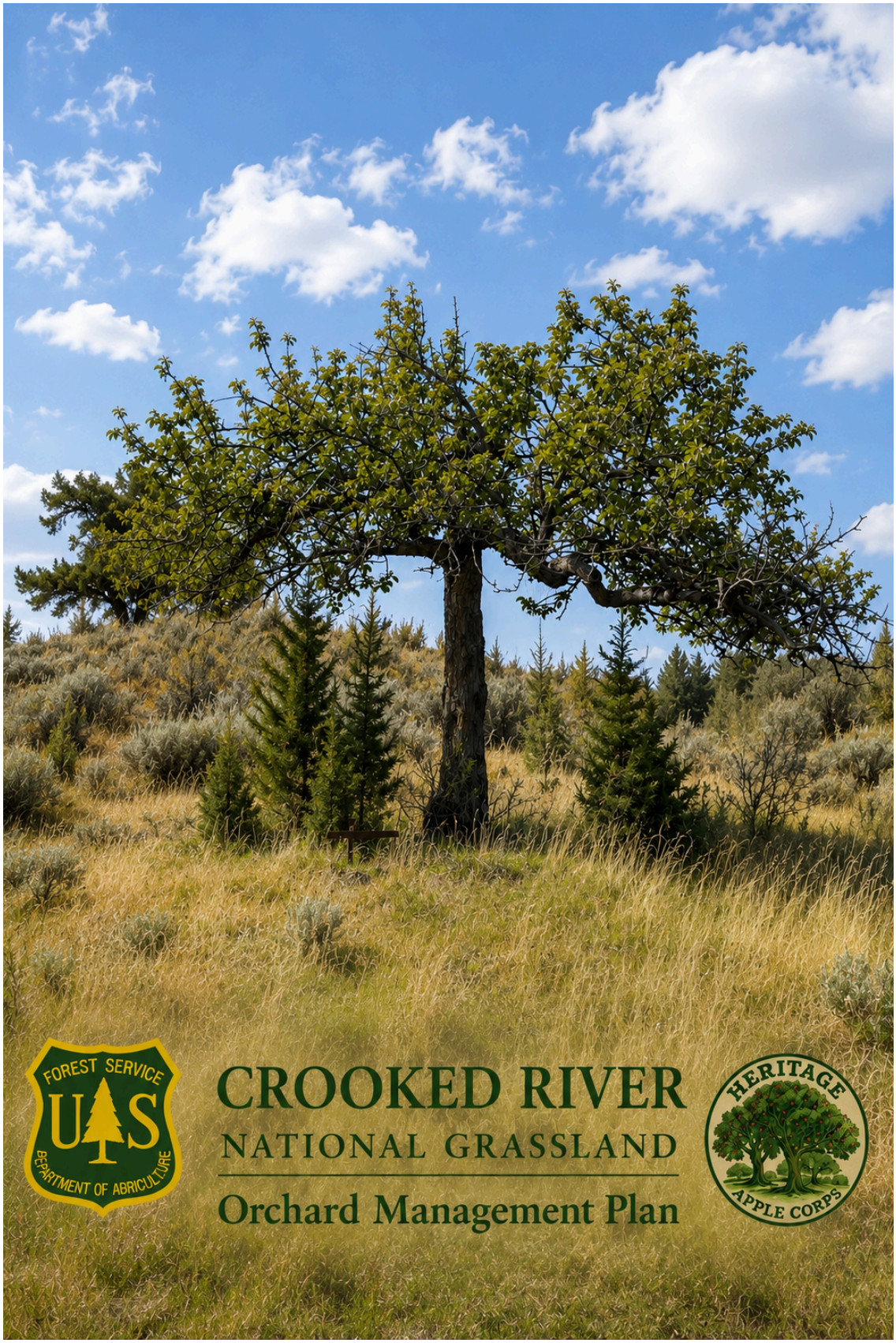
FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE
CROOKED RIVER
NATIONAL GRASSLAND
Orchard Management Plan
HERITAGE
APPLE CORPS

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Introduction

Crooked River National Grassland, part of the Ochoco National Forest, spans 111,571 acres in Central Oregon. Originally inhabited by the Warm Springs and Northern Paiute Tribes, the grassland is composed of a rugged mixture of high-desert sagebrush and juniper ecosystems. After European settlement in the late 19th and early 20th century, the landscape started to transform with the introduction of grazing.[1] In the 1930's and 1940's the federal government began acquiring parcels of the land for restoration until Crooked River National Grassland (CRNG) was consolidated and formally established in 1960.[2] Today the grassland serves as the only Forest Service managed grassland in the Pacific Northwest Region and is a federally protected swath of public land popular for outdoor recreation such as hunting, fishing, hiking, and bicycling.

CRNG is rich in American pioneer history, with evidence of early settlement from the late 19th and early 20th century spread across the grassland. Although many of the settlements were abandoned due to harsh conditions, living remnants of historic orchards persist in several locations. These locations include the McCoin Orchard and Cyrus Orchards. Additional clusters, including a small grove near Lithgow Springs, and individual trees scattered throughout the grasslands add additional context to the historic landscape.[2]

The McCoin Orchard, located on the southeast flank of Gray Butte, was originally planted in 1886 by Julius and Sarah McCoin as part of their family homestead. Claiming 160 acres from the Homestead Act, they selected their homestead at the head of a spring where water was readily available for their livestock and orchards.[3] The orchard provided fruit, including apples, pears, and plums, for the family and local markets. The property remained in the family until 1934, when Walter McCoin sold the land to the U.S. Forest Service (USFS) under the National Grassland Relocation/Marginal Lands Program.[3] Recognized for its cultural and historical significance, McCoin Orchard was added to the National Register of Historic Places in 2015, highlighting its role in early settler agriculture in Central Oregon.[3]

The Enoch and Mary Cyrus Orchard dates to the early 1880s when Enoch and Mary Cyrus established a homestead near Gray Butte in 1882. The landscape of sage and aspen was cleared to develop a diversified farm that included extensive orchards of apples, crabapples, peaches, and pears. In addition to farming approximately 500 acres, the Cyrus family tended 1,500-3,000 head of sheep.[4] Enoch Cyrus was a prominent local agricultural pioneer, introducing hard winter wheat known as "Cyrus Wheat", innovative harvesting equipment, and barbed-wire fencing to the region. The orchard at the family's Horse Camp site retains several surviving apple varieties. A short distance away, their son Omer (Omer) Cyrus homesteaded in 1900 and planted what is now known as the Omer Cyrus Orchard on a north-sloping hillside. Remarkably well-preserved despite minimal irrigation, this orchard still bears vigorous apple, crabapple, and pear trees.[4] In 1934 Warren Cyrus sold the land to the Relocation/Marginal Lands Program after Enoch and Mary moved north to farm potatoes.[4,5]

Beginning in the 1970's, and documented as late as 2001-2003, members of the USFS began pruning and removing encroaching vegetation to recover the abandoned orchards. Efforts to map and catalogue the trees gained momentum in 2012 when the Jefferson County Historical Society and Home Orchard Society of Portland undertook an effort to survey the orchards.[3] Today, efforts to preserve and restore the orchards continue. The Heritage Apple Corps, a collaborative effort involving USFS staff, and community volunteers has begun creation of a gene bank at the Historic Apple Preservation Arboretum in Clarno, conducted several workdays to remove encroaching brush to mitigate wildfire risk, continued variety identification and DNA analysis, and conducted two years of pruning and historic orchard rehabilitation workshops.[3]

Although preservation efforts began and have continued sporadically as early as the 1970's, the orchards have experienced neglect and suffered degradation from inconsistent management efforts. The remaining trees, many of which are in remarkable condition given their age and environmental exposure, are at risk of death and/or further decline from vegetative encroachment, pest and disease pressure, increased wildfire risk, and natural decline.

