT Murray | WLA Manager<br>District/Assistant Biologist | – Monitor golden eagle habitat.<br>– Implement closures as needed.<br>– Inspect nest sites. | Near term |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | | | b. Survey for golden eagle nest sites. | LT Murray | WLA Manager<br>District Biologist | – Conduct nest surveys | Near term |
| | | | c. Promote use of non-toxic ammunition on the WLA together with conservation partners. | -All | WLA Manager<br>District Biologist | – -Create education and outreach initiatives on the impacts of lead shot. | Long term |
| **4** | **Manage for species diversity.** | 1. Number of surveys completed.<br>2. Number of land improvement projects completed.<br>3. Amount of fence removed. | | | | | |
| | | | a. Conduct survey for Species of Greatest Conservation need as directed by Diversity Division. | All | District Biologist<br>Diversity Division<br>WLA Manager | – Coordinate and collaborate with WLA Manager and Diversity Division on priorities annually.<br>– Species surveys completed every 5 years (Y/N) | Near term |
| | | | b. Initiate land improvement projects to encourage sage brush growth for shrubsteppe-dependent species occupancy. | Whiskey Dick | WLA Manager<br>Partnership Coordinator<br>Diversity | – Continue fence removal, continue fence marking, partner with volunteers.<br>– Continue land improvement measures in Whiskey Dick to improve the area for occupancy. | Near term |
| | | | c. Protect wildlife movement corridors, core habitat, and climate refugia across the landscape to afford access to the WLA. | All | WLA Manager<br>District Biologist<br>Diversity | – Integrate statewide landscape connectivity research and findings into management objectives.<br>– Remove barriers that inhibit dispersal.<br>– Target acquisitions in mvmt. corridors.<br>– Continue engagement with partners on I-90 crossing project. | Near term |
| | | | d. Monitor impacts of forest treatments and controls on focal SGCN and PHS species such as the white-headed woodpecker, pygmy nuthatch, and flammulated owl. | LT Murray, Teanaway Valley<br>Yakima River | WLA Manager<br>Diversity<br>District Biologist<br>Habitat Biologist | – Purchase audio devices and other technologies for monitoring<br>– Monitor diverse species in forest settings.<br>– Coordinate with state Forester in establishing performance metrics for monitoring of diversity species. | Near term |
| **5** | **Restore and monitor fish populations.** | 1. Number of surveys completed.<br>2. Number of observations of target recovery species. | | | | | |
| | | | a. Collaborate with the Yakama Nation on species recovery and reintroduction efforts of Bull trout, coho, and summer steelhead in the Upper Yakima Basin. | All | Fisheries<br>Habitat | – Work with Yakama Nation Fisheries on Bull trout recovery in Taneum creek and the Teanaway river.<br>– Work with conservation partners on recovery of target species in the Teanaway Community Forest. | Near term |
| | | | b. Survey fish species population, composition, and abundance information on priority streams. | All | Fisheries<br>Habitat | – Prioritize survey locations through an aquatic restoration strategy.<br>– Survey fish species composition and abundance in prioritized streams in the L.T. Murray Complex. | Long term |
| **6** | **Restore natural stream processes, (including channel migration, floodplain connection, natural vegetation establishment, and LWM (large** | 1. Number of projects completed.<br>2. Number of structures installed.<br>3. Miles of stream treated with LWM.<br>4. Acres of floodplains reconnected.<br>5. Number of barriers removed/miles of stream opened up.<br>6. Number miles of stream-adjacent roads relocated or rehabilitated.<br>7. Miles of stream restored. | | | | | |

| Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|
| **woody material recruitment).** | 8. Number of beavers observed in restored areas. | | | | | |
| | | a. Develop a stream restoration pathway for the WLA. | All | WLA Manager<br>Habitat<br>Fisheries | – Develop strategies and priorities based on the production potential of a given habitat patch for highest priority species.<br>– Calculate "Critical Habitat" amount for each WLA Unit and its streams.<br>– Calculate amount of Fish-bearing water from the DNR FP GIS layer.<br>– Perform Geomorphic Assessment/hydrologic analysis where needed to identify restoration reaches. | Near term |
| | | b. Correct fish passage barrier issues. | Quilomene<br>Whiskey Dick | Habitat<br>Fisheries | – Engage Barrier Assessment Team to inventory barriers for prioritization and removal.<br>– Correct fish passage barriers and use WDFW's climate adapted culverts tool to ensure that culvert replacements are designed to accommodate fish passage and withstand higher future peak flows.<br>– Secure funding for project completion.<br>– Prioritize and address habitat quality issues for steelhead or other priority species. | Near term |
| | | c. Address road-related habitat impacts, sediment delivery issues, and stream-adjacent road impacts. | All | Habitat<br>Fisheries | – Prioritize areas impacted fish populations in developing aquatic restoration strategy for WLA.<br>– Address sediment delivery sources.<br>– Address stream adjacent roads and improve to RMAP like standards. | Near term |
| | | d. Regulate stream temperatures through riparian plantings. | Whiskey Dick<br>Quilomene | Habitat<br>Fisheries | – Plant woody vegetation in Whiskey Dick, Skookumchuck, Park and Quilomene drainages to improve riparian habitat function and to mitigate increasing stream temperatures.<br>– Monitor beaver dams and where they have colonized naturally. | Long term |
| | | e. Restore degraded stream channels throughout the L.T Murray complex using a variety of methods. | All | Habitat<br>Fisheries | – Prioritize structure locations across the wildlife area.<br>– Install LWM into incised streams.<br>– Pursue projects to install structure with partners (Mid-Columbia, AmeriCorps, Yakama Nation). | Near term |
| | | f. Monitor stream restoration projects before and after implementation. | All | Fisheries<br>Habitat<br>Barrier Assessment Team | – Create a prioritized list of streams to monitor.<br>– Use simple, easily repeatable metrics where possible.<br>– monitor passage post barrier removal to ensure passage is corrected/maintained. | Near term |
| **7** | **Protect and restore riparian and aquatic habitat.** | 1. Number of riparian and aquatic projects implemented.<br>2. Acres of riparian areas protected.<br>3. Acres of noxious weeds treated.<br>4. Number of floodplain reconnection projects accomplished.<br>5. Number of degraded channels improved. | | | | |
| | | b. Implement the WWRP grant to improve riparian areas along the Teanaway River and tributaries by 2023. | Teanaway Valley | All | – LWD project completed (Y/N)<br>– Side channel work (BDAs) completed (Y/N)<br>– Riparian plantings installed and grasses established (Y/N)<br>– Treat noxious weeds (Y/N)<br>– Coordinate with Mid-Columbia Fisheries (Y/N)<br>– Culverts removed in Fred Creek and Johns Creek (Y/N) | Regular Mgmt. activity |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | | | | | | – Include purchases important for habitat | |
| | | | c. Keep livestock out of riparian areas. | Quilomene | All | – Inspect fences.<br>– Laydown and erect seasonal fences.<br>– Repair as needed.<br>– Enclosures maintained (Y/N)<br>– Update the WAC as pilot areas progress and funding becomes available.<br>– Explore new virtual and other fencing technologies. | Regular mgmt. activity |
| | | | d. Reconnect the floodplains in shrubsteppe habitat to improve water storage. | Quilomene (Parke Creek) Whiskey Dick | All | – Explore the use of Zeedyk structures, Zuni bowls, BDA's. Explore Stage Zero restoration.<br>– Identify and produce map for specific areas for aquatic restoration in shrubsteppe habitat types. | Near term |
| | | | e. Protect riparian areas from negative effects of recreation. | All | All | – Coordinate with partners.<br>– Relocate dispersed areas back from riparian areas.<br>– Place strategic fencing to protect riparian area.<br>– Designate and/ or expand suitable camping areas where appropriate.<br>– Create educational signs to direct the public to appropriate camping.<br>– Direct recreation to durable sites and travel corridors.<br>– Survey impacted sites along riparian corridors as part of recreation planning. | Near term |
| **8** | **Protect and restore meadow and wetland habitats.** | 1. Number of acres of meadow and wetlands protected and restored.<br>2. Number of meadow projects identified.<br>3. Number of wetland projects identified. | | | | | |
| | | | a. Reduce conifer encroachments in meadow. | L.T. Murray | WLA Manager<br>Forester<br>Habitat | – Coordinate with Yakama Nation.<br>– Project or plan developed (Y/N)<br>– Remove encroaching trees.<br>– Engage stakeholder/volunteer groups for tree removal projects.<br>– Consider utilizing pre-commercial wood for targeted restoration to reverse incision at the outlet of impaired wetland meadows. | Near term |
| | | | b. Conduct desk top inventory existing and potential meadow and wetland habitat restoration. | All | WLA Manager<br>Forester<br>Habitat | – Perform desktop analysis and field verify.<br>– Coordinate with partners. | Long term |
| | | | c. Restore meadows and wetlands through reestablishment of hydrologic connectivity. | All | WLA Manger<br>Habitat | – Identify/inventory priority wetlands.<br>– Improve wetland function around existing infrastructure.<br>– Leverage internal agency partnerships to monitor and investigate downstream effects on wetland meadow restoration | Near term |
| | | | d. Prevent meadow and wetland damage from motorized vehicles. | All | WLA Manager<br>Habitat | – Coordinate with partners on education.<br>– Place barriers and signage.<br>– Increase enforcement.<br>– Explore options of citizen involvement in reporting illegal activities | Near term |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| **9** | **Improve biodiversity areas, connectivity, and corridors (PHS).** | 1. Miles of barbed wire removed.<br>2. Number of acres of native species, including forbs, planted.<br>3. Percent of migration corridors mapped for LTM. | | | | | |
| | | | a. Identify and Improve knowledge of wildlife movement and migration corridors. | All | WLA Manager | – Coordinate with partners and volunteers.<br>– Engage universities in opportunities for research.<br>– Reference connectivity analysis and PHS. | Near term |
| | | | b. Increase ability of animals to travel across the landscape. | All | WLA Manager<br>District Biologist<br>Habitat Biologist | – Remove barbed wire.<br>– Important areas of migration corridors mapped (Y/N) | Near term |
| | | | c. Enhance habitat in travel corridors. | All | WLA Manager | – Plant native species including forbs.<br>– Restore pollinator habitat by planting native flowers.<br>– Restore and reconnect stream habitat | Near term |
| **10** | **Protect and restore native shrubsteppe habitat that supports a diversity of species.** | 1. Shrubsteppe restoration strategy developed (y/n)<br>2. # of acres of shrubsteppe habitat restored post-fire<br>3. Number of informative kiosks installed.<br>4. Audubon recommendations adopted (y/n) | | | | | |
| | | | a. Implement post-fire restoration on burned shrubsteppe as needed. | All | WLA Manager<br>Habitat | – Partner with Arid Lands Initiative, Kittitas Audubon<br>– Implement and streamline cultural resources requirements.<br>– Continue to coordinate with DNR on fire protection.<br>– Coordinate with volunteers for post-fire restoration.<br>– Post-fire impacts evaluated (Y/N)<br>– Develop a post-fire restoration pathways process for both short and long-term restoration.<br>– Restoration budget and plan developed (Y/N) | Regular Mgmt. activity |
| | | | b. Develop outreach materials to inform the public on ways to reduce fire risk on public lands. | All | Partnership Coordinator<br>CAPE | – Information on reducing fire risk on public land developed (Y/N) | Long term |
| | | | c. Incorporate results and recommendations from WDFW/Audubon Sagebrush songbird surveys into shrubsteppe management. | Whiskey Dick | WLA Manager<br>Diversity<br>Habitat Biologist | – Ensure detections are entered into PHS -- Connect with Wildlife Science to stay current of any recommendations | Near term |
| | | | d. Provide information for fire fighters on important resources and priority areas. | All | WLA Manager<br>Habitat Biologist | – Map priority areas and potential fuel break areas to manage fire from produced (Y/N) | Regular Mgmt. activity |
| | | | e. Promote knowledge and appreciation of the shrubsteppe habitat through interpretive education highlighting plants and wildlife people can observe. | All | WLA Manager<br>Habitat Biologist & shrubsteppe outreach team | – Implement ALEA Grant<br>– Partner with ALI<br>– Engage with WDFW shrubsteppe outreach team.<br>– Participate in community outreach events such as GISS.<br>– Include information about shrubsteppe plant and animal species. | Long term |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | | | f. Develop a shrubsteppe restoration strategy by 2026. | All | WLA Manager/Habitat biologist | – Participate in a Region 3 shrubsteppe restoration strategy.<br>– Coordinate with Yakama Nation. and other partners. | Near term |
| **11** | **Protect and restore native, rare, or endangered plant communities and culturally significant plants.** | 1. Number of rare plant communities identified.<br>2. Number of culturally significant plants identified and located | | | | | |
| | | | a. Identify locations of state and federally listed plants. | All | Habitat Biologist<br>WLA Manager | – Identify partners to support the surveys.<br>– Determine if any species are federally listed.<br>– Review DNR Rare plants database.<br>– Determine if there are any UW rare plant surveys in the area. | Long term |
| | | | b. Determine types and locations of culturally significant plants | All | WLA Manager<br>Cultural Resource Staff | – Coordinate with cultural resources staff.<br>– Provide information to staff.<br>– Procedures or processes in place for protecting culturally significant plants (Y/N) | Long term |
| **12** | **Protect and enhance pollinator habitat** | 1. Number of restoration efforts that incorporate pollinator plant species.<br>2. Number of weed management actions that protect pollinator plant species. | | | | | |
| | | | a. Protect pollinators during management activities. | All | WLA Manager | – Language incorporated into management plan (Y/N)<br>– Pollinators considered in weed spraying plan (Y/N)<br>– Research ways to protect pollinators during prescribed fire events.<br>– Include info on pollinators in weed management plan. | Near term |
| | | | b. Provide and protect species of plants that provide food source and habitat for pollinators. | All | Habitat Biologist | – Increasing milkweed distribution assessed (Y/N)<br>– Investigate the Monarch project.<br>– Explore possibilities of how to use citizen science.<br>– Pollinator polygons developed (Y/N)<br>– Research seed mixes.<br>– Seed milkweed beds.<br>– Identify partners. | Near term |
| **13** | **Maintain or improve the ecological integrity of priority ecological systems and sites by protecting, restoring, or** | 1. Number of baselines established.<br>2. Number of ecological integrity goals established.<br>3. Monitoring plan designed (y/n). | | | | | |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | **maintaining habitats.** | | | | | | |
| | | | a. Establish an ecological integrity baseline and associated goals for ecological systems of concern/priority systems by 2025. | All | Ecological Integrity Monitoring Team | – Work with WLA manager to design monitoring plan to achieve Objective A over 10-year planning term.<br>– Conduct data collection to determine baseline within 10-year planning term.<br>– Provide EI baseline report to WLA manager prior to start of subsequent 10-year planning term.<br>– Work with WLA manager to establish EI goals. | Near term |
| | | | b. Conduct shrubsteppe condition surveys to assess shrubsteppe habitat. | All | Habitat Biologist<br>WLA Manager | | Near term |
| | | | c. Implement the Weed Management Plan | All | WLA Manager | | Regular mgmt. activity |
| **14** | **Protect and restore forest habitat.** | 1. Acres of commercial thinning implemented.<br>2. Acres - primarily PCT and early seral CT - treated for restoration.<br>3. Acres of pre-commercial thinning implemented.<br>4. Acres of prescribed burning conducted.<br>5. Number of streams where pre-commercially thinned trees are used in riparian projects.<br>6. Approximate number of snags left or created during forest projects. | | | | | |
| | | | a. Manage forests to a historic range of variability and future range of variability that is resilient to fires, pests, and disease and managed for the suite of focal species identified with different forest types. | LT Murray<br>Teanaway<br>Valley<br>Yakima River | Forester<br>WLA Manager<br>Habitat Biologist<br>District Biologist<br>Diversity | – Monitor pre- and post-commercial thinning and pre and post-prescriptive fire.<br>– Coordinate with Diversity and Habitat biologists on establishing performance metrics for monitoring diversity species.<br>– Explore use of photo points for monitoring. | Near term |
| | | | b. Manage for closed canopy late seral forest where appropriate. | LT Murray<br>Upper Yakima | Forester<br>WLA Manager<br>Habitat Biologist<br>District Biologist<br>Burn Team | – Identify areas that can be sustained for NSO type forest and target PCT or CT treatments to accelerate forest growth. | Near term |
| | | | c. For thinning projects, consider partnering with those conducting riparian projects for supplying woody debris | LT Murray<br>Upper Yakima | Forester<br>Habitat Biologist<br>District Biologist<br>WLA Manager | – Coordinate with partners such as Yakama Nation, Mid-Columbia Fisheries, and WCC. | Long term |
| | | | d. Monitor short snags in forest projects. | LT Murray<br>Teanaway<br>Valley<br>Yakima River | Forester<br>Habitat Biologist<br>District Biologist<br>WLA Manager | – Monitoring for short snags conducted (Y/N)<br>– Pilot monitoring project in Robinson Canyon | Long term |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | | | e. Coordinate with species specialists on listed, SGCN and PHS species management and implement recommendations. | LT Murray | WLA Manager<br>Forester<br>Habitat Biologist<br>District Biologist<br>Diversity | | Near term |
| **15** | **Develop and manage a sustainable system of motorized travel that protects habitat, wildlife, and cultural resources.** | 1. # of miles of Green Dot motorized roads and trails inventoried.<br>2. # of miles of Green Dot Roads designated, decommissioned, relocated, or realigned.<br>3. # of miles of motorized trails designated, decommissioned, relocated, or realigned. | | | | | |
| | | | a. Implement and apply recreation and road management strategies in the Naneum Ridge to Columbia River Recreation and Access Plan to protect shrubsteppe and aquatic habitat. | All | WLA Manager<br>Habitat Biologist<br>Recreation planner | – Conduct road repair and maintenance to RMAP-like standards (Y/N)<br>– Funding identified (Y/N)<br>– Coordinate with DNR<br>– Shrubsteppe protections implemented (Y/N)<br>– Aquatic habitat protections implemented (Y/N) | Near term |
| | | | b. Develop and implement road improvements strategy using a tiered approach compatible with RMAP standards to address habitat damage. | LTM (Cabin Creek)<br>Upper Yakima | WLA Manager<br>Habitat<br>CAMP<br>Recreation planner | – Tiered-road improvements plan developed (Y/N)<br>– Road management plan disseminated to the public.<br>– Secure additional funding for maintaining Green Dot Roads | Near term |
| | | | c. Develop and implement a sustainable trails management strategy for Cabin Creek. | Upper Yakima | WLA Manager<br>Recreation Planner | – Road and trail management plan for Cabin Creek developed (Y/N)<br>– Collaborate with stakeholders.<br>– Inventory all roads and trails.<br>– Assess recreational impacts to habitat, wildlife, and private property.<br>– Decommission unsustainable roads and trails | Long term |
| | | | d. Achieve a sustainable open road density of ~1 mile/square mile. | All | WLA Manager<br>Enforcement<br>Recreation Planner | – Evaluation of open road system completed (Y/N).<br>– Enforce road closures | Long term |
| | | | e. Develop a sustainable and road and trail management strategy for cross jurisdictional roads and trails shared with the U.S. Forest Service. | LTM<br>Upper Yakima | WLA Manager<br>USFS Partners | – Inventory all cross-boundary roads and trails that access USFS lands.<br>– Public notified of mgmt. strategy (Y/N)<br>– Collaborate with stakeholders.<br>– Assess winter routes during travel management planning | Long term |
| **16** | **Protect priority and sensitive habitats from the impacts of unauthorized motorized road and trail development and travel.** | 1. Miles of trails and roads restored or rerouted.<br>2. Acres of shrubsteppe protected.<br>3. # of signs and barriers placed.<br>4. Unauthorized motorized travel in shrubsteppe habitat eliminated (Y/N) | | | | | |
| | | | a. Reduce the development of new/unauthorized motorized trails and roads. | All | WLA Manager<br>Enforcement | – Plan developed (Y/N)<br>– Increase enforcement.<br>– Implement NFWF and WWRP grant. | Long term |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | | | | | | – Work with recreational partners. | |
| | | | b. Prioritize and decommission unauthorized roads and trails that harm habitats. | ALL | WLA Manager<br>Enforcement | – Identify locations for and place barriers and signage to prevent vehicular access to shrubsteppe habitat.<br>– Barriers placed in shrubsteppe habitat (Y/N) | Near term |
| | | | c. Restore areas with vegetation damage. | LTM<br>Quilomene<br>Whiskey Dick | WLA Manager<br>Habitat Biologist | – Place restoration area signage to improve compliance with road closures.<br>– Reseed or replant damaged areas. | Near term |
| | | | d. Prevent illegal fording in fish bearing streams. | Quilomene<br>Cabin Creek | WLA Manager<br>Fish Program | – Consult with partners.<br>– Place barriers and signage y/n<br>– Designate fords for motorized and nonmotorized use. | Near term |
| | | | e. Partner with USFS to re-route section of motorized Shoestring Trail to avoid sediment delivery to Manastash Creek. | LTM | WLA Manager<br>Partnership/Volunteer Coordinator | – Partner with USFS<br>– Engage stakeholders | Near term |
| | | | f. Direct recreational activities to durable sites and travel corridors. | All | WLA Manager<br>Recreation Planner | - | Long term |
| **17** | **Provide information and education to protect cultural and natural resources.** | 1. Number of educational materials developed, posted, and delivered.<br>2. Number of enforcement actions taken.<br>3. Number of sites protected | | | | | |
| | | | a. Provide education and enforcement to reduce removal of and damage to significant natural and cultural resources. | All | WLA Manager<br>Enforcement<br>Cultural Resources<br>CAPE | – Conduct outreach and education campaign.<br>– Post regulations and educational materials at access points. | Near term |
| | | | b. Identify locations and develop interpretive materials for Parke Creek. | Quilomene | WLA Manager<br>CAPE<br>Cultural Resources | – Options for interpretive points locations in Parke Creek located (Y/N)<br>– Funding identified (Y/N)<br>– Interpretive material developed (Y/N) | Long term |
| | | | c. Develop an interpretive display on the benefits of WDFW forest health practices. | LTM | WLA Manager<br>DFW Forester | – Create interpretive kiosk information.<br>– Post at various kiosks where there are timber objectives. | Near term |
| **18** | **Create outreach materials on Green Dot-road recreation.** | 1. Number of education and outreach initiatives. | | | | | |
| | | | a. Maintain kiosk materials to educate users of Green Dot rules. | LTM<br>Quilomene<br>Whiskey Dick | WLA Manager<br>CAPE | – Regulations displayed at WLA (Y/N)<br>– Regulations posted online (Y/N)<br>– Open roads clearly marked (Y/N)<br>– Produce annual maps and interactive resources.<br>– Maintain GD signage | Long term |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | | | b. Engage with new mapping applications to enhance the public's ability to identify Green Dot roads. | LTM<br>Quilomene,<br>Whiskey Dick | WLA Manager<br>CAPE<br>GIS | – A broad array of communication alternatives evaluated (Y/N)<br>– Work with DNR to keep up to date with technological advances. | Long term |
| **19** | **Develop and manage a sustainable system of non-motorized travel that protects habitat, wildlife, and cultural resources.** | 1. Miles of nonmotorized trails designated, decommissioned, relocated, or realigned over 10 years.<br>2. Miles of trails inventoried.<br>3. Number of volunteer opportunities identified.<br>4. Travel management plan developed. | | | | | |
| | | | a. Inventory existing trails to determine and conduct suitability analysis. | All | WLA Manager<br>GIS<br>Recreation Planner | – Roads and trails inventoried (Y/N)<br>– Create trail inventory and interactive map/layer. | Long term |
| | | | b. Develop a non-motorized trail plan that provides a sustainable user experience that minimizes long term impacts to wildlife and habitat. | All | WLA<br>GIS<br>Recreation Planner | -Collect user data<br>-Launch recreational user survey<br>-Convene advisory group<br>-Conduct trail condition surveys | Near term |
| | | | c. Identify funding and volunteer opportunities to support long term trail maintenance and construction efforts. | All | WLA Manager<br>Partnership Coordinator<br>Enforcement | – Coordinate with user groups and other partners.<br>– Implement trail plan priorities | Long term |
| **20** | **Manage seasonal closures to reduce recreational impacts to overwintering, nesting, or rearing wildlife.** | 1. Number of closure inspections.<br>2. Number of outreach initiatives. | | | | | |
| | | | a. Maintain, check consistency, and enforce the LTM all entry closure from Dec 15 to May 1 annually. | LTM | WLA Manager<br>Enforcement | – Install signage.<br>– Notify the public through outreach.<br>– Lock gates.<br>– Enforce closure. | Regular mgmt. activity |
| | | | b. Maintain, evaluate, and enforce the Whiskey Dick motorized travel closure from Feb 1 to May 1 annually. | Whiskey Dick | WLA Manager<br>Enforcement | – Install signage.<br>– Notify the public through outreach.<br>– Lock gates.<br>– Enforce closure. | Regular mgmt. activity |
| | | | c. Manage and enforce seasonal closure for golden eagles. | LTM | WLA Manager | – Public notified (Y/N)<br>– Signs installed (Y/N)<br>– Gates locked (Y/N) | Regular mgmt. activity |
| **21** | **Manage recreation activities to reduce impacts to resources and** | 1. Number of designated sited identified.<br>2. Number of alternative sites developed. | | | | | |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | **improve user safety and experience.** | 3. Number of unsafe or impacted areas closed.<br>4. Number of protection measures implemented.<br>5. Number of sites posted. | | | | | |
| | | | a. Manage dispersed camping to reduce impacts to riparian and aquatic habitats. | All | WLA Manager | – Assessment of dispersed sites along Taneum Creek completed (Y/N)<br>– Barriers installed on Taneum Creek (Y/N)<br>– Relocate and designate dispersed camping sites outside of sensitive habitats. | Long term |
| | | | b. Managed dispersed shooting areas for impacts to habitat and public safety. | All | WLA Manager<br>Enforcement | – Unsafe areas closed.<br>– Alternative areas developed.<br>Signs posted (Y/N)<br>– Education materials developed (Y/N) | Long term |
| | | | c. Identify and develop sites for recreational target shooting to minimize the impact to wildlife and the environment. | All (except TVU) | WLA Manager<br>Enforcement | – Identify target shooting areas to minimize conflict" in rec section. We have a WAC to use when there are burn bans to protect shrubsteppe | Long term |
| | | | d. Address winter recreation uses during recreation planning, including designation of sustainable access points and routes that minimize impacts to wildlife and habitat. | All | WLA Manager<br>Enforcement | – Inventory existing winter opportunities and integrate into recreation plan. | Long term |
| **22** | **Improve non-motorized access and provide recreational opportunities.** | 1. Number of non-motorized areas identified.<br>2. Number of nonmotorized access areas provided. | | | | | |
| | | | a. Identify specific non-motorized areas for enjoyment of natural resources. | All | WLA Manager | – Information and direction provided (Y/N) | Long term |
| | | | b. Evaluate use of de-commissioned roads as designated trails. | LTM | WLA Manager | – Evaluate during trail planning process | Long term |
| | | | c. Maintain access to Whiskey Dick for WDFW staff through Ginkgo State Park. | Whiskey Dick | WLA | – Update agreement with State Parks yearly | Long term |
| | | | d. Improve ADA / universal access to recreation opportunities. | All | | – Survey existing infrastructure for compliance.<br>– Address universal access during recreation planning. | Long term |
| **23** | **Maintain productive and positive working relationships with local community neighbors, lessees, and permittees.** | 1. Permits incorporate measures to prevent habitat degradation (Y/N).<br>2. Number of areas inspected and monitored. | | | | | |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | | | a. Manage livestock grazing to maintain or not adversely impact habitat. | Quilomene | WLA Manager<br>Range Ecologist | – During permit renewal, review existing permit for shrubsteppe protections.<br>– Adopt shrubsteppe protection in any new permit. | Regular Mgmt. Activity |
| | | | b. Manage livestock grazing to meet grazing plan objectives to maintain or enhance ecological integrity. | Quilomene | WLA Manager<br>Range Ecologist | – Permits incorporate measures to prevent habitat degradation (Y/N).<br>– # of areas inspected and monitored.<br>– Attend local club meetings. | Regular Mgmt. Activity |
| | | | c. Monitor existing commercial and recreational permits for compliance. | All | WLA Manager<br>Staff | – Conduct yearly field checks or as needed. | Regular Mgmt. Activity |
| **24** | **Offer multiple and varied opportunities for stakeholder participation and engagement.** | 1. Number of meetings per year.<br>2. Number of volunteer opportunities per year. | | | | | |
| | | | a. Coordinate and Maintain a Wildlife Area Advisory Committee. | | WLA Manager<br>Staff | – Meet with Wildlife Area Advisory Committee at least two times per year.<br>– Engage WAAC in site visits, volunteer opportunities, and educational events. | Regular Mgmt. Activity |
| | | | b. Provide opportunities annually for the public and other stakeholders to volunteer on the WLA. | | WLA Manager<br>Staff | – Coordinate communication with community groups about current wildlife area management activities. | Regular Mgmt. Activity |
| **25** | **Hire, train, equip, and license, as necessary, WLA staff, to meet the operation and management needs of WLAs.** | 1. Number of new positions filled.<br>2. Number of trainings provided.<br>3. Numbers of licenses obtained. | | | | | |
| | | | a. Increase staffing to meet workload demands. | All | WLA Manager | – Propose position descriptions, complete hiring process, and provide training.<br>– Hire a Natural Resource Specialist 2, a minimum of 1 Natural Resource Technician 2, and a minimum of 2 seasonal Natural Resource Worker 1 or 2. | Near term |
| | | | b. Work with partnership and volunteer coordinators to build capacity. | | WLA Manager<br>Partnership Coordinator<br>Volunteer Coordinator | | Long term |
| **26** | **Maintain safe, highly functional, and cost-effect administration and operational facilities and equipment.** | 1. Number of improvement projects completed.<br>2. Number of website and database improvements. | | | | | |

| | Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|---|
| | | | a. Update wildlife area facility information in the centralized database annually. | All | WLA Manager<br>CAMP | | Long term |
| | | | b. Review and update information on the wildlife area webpages annually | All | WLA Manager | | Long term |
| | | | c. Improve water access areas. | Yakima River | WLA Manager<br>Water Access Manager | – Improve road access, parking lot, and boat launch at the Teanaway Junction property. | Regular Mgmt. Activity |
| **27** | **Manage wildlife area lands with consideration to tribal history across the landscape.** | 1. Number of cultural resource reviews submitted for project planning.<br>2. Number of project areas surveyed. | | | | | |
| | | | a. Protect tribal treaty rights while carefully evaluating and considering management impacts to traditional hunting and gathering sites. | All | WLA Manager<br>Lands Operations Manager<br>Wildlife Program Manager<br>Land Steward Archaeologist | – Evaluate cultural resource staff on management actions that could affect tribal interests.<br>– Coordinate with affected tribes.<br>– Respond to inquiries from affected tribes on management actions | Regular Mgmt. Activity |
| | | | b. Discuss mutual concerns for wildlife resources with affected tribes. | All | - Wildlife Program Manager<br>- Cultural Resources Division Manager | – Coordinate a meeting between the Wildlife Program Manager, Cultural Resources Division Manager, tribal wildlife biologists and other tribal representatives as needed. | Regular Mgmt. Activity |
| | | | c. Assess project areas for culturally important sites and plants before project implementation. | All | WLA Manager<br>WLA Staff<br>Land Steward Archaeologist | – Coordinate with cultural resource staff.<br>– Work with cultural resources staff to check area for registered historical sites.<br>– Be aware of potentially culturally important plants.<br>– Complete all necessary permitting for project work; follow SEPA and NEPA, and other cultural resources processes | Regular Mgmt. Activity |
| **28** | **Maintain communication between WDFW and affected tribes to ensure mutual interests are managed and protected.** | 1. Number of coordination meetings attended.<br>2. Number of presentations provided to affected tribes (if applicable) | a. Work with affected tribes to ensure the plan's management objectives for fish and wildlife are achieved while providing opportunities for the exercise of treaty, trust, and other reserved rights. | All | WLA Manager<br>Lands Operations Manager<br>Wildlife Program Manager<br>Land Steward Archaeologist<br>Cultural Resources Division Manager | – Invite affected tribes to discuss wildlife area plan management objectives and mutual concerns for wildlife resources. | Regular Mgmt. Activity |
| **29** | **Investigate and improve the cultural ecosystems represented by shrubsteppe and low elevation mesic forest types** | 1. Number of trainings provided to wildlife area and other WDFW staff.<br>2. Number of monitoring sites identified and laid out per WLA unit.<br>3. Number of monitor sites surveyed across the complex and per unit. | a. Develop an understanding of cultural ecosystems that can be communicated to and maintained by WDFW staff by 2023. | All | WLA Manager<br>Lands Operations Manager<br>Land Steward Archaeologist<br>Habitat Biologists<br>Foresters | – Meet with affected tribes to identify their interests, knowledge, and contact people.<br>– Develop or compile a list of tribal contacts for discussions on traditional management practices in shrubsteppe and mesic forest habitats.<br>– Define cultural ecosystem.<br>– Develop Cultural Ecosystems training module for shrubsteppe and low elevation mesic forest types | Near term |

| Goals | Performance Measure | Objective | Units | Lead/Support | Tasks | Priority |
|---|---|---|---|---|---|---|
| | 4. Number of annual reports and/or assessments completed | | | | | |
| | | b. Identify culturally significant sites for establishing monitoring plots in high priority Wildlife Area Units of the L.T. Murray Complex where the effects of traditional management techniques can be documented. | All | WLA Manager<br>Lands Operations Manager<br>Land Steward Archaeologist<br>Habitat Biologists<br>Foresters | – Consult with affected tribes and experts in Traditional Ecological Knowledge (TEK) regarding data categories and collection.<br>– Monitoring protocols established<br>– Identify monitoring plots across the LT Murray Complex, especially within the LT Murray, Quilomene and Whiskey Dick WLA units to assess impacts at target locations.<br>– Fieldwork with WDFW staff, tribal and other participants to set up suitable test plot sites, complete control monitoring for initial data.<br>– Identify culturally significant sites where management should be avoided, such as chemical and mechanical techniques.<br>– Lay out plots physically and in GIS.<br>– Determine which traditional techniques may be employed.<br>– Complete annual monitoring reports and assessments. | Long term |
| | | c. Implement traditional management activities (such as tending and harvesting) in applicable test plots. | Quilomene<br>Whiskey Dick<br>LT Murray Unit | WLA Manager<br>WLA Staff<br>Land Steward Archaeologist | – Report details which traditional techniques will be used at each plot and how the monitoring protocol will be implemented there.<br>– Choose one or more plots (e.g., ag lands) where prescribed fire can be used on an annual or biennial basis to more closely match traditional practices than the current fire regime. | Near term |
| | | d. Facilitate access to LTM for cultural practices. | Quilomene WLA Unit<br>Whiskey Dick WLA Unit<br>LT Murray WLA Unit | WLA Manager<br>Lands Operations Manager<br>Wildlife Program Manager<br>Cultural Resources Div. Manager | – Have Cultural Div. Manager and Wildlife Program manager consult with affected tribes on objective information.<br>– Compile a list of WDFW and tribal contacts for access inquiries.<br>– Create GIS layers for ceded lands and Usual & Accustomed (U&A) gathering areas in L.T. Murray WLA<br>– Create tribal contact list.<br>– Create GIS layers for cultural access (e.g., areas where herbicide spraying or sensitive species areas should be avoided, areas where harvest has occurred). | Regular Mgmt. Activity |
| **30** | **Update and expand WDFW cultural resources site knowledge for the LT Murray WLA** | 1. Number of sites surveyed and inventoried across the LT Murray Complex<br>2. Number of records updated | a. Reference and Inventory existing cultural resource sites for the LT Murray Wildlife Area Complex to aid in project planning efforts; | Quilomene WLA Unit<br>Whiskey Dick WLA Unit<br>LT Murray WLA Unit to start but ultimately all areas should be inventoried | WLA Manager<br>Land Steward Archaeologist<br>Cultural Resources Div. Manager | – Conduct site surveys to verify site records and data.<br>– Update any inconsistencies or fallacies within the original records.<br>– Establish a protocol for record management and maintenance within site registries.<br>– Starting with high priority areas, areas should be deemed a priority based on significance of site or threat/risk of site damage. | Regular Mgmt. Activity |
| | | b. Develop site inventory for cultural resources across the WLA complex. | ALL | WLA Manager<br>Land Steward Archaeologist and Cultural Resources Div. Manager | | Long term |

# Part III. Species and Habitat Management

## Physical Characteristics

### Geology and Soils

Most of the L.T. Murray WLA is located in the Columbia Plateau, a part of central Washington characterized by its distinct ecology and soils. Portions of the complex lie within a geological zone known as the Yakima Fold Belt, and nearly all of it is underlain by Miocene flood basalts. Relatively level areas are bounded by steep hills and incised canyons, with a soil environment frequently mapped as complexes where deep soils, shallower soils, and lithosols often intermingle with abrupt transitions.

Soil parent materials across the complex generally consist of basaltic colluvium or residuum with varying amounts of loess and volcanic ash. Notable exceptions exist, such as on the Yakima River unit (andesitic colluvium or glacial outwash), or on the Teanaway Valley unit (sandstone colluvium/alluvium). Mollisols, often argixerolls or haploxerolls, predominate across much of the complex, although alfisols, entisols, and inceptisols also occur.

The wide range of precipitation supports mainly forested ecological systems on the Yakima River and Teanaway Valley units, mainly shrubsteppe on the Quilomene and Whiskey Dick units, and a combination of these types on the L.T. Murray unit. Abundant precipitation and the associated coniferous forests on the westernmost portions of the complex have supported the development of spodosols. Surface horizons are often fine silt loams or clay loams, and boulders, cobbles, and gravels are frequently present.