There is no existing orchard management plan for the historic orchard resources on the CRNG. Due to a lack of resources, preservation of these resources has not been a priority. However, significant local and regional community interest and engagement have fostered access to more robust resources, allowing for dispersal of effort and opportunity for partnership efforts to encourage active preservation of these cultural legacies. This management plan is intended to contribute to the preservation and restoration of these unique cultural and historical resources by providing a guide and outline for short- and long-term management of the historic orchard resources on the Crooked River National Grassland.

Background of Orchard History in the United States

During the "Golden Age of Pomology" from 1801-1880, fruit diversification and migration dominated the westward expansion of apple varieties.[7] This period is often associated with small farm orchards that include a mixture of seedling and varietal trees that generally exhibit trees with taller trunks, wide spacing, messy unpruned canopies, and biennial bearing.[7]

From 1881-1945 the history of fruit orchards in the United States began to shift to what is known as the early period of orchard specialization and industrialization, characterized by the grafting of variety trees on to seedling rootstock and headed to an open center or a central leader on a shorter trunk.[7] This pruning form was intended to make fruit more accessible, and coincided with orchards plantings on regular tree spacings and the beginning of selecting apples for commercial, or marketable, characteristics.[7]

Between 1804 and 1904, over 6,700 known varieties of apple had been identified.[7] But with the selection of "superior" market varieties during the early period of orchard specialization and industrialization (1881-1945) that number dwindled to hundreds of varieties in the early 20th

century to just tens of varieties by 1945.[7] Since 1946, modern fruit production has become increasingly commercialized and is known as the period of monoculture and orchard intensification.[7] Currently only dozens of varieties of apple are readily available, with most heirloom varieties are rarely found, or lost altogether.

The evolution of orchards in the United States is closely tied to the shifting human experience, evolving and changing with the social and cultural fabric of history. Orchards not only provided livelihoods in the past, but have continued to provide important economic, social, and historical context for food systems. Preservation of historic orchards not only offers the opportunity to step into the past through living history, but to connect to cultural roots and the landscape tied so intimately to them.

Statement of Significance

The remnant orchards located throughout CRNG possess several characteristics that make them a valuable historic natural and cultural resource. These characteristics include: 1) fruit tree varieties and unique genetic material of historic and present significance, 2) orchard design and characteristics that typify identified periods in the history of American fruit orchards, 3) local and regional historical perspective and educational opportunity, and 4) unique natural resource features.

The historic orchard resources across Crooked River National Grassland contain rare, culturally and genetically significant heritage fruit trees that are highly vulnerable to wildfire, insect infestations, and other environmental stressors. Without intervention, these historic resources face potential loss, threatening both their ecological and cultural value. Additionally, the project aligns with Forest Service priorities for hazardous fuels reduction, wildlife habitat improvement, and protection of Nationally listed historic sites.

Management Objectives

The main and sub-objectives of the project are:

1. Preserve and restore historic orchard landscapes within Crooked River National Grassland.
    a. Stabilize and restore living trees to maintain or improve existing conditions.
    b. Mitigate wildfire risks to historic orchard landscapes.
    c. Preserve genetic diversity of heritage fruit trees.
    d. Enhance orchard health through improved management of soil, water, and vegetative landscape components.
2. Promote integrated management of multiple use landscapes.
    a. Restore and maintain rangeland resources.

    b. Improve winter forage habitat for wildlife.
3. Foster ongoing community education and involvement in orchard preservation.
    a. Increase public outreach and education about orchard resources.
    b. Build community capacity through volunteer workshops, training, and events.

Project Team

The preservation and management of the historic orchard landscape will be managed and overseen by the USFS in cooperation with the Heritage Apple Corps. Additional partners are expected to become active as resources and needs shift throughout the lifetime of the project. In addition to partnership entities, the team will consist of community volunteers. Recommended roles and responsibilities for current and future team members are outlined in the Roles and Responsibilities section of this document.

Existing Conditions

The existing conditions in the orchard have been identified through condition assessments conducted sporadically between 2012 and present. Current composition, tree health, and environmental factors are outlined by orchard below. The condition assessment guidelines used to determine tree condition can be found in Appendix A.

Upper McCoin Orchard

The Upper McCoin Orchard currently consists of 31 trees (22 apple and 9 pear). There are nine varieties identified in the orchard, with 6 unique trees that do not currently match any known varieties. The number of apple trees by variety can be found in Table 1. Conditions of the existing trees can be found in Diagram 1.

Table 1. Number of apple trees by variety in Upper McCoin Orchard.[5]

Variety	Number of Trees
Baldwin	1
Black Twig	1
Esopus Spitzenburg	1
Fameuse	2
Lawver	4
Red Astrachan	2
White Winter Pearmain	2
Unique/Unnamed	6
Winesap	2
Yellow Newton/Yellow Pippin	1

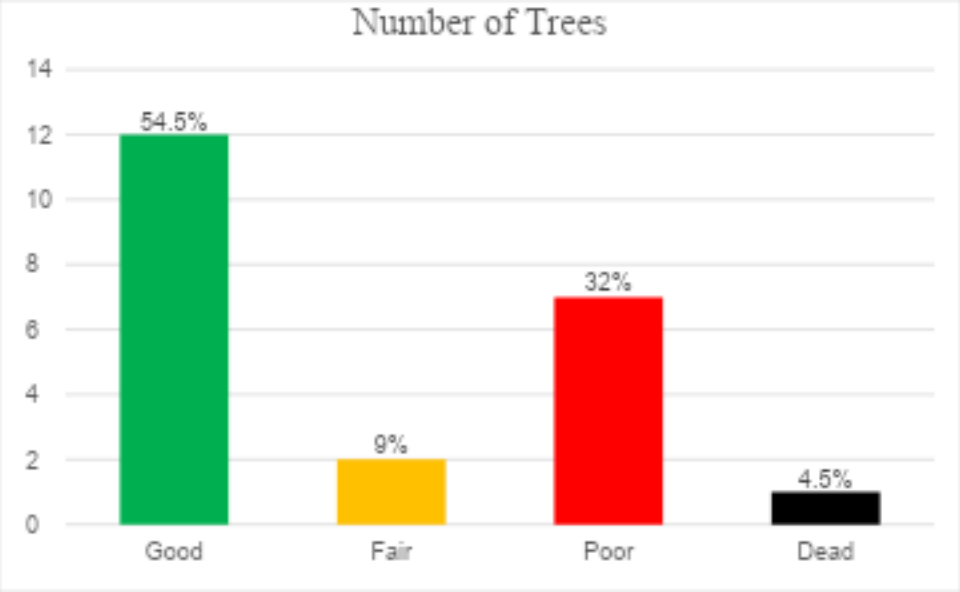

Diagram 1. Number of apple trees by condition in the Upper McCoin Orchard.[5]

Approximately half of trees in the Upper McCoin orchard are currently considered in good condition. The remaining trees are mostly in poor condition, with a small percentage in fair condition and one dead tree. The nine pear trees in the orchard are largely in fair condition, with one tree in poor condition and one tree dead.

First phase vegetation management has occurred in the orchard, with a focus on deadwood removal and encroaching shrub removal. There is deadwood on the ground in several locations within the orchard. There are woody shrubs and junipers encroaching on and within the orchard, increasing hazardous fuels around the fruit trees.

The apple trees in the Upper McCoin orchard have undergone two years of restorative and stabilization pruning in 2025 and 2026. Stabilization pruning has been conducted with the following primary goals: 1) improve structural integrity to reduce chances of catastrophic failure, 2) remove dead, unhealthy, and/or infected wood to slow spread of decline and/or disease, 3) thin structure to increase airflow and reduce disease potential, 4) correct structural deficiencies from historical pruning and neglect, and 5) encourage production of fruit wood and historic orchard character.

There is currently no cover crop management in the Upper McCoin orchard. The cover crop consists of a mixture of native grasses, native broadleaf species, non-native invasive species, and encroaching woody vegetation such as sagebrush and juniper.

There is currently no pest management in the Upper McCoin orchard. Limited pest damage is observable, with indications of seasonal damage from tent caterpillars. It is likely that codling moth is also present within the orchard.

There is currently no irrigation management in the Upper McCoin orchard, with no direct access to any existing water source. The orchard currently does not experience any supplemental irrigation and relies on rainfall and groundwater. There is a cattle water station at the bottom end of the orchard. Documentation indicates the orchard was irrigated or had access to irrigation historically.

Lower McCoin Orchard

The Lower McCoin Orchard currently consists of 31 trees (30 apple and 1 plum). There are eight varieties identified in the orchard, with four unique trees that do not currently match any known varieties. The number of apple trees by variety can be found in Table 2. Conditions of the existing trees can be found in Diagram 2.

Table 2. Number of apple trees by variety in Lower McCoin Orchard.[5]

Variety	Number of Trees
Alexander	5
Baldwin	4
Blue Pearmain	1
Gloria Mundi	4
Missouri Pippin	1
Northern Spy	2
Unique/Unnamed	4
Wealthy	7
Yellow Bellflower	2

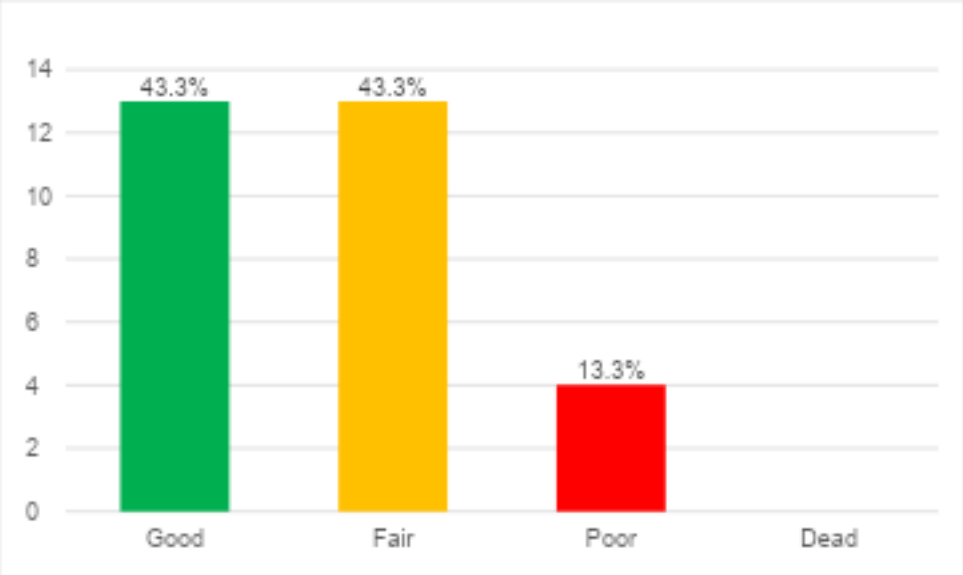

Diagram 2. Number of apple trees by condition in the Lower McCoin Orchard.[5]

Most of the trees in the Lower McCoin orchard are currently considered in good or fair condition. The remaining trees are in poor condition. The one plum tree is in poor condition.

Minimal vegetation management has occurred in the orchard, with a focus on deadwood removal and minimal encroaching shrub removal. There is deadwood on the ground in several locations within the orchard. There are woody shrubs and junipers encroaching on and within the orchard, increasing hazardous fuels around the fruit trees.

The apple trees in the Lower McCoin orchard have undergone two years of restorative and stabilization pruning in 2025 and 2026. Stabilization pruning has been conducted with the following primary goals: 1) improve structural integrity to reduce chances of catastrophic failure, 2) remove dead, unhealthy, and/or infected wood to slow spread of death and/or disease, 3) thin structure to increase airflow and reduce disease potential, 4) correct structural deficiencies from historical pruning and neglect, and 5) encourage production of fruit wood and historic orchard character.

There is currently no cover crop management in the Lower McCoin orchard. The cover crop consists of a mixture of native grasses, native broadleaf species, non-native invasive species, and encroaching woody vegetation such as sagebrush and juniper.

There is currently no pest management in the Lower McCoin orchard. Limited pest damage is observable, with indications of seasonal damage from tent caterpillars. It is likely that coddling moth is also present within the orchard.

There is currently no irrigation management in the Lower McCoin orchard. There is a cattle water station at the top end of the orchard which creates some seep into the upper reaches of the orchard and indicates there is groundwater available. The orchard currently does not experience any supplemental irrigation and relies on rainfall and groundwater. Site observations indicate the orchard was irrigated or had access to irrigation historically.

Cyrus Orchard

The Cyrus Orchard currently consists of 23 apple trees. There are seven varieties identified in the orchard, with nine unique trees that do not currently match any known varieties. The number of apple trees by variety can be found in Table 3. Conditions of the existing trees can be found in Diagram 3.

Table 2. Number of apple trees by variety in Cyrus Orchard.[5]

Variety	Number of Trees
Blue Pearmain	1
Duchess of Oldenburg	1
Monmouth Pippin	1
Northern Spy	1
Ohio Pippin	1
Red Astrachan	1
Unique/Unnamed	9
Yellow Transparent	8

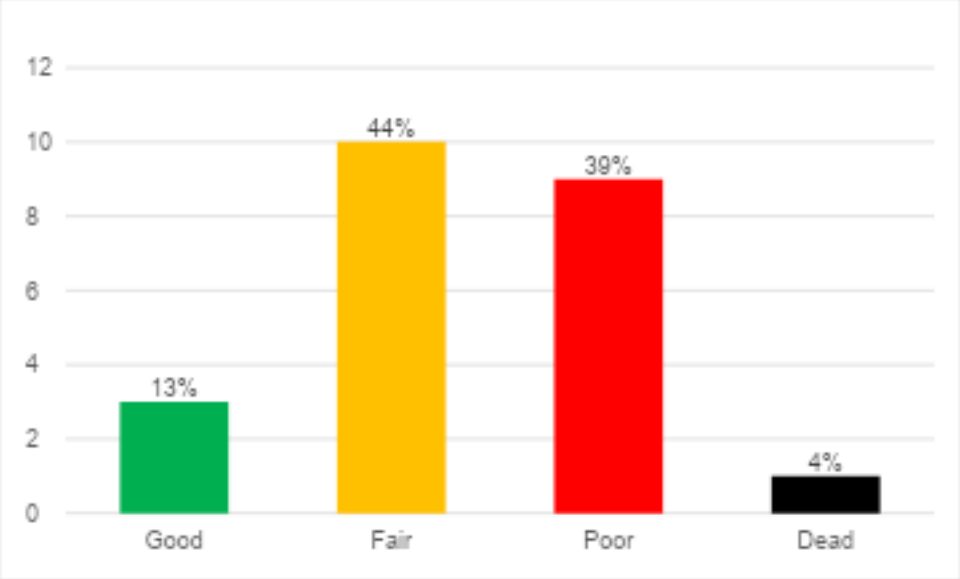

Diagram 3. Number of apple trees by condition in the Cyrus Orchard.[5]

Most of the trees in the Cyrus orchard are currently considered in fair or poor condition. Only three trees are in good condition, and there is one dead tree. Condition is likely due to natural tree aging, harsh environmental conditions, and lack of access to a reliable water source.