### Hydrology and Watersheds

The L.T. Murray WLA lies in the Upper Yakima and Alkalai/Squilchuck Water Resource Inventory Areas (WRIAs). The five distinct units are found north and south of Interstate 90 from approximately Easton nearly to Vantage, spanning a dramatic annual precipitation gradient of more than 40 inches to less than 10 inches, respectively. Unlike the Yakima River, Teanaway Valley, and L.T. Murray units, which are drained by the Yakima River, the Quilomene and Whiskey Dick units drain eastward toward the Columbia River.

The timbered portions of the L.T. Murray form the upper watersheds that culminate in Taneum and Manastash Canyons, and the agricultural lands of the eastern Kittitas Valley. Numerous smaller perennial and intermittent stream channels feed these two major drainages. The Quilomene, Skookumchuck and Whiskey Dick watersheds run through the arid uplands west of the Columbia River. Parke Creek lies to the west of the Wild Horse Wind Farm and drains west to the Yakima River.

Little snowpack accumulates in this shrub-dominated landscape, so flows are not greatly influenced by spring snowmelt, and remain relatively constant due to seeps and springs scattered throughout the drainage. Quilomene, Parke, Skookumchuck, and Whiskey Dick Creeks, in addition to some of their tributaries, provide habitat for resident trout, sculpin, and dace. There are numerous fish-bearing streams on the wildlife area that contain both resident and anadromous fish stocks, and WDFW actively coordinates with other landowners to remove stream barriers where fish passage blockage occurs. Most stream systems in the Quilomene and Whiskey Dick areas are ephemeral or have some stretch of underground flow, but many of the lower reaches support a host of resident species, in addition to providing off-channel rearing or other seasonal life requisites for species usually found in the larger Yakima or Columbia River watersheds. Steelhead trout have also been documented in Quilomene, Parke, Skookumchuck, and Whiskey Dick Creeks. See Table 11 for a list of fish species that occur on the wildlife areas.

## Climate

The L.T. Murray Wildlife Area lies near the geographic center of Washington. The climate of Central Washington is characterized as semi-arid with hot summers and cold winters. Due to the rain shadow effect of the Cascade Range, the eastern side of the state is much drier than the western side, receiving. 8-40 inches of precipitation annually, due to the varied geography and elevation profile between the eastern and western side of the wildlife area. The semi-arid climate supports native shrubsteppe vegetation as well as other drought-tolerant plant communities.

Snow can be expected after the first of December and remain on the ground for periods varying from a few days to two months between mid-December and the end of February, with snowpack remaining on the ground longer in the higher elevations. Annual snowfall totals average 83 inches on the western side of the Kittitas Valley, near the L.T. Murray, Yakima River, and Teanaway Valley units, while the eastern units, the Whiskey Dick and Quilomene, receive an average annual snowfall of 9 inches (WRCC, 2023). Average high temperatures in the summer can reach into the mid-80s to low 90s, while winter temperatures often drop below freezing. The region can also experience strong winds, particularly in the spring and fall. Stampede Pass to the west is a low elevation point in the Cascades, where high pressure air accelerates through the gap and spreads into the Kittitas Valley, creating strong wind currents.

**Figure 7: Cle Elum Climate Graph**

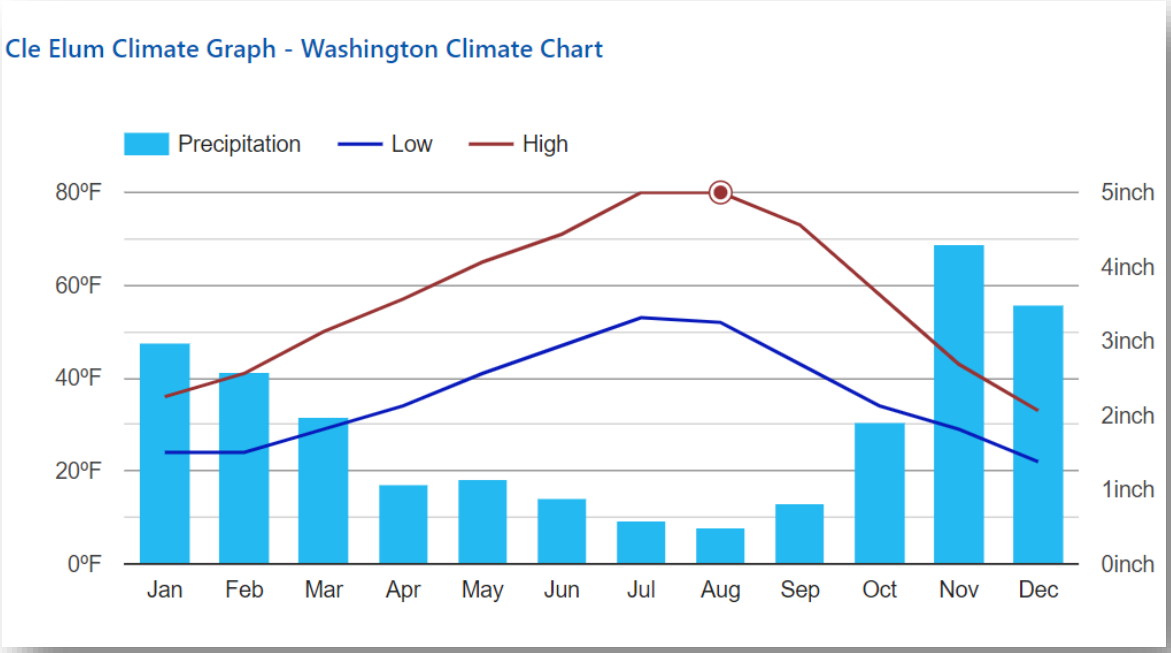
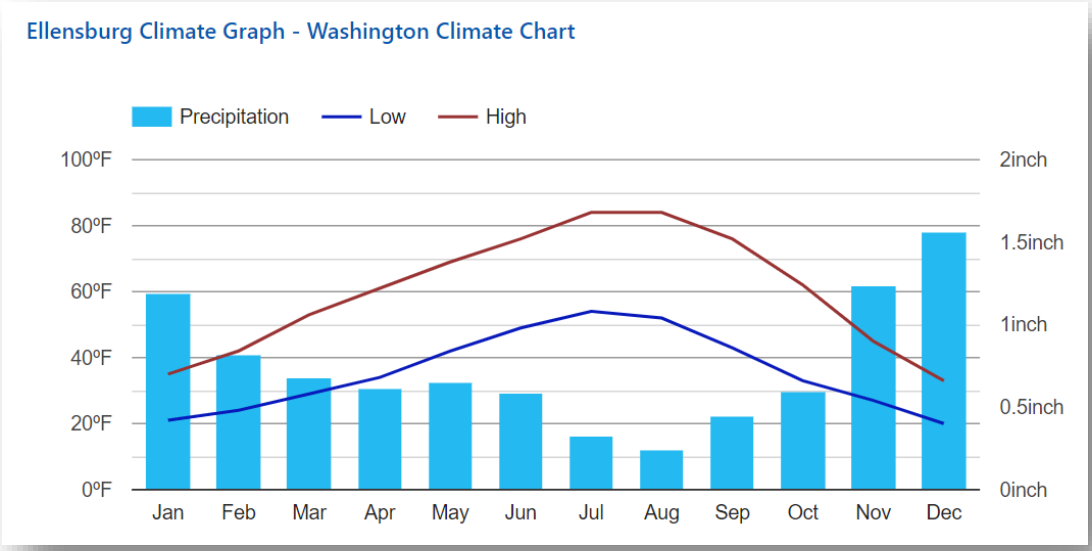


**Figure 8: Ellensburg climate information**




# Ecological Values

## Ecological systems and ecological integrity

Ecological integrity is defined as the **structure, composition, and function of an ecosystem operating** within the bounds of natural or historical range of variation. Ecological integrity monitoring assesses the ability of a system to support and maintain a community of organisms with species composition, diversity, and functional organization comparable to those of natural undisturbed habitats. WDFW's statewide goal is to restore and protect the integrity of priority ecological systems and sites. WDFW seeks to facilitate ecological integrity through maintaining both healthy habitats and wildlife populations through adaptive management frameworks.

## Monitoring and adaptive management

WDFW uses Ecological Integrity Assessments (EIA) and Ecological Integrity Monitoring (EIM) to track management progress on the wildlife area. Ecological integrity is defined as the ability of a system to support and maintain a community of organisms that has species composition, diversity, and functional organization comparable to those of natural habitats. Ecological Integrity Monitoring (EIM) is a tool for monitoring and evaluating ecological changes over time within priority systems or specific sites on the wildlife area. Habitats are classified by preservation and conservation priority, similar to species assessments (i.e., threatened or endangered) based on current threats and long-term sustainability. In the L.T. Murray Wildlife Area, WDFW will use the EIM system developed by DNR's Natural Heritage Program to measure and monitor progress towards desired future conditions. Ecological integrity monitoring and assessment is a high priority in this plan (see Goal 13). The L.T. Murray Wildlife Area planning team identified fourteen National Ecological Systems of Concern to manage for ecological integrity. Table 10 lists the systems considered "Critically Imperiled" and "Imperiled" on the WLA. The complete classification system document, including descriptions of all ecological systems, can be found on this web page: file.dnr.wa.gov/publications/amp_nh_ecosystems_guide.pdf.

The L.T. Murray Wildlife Area includes fourteen Ecological Systems of Concern as defined by the State Wildlife Action Plan as those most imperiled in the state (refer to Table 10). Actions associated with ecological integrity are included in the goals and objectives section and include establishment of baseline

data for each of these systems and devising a monitoring plan to evaluate progress toward improved ecological integrity over time.

**Table 10: Ecological systems of concern on the L.T. Murray Wildlife area (Rocchio, 2015)**

| Ecological system of concern | Units | Estimated acres | Description |
|---|---|---|---|
| **Columbia Basin Foothill Riparian Woodland and Shrubland**<br><br>***Critically imperiled*** | Teanaway Valley<br>Whiskey Dick<br>Quilomene<br>L.T. Murray | 555 | Low-elevation riparian system found along the mainstem of the Columbia River and associated major tributaries on the periphery of the mountains surrounding the Columbia River Basin at and below lower tree line. Found in low-elevation canyons and draws, on floodplains, or in steep-sided canyons, in narrow V-shaped valleys with rocky substrates. |
| **Columbia Plateau Low Sagebrush Steppe**<br><br>***Critically imperiled*** | Quilomene<br>L.T. Murray | 241 | Dwarf sagebrush shrubsteppe dominated by *Artemisia arbuscula*. This system forms stands on mountain ridges and flanks and broad terraces, ranging from 3280-4500 feet (1000 to 1400 m) elevation surrounded by *Pseudotsuga menziesii* and Pinus ponderosa forests. Substrates are shallow, fine-textured soils, poorly drained clays and almost always very stony, characterized by recent rhyolite or basalt. Vegetation: dominated by *Artemisia arbuscula.* |
| **North American Arid West Emergent Marsh**<br><br>***Imperiled*** | Quilomene<br>L.T. Murray | 113 | Marshes and freshwater wet meadows found in the arid and semi-arid regions of eastern Washington below lower treeline, where semi permanently flooded habitats are found as small patches in the matrix of a relatively dry landscape. Hydrophytic (emergent, floating) vegetation dominates these wetlands. |
| **East Cascades Oak-Ponderosa Pine Forest and Woodland**<br><br>***Critically Imperiled*** | Whiskey Dick<br>Quilomene | 28 | Forests and woodlands dominated by a mix of *Quercus garryana* and *Pinus ponderosa* or *Pseudotsuga menziesii* at or near lower treeline in the foothills of the Eastern Cascades and eastern Columbia River Gorge. |
| **Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland**<br><br>***Imperiled*** | L.T. Murray<br>Quilomene | 53 | Riparian woodlands and shrublands consisting of deciduous, coniferous, and mixed conifer, deciduous trees, and shrubs. This system occurs on streambanks and river floodplains of the lower montane and foothill zones. This riparian system is found on various soil types located on streambanks, point bars, and floodplains. |
| **Northern Rocky Mountain Ponderosa Pine Woodland and Savanna**<br><br>***Imperiled*** | L.T. Murray<br>Quilomene | 15,620 | Woodland and savannas dominated by ponderosa pine found in the foothills along the eastern Cascades, the Blue Mountains, the Okanogan Highlands, and Northern Rocky Mountains of eastern Washington. This fire-maintained system occurs on the driest sites supporting conifers in the Pacific Northwest. These woodlands occur on warm, dry, exposed sites on all slopes and aspects |
| **Temperate Pacific Freshwater Emergent Marsh**<br><br>***Imperiled*** | Teanaway Valley<br>Yakima River (east)<br>Yakima River (west) | 49 | Freshwater marshes found at all elevations below timberline; however, are most abundant in the lowlands. These semi-permanently to permanently flooded wetlands are dominated by emergent herbaceous species, |
| **Columbia Basin Foothill and Canyon Dry Grassland**<br><br>***Critically imperiled - imperiled*** | L.T. Murray<br>Whiskey Dick<br>Quilomene | 12,953 | Foothill herbaceous vegetation found on steep open slopes, in the canyons and valleys of the Columbia Basin, particularly along the Snake River canyon, the lower foothill slopes of the Blue Mountains, and along the main stem of the Columbia River. Settings are primarily long, steep slopes of 328 feet to well over 1,300 feet, and slope failure is a common process. |

| Ecological system of concern | Units | Estimated acres | Description |
|---|---|---|---|
| **Inter-Mountain Basins Big Sagebrush Steppe**<br><br>***Imperiled*** | Teanaway Valley<br>L.T. Murray<br>Whiskey Dick<br>Quilomene | 46,536 | This system is grassland with shrubs. Shrubs are dominated by Artemisia spp., and/or *Porshèa tridentata* in an open to moderately dense shrub layer and with at least 25% total perennial herbaceous cover. The natural fire regime of this ecological system maintains a patchy distribution of shrubs, so the general aspect is that of grassland. *P. tridentata* is present almost always in association with tree cover, not out in the open. |
| **Columbia Plateau Steppe and Grassland**<br><br>***Imperiled*** | L.T. Murray<br>Whiskey Dick<br>Quilomene | 4,430 | Extensive grasslands, not grass-dominated patches within sagebrush shrubsteppe ecological system, dominated by perennial bunch grasses and forbs, sometimes with a sparse shrub layer. Often forms a landscape mosaic with the Columbia Plateau Shrubland ecological system. Very little exposed bare ground due to mosses and lichens carpeting the area between plants, comprising a biological soil crust that is a very important characteristic in this ecological system. |
| **North Pacific Lowland Riparian Forest and Shrubland**<br><br>***Imperiled*** | L.T. Murray,<br>Quilomene | 15.57 | Riparian forests and shrublands found throughout low elevations west of the Cascades. These forests and tall shrublands are linear in character, occurring on low-elevation, alluvial floodplains that are confined by valleys and inlets or lower terraces of rivers and streams. Annual flooding is a key ecological process which results in a diversity of patch types such as woodlands, shrublands, wet meadows, and marshes. These various plant communities are adapted to specific flooding regimes or seral stages. |
| **North Pacific Oak Woodland**<br><br>***Critically Imperiled*** | L.T. Murray | .89 | *Quercus garryana* dominated to co-dominated forests and woodlands associated with dry, predominantly low elevation sites and/or sites that experienced frequent pre-settlement fires. Oak types associated with wetlands and riparian areas are part of the North Pacific Lowland Riparian Forest and Shrubland ecological system. |
| **Intermountain Basins Playa**<br><br>***Critically Imperiled*** | Quilomene | 6.89 | Intermittently flooded or groundwater supported basins with sparse to patchy vegetated plant cover. Generally, playas occur on sites that are seasonally to semi-permanently flooded in winter and early spring and then usually drying by mid- to late-summer. Seasonal drying exposes salt and mud flats which are colonized by halophytic (salt-tolerant) plant species. The Inter-Mountain Basins Playa is subject to both surface and groundwater inputs. The system occurs throughout much of the cool arid and semi-arid regions of the Columbia Plateau and Great Basin |
| **Inter-Mountain Basins Alkaline Closed Depression**<br><br>***Imperiled*** | Whiskey Dick | .89 | Herbaceous-dominated, seasonally flooded alkaline depressions moderately to densely covered by salt-tolerant and halophytic species. This ecological system occurs throughout much of the cool arid and semi-arid regions of the Columbia Plateau and Great Basin either as a large or small patch type. They almost always appear within a shrub steppe or semi-desert landscape. |

## Habitat Connectivity

The L.T. Murray Wildlife Area is a biologically diverse location spanning a wide range of elevations and precipitation patterns. Differences in elevation and precipitation result in the formation of very different habitats across the wildlife area. Generally, dry shrubsteppe habitat occurs at the lower elevations. Shrubsteppe gives way to ponderosa pine in the mid-elevations and moist coniferous forest characterizes the upper elevations. Because the wildlife area covers this diverse range of habitats, it supports a broad array of species.

Fish and wildlife survival depends in part on the ability to move through the environment to find food and reproduce. The degree to which land conditions support these necessary movements is called habitat connectivity. WDFW is a member of the Washington Wildlife Habitat Connectivity Working Group (WHCWG). This group represents a science-based collaboration of land and resource management agencies, non-governmental organizations, universities, and Washington Treaty Tribes.

The L.T. Murray Wildlife Area's five units range in size from about 215 to 51,038 acres, connecting to larger pieces of habitat on private lands and public lands managed by the U.S. Forest Service, the Washington State Department of Natural Resources, and the Bureau of Land Management. Fire has burned portions of the L.T. Murray Wildlife Area covered by the two connectivity analyses. The maps from those analyses are static. There is a desire to move to dynamic habitat connectivity mapping that can be updated routinely through automation to reflect significant modifications to habitat quality such as in the case of wildfire. However, any re-mapping effort is at the conceptual stage and no funding exists to perform that work at present. Some areas that burned will recover while other areas will need restoration. Through radio telemetry or GPS tracking, the habitat use of certain focal species, such as mule deer, can be examined to determine the species use in relation to the connectivity mapping efforts. The permeability of the habitat would remain for certain species even if the habitat quality has declined.

Key wildlife habitat connectivity linkage networks at the statewide level and the Columbia Plateau level were identified by the Washington Wildlife Habitat Connectivity Working Group (WHCWG 2010, WHCWG, 2012) in 2010. The linkage networks were derived from two modeling approaches: focal species and landscape integrity. The focal species approach identified important habitat areas and the best linkages between the habitat areas for wildlife focal species to move through. Focal species were carefully selected to represent the connectivity needs of a broader assemblage of wildlife (WHCWG 2010).

The focal species approach identified important habitat areas specific to an individual species' needs and the landscape integrity approach was used to help define the best linkages between intact habitat areas on or near the L.T. Murray Wildlife Area. Focal species were carefully selected to represent the connectivity needs of a broader assemblage of wildlife (WHCWG 2012). The best linkages provided the least resistance to movement between habitat areas for that animal in that area. This means that some of the linkages may not be comprised of ideal habitat but provide opportunities for movement through a human-modified landscape (WHCWG, 2012). Habitat connectivity information will be used to inform management decisions on the wildlife area. Habitat restoration and management projects in this plan help maintain or improve linkages between habitat blocks on the wildlife area for American marten, black bear, bighorn sheep, elk, mule deer, Sage-grouse, Black-tailed jackrabbit, White-tailed jackrabbit, Least chipmunk, Western rattlesnake, and the Western gray squirrel.

While connectivity across the L.T. Murray is a core objective, managing the movement of large animals onto private agricultural lands is necessary to reduce human-wildlife conflict, particularly for elk. Elk fence on the wildlife area acts as a movement barrier but is required for managing the movement of large animals onto private/agricultural lands. The elk fence is not an absolute barrier to all species movement, but it is a significant impediment for some species, including mule deer, bighorn sheep, and other mammals. Fences help reduce mortality from vehicle collisions and help protect wildlife from interactions with domestic

animals. For more background information on the Washington Wildlife Habitat Connectivity Working Group analysis and data, including habitat concentration areas and linkages for these species, follow this link: waconnected.org/.

## Species Management Overview

Consistent with WDFW's mission, the agency manages species on wildlife areas for two primary purposes: 1) conservation and protection to manage sustainable populations; and 2) provision of recreational and commercial opportunities. The Wildlife Area Management Planning Framework describes how species are classified – including species listed at the state or federal level as threatened or endangered, as well as other designations such as Species of Greatest Conservation Need (SGCN). SGCN species are summarized in the State Wildlife Action Plan: wdfw.wa.gov/sites/default/files/publications/01742/wdfw01742.pdf, and defined as species not yet listed but of conservation concern that may need additional research attention. The Department reviews species for listing following procedures in Washington Administrative Code 220-610-110.

The framework also incorporates goals from WDFW's Game Management Plan: wdfw.wa.gov/hunting/management/plans, which includes protecting, sustaining, and managing hunted wildlife, providing stable, regulated recreational hunting to all citizens, protecting and enhancing wildlife habitat, and minimizing adverse impacts to residents, other wildlife, and the environment. The wildlife area plan integrates these plans and priorities, and, in the goal and objectives section, defines specific actions to achieve them.

Sagebrush sparrow. Photo by Alan Bauer.

The L.T. Murray Wildlife Area supports a broad range of game and non-game species. The wildlife area supports various wintering waterfowl concentrations (Quilomene and Whiskey Dick units), bighorn sheep (L.T. Murray, Whiskey Dick, and Quilomene units), mule deer, and one of the largest herds of Rocky Mountain elk in the state (all units). Notably, the wildlife area supports several species that depend on shrubsteppe habitat, including the sage thrasher, sagebrush sparrow, burrowing owl, northern Pacific rattlesnake, ferruginous hawk, and pygmy short-horned lizard. The wildlife area is also home to the federally endangered gray wolf, Northern spotted owl, Chinook salmon, and federally threatened bull trout and summer steelhead.

## Conservation Status

Table 11 describes the state and federal conservation status for species that may occur on the L.T. Murray Wildlife Area. The Washington Department of Fish and Wildlife designates species as Candidates for listing in Washington as: State Endangered (SC), State Threatened (ST), State Sensitive (SS), Species of Greatest Conservation Need (SCGN) or Priority Habitat and Species (PHS). For a list of priority habitats and species, visit: wdfw.wa.gov/species-habitats/at-risk/phs. The federal status of species under the Endangered Species Act differs in some cases from state status; federal status is indicated as: Federal Endangered (FE), Threatened (FT), or Federal Candidate (FC) status. Species protected under the Bald and Golden Eagle Protection Act are indicated as (BGEPA) protected.

**Table 11: Species conservation status**

*State and federal conservation status, SGCN inclusion, WDFW Priority Habitats and Species (PHS) criteria and priority areas for species that may occur on the L.T. Murray Wildlife Area*

| Common Name | Scientific Name | State and Federal Conservation Status | WLA Units - species that may occur on the WLA |
|---|---|---|---|
| **MAMMALS** | | | |
| **American badger** | *Taxidae taxus* | SGCN | Quilomene, Whiskey Dick, L.T. Murray |
| **American pika** | *Ochotona princepts* | SGCN | L.T. Murray, Yakima River |
| **Bighorn sheep** | *Ovis canadensis* | PHS | L.T. Murray, Quilomene, Whiskey Dick |
| **Black -tailed jack rabbit** | *Lepus californicus* | SC, SGCN, PHS | Quilomene, Whiskey Dick |
| **Fisher** | *Pekania pennanti* | FC, SE, SGCN, PHS | L.T. Murray, Yakima River, Teanaway Valley |
| **Gray wolf** | *Canis lupus* | FE, SE, SGCN, PHS*Federally listed west of north-south line following Highways 97, 17, and 395. | All |
| **Pacific marten** | *Martes americana* | PHS | L.T. Murray, Yakima River |
| **Merriam's shrew** | *Sorex merriami* | SGCN, PHS | Quilomene, Whiskey Dick, L.T. Murray |
| **Rocky Mountain elk** | *Cervus canadensis nelsoni* | PHS | All |
| **Rocky Mountain mule deer** | *Odocoileus hemionus* | PHS | All |
| **Roosting concentrations of bats: big brown, myotis spp., pallid** | | SC, PHS | All |
| **Townsend's big-eared bat** | *Corynorhinus townsendii* | SC, SGCN, PHS | All |
| **Townsend's ground squirrel** | *Urocitellus townsendii* | FC, SC south of Yakima River, SGCN, PHS | Quilomene, Whiskey Dick |

| Common Name | Scientific Name | State and Federal Conservation Status | WLA Units - species that may occur on the WLA |
|---|---|---|---|
| **Western gray squirrel** | *Sciurus griseus* | ST, SGCN, PHS | L.T. Murray |
| **White-tailed jackrabbit** | *Lepus townsendii* | SC, SGCN, PHS | Quilomene, Whiskey Dick |
| **Wolverine** | *Gulo luscus* | SC, SCGN, PHS | Upper Yakima, Teanaway Valley |
| **BIRDS** | | | |
| **Bald eagle** | *Haliaeetus leucocephalus* | BGEPA, SGCN | L.T. Murray, Quilomene, Whiskey Dick |
| **Band-tailed pigeon** | *Patagonians fasciata* | SGCN, PHS | L.T. Murray, Upper Yakima |
| **Black-backed woodpecker** | *Picoides arcticus* | SC, PHS | L.T. Murray, Upper Yakima |
| **Burrowing owl** | *Athene cunicularia* | SC, SGCN, PHS | Quilomene, Whiskey Dick |
| **Cavity-nesting ducks (wood duck, Barrow's goldeneye, hooded merganser)** | | PHS | L.T. Murray, Upper Yakima |
| **Chukar (non-native)** | *Alectoris chukar* | PHS | Quilomene, Whiskey Dick |
| **Cinnamon Teal** | *Anas cyanoptera* | SGCN | Upper Yakima, Whiskey Dick, Quilomene |
| **Dusky grouse (formerly blue)** | *Dendragapus obscurus* | PHS | Quilomene, Whiskey Dick |
| **Ferruginous hawk** | *Buteo regalis* | SE, SGCN, PHS | Quilomene, Whiskey Dick |
| **Flammulated owl** | *Otus flammeolus* | SC, PHS | L.T. Murray, Yakima River, Teanaway Valley Unit |
| **Golden eagle** | *Aquila chrysaetos* | BGEPA, SC, SGCN, PHS | ALL |
| **Great blue heron (breeding areas)** | *Ardea herodias* | PHS | L.T. Murray, Yakima River |
| **Greater sage-grouse** | *Centrocercus urophasianus* | SE, SGCN, PHS | Quilomene, Whiskey Dick |
| **Harlequin duck** | *Histronicus histronicus* | SGCN, PHS | L.T. Murray, Yakima River |
| **Lewis's woodpecker** | *Melanerpes lewis* | SGCN | L.T. Murray, Yakima River |
| **Loggerhead shrike** | *Lanius ludovicianus* | SC, SGCN, PHS | Quilomene, Whiskey Dick |
| **Northern goshawk** | *Accipiter gentilis* | SC, PHS | L.T. Murray, Yakima River |
| **Northern spotted owl** | *Strix occidentalis* | FE, SE, SGCN, PHS | L.T. Murray, Yakima River, Teanaway valley |
| **Peregrine falcon** | *Falco peregrinus* | SGCN | Quilomene, Whiskey Dick |
| **Prairie falcon** | *Falco mexicanus* | PHS | L.T. Murray, Quilomene, Whiskey Dick |
| **Pygmy nuthatch** | *Sitta pygmaea* | SGCN | L.T. Murray |
| **Sage thrasher** | *Oreoscoptes montanus* | SC, SGCN, PHS | Quilomene, Whiskey Dick |
| **Sagebrush sparrow** | *Amphispiza belli* | SC, SGCN, PHS | Quilomene, Whiskey Dick |

| Common Name | Scientific Name | State and Federal Conservation Status | WLA Units - species that may occur on the WLA |
|---|---|---|---|
| **Sooty grouse (formerly blue)** | *Dendragapus fuliginosus* | PHS | L.T. Murray, Yakima River, Teanaway valley |
| **Vaux's swift** | *Chaetura vauxi* | SC, SGCN, PHS | LT Murray, Upper Yakima, Teanaway valley |
| **Waterfowl concentrations** | | SC, PHS | Quilomene, Whiskey Dick |
| **White-headed woodpecker** | *Picoides albolarvatus* | SC, SGCN, PHS | L.T. Murray, Yakima River |
| **Wild turkey (non-native)** | *Meleagris gallopavo* | PHS | ALL |
| **REPTILES** | | | |
| **Northern Sagebrush lizard** | *Sceloporus graciosus* | SC, PHS, SGCN | Quilomene |
| **Striped whipsnake** | *Coluber taeniatus* | SC, PHS, SGCN | Quilomene, Whiskey Dick |
| **Common Sharptail snake** | *Contia tenuis* | SC, PHS, SGCN | L.T. Murray, Teanaway Valley |
| **Ring-necked snake** | *Diadophis punctatus* | SCGN | L.T. Murray |
| **Western painted turtle** | *Chrysemys picta bellii* | Protected | L.T. Murray |
| **Side-blotched lizard** | *Uta stansburiana* | SGCN | Quilomene, Whiskey Dick |
| **Common sharp-tailed snake** | *Contia tenuis* | PHS, SGCN | Teanaway Valley L.T. Murray |
| **Northern desert night snake** | *Hypsiglena chlorophaea deserticola* | SGCN | Quilomene, Whiskey Dick |
| **Pygmy Short-horned Lizard** | *Phrynosoma douglasii* | SGCN | Quilomene, Whiskey Dick |
| **AMPHIBIANS** | | | |
| **Cascades frog** | *Rana cascadae* | Under federal review | Yakima, Teanaway Valley, L.T. Murray |
| **Coastal tailed frog** | *Ascaphus truei* | SS | L.T. Murray, Yakima River |
| **Columbia spotted frog** | *Rana luteivventris* | SC | Yakima River, Teanaway Valley, L.T. Murray |
| **Larch mountain salamander** | *Plethodon larselli* | SS, SGCN, PHS | Yakima River |
| **Western toad** | *Anaxyrus boreas* | SC, SGCN, PHS | L.T. Murray, Yakima River, Teanaway valley |
| **INVERTEBRATES** | | | |
| **Silver-bordered fritillary** | *Boloria selene atrocostalis* | SGCN, PHS | L.T. Murray, Yakima River |
| **Columbia Oregonian snail** | *Cryptomastix hendersoni* | SC, SGCN, Federal in review, SC | L.T. Murray |
| **Western pearlshell mussel** | *Margaritifera falcato* | SGCN | L.T. Murray, Yakima River, Quilomene, Whiskey Dick |
| **Western bumble bee** | *Bombus occidentalis* | SGCN, State Candidate | All |
| **Morrison's bumble bee** | *Bombus morrisoni* | SGCN | All |
| **Sonora skipper** | *Polites sonora* | SGCN | L.T. Murray |

| Common Name | Scientific Name | State and Federal Conservation Status | WLA Units - species that may occur on the WLA |
|---|---|---|---|
| **FISH** | | | |
| **Bull trout** | *Salvelinus confluentus* | FT, SC, PHS | Yakima River |
| **Coho salmon** | *Oncorhynchus kisutch* | PHS | L.T. Murray, Yakima River |
| **Cutthroat trout** | *Oncorhynchus clarki lewisi* | PHS | L.T. Murray |
| **Mountain sucker** | *Catostomus platyrhynchus* | SC, PHS | All |
| **Pacific lamprey** | *Lampetra tridentate* | SC, PHS | All |
| **Rainbow trout** | *Oncorhynchus mykiss* | PHS | L.T. Murray, Quilomene, Whiskey Dick |
| **Redband trout** | *Oncorhynchus mykiss gairdneri* | PHS | Quilomene, Whiskey Dick |
| **Spring Chinook salmon – mid-Columbia** | *Oncorhynchus tshawytscha* | PHS | L.T. Murray, Quilomene |
| **Spring Chinook salmon – upper Columbia** | *Oncorhynchus tshawytscha* | FE, SC, PHS | L.T. Murray, Quilomene |
| **Steelhead – mid-Columbia** | *Oncorhynchus mykiss* | FT, SC, PHS | L.T. Murray, Yakima River |
| **Steelhead - upper Columbia** | *Oncorhynchus mykiss* | FT, SC, PHS | Quilomene, Whiskey Dick |
| **Mountain Whitefish** | *Prosopium williamsoni* | | All |
| **PLANTS** | | | |
| **Coyote tobacco** | *Nicotiana attenuata* | SS | Quilomene, Whiskey Dick |
| **Hedgehog cactus** | *Pediocactus nigrispinus* | FS, SS | Quilomene, Whiskey Dick |
| **Hoover's biscuitroot** | *Lomatium lithosolamans* | SS | Quilomene, Whiskey Dick |
| **Palouse milkvetch** | *Astragalus arrectus* | ST | Quilomene, Whiskey Dick |
| **Pauper milkvetch** | *Astragalus misellus var. puper* | SS | Quilomene, Whiskey Dick |
| **Hairy Goldenweed** | *Pyrrocoma hirta var. sonchifolia* | ST | L.T. Murray |
| **Gray stickseed** | *Hackelia cinerea* | SS | Quilomene, Whiskey Dick |
| **Knoke's biscuitroot** | *Lomatium knokei* | SE | L.T. Murray |
| **Dwarf mooncup** | *Eremothera pygmaea* | SS | Quilomene, Whiskey Dick |
| **Gray cryptantha** | *Cryptantha leucophaea* | ST | Quilomene, Whiskey Dick |
| **Oregon goldenaster** | *Heterotheca oregona* | SS | L.T. Murray, Yakima River |

## Game species overview and management

Game species on the wildlife area are generally managed in accordance with the species-specific management plans. Management actions are focused on priority focal species on the wildlife area. Game species that require specific management actions in this plan include Rocky Mountain mule deer, Rocky Mountain elk, cougar, bighorn sheep, cougar, and black bear. Game birds are also managed under the Game Management Plan and include sooty grouse, chukar, wild turkey, gray partridge, and California quail. Ring-necked pheasant are released during the hunting season on the Whiskey Dick unit. For more information, see the WDFW Game Management Plan, available online at: wdfw.wa.gov/publications/01676

### Hunting

The L.T. Murray Area units are located in Game Management Units (GMUs) 329, 334, 335, 336, and 340. Hunting season dates and harvest restrictions are species-specific and vary regionally with seasons and

regulations evaluated and updated each year. Species populations under greater hunting pressure are monitored and adapted more regularly than those with lower participation rates; therefore, seasonal changes may occur more frequently for select species.

The specific regulations pertaining to individual species and hunting seasons are found on WDFW's website: wdfw.wa.gov/hunting/regulations/. Additional information on harvest history and population status is located in WDFW Game Harvest Reports: wdfw.wa.gov/hunting/management/game-harvest and the Hunting Prospects published annually for District 8: wdfw.wa.gov/hunting/prospects/. Status and Trend reports are found by searching under each individual species on the WDFW website.

**Rocky Mountain Elk**

Elk gather on the L.T. Murray unit. Photo by Alan Bauer.

Elk are found throughout Washington, with two separate subspecies, the Roosevelt elk (*Cervus canadensis roosevelti*) and Rocky mountain elk (*Cervus canadensis nelson*). The L.T. Murray Wildlife Area has two resident herds of Rocky Mountain elk. The Yakima herd is on the L.T. Murray and Yakima River units south of I-90. The Colockum herd resides on the Whiskey Dick, Quilomene and Teanaway units north of I-90.

Ungulates need access to forage and high-quality habitat. Herds typically migrate to higher elevations in spring, then return to lower elevation winter range in November. During the fall, elk need adequate forage to maintain weight for the winter. During winter and spring, elk prefer more open terrain with minimal human presence. In the snow-free seasons, elk prefer to graze on a variety of grasses and forbs but will browse on shrubs and trees. The best natural forage can be found in open meadows, burns, or timber cuts. Security (cover, low human use) is needed near the foraging area.

Loss of critical winter range due to human settlement patterns, as well as agriculture damage on private

lands from wintering elk, led to the erection of elk fences and establishment of feeding sites for the Yakima herd. Local citizens likely fed elk after their reintroduction in the early 1900s. The first official feeding sites were developed during the winter of 1942-43 but feeding did not become an annual occurrence until 1967-68. Today, the L.T. Murray wildlife area manages an annual feeding program for elk at Joe Watt and Robinson canyons on the L.T. Murray unit. Although the main objective of the program is to keep elk off private lands, the L.T. Murray winter feeding program has created a very popular elk viewing opportunity for the public.

Visitors can view elk feeding operations up close at Joe Watt canyon. Approximately 1,500 head of elk are fed on the L.T. Murray Wildlife area each winter to minimize depredation on private agricultural lands and to substitute for lost winter range habitat. Shed antler collecting is also a popular recreational activity on the wildlife area. Bulls drop their antlers every spring. The feed sites on the L.T. Murray unit are closed until May 1st. Shed hunters line up at the gates for the May 1 opener.

Human or recreational activity, both motorized and non-motorized, can have significant negative effects on behavior, abundance, and survival of wildlife (Visscher et al 2023; Wisdom et al. 2018). For elk, mitigating human disturbance during seasons of elevated stress, during both winter and summer calving (Jachowski et al. 2015), may lead to greater positive impacts on populations. Closures to winter range habitat and core calving areas is an established tool to mitigate negative effects of human disturbance for elk and has proven successful (Philips and Allredge, 2000). Given a significant increase in the intensity of human use on our wildlife areas, closures may be considered critical to protecting wintering elk, especially when populations are below objectives, and simultaneously can help mitigate conflict from elk groups seeking refuge from human disturbance on surrounding private agricultural lands.

Maintaining or increasing security through road and area closures is important for the health of the herd and to limit conflicts on private lands. Human activity and road density (miles of open road per square mile) can greatly influence wildlife movement and habitat use. Seasonal unit closures are used as a management tool to minimize human disturbance, particularly in early spring to protect ungulates during reproduction. Seasonal closures are employed in winter to protect elk at a vulnerable time when conservation of calories is critical. Managing forage production away from roads and near security cover will have the most benefit. Feed sites are currently closed to all access Dec. 15 – May 1. Some roads on the Whiskey Dick Unit are closed to motorized vehicles Feb. 1 - April 30 to minimize disturbance to wintering elk.