Vegetation management has recently occurred in the orchard, with a focus on deadwood, shrub, and tree removal. Two workdays have removed significant amounts of deadwood from the orchard, and material has been removed and chipped; however, there is still sagebrush and juniper intrusion into the orchard, increasing the hazardous fuels risk around the fruit trees.

The apple trees in the Cyrus orchard have undergone first-year restorative and stabilization pruning in 2026. Stabilization pruning has been conducted with the following primary goals: 1) improve structural integrity to reduce chances of catastrophic failure, 2) remove dead, unhealthy, and/or infected wood to slow spread of death and/or disease, 3) thin structure to increase airflow

and reduce disease potential, 4) correct structural deficiencies from historical pruning and neglect, and 5) encourage production of fruit wood and historic orchard character.

There is currently no cover crop management in the Cyrus orchard. The cover crop consists of a mixture of native grasses, native broadleaf species, non-native invasive species, and encroaching woody vegetation such as sagebrush and juniper.

There is currently no pest management in the Cyrus orchard. Limited pest damage is observable, with indications of seasonal damage from tent caterpillars. There is an observable gall, likely crown gall, on one of the trees in the orchard. It is likely that coddling moths are also present within the orchard.

There are currently no irrigation resources in the Cyrus orchard, and no supplemental irrigation is occurring.

Cyrus Horse Camp Orchard

The Cyrus Horse Camp Orchard currently consists of 11 apple trees. There are two varieties identified in the orchard, with eight unique trees that do not currently match any known varieties. The number of apple trees by variety can be found in Table 4. Condition of the existing trees can be found in Diagram 4.

Table 4. Number of apple trees by variety in Lower McCoin Orchard.[5]

Variety	Number of Trees
Red Astrachan	2
UAF5	1
Unique/Unnamed	8

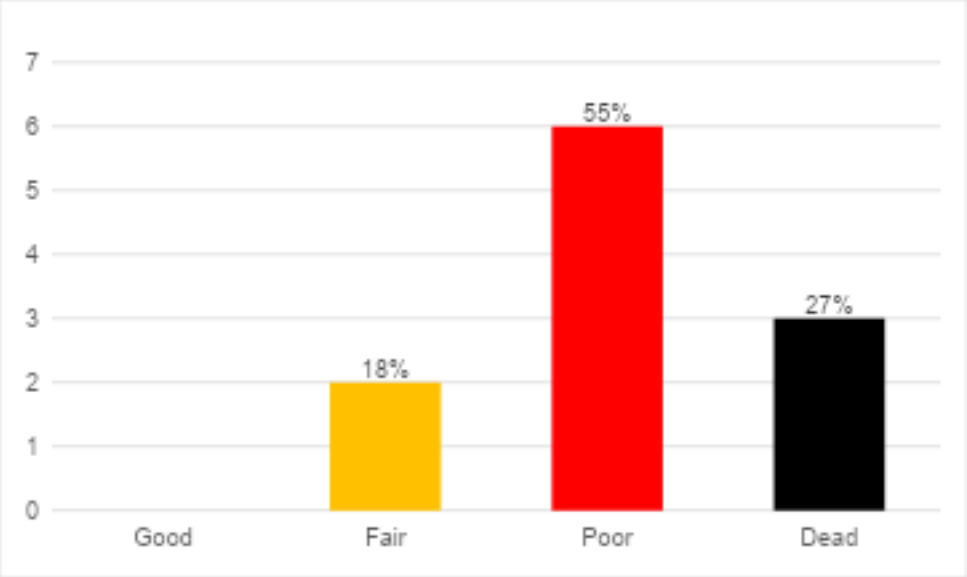

Diagram 4. Number of apple trees by condition in the Cyrus Horse Camp Orchard.[5]

Most of the trees in the Cyrus Horse Camp orchard are in poor condition. Over 25% of the trees in the orchard are dead and there are currently no trees in good condition.

Vegetation management has not occurred in the orchard, but it is located next to a camping area with frequent use and there are numerous larger trees around the orchard remnant. Juniper and brush encroachment along and proximate to the orchard increase the risk of high intensity wildfire. The dead trees remaining in the orchard also provide larger fuel accumulation.

The trees in the Cyrus Horse Camp orchard have not been pruned for stabilization.

There is currently no cover crop management in the Cyrus Horse Camp orchard. The cover crop consists of a mixture of native grasses, native broadleaf species, and non-native invasive species.

There is currently no pest management in the Cyrus Horse Camp orchard. Limited pest damage is observable, with indications of seasonal damage from tent caterpillars. It is likely that codling moth is also present within the orchard.

There is an old spring box and cistern just offsite of the orchard. The spring box may indicate there was historically irrigation, or a water source for livestock; however, the system is not currently being utilized. Observation indicates the springs have dried up.

Lithgow Springs/Other

There are several trees on the grassland that do not occur in the above-mentioned orchards. Some areas consist of small groves of trees, like that near Lithgow Springs, and some are individual trees on the landscape. There is an additional historic orchard near Cyrus Barn that contains some pear thickets and mature pear trees. The condition of individual trees has not currently been evaluated, but the small grove near Lithgow Springs contains seven trees including five apples, one pear, and one plum. Five varieties have been identified.

Table 5. Number of apple trees by variety in Lower McCoin Orchard.[5]

Variety	Number of Trees
Baldwin	2
Esopus Spitzenburg	1
McIntosh	2

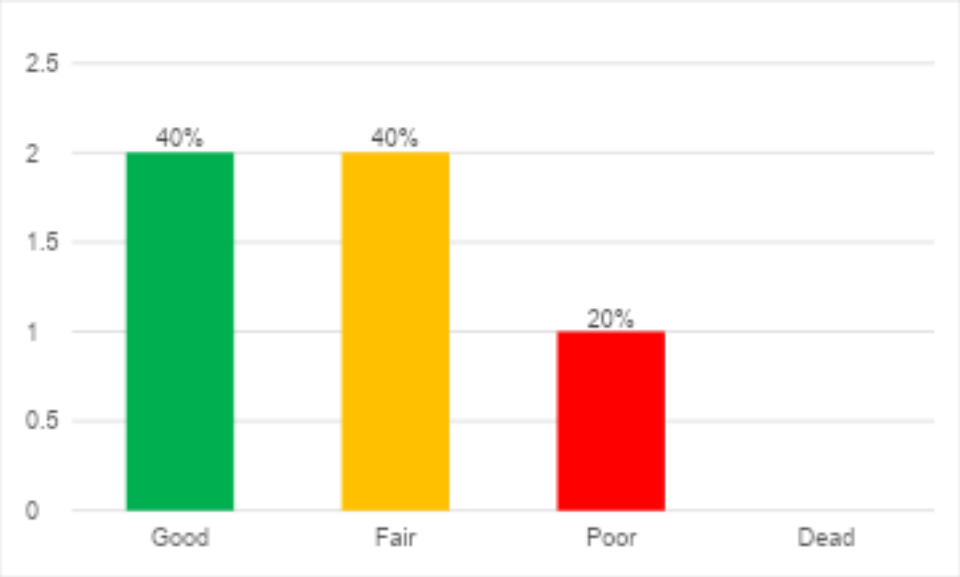

Diagram 5. Number of apple trees by condition near Lithgow Springs.[5]

Most trees near Lithgow Springs are in good to fair condition (80%). Only one of the trees is in poor condition. Additionally, the one pear tree is in good condition and there is one plum tree in fair condition.