## Yakima Herd

The Yakima elk herd is one of the largest of ten herds identified in the state (WDFW, 2002) and provides significant recreational, aesthetic, and economic benefits to Washington citizens. The 2002 Yakima Elk Herd Plan wdfw.wa.gov/publications/00777 prioritizes elk management activities and specifies elk herd and habitat management goals and objectives. There are three primary goals stated in the plan: (1) to preserve, protect, perpetuate, manage, and enhance elk and their habitats to ensure healthy, productive populations and ecosystem integrity, (2) to manage elk for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural, subsistence, and ceremonial uses by Native Americans, wildlife viewing and photography, and (3) to manage the elk herd for a sustained yield.

Priority elk herd objectives noted in the Yakima Elk Herd Plan address specific problems in elk management:

- Reduce and then maintain the post-hunting season elk population at 9,500 animals for the Cascade slope portion of the Yakima Herd.
- Manage for a post-hunting season bull ratio consistent with the Statewide Plan (currently equal to

or greater than 12 bulls/100 cows in combination with overall bull mortality of less than 50 percent).
- Improve the scientific basis for managing the elk population.
- Minimize damage caused by elk through aggressive removals of elk below the elk fence and improve department/ landowner relations.
- Maintain an effective and efficient elk winter-feeding program.
- Increase public awareness and viewing opportunities of elk.
- Cooperate and coordinate with the USFS and DNR to improve elk habitat quality and effectiveness on National Forest and DNR-managed lands.
- Secure more critical elk habitat.

Damage from elk does occur on private lands adjacent to public lands occupied by the Yakima herd, but damage is limited by the elk fence, winter closures, and feeding program. An elk study in the early 2000's using radio-collars found very few elk spent summer and fall on the L.T. Murray. Most migrated further west, likely seeking better forage and security. Keeping fences intact is important in reducing conflict.

### Colockum Herd

The Colockum elk herd is the fifth largest of ten herds identified in the state (WDFW, 2006), and is managed under the Colockum Herd Management Plan wdfw.wa.gov/publications/00770. The herd provides significant recreational, aesthetic, cultural, and economic benefits to recreationists, local communities, and Native Americans. There are three primary goals for the Colockum elk herd: (1) To preserve, protect, perpetuate, and manage elk and their habitats to ensure healthy, productive populations; (2) to manage elk for a variety of recreational, educational, and aesthetic purposes, including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography; and (3) to manage the elk herd for a sustainable yield. The Colockum elk herd plan outlines specific management objectives that directs the agency to:

- Maintain the population objective at approximately 4,500 animals +/- 5% in the surveyed portion of the winter range.
- Maintain a post-hunt population with a bull: cow ratio of 12–20 bulls:100 cows, with total bull mortality of less than 50%.
- Improve elk habitat quality and minimize disturbance to the elk herd during critical times of the year.
- Minimize complaints and damage caused by elk, thereby improving landowner support for Colockum elk management.
- Work cooperatively with the Yakama Nation to collect and share data about the Colockum herd.
- Increase public awareness of the Colockum herd and develop elk viewing opportunities.
- Work with public land managers to improve and protect elk habitat on state and federal lands including DNR and USFS.
- Work with private land managers to improve and protect elk habitat on private lands.
- Conduct research to provide essential data for improving management of the Colockum elk.

Damage to private agricultural lands is a significant concern for Colockum elk management. There are many factors that cause elk to move into areas where they can conflict with private landowners. In late winter and early spring, recreation on the wildlife area increases as the weather improves and elk antler gathering begins. Human activities create significant disturbances for wintering elk causing displacement from designated wildlife areas. As a result, elk often move onto private lands where disturbance is lower. The combination of better security and forge on private lands makes it difficult to keep them off agricultural fields. In summer, irrigated crops and pasture attract some elk to forage. During fall hunting seasons, some elk find security on private lands. In severe winters, elk will seek private hay either dispersed to livestock or forage hay directly out of barns.

WDFW uses varied tools, including fencing, seasonal closures, hazing, and damage permits, to manage property damage by the Colockum herd. Some elk leave during the closure, but it is unknown if this movement is due to human presence or part of a natural migration pattern. A herder/hazer is hired in spring to help keep elk off private fields, but the elk resist returning to the wildlife area. In summer/fall/early winter, damage permits and long Master Hunter seasons pressure elk off private fields. From a conservation perspective, harvesting elk is considered a less desirable management tool than preventing elk from entering fields. Cooperative fencing is an option to keep elk off private lands that can be explored in the future as a management tool. Two big game management objectives in this plan include evaluating the effectiveness of the Whiskey Dick closure and developing a possible winter closure on the Quilomene unit. For information on elk population and trends, reference the 2021 Game Status and Trends report at: wdfw.wa.gov/sites/default/files/publications/02298/wdfw02298.pdf.

**Rocky Mountain Mule Deer**

Mule deer graze in a snowy field. Photo by Susan Jensen.

All deer on the L.T. Murray Wildlife Area are considered mule deer. Phenotypically (the appearance of an organism resulting from the interaction of the genotype and the environment), they range from black-tailed to mule deer. Mule deer and black tailed deer are genetically distinct species but vary along a gradient of similarity in appearance.

Mule deer (*Odocoileus hemionus*) populations on the L.T. Murray Wildlife Area consist of both year-round residents and migratory populations. The overall population expands when migratory deer are present during the winter. Data collected from radio marking on their winter range indicates >80% of the mule deer wintering on the L.T. Murray are migratory, while <50% of those wintering on the Quilomene and Whiskey Dick units migrate (WDFW, 2021). Deer generally avoid large concentrations of elk. Surveys

show the highest concentrations of deer occur on the east portion of the L.T. Murray unit.

Mule deer provide food and clothing for native peoples, hunting and viewing opportunities for visitors to the wildlife area, and economic support to the state and local communities through purchases of hunting and camping supplies, food, hotel/accommodations, and purchases at local businesses. Mule deer are a generalist species and will utilize other habitats found on or adjacent to the L.T. Murray Wildlife Area units, including forest, agricultural fields, and grasslands.

## Mule Deer Management

The L.T. Murray Wildlife Area is part of the East Slope Cascades (Whiskey Dick, Quilomene and Teanaway units) and Naches Mule Deer Management Zones (L.T. Murray and Yakima units). The primary goals of mule deer management are to 1) preserve, protect, perpetuate, and manage deer and their habitat to ensure healthy, productive populations; 2) manage deer for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural, subsistence, and ceremonial uses by Native Americans, wildlife viewing, and photography; and 3) manage statewide deer populations for a sustainable annual harvest.

Mule deer eat a wide variety of vegetation and browse on trees and shrubs more than elk, especially in winter. Deer consume some grasses when green, but the highest quality habitat contains a wide variety of shrubs and forbs. Data is seldom collected pre-/post "restoration", but restoration in shrubsteppe likely decreases habitat quality due to a shift toward grass and sagebrush. Herbicides are non-selective and decrease forb density and variety.

Mule deer management on the wildlife area involves habitat improvement, including derelict fence removal, post-fire restoration, including reseeding and planting of native vegetation, and forest thinning. WDFW staff will pursue funding to support these efforts and identify critical areas that will improve mule deer populations throughout the wildlife area. The Washington State Mule Deer Management Plan (WDFW, 2016) provides background information on the natural history, biology, and status of mule deer herds, describes current issues, and establishes objectives and strategies to guide future management. For more information on Mule deer management, visit https://wdfw.wa.gov/publications/01755.

**Bighorn Sheep**

Ram on the Quilomene Unit. Photo by Justin Haug.

Bighorn sheep (*Ovis canadensis*) native to Washington were extirpated from the state by the 1930s by overhunting and disease associated with pathogens transmitted from domestic sheep (WDFW, 2021). All existing state populations are the result of reintroductions. The Quilomene reintroduction was the first in the region (early 1960s) and the population was estimated at over 100 animals by the late 1960s. The population then crashed in the early 1970s. The cause of the rapid decline is unknown, but the population reportedly died out by 1990. Reintroduction occurred again in 1993. By 1996, forty-one bighorns were released in the area. The Quilomene population quickly grew to over one hundred and sixty sheep. The Quilomene herd recently received twenty-one sheep from the Cleman Mountain herd in January 2017. Today the Quilomene population is approximately two hundred(WDFW, 2021).

Bighorn sheep inhabit grassy mountain slopes, canyonlands, and foothill country near rugged rocky cliffs and bluffs. WDFW formally recognizes and manages seventeen herds across the central and eastern portions of Washington. They can often be seen from highways and roadways in the canyon country of southeast Washington and the eastern slopes of the Cascades.

Wildfires have had a significant impact on bighorn sheep habitat on the L.T. Murray Wildlife Area over the last decade. Some sheep habitat burned on the Quilomene unit in 2013. Most of the sheep habitat was burned on the Whiskey Dick unit in 2022. Wildfires can improve sheep habitat in moist areas but decreases forage diversity on drier sites. Cheat grass is nutritious when green but is an invasive species that is poor quality forage in summer. Post-fire shrubsteppe restoration is an important objective in this plan to increase forb diversity and abundance (see Objective 10a). Once fires burn an area, monitoring is important to measure plant diversity in restored vs. controlled areas.

## Bighorn Sheep Management

The statewide goals for bighorn sheep are: 1) preserve, protect, perpetuate, and manage bighorn sheep and their habitats to ensure healthy, productive populations; 2) manage bighorn sheep for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, and wildlife viewing and photography; 3) manage for sustained yield; 4) develop habitat-based population objectives for each bighorn herd, considering public conflicts, disease history, and risk of contact with domestic sheep and goats (WDFW, 2021).

The main threat to bighorn sheep in the region is Mycoplasma ovipneumoniae (Movi) from contact with domestic sheep and goats, which causes bacterial pneumonia. Both domestic sheep and goats can carry bacteria, which typically has minimal impact to domestic sheep. After the initial pneumonia-related die-off in wild sheep herds from Mycoplasma ovipneumoniae (Movi), lamb recruitment is often low for decades. Herds often slowly die-off or languish at low population levels after contacting the bacteria. Separating bighorn sheep from domestic animals is essential to maintaining bighorn sheep populations.

WDFW recently purchased private lands in the Quilomene unit, which adds critical habitat and separation from domestic animals. Currently, one temporary crossing permit is managed on the L.T. Murray Unit and is reviewed by the agency annually. No additional domestic sheep grazing permits are planned, and domestic goats will not be used for weed management. WDFW adopted a new rule in 2022 intended to reduce the risk of Mycoplasma ovipneumoniae (Movi) transmission from domestic sheep and goats to bighorn sheep. The adopted rule prohibits visitors bringing domestic sheep or goats onto wildlife area units where bighorn sheep may be located, including the L.T. Murray Wildlife Area.

Male Blue Grouse display. Photo by Alan Bauer.

## Upland Game Birds

Huntable populations of California quail, forest grouse, gray partridge and chukars are present on the Whiskey Dick and Quilomene units. There are small coveys of upland birds on the east portion of the L.T. Murray unit, but relatively few hunter recreation days.

Recent fires have decreased habitat quality for upland birds. Riparian areas often recover from fire naturally, but planting is needed in some areas. Limiting herbicide application and focusing on restoring patches of sagebrush is the best management option for upland birds post-fire.

Roughly 350 pheasants are released annually in the Quilomene unit. Pheasants are released prior to the youth and general pheasant seasons and sporadically throughout the season to increase hunter opportunity. The birds released are all males, and the purpose is solely to provide hunting opportunity. More information on upland game birds and hunting can be found at wdfw.wa.gov/hunting/regulations/migratory-waterfowl-upland-game.

## Diversity species overview and management

The L.T. Murray Wildlife Area protects critical habitat for an array of diversity (non-game) species from shrubsteppe obligates such as the sage-grouse and white-tailed jackrabbit to mature closed canopy forest dependent species, such as the northern spotted owl and northern flying squirrel. Management of diversity species are directed by the State Wildlife Action Plan: wdfw.wa.gov/sites/default/files/publications/01742/wdfw01742.pdf. Focal species representing various habitat types were selected with the knowledge that managing habitat to support a focal species will support other species that rely on similar habitat.

Species occurrence data is limited for many species on the wildlife area because few extensive surveys have been conducted due to a lack of funding. All species and habitats listed as PHS (see Table 11) are a priority for the L.T. Murray Wildlife Area. There are limited resources to devote to a multitude of species. To compensate for the lack of resources, WDFW staff take a holistic approach when planning habitat enhancements and restoration to ensure that proposed actions benefit the greatest number of species.

Management of federally listed species are conducted in coordination with the U.S. Fish and Wildlife Services (USFWS). The USFWS provides consultation to states and federal funding to acquire habitat for the purposes of conserving endangered or threatened species. The USFWS enters into cooperative agreements with states to consult on species management and recovery. For example, the Heart of the Cascades Section 6 Management Plan (WDFW, 2020) addresses management for three federally endangered species: the Northern spotted owl, gray wolf, and bull trout, which are described in greater detail below. A goal of the Heart of the Cascades land acquisitions is to enhance landscape-level habitat connectivity by eliminating the threat posed by checkerboard land ownership. Consolidating land ownership creates larger tracks of high-quality habitat, reduces fragmentation, increases habitat connectivity, and allows for more coordinated land management across the landscape. Below is a list of focal species managed across the wildlife area. For more information on the State Wildlife Action Plan, visit: wdfw.wa.gov/sites/default/files/publications/01742/wdfw01742.pdf.

## Greater Sage-Grouse

Male Greater sage-grouse display.

Greater sage-grouse inhabit shrubsteppe and meadow steppe and are closely associated with sagebrush. With an estimated 80% of historic shrubsteppe lost or degraded to development and agriculture since the arrival of non-native settlers, protecting remaining shrubsteppe habitats is more important than ever for the long-term survival of the greater sage-grouse and other shrubsteppe obligate species, such as white-tailed jack rabbits, northern pacific rattlesnakes, mule deer, and burrowing owls.

The Whiskey Dick and Quilomene units both fall under the Colockum Sage Grouse Management Unit (see wdfw.wa.gov/sites/default/files/publications/00395/wdfw00395.pdf). Small populations are negatively affected by loss of genetic variability, inbreeding, predation pressure, and extreme weather. Loss of shrubsteppe habitat to fire is also a major threat to this species. When shrubsteppe habitat is burned, wildlife area staff employ the best available science, as outlined in the Greater sage-grouse recovery plan, to restore all habitat components, as shrubsteppe can take a long time to recover. There is a critical need to secure reliable funding, materials (seed and rooted stock), equipment, and staff to mitigate past and future impacts from fire. Post-fire restoration on burned shrubsteppe is priority objective in this plan (Objective 10a).

Greater sage-grouse (*Centrocercus urophasianus*) have historically occupied the Quilomene and Whiskey Dick units of the L.T. Murray Wildlife Area. The Greater sage-grouse have been declining in Washington and many parts of its range in North America. Sage-grouse can be found on about 8% of their historical range in the state (WDFW, 2004). Currently, there are no known populations of Greater sage-grouse within the L.T. Murry WLA. Long-term survival of the Greater sage-grouse in Washington will depend on protecting and enhancing suitable shrubsteppe habitat and re-establishing or expanding populations outside the current occupied areas. Protecting and restoring shrubsteppe habitat is part of a broader strategy on the wildlife area. Facilitating shrubsteppe recovery ensures ecosystem integrity and provides a pathway for both sage grouse recovery and other SGCN and game species.

**Golden Eagle**

Golden Eagle. Photo by Jarkko Jarvinen – Flikr.

Today, golden eagles only occupy about 60 of 270 known historical breeding territories statewide (WDFW, 2015). The golden eagle (*Aquila chrysaetos canadensis*) is listed as a WA state Candidate Species and a Species of Greatest Conservation Need (SGCN). Humans are the leading cause of golden eagle mortality, either directly or indirectly, including accidental trauma (e.g., collisions with vehicles, power lines, and other structures, electrocution from power lines, illegal shooting, and lead poisoning from shot in prey (Franson et al. 1995)). This species is of concern due to declines in distribution and abundance of its primary prey species, jackrabbits and ground squirrels, across its historic range (WDFW, 2013). Additional mortality factors include continued exposure to lead in the environment and collisions at wind energy facilities (WDFW, 2015). Foraging habitat in shrubsteppe and grasslands has declined due to loss and degradation of these habitats from agriculture, human development, and overgrazing. This species is protected under the Bald and Golden Eagle Protection Act. Sixty-five percent of golden eagles sampled in Washington had elevated lead levels and 24 percent demonstrated chronic exposure (Watson and Davies, 2015). To reduce exposure, a key management objective in this plan is greater public outreach and education on the use of nontoxic ammunition (see objective 3c).

Management actions on the L.T. Murray include protection and restoration of shrubsteppe foraging habitat and conservation of prey species, particularly jackrabbits and ground squirrels.-Human disturbance of golden eagle nest sites is another primary management concern on the L.T. Murray Wildlife Area. Limiting human activity near nests is necessary to facilitate recovery and conservation of golden eagles, who are less tolerant of human disturbance. Nest locations will be monitored annually, and public entry closures implemented as needed to limit human activity. Currently, an annual closure is implemented from February 15 to July 31st unless the nest either fails or fledges young sooner. If active, the nest's status will be monitored by WDFW biologists on the L.T. Murray unit.

### Townsend's ground squirrel

The Townsend's ground squirrel (*Urocitellus townsendii*) is a burrowing species found primarily in native shrubsteppe, grasslands, and large patches of sagebrush at the lower edges of forests. They also occupy a variety of human-modified habitats, including pastures, abandoned fields, orchards, vineyards, hop fields, canal banks, and sites adjacent to irrigated fields and springs. They are found in small to large colonies. Burrowing provides safety from predators, shelter, protection for young, and a stable hibernation site. Their diet consists of mainly grasses, forbs, and seeds. Information is lacking on relative population sizes, underscoring the need for future research and monitoring for the squirrel. What is known is that significant population declines have occurred in many areas of the state, while the squirrel is common in some human-modified locations. There can be very large population fluctuations in colonies in response to events not related to habitat management. WDFW staff can add structure to habitat, such as adding boulder clusters, to enhance habitat within the colonies, and monitoring utilization.

### Black and white-tailed jackrabbits

White-tailed Jackrabbit. Photo by USFWS.

The black-tailed jackrabbit (*Lepus californicus)* is one of three species of hare in Washington. The other two are the white-tailed jackrabbit and snowshoe hare. In Central Washington, east of the Cascade mountains, black-tailed jackrabbit distribution is concentrated in the semi-arid Columbia Plateau shrubsteppe and grassland habitats and extends south into Oregon. Black-tailed jackrabbits use sagebrush and rabbitbrush dominated habitats, as well as areas of mixed grassland and shrub. The species only occupies a small portion of its historic range in the state and small subpopulations may be susceptible to local extinction (WDFW, 2015).

The white-tailed jackrabbit (*Lepus townsendii)* is a State Candidate-listed species. In Washington, the

white-tailed jackrabbit is found throughout the semi-arid portions of the Columbia Plateau. This species was once common across the extensive grasslands of eastern Washington, but with reduced bunchgrasses due to overgrazing and encroachment of black-tailed jackrabbits, it is now rare and only occupies a small portion of its historic range (WDFW, 2015). White-tailed jackrabbits prefer hilly bunchgrass sites. They rest by day in shallow holes dug in the ground at the base of rocks or shrubs. In winter, they descend to sagebrush flats in valley bottoms and rest in cavities connected by tunnels beneath the snow. Home ranges may extend 1.2 to 1.9 miles in diameter. White-tailed jackrabbits are nocturnal herbivores that feed primarily on grasses and forbs and secondarily on shrubs. Monitoring for SGCN species and restoration of shrubsteppe habitat, notably post-fire, are high priority objectives in this plan, and will benefit shrubsteppe obligates such as the black and white-tailed jackrabbit.

### Northern spotted owl

Northern spotted owl. Photo by U.S. Forest Service Pacific Southwest Region.

The Northern spotted owl (*Strix occidentalis caurina)* dwells in old-growth or late successional conifer forests and was once prevalent across the vast forests of the Pacific Northwest. Historically, northern spotted owls occupied the L.T. Murray, Upper Yakima, and Teanaway Valley units of the wildlife area, as well as buffer areas contiguous with WDFW lands. Northern spotted owls are top predators and keystone species in late successional forests and serve as an indicator of ecosystem health.

Northern spotted owl numbers precipitously declined across the region due to loss of habitat to logging in the late twentieth century (WDFW, 2020). Competition from barred owls, which are more adaptable to modified habitats, also poses a threat to northern spotted owls.

Management of the Northern spotted owl on the wildlife area is directed by the USFWS Recovery Plan and the Heart of the Cascades Management Plan (HOC). The HOC management plan was developed for properties acquired with financial support from federal Habitat Conservation Land Acquisition grants. Approximately 4,087 acres are managed in perpetuity for the benefit of federally listed species on the wildlife area, including the northern spotted owl, gray wolf, and bull trout.

Historically, there are ten active territories of the Northern spotted owl that overlap with L.T. Murray lands (nine on HOC properties and one other). There were no known active territories on the L.T. Murray surveyed between 2014-2019. WDFW lands facilitate dispersal by maintaining linkages between federal late successional reserves (old-growth habitat) and state lands managed for nesting, roosting, and foraging habitat.

Mature stands are managed for complex, multi-aged/size trees with generally high canopy closure. Forest management practices to restore ecological conditions and reduce fire risk are being implemented on various landownerships in the eastern Cascades, including lands managed by WDFW. The amount of work required is substantial, and outreach regarding approaches to fire risk reduction is essential and will be challenging (Lange et. al., 2022). Maintaining forest habitat for mid-to late successional species is an important objective (see objective 14e and Appendix F) in this plan and part of a broader forest management strategy and provides a pathway for NSO recovery and conservation of other SGCN and game species.

### Northern flying squirrel

Northern flying squirrel. Photo by Charlie Snow.

The Northern flying squirrel (*Glaucomys sabrinus*) are strictly nocturnal coniferous and mixed-coniferous forest dwellers. They can't really fly, but rather glide far and accurately by means of the lateral skin flaps that triple their undersurface. The Northern flying squirrel is the smallest tree squirrel in Washington measuring

10 to 12 inches in total length. They usually nest in old woodpecker holes and prefer large-diameter trunks and dead and down trees.

Dwarf mistletoe, though parasitic to trees, creates complex structure and important habitat for the Northern flying squirrel and grouse. Although omnivorous, the squirrel relies heavily on underground-fruiting fungi and the fruiting bodies of the mistletoe in summer and on horsehair lichens in winter, which also insulate their nests. The squirrel is an important prey-base species for northern spotted owls and comprise a significant portion of the owl's diet. When owls prey on flying squirrels, they often discard their tails, providing evidence of the squirrel's presence in the forest.

Managing for complex forest canopies, diverse age classes and species of trees, with varied spacing and closed canopies, maintains habitat for northern flying squirrels, northern spotted owls, and other dwellers of mid to late successional forests.

### Flammulated owl

Flammulated owl. Photo by Alan Schmierer - Creative Commons Public Domain.

The flammulated owl *(Psiloscops flammeolus)* is a small (6 to 7 inch long) dark-eyed owl with small ear tufts. They can be found in mature ponderosa pine forests and other dry forested regions and prefer open canopy cover and the presence of large cavity trees or snags. They nest in large cavities excavated by pileated woodpeckers or northern flickers.

The flammulated owl is the only neotropical migrant owl in North America. It breeds in western North America and migrates to Mexico and Guatemala. In Washington, it is found in dry forests where pairs occupy small territories. The species has a low annual rate of reproduction. Rates of nest success and productivity in Washington are not known. Loss and fragmentation of mature forest habitat suggests that populations are declining. Increased monitoring and study of flammulated owls and other focal species associated with forest habitat types is a priority objective in this plan (see objective 14b). Flammulated owls are habitat specialists, requiring old-growth ponderosa pine and/or Douglas-fir stands, making them vulnerable to changes in

habitat extent and quality due to shifting wildfire regimes, precipitation changes, and other climatic changes. Flammulated owls are probably impacted by habitat loss (and degradation) and fire suppression in dry forest landscapes (WDFW, 2015). The species is a state candidate for listing. Management of the species includes maintaining dry forest habitat for dwellers of large cavity trees and snags. Tree spacing, canopy cover, and tree diameter are important habitat attributes for the flammulated owl, a keystone species and indicator of forest health. Prescriptive management includes retention of adequate numbers and diameters of large (≥20 inches) snags and live trees for future recruitment (WDFW, 2023). Monitoring before and after forest treatments to ensure habitat needs are met is a priority objective in this plan (see objective 4d).

### White-Headed Woodpecker

White-headed woodpecker.

White-headed woodpeckers (*Picoides albolarvatus*) are considered cavity dwelling birds and use both live and dead trees for foraging and nesting. Providing snags for cavity dwellers is an important aspect of forest habitat management.

White-headed woodpeckers prefer a wide variety of insects in spring and summer and will forage pine seeds in fall and early winter. Historically, small fires have created pockets of good habitat on the L.T. Murray unit. When stands are thinned, snags are creating by topping. Measuring the use and longevity of created snags is important data for managing cavity nesters. White headed woodpeckers utilize both green tress for foraging and snags for nesting. Snags area listed as a WDFW PHS habitat and important to retain on the landscape. Research on utilization of created short snags is ongoing in the L.T. Murray unit within Robinson Canyon.

New data is gathered annually and integrated into forest management activities. Research indicates that the habitat suitability of post-harvest forest stands with only 25–35 trees per acre in upland locations provides insufficient habitat for white-headed woodpeckers. Comparative monitoring of pre- and post-harvest stands, and untreated stands is an important objective of this plan (see objective 14a) and will be initiated to validate whether a sparse tree density harvest prescription meets the habitat needs of white-headed woodpeckers and other cavity-dwelling avian species. Leaving more trees per acre to increase basal area will be considered in forest treatment projects.

### Gray Wolf

WDFW biologist Ben Maletzke looks for signs of wolves in Eastern Washington in the annual wolf survey. Photo by WDFW.

The Gray wolf (*Canis lupus*) is native to Washington state but was nearly eradicated by the 1930s primarily due to overhunting. Wolves are returning to Washington, dispersing from populations in nearby states and Canada. Gray wolves are habitat generalists that require a sufficient year-round prey base, large areas of high-quality habitat, and protection from excessive human-caused mortality to thrive. They range widely and will defend areas from 193 to 386 square miles (WDFW, 2020). Wolves den on or near deer and elk winter range, which includes lower elevation and moderately open habitat. Wolves are present on all units of the wildlife area. The L.T. Murray Wildlife Area provides habitat connectivity to larger tracts of high-quality

habitat on public lands, which contains an adequate prey base for wolves. The Teanaway Valley unit is within the breeding territory of the Teanaway pack, the only documented wolf pack to occupy the L.T. Murray wildlife area. The Teanaway wolf pack was confirmed as a pack in 2011. According to the most recent population survey, the pack has dispersed, and the last remaining individuals left the area (WDFW, 2023). Dispersing individuals are occasionally detected moving through the L.T. Murray WLA. Updates on wolf activity, packs and breeding pairs are conducted annually and are available within the Annual Wolf Reports.

Recent studies underscore key habitat attributes that influence wolf recovery. Roads, extractive activities, and recreation can influence the distribution of wolves. Mladenoff et al. (2009) found the main factor influencing wolf distribution was human presence. Larsen and Ripple concluded "habitat modeling in the lower states has shown that wolves prefer forest cover, more public land, and lower development densities" (2006). Analyzing open road density and effective road management is a focus of management for wolves and other large predators. To aid in the recovery of the gray wolf, federal funding was secured in 2020 to acquire additional tracts of habitat for wolves and other focal species under the Heart of the Cascades Plan (2020). Under the plan, approximately 3,511 acres on the L.T. Murray unit and 215 acres on the Teanaway Valley Unit will be managed in perpetuity for the benefit of the federally listed northern spotted owl (*Strix occidentalis caurina*), gray wolf (*Canis lupus*), and bull trout *(Salvelinus confluentus)*, as well as other state priority species (SGCN) species.

WDFW takes a science-based, collaborative approach to wolf management, and complies with federal listing requirements under the Endangered Species Act. Wolves within the state are managed in accordance with the Washington State Wolf Conservation and Management Plan. Meeting wolf population goals, while minimizing wolf-livestock and wolf-human conflicts through cooperative partnerships are essential components of wolf recovery under this plan. To learn about wolf management, visit: [wdfw.wa.gov/species-habitats/at-risk/species-recovery/gray-wolf](wdfw.wa.gov/species-habitats/at-risk/species-recovery/gray-wolf).

### Desert-striped whipsnake

Desert -striped whipsnake. Photo by Lisa Hallock.

The desert-striped whipsnake (*Coluber* [*Masticophis*] *taeniatus*) is a long, slender, striped non-venomous snake. Adults range in size from 30 to 72 inches total length. They are a long-lived snake with a lifespan of up to 20 years. The belly is white, and the underside of the tail is pinkish or coral colored. The eyes are large,

and the pupil is round. The only other large striped snakes in Washington are northwestern, terrestrial, and garter snakes. The striped whipsnake differs from these in having smooth scales, 15 dorsal scale rows, and a dark mid-dorsal area between the lateral stripes.

In Washington, desert-striped whipsnakes are shrubsteppe obligates and occur primarily in the driest areas of the central Columbia Basin. Washington occurrences, historical and extant, are below 1,500 feet elevation. Most lands below this elevation in the Columbia Basin have been converted to agriculture or inundated by reservoirs for the Columbia Basin Irrigation Project. In addition, the habitat has been insidiously degraded by cheatgrass and other invasive weeds that have altered the understory of shrubsteppe habitat by colonizing the interspaces between native shrubs and perennial bunch grasses. This is particularly problematic for this active, visual predator, as well as the ground-dwelling lizards on which it preys. The loss of lower shrub branches can be significant for striped whipsnakes and their lizard prey as shrubs without their lower branches do not provide the same cover from the heat or predators. This can occur from cattle grazing when cattle push their heads under shrubs to eat the grass under the shrub. The habitat of the two existing populations includes basalt outcrops with areas of high quality shrubland.

Striped whipsnakes use communal dens (*i.e.*, hibernacula) in basalt outcroppings for winter dormancy. This species has high fidelity to hibernacula, returning each year to overwinter. Identification and protection of hibernacula sites is essential for conservation of this species. In Washington, striped whipsnakes become surface active in March as soon as temperatures become suitable for activity, although they remain in the vicinity of the hibernacula until daytime temperatures are more consistently warm in April. Breeding takes place after they emerge in the spring. Females lay eggs in July, and clutch sizes range from three to seven. The incubation period is 44 to 58 days. Striped whipsnakes are active during the day. They are fast, visual, predators that actively chase down their prey. Small ground dwelling lizards, such as the side-blotched lizard, are the predominant prey, but small mammals, snakes, young birds, and insects are also eaten.

The L.T. Murray WLA contains a diversity of snake species. Other snakes that can be found on the wildlife area include, but are not limited to, Northern Pacific rattlesnakes, gopher snakes, bull snakes, and rubber boas. For more details about the desert-striped whipsnake, as well as other snakes that can be found on the L.T. Murray WLA, see the Washington Herp Atlas.

**Monarch butterfly**

Monarch butterfly on gray rabbitbrush. Photo by Justin Haug

In 2014, the Monarch butterfly (*Danaus plexippus*) was petitioned to be listed under the federal Endangered Species Act. In December 2020, the USFWS found that the listing of the Monarch butterfly as an endangered or threatened species is warranted but precluded by higher priority actions to amend the List of Endangered and Threatened Wildlife and Plants (2020a). Given the precipitous decline in Monarchs, multiple ongoing threats, and their federal status as 'warranted', the Monarch was added to the State Candidate list in April of 2023. The species' decline may be linked to habitat loss, climate change, systemic pesticides (such as neonicotinoids), and habitat destruction on wintering grounds. In addition, availability, distribution and quality of breeding habitat and nectar resources are a key driver in Monarch decline (USFWS 2020b). In Washington, Waterbury et. al. (2019) found the primary threat to Milkweeds and Monarchs are herbicide use and invasive species, followed by mowing/haying, grazing, insecticide application and wildfire.

The Monarch butterfly is an obligate breeder on Milkweed plants. In Washington, Monarchs use three species of Asclepias as host plants (Showy Milkweed, A. speciosa; Narrow-leaf Milkweed, *A. fascicularis* and Swamp Milkweed, *A. incarnata*). Over 90% of the observations occurred on Showy Milkweed which is the most widespread and abundant host plant (Waterbury et al. 2019). Showy Milkweed and Swamp Milkweed both occur on the LT Murray WLA. Efforts to protect and encourage host plant habitat should be a priority. Milkweed habitat should not be disturbed during the time it supports Monarchs (late May – early September). To date, adults or larval stages of Monarchs have not been detected on LT Murray WLA but detailed surveys have not been conducted so the occurrence of butterflies are possible but unknown. Milkweeds and Monarchs in Washington often occur in open and disturbed sites, including weedy fields and sparsely vegetated habitats, often near wetlands or riparian areas where milkweed remains green (Waterbury et al. 2019), but they also can be found quite far from water or disturbed sites (E. Pelton, pers. comm.). Monarchs need late-season nectar sources and trees for roosting at night and during inclement weather along southbound travel corridors which are often river courses (Pyle 1999, 2015).

Pesticides and seeds used on the wildlife area by staff, contractors, or leaseholders should be reviewed to avoid those containing neonicotinoids, which unnecessarily cause nectar of the planted species to be toxic to insects (Halsch et al. 2020). Native bee species are also presumed to be in decline because of these pesticides. Widespread use of herbicide to target or collaterally damage milkweeds illustrate a regional perspective that milkweeds are "weeds" (Waterbury et al. 2019). WLA managers are encouraged to reach out to partners, stakeholders, and the public to educate them on the benefits of maintaining healthy milkweed populations that support breeding, development of adult and immature stages of Monarch butterflies. In addition, Milkweeds provide nectar, pollen, and habitat to many other native insects (e.g., bees, wasps, flies, butterflies) that provide pollination services to crops and native plant communities in eastern Washington.

## Fish species overview and management

Adult Bull trout. Photo by Eric Anderson.

The L.T. Murray Wildlife Area is located within the Mid-Columbia River Basin and Yakima River Subbasin. There are numerous fish-bearing streams present on the wildlife area that support both resident and anadromous fish populations. The wildlife area provides important spawning and rearing habitat for several anadromous species (species that spend their life cycle in both fresh and saltwater environments), including summer steelhead (*Oncorhynchus mykiss*), spring and summer Chinook salmon (*O. tshawytscha*), and Coho salmon (*O. kisutch*).

Resident native salmonids on the wildlife area include bull trout (*Salvelinus confluentus*), rainbow trout (*O. mykiss*), west slope cutthroat trout (*O. clarki lewisi*), mountain whitefish (*Prosopium williamsoni*) and Inland redband trout (*Oncorhynchus mykiss gairdneri)*. Redband trout are a unique interior subspecies of landlocked rainbow trout adapted to the arid environment of eastern Washington. Small native stream fishes such as the leopard dace (*Rhinichthys falcatus*), Umatilla dace (*R. umatilla*), and mountain sucker (*Catostomus platyrhynchus*) are SGCN and PHS species and may be present, but distribution throughout the Yakima Subbasin and Mid-Columbia basin is not well-documented.

Non-native brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) are widely distributed across the wildlife area. Brook trout were introduced into the Yakima River in the early to mid-1900s, and although they are no longer stocked, naturally reproducing populations are present in the L.T. Murray Wildlife Area. No stocking occurs in streams. All resident trout rely on natural reproduction. Brook trout pose threats to native salmonid species, including predation, competition for food, and a genetic threat to bull trout due to the potential for hybridization (i.e., crossbreeding). Non-native brook trout easily breed with bull trout and interbreeding eliminates the reproductive potential of bull trout. Hybrid offspring pose further threats of competition, predation, and interbreeding.

## Fish Management

The Columbia River Basin was once home to one of the largest salmon runs in the world with an estimated 10-16 million salmon returning to the river and its tributaries each year. Salmon have been an important part of the culture and economy of the indigenous peoples of the region for thousands of years and played a vital role in the diet and traditions of people who lived along the river. Historically, salmon supported a commercial fishing industry that provided jobs and food for people across the Pacific Northwest.

While significant efforts have been made to restore salmon populations in the Columbia Basin, the numbers of returning fish remain a fraction of what they once were. In 1991, the federal government declared Snake River sockeye salmon as endangered. In the next few years, 16 more populations of salmon were listed as either threatened or endangered. 75% of the state includes federal listings of at-risk salmon. In response to this crisis, the state legislature created the Salmon Recovery Act in 2004 and set in motion one of the most comprehensive recovery planning efforts in the United States. As a major partner in this effort, WDFW is working to address key factors contributing to that decline, while also monitoring the status of the state's salmon and steelhead populations.

Distinct populations of both bull trout and summer steelhead are listed as threatened under the Endangered Species Act in the Upper Yakima subbasin and Mid-Columbia River basins. Recovery plans and designations of critical habitat were developed for Yakima steelhead (Conley et.al, 2009) and bull trout (WDFW, 2012) in conjunction with the USFWS. Isolated populations of bull trout living in the upper Yakima Basin face significant challenges, such as barriers to adult migration, degraded instream habitats, and invasive species. Sensitive to warming temperatures, they are also challenged by a changing climate (WDFW, 2012).