Vegetation management has not occurred for the trees near Lithgow Springs. These trees are surrounded by encroaching vegetation, including sagebrush and juniper. The surrounding plant material increases fuels near the heritage trees and increases the risk of wildfire related injury or death.

The trees near Lithgow Springs have not been pruned for stabilization, have not experienced cover crop management, have not been evaluated for pest pressure and have no supplemental irrigation. It is possible the proximity to the spring may be providing sufficient groundwater to keep the trees in fair to good condition.

Proposed Actions

Summary

The following section outlines a summary of the proposed actions recommended to stabilize and preserve the fruit trees located in the Upper and Lower McCoin Orchards, Cyrus Orchard, Cyrus Horse Camp Orchard, the grove near Lithgow Springs, and miscellaneous historic fruit trees throughout the grassland. More detailed information regarding each action item can be found in subsequent categories of this document.

1) Use the 5-year orchard management plan to complete necessary environmental policy review (NEPA) to approve management actions to stabilize and preserve heritage fruit orchards and trees across CRNG.

2) Undertake regular assessment and monitoring of orchard condition to track trends in orchard health to guide management decisions.

3) Conduct fuels treatments in and surrounding known orchards and trees to decrease wildfire risks to historically significant cultural and natural resources.

4) Continue DNA and varietal identification to completely evaluate the rarity of the surviving trees and take steps to preserve rare and unique genetic resources.

5) Conduct initial stabilization pruning for 3-5 years on all orchards and trees in the grassland to improve structural integrity to reduce chances of catastrophic failure, remove dead, unhealthy, and/or infected wood to slow spread of death and/or disease, thin structure to increase airflow and reduce disease potential, correct structural deficiencies from historical pruning and neglect, and encourage production of fruit wood and historic orchard character. Continue subsequent maintenance pruning after the stabilization period at an interval that meets the pruning needs of the trees and can be maintained with available resources. Subsequent pruning is recommended annually, although some trees may not require annual maintenance pruning.

6) Use the recommendations below to guide and evaluate cover crop, pest, and irrigation status and challenges, and determine appropriate actions to promote preservation and restoration of historic orchard resources in accordance with project objectives.

7) Continue to promote education and community involvement through the maintenance and development of inter-agency partnerships, interpretive materials, outreach and training events, and volunteer coordination.

Management Recommendations

Assessment and Monitoring

Condition assessments establish basic information regarding orchard health, including tree identification, tree location and numbers, basic health and condition, and potential threats to orchard and tree health. This information helps managers make informed decisions about management priorities and decisions and establishes a baseline to track how management decisions impact stabilization performance.[6]

Condition assessments are not currently completed on an annual basis, making it impossible to track year-to-year changes in orchard health or annual changes in tree health due to management practices or environmental factors. Making timely decisions regarding management actions requires current and trend data that identifies why certain outcomes are observed. The most

recent condition assessment survey form and description of assessment components can be found in Appendix A.

It is recommended that annual condition assessments be performed and tracked to begin capturing the annual dynamic trends affecting orchard health, with an in-depth (including photos) condition assessment at least every 5 years thereafter.[6] If resources are limited, condition assessments should be completed as often as possible.

A comprehensive guide to condition assessment elements and process can be found on pages 40-63 in the Historic Orchard and Fruit Tree Stabilization Handbook by the California State Parks and National Park Service. A free online copy of this manual can be found at: https://irma.nps.gov/DataStore/Reference/Profile/2191277.

Genetic Preservation

The historic fruit trees and orchards in CRNG offer two unique opportunities regarding genetic culture. Firstly, they have rarely found surviving varieties associated with westward expansion in the mid-19th century such as Baldwin, McIntosh, Red Astrachan, Esopus Spitzenburg, and others; Secondly, there are 27 trees with unique genetics that match no known named variety.

There are four potential reasons that tree genetics may not match a named variety. These include: 1) genetically distinct seedling trees that grew from a heterozygous parent seed, 2) they represent a lost variety that was once propagated but have disappeared from commerce and documentation, 3) they are regional selections that were propagated locally but never distributed to a wider market, and 4) they are regrown from the rootstock (when apple trees of a variety are sold by a nursery, the tree is composed of two parts: the top is of the named variety, and is grafted onto roots of another variety. Period nurseries would sometimes use seedling roots as rootstock. Old trees may have their trunk die while the roots remain alive underground, pushing up new shoots that are genetically identical to the rootstock rather than the fruit wood.[9]

Regardless of the reason for the unique tree genetics, they represent an important genetic diversity that is not only a living history from the 19th century pioneer orchards in Central Oregon, but a valuable reservoir for research that could yield unique traits for apple taste, pest resistance, or climatic adaptation. Additionally, DNA analysis may be able to link these characteristics to lost varieties and recover knowledge to expand data on orchard history in the United States.[9]

Due to the unique nature of the trees surviving in the CRNG orchards, it is critical to preserve their genetics in the event of resource loss due to disease, environmental events, or wildfire. To ensure genetic preservation, it is essential to collect and successfully grow or graft genetically identical parent material that can both preserve the genetic individuality and provide material for future propagation to be used if orchard restoration is adopted as part of a long-term resource management strategy. This work is already partially underway with 20 CRNG trees grafted prior to 2025, and an additional 29 trees (19 from CRNG) in 2025. In 2026, approximately 90 heritage

trees were grafted, including an estimated 28 CRNG trees. The 2026 grafts are intended for planting in the preservation orchard in spring of 2027.

A site has been selected to house the genetically preserved material, which is located outside of the CRNG and Ochoco National Forest Lands. This location offers advantages which include geographic isolation in a catastrophic event (such as wildfire), partnership support for care and maintenance that does not rely on the USFS in the event of resource or staffing changes, and access to resources that may improve survivability of material. Disadvantages include dependence on external funding, potential loss of access to material, and alterations in site dynamics from the parent material location.

Expansion of genetic preservation is recommended, including the preservation of named varieties in addition to unique varieties. In addition to Malling-Merton 111 (MM-111) rootstock, it is also recommended that preserved genetic material be grafted onto a variety of rootstocks to ensure higher survival rates long-term, including the selection of at least two selections that are site suitable. Consultation with a fruit specific horticulturist is recommended during rootstock selection.

A memorandum of understanding or partnership agreement should be created to ensure that genetic material remains available to the USFS for restoration efforts long-term in the event of a change in partnership or orchard ownership for the preserved material. Additionally, distribution of the material to the public or partners should adhere to all agency regulations for use of federally owned resources, including any necessary legal authorities and associated documentation, such as partnership agreements and/or special use or commercial use permits.

The genetic reserve present in the orchards on CRNG offer a rare resource that characterizes not only a living cultural landscape but an opportunity to preserve that history for continued enjoyment and education for this and future generations. Germplasm conservation is consistently an initial step in stabilization and preservation of historic orchards.[6]

Wildfire Risk Reduction[8]

Wildfire risk and potential exposures to the historic orchards were first recognized around 2012. At that time the fuels program leadership initiated a live and dead fuels reduction project that was accomplished utilizing agency fire personnel. The objective of the treatment was to reduce live fuels (juniper and brush) from around the live fruit trees to create a modified fuel free zone to protect the heritage trees.