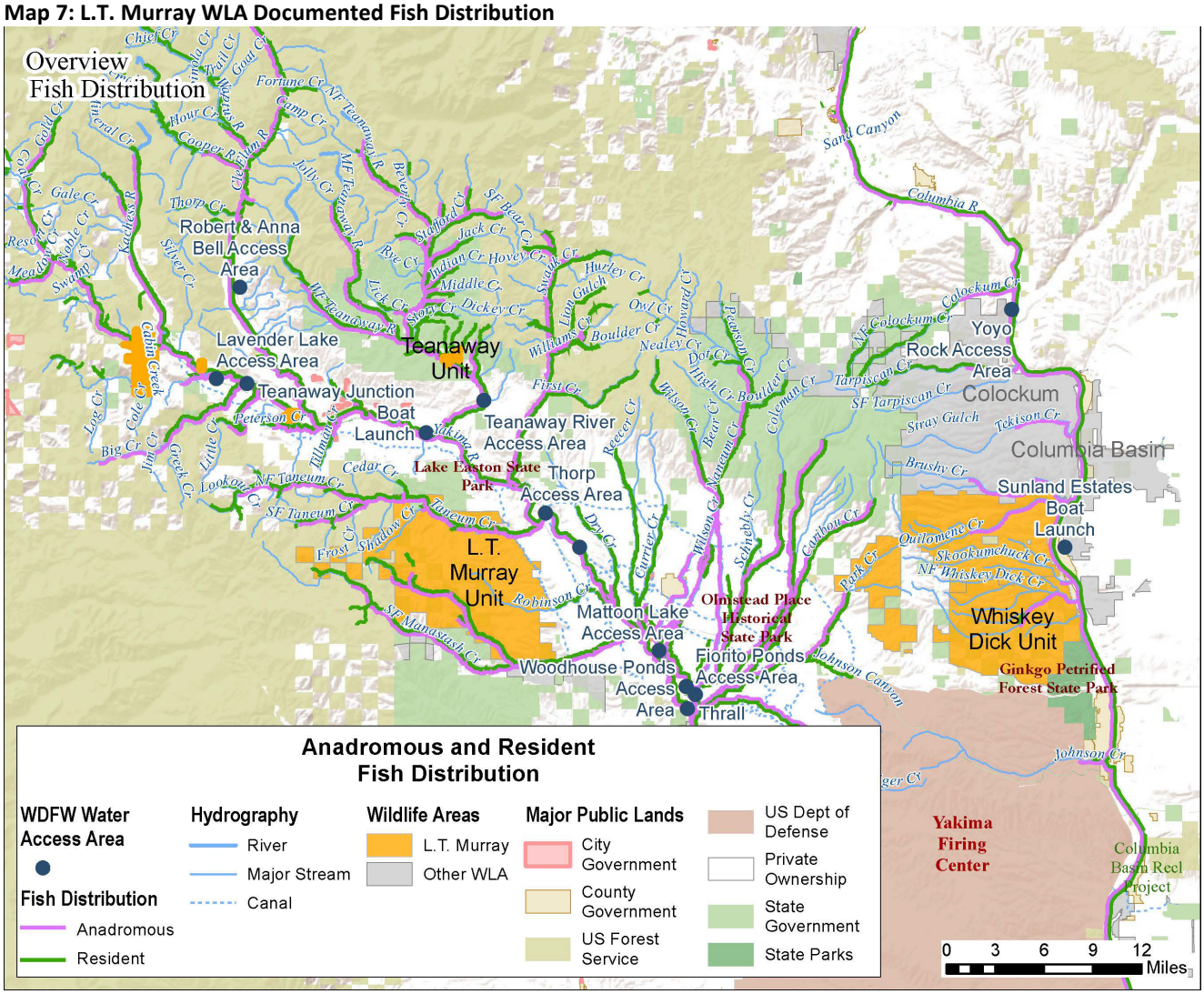
Major factors that limit anadromous fish and resident bull trout production include, the presence of various migration barriers (e.g., hydroelectric, water storage, and irrigation diversion dams; culverts and road crossings), degraded floodplain, riparian habitat and channel structure, degraded water quality and temperature, impaired stream flows, excessive sediment, harvest impacts, predator harassment of spawning fish, lack of marine-derived nutrients, and hatchery fish impacts (e.g., interbreeding or competition) on natural-origin populations (WDFW, 2012).

Fish management efforts in rivers and streams on the L.T Murray Wildlife Area focus on protecting wild populations, recovering ESA-listed species, and managing recreational sport fishing for trout with some limited harvest. Northwest tribes exercise treaty rights to harvest salmon, steelhead, and other fish species and co-manage Washington fisheries together with other state and federal agencies. Today, WDFW and

Northwest tribes work together to conserve and sustainably manage fish populations to provide opportunities for recreational, commercial, ceremonial, and subsistence harvest. Habitat restoration is a primary focus of fish management and recovery of at-risk species on the WLA. A description of fish management on each unit with accompanying maps showing fish distribution are provided below. For more information on fish conservation and recovery efforts, visit the Salmon Conservation website (SCoRE) at: fortress.wa.gov/dfw/score/score/.

Yakima River rainbow trout. Photo by Casey Lawson.

**Map 7: L.T. Murray WLA Documented Fish Distribution**

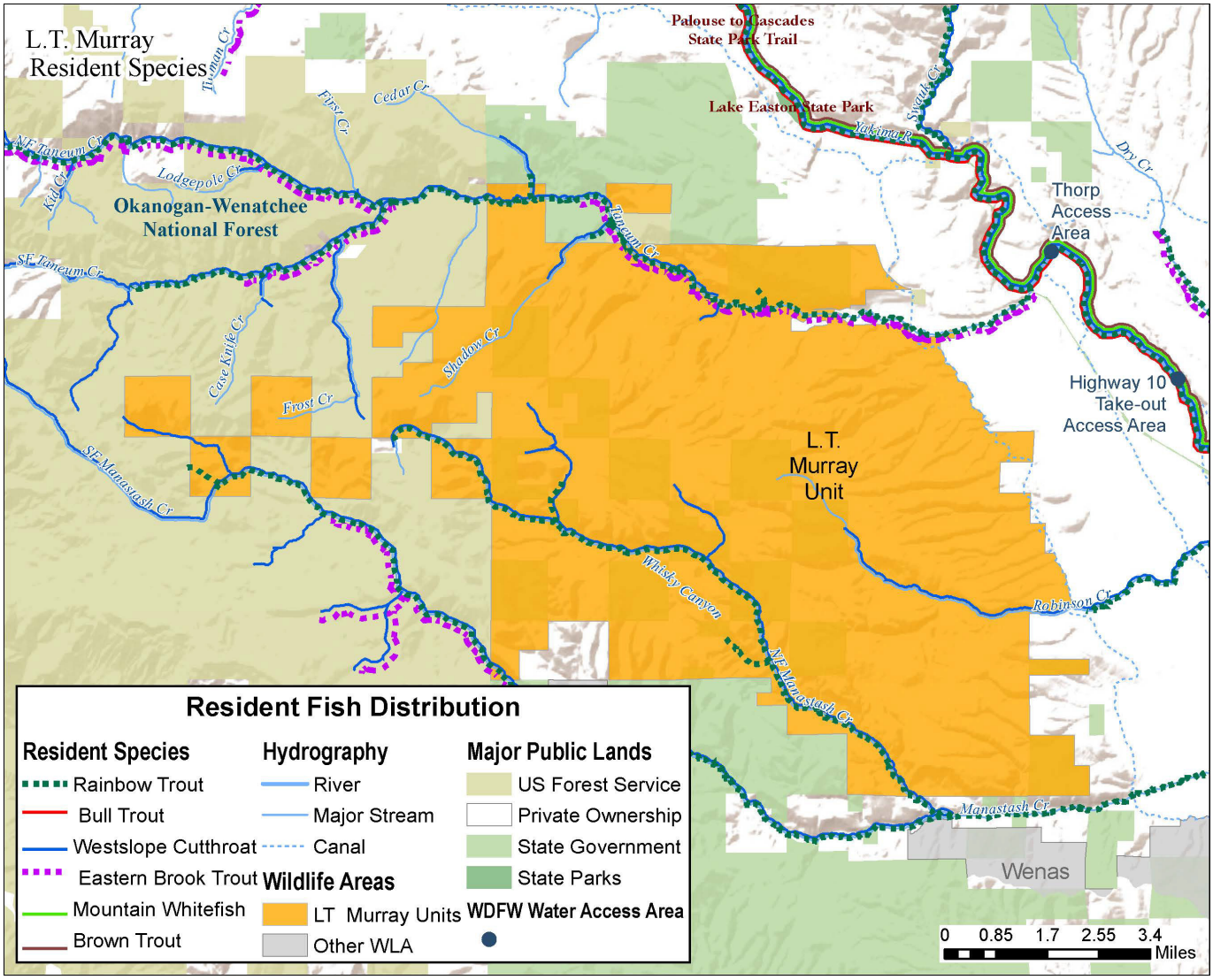



## L.T. Murray Unit

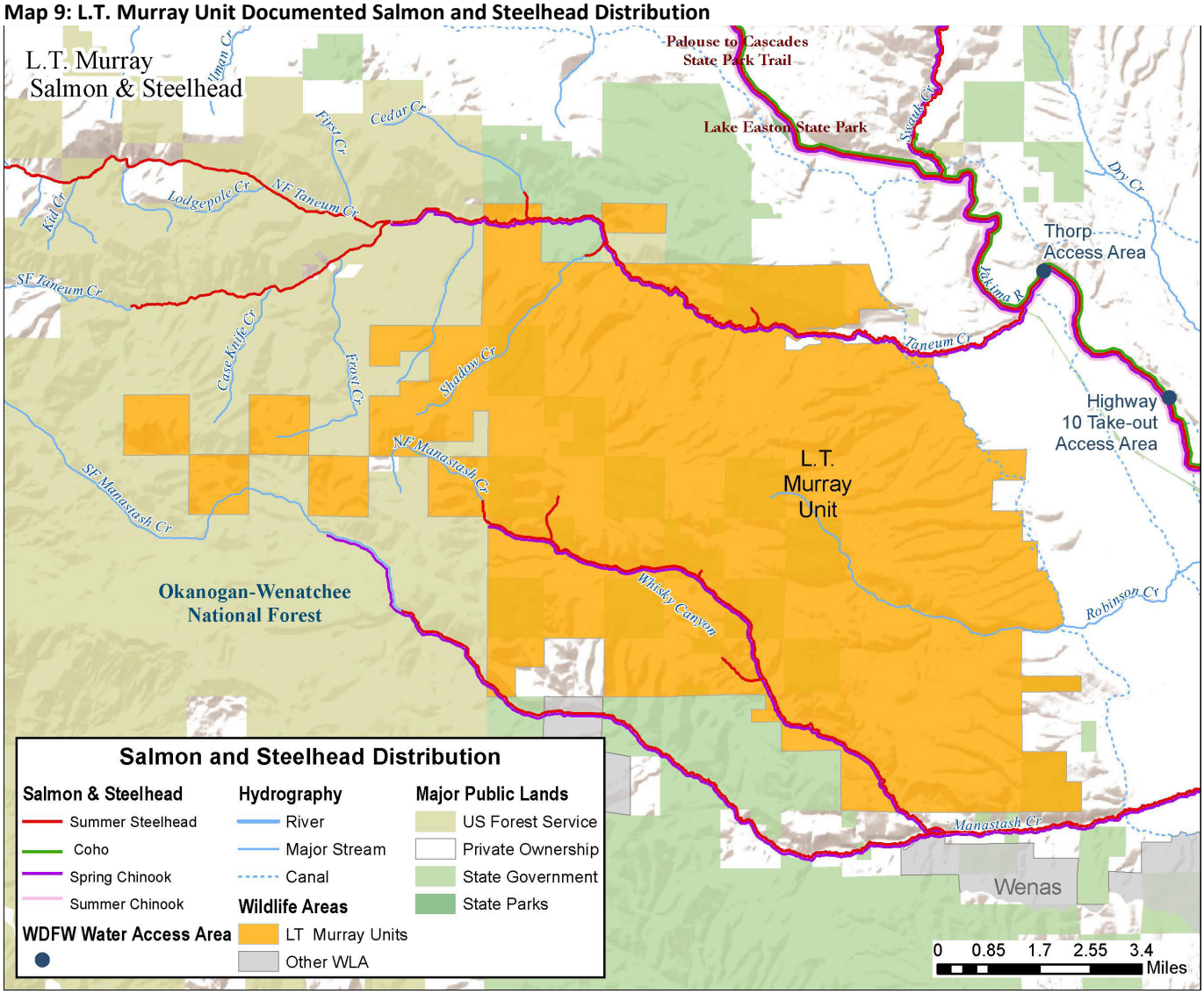
The L.T. Murray unit is located west of the Yakima River in the Upper Yakima River subbasin. Taneum creek and the North fork of Manastash Creek, both tributaries of the Yakima River, flow through the unit, and provide important spawning and rearing habitat for anadromous fish populations. Both Manastash and Taneum creeks are the focus of current and future habitat restoration efforts in this plan. Barrier removal, restoration of flows, native plantings, beaver recovery, and placement of woody debris are past management actions that have improved habitat for fish and other aquatic species on the units. Taneum Creek is the focus of future bull trout recovery efforts.

Resident fish populations of rainbow trout and non-native eastern brook trout can be found in both Manastash and Taneum creeks.

**Map 8: L.T. Murray Unit documented resident fish distribution**



**Map 9: L.T. Murray Unit Documented Salmon and Steelhead Distribution**




## Yakima River Unit

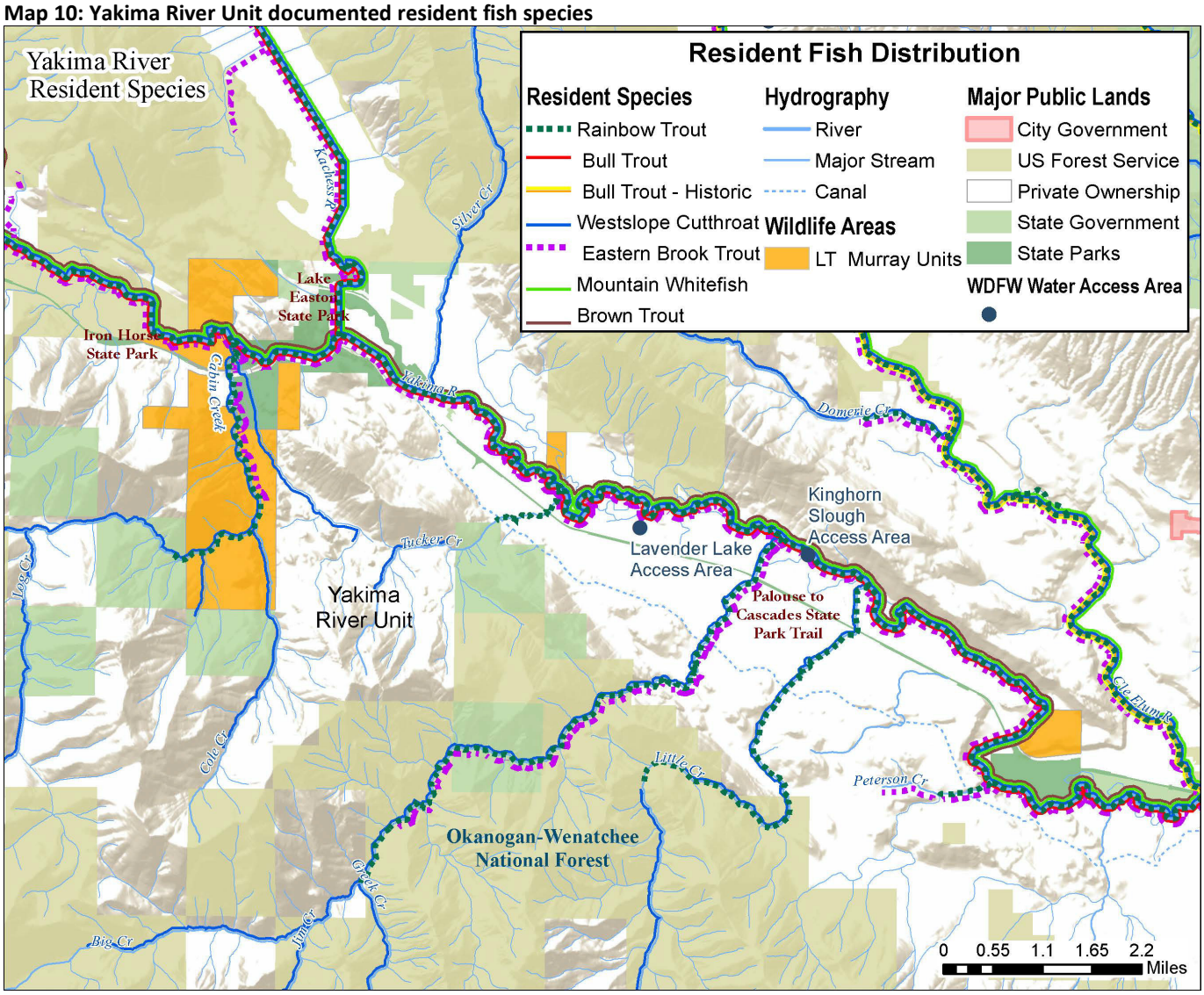
The Yakima River Unit is located on the upper reaches of the Yakima River below Lake Kachess. The mainstem of the Yakima flows through the unit, as do two tributaries of the Yakima: Cabin, and Cole creeks. The mainstem of the Yakima River supports populations of summer steelhead, spring Chinook, and summer Chinook. Resident populations of bull trout are documented in the upper Yakima River and Cabin Creek. Naturally reproducing resident populations of rainbow trout, westslope cutthroat trout, mountain whitefish, and nonnative eastern brook trout and brown trout are also present on the Yakima River Unit.

Recovery of bull trout populations is a priority objective in this plan (see objective 5a). In 2009, WDFW implemented the Bull Trout Recovery Strategy (WDFW, 2009), which targets restoration of habitats and connectivity for bull trout in key historic ranges, including the upper Yakima basin. In 2016, WDFW received funding from the USFWS and Recreation and Conservation Office (RCO) to acquire bull trout habitat in the upper Yakima basin. The funding agreement requires WDFW to protect, restore, and maintain suitable watersheds, riparian areas, and stream channel habitats. The acquisitions further protect bull trout rearing and migration habitat and expanded the unit.

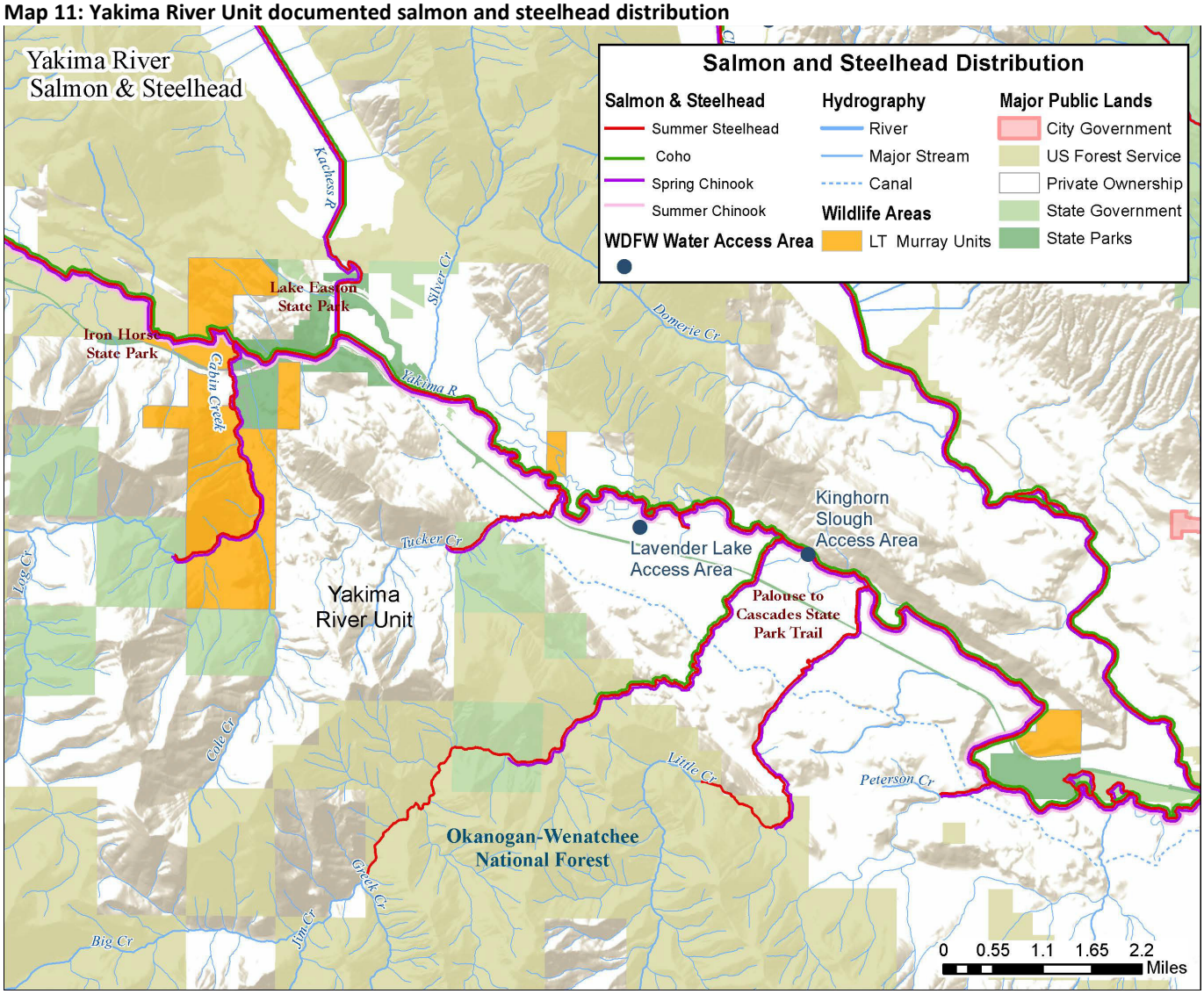
In 2019, Yakama Nation Fisheries (YNF) was assisted by WDFW in expanding current rescue operations of bull trout in Gold Creek and the Upper Kachess River. YNF finalized permitting and initiated captive rearing,

releasing fish back into their native reservoir habitats. YNF also installed and operated passive integrated transponder (PIT) tag arrays to monitor fish movement and assisted WDFW with annual redd surveys. In phase two of the plan, YNF will reintroduce bull trout back into their historic habitats. Support of the YNF Bull Trout Restoration and Monitoring Project is an important objective in this plan (see Goal 5).

**Map 10: Yakima River Unit documented resident fish species**



**Map 11: Yakima River Unit documented salmon and steelhead distribution**



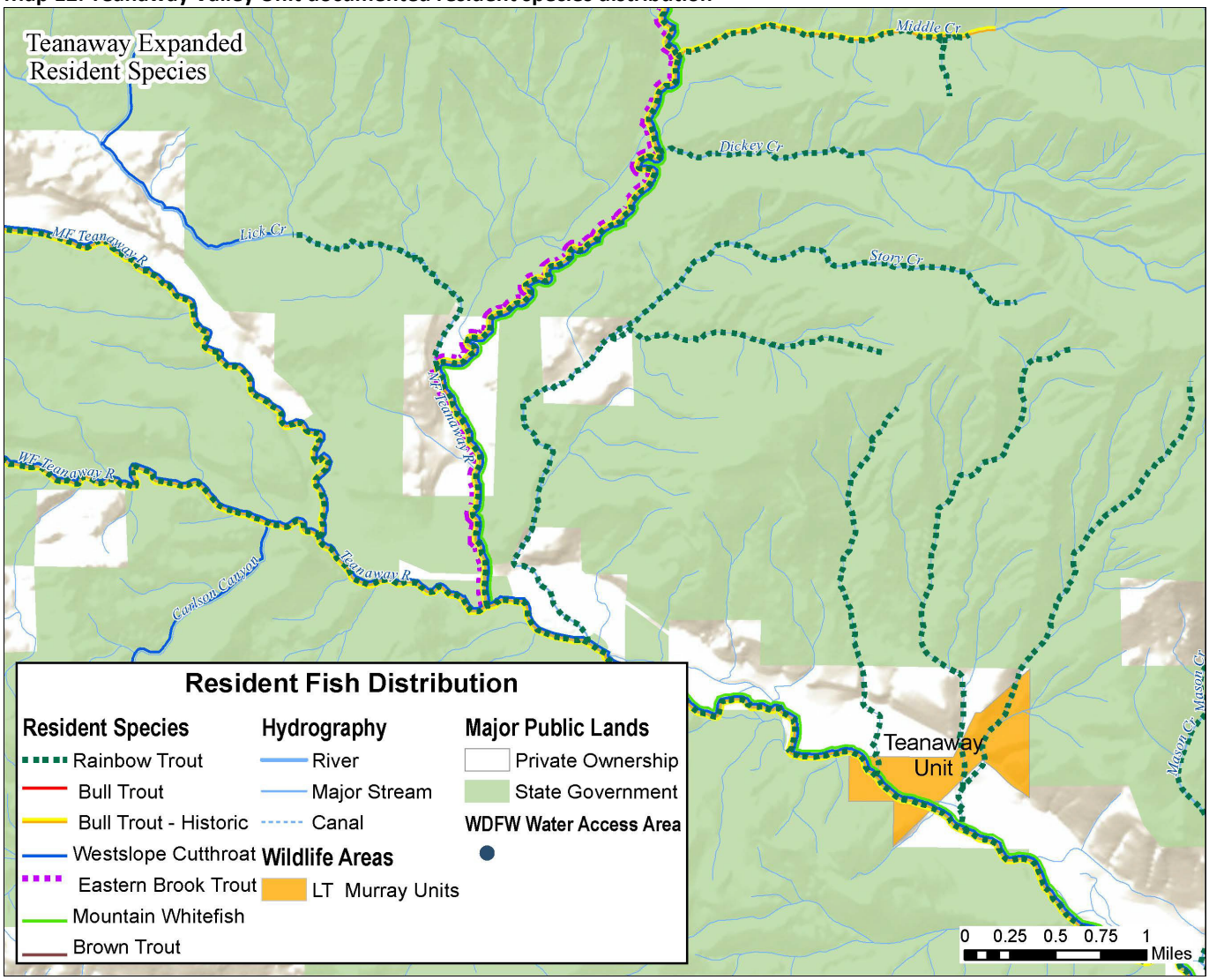

## Teanaway River Unit

The Teanaway River unit is located in the Upper Yakima Subbasin along the mainstem of the Teanaway River, a tributary of the Yakima River. WDFW received funding from USFWS and the RCO for purchase of the Teanaway Valley unit in 2016 to protect bull trout rearing and migration habitat. The acquisition furthers conservation goals outlined in Section 6 Heart of the Cascades Plan (WDFW,2020). Conservation values associated with the property for fish include protection of the mainstem Teanaway River and two fish bearing tributaries, protection of mature conifer forest, wetlands, meadow and floodplain habitat, and connection with the Teanaway Community Forest.

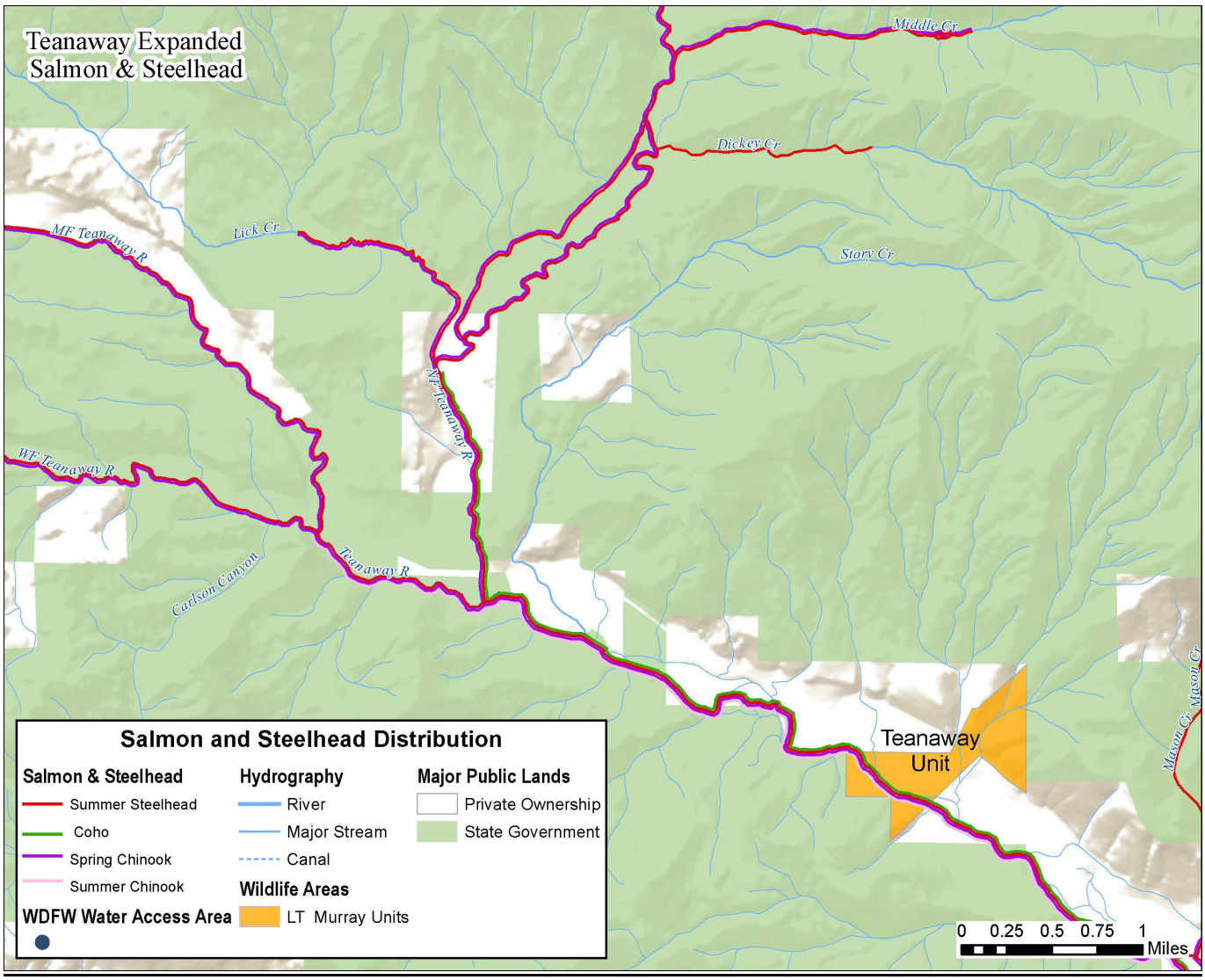
The Teanaway Community Forest is a public forest co-managed by WDFW and the DNR and a focus of larger fish habitat restoration projects. The Teanaway River flows through the unit and supports anadromous populations of summer steelhead, coho, spring Chinook, and summer Chinook. Naturally reproducing resident populations of rainbow trout, westslope cutthroat trout, and mountain whitefish are also present. Nonnative populations of eastern brook trout and brown trout are also present. Bull trout occupied the Teanaway river and its tributaries as part of its historic range. The North Fork Teanaway Bull Trout population is listed as a threatened species under the Endangered Species Act. A recovery plan has been developed for the population in coordination with the USFWS and is a target of recovery efforts in the Upper Yakima Basin.

The WDFW partners with the U.S. Forest Service, the Department of Natural Resources, Yakama Nation Fisheries, Mid-Columbia Fisheries, Trout Unlimited, and other partners, to restore upland fish habitat along the Teanaway River and its tributaries (see Success Story on pg. 17). Project work is aimed at restoring optimum flows for fish, removing barriers to migration, enhancing water quality through reductions in sediment loads, protecting and enhancing riparian corridors through native plantings and fencing, and improving habitat functions and values through placement of woody debris. Habitat biologists from WDFW in coordination with Teanaway Community Forest partners, developed an Aquatic Restoration Strategy that prioritizes project areas that will offer the highest return of quality habitat for fish and other aquatic species in the Teanaway Community Forest. For more information on the management of the TCF visit: dnr.wa.gov/Teanaway.

**Map 12: Teanaway Valley Unit documented resident species distribution**



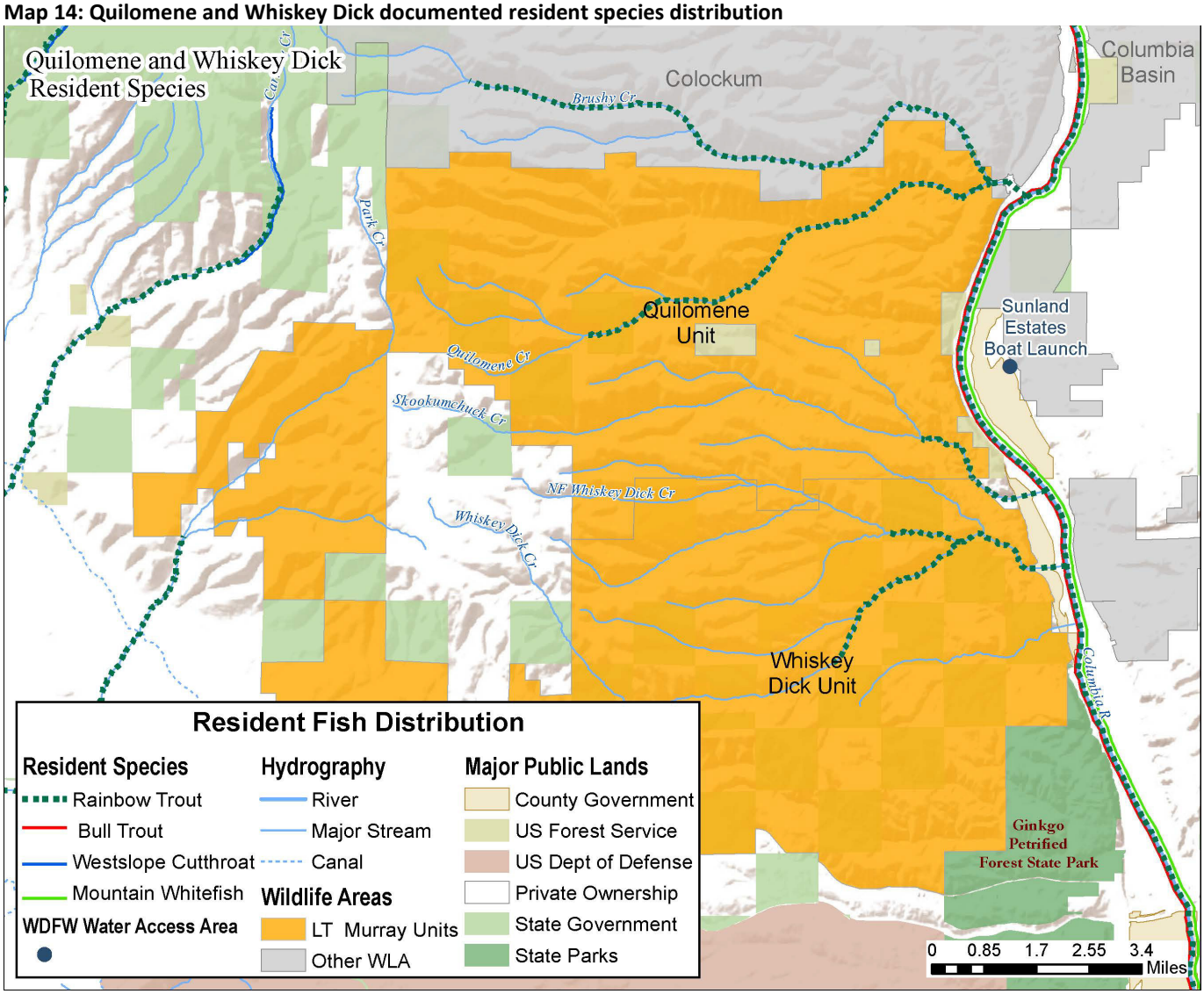
**Map 13: Teanaway Valley Unit documented salmon and steelhead distribution**



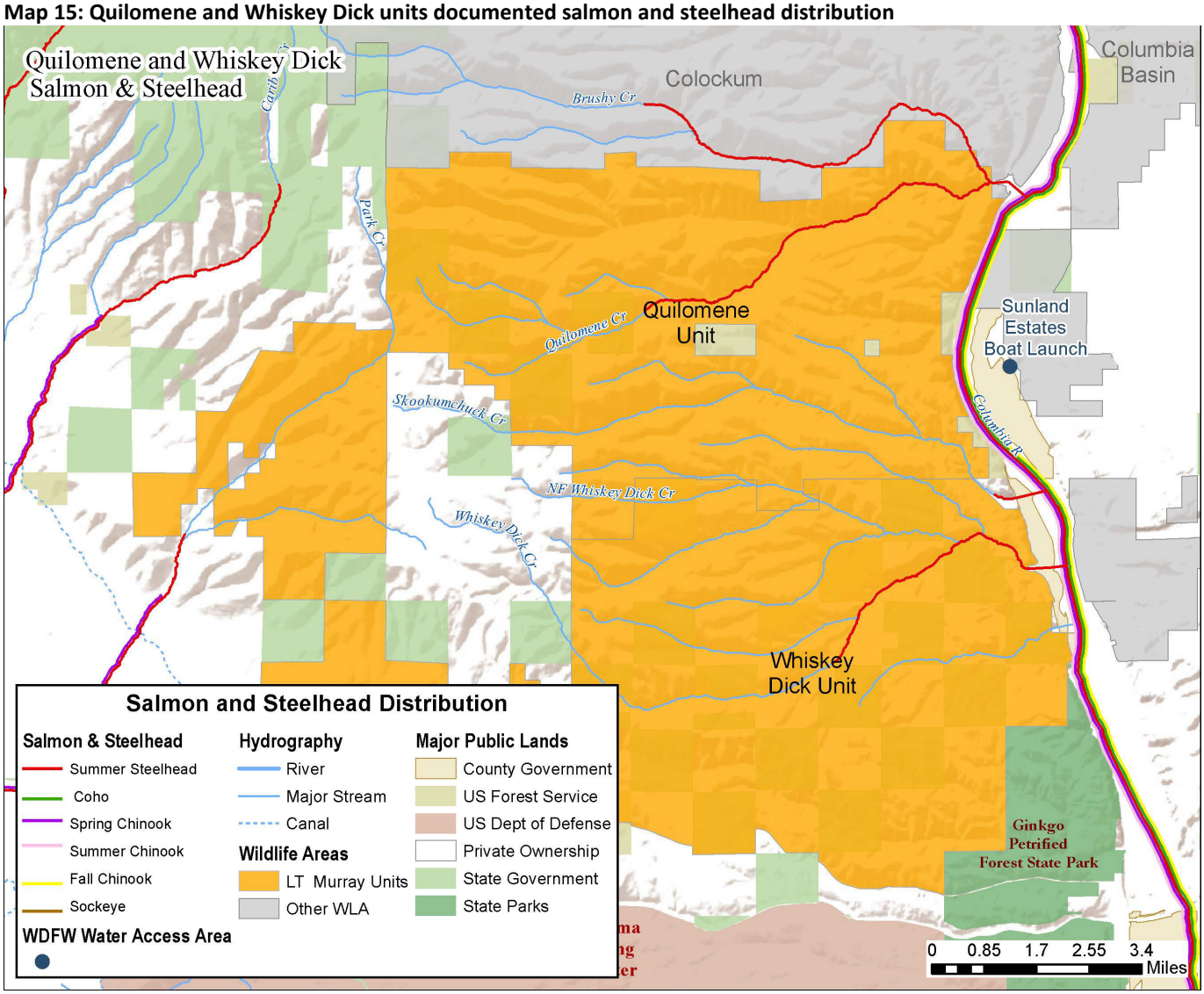

## Quilomene and Whiskey Dick Units

The Quilomene and Whiskey Dick units are bordered by the Columbia River to the east. The tributaries of the Columbia River that flow through the Quilomene and Whiskey Dick units, notably Quilomene, Skookumchuck, and Whiskey Dick creeks, support summer steelhead production and resident populations of rainbow trout. Summer steelhead (considered Mid-Columbia populations) found on the Quilomene and Whiskey Dick units, are federally listed as endangered species. While the creeks on the eastern wildlife units do not provide year-round habitat for these priority species, the lower creek reaches often provide seasonally important off-channel rearing habitat for young fish. Steelhead redds have been documented in the lower reaches of Skookumchuck and Quilomene creeks. The larger tributaries (Whiskey Dick, Skookumchuck, Parke, and Quilomene creeks) provide miles of fish habitat that support rainbow trout along with other resident fish species. Management actions are focused on removal of barriers that block migration, reduction of sediment loads into streams, and restoration of riparian and shrubsteppe habitat. This plan focuses on restoring the Whiskey Dick unit following a fire in 2022 that burned over 30,000 acres of the unit.

**Map 14: Quilomene and Whiskey Dick documented resident species distribution**



**Map 15: Quilomene and Whiskey Dick units documented salmon and steelhead distribution**




# Habitat management overview

Protecting and enhancing habitat for multiple species is the highest priority for the management of the L.T. Murray Wildlife Area, which encompasses a diversity of habitats, from the shrubsteppe of the Quilomene and Whiskey Dick units to the coniferous forests of the L.T. Murray and upper Yakima River units. The diverse habitats of the wildlife area support an array of both game and non-game (diversity) wildlife species, including species prioritized for conservation and recovery.

The WDFW Habitat program uses a variety of tools to conserve habitat, including working with local governments on land use zoning and critical area ordinances and reviewing and commenting on other public land management plans.

## Overview of Habitat Restoration and Habitat Management Concerns

Wildflower bloom on the L.T. Murray. Photo by Justin Haug.

Many types of habitat restoration projects and activities occur on the L.T. Murray Wildlife Area for forest health, habitat, and floodplains. Some examples of forest health management actions include thinning and prescribed burns and snag creation for wildlife. Fencing is maintained to keep livestock out of riparian and sensitive areas. Aquatic habitat restoration includes projects to reconnect rivers to their floodplains, especially through wood placement. For example, Wood-Fiesta is a 2018 project which connected floodplains, placed large wood, and improved instream habitat for salmon species. For more information, visit: ecology.wa.gov/Blog/Posts/October-2018/Wood-Fiesta-Improving-floodplains-in-Yakima-waters

### Shrubsteppe

Shrubsteppe is one of Washington's highest priority habitats and a focus of conservation efforts by state and federal agencies. Shrubsteppe landscapes are dominated by rolling, grassy plains or "steppe" with an overstory of sagebrush and other woody shrubs. This unique habitat is home to species found nowhere else in the state, including the Greater sage-grouse, burrowing owl, and sagebrush sparrow. On the ground, a fragile community of microscopic organisms form a cryptobiotic crust, which locks in moisture and helps prevent erosion. Various habitat features such as streams, wetlands, rocky talus slopes, and canyons support a variety of plants and animals uniquely adapted to the harsh and sensitive shrubsteppe ecosystem. Visitors flock to the region in spring to appreciate the variety of wildflowers present in the shrubsteppe.

Once covering 10 million acres in eastern Washington, 80% of historic shrubsteppe habitat has been lost due to agriculture, development, and fire since the arrival of non-native settlers. In 2020 alone, 600,000 acres of shrubsteppe was lost due to wildfire (WDFW, 2015). WDFW has developed resources for recovery and management of the shrubsteppe habitat together with conservation partners. During the 2021 legislative session, the Washington state legislature appropriated $2.35 million from the general state fund to restore and protect shrubsteppe habitat in Eastern Washington. *Management Recommendations for Washington's*

*Priority Habitats: Shrub-Steppe in Developing Landscapes* (2011) provides site-specific management guidance and strategies for balancing community growth with the needs and requirements of wildlife that use healthy shrubsteppe. Condensed versions for long-range planning and site-specific management are useful resources to minimize impacts of development. The Shrubsteppe and Grassland Restoration Manual for the Columbia River Basin provides resources and documents experience of others doing shrubsteppe and grassland restoration within the Columbia River Basin. In addition, the DNR/WDFW Naneum Ridge to Columbia River Recreation and Access Plan provides guidance on road management in shrubsteppe habitat. The Arid Lands Initiative is a consortium of public agencies and private partners dedicated to the conservation of shrubsteppe and other unique arid lands environments. For more information, visit: Arid Lands Initiative | About Us.

**Riparian**

Taneum river. Photo by WDFW.

Riparian areas contain elements of both aquatic (water) and terrestrial (land) ecosystems. Riparian areas are vegetated corridors found along streams, rivers, and other waterbodies. The interactions between water and land create an environment that is critical to the survival and existence of land-based and aquatic species. In fact, 80% of Washington's native species use riparian areas at some point during their life cycle (WDFW, 2015). Riparian areas can be used by wildlife for feeding, breeding, cover, and rearing young. The linear shape of riparian areas makes them a natural corridor for animals to move through the landscape. Known for

their moist and mild microclimates, riparian areas have fertile soils that enhance plant growth and support complex food webs. Because of their position on the landscape, riparian air temperatures are more moderate than surrounding areas, and soils tend to be moist and can act as a fire break. Riparian plants are adapted to grow in wetter conditions.

The L.T. Murray and Yakima River units contain riparian corridors critical to the survival of anadromous fish species, including connections to the major tributaries and small streams important for spawning, such as Taneum, Manastash, Cabin, Cole, Wilson, and Reecer creeks. The Teanaway Valley Unit contains important habitat connectivity to larger parcels protecting the Teanaway River corridor, which serves as an important tributary of the Yakima River, providing spawning habitat from anadromous and resident fish, as well as upland habitat for a variety of mammals, birds, and invertebrates. Riparian corridors laced in the draws of the shrubsteppe-dominated Quilomene and Whiskey Dick units provide critical food and cover for aquatic and terrestrial species, while the lower creek reaches provide seasonally important off-channel rearing habitat for young fish. The larger tributaries (Whiskey Dick, Skookumchuck, Parke, and Quilomene creeks) provide miles of fish habitat for rainbow trout along with other resident fish species.

Reconnecting rivers to floodplains through the placement of woody debris, planting riparian vegetation, and restoring adequate instream flows benefit diverse species. Climatic changes have resulted in changes to precipitation patterns, alteration of flow patterns, more frequent and flashier, and more frequent wildfires of greater intensity and size.

Water diversions, the straightening of stream channels, construction of berms and livestock grazing have degraded riparian areas. With adequate wood, beavers can assist in the restoration of riparian areas. Beavers create structure in a river or stream to slow water velocities and create pools and backchannels that support a variety of species for rearing, feeding, and cover, most notably for juvenile salmonids. The inclusion of beavers and woody debris is a climate adaptation management action highlighted in this plan that will restore riparian zones, support salmon recovery, and create climate resilience in our ecosystems into the future. For riparian management, WDFW uses Riparian Ecosystems, Volume 1: Science Synthesis and Management Implications (2020) and Riparian Ecosystems, Volume 2: Management Recommendations (2020).

## Forests

Forest treatment project on L.T. Murray unit. Photo by Alan Bauer.

The L.T. Murray Wildlife Area is unique because of the wide range of forest ecosystems present. Most forested acres fall within one of two forested ecological system types. The primary forest type is the Northern Rocky Mountain Ponderosa Pine Woodland and Savanna. At higher elevations, the primary forest type is the East Cascades Mesic Montane Mixed-Conifer Forest and Woodland. Farther west and at even higher elevations, there are small areas of Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland. Forest ecosystem distributions can be seen in the Forest Management Plan in Appendix F.

The harvest of large trees prior to acquisition and prolonged fire suppression have greatly altered forests on the wildlife area. Removal of large trees, climatic changes, and the suppression of fire over time have degraded the ecological integrity of forests and made them susceptible to insect outbreaks and severe wildfires. Overharvesting and selective removal of mature trees is no longer a threat to the ecological integrity of forests in the wildlife area because WDFW owns the timber rights. Without frequent fire or some other disturbance, forests gradually progress towards densely overstocked, unhealthy stands. These stands are vulnerable to unnaturally large insect outbreaks and more frequent and severe wildfires.

Due to current degraded forest conditions, more frequent large-scale, severe intensity fires could further reduce ecological integrity. These unnatural disturbance patterns further reduce ecological integrity by killing large trees that historically would have survived frequent, low intensity fires more typically associated with eastern dry side forests.

## Forest Management Approach

WDFW manages L.T. Murray's forested landscapes using an approach that balances concern about forest health, fire risk, and habitat conditions. Forest management projects also intend to reduce the risk of intense mega-fires that put WDFW lands and local communities at risk in favor of controlled, ecologically beneficial fires. Most of the work completed on the L.T. Murray unit falls within the high priority area of the landscape evaluation completed by the Nature Conservancy and the Tapash Sustainable Forest Collaborative (tapash.org/). Timber harvest, thinning, prescribed fire, tree planting, and other forestry practices are used in suitable areas to enhance species composition, increase the proportion of seral species, and restore spatial mosaics on a trajectory closer to the historic ranges of habitat variability. This management strategy also aligns with high ecological integrity. WDFW will strive towards high ecological integrity scores as defined in the Ecological Integrity Assessments developed by the DNR's Natural Heritage Program. Priority Habitat and Species (PHS) and Best Available Science (BAS) recommendations are also considered for species when they are an identified target in a project.

## Suitable Management Areas and Potential Projects

WDFW has identified 5,200 acres of forest suitable for active management within the next decade. Other areas within the L.T. Murray will be passively managed because either they do not need treatment or cannot be treated due to a variety of constraints, such as the lack of road access, steep slopes, erodible soils, riparian protection concerns, and regulatory constraints.

To date, projects have been planned to treat a small subset of suitable management areas. These projects will focus on thinning overstocked stands that are vulnerable to intense wildfires and other disturbances. Such projects can protect stands overstocked by understory and declining in health due to the absence of fire. Project prescriptions will be customized to each site with the following goals:

- Restore the historic range of variability for tree species, size classes and spacing. If that is not immediately possible, projects will focus on putting forests on trajectories to acquire such characteristics more quickly.
- Improve habitat quality, especially for priority species.
- Reduce wildfire risks to the forests and surrounding communities.

The Forest Practices Rules establish regulatory standards for timber harvesting, pre-commercial thinning, road construction, fertilization, forest chemical application and other forest practices applications. The rules are designed to protect public resources such as water quality and fish habitat while maintaining a viable timber industry. They are under constant review through the DNR Adaptive Management Program. Priority Habitat and Species (PHS) and Best Available Science (BAS) guidelines are considered when consistent with forest practice regulatory requirements when developing RMZ prescriptions. For a complete description of projects, see Appendix F.

**Fire**

The Whiskey Dick unit after the 2022 fire. Photo by Holly English.

Periodic fires, both human-caused and natural, affect all habitat types in the L.T. Murray Wildlife Area. Historically, fire was an important, natural process in creating and maintaining the various plant communities in the L.T. Murray Wildlife Area. In general, fires were common in most of the forests below 4,000 feet in elevation on the wildlife area, with fire return intervals typically ranging between 16-20 years. Frequent, low intensity fires were important for maintaining the open, late-seral stand structure and low fuel loads in dry side upland forests. On the forests above 4,000 feet, most fires were less frequent, typically ranging between 50-100 years with stand replacement fires occurring between 150-500 years. River bottom forests are primarily maintained by flooding and channel migration and burned less often due to greater soil and fuel moisture content.

Fire regimes on the wildlife area and adjacent lands have been altered due to fire suppression, silvicultural practices, grazing, and agriculture. Lower elevation shrubsteppe and grasslands fires on the wildlife area are trending toward larger-scale fires of greater intensity and frequency. As a result, vegetation is altered in favor of invasive annual grasses and weeds. The fires are generally human-caused and threaten life and property, in addition to degrading habitat quality. The forested, higher elevation fires are burning less often due to effective fire suppression. For example, fire exclusion has allowed historically open ponderosa pine forests to develop excessive accumulations of fuels, overstocking, insect outbreaks, causing increased vulnerability to unnaturally large and intense crown fires.

### Prescribed Fire

Prescribed fire is a management tool that involves the use of fire in a controlled setting. WDFW is using prescribed fire as a tool to manage and improve habitat primarily in dry forests (see Fire Management Plan, Appendix G). Animals and plants have evolved in response to natural disturbances such as fire. Historic removal of fire from the landscape due to total suppression policies have resulted in overstocked forests, disease, pest outbreaks, and changes in fire behavior. Under specific conditions, fires are intentionally set to mimic natural processes to improve ecosystem health. Prescribed burning is used to keep forests and habitats healthy and reduce the risk and impacts of catastrophic wildfire to public lands and neighboring communities. For example, the absence of fire has led to the encroachment of young trees in meadows. Prescribed burning is used to control weeds and maintain meadows and wetlands, which are key habitats for a variety of species. WDFW's Burn Team works with wildlife area managers, local fire districts, and others to develop and execute planned burns. For a complete description of fire management in the wildlife area, see Appendix G: Fire history and management.

### Fire Response

Wildfire response and suppression is handled in a variety of ways depending on where the fire is on the wildlife area. County fire districts, Department of Natural Resources (DNR), and the U.S. Forest Service (USFS) are the first to respond to wildfires ignited on the L.T. Murray Wildlife Area. Multiple fire districts cover portions of the wildlife area and respond when fires are near structures or threaten structures within their district. Most of the area is under DNR Forest Protection, whereas DNR provides fire oversight to protect forestlands. WDFW has an agreement with DNR to suppress fire in shrubsteppe areas outside of forest protection. Federal U.S. Forest Service (USFS) fire crews also provide protection, primarily in areas of checkerboard ownership. See the map of Fire Districts, DNR agreement areas, and the Forest Protection Boundary in Appendix C. In addition, local WDFW staff maintain fire suppression qualifications and maintain equipment on site for controlling wildfires. Wildlife area staff coordinate with DNR and USFS as resource advisors and landowner representatives to minimize habitat loss, protect resources and meet fire suppression needs.

### Weed Management

Managing weeds is a significant part of the staff's workload to establish and maintain diverse native plant communities that support fish and wildlife populations. Invasive plants and noxious weeds can infest high-quality native plant communities and convert them to low-quality monocultures that reduce habitat value. WDFW managers spend a significant amount of time monitoring vegetation and managing invasive species in the wildlife area. Weed management is consistent with state and local regulations and reduces the likelihood of noxious weeds spreading to adjacent private lands. The Weed Management Plan identifies species and management practices to control weeds, including weeds of primary concern to the wildlife area. The Weed Management Plan, located in Appendix B, provides details on the management of these and other weed species.

**Figure 9: Primary weeds of concern**

| State designation | Weed Species |
|---|---|
| C | Whitetop |
| B | Diffuse knapweed |
| C | Canada thistle |
| B | Musk thistle |
| C | Ventenata |

## Rare plants

The WLA is in two "ecoregions", or geographic areas defined by similarities in topography, climate, and general vegetation: the Columbia Plateau and East Cascades. These two ecoregions are noteworthy for having the highest number of rare plant species in the state. The Washington Natural Heritage Program (WNHP) currently recognizes 365 vascular plant taxa as state Endangered, Threatened, Sensitive, or Extirpated (WNHP 2019). The Columbia Plateau ecoregion has 134 of these species (36.7% of the state total) and the East Cascades 131 (35.9%).

The Columbia Plateau is the largest of the nine ecoregions in Washington state. At 13.9 million acres, it is also the hottest and driest. It is underlain by basalt that has weathered into deep productive soils (DNR 2021). The scouring by massive flooding events during the last ice age created a complex topography of scablands, rolling hills, dry coulees, and the deeply entrenched Columbia River. Shallow soil habitats are common in areas affected by these floods. The Columbia River has been altered by a series of large dams and reservoirs and the resulting irrigation water has transformed much of the area into vast agricultural fields. There are 1,956 total taxa of rare and unique vascular plants in the Columbia Plateau ecoregion, the second-highest number of all the ecoregions. It is also the second highest with 1,387 native plants, and at 134 has the highest number of "special concern" ranked plants.

Bordering the Columbia Plateau to the west is the East Cascades ecoregion, which takes in the drier foothills of the Cascades at 610 meters (2,000 feet), to the moist conifer forests and alpine ridges along the crest of the range. Most of the East Cascades are volcanic, but areas of the Wenatchee Mountains have a more diverse geologic makeup. Although the ecoregion is relatively small (4.9 million acres), it has a complex variety of ecosystems dominated by forest, shrubland, and meadow vegetation types. The East Cascades has the highest vascular plant species richness of any ecoregion in Washington with 1,938 native taxa, or 52.7% of the total state flora (Fertig, 2020).

The Columbia Plateau and East Cascades ecoregions are undergoing significant changes that will affect the long-term persistence of both rare and common native species. From 1992 to 2016, grassland and herbaceous cover, row crops, and developed open space have increased in area within the Columbia Plateau, while the cover of shrubby species and barren ground have declined (Fertig 2020). Much of this change is the result of conversion of natural lands to crops or wildfires replacing shrub cover with weedy grasses and forbs.

Table 12 lists the plant species of conservation concern and status, and the units where they may be found. Eleven state-designated sensitive, threatened, or endangered plants have been documented on or in the vicinity of the L.T. Murray Wildlife Area. Other rare plants that may occur on the wildlife area includes Beaked cryptantha, Cepitose evening-primrose, Bristle-flowered collomia, Columbia milkvetch, Composite dropseed, Desert cryptantha, Hoover's desert-parsley, Narrow-stem cryptantha, Nuttall's sandwort, Short-

fruited beeblossom, Silverskin lichen, Suksdorf's monkeyflower, and White eatonella. Wildlife area staff will conduct surveys of these additional plants in conjunction with the DNR Natural Heritage program when funding and capacity allows.

**Table 12: Rare plants on the L.T. Wildlife Area (Source: DNR Natural Heritage Program)**

| Species (synonyms in parentheses) | Common Name | Heritage Rank* | WA Status | Federal Status | Units |
|---|---|---|---|---|---|
| ***Astragalus arrectus*** | **Palouse milkvetch** | G2G4/S2 | Threatened | BLM Sensitive<br>USFS Sensitive | Quilomene<br>Whiskey Dick |
| ***Astragalus misellus var. pauper*** | **Pauper milkvetch** | G3/S2 | Sensitive | BLM Sensitive | Quilomene<br>Whiskey Disk |
| ***Cryptantha leucophaea (Oreocarya leucophaea)*** | **Gray cryptantha** | G2G3/S2 | Threatened | BLM Sensitive | Quilomene<br>Whiskey Dick |
| ***Eremothera pygmaea (Camissonia pygmaea)*** | **Dwarf mooncup**<br>Dwarf evening-primrose | G3/S3 | Sensitive | BLM Sensitive<br>USFS Sensitive | Quilomene<br>Whiskey Dick |
| ***Hackelia cinerea*** | **Gray stickseed** | G4/S1 | Sensitive | BLM Sensitive<br>USFS Sensitive | Quilomene –<br>Whiskey Dick |
| ***Lomatium knokei*** | **Knoke's biscuitroot** | G1/S1 | Endangered | BLM Sensitive<br>USFS Sensitive | L.T. Murray<br>He |
| ***Lomatium lithosolamans (Tauschia hooveri)*** | **Hoover's biscuitroot**<br>(Hoover's tauschia) | G2G3/S2S3 | Sensitive | BLM Sensitive | Quilomene<br>Whiskey Dick |
| ***Nicotiana attenuata*** | **Coyote tobacco** | G4/S2 | Sensitive | BLM Sensitive<br>USFS Sensitive | Quilomene<br>Whiskey Dick |
| ***Pediocactus nigrispinus*** | **Hedgehog (a.k.a Snowball or Basalt Cactus)** | G4/S2 | Sensitive | BLM, WA State Sensitive | Quilomene<br>Whiskey Dick |
| ***Pyrrocoma hirta var. sonchiifolia*** | **Hairy goldenweed**<br>(Sticky goldenweed) | G4G5/S2 | Threatened | BLM Sensitive<br>USFS Sensitive | L.T. Murray (new HOC lands) |

*Global (G) and state (S) ranking: 1-criticially imperiled; 2-imperiled; 3-vulnerabe to extirpation or extinction; 4-apparently secure; 5-widespread, abundant, and secure.

Hedgehog cactus. Photo Alan L. Bauer

## Climate Change Approach

### Purpose

The primary purpose of this section is to evaluate the potential impacts of projected changes in climate on the L.T. Murray Wildlife Area and highlight opportunities to mitigate or prepare for those impacts. This section describes predicted climate changes for the region and how they are expected to impact natural and cultural resources in the L.T. Murray Wildlife Area. This section lists species of greatest conservation need that are vulnerable to climate change and highlights management goals and objectives with a "climate nexus." This work is consistent with the directives of a 2017 WDFW policy titled "Addressing the Risks of Climate Change," which states that WDFW will "manage its operations and assets to better understand, mitigate, and adapt to impacts of climate change." Objectives with a climate nexus with corresponding management actions are highlighted in Table 22 in this section.

### Projected climatic changes and impacts

Warmer temperatures are predicted throughout this century for Kittitas County. Anticipated impacts include warmer winters and drier summers (Climate Impacts Group, 2013). Warmer summers are expected to reduce summer soil moisture and increase physiological stress for some plants and animals. Warmer summer temperatures are also expected to reduce tree growth and forest productivity in some areas and increase growth and productivity in mild climates. Outbreaks of some forest insects, such as mountain pine beetles, are expected to increase (Climate Impacts Group, 2013)

Precipitation models project a 5.5% increase in precipitation in Kittitas County between 2020-2049 with most of that increase falling during increasingly warm winters. Most models project increases in winter precipitation, with an average value reaching over 9% by 2080 (Salathé et. al, 2009). Decreased snowpack and altered peak flows in streams are also forecasted.

Snowpack serves as a water storage mechanism, and thus the rate and timing of the spring snowmelt has direct impacts to the natural and human environments. Reduced snowpack and more winter rain is expected to increase water availability in winter in Kittitas County for multiple uses, including drinking water, and decreased water availability in late spring and summer at critical times for spawning fish and when human demand is expected to increase. Reductions in snowpack are also expected to decrease opportunities for winter outdoor recreation and shorten the winter recreation season, with adverse effects on the economy and character of some communities. Warm season outdoor recreation opportunities may increase, shifting tourism from one recreation sector to another and into different seasons (Mauger et. al., 2015).

Increases in streamflow bring an increased risk of flooding, damage to infrastructure, impacts to aquatic species, and changes to recreation opportunities (Chegwidden et al.,2017). Higher stream flows are expected to directly affect salmonid populations and alter salmonid habitat, reducing the quantity of a culturally important species for Northwest tribes. Higher stream flows can scour the streambed and remove or crush salmon eggs, increasing mortality and reducing return rates, and reduce the availability of slow-water habitat and can increase sedimentation that affects habitat quality. Higher stream flows are also expected to increase riverine flooding within existing floodplains and could expand flooding to new areas not currently in existing floodplains. Increased riverine flooding can damage roads, bridges, and overwhelm drainage structures, such as culverts (Mauger et al., 2015).

Forests in Central Washington will be affected by climate-driven changes in disturbance regimes, such as wildfire (Littell et al. 2010), insect outbreaks such as the mountain pine beetle (Logan et al. 2003), disease (e.g., Swiss needle cast; Black et al. 2010), and drought (Van Mantgem et al. 2009; Knutson and Pyke 2008). The areas burned by fire in the Columbia River Basin are projected to triple by the 2040s relative to median acreage burned between 1916-2006 (Littell et al. 2010, 2012).

More frequent wildfires have the potential to damage cultural and historical sites, buildings, and cultural resources, reduce access to culturally important sites and resources for Northwest Tribes, and reduce timber, non-timber forest products, carbon storage, and forest habitat for some wildlife. Wildfires foster the establishment of invasive species and have the potential to increase runoff and sediment to streams, which can reduce aquatic habitat quality (Mauger et al, 2015). For a complete list of climate change projections for the L.T. Murray WLA, see Appendix H.

**Climate Change and Impacts to the Shrubsteppe Ecosystem**

Approximately 46,536 acres of the L.T. Murray Wildlife Area are classified as a shrubsteppe system called "Intermountain Basins Big Sagebrush Steppe", which is listed as imperiled (see Table 10 - Ecological Systems of Concern). Species of Greatest Conservation Need (SGCN) associated with this system on the wildlife area include: the American badger, burrowing owl, ferruginous hawk, greater sage grouse, sage thrasher, sagebrush sparrow, and the sagebrush lizard. Shrubsteppe systems are sensitive to changes in precipitation and soil moisture, temperature, drought, and altered wildfire regimes. Changes in precipitation can lead to shifts in species composition or vegetation structure. More frequent fire could result in conversion to annual grasslands, which would adversely impact many species. Shrubsteppe habitats and species will likely be adversely affected under projected future climate conditions. The level of certainty is high that the summers will get drier and hotter in the Columbia Plateau. Fall, winter, and spring will be wetter and warmer. Inter-mountain Basins Big Sagebrush Steppe is projected to decline by the end of the century. About 4% is projected to remain stable and 70% to become climatically unsuitable. Vegetation models of sagebrush-steppe systems in eastern Washington and Oregon simulate large declines in current distributions of shrublands under future climate conditions (Neilson et al. 2005; Rogers et al. 2011) with shrubs largely replaced by woodland and forest vegetation. The response to climate change of grassland and shrubland systems throughout the Pacific Northwest will be influenced by invasive species that are currently present in these systems or may be able to expand into these systems as climate changes (Dennehy et al. 2011).

**Species of Concern with High Vulnerability to Climate Change**

Table 13 shows the Species of Greatest Conservation Need (SGCN) documented on the L.T. Murray Wildlife Area that were assessed in the WDFW Climate Change Vulnerability Assessment (WDFW, 2015) to have a moderate-high vulnerability to climate change, and with high confidence in the data. Only SGCN were considered in this assessment and do not include climate sensitivities for other species that may be associated with the wildlife area. See Appendix A for terrestrial SCGN and relationships to ecological systems of concern.

**Table 13: Species on L.T. Murray Wildlife Area with moderate-high overall vulnerability to climate change and high confidence (WDFW 2015)**

| Species of greatest conservation need | Overall Vulnerability | Summary of sensitivity | Summary of exposure |
|---|---|---|---|
| **American pika** | High | The American pika displays high sensitivity because of its preferred habitat type and condition, low reproductive rate, and limited dispersal ability. The pika requires a moderate amount of snowpack to provide insulation during the winter months; decreasing snowpack because of rising temperatures and shifting precipitation patterns with more rain than snow will negatively impact this species. Pikas have high energetic demands, partly because they do not hibernate; increasing temperatures and extreme heat events may affect the species' ability to forage during the day. Climate change will likely alter the composition of vegetation in montane habitats; this shift may be to plant species less suited to the pika's nutritional needs. Populations forced to higher elevations in mountainous regions will become increasingly isolated. | Increased temperatures<br>Reduced snowpack<br>Shifts from snow to rain |
| **Golden Eagle** | Moderate-high | Golden eagles may experience some sensitivity to warmer temperatures. For example, nest success and brood size is inversely related to days with temperatures >32˚C. Sensitivity of this species is also influenced by foraging requirements (e.g., prey abundance and habitat), which can affect nest success and ability to lay eggs. Golden eagles prey on hares, rabbits, ground squirrels, prairie dogs, and marmots, among others, and their ability to forage can be negatively affected when prey habitat is lost (e.g., due to wildfires) and/or prey abundance declines. | Increased temperatures<br>Altered fire regimes |
| **Greater sage-grouse** | Moderate -high | Greater Sage-grouse may exhibit physiological sensitivity to drought conditions, which could result in decreased nest success and/or reduced chick survival. However, their overall sensitivity will be higher due to habitat and foraging requirements. Changes that reduce the availability and quality of sagebrush habitat (e.g., increased temperatures, drought and/or moisture stress, altered fire regimes), which Greater Sage-grouse depend on for forage, nesting, and brood-rearing, will adversely impact this species. | Drought and/or moisture stress<br>Increased temperatures<br>Altered fire regimes |

| Species of greatest conservation need | Overall Vulnerability | Summary of sensitivity | Summary of exposure |
|---|---|---|---|
| **Northern spotted owl** | Moderate-high | This species exhibits some sensitivity to increased temperatures both directly (i.e., physiologically) and indirectly through effects on prey availability. This species also exhibits some sensitivity to altered disturbance regimes (i.e., fire and insect outbreaks) that lead to habitat changes. For example, in the eastern Cascades in Oregon, high severity wildfire has reduced the number of spotted owl pairs in a USFS Ranger Unit. However, it appears that dense old forests may be relatively stable on the west-side of the Cascades, while more active management may help address fire risk in dry east-side forests. | Increased temperatures<br>Altered fire regimes<br>Increased insect outbreaks |
| **Mid-Columbia Steelhead** | Moderate-high | The survival of steelhead embryos or recently emerged fry may be sensitive to the timing and magnitude of spring runoff rather than the fall and winter aspects of flow regimes. For example, high winter flows that threaten the egg-to-fry survival of fall-spawning salmonids are not predicted to negatively affect steelhead. Steelhead juveniles, which typically live in freshwater for 2 years, would be sensitive to lower summer flows due to threats posed by reduction in amount of rearing habitat, increased exposure to higher temperatures, and/or forced movement into less preferred habitat (e.g., competition with other species).<br><br>Steelhead may also exhibit some sensitivity to warming water temperatures. Direct measures of Oncorhynchus mykiss thermal physiology suggest many parameters do not differ significantly from those of other salmonids (except in locally adapted populations of redband rainbow trout in desert streams). In addition, contemporary temperature regimes in the Columbia River cause steelhead and Chinook salmon to use the same thermal refuges during spawning migrations. Similar to Chinook salmon, steelhead are vulnerable to high angling pressure when seeking refuge in cold refugia such as tributary junctions; thus, warmer temperatures can have indirect effects on mortality. However, the geographic distribution of steelhead suggests they may be less sensitive to warm temperatures than other anadromous salmonids—steelhead occur in Southern California, farther south than any Pacific salmon. Further, the resident life history form of O. mykiss can persist in desert streams that often exceed 20˚C through what appears to be local adaptation. Whether steelhead populations from warmer streams exhibit higher thermal tolerance is poorly understood, as is the | Altered spring runoff timing and amount/ magnitude<br>Increased water temperatures<br>Lower summer flows |

| Species of greatest conservation need | Overall Vulnerability | Summary of sensitivity | Summary of exposure |
|---|---|---|---|
| | | potential rate of evolution in attributes of thermal physiology.<br><br>Similar to Chinook salmon, steelhead exhibit alternative life histories in regard to run-timing, which confer different sensitivities to climate. Summer-run steelhead migrate higher in river networks, entering freshwater between late spring and fall, and overwinter before spawning the following spring. In contrast, winter-run steelhead migrate during winter or early spring and spawn immediately. Because they spend more time in freshwater, summer-run populations of steelhead may be more sensitive to changes in flow and temperature regimes across river networks. For example, higher temperatures will increase the metabolic costs accrued by summer-run steelhead during the several months that they hold in streams prior to spawning.<br><br>The existence of a resident life history form likely buffers O. mykiss from environmental stochasticity and may make populations less vulnerable to extirpation. For example, anadromous individuals can survive ephemeral periods of unsuitability in their natal streams while they are away at the ocean, whereas residents can survive in years where conditions are poor along migratory routes. | |
| **Bull trout – Mid-Columbia Recovery Unit** | Moderate-high | Sensitivity of bull trout is primarily driven by water temperature. Bull trout are the southern-most species of Western North American char and have lower thermal tolerance than other salmonids they co-occur with. The upper incipient lethal temperature for bull trout was found to be 21˚C, whereas the optimal temperatures for growth were in the range of 10-15˚C. Thus, bull trout have a similar thermal optimum to the salmonids they co-occur with, yet a lower thermal tolerance, indicating they have a narrower thermal niche and higher sensitivity to temperature. Indeed, the geographic distribution of bull trout, and the persistence of populations during contemporary warming has been most strongly related to maximum water temperature. The ability of bull trout to persist in sub-optimally warm temperatures likely depends on food abundance. As temperature increases metabolic costs, the extent to which bull trout can maintain positive energy balance depends on its ability to find food. Bull trout historically relied heavily on salmon as a food resource and may | Increased water temperatures<br>Altered runoff timing<br>Increased winter/spring flood events<br>Lower summer flows |

| Species of greatest conservation need | Overall Vulnerability | Summary of sensitivity | Summary of exposure |
|---|---|---|---|
| | | be less resilient to temperatures in areas where foraging opportunities of salmon eggs and juveniles have declined. Invasive chars (brook and lake trout) now reside in many headwater streams and lakes and may exclude bull trout from these potential cold-water refuges, increasing their sensitivity to warming. Bull trout sensitivity to flows is likely to occur during two critical periods: (1) direct effects of altered runoff timing and magnitude on emerging fry in late winter/spring, and (2) indirect effects of low summer flows on all life phases of bull trout by mediating the duration and magnitude of thermal stress events. | |
| **Columbia spotted frog** | Moderate-high | Though there is very limited information available regarding the sensitivity of the Columbia Spotted Frog to climate change, their main sensitivity is likely to stem from any climate-induced changes in them. pond and stream breeding habitat. If streams and ponds become drier, this could limit available breeding and juvenile habitat for this species, particularly for juveniles who are unable to travel long distances to more suitable habitat. Changes in precipitation patterns could also affect the Columbia Spotted Frog through alterations in breeding timing, egg survival, and availability of prey. However, predicted increases in temperature and milder winters may positively impact this species, as studies have shown that warmer and less severe winters are linked to increases in survival and breeding probability. | Changes in precipitation (rain and snow)<br>Altered hydrology |
| **Western toad** | Moderate-high | Sensitivity of the western toad to climate change is primarily driven by its dependence on intermittent and permanent aquatic habitats (e.g., streams, seeps, wetlands, ponds, etc.) that may be lost or degraded due to changes in precipitation and altered hydrology. Greater, more variable, and episodic rainfall (all current predictions of climate change in the PNW) are likely to put these river-breeding populations at risk. High-elevation populations may be at risk because of reduced hydroperiods in breeding habitat that result either in reproductive failure or eliminate that ability of a significant portion of annual cohorts to reach metamorphosis. Desiccation of streams and pools along dispersal routes may create barriers to movement. Synergistic impacts such as climate changes combined with disease outbreaks increases sensitivity of this species. Physiological sensitivity of this species is unclear - some references cite sensitivities to temperature and | Changes in precipitation (rain and snow)<br>Altered hydrology<br>Greatest impacts to montane wetland-reliant taxa will most likely occur when landscapes primarily contain shallow wetlands at high risk of drying and are composed of multiple wetland types, but deeper habitats are unsuitable (e.g., due to presence of introduced fish) |

| Species of greatest conservation need | Overall Vulnerability | Summary of sensitivity | Summary of exposure |
|---|---|---|---|
| | | moisture conditions while others cite high adaptability to changes in these conditions. | |
| **Wolverine** | High | Wolverines exhibit sensitivity to temperature and declines in snowpack. The species is obligatorily associated with persistent spring snow cover, which provides critical thermal advantages such as predator refugia for denning females and young, preventing competition with other scavengers, and important prey caching/refrigeration areas. Temperature appears to play a role in fine-scale habitat selection and may affect prey caching success. Warming temperatures and declines in snowpack could lead to decreased habitat patch size, quality, and connectivity; reduced success of caching/refrigeration of carrion prey with subsequent impacts on survivorship and recruitment; limited den sites and/or loss of thermal refugia important for juvenile survival; and reduced dispersal abilities. Because wolverines are adapted to cooler temperatures, animals in the southern portions of the species' geographic range (e.g., Washington) may experience greater physiological stress as summer temperatures increase in the coming decades. | Reduced snowpack<br>Increased temperatures |

*Vulnerability to climate change was determined by an evaluation of inherent sensitivity to climatic variables, as well as an assessment of the likelihood of change in key climate variables important for each species. Confidence in each ranking was also assessed, based on the extent and quality of reference material and information.

## Making the Goals and Objectives of the Wildlife Area Plan Climate Resilient

Table 14 lists goals and objectives of this plan that could be affected by climate change, or those with a "climate nexus." Actions and considerations are listed to ensure climate impacts are addressed in the implementation of the L.T. Murray wildlife area management plan.