The wildfire risk to the orchards is considered using five categories: 1) vegetation and fuels, 2) recent nearby fire activity, 3) ignition sources and human presence, 4) topography and weather, and 5) values and consequences. These categories are discussed below. It is important to note that the USFS and local partners have documented and started restoration and fuels treatments, which reduce risk where applied but currently are limited in extent compared with the full landscape exposure.

Orchards are embedded in sagebrush/grass and scattered juniper stands typical of the Crooked River National Grassland — a fuel mix that supports fast-moving, wind-driven fires and produces embers that can ignite trees and structures. The significant encroachment of juniper, sage, bitterbrush, and other species have significantly increased ladder fuels that can generate high intensity flame fronts capable of damaging or destroying the heritage trees. Climate trends show increasing drought stress and extended fire seasons, elevating overall exposure risk. Additionally, surrounding vegetation and hazardous fuels in the adjacent landscapes have similar, and often more exaggerated vegetative conditions. Low- to moderate-intensity fires in grasses and shrubs can escalate to higher intensity where juniper or denser brush is present, threatening orchard trunks and root zones.

There is a recent history of fire activity in the area. Large, fast-moving fires have burned on the Crooked River National Grassland in recent seasons (for example the Alder Springs, Cram, and Flat fires of 2025), showing the area is vulnerable to rapid fire growth under the right weather/fuel conditions. This demonstrates a credible, recent ignition source threat to sites on the grassland.

Human usage is often associated with additional ignition risks. The grassland receives recreational use (trailheads, horse camp, dispersed camping, OHV areas) and is adjacent to private lands — increasing the chance of human-caused ignitions (campfires, equipment, vehicles). Historic homesteads/orchards close to trailheads and camps are therefore exposed to those ignition pathways. Since human activity (camping, OHV, other) is a plausible ignition source, public education and access controls matter.

Topography and weather can also impact fire risk. Local buttes, canyons and open slopes (e.g., Grey/Haystack Butte areas) can channel winds and create conditions for rapid upslope/downslope spread and long-range spotting — elevating fire intensity and reducing predictability for suppression around the orchards. During periods of hot, dry, windy, and red-flag conditions the orchards face rapid fire spread and ember exposure; individual trees and heritage features are vulnerable even if the main flame front does not directly pass through.

Value is assessed as more than a dollar amount. The orchards are a historic, irreplaceable resource, listed in heritage records and subject to ongoing volunteer restoration efforts, which raises the consequence level if they’re damaged and elevates the need for targeted fuels management and protection planning.

The following fuels management and wildfire risk mitigations are recommended:

1. Initial high priority mitigation efforts should focus on reducing fire spread probability, reducing radiant heat exposure, and lowering ladder fuel continuity within the established boundaries of the orchards.

- Efforts should focus on removing 90% of the existing brush and junipers within the orchards by manual cutting; debris should be moved offsite for disposal by chipping or burning. Avoid leaving chips within or directly adjacent the orchard boundary.
- Remove 90% or more of the existing deadfall where allowed.
- Periodic maintenance of these actions should occur every 2-5 years to ensure undesirable vegetation growth is kept in check.

2. Establish a 300 ft buffer around the boundaries of the orchards.
    - Reduce the density of existing brush and juniper by 50% at minimum, with 100% juniper removal recommended.
2. Annually, use low-impact string trimmers to trim fine fuels to within 4 inches of ground level within the driplines of all heritage trees. Trimming should be timed in late spring when growth has slowed and vegetation shows maturity and decreased growth rate.
3. Evaluate prescribed burning options adjacent to the orchard boundaries; consult with jurisdictional agencies and specialists to identify unit boundaries and prescriptions for burning.
4. Add messaging that addresses orchard vulnerability to wildfires to any existing or planned interpretive signage.

    Example:

    "These historic orchards are valuable cultural landscapes dating back to early homestead settlements in the Crooked River National Grasslands. They are vulnerable to wildfire due to dry grass, juniper encroachment, and increasing summer temperatures. How You Can Help Reduce Wildfire Risk:

    - *Stay on established roads and trails*
    - *Do not smoke or build fires near the orchards*
    - *Keep vehicles off dry grass during fire season*
    - *Report smoke or fire immediately to 911*

    Your stewardship helps protect these rare and irreplaceable historic resources for future generations."

5. Coordinate response plans with FS/BLM and Jefferson County RFPD. Ensure the orchards are identified as priority areas for effective initial and extended attack responses and the appropriate suppression actions in or near the orchards.

The single greatest short-term threat to the historic orchard survival is environmental extremes, particularly wildfire. Wildfire mitigation is a high-priority management strategy that can prolong the longevity of the orchards and is critical to protect all other efforts addressed in this management plan.

Pruning

Pruning is one of the most integral and undervalued components to orchard stabilization, preservation, and management. It can also be one of the most overwhelming components of orchard stabilization, particularly in historic and neglected orchards. Although there is variability in pruning methods based on orchard goals, there are some basic principles to establish a pruning baseline.

Stabilization pruning should focus on four main elements: 1) improve structural integrity to reduce chances of catastrophic failure, 2) remove dead, unhealthy, and/or infected wood to slow spread of death and/or disease, 3) thin structure to increase airflow and reduce disease potential, and 4) correct structural deficiencies from historical pruning and neglect.

The initial process of stabilization pruning should be: 1) removal of dead and diseased wood, 2) removal of root suckers or suckers emanating from the base of the trunk, 3) removal of suckers, waterspouts, and crossing branches, 4) removal of broken or structurally compromising branches, 5) removal of wood weight to prevent catastrophic failure, and 6) thinning or pruning to reduce or eliminate disease spread.[6] Stabilization pruning should be undertaken over a period of 3-5 years, with a multi-year approach in mind, to dilute stress to the tree from excess removal and allow for efficient use of limited resources such as pruning expertise, and time and financial limitations. After the stabilization period, pruning should continue an annual basis to maintain stability and promote orchard objectives.

If orchard objectives extend beyond stabilization, it is recommended to identify permanent staff and/or long-term partner participants to train on historic fruit tree pruning stabilization and preservation specifics, as this document is not intended to address in-depth pruning theory. There have been historic orchard pruning workshops in the McCoin and Cyrus orchards in 2024 and 2025, led by horticultural experts in fruit tree management with many returning participants. It is recommended this continue in 2026 and future years. Proper pruning is integral to the long-term success of any historic orchard, and specialized pruning resources should be prioritized, either on staff of the managing agency, or in a partner or volunteer capacity. Sporadic and/or untrained pruning can be detrimental to the longevity of historic trees.

Cover Crop Management

This section is considered separately from fuel and fire mitigation, as it addresses general long-term management decisions in orchard management. Cover crop management in a historic orchard can vary based on orchard goals. Historic orchards on public land are unique in that they can be managed as cultural resources, while considering a multiple resource focus. General cover crop management is focused on removing competition and encroaching vegetation.[6] Additional considerations may be available resources, pest/disease and water pressure, natural resource concerns, and unique site limitations.