**Table 14: Plan objectives with a climate nexus**

| Goal/Objective | Climate Nexus |
|---|---|
| **GOAL: Maintain and protect big game populations.** | |
| **Annually maintain elk fence.** | One of the costliest impacts stemming from weather and climate-related events to WDFW is replacing miles of fencing after wildfires burn the wood posts. Since 2009, the agency has altered its fence construction materials, using 2-inch steel pipe that is able to withstand wildfire events. While the steel posts are a higher upfront cost, the agency is ultimately saving money on both materials costs and staff time, because the steel posts are much less likely to need replacement. As elk fence is being maintained, conversion from wood posts to steel pipe should be prioritized where possible. |
| **Remove derelict barbed wire fence** | *See above* |
| **GOAL: Manage for species diversity.** | |
| **Conduct survey for Species of Greatest Conservation Need in** | Some adaptation activities may benefit from additional research, data collection, and monitoring specific to the needs laid out in SWAP. Taking steps to address these knowledge gaps will deepen WDFW's understanding of how climate change may |

| Goal/Objective | Climate Nexus |
|---|---|
| **coordination with the Diversity Division.** | affect SGCNs within the WLA, and ultimately help ensure that adaptation efforts are being targeted effectively. |
| **Monitor impacts of forest treatments (treatments and controls) on SGCN and PHS species.** | *See above re: monitoring* |
| **Initiate land improvement projects to encourage sage brush growth for shrubsteppe-dependent species occupancy.** | Actions that protect, restore, and manage habitats to reduce existing stressors and address projected climate impacts may assist ecosystems in coping with change, increasing their resilience. |
| **Protect wildlife movement corridors, and core habitat, and climate refugia across the landscape to afford access to the WLA.** | Wildlife have historically used movement or dispersal to adapt to changes in the climate, shifting ranges to stay within climatically suitable habitat. Species are using movement to adapt to climate change, but the current rate of change is so rapid that many species will have difficulty moving fast enough to keep pace with the changing environment. Additionally, human land use presents significant barriers to wildlife movement across landscapes. Enhancing habitat connectivity – the ability of species to move across the landscape – is a leading strategy for helping wildlife respond to climate change. Increasing landscape connectivity is expected to enhance resilience to climate change by facilitating species' adaptive range shifts, while also reducing existing stresses associated with habitat fragmentation. |
| **GOAL: Restore natural stream processes** | |
| **Correct fish passage barrier issues.** | Many culverts across the state are currently inadequate for fish passage and unable to withstand higher future peak streamflows. WDFW has studied the required culvert widths to accommodate projected future streamflow and fish passage. That information is being used as the basis for the climate adapted culverts tool being developed by WDFW and the University of Washington Climate Impacts Group. This tool estimates the likelihood that a particular culvert size will fail as a result of projected future flows over a user-specified design lifetime. Using this tool and other information to design and construct more climate-adapted culverts can help these critical elements of our infrastructure function under future conditions and also improve habitat connectivity for fish. |
| **Regulate stream temperatures through riparian plantings.** | Trees and vegetation in the riparian zone shade help shade streams, keeping water temperatures cool. Riparian habitat also reduces sediment erosion into rivers, provides flood water storage by holding and slowly releasing flood waters, and provides a source for downed wood in rivers and streams which slows streamflow and can facilitate pool formation of deep cooler water, providing suitable salmon habitat. |
| **Restore degraded stream channels throughout the L.T Murray complex using beaver dam analogs and beaver reintroduction.** | Beaver-related restoration (e.g., beaver reintroductions or beaver dam analogs) is a process-based approach that can facilitate both surface water and groundwater storage, increases in streamflow, reduce stream incision, reduce erosion, and increase and improve riparian vegetation. |
| **GOAL: Protect and restore riparian and aquatic habitat.** | |
| **Reconnect the floodplains in forest and shrubsteppe habitat to improve water storage.** | Reconnecting the floodplain is an adaptation strategy that can increase natural flood storage, reduce flood risk, recharge groundwater, and restore critical salmonid habitat. |
| **GOAL: Protect and restore meadow and wetland habitats.** | |
| **Restore meadows and wetlands through reestablishment of flow paths.** | The protection, management, restoration, and creation of wetland and meadow habitat-- and associated ecosystem functions -- are all essential for increasing resilience of these habitat types. Wetlands and wet meadows provide numerous ecosystem functions including habitat for species, regulating hydrologic function, |

| Goal/Objective | Climate Nexus |
|---|---|
| | soil stabilization, and act as natural fire breaks. All these functions will be increasingly important in a changing climate. |
| **GOAL: Improve biodiversity areas and corridors (PHS).** | |
| **Increase ability of animals to travel across the landscape** | Wildlife have historically used movement or dispersal to adapt to changes in the climate, shifting ranges to stay within climatically suitable habitat. Species are using movement to adapt to climate change, but the current rate of change is so rapid that many species will have difficulty moving fast enough to keep pace with the changing environment. Additionally, human land use presents significant barriers to wildlife movement across landscapes. Enhancing habitat connectivity – the ability of species to move across the landscape – is a leading strategy for helping wildlife respond to climate change. Increasing landscape connectivity is expected to enhance resilience to climate change by facilitating species' adaptive range shifts, while also reducing existing stresses associated with habitat fragmentation. |
| **Enhance habitat in travel corridors** | *See above.* |
| **GOAL: Protect and restore forest habitat.** | |
| **Manage forests to a historic range of variability and future range of variability that is resilient to fires, pests, and disease and managed for a suite of wildlife.** | Forest thinning increases the health and productivity of a tree, including its resilience to stressors. Thinning practices in forest stands are routinely used to control stand density, facilitate the growth of remaining trees, and accelerate the development of late-successional forest structure. Thinning increases tree vigor across the stand, by reducing competition from overcrowding, which can increase resilience to forest insects and pathogens and low soil moisture. These stand-level benefits can also increase resilience to other climate-related stressors including projected declines in summer soil moisture, stressors related to insects and wildfire -- both of which are projected to become more frequent with climate change. |
| **For thinning projects, consider partnering with those conducting riparian projects for supplying woody debris** | This supports cost effective and climate-relevant restoration efforts in the WLA. |
| | |
| **GOAL: Maintain or improve the ecological integrity of priority sites.** | |
| **Establish an ecological integrity baseline and associated goals for ecological systems of concern/priority systems by 2024.** | Include climate change future conditions in planning and monitoring. Develop indicators such as water and air temperature. Measure what is most sensitive to climate change. Use climate tools to evaluate goals and objectives. Evaluate attainability in light of climate change and maximize outcomes. |
| **GOAL: Achieve species diversity at levels consistent with healthy ecosystems.** | |
| **Conduct survey for Species of Greatest Conservation Need in coordination with the Diversity Division.** | May need to adjust surveys to accommodate species range shifts and/or phenological shifts. Adjust survey timing to match species instead of static window each year. |
| **GOAL: Support and maintain appropriate recreation opportunities** | |
| **Improve recreational experience user expectations, and support of the wildlife area by providing information on the web, at kiosks, in maps, and directional signage.** | As new signage and interpretive material is developed, keep in mind opportunities to include climate change, which can increase the knowledge of the ecological importance of these wetlands. |

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# Part IV. Appendices

A. Species and habitat information
B. Weed management plan
C. Fire response
D. Public Response Summary
E. Research and other studies
F. Forest management plan
G. Fire History and Management
H. Climate change

# Appendix A. Species and habitat information

**Table 15: Species of Greatest Conservation Need (SGCN) relationship with Ecological Systems of Concern for L.T. Murray Wildlife Area.**

***Bold X indicates SGCN species that are closely associated with the ecological system. Small "x" for SGCN generally associated with the ecological system.**

| SGCN relationship with Ecological Systems of Concern for the L.T. Murray WLA | Northern Rocky Mountain Ponderosa Pine Woodland and Savanna | Temperate Pacific Freshwater Emergent Marsh | Columbia Basin Foothill and Canyon Dry Grassland | Inter--Mountain Basins Big Sagebrush Steppe | Columbia Plateau Steppe and Grassland | North Pacific Lowland Riparian Forest and Shrubland | North Pacific Oak Woodland | Intermountain Basins Playa | inter-Mountain Basins Alkaline Closed Depression |
|---|---|---|---|---|---|---|---|---|---|
| American Badger | x | | x | **X** | **X** | | | | |
| American Pika | x | | | | | | | | |
| Bald eagle | x | x | x | | | x | **X** | x | x |
| Band-tailed pigeon | | | | | | | | | |
| Black-tailed jackrabbit | | | | x | x | | | | |
| Burrowing owl | | | x | x | x | | | | |
| Columbia Oregonian snail | | | | | | | | | |
| Common sharp-tail snake | **X** | | | **X** | | | | | |
| Ferruginous hawk | | | **X** | **X** | **X** | | | | |
| Flammulated Owl | **X** | | | | | | | | |
| Fisher | | | | | | x | | | |
| Golden eagle | x | | **X** | **X** | x | | | x | x |
| Gray wolf | **X** | | | | | x | | | |
| Greater sage-grouse | | | x | **X** | **X** | | | **X** | **X** |
| Harlequin duck | x | x | | | | | | | |
| Larch mountain salamander | x | | | | | x | | | |
| Lewis's Woodpecker | x | | | | | | | | |
| Loggerhead shrike | | | x | x | x | | | x | x |

| SGCN relationship with Ecological Systems of Concern for the L.T. Murray WLA | Northern Rocky Mountain Ponderosa Pine Woodland and Savanna | Temperate Pacific Freshwater Emergent Marsh | Columbia Basin Foothill and Canyon Dry Grassland | Inter--Mountain Basins Big Sagebrush Steppe | Columbia Plateau Steppe and Grassland | North Pacific Lowland Riparian Forest and Shrubland | North Pacific Oak Woodland | Intermountain Basins Playa | inter-Mountain Basins Alkaline Closed Depression |
|---|---|---|---|---|---|---|---|---|---|
| Merriam's shrew | | | x | x | x | | | | |
| Northern desert night snake | | | x | x | x | | | | |
| Northern sagebrush lizard | | | | | | | | | |
| Northern spotted owl | | | | | | | | | |
| Peregrine falcon | | **X** | x | x | | x | | x | x |
| Pygmy nuthatch | **X** | | | | | | | | |
| Pygmy short-horned lizard | x | | | **X** | **X** | | | | |
| Ring-necked snake | **X** | | **X** | **X** | **X** | | | | |
| Sage thrasher | | | | **X** | **X** | | | | |
| Sagebrush sparrow | | | | **X** | x | | | | |
| Side-blotched lizard | | | x | x | x | | | | |
| Sonora skipper | | | | | | | | | |
| Striped whipsnake | | | | **X** | | | | | |
| Townsend's big-eared bat | **x** | x | x | x | x | x | **X** | x | x |
| Townsend's ground squirrel | | | | x | x | | | | |
| Vaux's swift | | | | | | | | | |
| Western bumblebee | | | | | | | | | |
| Western gray squirrel | **X** | | | | | x | **X** | | |
| Western pearlshell mussel | | | | | | | | | |
| Western toad | x | **X** | x | **X** | | x | **X** | | |
| White-headed woodpecker | **X** | | | | | | | | |
| White-tailed jackrabbit | | | x | x | x | | | | |

## Priority Habitats

The Priority Habitats and Species (PHS) List includes species and habitats for which special conservation measures should be taken. Priority habitats are habitat types or elements with unique or significant value to many species. The PHS List explains why each priority habitat and species is on the list, shows which counties have that species or habitat, and provides links to PHS management recommendations.
There are 20 types of priority habitats in Washington and 11 on the L.T. Murray Wildlife Area. Priority habitats on the wildlife area are listed below.

**Table 16: Priority Habitats and Species**

| Kittitas County | Units |
|---|---|
| **Aspen Stands** | Teanaway Valley, Yakima River, L.T. Murray |
| **Biodiversity areas & corridors** | Teanaway Valley, Yakima River, Whiskey Dick, Quilomene |
| **Freshwater wetlands & fresh deep water** | L.T. Murray, Yakima River, Teanaway, Whiskey Dick, Quilomene |
| **Old growth/mature forest** | L.T. Murray, Yakima River, Teanaway Valley |
| **Shrubsteppe** | Quilomene, Whiskey Dick, L.T. Murray |
| **Riparian** | LT Murray, Teanaway, Yakima River, Quilomene, Whiskey Dick |
| **Instream** | LT Murray, Teanaway, Yakima River, Quilomene, Whiskey Dick |
| **Snag and logs** | LT Murray, Teanaway, Yakima River |
| **Cliffs** | LT Murray, Quilomene, Whiskey Dick |
| **Talus** | Whiskey Dick, Quilomene, |
| **Caves** | Quilomene |

# Appendix B. Weed Management Plan

## Weed Control Goals at the L.T. Murray Wildlife Area

The goal of weed control on the L.T. Murray Wildlife Area, which includes the L.T. Murray, Quilomene, Teanaway Valley, Whiskey Dick, and Yakima River units, is to maintain or improve the habitat for fish and wildlife, meet legal obligations, and protect adjacent, private lands.

WDFW uses integrated pest (i.e., weed) management (IPM), which is defined in RCW 17.15.010 as "a coordinated decision-making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet agency programmatic pest management objectives." WDFW's weed management objectives are prioritized based on resource availability and current mandates, in coordination with the Kittitas County Noxious Weed Board. Weeds that require mandatory control receive the highest priority. Areas within the L.T. Murray Wildlife Area that are prioritized for weed management include the following:

**a. Roads, parking areas and camping sites**: areas where the public frequently recreate are at high risk for weed infestations and movement into the surrounding landscape. The Quilomene and Whiskey Dick Units receive high road use and are most susceptible to new weed infestations due to low annual precipitation. The L.T. Murray complex receives high road use and camping due to low annual precipitation. These high use areas will be monitored on a regular basis throughout each spring and fall for weeds that may be introduced to the L.T. Murray WLA via recreational activities.

**b. Forests:** WDFW has thinned and burned forests to restore stand structure, improve wildlife habitat, and create more fire resilient stands. However, disturbance from logging roads and forest management activities are the primary causes of forest weed infestation and expansion. Areas on L.T. Murray Unit will be surveyed for bull thistle, diffuse knapweed, and Canada thistle in relation to forest improvement activities and any weed infestations found will be treated.

**c. Grasslands and riparian areas**: the department, in partnership with Mid-Columbia Fisheries Enhancement Group and Central Washington University, will work to restore 0.75 miles of in-channel habitat, and 82 acres of floodplain, riparian, and grassland/meadow habitats on the Teanaway Valley Unit. The area will be checked annually for knapweeds, Canada thistle, and field bindweed. The biocontrol agents *Bangasternus fausti* and *Larinus minutus* will continue to be released in remote areas for the control of knapweeds. Purple loosestrife is known to be present in several bays on the Columbia River and controlled annually. Invasive knotweed has been found on the wildlife area in the past, so emphasis will be placed on not letting this weed establish in riparian zones and floodplains.

**d. Winter Feed Sites** (Joe Watt and Robinson Canyon): ungulate feeding sites have extensive ground disturbances from feeding operations and have numerous annual weeds such as kochia and fiddle neck. Currently some of these sites are sprayed annually. Other efforts include mowing and seeding on an as-needed basis. Efforts should be expanded as funding allows for mowing, spraying, and seeding with an annual cover crop.

# Weed Species of Concern on the L.T. Murray WLA

Weeds occurring on the L.T. Murray WLA and associated units are a focus of management and are listed in Table 17. The table describes the weed's classification, an estimate of the acreage affected by the weed, how many acres were treated, the relative density of infestation, the general trend the weed infestation has been exhibiting, the control objective and/or strategy, and finally, which wildlife area units each weed is known to occupy.

Detailed descriptions and natural history information for each of the state-listed weed species can be found at the Washington State Noxious Weed Control Board website: http://www.nwcb.wa.gov/search.asp. Information on other species contained in the list can be found at the University of California's IPM Online web site: http://www.ipm.ucdavis.edu/PMG/weeds_intro.html.

Weed management information for individual weed species can be found at the PNW Weed Management Handbook link at: http://pnwhandbooks.org/weed/control-problem-weeds and on WDFW's weed management website at: TBD. General weed information can also be found at https://plants.usda.gov/home

Weed species of concern on the LTMWA include but are not limited to: Canada thistle (*Cirsium arvense*), cheatgrass (*Bromus tectorum*), cocklebur (*Xanthium* spp.), common mullein (*Verbascum thapsus*), Dalmatian toadflax (*Linaria dalmatica*), diffuse knapweed (*Centaurea diffusa*), , Dyer's woad (*Isatis tinctoria*), fiddleneck (*Amsinckia* spp.), field bindweed (*Convolvulus arvensis*), Japanese knotweed (*Polygonum cuspidatum*), kochia (*Kochia scoparia*), lambsquarter (*Chenopodium album*), meadow knapweed (*Centaurea* x *moncktonii*), medusahead (*Taeniatherum caput-medusae*), musk thistle (*Carduus nutans*), perennial pepperweed (*Lepidium latifolium*), puncturevine (*Tribulus terrestris*), purple loosestrife (*Lythrum salicaria*), Russian knapweed (*Acroptilon repens*), Russian thistle (*Salsola iberica*), Scotch broom (*Cytisus scoparius*), Scotch thistle (*Onopordum acanthium*), spiny cocklebur (*Xanthium spinosum*), spotted knapweed (*Centaurea biebersteinii*), St. Johnswort (*Hypericum erformatum*), sulphur cinquefoil (*Potentilla recta*), tansy ragwort (*Senecio jacobaea*), tumble mustard (*Sisymbrium altissimum*), ventenata (*Ventenata dubia*), whitetop (*Cardaria draba*), yellow starthistle (*Centaurea solstitialis*) and other, general weeds.

*Table 17: Weed management plan*

| Weed Species | 2022 State/County Weed Class | 2021 Estimated Affected Acres | 2021 Treated Acres | Qualitative Density | Annual Trend | Control Objective/Strategy | Wildlife Area Unit Weed Distribution (2022) |
|---|---|---|---|---|---|---|---|
| **General Weeds** | NA | 101-500 | 53.4 | Medium | Stable | Control as required / Monitor WLA systematically throughout growing season | L.T. Murray, Quilomene, Whiskey Dick, Teanaway, Yakima River |
| **Bull thistle** | C | 101-500 | 8 | Low | Decreasing | Suppress populations / Monitor after fire or thinning | L.T. Murray |
| **Canada thistle** | C | 11-100 | 5.25 | Low-Medium | Stable | Contain or reduce populations / Primarily use chemicals but mow when possible | L.T. Murray, Quilomene, Whiskey Dick, Teanaway, Yakima River |
| **Dalmatian toadflax** | B | 1-10 | 0 | Low | Decreasing | Eradicate / Continue to monitor only known site for new plants | Quilomene, Whiskey Dick |
| **Diffuse knapweed** | B | 101-500 | 11.6 | Medium | Stable | Contain or reduce populations / Primarily use chemicals but continue to add bio control agents to remote sites and pull when possible | L.T. Murray, Quilomene, Whiskey Dick, Teanaway, Yakima River |
| **Field bindweed** | C | <1 | 0.5 | Low | Decreasing | Eradicate / Continue to monitor | Teanaway |
| **Kochia** | B | 11-500 | 8 | Low | Decreasing | Contain or reduce populations / Use chemical applications and mowing as necessary | L.T. Murray, Whiskey Dick |
| **Meadow knapweed** | B | 1-10 | 1.1 | Low | Decreasing | Eradicate / Continue to monitor for new plants | Teanaway |
| **Medusahead** | C | 1-10 | .5 | Low | Decreasing | Eradicate / Continue to monitor only known site for new plants. chemically treat or pull. | Quilomene |
| **Musk thistle** | B | 11-100 | 2.3 | Medium | Stable | Contain or reduce populations / Chemically treat or cut tap root with shovel | Quilomene, Whiskey Dick |
| **Purple loosestrife** | B | 1-10 | 1 | Low-Medium | Stable | Contain or reduce populations / Monitor riparian areas and chemically treat | Quilomene, Whiskey Dick |

| Weed Species | 2022 State/County Weed Class | 2021 Estimated Affected Acres | 2021 Treated Acres | Qualitative Density | Annual Trend | Control Objective/Strategy | Wildlife Area Unit Weed Distribution (2022) |
|---|---|---|---|---|---|---|---|
| **Russian knapweed** | B | 11-100 | 3.1 | Low-Medium | Increasing | Contain or reduce populations / Monitor and chemically treat | Quilomene, Whiskey Dick |
| **Russian thistle** | NA | 11-100 | 18 | Medium-High | Stable | Contain or reduce populations / Chemically treat while plants are young | L.T Murray, Quilomene, Whiskey Dick |
| **Scotch broom** | B | 11-100 | 43 | Low | Decreasing | Contain or reduce populations / Chemically treat or mow | L.T. Murray, Yakima River |
| **Scotch thistle** | B | 1-10 | 1 | Low | Decreasing | Eradicate / Continue to monitor the small area plants are known to occupy | Quilomene |
| **St. Johnswort** | C | 1-10 | .5 | Low | Stable | Contain or reduce populations / Chemically treat | L.T. Murray |
| **Sulphur cinquefoil** | B | 1-10 | 2 | Low | Decreasing | Eradicate / Continue to monitor and restore infected sites | Teanaway |
| **Ventenata** | C | 101-500 | 22.2 | Medium-High | Stable | Contain or reduce populations / Chemically treat in the fall | L.T. Murray, Quilomene |
| **Whitetop** | C | 500+ | 66.4 | High | Stable | Contain or reduce populations / Chemically treat, aerially when possible | L.T. Murray, Quilomene, Whiskey Dick |
| **Yellow starthistle** | B | <1 | 0.0 | Low | Decreasing | Eradicate / Continue to monitor only known site | Quilomene |

B-Designate and B County Select- legally require control.
C County Select- legally requires control.
NA- not a listed weed.

# Appendix C. Fire Response Information

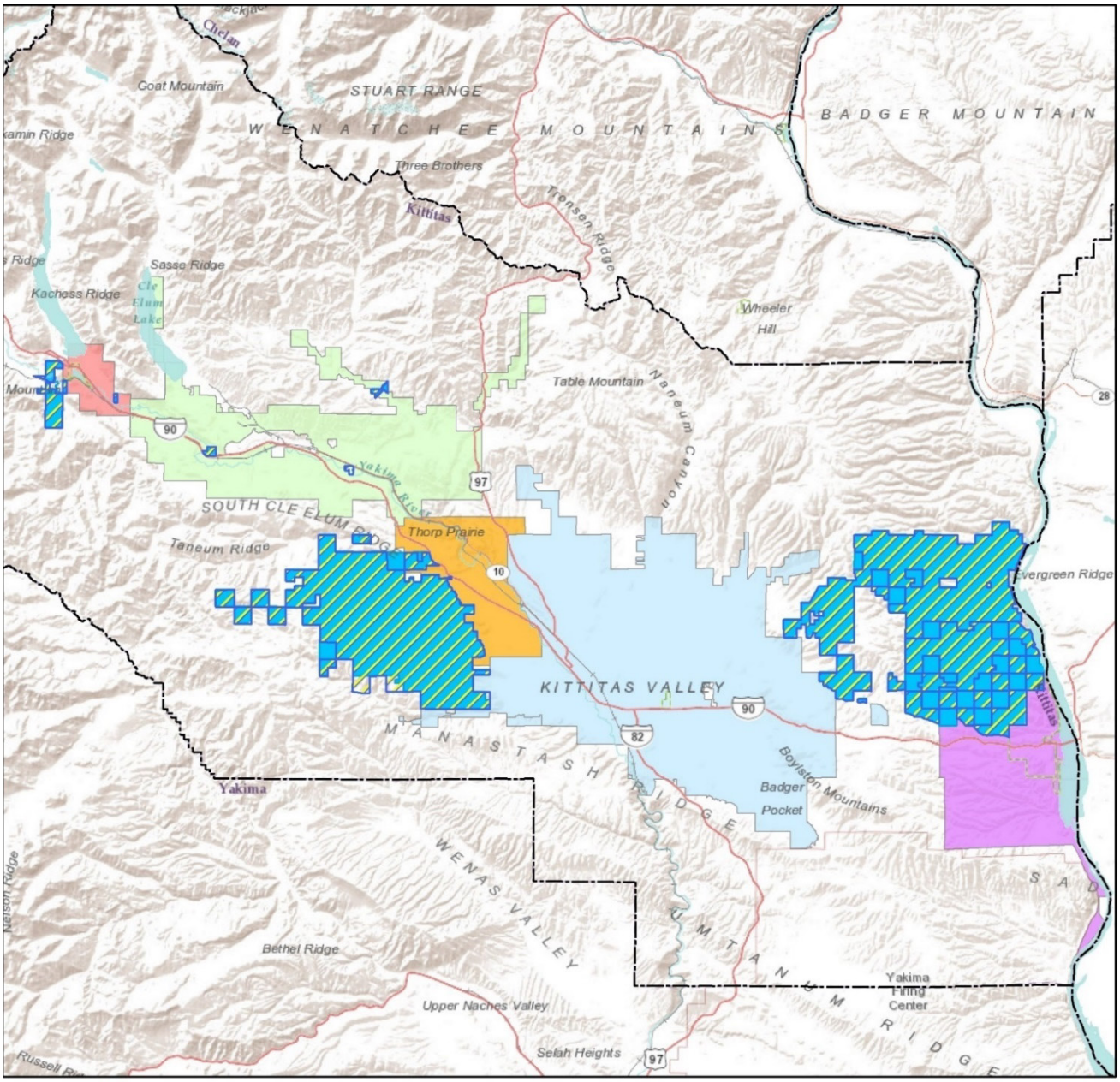
***Table 18: Fire response information***

| Agency | Responding Area | Units Covered | Phone Number |
|---|---|---|---|
| DNR Dispatch (CWICC) | ALL | ALL | (509) 884-3473 |
| Kittitas County Dispatch | ALL | ALL | (509) 925-8534 |
| Kittitas County Fire District #4 | Vantage | L.T. Murray, Quilomene, Whiskey Dick | (509) 856-2888 |
| Kittitas Valley Fire and Rescue (KVFR- Fire Dist. #2) | Ellensburg | L.T. Murray, Quilomene, Whiskey Dick | (509) 856-7714 |
| Kittitas County Fire District #1 | Thorp | L.T. Murray | (509) 679-8328 |
| South Cle Elum Fire Department (Fire Dist. #6/7) | Cle Elum | Yakima River, Teanaway Valley, L.T. Murray | (509) 201-0546 |
| Cle Elum Fire Department (Fire Dist. #6/7) | Cle Elum | Yakima River, Teanaway Valley, L.T. Murray | (509) 674-1748 |
| Roslyn Fire Department (Fire Dist. #6/7) | Cle Elum | Yakima River, Teanaway Valley, L.T. Murray | (509) 260-0743 |
| Kittitas County Fire District #7 | Cle Elum | Yakima River, Teanaway Valley, L.T. Murray | (509) 856-7714 |
| Kittitas County Fire District #6 | Ronald | Yakima River, Teanaway Valley | (509) 649-2600 |
| Kittitas County Fire District #3 | Easton | Yakima River | (509) 656-0121 |
| Kittitas County Fire District #51 | Snoqualmie Pass | Yakima River | (425) 761-0781 |

## Department of Fish and Wildlife Contacts - contact in order listed.

| Contact | Phone Number |
|---|---|
| Shaun Morrison, Wildlife Area Manager | (509)656-6646 (mobile) |
| Hannah Bates, *Region 3 Lands Operations Manager* | (509) 899-9686 (mobile) |
| Brant Johnson*, Region 3 Fish & Wildlife Enforcement Sergeant- Ellensburg* | (509) 306-5055 *Office*<br>(360) 855-5604 *Mobile* |
| Bob Weaver*, Region 3 Fish & Wildlife Enforcement Captain* | (509) 457-9315 *Office*<br>(509) 899-7140 *Mobile* |
| Ross Huffman, *Regional Wildlife Program Manager* | (509) 457-9313 *Office*<br>(509) 406-5949 *Mobile* |
| John Davis, *Forest Health Archaeologist*<br>Maurice Major, *Forest Health Archaeologist*<br>Katherine Kelly, *Cultural Resource Division Manager* | (509) 828-0275 *Mobile*<br>(360) 522- 0966 *Mobile*<br>(564) 669-4238 *Office*<br>(360) 951-0941 *Mobile* |

**Map 16: Fire protection and response**




# Fire Protection And Response

Unit Area

0 5

Miles

3/4/2021

## L.T. Murray Wildlife Area

### Wildlife Area Units Protected

DNR Forest Fire Protection Assessment Tax Land

L.T. Murray
Quilomene
Teanaway Valley
Whiskey Dick
Yakima River

### Fire Protection Districts Associated With a Wildlife Area Unit

- *L.T. Murray* — *THORP*
- *Quilomene* — *KITTITAS VALLEY FIRE AND RESCUE*
- *Teanaway Valley* — *KITTITAS COUNTY FD 7*
- *Whiskey Dick* — *VANTAGE*
- *Yakima River* — *EASTON*
- *Yakima River* — *KITTITAS COUNTY FD 7*

# Appendix D. Public Response Summary (SEPA)

## L.T. Murray Wildlife Area Management Plan

SEPA comments and other comments during SEPA Review Period: (table will be added when SEPA is finalized).

**Table 19: SEPA Comments**

| Date and Source | Comment | WDFW Response |
|---|---|---|
| **6/21/2023**<br><br>**Open House comment card** | Brief presentation, good information stations with knowledgeable staff. My concerns are with horseback access and enforcement. Also, mountain bikes and e-bikes. I am a member of Backcountry Horsemen and Kittitas Valley trail riders. | As a follow up to the LTM plan, we will be creating a specific recreation plan that addresses all uses and management of those uses and for both summer and winter seasons on roads and trails. Addressing user conflicts and safety on a site-specific basis will be part of the recreation planning process. |
| **6/21/23**<br><br>**Open House comment card** | Please consider changing your mgmt. objectives for the road systems. To only say you want to inventory 20 miles or road in a ten-year period is a very low objective for a resource that impacts every aspect of the wildlife areas. Please change the objective to the entire road system for inventory. You can then describe the importance of the roads and the need to get the system into the best mgmt. condition. The use of lidar, GPS and CWU students should help you reach this goal. The road system has such a wide-ranging impact on all resources should be one of if not the highest concern to managers. | Thank you for your detailed evaluation of our performance measures. We have amended the performance measures to take out the metric of "twenty miles" and changed it to "# of miles" so we can achieve and report on a higher number of roads evaluated when capacity and funding allows. Our goal is to inventory and evaluate the entirety of the road system over the life of this plan. |
| **6/21/23**<br><br>**Open House comment card** | Riggs Rd. needs new green dots. They are Missing/damaged ones are all over. | We appreciate the information and will designate staff to address this issue. |
| **7/14/23**<br><br>**Letter from Kittitas Audubon Society submitted to SEPA desk** | The thirty (30) goals selected for this 10-year planning period are appropriate and important. However, because of limited funding and staff, Washington Department of Fish and Wildlife (WDFW) will find it challenging to make meaningful progress in all these areas without securing help from interested citizens and organizations. Work plans should be structured to include/create opportunities for citizens and organizations to help WDFW advance these goals. In Washington, interested citizens and organizations have demonstrated a willingness and level of ability to help with such work. (Kittitas Audubon Society has helped with surveying sagebrush bird species, and with monitoring use of snags in the managed forests in the Robinson Creek area.) Agency-public partnerships can produce broad benefits for the environment and the public at large. | The 30 goals stated in the plan are prioritized with the understanding that we need more funding and capacity to achieve them. The prioritization process included a ranking exercise that considered capacity as a factor. In recognition of the need to increase capacity, the goal is to increase stakeholder opportunities to assist staff in carrying out management objectives. Please take note of goal 24 on page 63, which states "Offer multiple and varied opportunities for stakeholder participation and engagement, which includes an objective (24b) to "provide opportunities annually for the public and other stakeholders to volunteer on the WLA". In addition, WDFW recognizes the need for additional staff to assist the WLA manager in designing projects, coordinating volunteers, and providing logistical support to our partners. Please take note of |

| Date and Source | Comment | WDFW Response |
|---|---|---|
| | | goal 25 on page 63: "Hire, train, equip, and license, as necessary, WLA staff, to meet the operation and management needs of WLAs". The two objectives under this goal address capacity needs: 25a) Increase staffing to meet workload demands, and 25b) Work with partnership and volunteer coordinators to build capacity". We are designing workplans with the flexibility to accommodate more capacity but also must be prepared for unforeseen events. Our partnerships with conservation and recreation organizations are critical to the success of our management goals over the next ten years. |
| **7/14/23**<br><br>**Letter from Kittitas Audubon Society submitted to SEPA desk (cont.)** | Each of the 30 goals in the Management Plan has identified specific performance measures. However, these performance measures are primarily measures of "agency activity" rather than measures of "successful ecological outcomes". The current Management Plan performance measures should be modified to include some performance measures that document the ecological outcomes of the plan's actions. Additional outcome-based performance measures could also be incorporated during the proposed 2-year review cycle of the management plan. | Response: We understand the nature of your comments. We chose to focus on performance measures that are quantifiable, reportable, and will yield ecological results., which will be reported on every two years. Performance measures are referenced in employee work plans, which guide what employees do on the ground. Volunteers can help us achieve these goals. The plan does not preclude projects proposed or additional actions not outlined in the plan. We encourage volunteer involvement and project proposals. In the spirit of a partnership with Kittitas Audubon, we would like to extend an invitation for a meeting between WDFW staff and Kittitas Audubon to discuss ways that Kittitas Audubon can help WDFW achieve these habitat objectives. Please contact Shaun Morrison the Wildlife Area manager to arrange for such a coordination meeting if interested. |
| **7/14/23**<br><br>**Letter from Kittitas Audubon Society submitted to SEPA desk (cont.)** | Most of the units of the L.T. Murray Wildlife Area have experience stream channel incision and a general reduction in areas of moist meadows, floodplains and wetlands. Climate change is increasing this loss. The Management Plan's performance measures focus concern on fish-bearing steam reaches and neglect the extensive network of channels and moist areas not adjacent to fish-bearing waters. Despite the lack of fish, these areas are of great importance to animals and birds. Restoration efforts to reduce channel incision and re-water riparian area would improve habitat for upland wildlife. Also, water captured and stored in these areas higher in the watershed can be expected to beneficially extend flow in fish-bearing waters downstream. To address the impacts of climate change on the Wildlife Area, additional performance measures, objectives, and tasks are needed under Goals 7 and 8 to address these upper watershed area and small watershed areas. | Thank you for highlighting the importance of meadows, streams, wetlands, and other moist areas for habitat, water storage, and climate resilience. Additional climate resilience-focused objectives were developed for all goals in the climate section (see Appendix H). For Goal 7: "Protect and restore riparian and aquatic habitat", the associated climate objective is to "reconnect the floodplains in forest and shrubsteppe habitat to improve water storage" (pg. 126). Reconnecting the floodplain is an adaptation strategy that can increase natural flood storage, reduce flood risk, recharge groundwater, and restore critical salmonid habitat. For Goal 8: "Protect and restore meadow and wetland habitats", the associated climate objective directs the agency to "restore meadows and wetlands through re-establishment of flow paths" (p.126). The protection, management, restoration and creation of wetland and meadow habitat-and associated ecosystem functions – are all essential for increasing resilience of these habitat types. Wetlands and wet |

| Date and Source | Comment | WDFW Response |
|---|---|---|
| | | meadows provide numerous ecosystem functions including habitat for species, regulating hydrologic function, soil stabilization, and act as natural fire breaks. All these functions will be increasingly important in a changing climate.<br><br>We prioritized fish bearing streams over headwater streams as we can often get funding and capacity in fish-bearing streams more easily than in non-fish bearing systems. Our biologists and partners work on a floodplain and watershed level for multiple benefits. A guiding principle of stream restoration is to work on restoration from the bottom up to connect habitat rather than focus on isolated streams. It is more effective to prioritize habitat in lower order systems and work toward higher order streams as funding and capacity allows. Our biologists are working on headwater streams and meadows where funding and capacity are available. If you are interested, we'd be happy to sit down with you to show some of our current plans and incorporate input from you on other potential sites. |
| **7/14/23**<br><br>**Letter from Kittitas Audubon Society submitted to SEPA desk (cont.)** | In the section on Hydrology and Watersheds (page 66) the Management Plan suggests that the watercourses in the shrubsteppe dominated watersheds are maintained by springs and seeps and have minimal variations in flow. This is not an accurate characterization. Our typical precipitation patterns yield a higher spring flow period, with surface water in these channels for long distances. Channel and watershed restoration actions have the potential to store this extra water, expand riparian areas, and extend the period of surface flow downstream. Clarification of this annual cycle and restoration opportunities should be incorporated in the final document. | Thank you for addressing the importance of restoration opportunities in shrubsteppe habitat. A unique focus of this wildlife area plan is on the restoration and protection of shrubsteppe habitat on the wildlife area. Please take note of Goal 8 and the associated objectives on page 56 and Goal 10 and the associated objectives on page 56-57. Notably, the agency is directed to 8c: "restore meadows and wetlands through reestablishment of hydrologic connectivity" on all units of the wildlife area, as well as 10c: "Incorporate results and recommendations from WDFW/Audubon Sagebrush songbird surveys into shrubsteppe management", and 10f: "identify and develop a shrubsteppe restoration strategy" which will identify priority restoration opportunities together with our partners. Most streams in the Quilomene and Whiskey Dick are ephemeral. We revised the language in the Hydrology section to include the following language: "Some streams such as Parke, Quilomene, Skookumchuck and Whiskey Dick Creeks have perennial reaches." |
| **7/14/23**<br><br>**Letter from Kittitas Audubon Society** | The Management Plan (see Map 8, page 97) indicates that fish are not present in Robinson Canyon Creek with the L.T. Murray unit. This is not correct. A small, remnant population of fish are indeed still present in the creek in an area of perennial flow. The area used to include a beaver dam complex. Although the stream – adjacent road has been mostly removed, natural channel restoration has | Please revisit Map 8. The map and key show that both rainbow trout and cutthroat trout are present in Robinson Creek. We are currently working to restore Robinson Creek by increasing woody material and reconnecting channels and floodplain. The WLA is looking to add woody debris to most channels on the |

| Date and Source | Comment | WDFW Response |
|---|---|---|
| **submitted to SEPA desk (cont.)** | been slow. The addition of large woody material in the channel would likely be beneficial. | WLA. Working with Forestry staff, we can source wood of WLA forest health projects. |
| **7/14/23**<br><br>**Letter from Kittitas Audubon Society submitted to SEPA desk (cont.)** | It would be helpful to the reader of the Management Plan to have the table of goals in the plan Executive Summary (page 11) match the organization and enumeration of table of goals in the actual document (page 53, Table 9: Goals, Objectives, and Performance Measures). As currently presented, the tables are ordered differently, giving the reader the impression that there are two somewhat different sets of goals, and making the document confusing to review. | Thank you for your comment. Staff have revised the table of goals in the plan to match the organization of goals in Table 9 for greater clarity. |
| **7/12/23**<br><br>**Letter from Conservation Northwest submitted to SEPA desk** | There are a wide variety of goals and objectives proposed in this plan that will benefit wildlife, the habitat, and the people who utilize these lands. Obtainable performance measures were presented with a heavy emphasis on restoration projects, fence removal, and recreation management.<br><br>This WLA hosts many important watersheds that are in need of protection and repair. Conservation Northwest supports the many restoration projects and opportunities performance measures were presented with a heavy emphasis on restoration projects, fence removal, and recreation management. | Thank you for your support of the goals, objectives, and performance measures in the plan. |
| **7/12/23**<br><br>**Letter from Conservation Northwest submitted to SEPA desk (cont.)** | CNW strongly supports the investigation and implementation of virtual fence where possible (Goal 7). This can be an opportunity to replace derelict fences with an effective (both cost and ability) and wildlife friendly alternative to physical fences. Virtual fence will also allow the managers and the leases to work together to utilize grazing as a restoration tool without the limitations of physical fence and a new ability to spot graze invasive weeds and keep cattle away from important riparian areas. With experience in coordinating virtual fence projects throughout central Washington, our Sagelands Heritage Program staff hope to contribute information and assistance in this process. We would also recommend, if possible, some language regarding grazing deferment or relocation should a wildfire occur on the leased lands (Goal 23). This will allow the habitat to rest and recover with the help of other restoration techniques. | We appreciate CNW's concerns regarding grazing deferment or relocation in the case of wildfire. We consider relocation or deferment as a mitigation strategy for our existing grazing permits. Please note in the Tasks column for Objective 23a that we will review existing permits for shrubsteppe protections, which include protections for shrubsteppe habitat post-fire. Notably, the plan prioritizes staff to develop a shrubsteppe restoration strategy and budget by 2026 (Objective 10f), which includes evaluation of post-fire impacts and development of post-fire restoration pathways for both short and long-term restoration. |
| **7/12/23**<br><br>**Letter from Conservation Northwest submitted to SEPA desk (cont.)** | Investing in ways to monitor ecological integrity and gauge social conditions are important for maintaining effective recreation management. We encourage the continued effort to monitor road and trail conditions to inform decisions to improve green dot roads or decommission roads throughout the WLA. High road density and human disturbance can lead to impacts on migration corridors and wildlife movement, so the continued effort to reduce road density while still allowing access will benefit our elf, mule deer, and many other species. With the continually increasing number of recreationists visiting the WLA, it is pertinent to develop a means of monitoring for recreation impacts on the habitat. Especially in areas like Cabin Creek that have been overwhelmed with dispersed camping sites and vehicle use around and in the creek itself. | To address your comments regarding the Yakima River unit and recreational impacts to the Cabin Creek area, we have added the Yakima River Unit to the Unit description column in the Goals and Objectives table for Goal 16, Objective 16b, to ensure the objective is applied to this unit. |

| Date and Source | Comment | WDFW Response |
|---|---|---|
| **Email received from the Confederated Colville Tribes, on July 10, 2023, by the SEPA desk.** | "The CCT concurs with WDFW's issuance of a DNS in relation to the LT Murray Wildlife Area Management Plan. However, I have cc'd WDFW's Cultural Resources Program Manager, Katherine Kelly, here as the SEPA Checklist solely accounts for the Yakama Nation's cultural resource interests in the project area. I want to be sure that Ms. Kelly informs WDFW staff (in this case Holly English) to be sure to include the CCT when engaging in consultation regarding proposed projects within LT Murray, and that we expect our history to be accurately represented, and our views to be appropriately considered, in all cultural resource survey reports. Thank you for consulting with the Confederated Tribes of the Colville Reservation." | WDFW is in ongoing conversations with the CCT. The agency is committed to consultation with the CCT and all affected tribes within the project area per WDFW Policy 5007. Policy 5007 provides guidelines and expectations for WDFW employees to consult and coordinate on a government -to-government basis with federally recognized tribal governments, when a proposed WDFW policy, agreement, or program implementation may affect tribal interests. |

# Appendix E. Research and studies

Consistent with WDFW's mission to preserve, protect, and perpetuate fish, wildlife, and habitat, WDFW supports independent studies to achieve wildlife area objectives.