Cover crops can serve multiple functions, such as improving soil health, mediating orchard temperature, increasing water infiltration, preventing erosion, and increasing landscape biodiversity.[9] ***They can also act as competition for resources including soil nutrients and available water, and serve pest and disease reservoirs by increasing humidity, creating favorable environments for fungal growth, and acting as host plants for common orchard pests.***

Initial observations indicate that the cover cropping in the orchard is composed of native perennial and annual grasses and herbaceous broadleaves, limited non-native invasive species, and encroaching woody shrubs and trees. Potential management tactics to be considered are: 1) mowing and/or manual cover crop maintenance around tree base and dripline, 2) removal of non-native invasive species followed by seeding with appropriate and desired native species, 3) boot brushes and shoe cleaning for any equipment or persons involved in any ground disturbing activity associated with other orchard management activities, 4) alteration of existing cover crop through seeding or changes in other management strategies (such as irrigation), and 5) no action.

Currently, it is not recommended that any cover crop alteration be undertaken prior to fuels management, as cursory observation does not indicate significant cover crop risks. It is recommended to survey and treat any non-native invasive species, starting nearest the orchard and working outwards and using a method that aligns with any integrated pest management priorities established by the forest unit.

It is recommended that after initial fuels treatments and fire mitigation treatments the orchard floor is evaluated to determine appropriate management direction. This evaluation should consist of a species survey, an interval-based assessment of composition and height throughout the growing season to determine if current cover cropping poses any risks or benefits to orchard health, as well as an assessment to determine what forage and or nesting habitat the species composition provides. Any changes to the existing orchard floor composition (such as irrigation or water supply) must be considered in tandem with cover crop management, as both interact to produce changes to the orchard ecosystem.

Should cover crop management be determined to be valuable for long-term orchard stabilization, considerations should be made regarding resource availability, accessibility, and environmental components. Additionally, and pest or disease observations should be considered in tandem with cover crop management decisions, as many are related and mutually intertwined.

Pest Management

A comprehensive pest assessment and integrated pest management plan have not been established for the CRNG orchards. Initial visual inspection of the orchards indicates relatively limited current pest and disease threat, likely due to the isolated nature of the orchards. Initial observances indicate the limited presence of coddling moth and gall disease. Additional observations have indicated annual damage due to tent caterpillars.

A comprehensive pest assessment is recommended. This assessment would consist of interval recorded observations in the orchard throughout the growing season by a trained orchard pest specialist. Methods could include visual observation and recording. If any signs or symptoms of orchard pests or diseases are identified, additional focus would be on identification via trapping methods or specimen submittal for laboratory analysis. Once all associated pests and diseases are identified, an integrated pest management (IPM) plan should be developed by a qualified horticultural specialist to align with the orchard objectives. An IPM plan typically involves assessing risk and threat from existing and potential pests and disease, identifying target thresholds for damage, and developing a multi-faceted prevention and treatment plan that balances biological, mechanical, chemical, and cultural controls to manage the threat while reducing risks to people and the surrounding environment.

Once pests are identified and an IPM plan is put in place, informed active management of the pest and disease threat can be implemented and should be included in long-term planning and the comprehensive orchard management plan.

Irrigation and Water Resource Management

Documentation indicates that irrigation was a component of historical management of the orchards; however, irrigation has not played a role in survival of the orchards for decades. Often in mature orchards, older trees establish a balance in unirrigated landscapes, developing deep root systems to locate ground water, and reducing growth to limit intake needs.[6] Adjustments to water availability can encourage growth, which can be detrimental to tree health if not sustained or coupled with additional management changes such as pruning, fruit thinning, and bracing.[6]

Long-term consideration for irrigation restoration should be considered dependent on long term orchard management objectives; however, short term actions could improve the health and/or stabilization of the existing orchards without disturbing the existing balance between the mature trees and water availability. Although modernized systems could be considered, historic gravity fed systems or hybrid systems could be considered.

Without fully restoring or re-engaging the historic irrigation system, it may be beneficial to prioritize existing spring maintenance, remove competing vegetation such as junipers from springs or waterways, and to plug/fill sloped drainage to improve moisture retention. Long-term water access strategies would be addressed in a comprehensive orchard management plan; however, may only be necessary in the event of orchard re-planting to encourage survival of young trees.

Maintenance of Rangeland Habitat and Winter Wildlife Forage

Juniper removal restores natural sagebrush steppe and mixed-shrub habitats, stimulating the regrowth of native grasses, forbs, and shrubs. This increase of forage is anticipated to have a beneficial impact on wintering herds of elk, mule deer, and pronghorn antelope. Opening the

canopy also increases habitat for sagebrush obligate species such as the sage thrasher and sagebrush lizard, and raptors like the ferruginous hawk and prairie falcon

The forage quality and quantity for domestic livestock as well as other grass foraging wildlife such as elk is lost as juniper increases and grass decreases. As junipers have become the dominant plant species on what were sagebrush/bunchgrass sites, the following changes have occurred: The loss of mid-sized shrubs such as sagebrush, bitterbrush, and rabbitbrush. On many sites cover type conversion occurred from deep-rooted native perennial grasses and forbs to Sandberg bluegrass (shallow-rooted native grass) and annual forbs. This change constitutes a loss of plant species diversity (Condition and Trend transects and personal observation of Grassland personnel).[10]

Eddleman documented increasing juniper density and size has the apparent effect of reducing understory plant cover and productivity, with forage grasses being the most severely reduced while sediment yield is increased. Understory plants may be negatively affected by juniper induced reduction in light, soil moistures, and soil nutrients and by allelopathic factors (plant toxins) in juniper litter and root exudates.[10]

Juniper expansion can also cause undesirable watershed effects. For example, junipers can use soil moisture very early in the spring, before other plants begin to grow. On warm days, individual trees can use up to 20 gallons of water per day. In addition, in Central Oregon studies have shown that up to 20 percent of the annual precipitation may be intercepted by juniper trees before it can reach the grasses and shrubs underneath them. Over time, this competition for water can crowd out the grass and shrubs and increase the amount of bare soil. By reducing competition from junipers for soil moisture, grasses and shrubs become healthier, which in turn promotes watershed health.[10]

Education and Community Engagement

Community engagement has been a driving factor in the survival of the orchard resources within CRNG. Community engagement has secured funding, built partnerships, and drawn a robust volunteer community to participate in orchard management. Continued investment and education opportunities are critical to establishing continued buy-in for orchard restoration, establishing a community knowledge base that ensures long-term management of the orchards under shifting federal priorities, and encourages community support of public lands.

The orchards provide robust educational opportunities, not only for historical and cultural connection, but natural and biological hands-on learning opportunities. Creation and installation of interpretive signs help foster public education and respect for the resource. Additional interpretive materials, such as pamphlets or web pages can also disseminate information about the history and significance of the orchards, drawing interest and support for the public.

It is recommended that community engagement and education continue through strengthening partnerships, continuation of volunteer workdays, continuation of training workshops, and

development of additional interpretive materials, signage, and publications for local, regional, and national outreach.

Timeline

The following is a recommended general timeline for prioritizing and balancing management processes and decisions over the next 5 years for the CRNG historic orchards.

2026:

1. NEPA approval and implantation of fuels reduction activities within and adjacent to the orchards.
2. Conduct comprehensive condition assessment on all orchards, groves, and trees, managed under this orchard management plan on the CRNG.
3. Plan 2027 historic orchard restoration training workshop and workdays.
4. Begin fuels treatments around existing orchards.
5. Continue and/or complete material collection for genetic resource protection.
6. Complete irrigation historical assessment and action decisions.
7. Complete initial orchard pest assessment.

2027:

1. Conduct annual condition assessment on all orchards, groves, and trees, managed under this orchard management plan on the CRNG.
2. Complete fuels treatments around orchard resources.
3. Conduct third year stabilization pruning on Lower and Upper McCoin Orchard
4. Conduct second year stabilization pruning on Cyrus Orchard
5. Conduct first year stabilization pruning on Cyrus Horse Camp Orchard
6. Conduct first year stabilization pruning on Lithgow Springs grove
7. Begin planting of genetic preservation orchard
8. Initiate draft of comprehensive orchard management plan (i.e., identify key participants, necessary inputs and available resources).
9. Complete grafting of all genetic resource material and complete planting of genetic preservation orchards.
10. Initiate cover crop assessment and monitoring.
11. Implement irrigation improvement actions.
12. Follow-up orchard pest assessment and establish action thresholds.

2028:

1. Conduct annual condition assessment on all orchards, groves, and trees, managed under this orchard management plan on the CRNG.
2. Conduct maintenance pruning on Lower and Upper McCoin Orchard

3. Conduct third year stabilization pruning on Cyrus Orchard
4. Conduct second year stabilization pruning on Cyrus Horse Camp Orchard
5. Conduct second year stabilization pruning on Lithgow Spring Grove
6. Conduct first year pruning on additional orchard trees identified for stabilization.
7. Determine cover crop management requirements.
8. Complete additional surveys to capture disease and insect trends.
9. Complete IPM plan for the orchards.
10. Complete any follow-up fuels treatments.

2029:

1. Conduct annual condition assessment on all orchards, groves, and trees, managed under this orchard management plan on the CRNG.
2. Conduct maintenance pruning on Lower and Upper McCoin, and Cyrus Orchard.
3. Conduct third year stabilization pruning on Cyrus Horse Camp Orchard.
4. Conduct third year stabilization pruning on Lithgow Spring Grove.
5. Conduct second year pruning on additional orchard trees identified for stabilization.
6. Continue pest, cover-crop and irrigation assessments and adjust management accordingly.

2030:

1. Conduct comprehensive condition assessment on all orchards, groves, and trees, managed under this orchard management plan on the CRNG.
2. Conduct maintenance pruning on Lower and Upper McCoin, Cyrus, Cyrus Horse Camp, and Lithgow Spring Grove.
3. Conduct third year pruning on additional orchard trees identified for stabilization.
4. Continue pest, cover-crop and irrigation assessments and adjust management accordingly.

Future Actions

Short term future actions include completion of interim NEPA to address high-priority targets for orchard stabilization and preservation (wildfire risk reduction, etc.), immediate year follow-up planning for training workshop on orchard stabilization pruning, beginning assessments for out-year and comprehensive orchard management plan planning, additional preservation of genetic material, and ensuring all agency regulatory requirements are fulfilled.

Development of a comprehensive orchard management plan should be undertaken after initial short-term orchard management goals are assessed. It is recommended that planning for the comprehensive orchard management plan commence in 2027, establishing a draft document that can be finalized through the NEPA process after 3 years of management under the interim orchard management plan and annual condition assessments. If elected, final planning should include a comprehensive orchard management plan approval date of 2030. Additionally, if a comprehensive orchard management plan is not achievable given limited resources and data, it

should be considered to review and update this management document with relevant information and direction for an additional 5 year period.

Components of a comprehensive orchard manage plan or adapted interim orchard management plan include: long-term goals for orchard management in accordance with agency direction, long-term tracking of condition trends to inform decision making and management prioritization, development of an IPM plan, restoration and/or orchard reestablishment and replanting plans (if any), flexible planning for objective achievement in the face of changing agency and administrative direction, and a detailed 5-20 year outline for orchard direction and management objectives.

Roles and Responsibilities

Below are recommended roles and responsibilities for all current and anticipated team members:

USFS

- Conduct required NEPA review and specialist consultation to approve proposed orchard management activities including, but not limited to fuels reduction treatments, fence construction, water source improvement, and interpretive sign installation.
- Conduct, oversee, or direct physical and manual maintenance of the orchard environment including vegetation management, pest management, invasive plant management, exclusion fencing, water source systems, pruning, and propagation.
- Conduct required State Historic Preservation Office (SHPO) approvals and reporting.
- Ensure all partnership, volunteer, and memorandum of understanding paperwork is complete and in accordance with agency policy.
- Oversee, review, approve, and install interpretative materials.
- Ongoing maintenance of Clarno Preservation Arboretum

Heritage Apple Corps

- Develop the draft orchard management plan for USFS approval.
- Coordinate the annual Heritage Orchard Rehabilitation and Maintenance Workshop.
- Coordinate additional field days for pruning and fuel reduction around CRNG heritage trees
- Conduct fruit tree variety identification/inventory using DNA testing.
- Establishment of preservation arboretums to propagate heritage varieties to ensure survival and safeguard their genetic diversity against catastrophic loss.

Heart of Oregon Corps

- Conduct physical and manual maintenance of the orchard environment including vegetation management, pest management, invasive plant management, exclusion fencing, water source systems, pruning, and propagation.

- Conduct maintenance at Clarno Arboretum.

Community Volunteers

- Conduct physical and manual maintenance of the orchard environment including vegetation management, pruning, and propagation.
- Provide draft content for interpretative materials.
- Establishment, maintenance, and all associated management of the preservation arboretum.

Anticipated Future Contributors

- Conduct physical and intellectual contributions to orchard planning and management tasks.
- Potentially contribute funding or other financial or in-kind support of orchard management objectives.

Conclusions

The heritage orchards located across CRNG are a unique piece of living history that preserve the spirit of agriculture and pioneer settlement in the American west. These orchards offer unique genetic and historical context but are facing threat of deterioration or elimination from environmental stress, wildfire risk, pest and disease pressure, and natural decline from sporadic management. Increased partnership and community involvement in recent years have created a rare opportunity to balance resources and achieve management goals for this valuable resource.

Initial stabilization and preservation actions have been taken, but a formal more long-term management direction is required to ensure sustainable efforts going forward. This interim orchard management plan offers a brief history, timeline, and management recommendations to support this process and allow for streamlined decision making between the USFS and partners.

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Appendix A

Condition Assessment

Good: Good growth with minor physical damage, defects, disease or insect damage, or minor dieback/deadwood.

Fair: with moderate physical damage, defects, disease or insect damage, or moderate dieback/deadwood.

Poor: General state of decline with little or no growth, major physical damage, defects, disease or insect damage, or major dieback or deadwood.

Dead: Greater than 90% of crown dieback with no growth.

Zone	Description	Inspection Factors
Zone 0: Orchard Floor	*Ground beyond dripline*	• Overgrown groundcover • Rodent holes • Gopher mounds • Grade disturbances • Encroaching juniper • Accumulated debris • Drainage issues
Zone 1: Root System	*Ground within dripline*	• Root damage • Accumulated debris • Loss of soil • Root suckers • # Juniper to remove • Average height to remove • Exposed roots
Zone 2: Trunk Base	*Intersection of roots with trunk*	• Loss of bark • Cavities • Fruiting bodies • Cracks or splits • Girdling • Cankers • Root suckers • Wildlife damage • Soil accumulation • Trunk flare buried
Zone 3: Main Trunk	*Trunk up to scaffold limbs*	• Unbalanced scaffolds • Moss / lichen cover • Pack rat nests • Decay or cavities

Zone	Description	Inspection Factors
		• Leaning trunk • Deadwood • Water sprouts • Loss of limbs
Zone 4: Canopy	*Scaffold limbs, branches, and foliage*	• Deadwood • Pests • Foliage discolored • Foliage curled • % live canopy • Diseases • Early leaf drop • Foliage sparse • Unbalanced canopy • Dieback of terminal shoots
Zone 5: Above Canopy	*Area above canopy*	• Encroaching vegetation • Over-shading