**Table 20: Research and Studies**

| Researcher | Date | Title |
|---|---|---|
| Downes, Scott | 2004 | Reproductive ecology of Sage Thrasher *(Oreoscoptes montanus)* in a disturbed landscape. Master's thesis. Central Washington University, Ellensburg, Washington. |
| Ernest, Kris. Central Washington University | 2014, 2012 | BIOL 453 Small mammal trapping<br>Robinson Canyon, LT Murray Wildlife Area (2014)<br>Quilomene Unit, LT Murray Wildlife Areas (2012). |
| Beck, Dan. Central Washington University | Since 2000 | BIOL 362: Biomes of the Pacific Northwest<br>Shrubsteppe Observations. |
| Downes, Scott | 2020 - 2023 | Study of cavity nesting bird usage of created short snags in Robinson Canyon, LT Murray Wildlife Area. |
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# Appendix F. L.T. Murray Wildlife Area Forest Management Plan

Planning Period: 2021-2031

Prepared By: Rod Pfeifle, WDFW Statewide Forester

## Introduction

This forest management plan complements the agency-wide Forest Management Strategy for the Washington State Department of Fish and Wildlife (WDFW) with specific details for the L.T. Murray Wildlife Area including the forested portions of the main L.T. Murray and Yakima River units. The statewide forest management strategy includes information that is common to forested areas of all wildlife areas such as agency mission, policies, and priorities. Also included in the statewide plan are general descriptions of forest types, management implications, and guidance for identifying suitable management areas and potential forest restoration projects. The purpose of this document is to focus on site specific information related to development and implementation of forest management projects for the next 10-year planning cycle for the L.T. Murray Wildlife Area.

## I. Forest Description

The L.T. Murray Wildlife Area forests are composed of two primary and one minor forested ecological system as described by the Department of Natural Resources Field Guide to Washington's Ecological Systems (Rocchio, J. and R. Crawford 2008). Most forested acres fall within one of two forested ecological systems. The primary forest type on the driest transition zone forested ground is the Northern Rocky Mountain Ponderosa Pine Woodland and Savanna. As one progresses higher in elevation, the primary forest type is the East Cascades Mesic Montane Mixed-Conifer Forest and Woodland. Moving further west and even higher in elevation, there are small areas of Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland. Appendix A shows the distribution of these forests on the L.T. Murray Wildlife Area.

### Disturbance Factors

Prior to modern settlement, wildfire and Native American-managed fires were the primary disturbance on the wildlife area. Frequent low intensity fires helped to maintain open, late-seral forests, savannah, and woodlands. These relatively frequent fires kept fuel loads low in ponderosa pine and dry mixed conifer forest types that are found in low to mid elevation forests on the wildlife area. Additionally, these fires stimulated robust growth of fire-adapted plants and native perennial grasses. Fire intervals in the wildlife areas likely ranged between 10 and 20 years on lower elevation ponderosa pine and mixed dry conifer forest types. The fire return interval on the wetter, higher elevation forest types may have occurred every 100 years or more. Data from LANDFIRE (Existing Vegetation Type Layer) suggests most forested areas on the dry forest types of the L.T. Murray Wildlife Area had average fire return intervals of 15 to 20 years.

Other pre-European settlement disturbance to forested ecosystems included grazing of understory grasses and shrubs by large ungulates and occasional outbreaks of native forest insects and disease. Frequent fire helped to keep insect and disease outbreaks to endemic levels by maintaining

appropriate stocking levels, size classes and tree species composition. This in turn resulted in improved forest health that lessened the risk of epidemic insect and/or forest pathogen outbreaks. Low to moderate intensity fires helped to remove weak, disease-susceptible trees and reduce tree competition. This allowed the residual stands to remain relatively healthy and vigorous. Riparian forests, such as those found in large drainages like Manastash Creek, Robinson Creek, Taneum Creek, Cabin Creek, and their tributaries, were maintained by periodic flood events, channel migration and occasional mixed severity fires.

The L.T. Murray Wildlife Area has a history of logging and grazing dating back to the early 20th century and beyond. Prior to becoming the L.T. Murray Wildlife Area, most of the timber land was logged by L.T. Murray, owner of High Valley Ranch. Throughout the 20th century, the ownership was extensively logged, often using "high grade" logging prescriptions. This logging strategy resulted in the removal of the large diameter, high value species while leaving the smaller diameter, low value species. This provided logs for a growing economy, but it also came with consequences that we are still living with today including over-stocked stand conditions and a tree species mix that has significantly departed from the historic range of variability (HRV). The High Valley Ranch property was purchased by WDFW in 1968 with timber rights reserved for another 25 years until 1993.

## Current Conditions and Threat Assessment

### Ecological Integrity

*Fire and fuels*

In the period of modern settlement (late 1800's through the mid 1900's), most of the conifer forests on the L.T. Murray Wildlife Area were logged using clear cut and/or "high grade" logging prescriptions. On the LT Murray Wildlife Area, this resulted in removal of the largest and most valuable trees. This management strategy, combined with aggressive wildfire suppression strategies, altered the "typical" pattern of forest succession on the wildlife area. High grade logging resulted in the removal of large diameter, high value ponderosa pine and Douglas fir. Leave trees in those harvest units were typically small diameter, low value grand fir and small Douglas fir.

Active forest management strategies (thinning and/or prescribed fire) were excluded from most of the L.T. Murray Wildlife Area for more than 40 years. Many of these stands, particularly on the dry forest types, have now been transformed from historically "open" forests (20 to 40 trees per acre) to unnaturally dense stands of smaller diameter trees (100 or more trees per acre). During that same time, the proportion of ponderosa pine and western larch on the landscape has decreased. The has resulted in increased fuel loading, increased potential for large stand replacement wildfires, and increased threat of epidemic insect and/or disease outbreaks.

In many areas, the dense forest conditions of the wildlife area have significantly departed from the historic range of variability. This is particularly true for the open grown dry forest types that are prevalent on the wildlife area. Restoration thinning (commercial and pre-commercial) and prescribed fire are silvicultural tools that can be used to mimic the beneficial effects of frequent, low intensity wildfires on the landscape.

*Insects and disease*

Forest insects and diseases present on the L.T. Murray Wildlife Area are all native to forest types found on the east slopes of the Cascades. At endemic or "normal" levels, these insects and

pathogens can provide needed habitat features for many forest species. Dwarf mistletoe brooms provide nesting platforms for grouse and other bird species. Snags (wildlife tree) provide habitat for cavity nesting birds and small mammals. Bark beetles attack trees weakened by drought, physical damage, disease, or overcrowding. Dwarf mistletoe infests trees of the same species in pockets and spreads in crowded conditions to trees and branches below and downhill from infection centers. Root disease attacks weakened trees primarily through root-to-root contact underground. Pine engraver beetle, western pine beetle, mountain pine beetle, and western spruce budworm are some of the more common causes of insect mortality. The most common root diseases that often cause morality include laminated and Armillaria root rot.

Inventory data from stand exams completed in 2019 suggest that forests on the L.T. Murray Wildlife Area, particularly on the lower elevation dry forest types, are significantly overstocked well beyond the historic range of variability. This has resulted in individual trees to be stressed and more susceptible to epidemic levels of insect and disease attack. Predicted climate change effects, including extended summer droughts, may exacerbate impacts from insects and disease. Tree species not adaptable to potential climate change conditions, such as grand fir and Douglas-fir, may also be at increased risk of morality.

## Priority Species

WDFW designates certain species and habitat types as priorities for special conservation and management considerations. Some of these priority species and habitats are directly or indirectly associated with forest ecosystems. Examples of priority habitats include old growth or mature forest, snags, down logs, and aspen stands. Examples of special status species on the forested areas of the wildlife area include golden eagle, northern goshawk, northern spotted owl, flammulated owl and white-headed woodpecker.

There are several game species on the L.T. Murray Wildlife Area. Priority species using forest ecosystems include various game birds such as grouse, and wild turkeys. Important large ungulates on the wildlife area include Rocky Mountain elk and mule deer.

Sound forest management strategies and prescribed fire are important tools in maintaining forests for priority species and habitats. These activities can mimic the effects of naturally occurring wildfires that happened on a relatively frequent basis. Well managed, healthy forest ecosystems within the historic range of variability are generally believed to provide the greatest benefit to multiple species.

## Social and Economic Conditions

*Recreation*

The L.T. Murray Wildlife Area forests add to the scenic beauty of the landscape and are important places for public recreation including hunting, hiking, bike riding, horseback riding, wildlife viewing and camping. However, current conditions are less than ideal for most outdoor enthusiasts. Overstocked forests can lead to a significant increase in the potential for large scale, catastrophic wildfires. These uncharacteristic, large-scale wildfires can greatly reduce the quality of recreational opportunities and cost millions of dollars in suppression costs.

*Wildlife Urban Interface (WUI)*

The L.T. Murray Wildlife Area is adjacent to private and public forests with a mosaic of management strategies. WDFW recognizes the high to extreme wildfire threat from poorly managed forests. The agency is an active member of the Tapash Sustainable Forest Collaborative. This collaborative recognizes the need for active forest management and the desire to work together with adjoining landowners to complete large, landscape level forest treatments that are designed to reduce the risk of catastrophic fire and improve forest health. Forest management strategies used by the agency and Tapash collaborators include thinning, prescribed burning, tree planting, and other silvicultural practices.

*Local Economic Opportunities*

Commercial thinning projects on wildlife area forests provide support to local economies in terms of logging jobs and wood supply to area mills. Logging jobs provided by restoration commercial thinning projects provide family wages jobs to Kittitas County. The sale of logs from these projects covers most, if not all, of the logging costs. In some cases, a slight profit may be realized that can be re-invested back into the wildlife area for other wildlife area projects.

# II. Management Approach

WDFW will actively manage forests on the L.T. Murray Wildlife Area where stand conditions have significantly departed from the historic range of variability (HRV) and are not in line with future range of variability (FRV). Areas identified for treatment are carefully identified by foresters, biologists, and other natural resource professionals. Most of the immediate need for restoration treatments, including the current 10-year planning cycle, are on low elevation, dry forest types. Commercial restoration thinning (primarily from below), pre-commercial thinning, prescribed fire, and tree planting will be used to restore and maintain fire-dependent forests. The forest management approach on the wildlife area focuses on maintaining or improving habitat quality, wildfire resiliency and forest health. Management decisions will take into consideration both site-specific and landscape-level forest management needs and improving the habitat, particularly for species identified in the management goals and objectives. WDFW recognizes the need for active forest management in perpetuity to maintain forest resiliency and high ecological integrity.

## Desired Future Conditions

*Ecological Integrity*

Wildlife area forests will be managed and maintained to meet the priorities and expectations of WDFW's mission to "preserve, protect and perpetuate fish, wildlife and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities."

In general, desired conditions would move forests back closer to the historic ranges of variability (HRV) and future range of variability (FRV)for the landscape, as described in the 2015 *Management Strategy for the Washington State Department of Fish and Wildlife's Forests*. It is assumed that the forests managed closer to the historic ranges of variability provide the greatest ecological sustainability and therefore the greatest overall benefits to wildlife. Factors to consider when restoring stands to the historic range of variability include appropriate stocking levels, species composition, stand structure, fuel levels, trees per acre, basal area, and disturbance regimes.

Where possible, it would also be desirable to consider how the anticipated historic range of variability will be impacted by climate change. As temperatures are expected to increase, this will result in decreased snowpack, earlier spring runoff, and extended hot, dry summer conditions. This has the potential to increase the potential for large wildfires and stress on trees that could result in forest disease and insect outbreaks at epidemic levels. This threat is even more critical on the dry forest types. Forests on the wildlife that are close to appropriate stocking/species composition levels are more likely to be resilient to the effects of climate change.

Desirable conditions for dry ponderosa pine and mixed dry conifer forest types would include a strategy to mimic a fire return interval averaging 15 to 20 years. This fire return interval might increase to 30 to 40-year cycles on the transition zone between ponderosa pine and dry mixed conifer forest types or north facing slopes. Most stands would be more open and fire-resilient than they are today. However, it will be important to maintain some heterogeneity to provide a mosaic of habitats and microsites. For example, most dry forest types should be more open, favoring ponderosa pine and western larch. However, north facing slopes or riparian areas may be more densely stocked with shade tolerant species such as Douglas fir or grand fir. After treatment, the goal is to have a mix of openings, well-spaced individuals, and clumps of trees typical of a naturally occurring disturbance regime.

The primary risks to WDFW forests are fire, insects, and disease. Active management will be used in commercial size stands to lower the risk of catastrophic stand replacement wildfires by periodically removing small to medium size trees with ladder fuels through forest restoration thinning projects and prescribed burning. These actions cannot prevent all wildfire risk, but they can reduce fire intensity and severity. Ideally both wildfire and prescribed fires would remain on the ground, resulting in a reduction in fuel loading with the occasional torching typical of a frequent fire regime. In well managed stands, within the historic range of variability and "normal" fuel loading, full blown crown fires will often drop back down to the forest floor. Ground based fires, with individual tree torching and light burning of the forest floor, allows fire fighters to get a handle on the fire. Seral species that are better adapted to survive low intensity fire, including ponderosa pine and larch, would dominate the dry ponderosa pine or dry mixed conifer forest types in a normal disturbance regime.

Pre-commercial thinning will be used in small diameter stands (6 inches and less diameter at breast height) to improve growth rates, stand resiliency and overall forest health. Similar to commercial thinning prescriptions, the overall goal would be to accelerate the process of moving the stand closer to the historic range of variability in species composition, tree densities and spatial arrangement. Most of the pre-commercial age stands have been thinned over the last decade but there are still areas, including the Cabin Creek area, that will still benefit from thinning.

*Priority Species*

Priority species and habitats described in the Wildlife Area Management Plan will be a significant consideration in development of management recommendations. Agency foresters will work with biologists to develop prescriptions that balance the needs of the landscape, ecological integrity, priority species and priority habitats. Details on how to incorporate recommendations for priority species and habitats at the project level will be developed on a project-by-project basis with agency professionals including foresters, biologists, prescribed fire staff and other specialists.

*Social and Economic Conditions*

Washington Department of Fish and Wildlife's mission is to "preserve, protect and perpetuate fish, wildlife and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities". Forest management strategies described in this report are consistent with this mission and, in fact, improve social and economic conditions for Kittitas County and Washington State.

*Recreation*

Forest projects may have a temporary impact on recreational opportunities due to short-term closures to protect public safety. WDFW will attempt to minimize impact to the public by completing projects during periods of low use, generally from early spring to the start of modern firearm hunting for big game species. Over the long term, forest management projects will improve recreational opportunities by improving habitat conditions and completing much needed deferred maintenance work on Green Dot roads.

*Wildland Urban Interface (WUI)*

In the WUI, WDFW lands adjacent to both public and private ownerships may require additional assessment of stand conditions. In areas close to homes, structures, and unmanaged forests, fire risk management concerns may lead to more aggressive fuels management techniques and prescriptions than would ordinarily be used to help restore ecological integrity. Where feasible, WDFW may collaborate with neighboring property owners to develop prescriptions and implement proposed projects. This strategy may include treatment prescriptions that result in fuel and density levels at the lower end of the historic range of variability to reduce fuel accumulations and decrease the risk of catastrophic fire.

*Local Economic Opportunities*

While economic return is not the purpose of WDFW forest management projects, merchantable logs from thinning operations will be sold to offset most, if not all costs, associated with project implementation. The work will provide employment opportunities for local loggers, mill workers, professional forest consulting firms, pre-commercial thinning contractors and tree planting contractors. As much as possible, revenue realized from the sale of harvested logs would go back to the wildlife area to support other habitat enhancement projects such as public road improvements, weed spraying, road abandonment and fencing.

*Stream Enhancement Opportunities*

Some of the material from restoration thinning activities, whether pre-commercial or commercial, has been and will continue to be used for stream wood placement projects on the wildlife area as needed. The collaboration between fisheries and habitat biologists, the wildlife area manager and project forester can provide source wood to these projects. This partnership makes it possible to restore both upland and riparian habitat at the same time.

# Suitable Management Areas and Potential Projects

Forests on the L.T. Murray Wildlife Area historically relied on relatively frequent fire return intervals to maintain forest health and resiliency, particularly on lower elevation dry forest types. Without frequent fires, particularly on the dry forest landscape, forest health will continue to deteriorate until the eventual stand replacement fire.

Low elevation, dry forest types have experienced the greatest departure from historic stand conditions. As such, emphasis for the next 10-year planning cycle will continue to be placed on degraded stands with declining ecological integrity in these dry forest types.

Those stands that are currently on trajectory to desired future conditions, with little or no benefit to be achieved from active management, are low priorities for the current planning cycle. Also, those stands with feasibility issues (such as lack of roads, steep topography, and habitat concerns) have been excluded from consideration in the 2021 to 2031 planning cycle.

Where active management is appropriate, the primary goals for those management activities will be to:

1) Begin the process of restoring the project area to stand conditions more closely resembling the historic range of variability (HRV) for species composition, stand densities, size classes and spatial arrangement.

2) Improve habitat conditions for multiple wildlife species, with emphasis placed on priority habitats and species.

3) Improve forest health and stand resiliency.

4) Reduce the risk of catastrophic wildfire on the wildlife area and surrounding ownerships.

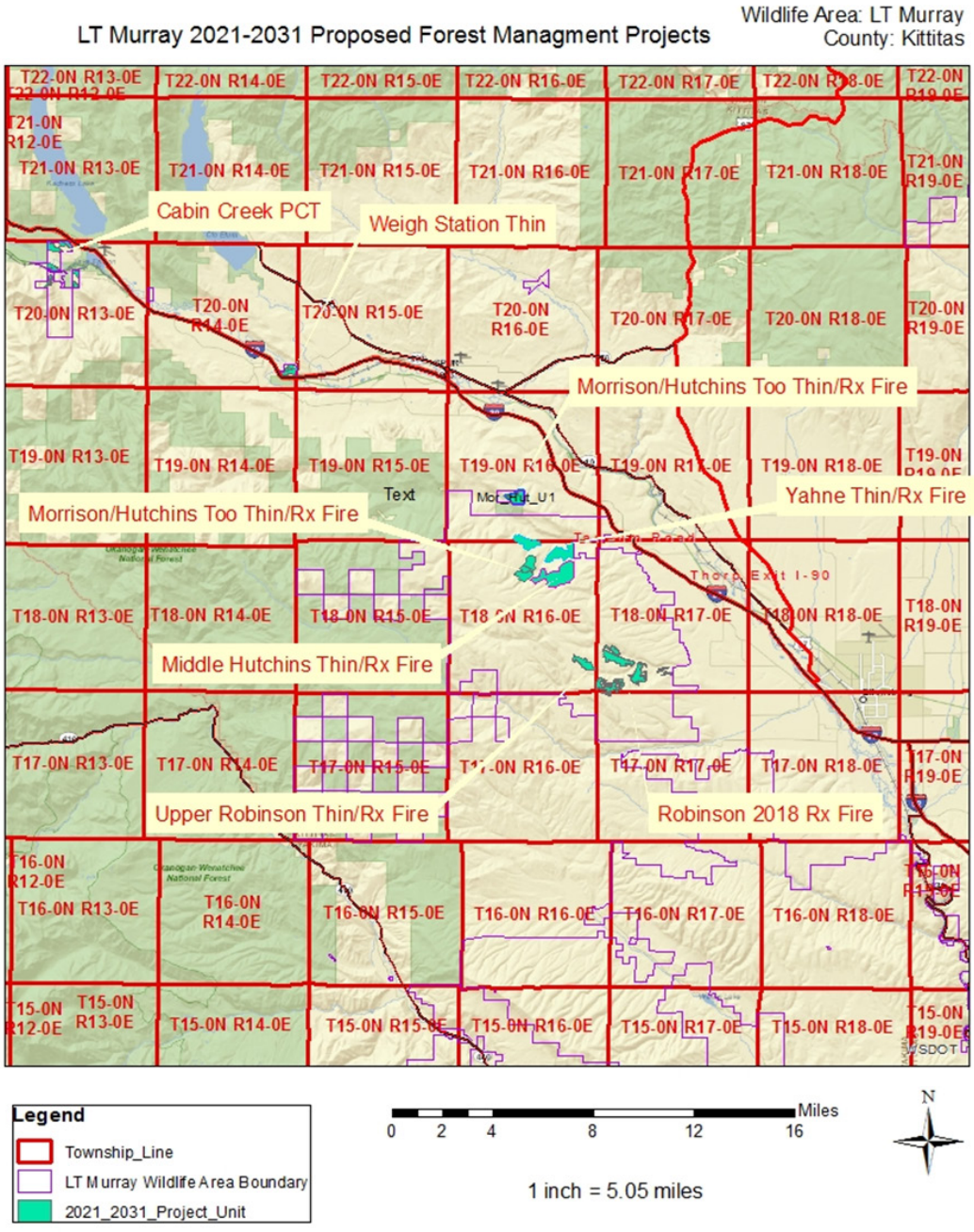
Commercial or pre-commercial restoration thinning, followed up with prescribed fire if appropriate, will be the primary management tools used to maintain healthy fire resilient forests in the next planning cycle. In young, overstocked plantations, pre-commercial thinning will be used to accelerate growth rates and improve forest health. In areas devastated by stand replacement wildfire, trees will be planted to accelerate the stand re-establishment process.

## Proposed Projects 2022 Through 2032

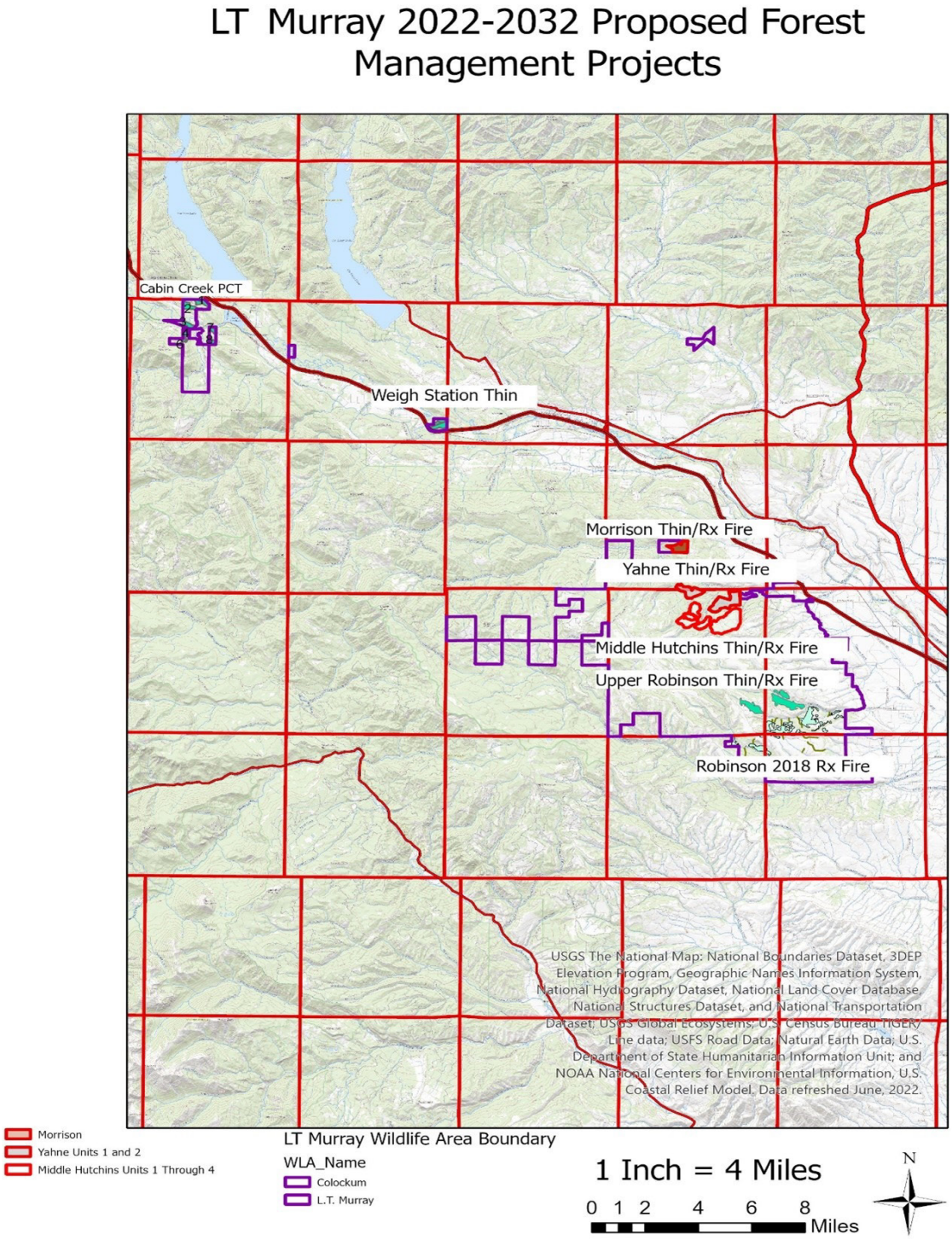
Approximately 5,000-7000 acres will be considered for forest restoration projects (commercial restoration thin, pre-commercial thin and prescribed fire) on the L.T. Murray over the next 10 years. This is a working document. Future projects may be added based on need, changing conditions, and priority objectives. Most of these projects are the result of an extensive stand exam/inventory project conducted on the L.T. Murray Wildlife Area in the fall of 2019. Figure 1 shows the locations of the 5 proposed commercial restoration thinning projects, 1 pre-commercial thinning project and 5 prescribed fire projects for the current planning cycle. Details of these proposed forest management projects for the next 10 years can be found in Table 21.

Where appropriate, and where funding is available, commercial forest management projects will be considered for follow-up prescribed fire treatment. Currently, WDFW has plans for prescribed fire on 5 projects included in this plan. The purpose of prescribed fire treatments are to stimulate forage species, reduce excessive fuel loading and reduce stocking levels of non-merchantable trees.

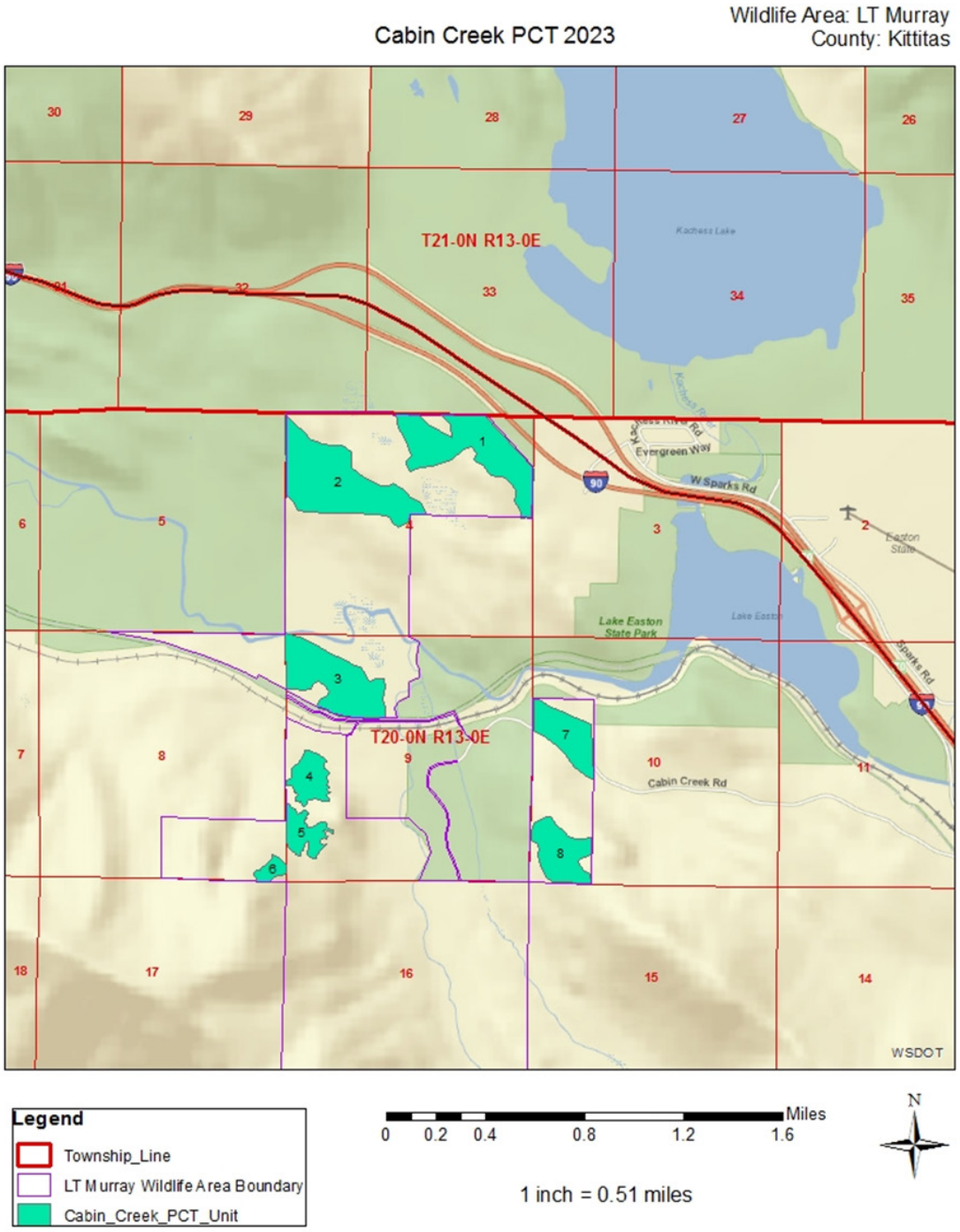
Timing of prescribed fire projects is difficult to plan given unpredictable weather conditions, smoke management concerns and regulatory constraints. Implementation dates are placeholders that will be updated on a yearly basis.



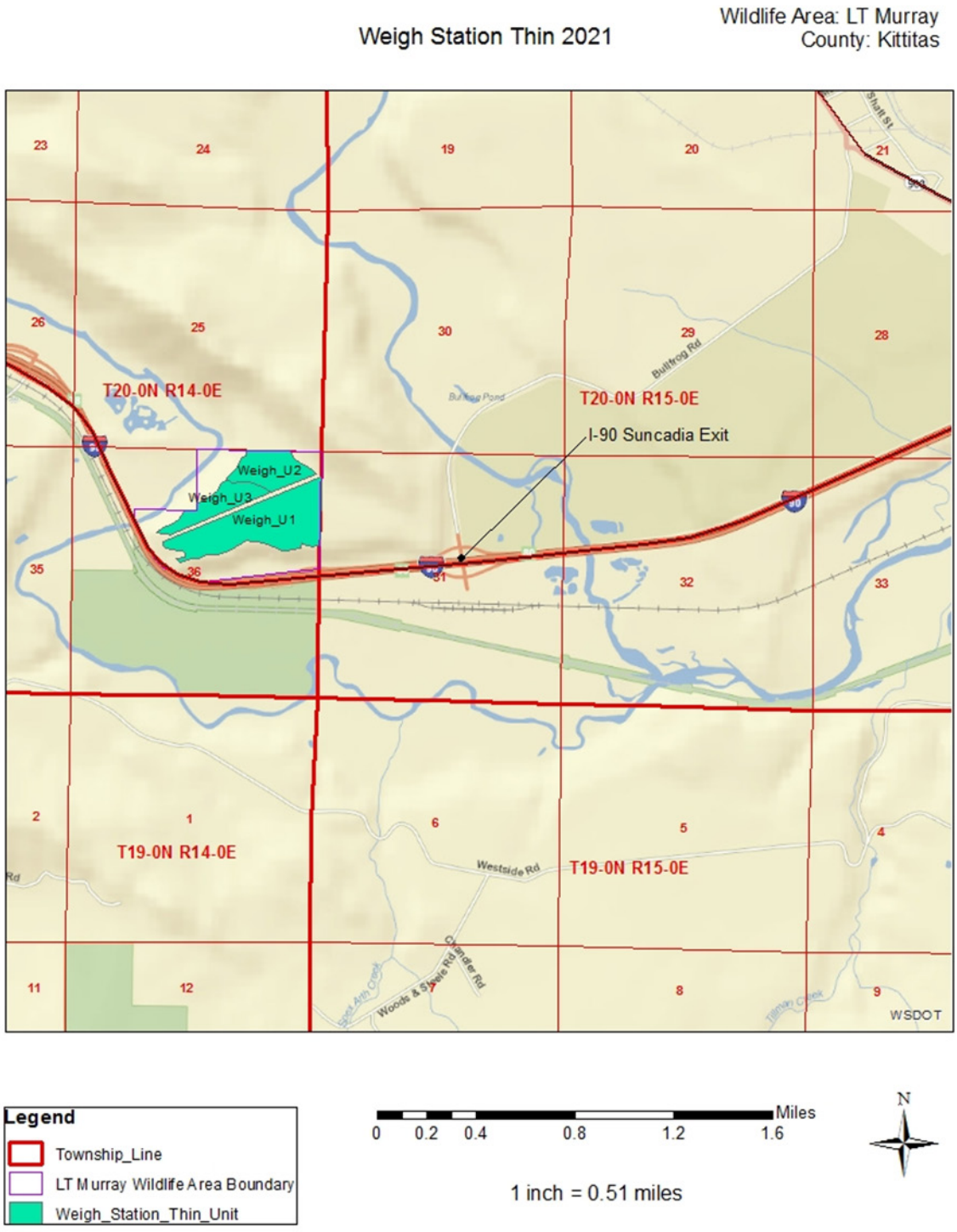

***Map 17: Proposed Forest Mgmt. Projects***



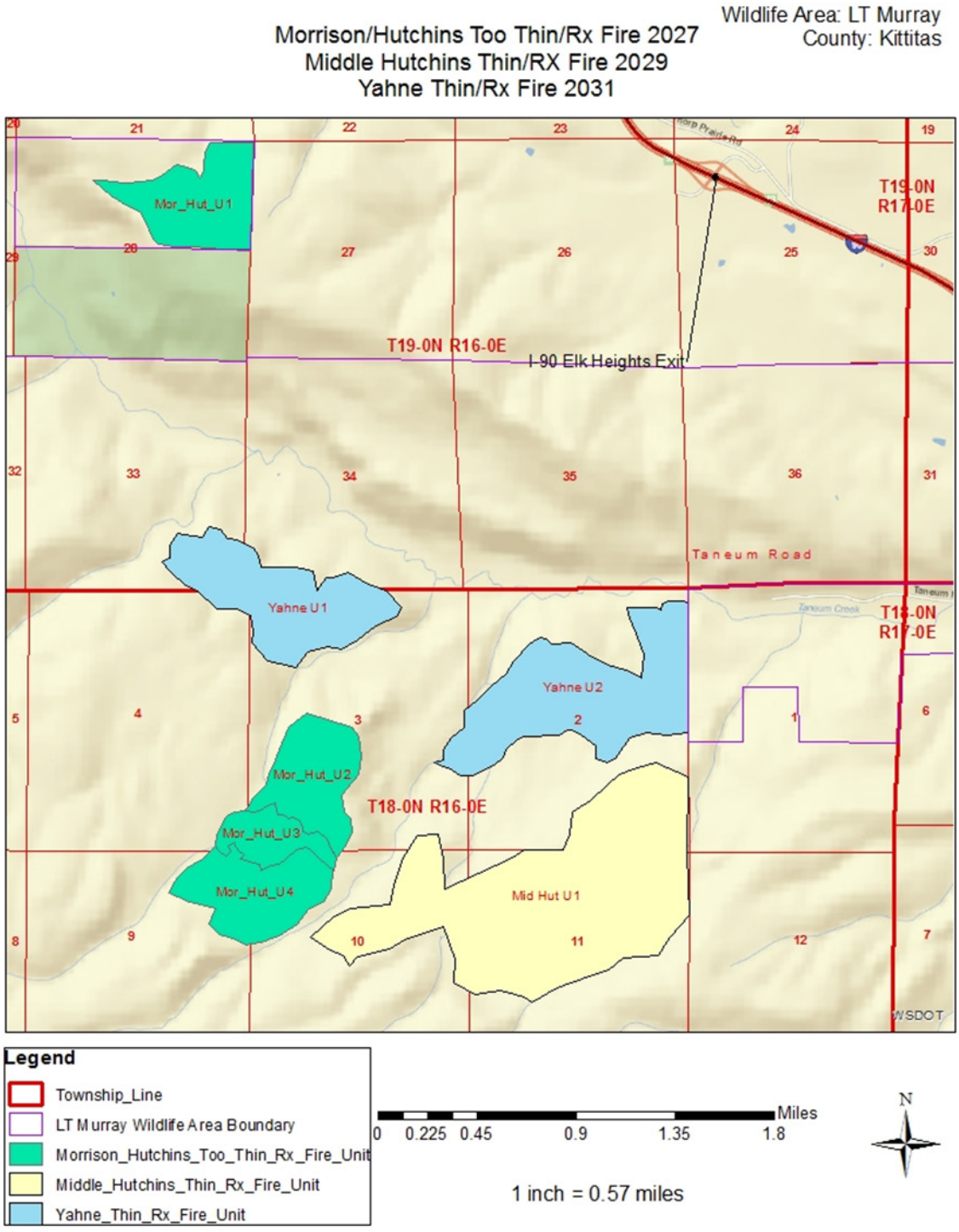

***Map 18: Proposed Forest mgmt. projects 2022-2032***



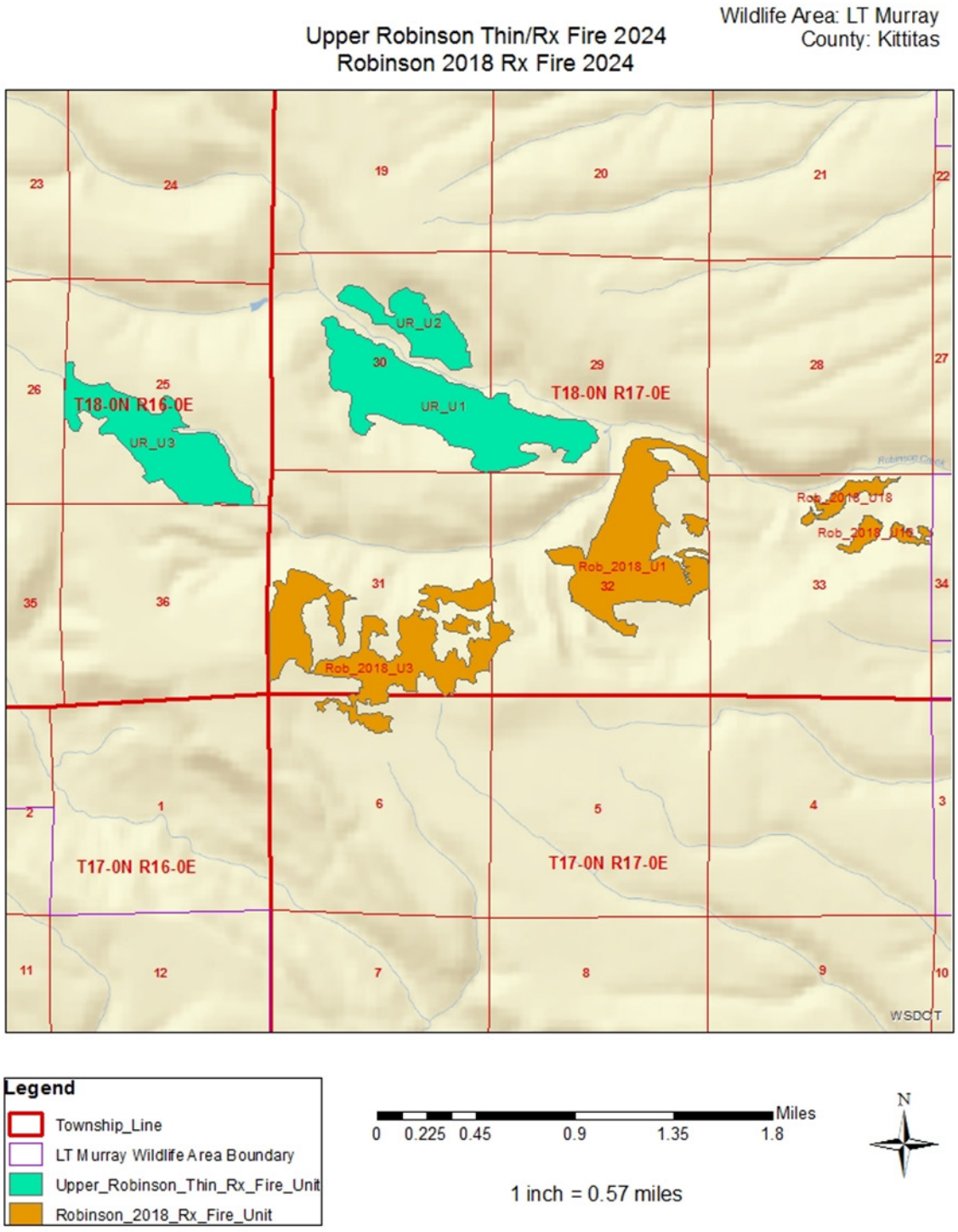

***Map 19: Cabin Creek PCT 2023***



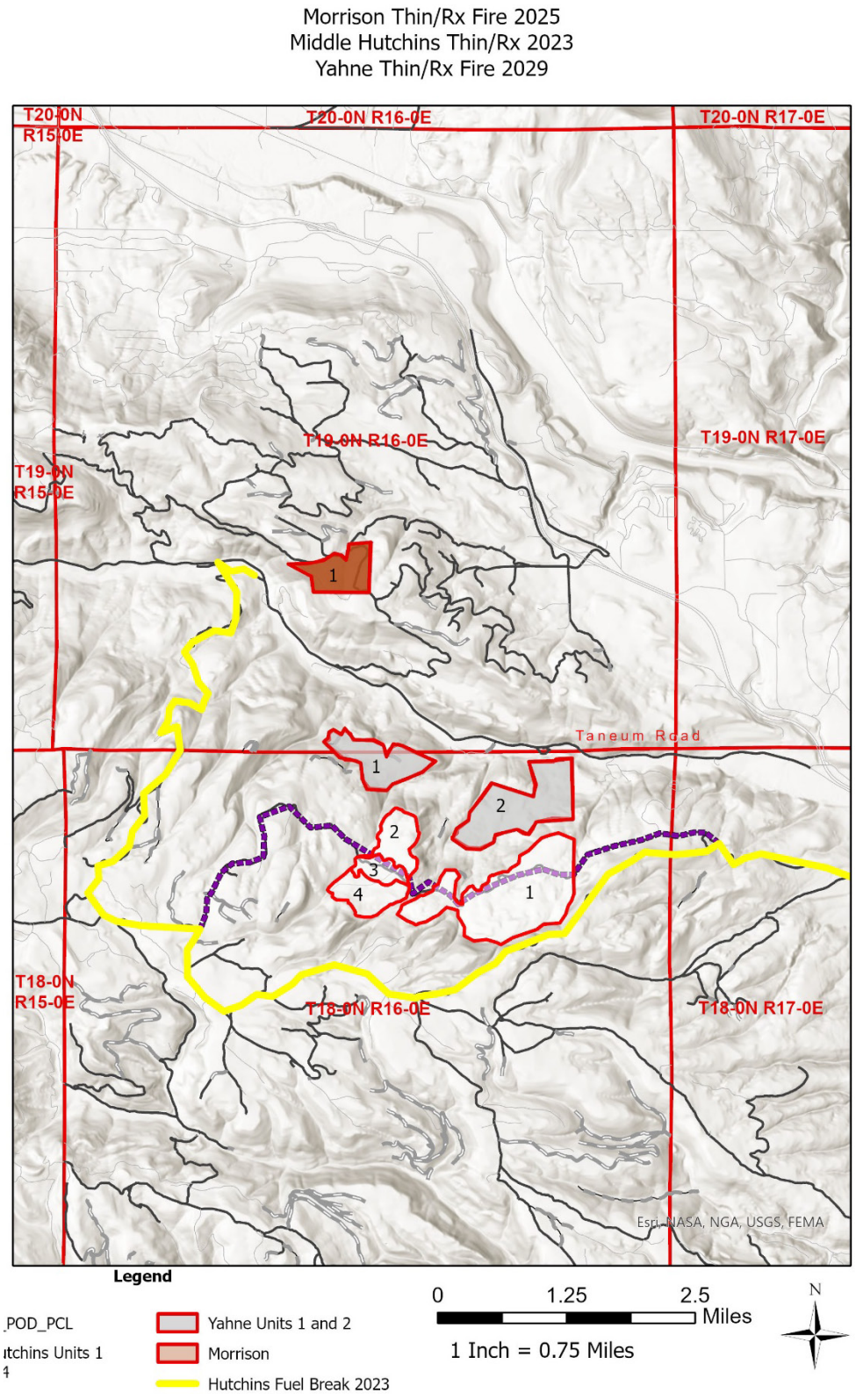

***Map 20: Weigh Station Thin 2021***




***Map 21: Morrison/Hutchins, Middle Hutchins, Yahne Thin/RX***




***Map 22: Upper Robinson/Robinson Thin Rx***




***Map 23: Morrison/Middle Hutchins/Yahne Thin/RX***

***Table 21: Proposed Forest treatment projects***

*Most of these projects are still in the conceptual stage and have not been vetted through the District Team process and/or forest restoration pathway.

| Project Name | Objective | Treatment Units/ S-T-R | Potential Treatment Acres | Project Leader | Task | Anticipated Completion Date |
|---|---|---|---|---|---|---|
| Weigh* Station | Restoration Thin To HRV | U1/ 30-20-16<br>U2/ 30-20-16<br>U3/ 30-20-16 | 67<br>20<br>24<br>**Total=111** | Rod Pfeifle | Commercial Restoration Thin | Completed Fall of 2022 |
| Upper Robinson | Restoration Thin To HRV | U1/ 30-18-17<br>U2/ 30-18-17<br>U3/ 25-18-16 | 208<br>60<br>140<br>**Total=408** | Isaac Nequette | Commercial Restoration Thin | Completed Fall of 2022 |
| Robinson/ Upper Robinson Prescribed Fire | Rejuvenate Browse Species & Reduce Fuel Loading | RU1/32-18-17<br>RU3/31-18-17<br>RU16/33-18-17<br>RU18/33-18-17<br>URU1/ 30-18-17<br>URU2/ 30-18-17<br>URU3/ 25-18-16 | 183<br>199<br>16<br>17<br>208<br>60<br>140<br>**Total=823** | TBD | Prescribed Fire | Fall 2024** |
| Cabin Creek | Improve Growth Rate Species Composition In Young Plantation<br>Improve future conditions for NSO habitat | U1/ 4-20-13<br>U2/ 4-20-13<br>U3/ 9-20-13<br>U4/ 9-20-13<br>U5/ 9-20-13<br>U6/ 8-20-13<br>U6/ 8-20-13<br>U6/ 8-20-13 | 5<br>73<br>50<br>5<br>16<br>**Total=216**<br>14<br>5<br>26<br>27<br>**Total=216** | Rod Pfeifle | Pre-Commercial Thinning | Fall 2023 |
| Morrison | Restoration Thin To HRV | U1/ 10-18-16 | 211<br>**Total=211** | TBD | Commercial Restoration Thin | Fall 2025 |
| Morrison Prescribed Fire | Rejuvenate Browse Species & Reduce Fuel Loading | U1/ 10-18-16 | 211<br>**Total=211** | TBD | Prescribed Fire | Fall 2027** |
| Middle Hutchins/ Hutchins Fuel Break | Restoration Thin To HRV | U1/ 11-18-16<br>U2/3-18-16<br>U3/3-18-16<br>U4/10-18-16<br>Fuel Break | 588<br>119<br>58<br>132<br>572<br>**Total=1,569** | Leland Lauffer | Commercial Restoration Thin | Fall 2024 |
| Middle Hutchins/ Hutchins | Rejuvenate Browse Species & Reduce Fuel Loading | U1/ 11-18-16<br>U2/3-18-16<br>U3/3-18-16 | 588<br>119<br>58 | TBD | Prescribed Fire | Fall 2026** |

| Project Name | Objective | Treatment Units/ S-T-R | Potential Treatment Acres | Project Leader | Task | Anticipated Completion Date |
|---|---|---|---|---|---|---|
| Fuel Break Prescribed Fire | | U4/10-18-16<br>Fuel Break | 132<br>572<br>**Total=1,569** | | | |
| Yahne | Restoration Thin To HRV | U1/ 3-18-16<br>U2/ 2-18-16 | 205<br>289<br>**Total=494** | TBD | Commercial Restoration Thin | Fall 2029 |
| Yahne | Rejuvenate Browse Species & Reduce Fuel Loading | U1/ 3-18-16<br>U2/ 2-18-16 | 205<br>289<br>**Total=494** | TBD | Prescribed Fire | Fall 2031** |

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# Appendix G. Fire History and Management

Planning Period: 2022-2032

Prepared By: Hannah Bates, WDFW Wildlife Area Manager &
Rod Pfeifle, WDFW Statewide Forester

## Introduction

Forests in eastern Washington, particularly dry forest types dominated by ponderosa pine, have a long history of relatively frequent fire. Researchers at the University of Washington, working in the Teanaway river drainage, determined that the historical fire return intervals on the east slopes of the Cascades were between 7 and 43 years (Wright and Agee, 2004). Most fires were relatively small. As expected, those fires were most common late in the growing season during periods of annual and seasonal drought. Numerous fire scars were found in dry forest types dominated by ponderosa pine, indicating that most fires were of relatively low intensity. Fire frequency declined dramatically with the advent of modern-day commercial timber harvest and aggressive wildfire suppression tactics in the early 1900's.

A history of fire suppression has resulted in less fire on the landscape. Today, researchers have a greater understanding of the benefits of fire. Frequent, low-intensity fires on dry forest habitat types are not only important to forest health and resiliency but are also necessary for the re-birth for fire-dependent species such as the lodgepole and ponderosa pine. The increased abundance of forage for large ungulates, after low or moderate intensity fire events, is well known. There are also habitat benefits for many threatened and endangered species. Additionally, many bird species also benefit from fire including American robin, western bluebird, hairy woodpecker, white-headed woodpecker, black backed woodpecker, American tree-toed woodpecker, house wren, dusky flycatcher, wood-pewee, and the gray flycatcher (Saab et al, 2022).

The purpose of this section is to discuss strategies for using prescribed fire in a proactive way on the L.T. Murray Wildlife Area. This includes both forest and shrubsteppe ecosystems. These prescribed fires, carefully planned and carried out using proven strategies, will provide the benefit of fire on the landscape while minimizing the risk associated with the treatment.

## Wildfire vs. prescribed fire—the positive and negative effects

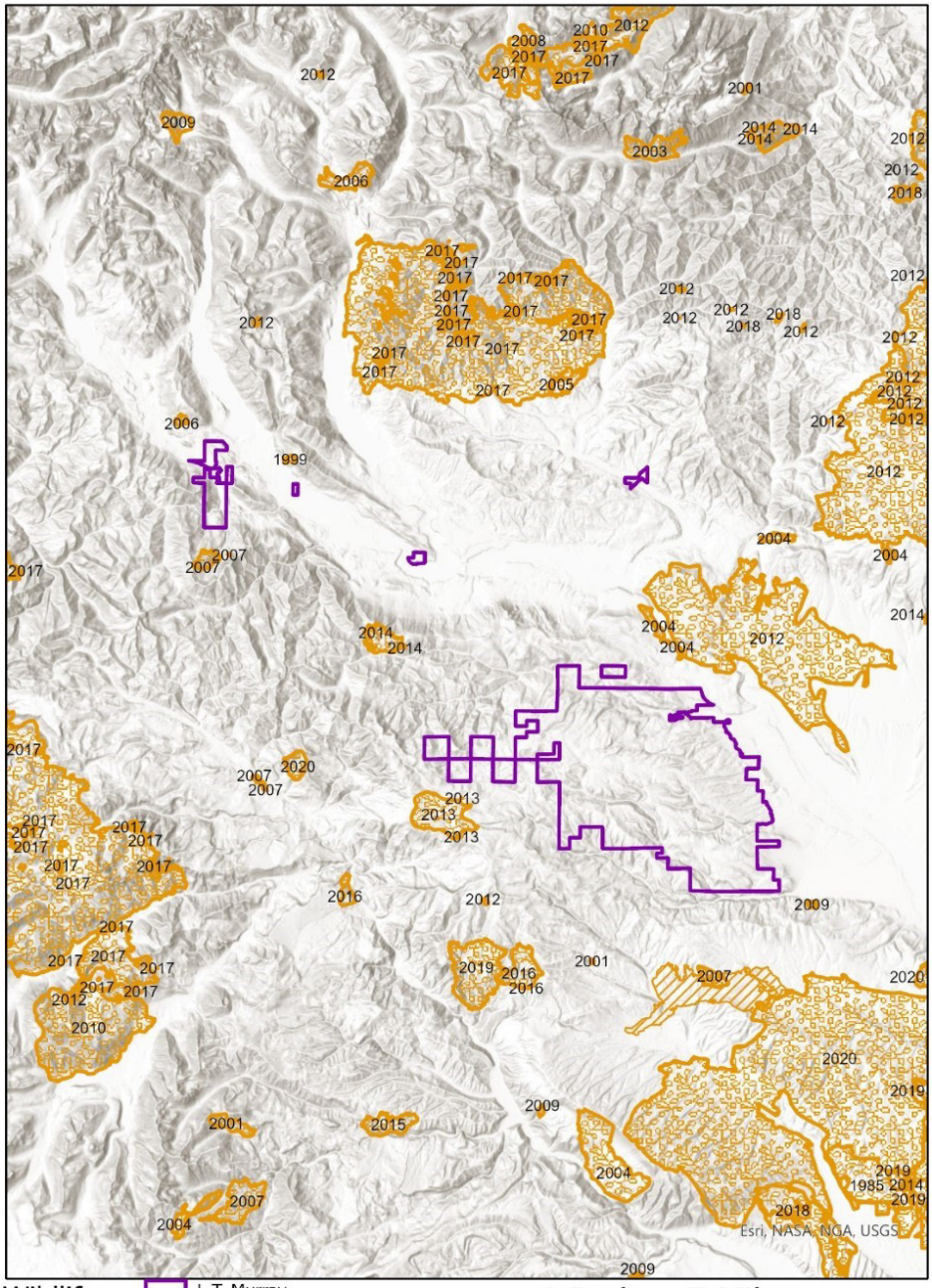
Fire has long been used a tool to alter landscapes for human use. Native Americans would use fire to burn off older vegetation to regenerate grasses, plants, and shrubs for food, medicines, and create favorable conditions for game. Wildfires will create changes in stand complexities but can help build a mosaic structure that over time will change fire behavior and dynamics. Many of the wildfires we are experiencing now are having greater impacts to landscapes due to reduced fire intervals (Wright and Agee, 2004). Loss of vegetative cover, landslides, and increased erosion are a few examples.

## A proactive management strategy

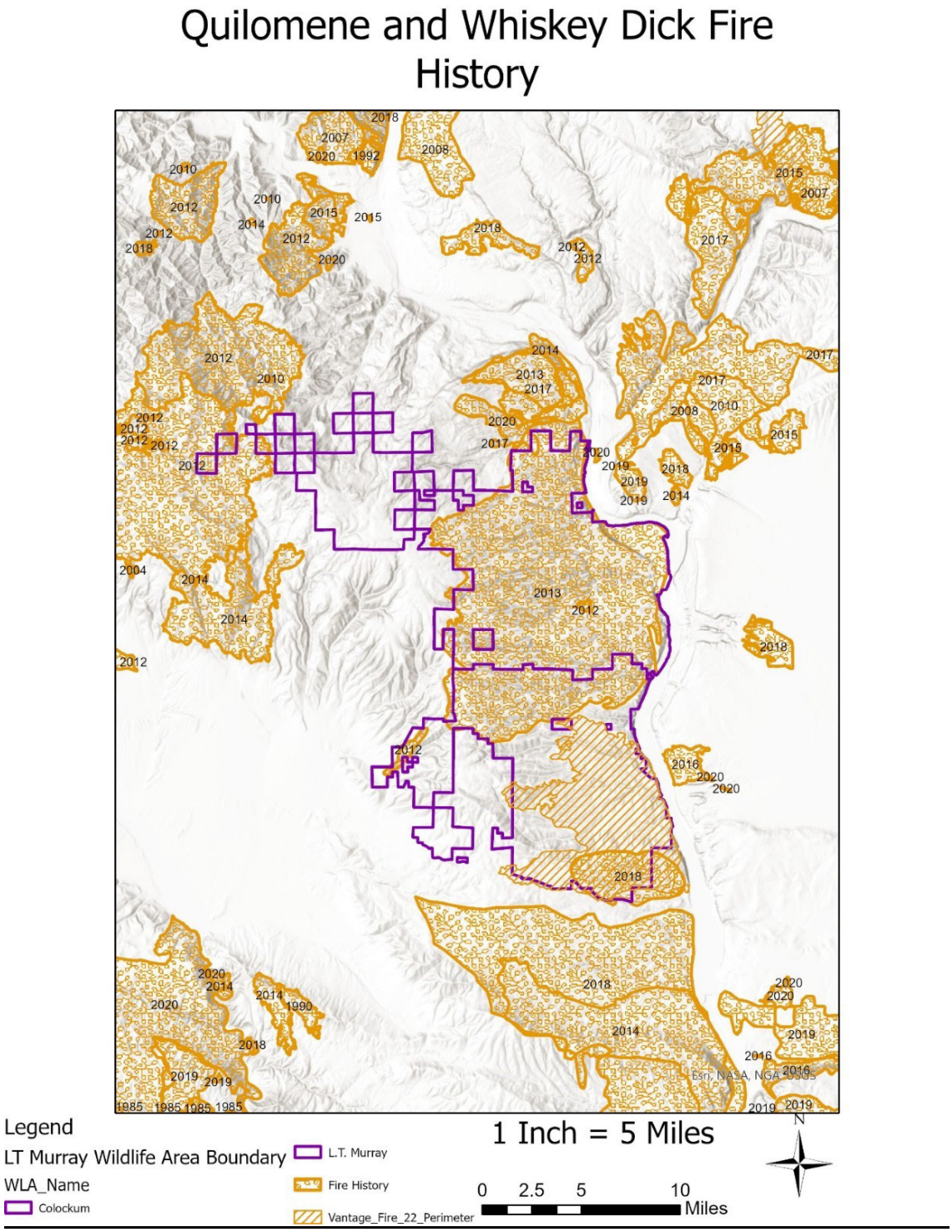
Prescribed fire can be used as a more predictable strategy for re-introducing fire to fire dependent ecosystems. The purpose of this section is to discuss strategies for using prescribed fire in a proactive way on the L.T. Murray Wildlife Area, including both forest and shrubsteppe ecosystems. Prescribed fires, carefully planned and carried out using proven strategies, will provide the benefit of fire on the landscape while minimizing the risk associated with treatment.

Prescribed fire will generally be recommended for dry forest types as a follow-up to commercial forest restoration treatments. Dry forest types are the focus of the current 10-year planning cycle and arguably the most in need of restoration. When a forest restoration project is proposed, a WDFW prescribed fire Burn Boss will be brought into the planning process to determine if prescribed fire is appropriate. If so, the Burn Boss will make recommendations to the L.T. Murray Wildlife Area Manager and Lead Forester to incorporate fire line construction, fuels (slash) disbursement and safety considerations (snags on fire lines, etc.) into the thinning prescription. If prescribed fire is appropriate and funding is available, prescribed fire would be recommended 2 to 3 years after thinning to allow time for fuels to cure. The burn boss will develop a burn plan for the project post-thinning that will be reviewed by the L.T. Murray Wildlife Area Manager, Lead Project Forester and the WDFW Habitat Biologist.

# LT Murray Fire History



***Map 24: Map of L.T. Murray Fire History (1973-present)***




***Map 25: Quilomene and Whiskey Dick Fire History (1973-present)***

Prescribed fire is not appropriate for all forest restoration treatments. Overstocked stands of smaller trees (6" diameter at breast height (dbh) and smaller) are not good candidates for prescribed fire. These stands/plantations have an abundance of trees with interlocking crowns all the way down to the ground. If this type of stand was burned, there is a strong possibility that there would be excessive, indiscriminate tree mortality. The risk of significant mortality is nearly as high for thinned small diameter stands, where fuel loading on the ground can be 12 inches in depth or more.

There are instances when prescribed fire may not be an appropriate follow up treatment after a commercial restoration thinning project. This limitation is due to unacceptable risk factors such as smoke management concerns, the Wildland Urban Interface (WUI), proximity to travel corridors, lack of funding and risk of spreading beyond containment lines. All risk factors will be assessed by the L.T. Murray Wildlife Area Manager, Lead Forester, and Burn Boss during the planning phase of project development. The decision whether to use prescribed fire as a follow up treatment will be made prior to implementation of proposed thinning projects.

If prescribed fire is deemed appropriate, the goal for most projects would be to move forward with implementation 2 to 3 years after thinning. Future treatments would depend upon how thinning/prescribed fire units respond. For most dry forest types, re-entry would occur in 20 to 30 years. Secondary treatments might include a thinning from below (removing ingrowth from shade tolerant species) followed up by a second prescribed fire treatment. Monitoring of treated stands will be necessary to determine when future treatments are appropriate.

Fire prescriptions will be developed using "SMART" objectives. These objectives are important in ensuring that a project will be viable:

- "S" **Specific**= goal is specific and narrow for effective planning
- "M" **Measurable**= define the evidence we can provide to prove we are making progress or may need to reevaluate
- "A" **Attainable**= can reasonably accomplish objectives in the designated timeframe
- "R" **Relevant**= objective should align with WDFW values and long-term plan
- "T" **Time-based**= end date for task prioritization

The Potential Operating Delineation (POD) is a concept developed by the Washington Department of Natural Resources (DNR) that attempts to compartmentalize potential large wildfires into large management areas or pods. These POD's increase the chance for wildfire control and containment. The boundaries of these POD's may include roads, streams, talus slopes, forest management thinning units and enhanced fuel breaks.

POD's will include designated Potential Control Lines (PCL's). The purpose of these PCL's is to further break down POD's into even smaller control units if conditions allow. The same natural and man-made features used to define POD boundaries would also be used to define PCL boundaries.

WDFW has embraced the idea of using POD's and PCLs as part of its pre-emptive wildfire defense strategy. We will be working with DNR to develop the Hutchins POD prescription and layout. Combining thinning projects with POD work will accelerate getting the work done on the ground at a lower cost than as a stand-alone project.

## Fire and other habitats

Fire has historically played a significant role in maintaining shrubsteppe habitat. However, fire and fire frequency has generally decreased in many shrubsteppe ecosystems with the advent of aggressive fire suppression strategies. Land managers may have concerns with the re-introduction of fire on the landscape that could result in undesired vegetation shifts to non-native or invasive plant species. Research has shown that groundcover from exotic annual grasses was of concern for the first 8 years after fire. Beyond that, cover from exotic grass species was down to 1% or less (Davies et al, 2020).

## Potential barriers to overcome

WDFW has been in the forefront of Washington state agencies using prescribed fire as a management tool. The challenge has been keeping prescribed fire crews intact when competing agencies, such as DNR and the United States Forest Service (USFS), can offer more wildfire suppression opportunities and the potential to make significantly more money during the fire season. Lack of funding for the prescribed fire program has not been a problem. However, funding levels could decrease if we are unable to deliver on our prescribed fire expectations.

The window of opportunity for prescribed fire operations is very narrow. Our burn plans have very specific weather conditions that need to be in place before lighting can begin. Several weather factors including temperature, wind, smoke dispersal, inversion potential and long-term forecasts can negatively impact the ability to burn safely. In general, these weather factors have been even more problematic considering the effects climate change.

Having resources available, both human and equipment, is critical to a successful prescribed fire program. To make this happen, agencies and landowners need to be able to work together, across ownership lines, to achieve our objectives. We will also need to rely more heavily on private contract crews to meet our staffing needs. Combined resources, from agency and private contractors, will give us the ability to increase treatment acreage and lower overall costs.

## Education and outreach

Interagency cooperation is important in the planning, implementation, and monitoring of prescribed fire projects. Quality research and monitoring will inform decisions concerning the use of fire prescriptions and demonstrate the efficacy of prescribed fire as a management tool. Public understanding and acceptance of prescribed fire is becoming more widespread. This is certainly true on the east slopes of the Cascades, where large wildfires are expected to occur almost every year. The L.T. Murray Wildlife Area will use prescribed fire as a management tool where feasible and continue to keep the public informed.

## Literature Cited

Agee, James K. and Wright, Clinton S. 2004. Fire and Vegetation History in the Eastern Cascade Mountains, University of Washington College of Forest Resources.

Davies, Kirk W. and Bates, Jon D. 2020. Re-introducing Fire in Sagebrush Steppe Experiencing Decreased Fire Frequency: Does Burning Promote Spatial and Temporal Heterogeneity? *International Journal of Wildland Fire.*

Block, William M., Dudley, Jonathan G. Latif, Quresh R. and Saab, Victoria A. December 2022. Short-Term Benefits of Prescribed Fire to Bird Communities of Dry Forests, Association of Fire Ecology.

# Appendix H. Climate change projections

Table 22 shows climate change projections[1] for the L.T. Murray Wildlife Area. All metrics are summarized at the county scale (Kittitas County). Mid-century refers to 2040-2069 and late-century refers to 2070-2099. The median modeled value is provided for each metric, followed by the modeled 10th and 90th percentile values in parentheses. The lower scenario refers to the RCP 4.5 greenhouse gas emissions scenario and the higher scenario to RCP 8.5. Future projections are compared to the historical baseline of 1980-2009 unless otherwise specified. NA indicates values that are either not applicable or not available.

***Table 22: Climate change projections for the L.T. Murray WLA and Kittitas County***

| Metric | Description | Historical Baseline | Scenario | Mid-Century | Late-Century |
|---|---|---|---|---|---|
| ***Temperature*** | | | | | |
| Summer Maximum Temperature | Change in average daily summer (June-August) maximum temperature | 74°F (74 to 75) | Lower | 4.5°F (2.8 to 7.3) | 5.7°F (3.9 to 8.9) |
| | | | Higher | 6.5°F (4.6 to 9.1) | 11.1°F (7.8 to 14.1) |
| Hot Days | Change in the number of days per year with maximum daily temperature greater than 100 °F | 0 days (0 to 1) | Lower | 1.8 days (1.2 to 3.8) | 2.9 days (1.6 to 5.9) |
| | | | Higher | 3.8 days (2.4 to 6.1) | 9.9 days (6.0 to 17.0) |
| 90 °F Max Humidex Days | Change in the number of days per year with a maximum humidex value over 90 °F. Humidex is a measure of "experienced" temperature and includes both temperature and humidity | 8 days (8 to 9) | Lower | 11.6 days (6.0 to 19.2) | 17.8 days (10.5 to 27.2) |
| | | | Higher | 18.8 days (10.3 to 27.8) | 36.8 days (22.6 to 53.4) |
| 65 °F Min Humidex Days | Change in the number of days per year with a minimum humidex value over 65 °F | 4 days (3 to 5) | Lower | 8.6 days (2.2 to 14.1) | 12.5 days (3.8 to 19.0) |
| | | | Higher | 14.2 days (5.4 to 20.5) | 33.5 days (13.3 to 46.5) |
| ***Wildfire*** | | | | | |
| Wildfire Danger | Change in the number of days per year, relative to 1971-2000, with high fire potential based on dry fuels, fuel moisture below the 20th percentile | 51 days (51 to 51) | Lower | 8 days (2 to 19) | NA |
| | | | Higher | 10 days (1 to 21) | NA |
| Wildfire Likelihood | Likelihood of having the climate and vegetation conditions each year that could support a wildfire, assuming ignitions are present and fire suppression is implemented | NA | Lower | 0.27 (0.15 to 0.43) | 0.38 (0.26 to 0.49) |
| | | | Higher | 0.36 (0.20 to 0.48) | 0.58 (0.42 to 0.69) |
| ***Precipitation*** | | | | | |
| Total Annual Precipitation | Percent change in average total accumulated annual precipitation in inches | 35 in (27 to 38) | Lower | NA | NA |
| | | | Higher | 7.8% (3.8 to 13.6) | 13.6% (6.7 to 22.5) |
| Late Summer Precipitation | Percent change in average July 15-September 15 precipitation | 1 in (0 to 3) | Lower | NA | NA |
| | | | Higher | -12.5% | -10.4% |

| Metric | Description | Historical Baseline | Scenario | Mid-Century | Late-Century |
|---|---|---|---|---|---|
| | | | | (-33.6 to 21.2) | (-35.3 to 12.1) |
| Precipitation Drought | Likelihood that summer (June-August) precipitation in any given year is below 75% of average historical precipitation | NA | Lower | NA | NA |
| | | | Higher | 0.25 (0.14 to 0.46) | 0.30 (0.23 to 0.42) |
| Heavy Precipitation Magnitude | Percent change in the maximum amount of water from the 24-hr rainstorm that occurs on average once every 2 years | NA | Lower | NA | NA |
| | | | Higher | 13% (6 to 26) | 18% (6 to 25) |
| Extreme Precipitation Magnitude | Percent change in the maximum amount of water from the 24-hr rainstorm that occurs on average once every 25 years | NA | Lower | NA | NA |
| | | | Higher | 12% (4 to 33) | 19% (-2 to 33) |
| 1-inch Precipitation Days | Change in days with more than 1-inch total precipitation | 4 days (2 to 6) | Lower | NA | NA |
| | | | Higher | 0.6 days (0.2 to 1.1) | 0.7 days (0.4 to 1.6) |
| 2-inch Precipitation Days | Change in days with more than 2 inches total precipitation | 1 day (0 to 1) | Lower | NA | NA |
| | | | Higher | 0.2 days (0 to 0.3) | 0.3 days (0.0 to 0.4) |
| 3-inch Precipitation Days | Change in days with more than 3 inches total precipitation | 0 days (0 to 0) | Lower | NA | NA |
| | | | Higher | 0.1 days (0 to 0.1) | 0.1 days (0 to 0.1) |
| Snowpack | Percent change in the amount of water contained in the snowpack (snow water equivalent) on April 1 | 12 in (11 to 14) | Lower | -59% (-68 to -39) | -69% (-81 to -43) |
| | | | Higher | -65% (-79 to -46) | -87% (-93 to -73) |
| Snowpack Drought | Likelihood that any year has April 1 snowpack below 75% of the 1981-2010 average | NA | Lower | 0.40 (0.33 to 0.47) | 0.48 (0.37 to 0.60) |
| | | | Higher | 0.47 (0.39 to 0.60) | 0.67 (0.53 to 0.81) |

[1]University of Washington Climate Impacts Group. Climate Mapping for a Resilient Washington. https://cig-wa-climate.nkn.uidaho.edu/. Accessed 7 February 2023.